

Review of Nova Scotia Power's Evergreen IRP, Updated Action Plan and Roadmap (August 8, 2023)

Prepared for the Nova Scotia Consumer Advocate

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1. Background

On August 8, Nova Scotia Power published its updated IRP action plan and roadmap, along with responses to stakeholder comments on the final IRP modeling results. On September 8, Bates White filed comments on that document.

2. Overview

NS Power's Evergreen IRP represents substantial forward progress in the utility's planning activities. Many of the concerns that we had at the conclusion of the 2020 IRP have been addressed in a reasonable manner. The range of sensitivities explored in this update is impressive, covering most of the relevant issues and trends.

Unfortunately, NS Power has stalled implementation of several key projects due to its current policy of limiting investments, a decision that may ultimately result in suboptimal investments and increased costs of implementation. NS Power's ACE Plan filing indicates that it agrees that "time is of the essence for completion of [the ECEI] projects on a schedule that aligns with the legislated 2030 requirements."¹ Despite this urgency, the ECEI projects are not included in NS Power's current 5-year forecast of capital investments.²

Progress on other capital projects supportive of a clean energy transition has been uneven. NS Power has deferred work on the dynamic line ratings (DLRs) and other grid-enhancing technologies (GETs), without establishing any clear schedule for reviving those efforts.³ Based on information shared with the FAM Small Working Group, NS Power has scheduled implementation of its new economic dispatch optimization software for 2024–2025. All of these projects support the clean energy transition by optimizing the use of existing and new resources, and should be revived and completed as fast as feasible.

We have identified two issues worthy of Provincial and/or Federal attention, which the Board should encourage. First, the final modeling results provides an (understandably) incomplete perspective regarding the major emerging issue of meeting winter peak heating demand at low ambient temperature, when heat pumps will be least efficient. If other resources (natural gas, propane, wood, or customer-sited battery storage) can meet extreme winter peaks, NS Power's resource plan can be simplified considerably.

¹ Exhibit N-9, *NS Power 2020 ACE Plan Rebuttal Evidence* (June 19, 2023), Matter No. M11017, p. 13.

² *Id.*, p. 5.

³ The filing does mention an expected filing date of 2024, but ACE plan expected filing dates are rarely reliable indications of progress. *Id.*, p. 14.

However, it is not clear whether those supplemental resources would actually make sense from a customer, Provincial or national perspective, given (1) customers' required investment and maintenance of the supplemental systems and (2) the carbon emissions from the back-up fuel options. The standby system costs would likely be modest for customers with existing oil or propane furnaces equipment in good condition, as well as those with wood stoves. The costs of supplemental heating will be higher for customers with only electric resistance heating, fossil systems nearing the end of their lives, or insufficient space for both systems. High levels of building shell efficiency, where possible, will reduce the need for supplemental heating. Given the complexity of customer circumstances and the policy options, there is no time to waste in analyzing these issues and proposing solutions, including rate design, technical support, and incentives from NS Power, E1, or the Province.

Second, the question of coordination with neighboring utilities, whether through infrastructure (e.g., the Atlantic Loop) or wholesale market reform (e.g., regional joint dispatch), appears to be progressing at an inadequate pace. Even if the relevant parties reach agreement in principle on what should be done this year, it would take several years for wholesale market reform to be implemented and even longer to construct new transmission infrastructure (the Labrador Island Link took about a decade to complete). Time is of the essence on improving coordination, and NS Power appears to be indicating that progress will be challenging and slow. While the Board may not have independent authority to overcome these challenges, on behalf of NS Power's customers the Board should speak clearly as to the urgency of improving regional coordination.

3. Issues Raised by the Evergreen IRP and NS Power's Response to Stakeholder Comments

As noted above, the Evergreen IRP represents substantial progress and NS Power's responses to comments on the final modeling results were often quite satisfactory. However, NS Power did not respond to key comments on the accuracy of DSM program modeling, a provincial study of hybrid peak mitigation policy, or the development of a conceptual hydrogen production tariff. In addition, we offer further evaluation of several issues in NS Power's final plan, including acknowledgement of how NS Power has addressed our concerns.

A. Hybrid Peak Mitigation

Our comments on the final model results noted the inconsistency between the modeling approaches for the costs of customer-owned solar and customer-owned oil/gas heating systems. NS Power acknowledges that "incorporating associated costs of retaining back up fuel systems ... would be an important element of ... modeling the hybrid peak strategy." (Response to Stakeholders, p. 4) We further pointed out that customers who maintain fossil-fueled heating systems for peak conditions use those systems beyond peak conditions, depending on energy pricing and equipment efficiency. We are concerned that NS Power did not commit to ensuring that future analyses capture broader non-peak use of dual-fueled heating systems for residential and small commercial customers.

We also pointed to the commitment by Eastward Energy Inc. in its recently approved rate case settlement to engage at the provincial level on a study of this issue. The 2022 revision to the Public Utilities Act has also charged Efficiency One with administration of strategic electrification programs, including all "energy end uses currently powered by fossil fuels." We are unaware of any public response by NS Power that it would take an active role in such a study – in our view, NS Power should be assigned responsibility for leading a supportive technical study, since most energy shifts would be to increased electricity use.

Such a coordinated multi-sector study should investigate the options for meeting customers' needs for heating, hot water, and other related needs. It should seek submissions from Eastward, NS Power, Efficiency Nova Scotia, and other parties, such as businesses that install or supply propane and fuel oil systems. The study should ask whether peak winter heating load is best met by energy delivered via wires, pipelines, or trucks. The study should also ask whether energy to meet those peak demands should be stored in a battery, a tank, a lake or in a regionally linked, diversified energy system.⁴ The answer needs to involve clear standards for making tradeoffs among the different resource options, because those choices have consequences for energy customers.

Residential and small commercial customers have demonstrated a tendency to hedge their bets on heat pumps by retaining backup fuels. But with the forecast increase in carbon prices, greater familiarity with heat pumps, and increasing cost of maintaining the aging backup equipment, customer behavior will likely change. The study should ask how customer behavior may change, and how NS Power should respond to the challenges presented by decarbonization policy, the long-term financial condition of Eastward, and customer preferences.

B. Atlantic Loop

NS Power confirmed that it has chosen a "No Atlantic Loop" reference scenario (CE1-E1-R2) for planning purposes. (Response to Comments, p. 11) It declined to comment on the likelihood of a contract (or other commitment) for bi-directional transactions with Hydro Québec. That should be an attractive option, since Hydro Québec views itself as the "green battery of North America."⁵ A battery suggests charging from excess energy in Nova Scotia and other jurisdictions, as well as selling stored energy to those parties. When asked whether such contracts were available on commercially reasonable terms, NS Power's response was ambiguous.

In its comments on the Updated Action Plan and Final Report, Bates White points out that NS Power's share of the Atlantic Loop has likely increased well beyond the \$1.7 billion figure used in the Evergreen IRP. (Bates White, p. 7) Bates White points out that NS Power's finding that the Atlantic Loop could result in lower system costs for NS Power is sensitive to assumptions regarding New England market prices.

Bates White also highlights New Brunswick Power's finding that the Atlantic Loop would increase its generation costs, and would provide value to New Brunswick only in limited hours. (Bates White, p. 8) According to NB Power's 2023 IRP (released July 28), NB Power favors in-province carbon-free resources over expansion of transmission connections to Hydro Quebec.

We concur with Bates White that, in light of the discouraging signals regarding the potential for development of the Atlantic Loop, NS Power should "robustly consider and potentially pursue full joint dispatch with New Brunswick (and potentially other provinces in the region), as well as increase operational and planning initiatives with New Brunswick and other provinces." (Bates White, p. 9) In particular, coordination with Newfoundland should be beneficial to both provinces.

⁴ NS Power could lead the development of several scenarios from this study that examine alternative peak heating technology pathways, considering varying policy options and customer responsiveness. It could then evaluate the system impacts of those scenarios in its IRP model.

⁵ Because bi-directional transactions on the Atlantic Loop will reduce wind curtailment, the value offered by the Green Choice program may be affected by decisions on this project.

We also raised concerns that NS Power does not have a good method for valuing bi-directional transactions over a future Atlantic Loop transmission path. For example, the value of export power is assumed to be zero in NS Power's current model. And, as the Maritime Link project has demonstrated, forecasts of the timing and value of energy delivered over transmission mega-projects are difficult to rely upon. NS Power's response to our comments suggest that it does not have a path towards improving its forecast of transaction values. (Response to Comments, p. 3)

C. Regional Joint Dispatch

In the Fuel Adjustment Mechanism Audit proceeding (M10416), the Consumer Advocate and Bates White agreed that NS Power should be encouraged by the Board to pursue regional joint dispatch with neighboring utilities. A joint dispatch agreement is the simplest form of wholesale market reform, in which "the dispatch of all of the online generation of multiple utilities is pooled and optimized to serve their combined load."⁶ Either a member utility is designated to operate the dispatch (which could lead to concerns about bias) or an independent administrator can be established.⁷ In many joint dispatch agreements, minute-to-minute dispatch, balancing, and operating reserves are managed separately by member utilities.

Other structural wholesale market reforms include an Energy Imbalance Market, which is an independent entity that optimizes real-time dispatch, and a Regional Transmission Operator (RTO), in which member utilities are consolidated into a single balancing authority. In some cases, RTOs take on some resource planning functions through the management of capacity markets. However, joint dispatch agreements generally do not involve balancing authority consolidation, joint planning or procurement by unaffiliated utilities.⁸

D. Procurement

Bates White offers constructive comments on the use of best practice competitive procurements. (Bates White, pp. 3-6) We endorse Bates White's comments and elaborate on some of them.

Bates White's well-advised recommendations include their support for all-source RFPs, cautious consideration of utility- and affiliate-sponsored projects in RFPs, and avoidance of excessively restrictive quantity targets in technology-specific RFPs (if those are issued). We recommend that the Board direct NS Power convene a stakeholder process, similar to that used for the IRP, for review and advice on the development of procurement plans for its generation and related resources.

We strongly endorse utility adoption of all-source RFP best practices,⁹ and have monitored recent developments in procurement policies, including:

- Different regulatory oversight depending on whether procurements allow for fuel-consuming resources (e.g., gas) to participate – many are restricted to such clean resources as wind, storage

⁶ Brattle, [Assessment of Potential Market Reforms for South Carolina's Electricity Sector](#) (April 27, 2023), p. 40.

⁷ *Id.*, p. 43.

⁸ Note that the NS Power Panel testified *incorrectly* that a joint dispatch agreement would "effectively be a regional IRP." (Transcript, M10416, p. 464.) Dispatch operates on the scale of minutes and days, while IRPs deals with years. We are unaware of any joint dispatch agreements that include resource planning by unaffiliated utilities.

⁹ Wilson, J. D. et al., [Making the Most of the Power Plant Market: Best Practices for All-Source Electric Generation Procurement](#), Energy Innovation and Southern Alliance for Clean Energy (April 2020).

and solar. Simplified evaluation procedures can be adopted for RFPs that target zero-emission energy resources that primarily represent capital investment, even if the pricing is on a \$/MWh basis. In such cases, regulators have chosen to conduct comprehensive prior review and approval of the terms of the RFP, with active oversight of the procurement process, allowing expedited certification of projects resulting from compliant procurements.

In contrast, procurements that allow for fuel-consuming resources to participate may require both pre-RFP and pre-certification hearings, to verify that the evaluation of all resources properly considered operating cost risk due to fuel costs and load factor.

- Similarly, procurements that allow for utility-sponsored projects, particularly if the utility is able to obtain cost recovery of prudently-incurred overruns, should require both pre-RFP and pre-certification hearings and approval. Because third-party supplier bids are not usually allowed to increase prices in response to cost overruns, additional regulatory oversight is advisable to ensure that the utility-sponsored projects are not selected based on overly optimistic projections.
- In addition to the differences in process, bid evaluation methods should also vary based on whether the RFP allows fuel-consuming technologies and utility-sponsored projects. For the simplest RFPs, the evaluation method can be represented in a spreadsheet that considers pricing and applicable performance considerations. For more complex RFPs that allow for differing fuel specifications and utility ownership, the RFP should evaluate risk scenarios through bid portfolio evaluation in the utility's resource planning software. Optimization of battery storage value is an emerging challenge that may require similar use of resource planning software to select the optimal mix and quantity of storage resources.

What is evident from the emerging practice of procurements that are styled "all-source" is that no two utilities are using the same regulatory or bid evaluation procedures. As such, it is advisable for the utility to consult with stakeholders and the Board well in advance of initiating such procurements, in order to ensure that it has addressed all reasonable concerns. The consequence of a poorly-planned procurement can be a contentious capital approval or rate case proceeding.

E. Reliability Tie

As we noted in our comments on the modeling results, NS Power has delayed the earliest completion date of the reliability tie (a second 345 kV AC transmission line from Onslow, NS to Salisbury, NB) until at least 2027, rather than 2025, consistent with NS Power's decision to suspend investment commitments because of what it has described as constraints on its ability to obtain capital as a result of Bill 212. Otherwise, we understand that NS Power has not identified any obstacles to the methodical development of the tie. Its current Action Plan indicates that the application will be filed for review in 2024, with an in-service date of 2028. NS Power and the Board should endeavor to facilitate the review of this project, which appears to be vital in the integration of the wind required in this decade.

F. Enhanced Operational Practices

We recommended in earlier comments that NS Power enhance its operational practices to support more complex commitment and dispatch decisions and to reduce the cost of maintaining system reliability. NS Power responded with a more limited commitment to "identify opportunities to reduce curtailment of

variable renewable generation on the system.” (Final Report, Action Item 3e) The scope of this commitment appears to be more limited than we suggested and does not commit to a comprehensive updating of its operational resources and practices.

G. Demand-Side Management (DSM) Programs

Our comments on the final model results raised questions about the finding that higher levels of DSM investment do not show a reduction in either cost or emissions. We asked for further explanation of the final modeling assumptions that result in an improbable, counter-intuitive result: The incremental DSM in the MMDSM scenario only reduces system costs by \$7 million (gross savings).

This comment was ignored in NS Power's response to stakeholders. Nor is it reflected in the Updated Action Plan and Roadmap. The Board should not rely on these results, pending additional analysis.

H. Hydrogen Production

We recommended that NS Power include development of a conceptual hydrogen production tariff in the IRP action plan, to provide potential projects with an indication of potential pricing and terms, even if such a tariff is subject to further review when submitted for Board approval. NS Power responded by adding Roadmap Item 11, “Monitor the development of the hydrogen industry in Nova Scotia, including tariff structures specific to hydrogen development. Assess the impacts as they relate to future modeling assumptions.”

This response suggests a passive approach to this market initiative. Our recommendation is that NS Power develop a conceptual hydrogen production tariff. The development of tariff structures cannot be “monitored” if NS Power does not develop such a tariff. NS Power should strengthen this item by committing to develop a conceptual tariff over the next one to two years that can be shared with potential hydrogen producers. For clarity, we do not recommend that NS Power submit the tariff for Board approval until the hydrogen industry develops to a stage where a tariff is required to allow investments to proceed.

I. Geothermal Energy

NS Power's Roadmap Item 8 commits to monitoring developments in technology and enabling policy for resources such as small modular nuclear reactors and geothermal. Geothermal energy may merit a more proactive investment of utility or provincial resources, based on two recent developments. First, Fervo Energy successfully demonstrated enhanced geothermal at a commercial scale.¹⁰ Second, the US National Renewable Energy Laboratory (NREL) found that existing resource assessments may filter out high-temperature enhanced geothermal system opportunities, especially at depths of 3-4 km.¹¹ The potential geothermal aquifers identified in Nova Scotia at depths of 5.5 to 7 km¹² could be re-evaluated using the updated methods described by NREL, and the commercial potential assessed in light of the Fervo Energy accomplishment.

¹⁰ Fervo Energy, [Fervo Energy Announces Technology Breakthrough in Next-Generation Geothermal](#) (July 18, 2023).

¹¹ Augustine, C. et. al., [Enhanced Geothermal Shot Analysis for the Geothermal Technologies Office](#), NREL/TP-5700-84822 (January 2023), p. 9.

¹² Comeau, F.-A., et al., [Assessment of Geothermal Resources in Onshore Nova Scotia](#), Nova Scotia Energy and Mines Open File Report ME 2021-003 (June 2021), p. 96.