Nova Scotia POWER
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October 17, 2023

Ms. Crystal Henwood
Regulatory Affairs Officer/Clerk
Nova Scotia Utility and Review Board
1601 Lower Water Street, 3rd Floor
P.O. Box 1692, Unit "M"
Halifax, NS B3J 3S3

Re: M11307 Evergreen IRP Reply Submission

Dear Ms. Henwood:

On August 8, 2023, Nova Scotia Power Incorporated (NS Power, Company) filed its Evergreen IRP – Updated Action Plan and Roadmap – 2023 (Evergreen IRP Update).

Evergreen IRP process was borne of a commitment arising from the 2020 IRP. The Evergreen IRP Update provided as follows:

> The 2020 Integrated Resource Plan (IRP) process identified both Action Plan and Roadmap items intended to advance NS Power's long term electricity strategy. As part of the Roadmap, NS Power proposed an evergreen IRP process, which allows for the refinement of the Action Plan and Roadmap in alignment with planning environment changes. The changes in environmental policy, load, and resource assumptions since the 2020 IRP indicated it would be appropriate for NS Power to revise the long-term electricity strategy in alignment with Nova Scotia's 2030 environmental targets and beyond. The results of this work, in addition to the extensive stakeholder engagement process and ongoing consultation, demonstrates NS Power's commitment to ensure that its long-term strategy is in alignment with significant policy and market changes and supports the progression towards a decarbonized future.
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> The evergreen IRP process included updates to the assumptions and new modeling scenarios to reflect significant changes since the 2020 IRP and corresponding modeling work to support the assessment of these changes. The twenty-four scenarios assessed as part of the evergreen IRP capture a broad range of potential planning environment outcomes. The final

> modeling results, which can be found here, provide NS Power with a range of potential system planning outcomes. The common elements amongst the scenarios signal to NS Power key areas of focus for our long-term electricity strategy and inform tangible Action Items to meet our 2030 targets and beyond.

The filing of the Evergreen IRP Update was the culmination of a comprehensive stakeholder process over the course of approximately 15 months.

On August 31, 2023, the Nova Scotia Utility and Review Board (NSUARB, Board) established by letter a proceeding inviting Board counsel consultants and participants to submit comments regarding the Evergreen IRP Update.

In accordance with the NSUARB's proceeding timeline, Board consultants Synapse and Bates White provided submissions regarding the Evergreen IRP Update on September 8, 2023.

Likewise, on September 26, 2023, the following Evergreen IRP participants submitted their comments:

- Grid Strategies (GS) on behalf of the Consumer Advocate (CA)
- The Small Business Advocate (SBA)
- EfficiencyOne (E1)
- Eastward Energy (EE)
- Port Hawkesbury Paper (PHP)
- Nova Scotia Department of Natural Resources and Renewables (NRR)

This submission is the Company's reply to the Board's consultants' and participants' comments regarding the Evergreen IRP Update. Key themes and the path forward are addressed in this reply. Specifics with respect to these key themes, and in particular comments and recommendations from the Board's consultants' and participants' submissions, are addressed in greater detail in Appendix A, which also provides NS Power's response to each.

In the interest of completeness of the record, NS Power has generally provided the full excerpt of the stakeholder comment and any additional relevant context in its response to the comments. The resultant length of Appendix A does not detract from NS Power's view that the Evergreen IRP Update can be considered complete and that NS Power can be permitted to move forward with execution of its Action Plan and Roadmap, while continuing to take into consideration the input of the various parties.

Given the breadth and complexity of the Evergreen IRP Update, concerns raised regarding certain assumptions and key findings, as well as specifics related to certain scenarios and investments, are to be expected. Notwithstanding, most stakeholders found that the Evergreen IRP Update process was transparent, helpful, and an improvement over the already robust 2020 IRP proceeding, and that there was overall reasonability and consensus in the analysis and key findings.

Key Themes

There were several common key themes noted in the submissions provided by both Board consultants and participants, which can be broadly categorized as follows:

- Reflections on the Evergreen IRP Analysis
- Specific Recommendations: Future Analysis & Action Plan Items

Reflections on the Evergreen IRP Analysis

General Comments on the Update Process, Reasonability of Analysis and Key Findings

Comments from Board Counsel's consultants and many participants were generally positive with respect to the quality of analysis and reasonability of key findings of the Evergreen IRP process.

Board Counsel consultant, Synapse, generally supports the Evergreen IRP Update underlying analyses and key findings:

> Based on our review of IRP documents, Synapse generally supports the methods underlying the technical and economic analyses and NSPI's associated key findings for many, but not all, of the elements in NSPI's Action Plan and Roadmap.[1]

Board Counsel consultant, Bates White, provided positive comments regarding the overall Evergreen IRP update, with an emphasis on continued monitoring of factors potentially affecting the analysis:

> In our view, NSPI's Evergreen Update is a thorough, informative, and succinct document that acknowledges a number of key efforts that will be

[1] Synapse Submission, *Synapse Comments on Nova Scotia Power Updated Action Plan and Roadmap (August 2023)*, M11307, September 8, 2023, Page 2 of 11.

> required going forward, including monitoring uncertain factors closely (such as development of the hydrogen industry in Nova Scotia and its impact on demand for electricity and supply of a low carbon fuel for power generation).[2]

Like in the 2020 IRP proceeding, NS Power is pleased to receive these mostly supportive comments on the outcome of the Evergreen IRP Update, especially given the breadth and technical complexity of the Evergreen IRP Update exercise. It is to be expected that there will be areas of disagreement among technical consultants. However, the objective for NS Power throughout both the 2020 IRP and the Evergreen Update was to ensure input was fully considered and that at the conclusion of the exercise, parties would be in a position to confirm their view that the 2020 IRP exercise produced a reasonable strategic plan upon which to base future actions.

GS, on behalf of the CA, provided the following with respect to the thoroughness of the analysis and final modelling results:

> 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.[3]
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> 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.[4]

The SBA noted balance that the Evergreen IRP Update strikes between a rapidly evolving planning environment and providing improved insight on planning decisions:

> The SBA supports the Evergreen IRP process as an improvement in NSPI's long-term planning processes. Given the rapid evolution of a variety of policy, economic, and technological conditions, an increase frequency of updates to the IRP can lead to improved resource planning outcomes and

[2] Bates White Submission, *Bates White Economic Consulting's Comments On Nova Scotia Power, Inc.'s Evergreen IRP Action Plan & Roadmap Update*, M11307, September 8, 2023, Page 3 of 9.
[3] Grid Strategies Submission, *Review of Nova Scotia Power's Evergreen IRP, Updated Action Plan and Roadmap (August 8, 2023)*, M11307, September 26, 2023, Page 1 of 6.
[4] Ibid, Page 2 of 6.

> lower costs to customers. The SBA believes that, as a first effort in the Evergreen IRP structure, NSPI has demonstrated a good balance of conducting enough analysis to provide improved insight on planning decisions without engaging in endless updates and analysis to capture all changing conditions and sensitivities.
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> The SBA has been an active participant in all discussions throughout the stakeholder process and has provided multiple rounds of comments. The SBA has reviewed the updated filing and in general, the SBA agrees with NSPI' s priorities detailed in the Action Plan and Roadmap.[5]
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> The SBA believes that the ongoing collaboration and feedback opportunity in this Evergreen IRP process has been incredibly helpful and helps assist all stakeholders in understanding how NSPI and its customers are going to transition to a new no-coal/net-zero electricity grid.[6]

Eastward Energy also acknowledged the Evergreen IRP Update as a "substantive undertaking which has captured many revisions to assumptions since the prior IRP."[7]

The Atlantic Loop

A prominent issue arising from participant feedback, and indeed a focus throughout the Evergreen IRP process, was the potential impact of the Atlantic Loop project. In particular, stakeholders submitted comments highlighting potential risks from an overall cost, timeline, and commercial agreement perspective. Much of the feedback recommended NS Power progress alternative plans in the event the Atlantic Loop is not feasible, particularly on a 2030 timeframe, in order to ensure the 2030 decarbonization targets are met.

NS Power's current planning does not anticipate that the Atlantic Loop will be available by 2030. As demonstrated in the 2023 10 Year System Outlook report, the Company's central planning case is consistent with Evergreen IRP scenario CE1-E1-R2, which does not include the Atlantic Loop. Using scenario CE1-E1-R2 as the basis for system planning allows NS Power to act on investments corresponding to the updated Evergreen IRP Action Plan and 2030 Resource Development Plan (Figure 9 of the Evergreen IRP Update) to meet 2030

[5] SBA Letter, Re: M11307 - Nova Scotia Power Inc. - 2023 Evergreen IRP Action Plan and Roadmap Update, M11307, September 26, 2023, Page 1 of 3.
[6] Ibid, Page 3 of 3.
[7] Eastward Energy Letter, Re: Nova Scotia Power Inc. 2023 Evergreen Integrated Resources Plan ("IRP") Updated Action Plan and Roadmap, M11307, September 26, 2023, Page 1 of 4.

decarbonization targets, and leaves open the ability to further study various regional integration opportunities post-2030.

There continues to be value in understanding regional integration opportunities over the long term, in alignment with Evergreen IRP scenario CE1-E1-R1-AAT that evaluated a 2035 in-service date for the Atlantic Loop. NS Power will continue to participate in discussions on opportunities for regional integration, as per Action Plan Item 1b, and will adjust the long term resource plan if needed based on these opportunities as they evolve. This approach was supported by feedback from Bates White and reflects the Company's continued focus on regional sources of available import capacity; however, as previously stated, the Company is not planning for Atlantic Loop availability by 2030.

The updated IRP Action Plan and Roadmap and the associated 2030 Resource Development Plan includes the common resources and investments seen across the twenty-four Evergreen IRP scenarios. Accordingly, the Evergreen IRP conclusions and Resource Development Plan provide a firm basis on which to pursue this system transformation consistent with the approach recommended by stakeholders.

Hydrogen Analysis & Tariff Development

The CA and the SBA referenced the need for the assessment of future hydrogen development (load, generation) in Nova Scotia (SBA) and the need for tariff development to support hydrogen production in the region (CA).

The Evergreen IRP assessed the impacts of a generic hydrogen plant (incremental load served by renewable resources on an annual basis, and the availability of a lower priced domestic hydrogen fuel source), and the Evergreen IRP updated Roadmap includes Item 11: Hydrogen Tariff Impacts which focuses on the monitoring of hydrogen specific tariff development.

Hydrogen project specific work and the development of the tariff are initiatives completed outside of the Evergreen IRP process. This work (both project assessment and tariff structure) is managed separately by NS Power along with stakeholders, but will tie back to the Evergreen IRP process through specific Roadmap items (Roadmap Items 3, 8, and 11 in particular).

Diversity Benefit of Wind, Solar and Batteries

Feedback received from Synapse, E1 and NRR requested additional study work to evaluate the additional effective load carrying capacity (ELCC) diversity benefit of having combinations of battery, wind, solar, and demand response resources on the system

simultaneously.

As part of the 2019 Planning Reserve Margin and Capacity Value Study (Capacity Study), which informed the 2020 IRP, Energy and Environmental Economics (E3) calculated the diversity benefit of having both battery and renewable energy sources on the system (combination of batteries and wind or batteries and solar) and the additional ELCC credit that can be achieved via the combination of these two energy-limited resources. The ELCC diversity benefit of wind + storage was incorporated into the Evergreen IRP model. For example, in scenario CE1-E1-R2 a diversity benefit of 4.8 MW is credited in the resource plan in 2030, reflecting the pairing credit of 140MW of 4-hr energy storage with the incremental wind build of 1,497MW.

The diversity benefit of solar and storage was not included in the PLEXOS model, since the potential interactive effect of considering wind + solar + storage diversity benefits simultaneously was not considered from the 2019 capacity value study. Wind was the primary variable renewable resource added in both the initial insights and draft modeling results phases of the Evergreen IRP, with very little grid-connected solar seen in any resource plans at those stages of the process.

NS Power notes that in the Final Modeling Results, many resource plans (including CE1-E1-R2) incorporate approximately 200MW of grid-connected solar by 2030, with this change likely driven in part by the addition of the federal Investment Tax Credits between the Draft and Final results. Ignoring any potential "double counting" of wind + storage and solar + storage diversity credits, the credit for pairing 140MW of 4-hr storage with 200MW of solar would be approximately 18MW per the 2019 Capacity Study. If the addition of this credit increased the solar and storage build in the optimal capacity expansion plan to, for example, 300MW of 4-hr storage with 300MW of solar, the diversity credit would increase to 38MW. NS Power notes that this approach may result in "over-crediting" the diversity benefit, since the same capacity of installed 4-hr storage is now being credited for pairing with wind and solar simultaneously.

Synapse, E1 and NRR have recommended expanding the Capacity Study to include the evaluation of incremental diversity benefit from higher order interactive effects (i.e. solar + wind + battery + demand response), to determine the potential to offset a portion of the requirement for other new firm capacity resources. NS Power acknowledges this request and will investigate avenues for completing this work prior to the next IRP analysis.

NS Power notes that a firm capacity benefit of 18MW-40MW is valuable to the system and should be considered in future modeling and planning work. Comparatively, there is an average requirement of approximately 600MW of new fast acting generation capacity by 2032 in No Atlantic Loop Evergreen IRP scenarios. The Company's 2023 Load Forecast

Report also shows accelerated firm peak growth relative to the 2022 Load Forecast Report. Accordingly, although there is potential value in the diversity benefit of added solar and storage, further study is not necessary prior to proceeding with the first addition of 300MW of new fast acting generation with an in-service target of 2027 identified in the 2030 Resource Development Plan.

This interpretation is supported by feedback from both PHP and Eastward Energy. Specifically, PHP acknowledged that although there could be some potential additional diversity benefits, the benefits would not be significant enough to substantially limit the immediate need for new firm, fast-acting generation.[8] As well, Eastward Energy expressed concern related to the timeline as fast acting generation plants take time to site and build; further study jeopardizes ensuring there is adequate in-Province capacity to accommodate the integration of forthcoming variable renewable generation.[9] Proceeding with the first addition of fast acting generation under the resource development plan also enables NS Power to respond to potential scenarios in the planning environment, such as an increased pace of load growth due to economy-wide electrification and population growth.

Pace of 2030 Resource Development Plan Execution

A frequently repeated concern was with respect to the pace at which NS Power is pursuing investments required to meet 2030 decarbonization targets: namely, reaching 80 percent renewable generation and phasing out coal generation.

The objective of NS Power's IRP process is to develop a robust, risk-weighted least-cost long-term electricity strategy. This strategy informs the development of the IRP Action Plan and Roadmap, describing the key tasks to be undertaken in the next five years to implement the strategy. NS Power has collaborated with stakeholders and promoted understanding and consensus on the next steps that the Company, in collaboration with partners across the province, must take toward achieving the 2030 decarbonization targets. In NS Power's view, the Evergreen IRP has satisfied these objectives and provided a long-term strategy upon which individual capital projects can now be submitted for the Board's review and approval. NS Power will rely on this alignment to the IRP Action Plan in these future submissions in order to maintain the required pace of system transformation to 2030.

NS Power will continue to move forward with planning and execution of capital investments corresponding to the IRP Action Plan. The Company also notes that plans

[8] PHP Letter, RE: M11307 – Nova Scotia Power Inc. 2023 Evergreen Integrated Resources Plan ("IRP") Updated Action Plan and Roadmap, M11307, September 26 2023, Page 3 of 4.
[9] Eastward Energy Letter, Re: Nova Scotia Power Inc. 2023 Evergreen Integrated Resources Plan ("IRP") Updated Action Plan and Roadmap, M11307, September 26, 2023, Page 3 of 4.

regarding the pursuit of corresponding capital investments in accordance with the IRP Action Plan were canvassed during the 2023 ACE Plan proceeding and hearing, resulting in the following NSUARB direction:

1) File a detailed and specific plan outlining how the Company will achieve the 2030 obligations, what specific steps are required to meet these obligations, how the proposed steps will accomplish that goal, and when these steps will be taken.

2) Use its best efforts to file such a plan with the 2024 ACE Plan. Keeping in mind the usual November filing of the ACE Plan. If this is not possible, the Board directs that a detailed plan be filed by December 31, 2023.[10]

It is NS Power's opinion that the "detailed and specific plan outlining how the Company will achieve the 2030 obligations" will address related concerns raised by the Board's consultants and participants in the Evergreen IRP Update engagement. NS Power intends to file its submission with the Board by December 31, 2023 in compliance with the directives.

Specific Recommendations: Future Analysis & Action Plan Items

All Source RFP Process

Bates White and Grid Strategies on behalf of the Consumer Advocate recommend all source RFP processes to acquire generation and infrastructure assets deemed necessary in the Evergreen IRP Update resource plan to meet the 2030 decarbonization targets and beyond.

NS Power anticipates that multiple and robust procurement processes will be required and pursued to support the progression of the IRP Action Plan, some of which are anticipated to be prescribed and administered by the Province and not the Company.

NS Power will continue to work with the Province and engage with stakeholders on future project-specific processes to procure the necessary resources on the path to 2030. Any related capital investments will be subject to NSUARB review and approval, resulting in the engagement of formal hearing proceedings and the involvement of interested stakeholders' review and comment.

Publication of the Electrification Study

[10] NSUARB Order, Re: IN THE MATTER OF AN APPLICATION by NOVA SCOTIA POWER INCORPORATED for Approval of its Annual Capital Expenditure Plan for 2023, M11017, September 12, 2023, Page 1 of 2.

Eastward Energy, PHP, and Synapse expressed urgency in finalizing and publishing the results of the E3 Electrification Study for stakeholder review. NS Power is committed to releasing this report for stakeholder review in 2023.

Wind Curtailment Reduction Opportunities/Dispatch and Wind Integration Studies

NS Power notes broad stakeholder support for the IRP Action items related to the publication of wind integration studies and the analysis of opportunities to reduce curtailment. NS Power will be publishing the wind integration studies for stakeholder review in 2023 in alignment with the IRP Action Plan. As described in the IRP Action Plan, NS Power will initiate studies on opportunities to support the optimization of wind dispatch and minimization of curtailment with the increase in variable renewable generation on the system while maintaining system reliability.

Additional Study of the Hybrid Peak Mitigation

The CA, E1 and EE support continued study of the value of the Hybrid Peak Mitigation electrification profile. Specifically, the study of the potential costs associated with the hybrid peak electrification strategy is requested to enable additional analysis of the benefits.

NS Power has included future assessment of the hybrid peak electrification strategy in Action Plan Item 4b. NS Power will be an active participant in the process, but the opinion of the Company is that such a study should be led by an external third-party to coordinate the multi-stakeholder process required to ensure a robust study.

Urgency of the Reliability Tie Project

PHP, NRR and Synapse are in agreement on the urgency of progressing the Reliability Tie project given its noted importance to the long-term strategy based on the key findings of the Evergreen IRP Update. NS Power acknowledges this urgency and will continue to progress the development of the Reliability Tie project per IRP Action Plan Item 1a.

Clean Electricity Regulation and Impacts on the Long-Term Strategy

PHP and NRR commented on the importance of participating in the CER consultation process with the Federal Government and assessing the impacts of this pending regulation on the long-term electricity strategy.

Pursuant to Road Map Item 5, NS Power will continue to participate in the engagement process with the Federal Environment and Climate Change Canada (ECCC).

The Path Forward

The Evergreen IRP Update was undertaken due to the continued pace of change in the planning environment, including significant shifts in environmental policy. In particular, since the 2020 IRP process, Nova Scotia has established a deadline of 2030 to achieve 80 percent renewable electricity sales and to phase-out coal generation. These factors and more triggered 2020 IRP Roadmap items leading to re-examining the 2020 IRP analysis through this Evergreen IRP process, with appropriate revisions to the long-term electricity strategy. It is within this context that many of the parties' comments are made, which understandably reflect some discomfort with the shifting planning landscape.

Nevertheless, the Company notes that many of the key findings of the Evergreen IRP Update are consistent with the conclusions of the 2020 IRP. This provides confidence that the conclusions and preferred scenarios established in both the 2020 IRP and Evergreen IRP Update will withstand even significant changes in the planning environment without major modification to NS Power's near to long-term electricity strategy.

NS Power must balance continued review of ongoing IRP Roadmap items while advancing investments in accordance with the 2030 Resource Development Plan in the best interest of customers. This includes pursuing and acting on corresponding capital investments in the near to mid-term, providing appropriate justifications and review of alternatives as appropriate. It has been well recognized that an IRP is a planning exercise; how a strategic plan established by an IRP is operationalized and commercialized is not part of the scope of that exercise as confirmed in the Terms of Reference (ToR) approved for the 2020 IRP process:

> The IRP is a comprehensive public utility planning exercise that integrates resource options (both supply and demand-side) in order to develop a long-term electricity strategy for the Utility. The IRP provides a roadmap to guide the Utility's strategy for meeting its resource needs over the planning horizon. It is directional, not prescriptive in nature. The IRP does not commit the Utility to certain courses of action or foreclose options determined to be in the interests of customers subsequent to completion of the process. Instead, the plan is meant to provide the Utility with flexibility to effectively accommodate a range of future uncertainties and opportunities.[11]

Notwithstanding the directional nature of the IRP outcomes and flexibility to accommodate

[11] 2020 Integrated Resource Plan Terms of Reference, M08929, submitted December 16, 2019, approved by NSUARB January 21, 2020.

future uncertainties, resource needs that may be put forward for approval by the NSUARB are justified in part as having been compared to alternatives in the IRP and determined to be part of a suite of "no regrets" investments. Indeed, NRR acknowledged as much in its submission, providing that "NRR does not disagree with all the findings of the IRP, noting that many near-term decisions are common to all scenarios, and that these no-regrets decisions can set the direction for utility operations during the period when the problems with this IRP are resolved." [12]

NS Power notes the release of *Nova Scotia's 2030 Clean Power Plan* by the Province of Nova Scotia on October 11, 2023. NS Power is pleased to see significant alignment between that plan and the elements of the updated IRP Action Plan and Roadmap. NS Power will further consider this alignment in the plan it will file with the Board prior to December 31, 2023, outlining how it will achieve the 2030 obligations, as directed by the Board in its decision in M11017.

From NS Power's perspective, the comments provided by the Board's consultants and participants regarding the Evergreen IRP Update can be accommodated by continued work informing future Evergreen IRP updates, and do not detract from the general endorsement for the quality of the Evergreen IRP process, nor should they limit the Company's ability to act on resource needs in pursuit of achieving the 2030 decarbonization targets. NS Power is appreciative of the participation and perspectives of the Board's consultants and all participants regarding this matter.

Yours truly,

Mark Peachey, LL.B.
Manager, Capital Filings

[12] Department of Natural Resources and Renewables Letter, RE: M11307 – NRR Comments on Evergreen Update, M11307, September 26, 2023, Page 4 of 4.

Feedback Item #	Stakeholder/ Feedback Document Reference Page	Theme/Feedback	NSPI Response
1	Bates White Pg. 3	**RFP Process** NSPI should maximize use of best practices competitive procurement to mitigate costs, risks in needed resource investments. Should these resources be pursued, such an aggressive schedule and scope of resource additions will place a premium on the procurement process to manage cost and risk. We reiterate the best practices to be used in competitive procurements that we had previously identified in our December 2020 IRP comments. We make this as a general recommendation, recognizing that the timing, size, and specifications of the procurement(s) would require definition and additional thought. First, NSPI should pursue competitive procurements that solicit binding offers – not indicative bids – from interested and qualified entities. This will allow NSPI to compare competitive alternatives that clearly identify the costs of a given proposal.	NS Power notes that procurement decisions are not within the scope of the IRP but appreciates the feedback. NS Power submits that multiple and robust procurement processes will be required and pursued to support the progression of the IRP Action Plan, some of which are anticipated to be prescribed and administered by the Province and not the Company. NS Power will continue to work with the Province and engage with stakeholders on future project-specific processes to procure the necessary resources on the path to 2030. Any related capital investments will be subject to NSUARB review and approval, resulting in the engagement of formal hearing proceedings and the involvement of interested stakeholders' review and comment.

		Second, NSPI should consider use of all-source RFPs, which would allow competition between disparate resources to provide common, defined products, such as replacement capacity for retiring thermal generation. Third, to the extent NSPI conducts technology-specific RFPs, NSPI should recognize the interaction between the price of the solicited resource and the optimal quantity. Fourth, competitive procurements can be designed to include bids from external control areas that could provide incentive for regional cooperation on transmission investment. Fifth, competitive procurement can also accommodate full participation by utility-sponsored projects and projects proposed by utility affiliates. Sixth, the competitive procurement can and should account for the reasonable expected environmental attributes of resources that assist NSPI in meeting (or exceeding) environmental limitations, mandates, and targets.	
2	Bates White Pg. 6	**Solar Capacity Additions** NSPI should expeditiously further assess solar capacity additions and include both solar and wind together in procurement decisions.	NS Power anticipates the procurement of solar resources will continue to be included in future renewable procurement processes. This multi-resource approach has been seen in the Rate Base Procurement and the draft materials related to the Green Choice Program.

		NSPI states that "[t]he addition of 200 MW of solar capacity is consistent among all scenarios by 2030 and **requires further assessment** as a near term renewable resource option." We agree that further assessment of solar capacity additions is warranted and would recommend NSPI do such an assessment expeditiously, given the time constraints inherent in procuring any needed resources in the near term. Additionally, we note that NSPI's discussion of solar capacity procurement does not fully explain whether solar capacity procurement would be done pursuant to a solar-only procurement, or whether it would be coupled with wind (or other resources). In our view, solar resources should, at minimum, be procured pursuant to best practices competitive solicitations alongside other renewable resource options, such as wind, and should also be procured in any all-source procurements issued by NSPI.	The assessment of the additional solar capacity requirements on the system is intended to verify the value of solar in comparison to wind, for example due to naturally occurring resource diversity. This could inform anticipated solar-specific procurement exercises such as the Community Solar program.
3	Bates White Pg. 6	**The Atlantic Loop** The Atlantic Loop is a large-scale, interregional megaproject that carries with it potentially unparalleled costs, benefits, and risks. Given these costs and risks, we recommend NSPI consider other regional solutions as it continues to consider the Atlantic Loop project. Encouragingly, and as noted above, NSPI acknowledged that it would pursue "other opportunities for regional integration" beyond the Atlantic Loop in its IRP Action Plan. We	NS Power's current planning does not anticipate that the Atlantic Loop will be available by 2030. As demonstrated in the 2023 10 Year System Outlook report, the Company's central planning case is consistent with Evergreen IRP scenario CE1-E1-R2, which does not include the Atlantic Loop. Using scenario CE1-E1-R2 as the basis for system planning allows NS Power to act on investments corresponding to the updated Evergreen IRP Action Plan and 2030 Resource Development Plan (Figure 9 of the Evergreen IRP Update) to meet 2030 decarbonization targets, and leaves open the ability to further study various regional integration opportunities post-2030.

		suggest NSPI 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. NSPI should not myopically pursue the Atlantic Loop or consider the Atlantic Loop as the only viable alternative to development of emerging no-carbon solutions like small nuclear modular reactors ("SMRs"). NSPI should maintain a flexible approach to regional integration and consider the costs and risks of its regional options and should focus on near-term efforts that provide value regardless of the eventual viability of the Atlantic Loop.	There continues to be value in understanding regional integration opportunities over the long term, in alignment with Evergreen IRP scenario CE1-E1-R1-AAT that evaluated a 2035 in-service date for the Atlantic Loop. NS Power will continue to participate in discussions on opportunities for regional integration, as per Action Plan Item 1b, and will adjust the long term resource plan if needed based on these discussions as they evolve. This approach was supported by feedback from Bates White and reflects the Company's continued focus on regional sources of available import capacity. For clarity, the Company repeats that it is not planning for Atlantic Loop availability by 2030. NS Power has demonstrated its commitment to remaining live to any potential import options with neighbouring jurisdictions and will continue to assess opportunities as part of the Updated Action Plan and Roadmap, specifically Action Plan Item 1b. NS Power has previously demonstrated active pursuit of Joint Dispatch opportunities, including the execution of a Joint Dispatch agreement with NB Power that is still in effect today. NS Power continues to be open to enhanced joint dispatch with neighbouring utilities.
4	Consumer Advocate Pg. 2	**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."	NS Power supports the continued study of the hybrid peak mitigation scenario and will be an active participant in any study work to assess the cost and value of the hybrid peak mitigation approach. Although NS Power would be involved and provide support, this process should be led by a third party organization that can coordinate a multi-stakeholder study and be responsible for managing the interests of all parties involved.

		(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. The answer needs to involve clear standards for making trade-offs 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.	
5	Consumer Advocate Pg. 3	**Atlantic Loop** 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.	Please see response to Bates White feedback item #3 above. For clarity, in the bi-directional scenario (CE1-E1-R1-BD) no monetary value is assigned to the transaction in either direction; rather an energy exchange on a volume basis is contemplated, with an export of 2.5TWh and a corresponding import of 2TWh.

		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)	
6	Consumer Advocate Pg. 4	**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." Either a member utility is designated to operate the dispatch (which could lead to concerns about bias) or an independent administrator can be established. 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	NS Power has previously demonstrated active pursuit of Joint Dispatch opportunities, including the execution of a Joint Dispatch agreement with NB Power that is still in effect today. NS Power continues to be open to enhanced joint dispatch with neighbouring utilities.

		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.	
7	Consumer Advocate Pg. 6	**Procurement** 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 quantify 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, 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 and solar.	Please see response to Bates White Feedback item #1 above.

		- 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. 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.	
8	Consumer Advocate Pg. 5	**Reliability Tie** 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.	NS Power is progressing design work on this project in order to target a 2028 in-service date per the 2030 Resource Development Plan
9	Consumer Advocate	**Enhanced Operational Practices**	NS Power is progressing the development of projects to enable more complex commitment and dispatch decisions to support the integration of wind resources as coal generation

	Pg. 5	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.	is phased out and variable renewable generation is increased on the system. This work, outside of the scope of the IRP, is being monitored via the FAM Audit Action Plan.
10	Consumer Advocate Pg. 6	**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.	NS Power evaluated the MMDSM profile in three scenarios for which there are comparable scenarios using the Base DSM profile: • CE1-E1-R1 (Base With Atlantic Loop) • CE1-E1-R2 (Base No Atlantic Loop) • CE1-E2-R2 (Hybrid Peak No Atlantic Loop) In all cases, the MMDSM plans were more expensive on a 26-yr NPV basis by between $320MM and $390MM (average $347MM) than their comparable Base DSM plan. The incremental cumulative energy and capacity savings under MMDSM, relative to Base DSM, are approximately 300GWh and 43MW respectively. The incremental program cost of MMDSM over Base DSM, on a 26-yr NPV basis, is $474MM. This indicates that the DSM program is reducing system costs by $127MM, on average across 3 scenarios, over the 26-yr planning horizon. NS Power interprets this result as

			demonstrating that the system does realize savings via the incremental avoided capacity and energy over the long term, relying on the cumulative effects of the incremental DSM measures implemented under MMDSM.
11	Consumer Advocate Pg. 6	**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.	NS Power is working closely with hydrogen developers but is still at the stage of assessing the requirements of the individual developers, which vary depending on their current operating methodologies. The development of a generic tariff outside of this work would be incremental effort that would not reflect the specific needs being identified by these customers.
12	Consumer Advocate	**Geothermal Energy**	NS Power has modeled geothermal as a resource option in the evergreen IRP to reflect the pilot stage nature of this

	Pg. 6	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. 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. The potential geothermal aquifers identified in Nova Scotia at depths of 5.5 to 7 km could be re-evaluated using the updated methods described by NREL, and the commercial potential assessed in light of the Fervo Energy accomplishment.	emerging resource (binary system deep enhanced geothermal wells). The research completed by the Province of Nova Scotia points to the value of geothermal as a local heating source. The potential for deep geothermal wells is not yet fully understood and future development appears to require stimulation of the reservoir to achieve temperature gradients necessary for grid power generation. NS Power is prepared to actively participate in any future Provincial programs evaluating geothermal resources. As the potential for this resource is better understood in NS, the resources referenced by the Consumer Advocate can be used to provide insight into the technology that can be used to access deep aquifers and the costs associated with it.
13	Eastward Energy Pg. 1	**Hybrid Peak Mitigation** Eastward notes NSPI's support at page 4 of its responses to stakeholder comments, in direct response to a question from Eastward, for a multi stakeholder process to further analyze the issue of hybrid peak mitigation, which process NSPI notes could be led by a third-party organization with experience in leading multi sector energy studies. Eastward supports such an approach and believes it has particular insight in this regard, and suggests that the Board specifically note the requirement for the ongoing review to include collaboration with Eastward and other energy providers that can provide peak mitigation,	Please see response to Consumer Advocate Comment #4 above. NS Power supports the future evaluation of the hybrid peak mitigation scenario as well and is looking forward to partaking in the study work.

		consistent with its recent findings in *Eastward Energy Incorporated (Formerly Heritage Gas) (Re)*, 2023 NSUARB 166 (M10960), where the Board held as follows: [43]…The Board agrees that there is a benefit to coordinated planning for the energy transition, although any policy discussions with the provincial government could affect that planning. That said, the Board will direct its staff to engage with regulated entities to explore whether there are opportunities for more efficient and effective coordination of the long-term planning processes of regulated entities. NSPI notes at page 13 of its Update that "pursuing a hybrid peak solution could have value to customers via avoidance of new firm capacity costs". Eastward believes this is highly likely to be the case and can commit to actively collaborating in any further review to address this opportunity. As this review will involve collaboration of competitive energy service providers, Eastward suggests that it would be useful for the review to be conducted by an impartial third party who would be able to ensure that the results were based fully on obtaining the lowest cost reliable energy solution. Eastward looks forward to participating in the process.	
14	Eastward Energy Pg. 2	**Fast Acting Generation and Coal to Gas Conversion** Eastward views natural gas and its infrastructure as being central to the fight against climate	NS Power will continue to progress fast acting generation and coal to gas conversions in alignment with the long-term strategy and the 2030 Resource Development Plan.

		change and a critical resource to maintain energy security and reliability both on its own and in the production of electricity. As natural gas plants take time to site and build, Eastward believes that any such review as called for by Synapse, and which may be mandated by the Board, should be placed on a very tight timeline so as not to jeopardize ensuring that the NSPI system has adequate in-Province capacity to accommodate the substantive amounts of non-dispatchable electricity which the IRP Evergreen Update calls for. Further, Eastward notes NSPI's statement that "Fuel flexibility is a component of this work, including consideration for low/zero carbon alternative fuels such as hydrogen." Eastward fully supports this approach.	
15	Eastward Energy Pg. 3	**Atlantic Loop** Eastward notes and shares the concerns expressed by Synapse and Bates White regarding the assumptions underpinning the Atlantic Loop bi-directional flow sensitivity run. Synapse notes at page 2 of its report that "the underlying assumptions of the bi-directional flow sensitivity are not based on any contractual commitments with Quebec, and thus it is unclear how robust is the finding that under a bi-directional contract, the NPVRR costs would remain lower than the No Atlantic Loop costs". Bates White notes on page 9 of its report that, “NSPI should maintain a flexible approach to regional integration and consider the costs and risks of its regional options and should focus on near-term efforts that provide value	Please refer to the Bates White feedback response item #3 above.

		regardless of the eventual viability of the Atlantic Loop." Eastward agrees with this approach.	
16	Eastward Energy Pg. 3	**Hydrogen** Eastward appreciates NSPI's comments regarding monitoring the development of low/zero carbon fuels in Roadmap Item 3, monitoring emerging technologies, including hydrogen combustion turbines, in Roadmap Item 8, and monitoring the development of the hydrogen industry in Nova Scotia in Roadmap Item 11, and supports these elements of the Roadmap. Eastward is actively engaged in the development of hydrogen production for domestic end-use within the Province.	NS Power appreciates the feedback and insight into the work Eastward is undertaking with respect to the domestic end use hydrogen source in the Province.
17	Eastward Energy Pg. 4	**Other** Eastward also supports NSPI IRP Action Plan Item 2c to address the electrification impacts on the transmission and distribution (T&D) assets, and suggests that the Board set a schedule for ongoing update reporting by NSPI in this regard. In response to E1 at page 14 of its responses to stakeholder comments, NSP noted that it acknowledged E1's request that upon release of the final Electrification Strategy Roadmap, planned for release in 2023, that NSPI and E3 provide full technical support and detail (eg. modeling results if appropriate) alongside the document. Eastward believes it would be useful for the Board to indicate that this information is to be provided to IRP participants upon release of the electrification study results.	NS Power will be releasing the electrification study from E3 in 2023 for stakeholder review and will include reference to modeling assumptions and outcomes. NS Power is currently assessing the Clean Electricity Regulations under Canada Gazette 1 and will provide updates to stakeholders on any key findings that would influence the Action Plan and Roadmap.

		Eastward notes that the federal government issued draft *Clean Electricity Regulations*. Upon Eastward's review of these draft regulations, we anticipate they will create economic and technical challenges for NSPI. Eastward assumes NSPI and many market participants will be commenting on the impacts of those draft regulations during the ongoing review period. Eastward will be monitoring this issue closely as it continues to unfold.	
18	Efficiency One Pg. 3	**IRP Results/Terms of Reference** E1 recommends that the primary and secondary evaluation criteria outlined in the 2020 IRP Terms of Reference be considered in analyzing and understanding the results of the Evergreen IRP processes. E1 recommends that NS Power clarify how CE1-E1-R2 was selected for use in the 10-year system outlook.	NS Power has been consistent with the objectives and evaluation metrics identified in the 2020 IRP Terms of Reference. CE1-E1-R2 was selected as the basis for the 10 Year System Outlook report for 2023 as it was the scenario with the lowest 26-yr NPV (adjusted for end effects) that incorporated: • No Atlantic Loop • Net Zero 2035 • Base Fuel & Purchased Power Prices
19	Efficiency One Pg. 6	**Atlantic Loop** E1 recommends that the reduced Plan Flexibility and risk characteristics associated with the Bi-Directional Atlantic Loop scenario be considered when determining the appropriateness of IRP findings.	As outlined in the Action Plan and supported by stakeholder comments, NS Power will continue to pursue both the Atlantic Loop project and opportunities for other Regional Integration or import opportunities and will update the IRP findings if significant changes in those assumptions are observed.
20	Efficiency One Pg. 6	**Hybrid Peak** E1 recommends that the implications inherent in any hybrid peak solution be clarified and that further analysis of the hybrid peak mitigation scenarios include all customer costs and benefits,	Please refer to Eastward Energy feedback response item #13.

		utility costs and benefits, and all-fuel GHG emissions in an effort to appreciate the economic and decarbonization potential of these scenarios.	
21	Efficiency One Pg. 9	**DSM** In the context of analyzing the 2022 Evergreen IRP Final Modeling Results, E1 recommends that the limitations of the 2019 DSM Potential Study be acknowledged. That is, the 2019 DSM Potential Study's limitations may render it conservative relative to current market conditions which may offer additional DSM opportunities (e.g., greater electrification activity, emerging technologies).	DSM profiles in the evergreen IRP continue to be based on the 2019 DSM Potential Study; E1 notes in its comments that "This study remains the best source of DSM Potential for use in an IRP process". In collaboration with E1 through the assumptions development stage of the IRP, NS Power included additional scenarios provided by E1 to test an updated range of potential outcomes (Base Plus DSM and Modified Mid DSM). NS Power acknowledges the opportunities for continued improvement in DSM modeling while maintaining the view that the DSM representation in the evergreen IRP is sufficient based on the best available information today.
22	Efficiency One Pg. 9	**DSM** E1 recommends that the NPVRR results be interpreted with caution, considering the complexities of the scenarios and the unknowns regarding the performance of the difference DSM levels.	For each DSM scenario modeled, NS Power incorporated the DSM (and DR) savings into the load forecast and included the DSM costs in the evergreen IRP modeling work. The resultant NPVRR of each scenario is reflective of the input assumptions and constraints. NS Power acknowledges that, similar to any other input assumptions, uncertainty and unknowns exist and that per E1's submission, the DSM assumptions used in the evergreen IRP are based on the best available information source today.
23	Efficiency One Pg. 10	**Project Risk** E1 continues to recommend the development and implementation of a risk matrix for each scenario to assess the degree to which technical, legislative, and stakeholder risks and concerns have been identified within each scenario.	The long-term electricity strategy is informed by the common action items from the range of scenarios modeled. This approach is intended to ensure the robustness of the Action Plan and Roadmap items, in alignment with the Terms of Reference. Project-specific risks associated with particular action items will be assessed in detail at the project level and will be submitted as part of any corresponding Board approvals for review by the Board and Intervenors.

24	Efficiency One Pg. 10	**DSM** The 2022 Evergreen IRP only considered energy efficiency and demand response as DSM resources. "Base DSM" only considered energy efficiency. To the extent other DSM (e.g., distributed energy resources) activities are contemplated in the future, it should be recognized that these were not included in the modeled DSM activities, savings or expenditures in the 2022 evergreen IRP. It is recommended that these other DSM activities be considered separate and distinct, when compared with the results of the 2022 IRP associated with DSM in particular.	NS Power has included the impacts of both DSM and DR in the evergreen IRP load forecast assumptions. For clarity, the "Base DSM" program, similar to the other levels of DSM programming modeled, includes both DSM and DR components (see slide 29 of the updated IRP assumptions, January 2023).
25	Efficiency One Pg. 11	**Avoided Costs of DSM** E1 recommends a thorough and transparent stakeholder engagement process for the development of these updated avoided costs. E1 requests that considerations related to avoided costs in the context of Distributed Energy Resources (DERs) and electrification activities be examined. E1 continues to request that NS Power propose an appropriate methodology for valuing the avoided costs of demand response.	NS Power will continue to work with the DSM Advisory Group on the development of the avoided costs of DSM for both energy/capacity and transmission/distribution. An initial proposal for Avoid Cost modeling was shared with the DSMAG at the Sept. 28 2023 meeting.
26	Efficiency One Pg. 13	**HDER Scenario** E1 wishes to highlight the utility benefits of distributed energy resources, such as solar PV, as shown in the HDER scenarios modeled. E1	NS Power's Smart Grid Nova Scotia (SGNS) Project is on track to provide a final report to the NSUARB by year-end 2023. The final report will detail the data and learnings from testing

		recommends that further work should be completed to study the full costs and benefits of DERs and to better understand how these resources can be optimized to maximize grid benefits.	multiple use cases and corresponding benefits arising from DERMS control of various DER asset classes.
27	Efficiency One Pg. 14	**Emissions** E1 requests that NS Power provide additional information relating to the planned activities throughout 2023-2025 that will induce the significant drop in emission intensity that is forecasted for these years. E1 further requests that NS Power provide an update regarding whether these activities are on-track and what related risks and risk mitigation strategies have been identified.	Between 2023 and 2025, reductions begin for emitting generation (reduction in generation as a result of carbon tax; thermal units in cold reserve) and an increase in wind capacity on the system from Provincial procurement projects. In addition, the delivery of energy over the Maritime Link at commercial volumes leads to significant emissions reductions relative to the 2022 historical data referenced by E1. The timing for these developments are referenced in the 2023 10 Year System Outlook report. There are no observed changes in timing as compared to the additions and removals referenced in the report.
28	Efficiency One Pg. 15	**Electrification Strategy Publication** E1 strongly agrees with Action Plan Item 2a and recommends that NS Power carry the results of this analysis into the estimation of avoided costs of T&D. E1 expects these avoided costs to grow with increased level of system build-out anticipated as part of increased load growth in coming years.	The electrification strategy will be released in 2023 for stakeholder feedback.
29	Efficiency One Pg. 15	**Hybrid Peak** E1 agrees that an understanding of the cost and impacts of the Hybrid Peak Mitigation Scenario is important. To the greatest extent possible, E1 recommends that the analysis should contemplate non-technical factors, such as product availability, expected customer	Please refer to Eastward Energy feedback response item #13. NS Power supports the continued study of the hybrid peak mitigation scenario and a multi sector approach to supporting this study, which would enable the evaluation of non-technical factors as well.

		behaviour, and other non-technical factors affecting risk and be shared with stakeholders as well.	
30	Efficiency One Pg. 15	**Wind Integration Studies** NS Power intends to publish the results of ongoing wind integration studies in 2023, providing guidance and monitoring for any major changes going forward. E1 agrees that an additional study of renewable integration would be beneficial and recommends that any future work on wind integration recognize the emerging value of demand response as a tool for wind integration.	The wind integration study will be released for stakeholder review in 2023. The value of DR is incorporated into the load forecast, which is an assumption in the wind integration modeling.
31	Efficiency One Pg. 15	**Installed Costs of Wind, Solar and Energy Storage** NS Power plans to continue to track the costs of wind, solar and storage to assess changes in costs. E1 strongly agrees with this and expects the costs of solar and battery storage to continue to evolve and require monitoring.	NS Power confirms continued inclusion of Roadmap Item 4 and the tracking of the costs for wind, solar and storage.
32	Efficiency One Pg. 16	**Electrification and Load Growth** NS Power plans to continue to monitor electrification and load growth within Nova Scotia. E1 supports this important work and recommends that any learnings be used to provide updates to the core electrification forecasts contained within the Load Forecast processes.	Learnings from the E3 electrification study work have, and will continue to, inform NS Power's annual Load Forecast reports.
33	Efficiency One Pg. 16	**Evergreen IRP** NS Power suggests that the Evergreen IRP process "should facilitate annual updates as conditions	"Annual updates" reflects the update to stakeholders on the execution of Action Plan and Roadmap that NS Power produces after the end of each calendar year. Additional modeling will only be required if significant changes in the

		change and technology or market options develop, and as Action Plan items are completed or significantly advanced." E1 agrees that the Evergreen process should facilitate annual updates. E1 requests that NS Power clarify whether this means additional modeling should be completed each year, or whether that decision is expected to be made by NS Power, stakeholders, or some other group.	planning environment warrant further assessment, for example as identified by the IRP Roadmap Items.
34	Efficiency One Pg. 17	**Synapse Feedback** E1 agrees with the points made by Synapse and would like to see their recommendations implemented in future work associated with IRPs, as well as the implementation of Action Plan and Roadmap items. E1 agrees with Synapse's comments relating to ELCC and wishes to specifically emphasize the value of updating the input assumptions around ELCC in relation to DER and DR resources to ensure these resources are not underutilized, or that other resources are not over-built, on the basis that the capacity contributions from these technologies have been undervalued.	Please refer to NS Power's previous responses to Synapse's feedback below.
35	Natural Resources and Renewables Pg. 2	**Atlantic Loop** Bates White raises several further operational and project issues with the Loop in its comments. NRR takes no issue with this commentary and suggests that NSP be required to address these issues. NRR views these issues as critical and should be resolved before using Loop scenarios for planning.	Please refer to the Item #3 response to Bates White.

36	Natural Resources and Renewables Pg. 2	**Commercial Sensitivity** NRR observes that the UARB takes confidentiality seriously, and notes that NSP has several clear pathways for sharing confidential information with a select group of intervenors. The absence of information on the actual status of Quebec negotiations was unusual and reduces confidence in the process.	NS Power cautions that the sharing of commercially sensitive information during commercial negotiations, even on a confidential basis, would frustrate the purpose of achieving agreeable and beneficial commercial terms, and cause a cooling effect amongst the parties in the transparent exchange of information to achieve those goals. It is normal practice that in the event any resulting initiative or investment reaches commercial terms with parties, details, including resulting contracts and procurement recommendations, are submitted confidentially to the NSUARB for its review.
37	Natural Resources and Renewables Pg. 2	**End Effects** NRR suggests that decisions be weighted based on near- to medium-term when numbers are more likely to be useful, given that technology is changing rapidly, as is pricing for technology and fuel. There is significant value to preserving space to make decisions in the future when more information is known.	The objective of the IRP process, as described in the NSUARB-approved Terms of Reference to the 2020 IRP, is to develop a robust, risk-weighted least-cost long-term electricity strategy. This objective is served by the primary evaluation criterion identified in the same Terms of Reference, the minimization of the cumulative present value of the annual revenue requirements over the 25 year planning horizon (adjusted for end-effects). As part of its results releases, NS Power has provided a shorter term (11 year) NPV RR metric as an additional data point. Not considering the full planning horizon including end effects could result in an unfair comparison between scenarios where the model makes capital additions closer to the end of the modeling horizon in order to meet the electricity system requirements and policy objectives. To ensure like-to-like comparisons, NS Power will continue to use the 26 year horizon with end effects as the primary criterion for evaluation.

38	Natural Resources and Renewables Pg. 2	**Conversion of Lingan Oil** NRR is pleased to see that a low-cost source for capacity has been identified. The addition of these conversions will save ratepayers millions of dollars, avoid the construction of new fossil-fuel units and do so without negative impacts on greenhouse gas emissions. NRR is concerned that this option was not identified earlier in the planning process, and wonders what additional opportunities may exist which have not been fully explored. NRR would like to see a comprehensive analysis from NSP of which coal facilities can be converted for use as backup, and the impact on sustaining and existing capital. This request dovetails with the UARB's own request for concrete planning around coal retirement in its recent decision in M11017.	NS Power agrees with NRR's comment that the identified operation of Lingan units on HFO as a capacity resource will be beneficial to customers. The option to select HFO operation of Lingan units was included in the initial assumption set of the Evergreen IRP process and has been evaluated in each set of modeling runs, where its inclusion in optimal resource plans has been a consistent finding. The Evergreen IRP results demonstrate that the optimal timing of these conversions is 2028-2030 across the 24 scenarios evaluated; accordingly there has been no impact to NS Power's operational or capital planning to date. NS Power notes that in addition to the Lingan operation on HFO, both Point Tupper 2 and Trenton 6 were offered to the model for coal to gas conversions. NS Power notes that as the power system transitions to a high penetration of variable renewable resources, a mix of firm capacity assets including energy storage, fast acting generation, and unit fuel conversions will be needed to reliably integrate this renewable generation. The outcome of the Evergreen IRP, which adds fuel switching of the Lingan units to the IRP Action Plan, was based on updated sustaining capital costs that were a result of analysis completed by the NS Power Enterprise Asset Management team. No additional analysis is required.
39	Natural Resources and Renewables	**Hydro Assumptions** NSP includes refurbishment of all hydro assets, despite a lack of UARB approval or evidence of	The 2020 IRP process incorporated a comprehensive review of NS Power's hydro generation fleet and concluded that sustaining the hydro fleet was the lowest cost alternative when compared to decommissioning assets and replacing the

	Pg. 3	stakeholder acceptance. NRR would like to see all hydro assets which are up for capital renewal – using reasonable and agreed upon cost assumptions – compared for cost-effectiveness against new resources in this planning exercise.	associated energy and capacity. Since the conclusion of the 2020 IRP, increasing renewable standards, carbon costs, and peak load requirements have increased the value of the renewable energy and capacity provided by the hydro fleet. In order to manage the scope of the 2022-23 Evergreen IRP exercise, a re-evaluation of this 2020 IRP finding was not included in order to focus on other changes in the electricity planning environment. The assumptions for hydro asset sustaining capital costs reflect the most up to date understanding of the forecasted sustaining capital costs. Future hydro refurbishment capital applications will include economic alternatives analyses, including, for example, assumptions related to replacement energy costs.
40	Natural Resources and Renewables Pg. 3	**Avoided Cost of DSM** NRR is pleased to see that NSP has accepted E1's desire for refinement of avoided costs. 2030 is rapidly approaching and E1's programming remains a critical part of meeting targets. NRR hopes that NSP and E1 can collaboratively work to ensure appropriate avoided costs are factored into program design as soon as practicable. As stated earlier, NRR does not believe the scenarios containing the Loop are reasonable to use for this exercise.	NS Power will continue to work with E1 as part of the DSM Advisory Group (DSMAG) to model avoided costs of DSM. NS Power has provided an initial submission to this group which has identified No Atlantic Loop scenarios as the preferred candidates for avoided cost modeling.
41	Natural Resources and Renewables Pg. 3	**Solar, Storage and Battery Capacity Interplay (Diversity Benefit)** Synapse addresses this issue more comprehensively in its comments on the Evergreen update, and NRR agrees with Synapse	As part of the 2019 Planning Reserve Margin and Capacity Value Study (Capacity Study), which informed the 2020 IRP, Energy and Environmental Economics (E3) calculated ELCC curves for Wind, Solar, Storage, and DR resources as well as the diversity benefit of having both battery and renewable energy sources on the system (combination of batteries and wind or batteries and solar) and the additional ELCC credit

		that correctly identifying the need for capacity is paramount for all subsequent IRP runs. The initial analysis – failing to provide a clear ELCC for the three technologies together – was identified to NSP the moment the initial report was presented, but, three years later, remains unaddressed. This error will make it difficult for the UARB to approve new capacity construction while doubt remains on whether this capacity is necessary.	that can be achieved via the combination of these two energy-limited resources. The ELCC diversity benefit of wind + storage was incorporated into the Evergreen IRP model. For example, in scenario CE1-E1-R2 a diversity benefit of 4.8 MW is credited in the resource plan in 2030, reflecting the pairing credit of 140MW of 4-hr energy storage with the incremental wind build of 1,497MW. The diversity benefit of solar and storage was not included in the PLEXOS model, since the potential interactive effect of considering wind + solar + storage diversity benefits simultaneously was not considered from the 2019 capacity value study. Wind was the primary variable renewable resource added in both the initial insights and draft modeling results phases of the Evergreen IRP, with little grid-connected solar seen in any resource plans at those stages of the process. NS Power notes that in the Final Modeling Results, many resource plans (including CE1-E1-R2) incorporate approximately 200MW of grid-connected solar by 2030, with this change likely driven in part by the addition of the federal Investment Tax Credits between the Draft and Final results. Ignoring any potential "double counting" of wind + storage and solar + storage diversity credits, the credit for pairing 140MW of 4-hr storage with 200MW of solar would be approximately 18MW per the 2019 Capacity Study. If the addition of this credit increased the solar and storage build in the optimal capacity expansion plan to, for example, 300MW of 4-hr storage with 300MW of solar, the diversity credit would increase to 38MW. NS Power notes that this approach may result in "over-crediting" the diversity benefit, since the

			same capacity of installed 4-hr storage is now being credited for pairing with wind and solar simultaneously. The identified diversity benefit is important and will be considered in future planning and modeling activity. However, future modeling refinement will not result in the elimination of new firm capacity in order to maintain system reliability. In light of this, Board consideration and approval of new capacity construction should not be contingent on future modelling refinement; the IRP has demonstrated new capacity will be required.
42	Natural Resources and Renewables Pg. 3	**Planning Reserve Margin** Discussion of reserve capacity was largely absent this IRP iteration, though it was present in previous exercises. NSP has modeled a continued use of 20% planning reserve margin, but NRR does not accept this without clear consensus from intervenors and scrutiny by the Board. Establishing the exact value of this number is critical to determining which investments are made in the short term and insufficient conversation has taken place for the parties to accept a raw number. A change in this value from 20% to 16%, largely a paper exercise, would remove the need to construct an entire combustion turbine.	The 20% ICAP Planning Reserve Margin was empirically confirmed as part of the 2019 Planning Reserve Margin and Capacity Value Study (Capacity Study). Incorporating stakeholder feedback, this criterion was converted to a 9% UCAP planning reserve margin requirement for modeling purposes in order to more equally compare new and existing assets by incorporating unit forced outage rates into ELCC values. This well-developed finding was revisited during the development of assumptions for the evergreen IRP. No concerns related to the PRM approach were raised during the assumptions development feedback period, or any subsequent period, by any party, until this closing submission after 15 months of modeling effort has concluded. Based on the empirical evidence available, NS Power submits that reducing the Planning Reserve Margin for planning purposes would take Nova Scotia out of compliance with Northeast Power Coordinating Council (NPCC) requirements and reduce supply reliability for customers.

43	Natural Resources and Renewables Pg. 4	**Clean Electricity Regulation** The Federal Government recently published proposed regulations impacting the electricity system. While the final impact of these decisions will not be known for some time, this change also demonstrates the ever-shifting requirements on the sector, the need for an ability to adapt and the necessity of continuing to update the modelling work on a regular basis.	The evergreen IRP process, which continues to be a component of the Updated IRP Roadmap, will enable the adequate and timely assessment of significant changes to the planning environment when required.
44	Port Hawkesbury Paper (PHP) Pg. 2	**Wind Integration** PHP specifically notes Synapse's comment at page 4 of its report: "Action Item 3d is development of a procurement strategy for solar and wind resources, and continuing study work to identify opportunities to reduce curtailment. Synapse emphatically supports these Action Plan elements, and further recommends prioritization by NSPI of a procurement plan and a need to ensure interconnection study resource availability for the sizable level of wind clearly needed on the system under any scenario, and the significant level of solar PV." PHP fully reiterates Synapse's comments in this regard. PHP also notes that the information in NSPI's IRP refers to the recent rate base procurement program and other renewable procurement programs, such as Green Choice and Renewable to Retail, but does not specifically include PHP's significant proposed wind project.	All of the evergreen IRP scenarios include the proposed PHP wind project, modeled as a 130MW wind farm coming online in 2025.. NS Power's wind integration study will be released in 2023 for review by stakeholders.

		Thus, the IRP itself may understate the amount of wind energy anticipated to be on the system as early as the fourth quarter of 2025. It is therefore critical that very early action is taken to fully understand how to best minimize renewable integration costs on the NSPI system, and to minimize curtailment of a valuable, renewable resource to the greatest extent possible. NSPI's comments reference its ongoing wind integration studies (Roadmap Item 1) that are intended to be released in 2023 and its electrification strategy report also expected in 2023 (Updated Action Plan Item 2a). As these are critical ongoing studies, PHP believes it would be appropriate for the Board to set a firm date in 2023 by which these studies will be provided to the Board and IRP participants. It is important that these studies be completed and shared with IRP participants in a timely manner.	
45	Port Hawkesbury Paper (PHP) Pg. 2	**Hybrid Peak Mitigation, Battery Storage, and New Fast-Acting Generation** On the issue of ongoing study of the hybrid peak mitigation scenario, PHP notes NSPI's stated support at page 4 of its responses to stakeholder comments for a multi-stakeholder process to further analyze this issue, which they note could be led by a third-party organization with experience in leading multi-sector energy studies. PHP generally supports such an approach. While PHP understands Synapse's view with respect to the potential larger diversity benefit of	Please refer to CA feedback response item #4 for approaches to evaluating the potential of a hybrid peak. Please refer to the NRR feedback response item #41 for a discussion of combined wind/solar/storage diversity credit. NS Power agrees with the comment from PHP that further consideration of this modeling refinement should not jeopardize the timelines for adding new firm capacity resources to the Nova Scotia system. The wind integration study, which will be published in 2023, will provide additional insights into the potential for system wide and site specific synchronous condenser support. This

		battery energy storage, PHP is concerned with further study that could potentially delay firm in-province resources which will be required to maintain the reliability of the system, especially with the addition of significantly greater amounts of non-dispatchable renewables. PHP is of the view that any further study that the Board may order in this regard must be done in an expeditious enough manner so as not to in any way jeopardize the timeframe needed to build firm peaking or other resources necessary to maintain the reliability of the system and minimize interruptions to the greatest extent possible. This is critical as the Evergreen IRP Update calls for in the order of 300 MW of new fast-acting generation by 2027 (Action Plan Item 3c). While battery storage does assist with the curtailment issues, wind integration and capacity, and additional battery storage is called for in the No Loop scenarios, NSPI lays out in some detail in its responses to stakeholder comments (see pages 6/7 and 23/24) why battery storage cannot be simply used to replace fast acting generation, due to its storage duration limitations, and the need to ensure the system has sufficient resources during peak periods. PHP also notes that on average 80 MVA of synchronous condensers are added to support wind integration by 2030. However, as NSPI notes, other planning considerations may require additional synchronous condenser support, which	will be released to stakeholders for their review and NS Power will request feedback on the findings.

		will be evaluated by further study work (Updated Action Plan page 7), including generator site–specific system impact studies for new variable renewable generation. As the potential addition of more synchronous condensers could come at a substantial cost, and as synchronous condensers provide various system value, PHP believes a thoughtful and comprehensive look at this issue is warranted. NSPI Action Plan Item 3g states "complete generator site-specific system impact studies for new variable renewable generation to assess the need for synchronous condenser support". As significantly more renewables are required to be added to the system in all modeled scenarios, it may be problematic to simply view the need for synchronous condensers solely on a generator site-specific basis. PHP suggests that it may be appropriate to review this matter on a timely basis in a more system-wide holistic manner.	
46	Port Hawkesbury Paper (PHP) Pg. 4	**Clean Electricity Regulations** NSPI's roadmap item 5 indicates in part tracking the development of the Federal Clean Energy Regulations and monitoring for limitations on the use of gas and oil-fired generation beyond those already considered in the Evergreen IRP. In this regard, PHP notes that the recently released draft Federal Clean Electricity Regulations appear to potentially significantly impact the natural gas peaking capacity in Nova Scotia, which capacity PHP understands is critical for cost effective reliable electric supply. PHP understands that NSPI and other parties will be commenting on the draft	NS Power confirms it will continue to participate in stakeholder processes related to the proposed Clean Electricity Regulations.

		regulations to the Federal government in order to ensure the necessary amendments are made so that the final version of the regulations are workable for Nova Scotia. PHP fully supports all such efforts.	
47	Port Hawkesbury Paper (PHP) Pg. 4	**2030 Resource Schedule** PHP notes Bates White's comments on page 3 of its report that should all the resources that the IRP calls for to be in place by 2030 be pursued, "such an aggressive schedule and scope of resource additions will place a premium on the procurement process to manage cost and risk". It is clear that the significant amount of undertakings required between now and 2030 to get Nova Scotia off of coal and to achieve 80% renewables is daunting. In order to get there, it will be necessary for all parties (NSPI, market participants, and the Board) to share information openly and transparently and work collaboratively to achieve these goals. PHP believes it would be appropriate for the Board in commenting on the NSPI IRP Action Plan and Roadmap to highlight this requirement for ongoing transparency, collaboration, and cooperation.	NS Power will anticipates that the activities and projects initiated in support of the IRP Action Plan will continue to provide opportunities for stakeholder engagement and feedback as the Nova Scotia system continues its decarbonization transformation.
48	Small Business Advocate Pg. 1	**Procurement** NSPI should investigate best practices from other regions to ensure that its procurement approaches are well-suited for current market dynamics and balance economies of scale with customer protections.	Please refer to response to Bates White comment response #1.

49	Small Business Advocate Pg. 2	**Energy efficiency and demand response may be undervalued in NSPI analysis** As noted above, the updated IRP requires significant buildout of new resources and capital costs have been very volatile in recent years. EE and DR program costs are often more stable and predictable due to the more limited capital needs. In addition, accelerated development of these resources can help delay the need for new energy or capacity resources. Recent research from U.S. markets has demonstrated high value in DR and "virtual power plants" in decarbonizing resource portfolios. NSPI should consider a more expansive view of the benefits of such resources, and look for more opportunities to more fully integrate these resources as resource options in the IRP.	Energy efficiency (DSM) and demand response have both been considered extensively in the evergreen IRP. These programs, as modeled, provide capacity (including planning reserve margin), energy, and emissions value. Multiple DSM profiles were examined across different sets of scenarios. NS Power agrees with the SBA that DR programing should be a particular focus for efficiency investment going forward, due to its ability to reduce capacity requirements on the system.
50	Small Business Advocate Pg. 2	**Atlantic Loop/Risk** Given the large degree of uncertainty around capital costs for both transmission and the various generation technologies, as well as policy uncertainty and potential for interregional collaboration, the SBA recommends that NSPI continue development activity on the infrastructure options, particularly those with long development timelines. For this reason, the SBA supports Item 1b of the Action Plan to continue coordination with other jurisdictions on the Atlantic Loop, while still planning to meet its resource needs even if the project is not ultimately viable.	NS Power agrees that continued progress on the 2030 Resource Development Plan is critical. This plan reflects the common findings amongst all evergreen IRP scenarios, with and without the Atlantic Loop. Please refer to Bates White comment response #3 for additional commentary on NS Power's approach to pursuing multiple approaches to Regional Integration, including consideration for in-service dates beyond 2030.

		Given the high degree of uncertainty, it is prudent to keep all options viable at this time so long as they are expected to produce benefits to Nova Scotia customers. However, NSPI's ultimate obligation is to provide reliable electric service at the lowest possible cost to the province, so the planning process should ensure that this objective is achieved regardless of actions taken by other provinces or the federal government.	
51	Small Business Advocate Pg. 2	**Regional Collaboration** There are multiple future conditions that have not been modeled by NSPI in this analysis, including a future with significant offshore wind development consistent with the province's May 2023 Offshore Wind Roadmap, and a future with significant hydrogen production or utilization. Some of those potential futures with significant infrastructure development could benefits from regional collaboration, either through new transmission like the Atlantic Loop, or other cost-sharing on infrastructure spending. NSPI should consider these issues in future planning analysis to provide an assessment of optionality of certain resource planning approaches.	NS Power incorporated a generic hydrogen plant load as part of the Domestic Hydrogen (DH) sensitivity scenario. Offshore wind was included as a resource in the model for economic selection. However, in all scenarios, it was not chosen as a resource due to the high capital cost. As assumptions for offshore wind develops, and as data on offshore wind shapes and diversity to onshore wind resources becomes available, the evergreen IRP process will enable additional analysis in the future as required.
52	Small Business Advocate Pg. 2	**Wind Integration Studies** The SBA has previously provided comments on the importance of continuing NSPI's analysis of system reliability with the growth in inverter-based resources. NSPI used some initial results as the basis for modeling constraints in this IRP analysis, but more analysis is needed to confirm how different resource strategies (e.g. additional	NS Power's wind integration study will be released in 2023 for review by stakeholders.

		interties, higher electrification or demand response, etc.) will impact reliability and lead to need for synchronous condensers or other measures to ensure secure grid operation.	
53	Synapse Pg. 3	**Atlantic Loop** Action Plan item 1b, Regional Integration, includes continuing assessments of the economics of firm import options. Synapse supports these planned assessments and emphasizes a need to clarify both the capital costs of the Atlantic Loop, and the costs associated with any firming of energy import and export assumptions. If or as this information is made available, Synapse recommends a re-running of the bi-directional Atlantic Loop scenario.	NS Power agrees with Synapse on the need to continue to support regional integration evaluations, working with other utilities in the region. NS Power agrees with Synapse on the need to continue to support regional integration evaluations, working with other utilities in the region. The Evergreen IRP provides the avenue to update modeling based on significant changes in the assumptions, including capital costs. If a change in the capital costs of the Atlantic Loop or the assumptions associated with import availability change, NS Power can update the modeling to assess the impacts. NS Power notes that evaluating alternate capital costs for the bidirectional loop scenario can be completed without a PLEXOS run by adjusting the NPVRR figures provided by NS Power on a $2025 NPV basis.
54	Synapse Pg. 3	**Reliability Tie** The reliability tie is needed; Synapse recommends its development continue as a high priority item for NSPI.	NS Power agrees.
55	Synapse Pg. 4	**Solar and Wind Procurement** Action Item 3d is development of a procurement strategy for solar and wind resources, and continuing study work to identify opportunities to	NS Power agrees and is prioritizing these actions per the IRP Action Plan.

		reduce curtailment. Synapse emphatically supports these Action Plan elements, and further recommends prioritization by NSPI of a procurement plan and a need to ensure interconnection study resource availability for the sizable level of wind clearly needed on the system under any scenario, and the significant level of solar PV.	
56	Synapse Pg. 4	**ELCC and Diversity Value** Synapse supports NSPI's Action Plan Item 3f but recommends accelerated study to determine the value of considering an increased pace of battery storage implementation. In our opinion, the pre-IRP capacity value study from 2019 (used in the 2020 IRP) does not fully capture the diversity effects that exist among battery energy storage, wind, solar, and demand response resources, and the capacity accreditation given to battery resources in this IRP update is too low. This affects the PLEXOS model optimization of capacity resources. Prior to the next IRP update, this study and the methods used to capture portfolio diversity should be updated. The new study should reflect the full measure of diversity effect considering all four of these resources, which are highly complementary in the provision of capacity. Demand response resources, or the equivalent capability of mitigating peak increases such as would be seen in the "hybrid peak mitigation" case, have a material influence on the peak load that might otherwise need a higher level of battery resources	Please refer to the NRR feedback item #41 response above.

		or other capacity resources to maintain reliability. This would affect the portfolio ELCC and directionally would increase any ELCC factor attributed to the battery energy storage resources. As noted, the battery energy storage ELCC profile used in this IRP update is a critical input value to the modeling that needs to be carefully re-examined in the next IRP or IRP update. The re-examination needs to be conducted in conjunction with an updated "portfolio ELCC" analysis that better considers the interactive effect of all four clean resources (wind, solar PV, battery energy storage, and demand response or peak load mitigation during winter peak periods). The current input assumptions used for ELCC for the portfolio of resources, while reflecting some level of diversity benefit, do not fully capture this critically important dynamic. The effect of this shortcoming is a failure of the capacity expansion portion of the modeling exercise to fully capture the interactive effect and thus produce a potentially sub-optimal output in the selection of capacity resources.	
57	Synapse Pg. 7	**Fast Acting Generation and Plant Conversions** Procurement of capacity resources through new CT additions or conversion of coal resources is seen in Action Plan Items 3c and 3e. While Synapse generally recognizes the value in ensuring low-cost capacity through conversion of coal units as modeled in all scenarios, it is unclear whether or not the level of new CT or reciprocating engine	Please refer to NRR comment response #41

		need seen in the results is robust, given our concerns over the capacity value attributed to new battery energy storage resources. Synapse recommends ongoing study under the hybrid peak mitigation scenario and under other No Atlantic Loop scenarios; and an updated IRP analysis of battery energy storage capacity prior to significant commitment to reach the 2029 or 2030 CT additions levels seen in the CE1-E1-R2 scenario above.	
58	Synapse Pg. 8	**Electrification Study** Synapse supports NSPI's ongoing planning for an electrification strategy as seen in Action Plan Item 2a and for data collection (Action Plan Item 2b) and looks forward to reviewing the study when available in 2023.	NS Power will release the electrification strategy in 2023 and solicit feedback from stakeholders.
59	Synapse Pg. 8	**Import/Export and Wind Curtailment** Synapse supports NSPI's plans to continue to review curtailment issues and identify opportunities to reduce curtailment, as seen in Action Plan Item 3d. Synapse recommends that NSPI explicitly make available more detailed information on the temporal patterns of import and export energy flows associated with all of the Scenarios in this modeling update. Synapse also recommends that the next IRP clearly describes the extent to which exports from Nova Scotia are considered as allowable under the different scenarios. We also recommend that specific scenarios with considerably higher levels of nameplate battery capacity be included as part	Please refer to the CA feedback item #9 for details on wind curtailment reduction opportunities. Economic exports were not modeled in the evergreen IRP model due to the uncertainty in market demand and pricing over the long term. NS Power will evaluate options for enhanced modeling of exports as part of evaluating options to reduce curtailment.

		of the exploration of means to mitigate curtailment levels, regardless of the propensity of the capacity expansion algorithms to limit selection of new battery storage capacity because of diminishing returns to firm capacity value due to the ELCC effect currently in place.	