

Matter No. M11017

**In the Matter of an Application by Nova Scotia Power Incorporated
(NS Power) for approval of its Annual Capital Expenditure Plan
(ACE Plan) for 2023**

**EVIDENCE OF
JOHN D. WILSON
ON BEHALF OF
THE CONSUMER ADVOCATE**

Grid Strategies, LLC

MAY 25, 2023

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1 **I. Identification & Qualifications**

2 **Q: Mr. Wilson, please state your name, occupation, and business address.**

3 A: I am John D. Wilson. I am the Vice President of Grid Strategies, LLC, Bethesda, MD.

4 **Q: Summarize your professional education and experience.**

5 A: I received a BA degree from Rice University in 1990, with majors in physics and history, and
6 an MPP degree from the Harvard Kennedy School of Government with an emphasis in
7 energy and environmental policy, and economic and analytic methods. I have been
8 employed by Grid Strategies since 2023, and previously I performed similar duties as an
9 employee of Resource Insight.

10 Previously, I was deputy director of regulatory policy at the Southern Alliance for
11 Clean Energy for more than twelve years, where I was the senior staff member responsible
12 for SACE's utility regulatory research and advocacy, as well as energy resource analysis. I
13 engaged with southeastern utilities through regulatory proceedings, formal workgroups,
14 informal consultations, and research-driven advocacy.

15 My work has considered, among other things, the cost-effectiveness of prospective
16 new electric generation plants and transmission lines, retrospective review of generation-
17 planning decisions, conservation program design, ratemaking and cost recovery for utility
18 efficiency programs, allocation of costs of service between rate classes and jurisdictions,
19 design of retail rates, and performance-based ratemaking for electric utilities.

20 My professional qualifications are further summarized in Attachment 1.

21 **Q: Have you testified previously in utility proceedings?**

22 A: Yes. I have testified more than thirty times before utility regulators in California, Colorado,
23 Nova Scotia and the Southeast U.S., and appeared numerous additional times before various
24 regulatory and legislative bodies.

25 **Q: Have you previously testified in other proceedings before this Board?**

26 A: Yes. I have filed testimony in seventeen matters. I have also assisted the Consumer Advocate
27 in preparing comments and developing positions in numerous proceedings and stakeholder
28 processes.

1 **Q: On whose behalf are you testifying?**

2 A: My testimony is sponsored by the Nova Scotia Consumer Advocate.

3 **II. Introduction and Summary**

4 **Q: Please summarize NS Power’s application.**

5 A: NS Power is seeking Board “approval of 12 capital work orders with total project investment
6 of \$39.9 million and the 2023 capital routine program of \$126.0 million for an aggregate
7 total of \$165.9 million.”¹ Together with capital projects under \$1,000,000 and Point Aconi
8 projects that do not require NSUARB approval, carryover spending, capital routines, and
9 subsequent submittal items, NS Power’s overall 2022 capital budget amount is \$382.3
10 million.

11 If the forecast is fully realized, the \$382.3 million expenditure would be similar to
12 actual capital expenditures in 2019 and 2021, but lower than the unusually high \$540.2
13 million in 2022 expenditures.² The 2022 expenditures exceeded budget expectations by
14 \$8.6 million—despite spending only \$7.7 million out of the \$120 million forecast on the four
15 Eastern Clean Energy Initiative (ECEI) subsequent submittal projects.³ By far, the most
16 significant budget exceedance for 2022 is the provincial storm routine distribution capital
17 spending, which was \$108 million above forecast.⁴ These costs will be reviewed in the annual
18 Distribution Routines ATO application.

19 Some of the other key information that NS Power has submitted includes:

- 20 • A 2017–2022 Contingency Report (Appendix D);⁵
- 21 • Examples of cost minimization practices (Section 11.1.4 and Appendix E);⁶
- 22 • Examples of post-project reviews, as referenced in the 2020 ACE Plan Decision;⁷

¹ Exhibit N-1, *2023 ACE Plan*, p. 8, lines 18-20.

² *Id.*, p. 14, Figure 1.

³ Exhibit N-1, *2023 ACE Plan*, Appendix C, p. 5; Exhibit N-5, NSUARB RIR-6; Matter No. M10366.

⁴ Exhibit N-1, *2023 ACE Plan*, Figure 25, p. 50.

⁵ NSUARB, *2021 ACE Plan Order*, Matter No. M09920 (June 10, 2021), Order Paragraph 3.

⁶ *Id.*, Order Paragraph 4.

⁷ Exhibit N-3, NS Power response to CA IR-3(b); NSUARB, *2020 ACE Plan Decision*, Matter No. M09499 (June 25, 2020), p. 25

- 1 • Information describing the status of the Project Delivery Model (PDM) (Appendix F,
2 pp. 7-9);⁸ and
3 • Revisions to the Capital Expenditure Justification Criteria related to using a total cost
4 of ownership (TCO) analysis for all IT projects over \$1 million where an Economic
5 Analysis Model (EAM) is not provided (Appendix F, pp. 10-179).⁹

6 On the other hand, NS Power’s 2023 ACE Plan omits future forecast information that it has
7 normally provided, “including projections for future capital investments, directionally by
8 functional class and by spending program.”¹⁰

9 **Q: What is the purpose of your testimony?**

10 A: I have reviewed most of the issues identified by the Board as well as the specific projects that
11 NS Power seeks approval in its Annual Capital Expenditure Plan for 2023. Throughout my
12 testimony, I will give particular attention to two themes: the Board’s concerns about (a) cost
13 overruns on capital projects and (b) alignment of 2023 ACE Plan with its most recent IRP
14 analysis and more recent provisional and federal legislation.

15 **Q: What steps has the Board taken to address cost overruns?**

16 A: Cost overruns can and will occur because “unforeseen conditions and issues often arise in
17 capital construction projects.”¹¹ However, on average, cost overruns should be balanced by
18 cost savings. The Board has observed that NS Power has much more frequent and larger
19 cost overruns than projects under budget because NS Power has “inadequate ... capital cost
20 estimating/budgeting practices, inadequate cost minimization efforts, or a combination of
21 both.”¹² The Board has also observed that even when an ATO is not required, overspending
22 that may occur “does not require Board approval and goes to NS Power’s rate base upon
23 which the company earns a return.”¹³

24 In 2020, the Board expressed its intent to verify the adequacy of NS Power’s cost
25 minimization practices by:

⁸ NSUARB Decision, 2022 ACE Plan, Matter No. M10366 (June 9, 2022), Order Paragraphs 99-100, p. 41.

⁹ NSUARB Decision, 2022 ACE Plan, Matter No. M10366 (June 9, 2022), Order Paragraphs 204-206, p. 76.

¹⁰ Exhibit N-3, NS Power response to CA IR-2.

¹¹ NSUARB Decision, 2020 ACE Plan, Matter No. M09499 (June 25, 2020), p. 31.

¹² NSUARB Decision, 2021 ACE Plan, Matter No. M09920 (June 10, 2021), p. 24, para. 56.

¹³ NSUARB Decision, 2020 ACE Plan, Matter No. M09499 (June 25, 2020), pp. 31-32.

- 1 • Recognizing the “importance of adequate information being made available to satisfy
2 ratepayers and the Board that NS Power adheres to its mantra that cost minimization
3 is at the forefront of its activities;”
4 • Welcoming “NS Power’s willingness to do ‘internal post project reviews;” and
5 • Directing NS Power “to provide examples of cost minimization during execution and
6 construction from the prior year’s projects, with specific cost minimization being
7 fully described.”¹⁴

8 In its 2020 ACE Plan decision, the Board also indicated its concerns that there may be
9 “general issues with NS Power cost estimating practices, under-scoping of projects at the
10 original approval submission stage and/or use of inadequate project contingencies.”¹⁵ In its
11 2021 Decision, the Board observed that the opposite can also be true: it noted that some
12 examples of cost savings may not “represent examples of proactive cost minimization
13 practices by the company, but instead would be a result of NS Power simply overestimating
14 units/quantities when it prepared capital cost budget estimates.”¹⁶

15 Also in its 2020 ACE Plan decision, to verify the adequacy of NS Power’s budgeting
16 practices, the Board directed NS Power to:

- 17 • “Develop non-binding guidelines describing how it determines when a capital cost
18 estimate contingency amount is merited and at what level;”
19 • Track and file certain information regarding project budgets, costs, and
20 contingencies; and
21 • Provide information to “review the relationship between various capital
22 expenditures” related to thermal generation.¹⁷

23 In response, NS Power has updated its non-binding contingency guidelines following the
24 2021 stakeholder engagement.¹⁸ The Board directed further clarity on the application of
25 these methods in its 2022 ACE Plan decision.¹⁹

¹⁴ NSUARB, *2020 ACE Plan Decision*, Matter No. M09499 (June 25, 2020), p. 25. In 2021, the Board clarified that it wished the projects selected for cost minimization review need to be more defined to ensure that they vary in overall cost and asset type. NSUARB Decision, *2021 ACE Plan*, Matter No. M09920 (June 10, 2021), p. 32, para. 70.

¹⁵ NSUARB, *2020 ACE Plan Decision*, Matter No. M09499 (June 25, 2020), pp. 31-32.

¹⁶ NSUARB, *2021 ACE Plan Decision*, Matter No. M09920 (June 10, 2021), p. 35, para 74.

¹⁷ NSUARB, *2020 ACE Plan Decision*, Matter No. M09499 (June 25, 2020), pp. 33-37.

¹⁸ NS Power, *2021 ACE Plan Stakeholder Engagement Report*, Matter No. M09920 (October 1, 2021), , pp. 12-13. NS Power provided the current guidelines in Exhibit N-4, CA RIR-15, Attachment 1.

¹⁹ NSUARB, *2022 ACE Plan Decision*, Matter No. M10366 (June 9, 2022), pp. 64-65, paras. 163-164.

1 In its 2022 ACE Plan decision, the Board directed NS Power to provide a TCO for IT
2 projects over \$1 million when an EAM is not provided.²⁰

3 In its 2021 Decision, the Board also clarified its guidance with respect to internal post-
4 project reviews. The Board rejected NS Power’s proposed threshold of capital projects over
5 \$5 million in costs and observed “that cost minimization opportunities, as well as the
6 likelihood of project overspending, can vary across projects of varying sizes.”²¹ In its 2021
7 Stakeholder Engagement Report, NS Power agreed to also conduct such reviews for projects
8 between \$1 million and \$5 million that meet criteria addressing (i) new technology, (ii)
9 safety or environmental issue, (iii) schedule/budget over/underperformance, and (iv)
10 project manager recognition.²² In its 2022 testimony, NS Power further agreed to conduct
11 post-project reviews for sole-sourced and a selection of projects with budgets under \$1
12 million.²³

13 NS Power has also determined that its post project review template will be used to
14 track lessons learned, in response to the Board’s direction that NS Power implement the
15 Consumer Advocate’s recommendation for a “framework and reporting protocols for a
16 capital cost ‘lessons learned’ business practice.”²⁴ NS Power further agreed to include this
17 information in its annual capital program workshops.²⁵

18 In its 2022 ACE Plan Decision, the Board directed that many of these elements be
19 unified in NS Power’s Project Delivery Model (PDM). As the project management standard
20 guidance, the PDM should include practices for risk management, value engineering and
21 benchmarking to improve capital cost performance.²⁶

22 **Q: Please summarize your recommendations.**

23 A: The Board should encourage or direct NS Power to:

- 24 1. Engage directly with stakeholders during the modeling and analysis process for the
25 Eastern Clean Energy Initiative (ECEI) projects prior to filing applications. (Page 10)

²⁰ NSUARB, *2022 ACE Plan Decision*, Matter No. M10366 (June 9, 2022), p. 76, paras. 204-206.

²¹ NSUARB, *2021 ACE Plan Decision*, Matter No. M09920 (June 10, 2021), pp. 35-36, para 76.

²² NS Power, *2021 ACE Plan Stakeholder Engagement Report*, Matter No. M09920 (October 1, 2021), p. 4.

²³ Exhibit N-12, *2022 ACE Plan Rebuttal Evidence*, Matter No. M10366 (March 16, 2022), p. 26.

²⁴ NSUARB, *2021 ACE Plan Decision*, Matter No. M09920 (June 10, 2021), p. 38, para. 81.

²⁵ NS Power, *2021 ACE Plan Stakeholder Engagement Report*, Matter No. M09920 (October 1, 2021), p. 5.

²⁶ NSUARB, *2022 ACE Plan Decision*, Matter No. M10366 (June 9, 2022), p. 34, para. 82.

- 1 2. Recognize its obligation to plan prudently for approaching regulatory deadlines,
2 notwithstanding the 2022 rate case decision. (Page 11)
- 3 3. Accelerate and expand its investigation into applying dynamic line ratings (DLRs)
4 and other grid-enhancing technologies (GETs). (Page 13)
- 5 4. Bring forward evidence to allow a decision on whether the Mersey, Harmony, and
6 Roseway hydro systems, and potentially other facilities such as the Dargie Lake Dam
7 should be decommissioned, redeveloped, or maintained in a safe state for future
8 optionality. (Pages 15, 17, 21)
- 9 5. Either reassess its reliability strategies or seek a third-party review of its reliability
10 investments and programs, with results, including new projects or resource
11 reallocations, reported no later than the 2024 ACE Plan. (Page 20)
- 12 6. Address concerns regarding the incomplete status of certain studies required for the
13 Lequille Refurbishment project. (Page 21)
- 14 7. Continue to include the contingency directive data with its ACE Plan applications.
15 (Page 25)
- 16 8. Justify contingency costs as directed and agreed to and, if no such justification is
17 provided, require capital work orders to be revised and resubmitted prior to further
18 consideration. (Page 30)
- 19 9. Take actions the Board determines to be necessary to verify that NS Power is
20 fulfilling its commitments to implement the Project Delivery Model (PDM) in an
21 expeditious manner. (Page 34)
- 22 10. Follow through on creating processes to transfer lessons learned into broader
23 practice, such as consolidating tracking and reporting on both cost minimization
24 successes and post-project actionable recommendations, to ensure improvements in
25 cost minimization, schedule adherence, and risk management. (Page 38)

26 **III. Significant Areas of Risk in the 2023 ACE Plan**

27 **Q: What is NS Power’s forecast capital spending for 2024 through 2027?**

28 A: None is available, even an incomplete forecast. NS Power states that,

1 As noted in the 2023 ACE Plan, on November 9, 2022, Bill 212 was enacted in
2 the Nova Scotia Legislature, amending the Public Utilities Act, which has caused
3 unique circumstances and continued uncertainty around the Company’s future
4 capital investment plans. As a result, the Company’s ability to forecast future
5 capital investment plans over the typical 5-year period as displayed in prior ACE
6 Plans has been impacted and the 5-year capital forecast is continuing to be
7 developed at this time.²⁷

8 I am surprised that NS Power cannot even provide forecasts for certain types of capital
9 spending, such as customer/load driven and regulatory/compliance investments.²⁸

10 There are several deferred or unscheduled future projects that I wish to highlight as
11 representing cost, compliance or reliability risks. NS Power states that in its 2023 capital
12 investment plan, it has “increased the magnitude of capital investment related to customer
13 reliability.”²⁹ In Section IV, I will discuss NS Power’s customer reliability plans for the future
14 which appear to be negatively impacted by the uncertainty regarding what investments will
15 be included in the capital spending forecast.

16 The other projects that I view as representing cost, compliance or reliability risks
17 include the four deferred Eastern Clean Energy Initiative projects, the ECC Dynamic Line
18 Rating project, the Mersey Redevelopment project, and the Roseway Hydro System
19 Decommissioning project.

20 **A. Eastern Clean Energy Initiative Projects**

21 **Q: What is the Eastern Clean Energy Initiative (ECEI)?**

22 A: The ECEI is NS Power’s “plan to transition away from coal...and realize 80 percent
23 renewable energy in Nova Scotia by 2030.”³⁰ The four projects that were to be submitted in
24 2022 are now deferred.

- 25 • CO044391 (\$352 million): Some or all of the Atlantic Loop, “a series of transmission
26 expansion projects that would increase transfer capabilities between Hydro Québec
27 and New Brunswick (HVDC), and between New Brunswick to Nova Scotia (345kV

²⁷ Exhibit N-6, NSUARB RIR-1.

²⁸ Exhibit N-6, NSUARB RIR-2.

²⁹ NS Power, NSUARB RIR-3(a).

³⁰ Exhibit N-1, 2022 ACE Plan, Matter No. M10366, p. 8, lines 7-10; Exhibit N-5, NSUARB RIR-5, Matter No. M10366.

1 AC) ... [that] is anticipated to provide up to 550 MW of capacity and 2+ TWh of
2 renewable energy to NS Power.”³¹

- 3 • C0044392 (\$32 million): Conversion of “one existing coal-fired boiler to fire
4 primarily on natural gas, retaining the ability to fire on Heavy Fuel Oil (HFO) as a
5 secondary fuel,” either Point Tupper or Trenton 6. The submittal will not include a
6 potential second boiler conversion.³²
- 7 • C0044771 (\$83 million): Wind assets, including 350 MW from a provincial RFP and
8 up to 160 MW of “onshore wind energy in partnership with one or more Mi’kmaq
9 communities.”³³
- 10 • C0045132 (\$171 million): Up to 200 MW of battery energy storage system (BESS).³⁴

11 While the general outline of the ECEI is described by NS Power, it falls short of being a
12 “plan.” When complete, the ECEI plan will effectively replace components of the 2020 IRP.³⁵

13 **Q: How is NS Power planning to demonstrate the cost-effectiveness of the four**
14 **ECEI projects?**

15 A: This topic was discussed in the 2022 ACE Plan hearing, where Mr. Athas and I testified in
16 favor of updated IRP modeling to demonstrate the optimality of the four ECEI projects. NS
17 Power opposed “delaying project submittals pending updated 2020 IRP modeling,” in part
18 because of the “relatively short time the company has to meet the 2030 targets related to
19 coal generation and renewables.”³⁶

20 In response to the hearing testimony, the Board made the following statements:

- 21 • “[T]he purpose of an IRP is not to prescribe specific investments.”

³¹ Exhibit N-1, *2022 ACE Plan*, Matter No. M10366, p. 17, lines 10-11; p. 35, Figure 10. NS Power states that “portions” of the Atlantic Loop are included in C0044391, suggesting that NS Power may intend to bring further portions of the Atlantic Loop forward in further capital submittals. NS Power, *IRP Action Plan Update* (January 2022), Matter No. M08929, p. 16.

³² Exhibit N-1, *2022 ACE Plan*, Matter No. M10366, p. 35, Figure 10; Exhibit N-4, CA RIR-3(a), Matter No. M10366; Exhibit N-5, Matter No. M10366, NSUARB RIR-5.

³³ Exhibit N-1, *2022 ACE Plan*, Matter No. M10366, p. 35, Figure 10; Exhibit N-5, Matter No. M10366, NSUARB RIR-5; NS Power, *IRP Action Plan Update* (January 2022), Matter No. M08929, p. 47.

³⁴ Exhibit N-1, *2022 ACE Plan*, Matter No. M10366, p. 35, Figure 10; NS Power, *IRP Action Plan Update* (January 2022), Matter No. M08929, p. 43.

³⁵ NS Power disagrees with this plain description of how the projects relate to the IRP Action Plan. Instead, NS Power “disagrees with any suggestion that the four projects either displace components of the 2020 IRP or are investments which formed part of the IRP. That said, NS Power views the four ECEI projects as aligned with the 2020 IRP strategy.” NSUARB, *Decision on the Annual Capital Expenditure Plan for 2022* (June 9, 2022), Matter No. M10366, p. 70, para. 182.

³⁶ NSUARB, *Decision on the Annual Capital Expenditure Plan for 2022* (June 9, 2022), Matter No. M10366, p. 70, para. 185.

- 1 • “[T]he 2020 IRP forms an integral part of any capital works planning.”
- 2 • “The Board would, therefore, expect that there would be alignment between
- 3 [updated IRP modeling] and the [updated] IRP Action Plan ... and Roadmap.”
- 4 • “The Board agrees in principle that [updated modeling done in parallel with the
- 5 preparation and submittal of the four ECEI projects] could achieve the desired
- 6 result.”
- 7 • “The Board has cautioned NS Power about its concerns that time could
- 8 potentially be wasted if all the modeling is not done before submitting the
- 9 applications.”³⁷

10 In their descriptions of a “parallel” process (which remains a bit vague), it appears that NS
11 Power and the Board have accepted the recommendation I made in 2022 against evaluating
12 the four ECEI projects on a stand-alone basis, such as by using the Economic Analysis Model
13 (EAM).

14 **Q: Did the Board address your recommendation regarding stakeholder**
15 **engagement in the development of the ECEI project applications?**

16 A: No, the Board’s decision did not address that point. In the evidence I submitted in 2022, I
17 noted that the specific amounts or characteristics of ECEI-related resource investments
18 were subject to substantial discussion in the 2020 IRP. Of the four ECEI projects, NS
19 Power’s IRP team has shared more information about the status of the transmission project
20 and continued to engage around modeling practices related to reliability and wind
21 curtailments. Market data from the base rate procurement should help inform modeling to
22 determine the optimal level of wind resources. I continue to advise that the application
23 review process will be smoothed if NS Power engages directly with stakeholders during the
24 modeling and analysis process, rather than simply providing discovery responses that
25 explain model findings.

³⁷ NSUARB, *Decision on the Annual Capital Expenditure Plan for 2022* (June 9, 2022), Matter No. M10366, pp. 71-72, paras. 187-189.

1 **Q: What will be the consequences of deferring the four ECEI projects for**
2 **submission in 2024, or later?**

3 A: As noted above, in its 2022 ACE Plan Decision, the Board recognized that, “NS Power is
4 concerned about the relatively short time the company has to meet the 2030 targets related
5 to coal generation and renewables.”³⁸ One year later, time is even shorter.

6 NS Power appears to have made some progress on each of these projects as evidenced
7 by a total of \$9.4 million in capital spending on ECEI projects during 2022, for a total of
8 \$14.5 million spent to date.³⁹

9 At some point, the obligation to plan prudently for approaching regulatory deadlines
10 will compel NS Power to submit capital work orders in support of making the transition
11 away from coal and realizing 80 percent renewable energy in Nova Scotia by 2030. Should
12 the planning of those projects or the review process be constrained in any way by urgency,
13 an optimal decision may not be reached. The Board should remind NS Power that its
14 obligation to plan prudently remains unaffected by the 2022 rate case decision.

15 One has only to look at the Maritime Link project for an example of a failure to fully
16 explore all contingencies. In reviewing the history of the Maritime Link project for other
17 matters, it appeared to me that the 2013 application review gave surprisingly little
18 consideration to the software that has turned out to be such a crucial element in delaying
19 operation of the Labrador Island Link and delivery of energy over the Maritime Link.

20 Thus, I am even more concerned now that stakeholder engagement, if it occurs, will
21 be late in the process and that NS Power may merely go through the motions of consultation.
22 Given that NS Power has deferred the four ECEI projects to no earlier than 2024, it seems
23 that the Board has the opportunity to encourage NS Power to engage in meaningful
24 stakeholder engagement.

25 **B. ECC Dynamic Line Rating Project**

26 **Q: Please describe the ECC Dynamic Line Rating (DLR) Implementation project.**

27 A: NS Power describes it as follows:

³⁸ NSUARB, *Decision on the Annual Capital Expenditure Plan for 2022* (June 9, 2022), Matter No. M10366, p. 70, para. 185.

³⁹ Spending related to the reliability tie and Atlantic Loop began prior to 2022. Exhibit N-1, *2023 ACE Plan*, Appendix C, Tab R6, cells E18:F20 and F25.

1 The scope of the ECC Dynamic Line Rating (DLR) Implementation project is to
2 implement a system of line devices and associated software which can monitor
3 and relay real-time transmission line capacity to System Operators in addition to
4 detecting conditions which may impact capacity. This project is expected to
5 improve both situational awareness and condition monitoring, thereby
6 providing key indicators to expedite detection and response to adverse system
7 conditions (including inclement weather) and improve system stability.⁴⁰

8 Among the potential benefits of DLR projects are “potential capacity gains on [transmission]
9 lines [that may] reduce or prevent the need for curtailment that may otherwise be required
10 for reliable system operation.”⁴¹

11 **Q: Please summarize the history of the DLR project.**

12 A: This project goes back to at least 2009, when a transmission system report by SNC-Lavalin
13 included the following among its key findings.

14 Dynamic thermal ratings (using physical monitoring equipment where required
15 for specific limited transmission lines) can release more transfer capacity to
16 [accommodate] wind power on the existing transmission infrastructure.⁴²

17 In 2020, the Board rejected NS Power’s 2019 application for the DLR project.⁴³ Since
18 that decision, NS Power has continued technology research, “working towards preparation
19 of the next project submission,”⁴⁴ including “investigating the best approach to integrate this
20 initiative into the Control Centre Operations team as appropriate to maximize potential
21 benefits,” with a current implementation target in 2025.⁴⁵

22 The benefits of dynamic line ratings were also considered in Concentric Energy
23 Advisors’ dispatch study for NS Power conducted as an outcome of the 2018-2019 FAM
24 Audit.⁴⁶

⁴⁰ NS Power, CA RIR-7(a).

⁴¹ NS Power, CA RIR-7(a).

⁴² SNC-Lavalin ATP, *Transmission and System Operator Options for Nova Scotia*, prepared for Nova Scotia Department of Energy (December 2009), p. ii.

⁴³ NSUARB, *Decision on 2020 Capital Work Order* (April 14, 2020), Matter No. M09508.

⁴⁴ NS Power, CA RIR-7(b).

⁴⁵ NS Power, NSUARB RIR-9(a), p. 5.

⁴⁶ Concentric Energy Advisors, *FAM Dispatch Study* (February 10, 2022), Matter No. M09548, pp. 87-88.

1 **Q: How much effort has NS Power put into the DLR project since the 2019**
2 **application was turned down?**

3 A: Very little. Since 2020 Q3, NS Power’s actual spend has increased from \$224,445 to
4 \$286,278.⁴⁷

5 **Q: By failing to advance the DLR project, is NS Power potentially imposing costs**
6 **and risks on its customers?**

7 A: Yes. DLRs are just one of several so-called Grid-Enhancing Technologies (GETs), which also
8 include dynamic transformer ratings, advanced power flow controllers, and topology
9 optimization.⁴⁸ GETs installations are typically low-cost, high-impact projects, with the
10 opportunity to temporarily deploy GETs devices to resolve congestion while a new
11 transmission line is built, and then redeploy some devices elsewhere. A US Department of
12 Energy case study found that low-cost GETs could provide payback periods of 0-6 years (a
13 bit longer if a new substation is required), concluding that “relative to the Traditional
14 Upgrades, the GETs strategies are generally significantly less costly and inch toward the high
15 benefit established by traditional upgrades.⁴⁹

16 In NS Power’s present circumstances, it seems imprudent to not place greater
17 emphasis on GETs with their relatively low investment costs and suitability for addressing
18 wind integration and reliability concerns. In my view, the Board’s 2020 decision to turn
19 down the DLR project was justified because NS Power had not made it clear “why costs and
20 benefits of DLR methodology are not compared with any other feasible options, besides a
21 new transmission line.”⁵⁰

22 **Q: What is your recommendation?**

23 A: The Board should direct NS Power to accelerate and expand its investigation into applying
24 DLRs and other GETs in order to facilitate the recently procured base rate wind capacity on

⁴⁷ NS Power, *2021 ACE Plan*, Appendix C, Tab R2, Cell I135; NS Power, *2023 ACE Plan*, Appendix C, Tab R5, Cell F43.

⁴⁸ Transmission topology optimization software is used to control high voltage circuit breakers to more evenly distribute flow over the grid, increasing total transfer capacity. US Department of Energy, *Grid-Enhancing Technologies: A Case Study on Ratepayer Impact* (February 2022), pp. 4-8.

⁴⁹ US Department of Energy, *Grid-Enhancing Technologies: A Case Study on Ratepayer Impact* (February 2022), p. x.

⁵⁰ NSUARB, *Decision on ECC – Dynamic Line Rating Implementation 2020 Capital Work Order* (April 14, 2020), Matter No. MO9508, p. 2.

1 its system, as well as potential additional resources that may be developed as part of the
2 ECEI projects.

3 **C. Mersey Redevelopment project**

4 **Q: Please summarize the status of the Mersey Redevelopment project.**

5 A: The Mersey Hydro System Re-Development project is now in deferred status. In the 2022
6 ACE Plan, NS Power included the Mersey project as a subsequent submittal project, as it
7 had been in the 2017 ACE Plan and each subsequent plan. Even though NS Power has
8 previously represented that the project is within one year of submission, NS Power now
9 states that it “is not able to provide a proposed filing date.”⁵¹

10 The project is now estimated to cost more than \$215 million.⁵² For comparison, NS
11 Power estimated its decommissioning cost to be \$227 million for its 2020 IRP modeling
12 analysis.⁵³

13 **Q: By continuing to delay a decision on the future of the Mersey system, is NS**
14 **Power potentially imposing costs and risks on its customers?**

15 A: Yes. According to NS Power, there will be increased costs, more frequent outages (with
16 resulting system production costs), and reduced reliability provided by its generation units.
17 NS Power states the following:

18 With the deferral of this project there are additional risk mitigation strategies
19 that are required to sustain the safe, environmentally complaint operation of the
20 Mersey Hydro System. These additional risk mitigation strategies will lead to
21 increased maintenance and sustaining capital costs. NS Power has included
22 additional sustaining capital costs within the Hydro Interval Plan to reflect the
23 deferral of this project.⁵⁴

24 Furthermore, in response to comments regarding the impact of project delays on the
25 reliability of the Mersey system, NS Power stated,

⁵¹ NS Power, NSUARB RIR-9(b), p. 2.

⁵² NS Power, NSUARB RIR-9(c), p. 2.

⁵³ NS Power, *2020 Integrated Resource Plan* (November 27, 2020), Appendix E, p. 59.

⁵⁴ NS Power, NSUARB RIR-9(d-e).

1 NS Power agrees with the CA’s comment that there is a benefit to assessing the
2 elevated outage potential for the Mersey system. Based on this, the modeling
3 representation for the Mersey system has been updated by imposing a 15%
4 DAFOR, which will simulate randomized system outages, impacting energy
5 production of the hydro system and resulting system production costs. NS Power
6 has also reduced the ELCC of the Mersey system from 95% to 85% for the final
7 modeling results.⁵⁵

8 **Q: What is your recommendation?**

9 A: For at least the past seven years, it has been clear that redevelopment of the Mersey hydro
10 system is, at best, of marginal benefit to customers. That benefit appears to be mainly in the
11 form of deferring the considerable decommissioning costs and risks for some decades. Now
12 it is clear that the continued study of this project, perhaps in vain hope of avoiding taking
13 the system out of service, is beginning to impose costs on today’s customers.

14 The Board should consider whether NS Power’s approach to managing the Mersey
15 hydro system is cost-effective and in the interests of customers. Whether NS Power
16 decommissions, redevelops, or maintains the project in a safe state for future optionality,
17 the decision should be intentional and provide the Board with an opportunity for review.
18 Otherwise, urgent and necessary expenses may be required on short notice without an
19 opportunity for a more deliberate decision.

20 **D. Roseway Hydro System Decommissioning**

21 **Q: Please summarize the status of work on the Roseway Hydro System.**

22 A: NS Power reports \$120,159 in unapproved spending on the Roseway Site Stabilization
23 project (CI C0050414) for work that began in Q4 2022. The Roseway Hydro System has a
24 0.7 MW powerhouse that has not generated electricity since 2009.⁵⁶ The Board directed that
25 Roseway hydro system assets be written off over five years, beginning January 1, 2018.⁵⁷

⁵⁵ NS Power, *Responses to Stakeholder Comments: Updated Evergreen IRP Assumptions and Draft Modeling Results* (March 24, 2023), Matter No. 10504, p. 9.

⁵⁶ Exhibit N-4, *Hydro Asset Study* (December 21, 2018), Matter No. M08984, p. 42; Appendix B, Hatch, *Hydro System Decommissioning Cost Estimate for NSP’s Control Structures* (December 12, 2018), p.10. In conflict with that source, NS Power states that the system has not operated since 2012 in response to an information request. NS Power, CA RIR-8(a).

⁵⁷ NSUARB, *Harmony Hydro System Directive* (June 26, 2018), Matter No. M08358, p. 2.

1 According to NS Power’s 2018 Hydro Asset Report, decommissioning costs are
2 estimated to be about \$4.6 million (\$2018), consisting primarily of removal costs.⁵⁸ In
3 support of that estimate, a report on potential archaeological costs only identifies a small
4 amount of reconnaissance costs, with no shovel testing or excavation costs. However, this
5 area is reported to have a “High Potential for impacting archaeological resources” based on
6 “previous background research and archaeological potential monitoring.” Another cited
7 assessment report represents the area as exhibiting “Low Potential for archaeological
8 resources.”⁵⁹ It is unclear why these conflicting assessments led to a relatively low forecast
9 for archaeological-related costs.

10 NS Power describes the ongoing Roseway Site Stabilization project (CI C0050414) as
11 follows:

12 In August 2022, NS Power engaged a consultant to provide engineering
13 consulting services in support of future investment decisions related to the
14 Roseway Hydro System. The ongoing preliminary engineering includes updating
15 capital cost estimates for redevelopment and decommissioning options. The
16 benefits of the project include minimizing risk associated with deteriorating
17 assets on site and complying with DFO’s direction with respect to fish passage
18 and fish habitat.⁶⁰

19 The project is currently in the preliminary design phase and has not yet reached “alignment
20 on the project objectives ... with DFO, NSE and the Mi’kmaq.”⁶¹

21 **Q: Do you have any concerns about work on the Roseway hydro system?**

22 A: Yes. NS Power has a poor track record recently with respect to managing costs on hydro
23 projects involving the potential for civil and archaeological work, such as the Gaspereau and
24 Tuskett projects.⁶²

⁵⁸ It is unclear how this \$4.6 million is supported by the studies by Hatch (Appendix B) and Yates (Appendix C), as the separate costs included in those studies total more than \$5 million. Furthermore, the Hatch report relied on “existing work performed” for the Roseway system, but the source of that estimate is not further explained (e.g., the scope and data are not specified). Exhibit N-4, *Hydro Asset Study* (December 21, 2018), Matter No. M08984, Appendix B, p. 10, 14; Appendix C, JB Yates Engineering Ltd., *Site Decommissioning Estimate Summary for Asset Retirement Obligations (ARO) Study* (December 19, 2018), p. 98.

⁵⁹ Exhibit N-4, *Hydro Asset Study* (December 21, 2018), Matter No. M08984, Appendix F, Boreas Heritage Consulting Inc., *Hydro Asset Archaeology Study Costing Document* (December 2018), p. 78.

⁶⁰ Exhibit N-3, CA RIR-8(a).

⁶¹ Exhibit N-3, CA RIR-8(c-e).

⁶² The Tuskett Falls Main Dam project has now spent \$58 million as compared to the approved amount of \$19 million, with the ATO application deferred to at least 2024. Exhibit N-6, NSUARB RIR-20.

1 Furthermore, based on my review of documents related to the Harmony hydro system,
2 it does not appear that NS Power has a clear plan for managing and decommissioning either
3 the Harmony or the Roseway hydro systems. In 2017, NS Power received Board approval
4 for the Harmony Stabilization project (CI 38931). The Harmony hydro system also has a
5 history of a 0.7 MW powerhouse and the 2017 project resulted in partially decommissioning
6 of the system at a cost of \$0.8 million.⁶³ In that application, NS Power provided a
7 decommissioning cost estimate of \$11.7 million.⁶⁴ However, the 2018 Hydro Asset Study
8 estimated decommissioning costs for the Harmony hydro system to be \$5.4 million.⁶⁵ It is
9 unclear why these assessments conflict.

10 Based on my review of the 2017 Harmony Stabilization project, it appears that such
11 projects are required because assets that are disused for a decade or more may deteriorate
12 and present both the public and NS Power personnel with a safety risk. There could be other
13 concerns, such as impacts on fisheries. It also appears that NS Power has delayed a
14 commitment to full decommissioning of either hydro system because of the potential that it
15 may become economic to redevelop the hydro systems to supply renewable energy.

16 **Q: What is your recommendation?**

17 A: The Board should consider whether NS Power’s approach to managing these hydro systems
18 is cost-effective and in the interests of customers. Whether NS Power decommissions,
19 redevelops, or maintains the projects in a safe state for future optionality, such decisions
20 should be intentional and provide the Board with an opportunity for review. Otherwise,
21 urgent and necessary expenses may be required on short notice without an opportunity for
22 a more deliberate decision.

23 **IV. Reliability Investments**

24 **Q: What has NS Power reported in terms of reliability performance standards?**

25 A: For NS Power’s two key system reliability performance standards, as shown in Figures 49
26 and 50 of the 2023 ACE Plan,⁶⁶ NS Power’s performance has worsened over the past two

⁶³ NSUARB, *Approval of 2017 Capital Work Order* (February 15, 2018), Matter No. MO8358, p. 2.

⁶⁴ Exhibit N-2, NSUARB RIR-7(d), Matter No. MO8358.

⁶⁵ Exhibit N-4, *Hydro Asset Study* (December 21, 2018), Matter No. MO8984, p. 32.

⁶⁶ Exhibit N-1, *2023 ACE Plan*, p. 85.

1 years, even after removing major and extreme events from the data. With major and extreme
2 events included, 2022 was the worst year over the past ten years.

3 In these past two years, NS Power did not meet performance standards for either the
4 System Average Interruption Duration Index ("SAIDI") or the System Average Interruption
5 Frequency Index ("SAIFI") measures.⁶⁷

6 **Q: Does NS Power acknowledge that its system reliability trends are not positive?**

7 A: Yes. In its 2021 and 2022 ACE plans, NS Power stated, "The 10 year trend shows overall
8 sustainment or only small deterioration of reliability for customers despite challenging
9 weather conditions in recent years."⁶⁸ In the 2023 ACE Plan, NS Power revised this sentence
10 to read, "The 10 year trend shows the impact of SEDs and overall challenging weather
11 conditions in recent years."⁶⁹

12 NS Power acknowledges that, "the overall SAIFI and SAIDI performance in Figures 49
13 and 50 do show poorer performance in 2021 and 2022 compared with 2020."⁷⁰

14 **Q: To what does NS Power attribute worsening system reliability?**

15 A: NS Power attributes worsening system reliability to "prevailing environmental conditions,
16 including the added stresses of high winds and icing events" which have a "strong influence
17 on overall performance even outside ... [the] high number of significant local and provincial
18 weather events."⁷¹

19 Notably, NS Power found that in 2022, Nova Scotia experienced the highest "number
20 of hours of gusts greater than 80 km/h ... since at least 1994."⁷² Considering these and other
21 trends, "NS Power anticipates that the impacts of a changing climate over the medium and
22 long term will result in increasing weather risks for the system that must be mitigated."⁷³

⁶⁷ NS Power, *2021 Performance Standards Annual Report*, Figure 2, p. 10; NS Power, *2021 Performance Standards Annual Report*, Figure 2, p. 16.

⁶⁸ Exhibit N-1, *2021 ACE Plan*, Matter No. M09920, p. 136; Exhibit N-1, *2022 ACE Plan*, Matter No. M10366, p. 155.

⁶⁹ Exhibit N-1, *2023 ACE Plan*, p. 84.

⁷⁰ Exhibit N-3, CA RIR-16(a).

⁷¹ Exhibit N-3, CA RIR-16(a).

⁷² Exhibit N-1, *2023 ACE Plan*, p. 93.

⁷³ Exhibit N-1, *2023 ACE Plan*, p. 93.

1 **Q: How is NS Power adjusting its investment strategy to mitigate for increasing**
2 **weather risks?**

3 A: It is not clear that NS Power is making any substantial changes to its capital or operational
4 practices to drive material improvements in system reliability, whether or not related to
5 weather conditions such as high winds and icing events. In response to an information
6 request on this topic, NS Power responded as follows.

7 NS Power continues to identify, evaluate, and implement opportunities for
8 targeted initiatives and capital investments to mitigate outage risk. Some notable
9 initiatives completed and ongoing in recent years designed to address reliability
10 include:

- 11 • Climate Adaptation Planning⁷⁴
- 12 • Enhanced Vegetation Condition Assessment
- 13 • Work and Asset Management Project
- 14 • Distribution SCADA
- 15 • Additional Dynamic Protective Devices

16 These new and innovative approaches are combined with traditional capital
17 investments designed around a risk-based asset management model to
18 effectively support improving reliability in targeted areas.⁷⁵

19 It seems to me that NS Power’s focus is on continuation rather than adjusting to changing
20 conditions. This impression is formed from NS Power’s descriptions of its reliability
21 investments as intended to “sustain reliability” since at least the 2021 ACE Plan.⁷⁶

22 For 2024, NS Power may make “an incremental increase in reliability investment,
23 particularly in enhanced vegetation management to mitigate tree contacts which are one of
24 the leading causes of outage impacts.”⁷⁷ Again, this seems to be more of the same.

25 **Q: Do you view this effort to improve reliability as sufficient?**

26 A: No. While I agree that NS Power should continue to use its risk-based decision-making
27 approach, it may be time for a strategic re-assessment. The considerable investments over
28 the past several years in right-of-way widening, vegetation management, and other

⁷⁴ This appears to be a reference to project CO020783, AMO Climate Change Management System. The earliest reference I can find to this project is in the 2021 ACE Plan, where it is simply listed. The scope and significance of this project is unclear. Exhibit N-1, *2021 ACE Plan*, Matter No. MO9920, Appendix B.

⁷⁵ Exhibit N-3, CA RIR-16(e).

⁷⁶ Exhibit N-1, *2021 ACE Plan*, Matter No. MO9920, pp. 139, 142, 150; Exhibit N-1, *2023 ACE Plan*, pp. 87, 91, 94, 97.

⁷⁷ Exhibit N-3, CA RIR-16(e).

1 measures have not resulted in *increased* reliability and resilience during major events and
2 storms.

3 As referenced in the 2023 ACE Plan, the Board directed NS Power to monitor and
4 report on its efforts to improve its reliability performance in its 2013, 2015, and 2017 ACE
5 Plan proceedings. Clearly more is needed than simply a focus on monitoring and reporting.
6 I recommend that the Board either direct NS Power to reassess its reliability strategies or,
7 considering its response to prior directives, encourage NS Power to seek a third-party review
8 of its reliability investments and programs. The results of such assessments, including new
9 projects or resource reallocations, should be reported back to the Board no later than the
10 2024 ACE Plan.

11 **V. Comments on Other Capital Work Orders**

12 **Q: What other capital work orders do you wish to call to the Board's attention?**

13 A: In my review of the 2023 ACE Plan, I identified two other projects that merit the Board's
14 attention as explained below.

15 **A. *Lequille Refurbishment***

16 **Q: Please summarize the Lequille Refurbishment Project.**

17 A: The 11 MW Lequille hydro system includes three storage reservoirs and a single powerhouse.
18 The proposed project would refurbish the Lequille power canal embankments, replace the
19 powerhouse intake gate and hoist, and replace the tailrace gate and retaining structure.

20 **Q: Did the 2020 IRP find that the Lequille hydro system is likely to be cost 21 effective?**

22 A: Yes. The 2020 IRP found that the costs to decommission the Lequille hydro system and
23 replace it with alternative resources would be \$72 million over a 40-year time horizon
24 compared to a \$10 million cost of sustaining operations.⁷⁸ While the \$7.0 million cost of the
25 proposed project appears to indicate that the 40-year sustaining operations cost of \$10
26 million may have been too low, nonetheless it appears that the cost of replacement resources

⁷⁸ NS Power, *2020 Integrated Resource Plan*, p. 64.

1 for the Lequille hydro system substantially exceeds current and forecast costs required to
2 sustain operations.

3 **Q: Do you have any concerns about the project?**

4 A: I have two concerns. Neither concern calls for the Board to reject NS Power’s proposal, but
5 the Board may wish to provide further direction to NS Power on the following two points.

6 The main concern I have is that certain studies required for a class 3 cost estimate do
7 not appear to be complete for the Lequille Refurbishment. According to the project cost
8 estimate input checklist and maturity matrix, the topography & bathymetry study and the
9 geotechnical investigation remain partially at the preliminary classification, with some work
10 apparently “defined.”⁷⁹

11 I am also concerned that the project does not discuss the future of the Dargie Lake
12 Dam, which “has very little economic value for hydroelectric generation and is not currently
13 being operated as a reservoir for the Lequille Hydro System.”⁸⁰ According to AMEC’s *2011*
14 *Dam Safety Review*,

15 The condition of the [Dargie Lake] dam is poor and is deteriorating; NSPI should
16 decide whether to continue maintaining the dam or decommission it. The dam is
17 not currently being used to hold back water. The gate structure is not in service.

18 The concrete spillway and sluiceway were in poor condition.⁸¹

19 Currently the Dargie Lake Dam’s sluice gate is open and water in the lake is free flowing.
20 There are no residences downstream.⁸² There is not any evidence regarding the cost to
21 maintain the structure. NS Power and the Board should determine whether the facilities
22 should be decommissioned or simply allowed to deteriorate.

23 **B. Lingan Heavy Oil Tank Refurbishment**

24 **Q: Please summarize the Lingan Heavy Oil Tank Refurbishment project.**

25 A: The heavy fuel oil (HFO) tank is essential to Lingan Generating Station operations. In order
26 for operation of the Lingan units to continue, the tank must be inspected by sometime in

⁷⁹ Exhibit N-1, *2023 ACE Plan*, p. 137 (CI0012838, p. 13).

⁸⁰ Exhibit N-6, NSUARB RIR-72, Attachment 1, p. 27.

⁸¹ Exhibit N-6, NSUARB RIR-72, Attachment 1, p. 178.

⁸² Exhibit N-6, NSUARB RIR-72, Attachment 1, p. 91.

1 2023. NS Power deferred the approved project from 2021 due to labor shortages and higher
2 priorities for work to be completed on HFO tanks at Trenton and Tufts Cove.⁸³

3 The spending history on the project does not indicate that the project is over budget.

4 **Q: Do you have any comments on this project?**

5 A: My concerns about the project were mostly addressed in the response to the information
6 request. I call this project to the Board's attention because the project schedule is now
7 critical to the reliability of the Lingan units. Should there be any unexpected issues or delays,
8 the prior decisions to reschedule the work have left little room for error.

9 **VI. Cost Minimization Practices**

10 **A. Contingency Report**

11 **Q: What trend is shown by the contingency report (Appendix D)?**

12 A: NS Power summarizes its results as follows:

13 While the number of projects over spent by more than 30 percent slightly exceeds
14 what can be expected from a portfolio of projects with Class 3 estimates (10
15 percent of projects over-spent by 30 percent or more), the trend is continuing in
16 a positive direction and NS Power's performance is approaching the expected
17 range.⁸⁴

18 While this text is in reference to Figure 76 in the 2023 ACE Plan, NS Power provided an
19 updated table in response to a request for the data to be presented in compliance with the
20 Board's directive, as shown in Figure 1.

⁸³ Exhibit N-3, CA RIR-14.

⁸⁴ Exhibit N-1, 2023 ACE Plan, p. 116.

1 **Figure 1: NS Power’s Summary of Appendix D Data**⁸⁵

Year	Total # of projects submitted for Board approval	Percentage of projects under-spent by greater than 20%	Percentage of projects with total spending between -20% and +30% of budget	Percentage of Projects over-spent by greater than 30%
2015	1	0%	0%	100%
2016	7	0%	29%	71%
2017	109	6%	69%	26%
2018	101	13%	69%	18%
2019	77	9%	84%	6%
2020	13	15%	85%	0%
2021	3	33%	67%	0%
2022	3	67%	33%	0%
All Years	314	10%	72%	18%

2
3 In addition to the trends highlighted by NS Power, I reviewed two further trends, as
4 shown in Table 1. First, I reviewed the total variance by year of project submission. Second,
5 I reviewed the trend by level of project variance. In both cases, I focused on projects
6 submitted for Board approval from 2017 to 2020, as projects with earlier and later dates
7 reflect just a small sample of those year’s submissions. Overall, I concur with NS Power’s
8 observation that the trend appears to be in a positive direction, but it is too early to conclude
9 that NS Power is approaching the expected range.

10 **Table 1: Project Variance by Year of Submission**⁸⁶

Year	Total # of Projects Submitted for Board Approval	Total Variance	Total	Projects Under-Spent by Greater than 20%	Projects with Total Spending from -20% to +30% of Budget	Projects Over-Spent by Greater than 30%
2017	109	\$15,443,608	12%	-31%	4%	66%
2018	101	\$7,298,472	7%	-33%	5%	98%
2019	77	\$1,708,659	2%	-30%	2%	67%
2020	13	-\$5,468,772	-11%	-84%	2%	0%

11
⁸⁵ Exhibit N-6, NSUARB RIR-65(d).

⁸⁶ Compiled from Exhibit N-1, 2023 ACE Plan, Appendix D.

1 **Q: Why is it too early to conclude that NS Power is approaching the expected**
2 **range?**

3 A: The observed trend is very brief and the data are subject to a selectivity bias. There are only
4 four years in which a representative number of projects are reported as having reached the
5 point of complete costs, which occurs some months after the in-service date. And even
6 among those years, only a small portion of projects submitted in 2020 have complete costs.
7 A meaningful trend will require more data. The 2017–2022 trend may look different from
8 the perspective of 2026 than it does today.

9 Furthermore, the projects with substantial over-spend are likely to be delayed. So I
10 would expect annual variances to be small when only an initial few projects are completed,
11 but to grow as more complex and delayed projects are completed. This will be especially
12 evident when projects with massive overspending, such as the Tuskett Falls Main Dam, are
13 completed.

14 Another factor that needs to be examined is the effect of contingency amounts on
15 variances, particularly when more projects submitted beginning in 2021 are completed.
16 Projects submitted in 2021 were the first that could have been affected by the non-binding
17 contingency guidelines. This effect is likely to be larger in 2022 and 2023 as practices related
18 to those guidelines were clarified through both revision (in August 2021) and through
19 internal training and experience.

20 Ideal budgeting would result in all projects having final costs that are somewhere
21 between the budgeted amount without contingency and the budget including contingency.
22 That is, of course, unrealistic and not predicted by the AACE cost estimation practices relied
23 upon in the guidelines.

24 If, over time, a high degree of over-spending continues to be evident, that will reflect
25 either poor budgeting or poor cost-minimization practices. I look particularly at the trends
26 for projects with high variance (e.g., over 30% above budget) to see evidence of these
27 problems. With the caveats regarding limited data in mind, this is where I see the most
28 positive trends in the data provided in Appendix D.

29 It is also possible that over time, NS Power may demonstrate costs that are, overall,
30 under budget. That result could indicate highly effective cost minimization practices, or it
31 could indicate a tendency to pad the budget or contingency in order to influence the ultimate
32 outcome. I have not found any evidence of this practice, but would look particularly at the

1 trend in the variance for projects that are not outliers, that is projects within the -20% to
2 +30% range. If the annual variance in costs for these projects dips below 0%, that would
3 suggest that further investigation is needed to determine whether or not this is due to
4 effective cost minimization practices. The initial trends in the data suggest that this trend is
5 also evident.

6 **Q: What are your reactions to the trends you have described?**

7 A: First, I recommend that the Board continue to direct NS Power to include the contingency
8 directive data with its ACE Plan applications. The data will become more useful over time.

9 Second, in the following subsections, I will discuss several aspects of the budgeting
10 and project management process that provide context for the trends I have described,
11 including recommendations to maintain or increase Board attention to these issues.

12 **B. Application of Non-Binding Contingency Guidelines**

13 **Q: What commitments or directives did you review regarding NS Power’s**
14 **application of the non-binding contingency guidelines?**

15 A: In its decision on the 2022 ACE Plan, the Board found merit in the suggestions I made
16 regarding improvements to the guidelines, although it did not order changes “given their
17 non-binding nature.” Specifically, the Board agreed that the expected accuracy of a cost
18 estimate should not inform the determination of contingency amounts. The Board directed
19 NS Power to provide greater clarity on how it arrives at contingency amounts.

20 This direction was in addition to NS Power’s agreement to include the following
21 documents with every capital work order and application.⁸⁷

- 22 • Project maturity classification checklist
- 23 • Statement of the basis for the contingency guidelines including, as applicable:
 - 24 a. Predetermined guidelines – reference to or statement of documented basis
 - 25 for use of a standard “single contingency” or other referenced practice
 - 26 b. Subject matter expert judgement – documented reasons for the
 - 27 determination, including a supporting risk register
 - 28 c. Other, more technical methods - Supporting analysis as described in the
 - 29 Contingency Guidelines

⁸⁷ NSUARB, *2022 ACE Plan Decision*, Matter No. M10366 (June 9, 2022), p. 61, paras. 150-151.

1 Context for the level of detail that should be supplied in the statement of basis can be
2 referenced to NS Power’s commitment in its 2021 ACE Plan Rebuttal Evidence, as follows:

3 As such, NS Power utilizes expert judgment as part of the Company’s project
4 management practices in selecting appropriate contingency amounts, as
5 required, and further to the AACE Recommended Practices. However, NS Power
6 will, when applicable, elaborate on its use of expert judgment (whether internal
7 subject matter experts or third-party subject matter experts) when used to
8 determine contingency within capital work order description pages.⁸⁸

9 **Q: Has NS Power provided greater clarity on how it has implemented its non-**
10 **binding contingency guidelines?**

11 A: NS Power’s 2023 ACE Plan does not include any discussion that provides more clarity on
12 implementation of the non-binding contingency guidelines.⁸⁹

13 **Q: Has NS Power provided a project maturity classification checklist with every**
14 **capital work order included in the 2023 ACE Plan?**

15 A: Yes. The addition of this checklist provides clarity regarding the basis for the project
16 maturity and a reference point for future review, should it be required.

17 **Q: Has NS Power included a statement of the basis for the contingency with**
18 **supporting evidence in each capital work order included in the 2023 ACE Plan?**

19 A: No. None of these capital work orders provide evidence that explain why the contingency
20 value is reasonable. As shown in Table 2, the twelve capital work orders rely on “expert
21 judgement and predetermined guidelines” as the basis for contingencies of 10% or 15%, with
22 one exception. These statements lack any elaboration on the use of expert judgement or
23 documentation referenced as predetermined guidelines, such as a supporting risk register.

24 In seven cases, a phrase such as “including greater uncertainty for actual site
25 conditions” is added to the standard language. It is unclear what “greater uncertainty” may
26 refer to (greater than what?), since the resulting contingency may be either 10% or 15%.

27 For one project, the contingency and management reserve was determined using a
28 simulation analysis. However, the referenced simulation analysis is not included or further
29 described, so it is impossible to judge whether the outcome is reasonable.

⁸⁸ Exhibit N-9, *NS Power 2021 ACE Plan Rebuttal Evidence*, Matter No. M09920, p. 29.

⁸⁹ The guidelines are only briefly referenced. Exhibit N-1, *2023 ACE Plan*, pp. 116-117.

1 **Table 2: Statement of Basis for Contingency**

Project Number	Project	Statement of Basis for Contingency
CI C0012838	Lequille Canal Dyke, Gates and Tailrace Refurbishment	Contingency [14%] and Management Reserve [4%] determined using simulation analysis. Main risks that require contingency include civil materials and contracts. These risks are well understood. The project is based on a Class 3 estimate. The management reserve is required to cover unknowns mainly related to civil works (water management, unknown material findings, supply and pricing changes due to geopolitical conditions). ⁹⁰
CI C0051134	TUC2 L-o Blade Replacement	Contingency [10%] determined using a combination of internal subject matter expert judgment and predetermined guidelines which have been gained over many years, including greater uncertainty for actual site conditions. Risks are well understood based on past experience. ⁹¹
CI C0051135	TUC2 Turbine Valves Refurbishment	Contingency [15%] determined using a combination of internal subject matter expert judgment and predetermined guidelines which have been gained over many years, including greater uncertainty for actual site conditions. Risks are well understood based on past experience. ⁹²
CI C0041506	LM6000 191-253 Major Engine Refurbishment	Contingency [30%] determined using a combination of internal subject matter expert judgment and predetermined guidelines which have been gained over many years, including greater uncertainty for unique site conditions. Risks are well understood based on past experience. ⁹³
CI C0029682	VJ2 Generator Replacement	Contingency [10%, 15% on materials] determined using a combination of internal subject matter expert judgment and predetermined guidelines which have been gained over many years, including greater uncertainty for unique site conditions. Risks are well understood based on past experience. ⁹⁴
CI C0041788	L6516 Replacements and Upgrades Phase2	Contingency [15%] determined using a combination of internal subject matter expert judgment and predetermined guidelines which have been gained over many years, including greater uncertainty for actual site conditions. Risks are well understood based on past experience. ⁹⁵
CI C0055539	10H-T1 Transformer Replacement	Contingency [15%] determined using a combination of internal subject matter expert judgment and predetermined contingency guidelines. Risks are well understood based on past experience. ⁹⁶
CI C0052299	2023/2024 Steel Tower Life Extension	Contingency [10%] determined using a combination of internal subject matter expert judgment and predetermined contingency guidelines. Risks are well understood based on past experience. ⁹⁷
CI C0055796	2023 EHV Breaker Replacements	Contingency [10%] determined using a combination of internal subject matter expert judgment and predetermined contingency guidelines. Risks are well understood based on past experience. ⁹⁸

⁹⁰ Exhibit N-1, 2023 ACE Plan, Capital Work Order CI 0012838, p. 6.

⁹¹ Exhibit N-1, 2023 ACE Plan, Capital Work Order CI C0051134, p. 4.

⁹² Exhibit N-1, 2023 ACE Plan, Capital Work Order CI C0051135, p. 4.

⁹³ Exhibit N-1, 2023 ACE Plan, Capital Work Order CI C0041506, p. 4.

⁹⁴ Exhibit N-1, 2023 ACE Plan, Capital Work Order CI C0029682, p. 4.

⁹⁵ Exhibit N-1, 2023 ACE Plan, Capital Work Order CI C0041788, p. 4.

⁹⁶ Exhibit N-1, 2023 ACE Plan, Capital Work Order CI C0055539, p. 4.

⁹⁷ Exhibit N-1, 2023 ACE Plan, Capital Work Order CI C0052299, p. 4.

⁹⁸ Exhibit N-1, 2023 ACE Plan, Capital Work Order CI C0055796, p. 4.

Project Number	Project	Statement of Basis for Contingency
CI Co055696	L5031 Replacement and Upgrades Robinson Corner Tap	Contingency [15%] determined using a combination of internal subject matter expert judgment and predetermined guidelines which have been gained over many years, including greater uncertainty for actual site conditions. Risks are well understood based on past experience ⁹⁹
CI Co052654	L5541 Water Crossing Upgrades	Contingency [15%] determined using a combination of internal subject matter expert judgment and predetermined guidelines which have been gained over many years, including greater uncertainty for actual site conditions. Risks are well understood based on past experience ¹⁰⁰
CI Co050836	2023 Padmount Replacement Program	Contingency [10%] determined using a combination of internal subject matter expert judgment and predetermined contingency guidelines. Risks are well understood based on past experience. ¹⁰¹

1

2 **Q: Are there any projects in which NS Power has elaborated on the use of expert**
3 **judgement in determining contingency?**

4 A: In response to a 2021 information request, NS Power identified three projects that it stated
5 “will incorporate and elaborate on the use of expert judgement in determining
6 contingency.”¹⁰² One of those projects, the Mersey Redevelopment project, has been
7 deferred.

8 For another of the three projects, NS Power stated that the project justification “does
9 not reference a specific use of expert judgment in the application.”¹⁰³

10 For the Cogswell HRM Redevelopment Program (CI Co008638), the project estimate
11 contingency basis is as follows:

12 Contingency [12%] was determined using Hybrid Method: expected value,
13 similar work variance (for eg. recent temporary power installation removal work)
14 and expert judgment. Main risks that require contingency include any significant
15 scope change, material, temporary power and labour. These risks are quantified
16 using quantitative analysis. The project is based on a Class 3 estimate.¹⁰⁴

17 The basis for the project contingency was further discussed in an information
18 response. NS Power states that, “the contingency of 12% covers known risks.” The risks are
19 specified as “fund AFUDC in case operational dates shift,” “increase in OT or regular hours,”

⁹⁹ Exhibit N-1, 2023 ACE Plan, Capital Work Order CI Co055696, p. 4.

¹⁰⁰ Exhibit N-1, 2023 ACE Plan, Capital Work Order CI Co052654, p. 4.

¹⁰¹ Exhibit N-1, 2023 ACE Plan, Capital Work Order CI Co050836, p. 4.

¹⁰² Exhibit N-4, CA RIR-15(d), Matter No. M10366.

¹⁰³ Exhibit N-3, CA RIR-6(c)(i).

¹⁰⁴ Exhibit N-1, Matter No. M10609, Capital Work Order CI Co008638, p. 10.

1 “increase of price of material, “increase in environmental cost,” and “increase in temporary
2 power requirement.”¹⁰⁵ There are no calculations or explanations of how these risks are
3 reasonably related to the \$475,676 contingency amount, such as providing a benchmark for
4 the similar work variance referenced in the project estimate.

5 While the Cogswell HRM Redevelopment Program example does provide some
6 indication of what topics were reviewed in expert judgment, those indications were provided
7 in a response to an information request and not in the capital work order filing.

8 **Q: Has NS Power provided a reasonably detailed explanation of the basis for its
9 contingency for any projects?**

10 A: Yes. In response to an information request, NS Power provided a reasonably detailed
11 statement of basis for the contingency (16%) and project management reserve (8%) for the
12 Trout River Diversion Structure Replacement (CI 49634).¹⁰⁶ (This is the project that NS
13 Power incorrectly advised would have a contingency based on expert judgment.)

14 Although the information response related to the contingency determination includes
15 approximately 29 pages, I believe a reasonably detailed explanation could have been
16 provided in just two pages. The response includes a two-page response to parts (a) through
17 (e) that include about 44 lines of substantive text. With formatting more typical to a capital
18 work order and elimination of redundancy, this information could easily fit on a single page.
19 There is also a 27-page output from a simulation model; the first page of this output would
20 be sufficient to inform a reviewer of the nature of this contingency determination. I have
21 included the two-page response and the first page of the simulation model output as
22 Attachment 2 to my evidence for convenience of review.

23 **Q: Why is it important for NS Power to include a reasonably detailed explanation
24 of the basis for its contingency in a capital work order filing?**

25 A: First of all, NS Power’s non-binding contingency guidelines do not imply that for most
26 projects, the contingency will be set at either 10% or 15% of the project cost estimate. For
27 the sake of illustration, if that is to be NS Power’s practice, then a 5% increase in authorized
28 spending is a material difference and should be subject to review, just as the number of poles
29 expected to be replaced in a distribution project should be subject to review.

¹⁰⁵ Exhibit N-2, NSUARB RIR-13(d), Matter No. M10619.

¹⁰⁶ Exhibit N-1, Matter No. M10845, *Capital Work Order CI 49634*, p. 3; Exhibit N-2, Matter No. M10845, NSUARB RIR-14(a)-(e) and Attachment 1.

1 I do not think it is reasonable for this information to be withheld until NS Power
2 receives an information request. As referenced above, NS Power has already agreed to
3 provide more detailed information. The level of detail that should be provided in response
4 to this request is not particularly great. The benefit of providing this information with the
5 capital work order is that it allows parties to ask information requests regarding specific
6 details in the statement of basis.

7 Information requests by parties may reveal inconsistencies in the contingency
8 determination between projects, but the parties would have no effective opportunity to
9 further understand the discrepancies. A potentially more important reason to allow for
10 review of the statement of basis is that the description of risks allows parties to identify risks
11 that may have been overlooked, or to reference practices that could help reduce those risks
12 that do not appear to have been included.

13 Even a simple requirement to relate the contingency determination to identified risks
14 may prompt NS Power to conduct more extensive risk management planning. For example,
15 had I been involved in the Trout River Diversion Structure proceeding, I would have asked
16 why the risks included in the contingency analysis did not include failure of the cofferdam
17 to provide a dry working environment.¹⁰⁷ (This failure is a principal reason that the Tusket
18 Main Dam project is so far over budget.) In two of the example post-project reviews provided
19 by NS Power, as discussed in Section VI.E, the reviews suggested that better identification
20 of risks during planning could have assisted with task identification and project
21 execution.¹⁰⁸

22 **Q: What is your recommendation to correct the deficiency in justifying**
23 **contingency costs in proposed project budgets?**

24 A: The Board's directives and NS Power's commitments have been clear and reasonable, and
25 there has been adequate time to comply with them. The Board should direct NS Power to
26 justify contingency costs as directed and agreed to and, if no such justification is provided,
27 require capital work orders to be revised and resubmitted prior to further consideration.

¹⁰⁷ Exhibit N-1, Matter No. M10845, Capital Work Order CI 49634, Attachment 1; Exhibit N-2, Matter No. M10845, NSUARB RIR-14, Attachment 1.

¹⁰⁸ Exhibit N-3, CA RIR-3, Attachment 2, pp. 7-8, 18-20.

1 **C. Total Cost of Ownership**

2 **Q: What is the Total Cost of Ownership (TCO) analysis?**

3 A: In its 2022 ACE Plan decision, the Board directed NS Power to provide a TCO for IT projects
4 over \$1 million when an EAM is not provided.¹⁰⁹ A TCO will be useful when there is no
5 alternative to the proposed project because parties and the Board will better understand the
6 full implications of project approval. For example, the assumptions included in the TCO may
7 indicate constraints that parties may wish to question in light of other planned investments
8 by NS Power. The TCO analysis will provide a framework for NS Power to demonstrate a full
9 understanding of the requirements to maintain and further develop its IT investments.

10 **Q: Did NS Power appropriately update its Capital Expenditure Justification**
11 **Criteria to include the TCO analysis?**

12 A: Yes. After stakeholder consultation, the revisions submitted by NS Power are consistent with
13 the Board directive.¹¹⁰

14 **Q: Has NS Power appropriately implemented the TCO analysis requirement?**

15 A: It appears so. In some cases, NS Power submits an EAM that compares the “pricing structure
16 of two vendors with the same project objectives.”¹¹¹ A potential concern would be if NS
17 Power’s EAM considered only the initial costs associated with the two vendors and omitted
18 similar or identical costs related to future upgrades such as customization to integrate with
19 other software systems.

20 It appears that NS Power’s EAM process is addressing this concern. NS Power goes on
21 to say that in two such cases,

22 Both EAMs provide a comprehensive understanding of the total cost of
23 investment over the useful life of the assets being developed, given the
24 information available at the time of submission. NS Power includes the capital
25 costs and operating costs associated with each alternative within the data input
26 tabs of the EAM. The book depreciation is calculated by the EAM within these
27 tabs and calculated using NS Power’s approved depreciation rates.¹¹²

¹⁰⁹ NSUARB, *2022 ACE Plan Decision, Matter No. M10366 (June 9, 2022)*, p. 76, paras. 204-206.

¹¹⁰ Exhibit N-1, *2023 ACE Plan*, Appendix F, p. 32.

¹¹¹ Exhibit N-3, CA RIR-20(b).

¹¹² Exhibit N-3, CA RIR-20(d).

1 In one of those cases, NS Power’s capital work order also included a 5-year TCO
2 comparison between specific vendors. I was not able to review the confidential TCO
3 comparison, but NS Power asserted that the more limited comparison was “prepared as part
4 of the RFP process” and only included “costs associated with the specific vendors.”

5 While I have not had an opportunity to review the data underlying either a full TCO
6 analysis or an EAM that provides a similarly comprehensive understanding of costs, NS
7 Power’s representations of recent capitol work orders appear consistent with the Board’s
8 directive.

9 ***D. Project Delivery Model***

10 **Q: What is NS Power’s Project Delivery Model (PDM)?**

11 A: As summarized by the Board in its 2022 ACE Plan decision,

12 The PDM will include guidance and recommended practice for risk management,
13 value engineering and benchmarking, to ensure these tools are identified and
14 applied appropriately. The PDM will be provided as the project management
15 standard guidance for capital projects at NS Power. NS Power confirmed during
16 hearing testimony that it expects the PDM will help the company improve its
17 capital cost performance so that it better meets AACE accuracy expectations. NS
18 Power also stated that it expects the new PDM to be implemented in the second
19 quarter of 2022.¹¹³

20 **Q: Was the PDM submitted as part of the 2023 ACE Plan?**

21 A: No. In Appendix F, NS Power included an “overarching framework [that is] not the
22 comprehensive PDM program that has been developed to date.”¹¹⁴

23 **Q: Has NS Power completed development of the PDM?**

24 A: No. NS Power states that, “Supporting materials are currently in various states of
25 development and are being implemented and piloted within NS Power’s more complex
26 projects.”¹¹⁵ It appears that the framework and PDM components are expected to be
27 complete in October 2023,¹¹⁶ over one year later than was represented in the 2022 ACE Plan
28 proceeding.

¹¹³ NSUARB, *2022 ACE Plan Decision*, Matter No. M10366 (June 9, 2022), p. 34, para. 82.

¹¹⁴ Exhibit N-3, CA RIR-4(d)(i).

¹¹⁵ Exhibit N-3, CA RIR-4(d)(ii).

¹¹⁶ Exhibit N-6, NSUARB RIR-51, Attachment 1, p. 4.

1 **Q: What are the components of the PDM materials?**

2 A: It appears that the PDM consists of the following elements:

- 3 • Defined Stage Gates and associated deliverables
- 4 • Standardized templates for consistency and developed to allow for scalability
- 5 • Centralized filing, workflows, trackers and logs¹¹⁷

6 Among the templates are cost minimization tools and post-project reviews, which I
7 will discuss in Section VI.E.

8 **Q: What does NS Power mean when it says that PDM materials are being piloted?**

9 A: In one response, it appears that NS Power is referring to a “cost minimization tracker,” and
10 that the cost minimization opportunities collected in the tracker are potentially used during
11 new project development.¹¹⁸

12 In another response, NS Power appears to indicate that it is piloting a wider range of
13 PDM materials in seven pilot projects, four of which are expected to begin construction in
14 2023.¹¹⁹

15 I remain unclear as to how comprehensive NS Power’s 2023 pilots of PDM materials
16 may be, and when NS Power expects that it will fully deploy the PDM beyond these pilots.

17 **Q: What is your overall opinion of the PDM implementation?**

18 A: NS Power’s evidence on its PDM implementation is thin and leaves me unconvinced that it
19 is fully addressing the commitment it made in the 2021 ACE Plan stakeholder engagement
20 process to, as the Board summarized it, “review and update its project management
21 guidance documentation and practices, which includes cost minimization elements.”¹²⁰

22 On the one hand, the outline of PDM elements provided in NSUARB RIR-51 appears
23 relatively comprehensive and responsive to the concerns raised during the 2021 ACE Plan
24 proceeding regarding a lack of internal structure in NS Power’s cost minimization and
25 project management practices. Although the evidence on this point is thin, it appears that
26 NS Power understands and may be implementing the commitments it has made in prior
27 ACE Plan proceedings.

¹¹⁷ Exhibit N-6, NSUARB RIR-51, Attachment 1, p. 3.

¹¹⁸ Exhibit N-6, NSUARB RIR-51(b).

¹¹⁹ Exhibit N-6, NSUARB RIR-51, Attachment 1, p. 4.

¹²⁰ NSUARB, *2022 ACE Plan Decision*, Matter No. M10366 (June 9, 2022), p. 33, para 82.

1 On the other hand, I am surprised that it has taken two years to initiate pilots, which
2 may include only some or perhaps all PDM elements.

3 I recommend that the Board investigate this topic further and provide any direction it
4 determines to be necessary to verify that NS Power is fulfilling its commitments in an
5 expeditious manner.

6 ***E. Cost Minimization Savings and Post-Project Reviews***

7 **Q: Please summarize NS Power’s activities related to reporting cost minimization**
8 **savings and post-project reviews.**

9 A: These two reporting or documentation requirements are a result of the Board’s direction in
10 response to its concerns “with the effectiveness of NS Power’s capital cost minimization and
11 budgeting practices.”¹²¹ In its 2022 ACE Plan decision, the Board noted that using the RFP
12 process is a “general example of obtaining best value” and not “specific examples of a
13 proactive cost minimization practice by the company,” which is what the Board is seeking in
14 its cost minimization reporting.

15 While the cost minimization reports document NS Power’s successes, its post-project
16 reviews document “lessons learned” that can be applied to minimize costs in future cases.
17 While the lessons learned are not documented in the 2023 ACE Plan, several examples of
18 post-project reviews were provided in response to an information request.

19 **Q: What is your overall impression of the documentation?**

20 A: Both the cost minimization examples and the post-project reviews show serious
21 consideration to recognizing or identifying opportunities for improvement. In comparison
22 to information provided in prior ACE Plan proceedings, this information appears much
23 more specific and actionable (capable of being replicated in future projects).

24 **Q: What are some examples of replicable practices in the cost minimization**
25 **examples?**

26 A: Several of the examples identify design changes after the planning process that could be
27 incorporated into future plans.

¹²¹ NSUARB, *2022 ACE Plan Decision*, Matter No. M10366 (June 9, 2022), p. 43, para. 104.

- 1 • Vegetation management coordination with other parties conducting the same
2 activity resulted in lower distribution ROW costs.¹²² Coordinate vegetation
3 management activities with other parties seems like a replicable practice.
- 4 • Barn swallow habitat appears to be a frequent issue with hydroelectric projects.
5 Lower-cost methods for discouraging nesting during construction and providing
6 for post-construction nesting habitat were identified.¹²³
- 7 • Bridge replacements appear to be a frequent requirement during hydroelectric
8 projects. For the Big Falls bridge replacement, standard guard rail materials were
9 substituted for more expensive tri-beam systems by widening the approach
10 corridor from 1 lane to 2 lanes.¹²⁴
- 11 • Using broader tolerances for replacing equipment nearing the end of its useful
12 life, such as the boiler tubes, is a practice that will become increasingly relevant
13 with the 2030 deadline for coal unit retirements.¹²⁵
- 14 • Transmission projects appear to be good opportunities for better planning. Cost
15 minimization successes included reducing the scope of work on a line scheduled
16 for redundancy and identifying opportunities to combine multiple tasks during a
17 single site mobilization.¹²⁶

18 NS Power should incorporate these and other cost minimization successes into future
19 project planning to ensure improvements in cost minimization, schedule adherence, and
20 risk management.

21 **Q: Do the post-project reviews address all of the questions that you expect should**
22 **be covered in a post-project review?**

23 A: No. As shown in Table 3, some of the topics that my review of publicly available post-project
24 reviews from various disciplines suggested do not appear to have been considered in the
25 examples of post-project reviews provided by NS Power.

¹²² Exhibit N-1, 2023 ACE Plan, Appendix E, row 3.

¹²³ Exhibit N-1, 2023 ACE Plan, Appendix E, rows 19-20, 31.

¹²⁴ Exhibit N-1, 2023 ACE Plan, Appendix E, row 24.

¹²⁵ Exhibit N-1, 2023 ACE Plan, Appendix E, row 46.

¹²⁶ Exhibit N-1, 2023 ACE Plan, Appendix E, rows 64, 68, 71-75.

1 **Table 3: Coverage of Post-Project Review Topics**¹²⁷

Review Topic	Assessment
1. Did the project fully meet the objective, or were further requirements identified during the project planning and implementation that require additional projects?	The reviews do not explicitly identify any shortcomings in meeting project objectives or reflect on further requirements.
2. Compare final cost, labor-hour, and schedule performance reports for the project to the planning estimates used in the ACE Plan submission.	The reviews do not explicitly compare planning estimates to final performance reports.
3. Did internal coordination meetings and other governance activities occur as scheduled throughout the entire project?	The reviews discuss shortcomings in internal coordination, such as higher priority projects limiting operations team support, poor coordination between contractors, and issues related to a mid-project change in the project manager. ¹²⁸
4. Was a risk register (list of identified project risks) prepared at the outset and updated based on unanticipated information?	One review noted that, “Complex unforeseen tasks ... were not anticipated in the planning stages as a safety risk register was not used.” ¹²⁹ It is unclear whether a risk register was used in the other two projects.
5. Survey key internal stakeholders to determine how well they feel the project addressed their needs and their assessments of project team and project manager performance.	The review process includes attendees at “review discussion,” which included 1, 2 or 9 people. There is no indication of any process to gather feedback from internal stakeholders.
6. Survey any external stakeholders (e.g., Mi’kmaq, adjacent property owners) regarding the degree to which project implementation met expectations.	There is no indication of any process to gather feedback from external stakeholders.
7. Identify each significant unanticipated problem that occurred during the project. Were all relevant staff (and external parties, if applicable) notified promptly and responsive with timely adjustments to their plans and budgets?	Each of the three reviews includes substantial discussion of multiple issues encountered and the response of appropriate staff.
8. For any cost overruns resulting from defective equipment supplied by a vendor, were there any	One review discussed a problem of this nature. ¹³⁰ Other reviews discussed

¹²⁷ These ten topics were identified in my 2022 ACE Plan evidence. Exhibit N-10, Matter No. M10366, pp. 33-34.

¹²⁸ Exhibit N-3, CA RIR-3, Attachment 2, pp. 2, 9, 12.

¹²⁹ Exhibit N-3, CA RIR-3, Attachment 2, p. 7.

¹³⁰ Exhibit N-3, CA RIR-3, Attachment 2, p. 3.

Review Topic	Assessment
missed opportunities to test and identify the defects prior to the attempted installation?	budget and schedule impacts of shortcomings in project planning. ¹³¹
9. Was there an efficient transition to operations? Were operations personnel engaged in testing or training at appropriate points prior to the formal transition to operations?	One review discussed inadequate support from operations. ¹³²
10. Were all lessons learned from the above questions captured for future application?	The review documents appear to capture lessons learned effectively. It is not possible to know whether the above questions that were not answered would have contributed additional lessons learned.

1 **Q: Is NS Power effectively capturing and putting into practice the lessons learned**
2 **from cost minimization and post-project review documents?**

3 A: That is unclear. According to NS Power’s PDM documentation, the “lessons learned register”
4 was scheduled to be rolled out by March 2023.

5 Furthermore, it is unclear whether NS Power will continue to capture the same level
6 of detail shown in the three example post-project reviews. NS Power states that,

7 Post-project reviews have always been effective in continuous improvement as
8 they are a good medium to share lessons learned across the business. While an
9 effective practice that does add value, completion of the post-project reviews in
10 the current format is time-consuming and has added strain on internal
11 resources. Going forward, NS Power will attempt to simplify the process to make
12 it more manageable for internal resources to complete, while ensuring that the
13 benefits of tracking lessons learned and passing those lessons along are
14 maintained.¹³³

15 NS Power does not explain what is meant by “time-consuming” and “added strain.”
16 Based on the examples provided, it appears that the post-project reviews involve a single
17 meeting and then typing up the notes from the meeting (if not completed during the
18 meeting). Considering that each of the three post-project reviews includes significant
19 actionable recommendations that appear likely to lead to cost savings (or risk reduction) in
20 future projects, the time invested in these reviews seems to be very high value—assuming
21 that the lessons learned are actually tracked and acted upon.

¹³¹ Exhibit N-3, CA RIR-3, Attachment 2, pp. 7, 18.

¹³² Exhibit N-3, CA RIR-3, Attachment 2, p. 2.

¹³³ Exhibit N-3, CA RIR-3(c).

1 I recommend that the Board reinforce its direction to NS Power regarding the
2 importance of following through on these practices, which the Board has been asking NS
3 Power to implement for several years. It may be appropriate to consolidate tracking and
4 reporting on both cost minimization successes and post-project actionable
5 recommendations, as these two types of information are both inputs into future project
6 planning to ensure improvements in cost minimization, schedule adherence, and risk
7 management.

8 **Q: Does this conclude your testimony?**

9 A: Yes.