

July 17, 2017

Doreen Friis  
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: Generation Utilization and Optimization – M08059**

Dear Ms. Friis:

In correspondence dated May 5, 2017, the Utility and Review Board (UARB, Board) advised that it would be engaging Synapse Energy Economics Inc. (Synapse) to undertake an independent analysis of optimal utilization of generation resources and potential options that may be more economical for Nova Scotia ratepayers. The Board further advised that the process would begin with development of a Terms of Reference (TOR) by Synapse and that stakeholders would be provided an opportunity to review and comment on the TOR.

On July 7, 2017, the Board circulated Synapse's TOR and invited NS Power and interested parties to submit comments to the Board regarding the TOR by July 17, 2017. NS Power appreciates the opportunity to provide these comments for the Board's consideration.

NS Power's top priority is provision of affordable electricity for customers and as such, NS Power is committed to a cooperative process to assist Synapse in carrying out its engagement. The eventual report to be prepared by Synapse will be informative to all parties. NS Power has a clear and direct interest in understanding the scope and potential outcomes of this work as a party that is directly affected by the undertaking of this work, both through its role in supporting Synapse with information as needed, as well as by virtue of the fact that the Synapse study is intended to make recommendations about the best use of NS Power generation assets and other potential capacity options for Nova Scotia customers. NS Power's comments on the Synapse TOR therefore are focused on the following three areas:

1. Objective/Purpose
2. Process and Timeline
3. Technical Clarity

#### **1. Objective/Purpose**

While the manner in which the work will be undertaken is described differently from the approach that has been used in recent Board-directed Integrated Resource Plans (IRPs) in that it will be done by Synapse alone, the nature of the study work to be done appears from the TOR to be IRP type-analysis work. However, the TOR appears to contemplate a broader scope of studies/model runs than what the recent IRPs have undertaken (this is discussed further in comments on Technical Clarity below).

The first comprehensive IRP undertaken by NS Power, in collaboration with Board consultants, was in 2007, with an update done in 2009 and full IRP again in 2014. Through the various IRP studies done over the last decade, the Board, NS Power, and other interested parties have developed understandings of the intended purpose of these exercises and value to be taken from them. The objectives and purpose have typically been stated upfront as part of the IRP TORs. In the most recent 2014 IRP for instance, the Purpose was stated in the TOR as follows:

The IRP is a comprehensive and public utility planning exercise that integrates supply and demand-side options to develop a long-term Preferred Resource Plan for the utility. The resultant Preferred Resource Plan is a road-map to guide the utility's strategy for meeting its resource needs over the planning horizon. It is directional, not prescriptive in nature. The Preferred Resource Plan does not commit the utility to certain courses of action or foreclose options determined to be in the interests of our customers subsequent to completion of the IRP process. Instead, the Preferred Resource Plan is meant to provide the utility with sufficient flexibility to effectively accommodate a range of future uncertainties. As a result, the utility is expected to adhere to the strategy expressed through the Action Plan.<sup>1</sup>

The Synapse Generation Utilization and Optimization study is a new type of UARB-process for all parties. Understanding its purpose and the expected use of its findings is critically important to all directly affected parties. NS Power recommends a clearly stated purpose and objective be included within the TOR for the benefit of all who will be engaged on the issues to be resolved by this work.

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<sup>1</sup> 2014 NSPI 2014 IRP Update; M05522, P-884.14, Terms of Reference, Exhibit N-3.

## 2. Process and Timeline

The Synapse TOR provides a timeline for commencement through to completion of the work from early July to December. The TOR and milestones provided in the timeline do not contemplate collaboration, and contemplate only minimal consultation with NS Power and other interested parties. It does not appear that there will be opportunity for interested parties to provide input to the assumption setting process. Item g) under Scope, states:

Develop and deliver “inputs assumption” memorandum. This phase, and the underlying research to inform the key analytical inputs, will include NS UARB input and review of stakeholder TOR comments.

It is not clear from the above that NS Power and other interested parties will receive the “inputs assumption” memorandum, and it appears the only input to it will come from the NS UARB. NS Power assumes “NS UARB” is intended to refer to UARB staff, but NS Power requests confirmation.

The only explicitly stated opportunity for consultation with interested parties will be in the form of a day-long technical conference in late November, after the draft report and modelling analysis is done, at which Synapse will solicit feedback and then address feedback in its final report. The final report will be finalized shortly thereafter in December.

NS Power respectfully requests the opportunity for it and all interested parties, at a minimum, to be permitted to review the modelling plan and draft input assumptions and to provide comments and have their comments considered before assumptions are finalized and before modelling work is done.

NS Power also requests confirmation in the TOR that the draft report and modelling analysis will be provided to all interested parties in advance of the contemplated day-long technical conference, with a date for provision of the draft report and modelling analysis, and a timeline that provides reasonable time for interested parties to ask questions and formulate comments for consideration by Synapse. In addition, NS Power suggests that an interim technical conference while modelling work is still underway, but before finalization of the analysis would be beneficial to all parties and provide an opportunity for Synapse to obtain key input from interested parties.

The Board has recognized the significant value that consultation and consensus-building brings to regulatory processes. NS Power submits that a process where Synapse works in

isolation with Board staff only (other than to request specific information from NS Power) for months without providing a window to their work and opportunity for input until the very end does not best position this project for success.

Aside from comments respecting building consultation into the timeline, NS Power believes there will be challenges with the timeline given the scope of the modelling described. Synapse has proposed a modelling process similar to the Candidate Resource Plan approach used in the 2014 IRP. If each of the variables listed in the table on page 2 of the Terms of Reference were to be fully modelled, it appears that Synapse would have to perform 177,147 individual runs (as further explained in the attached technical Appendix).

The TOR does not state what happens following completion of the Final Report. Will the report be filed formally with the Board? What process is contemplated for review and testing, if any? NS Power respectfully recommends additional clarification as to what is intended to take place upon completion of a Final Report.

Beyond the above comments respecting the timeline, NS Power understands it has a critical role to provide timely and detailed information to Synapse and that Synapse views NS Power's responses to its data requests on the timeline it requires to be critical to achieving the schedule proposed. NS Power also anticipates that it has a role to answer technical questions that may arise respecting the operation of the model. NS Power wants to best support the Synapse work and so recommends that before the final timeline is established, that NS Power and Synapse engage concerning expectations for timing and scope of data requests. NS Power has a small planning group with a number of ongoing coincident projects and deliverables independent of this work and personnel availability constraints over the next several months. NS Power would welcome the opportunity to share schedules and work towards a mutually agreeable schedule that allows NS Power to provide Synapse with what it needs on a reasonable timeline that permits it to manage accordingly.

NS Power believes that at a minimum, the timeline proposed by Synapse should be extended by an additional three months to provide adequate opportunity to all interested parties to engage and provide feedback on key milestones in the process, for sufficiency of time based upon the scope of modelling work to be undertaken, and to permit NS Power to plan with Synapse for its own resourcing to meet their needs.

### **3. Technical Clarity**

NS Power believes that the TOR for this process should provide clear technical objectives and measures. As a first principle, the TOR does not state how Synapse will measure and

evaluate whether it is “cost-effective to ratepayers to retain NSPI’s thermal fleet through 2030, and possibly beyond.” Synapse references identifying “something akin to a “candidate resource plan.” Before commencing this work, NS Power submits how “cost-effectiveness” will be measured should be objectively stated, and if something akin to a ‘candidate resource plan’ is part of how that will be evaluated, this should be more explicitly described. If Synapse intends to use different tests for evaluation than those used in the 2014 IRP Update, this will be important for NS Power and interested parties to understand.

There are instances where terms used would benefit from further clarification or definition. For example, in Synapse’s Illustrative Matrix, there are various references to “low”, “medium” and “high” for various assumptions but does not describe them in quantifiable terms.

The attached Appendix provides NS Power’s specific comments respecting the technical clarity that it believes is needed – either through the TOR, or through a consultative assumption setting process – before embarking upon this important work for customers.

NS Power thanks the Board for the opportunity to provide these comments for its consideration on the TOR.

Yours truly,

A handwritten signature in blue ink, appearing to read "Andrew G. Smith". The signature is fluid and cursive, with the first name "Andrew" being more prominent than the last name "Smith".

Executive Vice President, Regulatory, Legal and Business Planning

## Appendix

### Technical Clarity Comments on Synapse TOR

#### Evaluation of Alternatives

NS Power requests that clarity be provided for the following items relating to the evaluation of alternatives for the study:

- What will be used to determine which is the most “economically optimum” path (e.g. NPV over 25 years, 5 year rate impact, etc.)?
- What rate impacts will be considered?
- What evaluation metrics or criteria other than customer costs (e.g. emissions reduction, employment, level of risk, etc.) will be used to evaluation of plans? What will be the weighting used for this criteria?
- What is the full list of “all reasonable alternatives” to be considered?
- What are the detailed assumptions to be used for each “reasonable alternative”?
- How will ‘reasonable alternatives’ be determined and how much weight will be given to technological maturity.

Considering additional balancing area constructs seems beyond the necessary scope of this exercise. This would require full collaboration with other utilities during the assumptions setting process, and would require modelling of the full Atlantic region. NS Power suggests this option be removed from the scope of this study.

#### Modelling Plan

The scope of work proposed in the TOR appears to be as comprehensive as an update of a full IRP Study. To achieve objectives as stated, and complete the process as outlined, the timeline does not allow for the necessary precision and attention to detail. Critically, the modelling timeline seems out of proportion with the work plan described. 20 – 25 years (through 2038 – 2043) is a traditional IRP timeframe. A shorter term analysis may be more appropriate to achieve the stated objectives.

NS Power requests that a full modelling and analysis plan be provided for stakeholder review and comment prior to commencement of modelling. Even as single variables for each of the 11 parameters listed in the example assumptions matrix on page 2 of Synapse’s Terms of Reference, a total of 177,147 possible cases could be formed. The modelling plan should include information on the specifics of the number of cases to be conducted, and the process to prioritize and produce the case solutions. It should also provide clarity on the following:

- Who is the referenced project team?
- Which parties will be responsible for conducting quality assurance and ensuring results comply with system configuration limitations?
- What is the basis for setting the rate impact time horizon to “2030 or possibly beyond”?
- How will Synapse distill each case’s optimized candidate resource plan to a single preferred resource plan?
- How will the real option value of deferral of capacity expansion and retirement decision will be considered?
- How will the relative risk level of uncertain future assumptions and scenarios (e.g. reliance on future non-utility development, changes in federal or provincial policy, etc.) be evaluated?
- What considerations will be used to decide on necessary internal iteration of model runs?
- What lower and upper limits will be placed on the number and type of iterated model runs?
- As the Plexos LT capacity expansion mode does not model system dispatch, will the “optimal resource plan” from each assumption set will be tested for the 25 year period in the MT/ST Plexos module to assess customer cost and rate impact?

## **Assumptions**

NS Power requests that clarity be provided for the following items relating to the assumptions to be used for the modelling:

- How will Synapse distinguish critical input assumptions that can significantly affect the results from non-critical assumptions? Will those critical input assumptions be treated differently?
- What demand-side assumptions will be considered for the “Increased” and “Highest” cases? Will the 2014 DSM Potential Study be used as a basis for assumptions? What cost estimates, with what basis, will be used?
- When public documents are used to inform assumptions, how will adjustments to supply-side resource costs and performance to reflect the Nova Scotia market and conditions be made?
- What type of storage resource technologies will be considered, with what type of performance? What range of cost assumptions will be considered, to evaluate the potential that industry projections do not materialize?
- What are the ranges for the “increased” and “highest” level of sustaining capital assumptions?
- What are the natural gas availability and pricing assumptions to be used? What is the basis for these assumptions?

- What are the details of the transmission configurations to be used in the assumption sets?
- Given that the Province of Nova Scotia has announced a cap and trade model for enforcement of a carbon price, why is an explicit carbon price being modelled?
- What sustaining capital assumptions will be included for new resources, both fueled and renewable?
- How will the declining capacity value of new incremental wind resources be accounted for?

NS Power has reviewed the example assumptions provided in the Terms of Reference and discussed in its Appendix A and provides the following comments for consideration.

NS Power does not have detailed system stability analysis for every conceivable resource option or combination of resources, as transmission and system conditions will change with different configurations. Independent system studies may be required for each scenario to evaluate system stability since as the system makeup changes, system stability requirements also change.

Regarding the transmission tie to New Brunswick, the 150 MW referred to in “set 2” cannot provide firm capacity in on peak winter periods due to system constraints. Additionally, the 800 MW import option from “set 3”s may prove out of proportion with the scale of the NS Power system and could present reliability risks without additional system resources to respond to contingencies. Rescaling of this assumption or consideration of reliability implications would be required.

Regarding the “medium” and “high” cases for wind capacity contribution the GE study results were based on a single year of data using 2006 wind speed measurements, which lack the accuracy of wind generation data. In addition, the single year of data used in the GE study does not reflect the variability of multi-year wind and load correlations. The multi-year methodology used by NS Power in its annual LOLE study in the 2017 10 Year System Outlook should be used to establish wind capacity value ranges, as it is based on actual NS Power wind generation data, considers 9 years of historical data, and is consistent with the IEA recommended methodology used by others such as MISO. NS Power suggests P50, P10 and P90 values from the multi-year study results be used to establish the base/medium/high cases. NS Power also notes that these wind capacity contribution scenarios should apply to existing wind only. Incremental wind installed on the system would be assigned a decreasing capacity value, as the capacity contribution of wind decreases as the wind penetration level increases.

On page A-1, Synapse states that:

NSPI has not provided any sensitivity analysis around this projection of sustaining capital expenditure; it is reasonable to surmise significant uncertainty likely exists around this projected amount, given the age of the plants. Notable in the projection of costs is the occasional need for larger-than-average capital injection levels (e.g., \$10 million, Ligan 3, 2020; \$10 million, Ligan 4, 2024; \$13 million, Point Aconi, 2021; \$9 million, Trenton 5, 2020; \$15 million, Trenton 6, 2025).

NS Power notes that the larger-than average capital injection levels represent specific “major” outage intervals, which are projected based on the actual and forecasted unit utilization. The year this investment is required and can change based on the actual or forecasted utilization of each unit.

On page A-1, Synapse states:

The 2014 IRP representation did not directly consider the unit-specific, year-to-year requirements for sustaining capital, but instead used a levelized approach to reflect these costs. Any impending year-over-year pattern of expenditures for the steam plants should be directly considered when analyzing an optimal or near-optimal (i.e., ratepayer least cost) plan for sustaining capital investment.

Levelized sustaining capital investments were used only for “balance of plant” asset classes. Major asset classes (turbine/generation, boilers) that establish the major overhaul schedules and investments were forecasted based on utilization and reflected in the 2014 IRP sustaining capital assumptions.

On page A-4, Synapse observes:

The resulting comparison of different plans did not account for the difference in surplus capacity associated with each plan. If the differences were minor, NSPI’s conclusion would not be unreasonable, subject to the certainty of sustaining capital cost assumptions. However, the differences were not minor – the plans with higher levels of peak load reduction resulted in surplus capacity levels that were significantly higher than those associated with lower peak load reduction plans, because no adjustment was made in sustaining capital contribution to allow for retirement of surplus capacity.

NS Power notes that the surplus capacities shown in the Figure may no longer exist as the 2014 IRP load demand assumptions included the double-counting of DSM, which was corrected in the 2016 Load Forecast Report. Furthermore, forecasts for demand reductions arising from efficiency programs were downgraded by Efficiency One in the 2015 DSM proceeding from those used in the 2014 IRP. An updated load forecast and reserve margin projection, such as that in the 2017 10 Year System Outlook, reflects a more likely future capacity deficit rather than surplus.

On page A-8 Synapse states:

However, the Synapse report recommended that NSPI should “review and refine the peak load calculations, taking into consideration that the historical peak loads have been essentially flat”. The report further notes that NSPI’s method led to much greater increase in peak load projection than in energy projection. This nuance in interpretation of Synapse’s finding concerning NSPI’s shift to using end-use load forecasting methods in place of econometric load forecasting methods is crucial. For the purposes of system planning, a careful review of peak load forecast drivers is imperative.

The assertion that NS Power historical peak loads have been “essentially flat” is incorrect. As presented at the Technical Conference, there has been a consistent trend of a 1% increase per year in firm peak load. The 2016 temperature-adjusted firm peak was the highest on record, and indicates historical load growth, not a flat trajectory.