

NOVA SCOTIA ENERGY BOARD

IN THE MATTER OF: **The Public Utilities Act**

- and -

IN THE MATTER OF: **Nova Scotia Power Incorporated** ("NS Power")
10 - Year Energy and Demand Forecast
(2025 Load Forecast Report)

NON-CONFIDENTIAL INFORMATION REQUESTS

To: **Mark Peachey**
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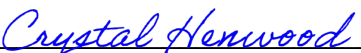
From: **Synapse Energy Economics Inc.**
Board Counsel Consultant

Responses Due: **August 19, 2025**

Copies: 1 electronic copy (PDF searchable)

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Crystal Henwood, Regulatory Affairs Officer/Clerk

Request IR-1:

Report Tables and Graphs

- a. Please provide in electronic spreadsheet format all tables and graphs with identification of the data source(s) that appear in the load forecast report and appendices, retaining all formulas and calculations. To the extent that any tables and graphs have already been provided in electronic spreadsheet format in one of the report attachments, please provide references to the associated attachment.

Request IR-2:

System Peak (Section 1.0, p. 10).

- a. Refer to Figure 3. Please explain the main factors driving the high degree of change and volatility in the system peak in the years 2022-2025.
- b. Why did the system peak decline by approximately 14.9 percent in 2024?

Request IR-3:

Unexplained residential forecast variance (Section 2.0, pp. 12-13; Section 5.0, p. 57)

- a. The report notes the Board's direction in M11689 to "continue to investigate the unexplained variance between forecast and actual NSR for the residential sector." Later, the report indicates that "adjustments were made to the heating intensities last year to better capture the trends" underlying the "Other" variances. Please document and explain in detail the specific modifications that have been made to heating intensities, and please also provide any evidence further supportive of these changes to intensities (separate from the fact that changing intensities reduces the variances).
- b. Did NSPI consider any other changes to its modeling approach to reduce the unexplained variances in the residential NSR? Please address the reasonableness of any other approaches to reducing this variance and please explain why any alternative approaches weren't ultimately adopted.

Request IR-4:

Billed versus Accrued Sales and Regression Period (Section 4.0, p. 16)

- a. The report notes that it uses monthly billed sales data from January 2015 to December 2024 for the residential and commercial energy forecasts, sales data from January 2015 to December 2024 for Small Industrial, and sales date from January 2006 to December 2024 for Medium Industrial "to improve the fit." Please quantify the nature of the improved fit.
- b. In NSPI's view, are there any potential issues with utilizing different data periods for different class forecasts? Please explain in detail.
- c. In NSPI's view, does the fact that the Medium Industrial model fit is comparatively poor when estimated using the more recent ten-year period rather than the full eighteen years

of data have any implications for its accuracy in rendering forecasts? Have NSPI's forecasts for Medium Industrial been comparatively less accurate than its forecasts for other classes in recent years?

d. In NSPI's view, would it be reasonable to use the same period for Medium Industrial as for the residential, commercial, and Small Industrial classes (January 2015 to December 2024)? Please explain in detail.

e. Please explain how large customer peak demand is separately forecast.

Request IR-5:

Cloud Cover (Section 4.2.1, p. 23)

a. Does NSPI have any concern about how accurately the SWin data from NASA, reflecting conditions in the Halifax area, effectively represents cloud cover across NSPI's service territory? Please explain in detail.

b. Is NSPI aware of any alternative sources of data for cloud cover in its service territory?

c. Has NSPI considered alternative approaches to modeling the effects of cloud cover within the regression framework apart from or in addition to include it as an independent variable (e.g., accounting for non-linear effects and/or accounting for interactive effects)? Please explain in detail.

Request IR-6:

Economic Information (Section 4.3, pp. 24-27)

a. Please refer to the directive from the Board's Decision in M11689 that is quoted on page 24 (lines 17-20) of the load forecast. Please explain how NSPI has considered each of the following in validating its use of housing completions for its near-term forecasting of new customers:

i. The Statistics Canada's provincial population growth scenarios.

ii. Changes to building and permitting such as the Housing Accelerator

b. Aside from the historical underestimation of actual customer additions by approximately 20 percent over the previous five years, is there any additional justification for adjusting upward by 20 percent the Conference Board's forecast for housing completions for 2025-2030?

c. How does NSPI know that the drop in manufacturing jobs in the 2025 CBoC forecast is the result of reporting and modeling changes rather than being reflective of an actual drop in employment? Has NSPI addressed the possibility that continued reliance on the 2024 forecast will result in an over-estimation of 2025 manufacturing employment? Please explain in detail.

d. Why is the industrial forecast based upon an econometric framework while the commercial models do not use an econometric framework?

Request IR-7:

COVID-19 Variable (Section 5.0, p. 57; Section 6.0, p. 63; Appendix B, p. 5; Attachment 05 EO)

- a. Please provide an explanation for the statement about the use of the COVID-19 quasi-binary variable in the residential model that it “helps to explain changes in consumption patterns over the 2020-2024 time period, but it is expected that these changes are sufficiently captured by the other model variables in future years and a separate variable is not needed in the forecast period.” What is happening, mechanically, within the SAE model to render the COVID-19 variable no longer necessary – changes in the estimation of the input values for the terms (e.g., XHeat), or something else?
- b. On what basis has NSPI determined the input values for the COVID-19 variables for 2020-2024 in the residential model (input values = 1, 0.5, 0.13, and 0.01).
- c. How do the input values for the COVID-19 variable used in this year’s residential model differ from the values used in prior years’ models? How does the overall estimation of historical COVID-19-related work-from-home consumption in the residential model differ in this year’s model relative to the estimates in prior years’ models? What are the implications of any such differences?
- d. Please explain how it is possible that the historical data in the General rate class model captures COVID impact to sales, whereas the historical data in the residential model does not sufficiently capture these historical impacts, necessitating the need for the use of the COVID-19 variable for the years 2020-2024.

Request IR-8:

Annual Consumption by Building Type (Section 5.0, p. 59; Appendix B, p.2)

- a. How do the assumptions about energy consumption by house type enter into the load forecast? Please provide a detailed response with reference to the full residential model presented in Appendix B.

Request IR-9:

Electric Vehicles (EVs) ((Section 4.4.3, p. 38-41)

- a. Please provide the source data and calculations behind Figure 26-29.
- b. Please specify the share of EVs in the forecast which are light-duty, non-plug-in hybrids, plug-in hybrids, and/or battery-electric.
- c. Please provide the method for estimating the total number of EVs.
- d. How did elimination on rebates affect the EV forecast?
- e. Besides the elimination of rebates, were there any other changes driving the differences between the 2024 and 2025 EV sales forecasts?
- f. For the AMI data collected over 2023 and 2024, please state the number of customers in the new EV owners group and the control group.

g. Please state whether the 2025 EV forecast incorporates data from the Smart Grid Nova Scotia report.

h. Please confirm whether managed charging is incorporated into the 2025 forecast. If it is not, please explain. If NS Power has forecasted managed charging, please provide this information.

Request IR-10:

Price Forecast (Section 4.5, p. 51)

a. Why are electricity prices forecast to increase by 5 percent between 2026 and 2029? Why are electricity prices forecast to increase by 2 percent thereafter? Why are these values different?

Request IR-11:

Renewable to Retail (Section 4.6, pp. 55-56)

a. Please describe how the RTR impacts the peak load forecast.

Request IR-12:

Prevalence of AMI (Section 10.4, pp. 88-89)

a. Please provide the percent of customers with AMI for each of the classes listed in Figure 71 on the 2024 peak day.

b. Please provide the total number of customers in the “Rest” category.

Request IR-13:

IRP and ELCC (Section 10.0, p. 76)

a. Refer to the following statement from the Load Forecast: “On February 6, 2025, NS Power distributed to stakeholders for review and comment a draft study scope document for the next ELCC study.”

iii. Please provide the draft study scope.

iv. Please describe the anticipated timeline for completion of the ELCC study.

v. Please indicate if it is expected for the 2026 Load Forecast to be able to be updated with the results of the ELCC study. If it is not anticipated to be provided in the 2026 Load Forecast, please estimate which load forecast is expected to be the first load forecast which incorporates information from the updated ELCC study.

Request IR-14:

DSM Potential Study (Section 4.5.1, p. 53)

a. Refer to the following statement from the Load Forecast. “Beyond 2025, DSM amounts are based on E1’s 2019 Potential Study base case scenario. These values are all in line with past assumptions about future DSM.” Please address the following:

i. What was the most recent year of data available for the 2019 Potential Study.

- ii. How did the potential study compare to actual demand side management results for the years 2021-2024? Does NS Power and/or E1 believe that the 2019 Potential Study accurately predicted the impact of DSM in that time period?
- iii. Are there any expectations for creating an update to the 2019 Potential Study, or have any updates been created?
- iv. Are there any key assumptions from the 2019 Potential Study which have been violated between the study's release and the drafting of the 2025 Load Forecast?

Request IR-15:

Solar Generation (PV) (Section 4.4.4, pp 42-44)

- a. Please provide supporting data for the average capacity and capacity factor for the PV installations used in the forecast.
- b. Please provide the source data and calculations for the values in Figure 30.

Request IR-16:

Solar Impact to Peak (Section 10.2, p 85)

- a. Please provide the source data and calculations for the values in Figure 68.

Request IR-17:

New Technologies (Section 4.4.5, pp 45-46)

- a. Please provide the assumptions and calculations behind the values in Figure 33.
- b. Has NS Power considered projected cost declines of home batteries? If so, please provide the assumed cost declines.
- c. Please provide the installed battery capacity for each residential share.
- d. Please describe if there is any monetary compensation available for residential or commercial customers to export to the grid with a battery. Please describe how this compensation differs from residential PV net metering.
- e. Please confirm that the information in Figure 33 is not incorporated into the forecast and that it is a sensitivity analysis.
- f. Please describe what the Residential Share (%) variable means in Figure 33.

Request IR-18:

Residential Sector (Section 5.0)

- a. Please provide the source data behind the results in Figure 42.
- b. Please provide the inputs and calculations used to create Figure 43.
- c. Please provide the inputs and calculations used to create Figure 46.

Request IR-19:

Renewable to Retail (Section 4.6, pp 55-56):

- a. Please explain why the total energy magnitude associated with the RTR increased compared to the 2024 forecast.

- b. Please describe how the RTR is expected to impact the peak load forecast.

Request IR-20:

Net System Requirement (Section 9.0).

- a. Please provide the source data and the calculations used to produce the values in Figure 57.
- b. Please provide the source data and the calculations used to produce the values in Figures 58 and 59.

Request IR-21:

Appendix A: Forecast

- a. Please provide in electronic format the specific calculations used to create the values in Tables A1 and A2. If this information has already been provided in electronic format in one of the report attachments, please provide references to the associated attachment.
- b. Please explain the historical changes in the Interruptible Contribution to Peak values and the future year values used in the forecast.

Request IR-22:

Sensitivity Analysis (Section 11.0 and Appendix D)

- a. Please provide in electronic format the data and calculations used to create Figures 74 and 75.
- b. Please provide the actual statistical distributions used for the sensitivity variables and how they were determined.
- c. What other variables were considered but not chosen? Please explain.
- d. Please describe if and/or how the P10/P90 probability analysis is used in decision making regarding system planning.

Request IR-23:

Appendix D: Forecast Sensitivity Analysis

- a. Please provide the model outputs in electronic form.
- b. Please provide the full set of Oracle input data in electronic format so that it can be replicated.
- c. Please provide the historical data and forecasts used to develop the probability distributions for each variable used in the Monte Carlo analysis.
- d. Please provide the source data and calculations for Figure D8.

Request IR-24:

Appendix B: Residential Model

- a. Please provide in electronic spreadsheet format the data and the statistical model parameters and the full data and results used to produce the residential model coefficients and statistics tables.
- b. For the XHeat variable please provide the underlying factors (penetration, usage, etc.) driving the change of percentage for HP Heat.
- c. For the XCool variable please provide the underlying factors (penetration, usage, etc.) driving the change of percentage for HP Cool.
- d. For the XOther variable please provide the underlying factors (penetration, usage, etc.) driving the change of percentage for Other.
- e. Please note any changes in the model specification relative to the 2024 forecast residential model, and please further quantify the impact of any such changes in specification to the extent possible.

Request IR-25:

Appendix B: Peak Forecast

- a. Please provide in electronic spreadsheet format the data and the statistical model parameters and the full results used to produce the model coefficients and statistics tables.
- b. Please note any changes in the model specification relative to the 2024 peak forecast model, and please further quantify the impact of any such changes in specification to the extent possible.

Request IR-26:

Residential and Commercial Heating and Heat Pumps (Section 4.4, pp 30-35)

- a. Refer to Figure 20. Please provide for all the forecast years:
 - i. Total number of residential customers,
 - ii. Number of customers for HP, Hybrid, Resistance, Wood, and Fossil Fuel heating systems as indicated in Figure 17.
 - iii. Number of customers using heat pumps as the sole technology
 - iv. Number of customers using heat pumps as primary heating with supplemental resistance heating,
 - v. Number of customers using hybrid heat pumps with a breakdown of customers by the type of backup heating fuel
 - vi. Number of customers using oil for primary heating,
 - vii. Number of customers using natural gas for primary heating
 - viii. Number of customers using propane for primary heating
 - ix. Number of customers using wood for primary heating.

- 1 b. Please indicate the number of new residential customers from 2024 through 2050 and the
2 breakout of their space heating technology.
- 3 c. Refer to page 33 of the report. Please provide the full scope of work for “The Path to
4 2030” regarding the Province’s work to study the hybrid scenario. Please provide all draft
5 study materials, if they are publicly available.
- 6 d. Refer to Figures 20 and 21 and hybrid heating.
- 7 i. Please provide a detailed explanation of how E3 developed its stock forecast of
8 residential hybrid heating systems. Include all supporting evidence, such as
9 studies, data sources, and analyses used to develop this forecast.
- 10 ii. Please provide a detailed explanation of how E3 developed its stock forecast of
11 commercial hybrid heating systems. Include all supporting evidence, such as
12 studies, data sources, and analyses used to develop this forecast.
- 13 iii. E3 results are cited, but no modeling documentation is provided. Please provide
14 the full E3 model, report, or shared assumptions that informed the hybrid scenario.
- 15 e. Refer to the 48 percent saturation of customers providing their heat via heat pumps in
16 2024 (p. 32).
- 17 i. Is this heat pump saturation rate for residential customers only?
- 18 ii. Please provide all the supporting evidence and calculations for this data.
- 19 iii. The sum of the heat pump saturation rates in Figure 20 is less than 40 percent.
20 Why did E3 scenario not reflect the latest heat pump saturation data?
- 21 iv. Please provide NSPI’s own forecast of space heating stock saturation from 2024
22 to 2050 for both heat pumps and electric resistance heating, corresponding to
23 Figure 20.
- 24 f. Refer to Figures 21 and 22. Please provide for all the forecast years:
- 25 i. Please provide the underlying data for the commercial space heating saturation
26 including the commercial floor area that relies on heat pumps.
- 27 ii. Please provide a breakdown of NSPI’s forecast of space heating stock saturation
28 shown in Figure 22, including separate values for heat pumps and electric
29 resistance heating.
- 30 g. Refer to page 35 and Figure 23 regarding the adjustments to the energy and peak forecast
31 values to account for hybrid heating.
- 32 i. Please explain why hybrid heat pump systems were not explicitly modeled within
33 the SAE framework.

- 1 ii. Has NS Power considered incorporating hybrid systems as a separate end-use or
2 intensity variable in the SAE model? If not, explain why.
- 3 iii. What steps would be required to enable this integration in future forecasts?
- 4 iv. Please explain how E3 estimated the peak load impacts of both hybrid heating
5 systems and full heat pump systems. In your response, include the lowest
6 temperature assumed in the analysis and the corresponding heat pump
7 performance (coefficient of performance) at that temperature.
- 8 v. For the hybrid heating scenario, how did E3 model switching behavior between
9 electric and fossil backup heat? What temperature threshold, if any, was assumed
10 for backup system use?
- 11 vi. Please explain how NSPI estimates its HP peak impacts. In your response, include
12 the lowest temperature assumed in the analysis and the corresponding heat pump
13 performance (coefficient of performance) at that temperature.
- 14 vii. Please explain the significant discrepancy between the changes in energy forecast
15 and the changes in peak forecast in Figure 23.
- 16 viii. Why does NSPI adopt the energy and peak forecast adjustments without making
17 any modifications to those adjustments despite that the underlying heat pump
18 stock forecasts are different between the two forecasts? The adjustments imply
19 that NSPI is essentially using E3's HP analysis results. What is the role of NSPI's
20 own heat pump energy and peak estimates?
- 21 h. Refer to Figure 24 regarding heat pump forecast and the "2025 LFR Attachment 01 EO -
22 Residential Intensities" workbook.
- 23 i. Please provide a detailed explanation of how NSPI estimated the overall heating
24 intensities. When answering this question, please indicate all the key assumptions
25 and data sources used to develop the heating intensities.
- 26 ii. What do "% Install Non-Elec. Heat" and "% Install Elec. Heat" in Figure 24 mean?
27 What empirical evidence supports this assumption?
- 28 iii. Has NS Power conducted any surveys or studies to confirm actual heating system
29 usage post-installation for hybrid heating systems? If so, please provide the
30 surveys or studies.
- 31 iv. Has NS Power coordinated with EfficiencyOne to gather data on heat pump
32 adoption through rebate programs?
- 33 i. The report mentions the use of AMI data to meter actual consumption or savings data
34 associated with EV (p. 39), PV (p. 43) and single-family homes (page 59).

- i. Has NS Power conducted any analysis of AMI data to verify hourly or seasonal load patterns of customers with heat pumps?
- ii. If so, please provide the methodology, sample size, and key findings from this analysis.
- iii. If not, please explain why AMI data was not used to validate assumptions about heating usage and peak contributions.

Request IR-27:

Residential Water Heaters (WH) (Section 4.4, p. 37) and the “2025 LFR Attachment 01 EO - Residential Intensities” workbook.

- a. Please describe in detail how NSPI developed its forecast of water heating intensities from 2025 through 2035. In answering this question, please explain how the efficiency of heat pump water heaters is reflected in the intensity values.
- b. What is the data source for the efficiency values provided in columns W to AP in the “Efficiencies” tab?
- c. What does “EWHeat” in column AE in the “Efficiencies” tab represent?
- d. How does NPSI estimate peak load impacts from electric water heaters?
- e. Please provide the complete source citation for the EIA data presented in the “EIADData” tab.

Request IR-28:

Demand Side Management (Section 4.5.1, pp 53-55).

- a. Please provide the source data for the DSM values used in this forecast.
- b. Please provide the DSM values used in the latest IRP.
- c. Please provide the DSM levels for all scenarios as presented in E1’s 2019 Potential Study and a more recent DSM potential study if any.
- d. Please explain the basis for using E1’s 2019 Potential Study base case scenario for DSM amounts beyond 2025 and how valid the use of the 2019 Potential Study is for developing NSPI’s load forecast.
- e. Please provide the inputs and calculations used to create Figure 40.
- f. Please identify any changes to the forecast of Annual DSM Savings provide in Figure 40 relative to the same forecast provided in the 2024 Load Forecast Report, and please provide a narrative explanation of any such changes.

Request IR-29:

Price Elasticity (Section 2.0, p. 12; Section 4.5, p. 52)

- a. Please identify where and to what extent NSPI has tested TVP elasticity in its Load Forecast, as required by the Board in its Decision on the 2024 Load Forecast.

- 1 b. Please confirm that price elasticity for CPP customers are lower than that of TOU
- 2 customers, and if so, please explain why.