2024 **M11689**

NOVA SCOTIA UTILITY AND REVIEW 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
(2024 Load Forecast Report)

NON-CONFIDENTIAL INFORMATION REQUESTS

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

Responses Due: **June 19, 2023**

Copies: 1 electronic copy (PDF searchable)

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Issued at Halifax, Nova Scotia, this Wednesday, May 29, 2024.

Lisa Wallace
for Crystal Henwood, Regulatory Affairs Officer/Clerk

Request IR-1:

Report Tables

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:

Historical Sales and Energy Data (Figures 1, 3, 37-39, 43, 45-46, 48-50, 52). For all of the following, to the extent that the requested data have already been provided in electronic spreadsheet format in one of the report attachments, please provide references to the associated attachment.

a. Please provide in electronic spreadsheet format the customer sales data by rate class since 2008, on a monthly basis.
b. Please provide in electronic spreadsheet format historical usage and customer data for electric space-heat customers since 2008 on a monthly basis.
c. Please provide in electronic spreadsheet format system hourly load data from January 2008 through December 2023.
d. Please provide the magnitude of unmetered historical sales by year and by category since 2008.

Request IR-3:

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

a. The report notes that the load forecast uses “billed” sales rather than “accrued” sales. Please identify the quantitative differences between the two for the most recent available year.
b. The report notes that it uses monthly billed sales data from January 2014 to December 2023 for the residential and commercial energy forecasts, and sales data from January 2014 to December 2023 for Small Industrial, and from January 2006 to December 2023 for Medium Industrial “to improve the fit.” Please quantify the nature of the improved fit.
c. Please identify the effect if the medium industrial forecast were to use the same period as the residential and commercial forecasts (that is, January 2014 to December 2023).

Request IR-4:

Weather Data (Section 4.2, pp 17-22)

a. Refer to the following statement on page 17: “18°C is assumed to be a comfortable room temperature below which space heating is generally required and above which space cooling is also required.” Please explain how NSPI used 18°C and outdoor temperatures to develop HDD and CDD estimates. Please also explain how NSPI takes into account building internal heat gains and sola heat gains in these calculations. If these factors are not taken into account, please explain how HDD and CDD estimates would be different if such factors were included.
b. Please provide in electronic spreadsheet format the temperature data on a daily basis for January 2008 through December 2023, and the monthly HDD and CDD values used for this forecast identifying the weather station.
c. Please provide in electronic spreadsheet format the monthly HDD and CDD data for other weather stations in Nova Scotia for the same period.
d. Please provide the calculations used to construct the data values in Figure 7: HDD Trend from the Historic Annual HDD shown in Figure 6. Please identify the years represented on the x-axis for Figure 7.
e. Please provide the data and calculations for Figure 8: CDD Trend. Please identify the years represented on the x-axis for Figure 8.
f. Please provide the data and calculations behind the HDD and CDD forecast in Figure 9.
g. Please provide the hourly peak loads and temperature data for ten years as referenced on page 21.
h. Please identify which years represent the 10-year averages for the bars in Figure 10. Also please provide the data used for these average calculations.

Request IR-5:

Economic Information (Section 4.3, pp 23-29)

a. Please provide in electronic spreadsheet format all economic and provincial statistical data used both in developing the models and the forecasts for the historical analysis and forecast period. Cite the sources of the data. What sources other than Conference Board were considered or used?
b. Please describe in detail the construction of the work-from-home variable.
c. Refer to page 23, where NSPI indicates that “[h]ousing completions continue to be highly correlated with residential customer count, as seen in **Figure 11**, and continue to be the most appropriate indicator in the near term.” Given that the Board directed NSPI in its 2023 Decision in Matter 11108 to “re-evaluate the use of housing completions for the near-

term," please discuss in detail any alternatives to housing completions considered and the relative merits of each alternative considered.

d. Regarding Figure 16 and the historical changes. Please explain the increases in population for 2022, 2023 and 2024 and how that relates to customer numbers and housing completions. What are the comparable changes on a percentage basis? What is the forecast for the population changes during the forecast period?

e. Please discuss why non-manufacturing gross domestic product and non-manufacturing employment continue to be used for the commercial models. Were other drivers considered? Why were they not chosen?

f. Please discuss why manufacturing GDP and manufacturing employment were chosen for the industrial models. Were other drivers considered? Why were they not chosen?

g. What consideration if any was given to labour shortages or increased automation for the industrial sector?

h. What would be the effects on the industrial forecast if 10 years were used for the regression?

i. Please provide the inflation adjustments used to convert to constant dollars.

j. Regarding economic forecasts, identify the scenario/case used for this analysis and the reasons for choosing it.

k. Please indicate any other economic forecasts that are available and indicate why they were not chosen. For example, the use of major bank forecasts for the near term.

Request IR-6:

Residential End-Use Intensity Trends (Section 4.4, pp 30-50)

a. Please provide in electronic spreadsheet format the end-use data in the form of saturations and efficiencies from NRCan and U.S. EIA used for the residential and commercial models.

b. Please identify specifically which of that data was used in the SAE modeling and any adjustments, transformations, etc. that were made in that process.

c. Please identify the adjustments that were made "so that the resulting intensities are consistent with NRCan-reported end-use consumption and actual average use derived from NS Power billing data." [page 30, lines 13-15]

Request IR-7:

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

a. Refer to the E3 scenario on page 31. Does the E3 scenario achieve net zero emissions from the building sector by 2050? If so, please explain how E3 assumes that the scenario achieves net zero emissions for space heating fuels used for backup heating for hybrid heat pumps.

b. Refer to Figure 17 and Figure 18 on page 32. Did NSPI use E3's residential and commercial space heating saturation forecasts for its 2024 load forecast? If not, please provide the space heating saturation forecasts that NSPI used for its load forecasts in the same way as presented in Figure 17 and 18.

c. Refer to Figure 17. Please provide for all the forecast years:
    1. Total number of residential customers,
    2. Number of customers for HP, Hybrid, Resistance, Wood, and Fossil Fuel heating systems as indicated in Figure 17.
    3. Number of customers using heat pumps as the sole technology
    4. Number of customers using heat pumps as primary heating with supplemental resistance heating,
    5. Number of customers using hybrid heat pumps with a breakdown of customers by the type of backup heating fuel
    6. Number of customers using oil for primary heating,
    7. Number of customers using natural gas for primary heating
    8. Number of customers using propane for primary heating
    9. Number of customers using wood for primary heating.

d. Please indicate the number of new residential customers from 2024 through 2050 and the breakout of their space heating technology.

e. Refer to the 44 percent saturation of customers providing their heat via heat pumps in 2024 (p. 31).
    a. Please provide supporting evidence for this data.
    b. Please provide a breakdown of these customers by customer class or segment.
    c. Please explain how the 44 percent saturation rate is related to Figure 17 and Figure 18.

f. Refer to Figure 18. Please provide for all the forecast years:
    1. Total number of commercial customers,
    2. Total areas of commercial building floors
    3. Number of customers for HP, Hybrid, Resistance, and Fossil Fuel heating systems as indicated in Figure 18.
    4. Number of customers using heat pumps as the sole technology

5. Number of customers using heat pumps as primary heating with supplemental resistance heating,
6. Number of customers using hybrid heat pumps with a breakdown of customers by the type of backup heating fuel
7. Number of customers using oil for primary heating,
8. Number of customers using natural gas for primary heating
9. Number of customers using propane for primary heating

g. Refer to Figure 18 and 19.
    a. Please provide NSPI's own commercial space heating saturation forecasts by technology and fuel type, reflecting NSPI's own commercial electric heating share provided in Figure 19. For heat pumps, please provide a breakdown of (a) customers using heat pumps as the sole heating technology and (b) customers using electric resistance supplemental heating for heat pumps. For hybrid heat pumps, please provide a breakdown of customers by backup fuel type.
h. Refer to Figure 20.
    a. Please clarify the purposes of "the NS Power models" and "the E3 hybrid scenario models" and which models NSPI used to develop its own peak load forecast.
    b. Please elaborate on the following statement: "These adjustments are applied to the model to estimate the impact of the hybrid scenario" and explain what the "hybrid scenario" in this sentence refer to.
    c. For NS Power HP Peak (MW) estimates for 2030 and 2035, please provide the corresponding average peak load impacts in kW per residential customer and per commercial customer by the following technology type: electric resistance heating, whole-building heat pumps (that have no electric resistance backup), heat pumps with electric resistance backup heating, and hybrid heat pumps.
    d. For E3 HP Peak (MW) estimates for 2030 and 2035, please provide the corresponding average peak load impacts in kW per residential customer and per commercial customer by the following technology type: electric resistance heating, whole-building heat pumps (that have no electric resistance backup), heat pumps with electric resistance backup heating, and hybrid heat pumps.
i. Refer to Figure 21 regarding heat pump forecast.
    a. Please provide the data with underlying calculations intact in an Excel spreadsheet.
    b. Please provide NSPI's estimates of heating intensity (kWh/house) assumed for 2024 through 2034 for all residential electric heating systems and separately for

the following residential heating types: electric resistance heating, heat pumps, and hybrid heat pumps.

c. Please provide NSPI's estimates of the average of the maximum winter peak load impacts per household (kW/house) assumed for 2024 through 2034, for all electric heating systems and separately for the following heating types: electric resistance heating, heat pumps, and hybrid heat pumps.

d. Please provide space heating and cooling efficiencies (in terms of coefficient of performance) assumed for new residential heat pumps from 2024 through 2034.

e. Please provide a table of NSPI's heat pump forecast for commercial heat pumps, equivalent to Figure 21.

f. Please provide NSPI's estimates of heating intensity (kWh/building) assumed for 2024 through 2034, for all commercial electric heating systems and separately for the following commercial heating types: electric resistance heating, heat pumps, and hybrid heat pumps.

g. Please provide NSPI's estimates of the average of the maximum winter peak load impacts per building (kW/building) for 2024 through 2034, for all commercial electric heating systems and separately for the following commercial heating types: electric resistance heating, heat pumps, and hybrid heat pumps.

h. Please provide space heating and cooling efficiencies (in terms of coefficient of performance) assumed for new commercial heat pumps from 2024 through 2034.

j. Refer to the following statement: "The heat pump heating component intensities were adjusted to account for the fact that the large unallocated variance occurred mainly in the winter months and was determined to be primarily weather dependent."

a. How did NSPI make this determination?

b. Please provide all evidence and analyses to support this determination.

Request IR-8:

Residential Water Heaters (WH) (Section 4.4, p 35-36)

a. Please provide NSPI's projection of electric resistance water heaters and heat pump water heaters for 2024 through 2034.

b. Please provide the electric water heating intensity per household (kWh/household) for 2023 through 20234, for all electric water heating systems and separately for electric resistance water heaters and heat pump water heaters.

c. Please provide NSPI's estimates of the average of the maximum winter peak load impacts per household (kW/household) for 2024 through 2034, for all electric water heating

systems and separately for electric resistance water heaters and heat pump water heaters.

d. What are the existing or proposed standards for improving hot water efficiency?

e. Please describe NSPI or E1's current and proposed program offerings to promote heat pump water heaters.

f. Does NSPI assume any impacts of any load control strategy for electric water heaters? If so, please describe the load control strategy and assumed peak load impacts. If not, explain why not.

g. Has or NSPI conducted or is currently conducting an impact evaluation study of electric water heater controls? If so, please provide the study.

h. Is NSPI aware of any other jurisdictions that implement load control programs for electric water heaters? If so, please provide the names of such jurisdictions and program impacts they found in terms of winter peak reduction per electric water heater.

Request IR-9:

Residential Electric Vehicles (EV) (Section 4.4, pp 36-41)

a. Please provide NSPI's rationale and all data that support the EV scenario assumptions described in the following statement on page 37: "To account for the higher growth in recent years, the high scenario is used for 2025, 50 percent of the high scenario was used for 2030, and the forecast aligns with the low scenario for 2035."

b. Please provide the underlying data for Figure 24.

c. Refer to the EV forecasts in Figure 24. Please provide EV forecasts separately for LDV, MDV, and HDV.

d. Refer to average kW impacts per vehicle on peak in Figure 25.

    1. Please provide more details about E3's EV Load Shaping Tool and how it was used to produce the average kW impact for LDV, MDV, and HDV.
    2. Please provide supporting evidence for the peak load impact per vehicle.
    3. Please provide daily EV load shapes (in kW/vehicle over a source of 24 hours) for the summer and winter seasons for each type of vehicle used to estimate peak load impacts. Please also explain how such load shapes were developed and provide key data sources used to develop the load shapes.
    4. Please provide NSPI's daily system peak load shapes for the winter season.
    5. For LDV, MDV, and HDV, please provide peak load reductions in kW per vehicle for each vehicle category that NSPI expect and assumed through managed charging programs or time of use rates.

e. The SGNS project found average evening peak reductions of 0.24 kW/vehicle from one EV pilot program participant cohort and 0.65 kW/vehicle from another cohort. NSPI states that these average peak impacts are unmanaged on page 41.
    1. Please confirm that these impacts are relevant to the winter peak.
    2. What are the SGNS project's major findings about the impacts of managed charging strategies?
    3. Please explain whether and how NSPI used these results to develop peak load impacts from EVs.
f. Refer to Figure 26 on EV impacts to energy and peak forecast.
    1. Does this figure present EV impacts for LDV?
    2. If the answer to the first question is yes, pleas provide equivalent tables for MDV and HDV, including the impacts of managed EV charging.
g. Please provide an update on the status of the time of use tariffs currently in the pilot stage and the Company's future plans for deploying time of use rates.
h. The Company assumes that 70 percent of EV charging is managed and 30 percent is unmanaged.
    1. Please provide supporting evidence and rationales for these assumptions.
    2. Do these assumptions apply to all vehicle types? If not, please explain to which vehicle types they are applicable and provide rationales.
i. NSPI states on page 39 that the average peak contributions in E3's "blended" managed and unmanaged charging scenario is 0.9 kW/vehicle and the peak impact for the unmanaged scenario is 1.6 kW/vehicle.
    1. Please provide E3's average peak impact estimate per vehicle for the managed charging scenario.
    2. Please explain how E3 developed the peak load impacts for the managed and unmanaged charging scenarios. Please provide all supporting evidence and analyses that E3 used to develop the peak load impacts from EVs.
j. Please provide the inputs and the calculations behind the results in Figure 26.

Request IR-10:

Solar Generation (PV) (Section 4.4, pp 42-43)

a. Please provide supporting data for the average capacity and capacity factor for the PV installations used in the forecast.
b. Have you calculated the impacts of PV on summer peaks over the forecast period? If so, please provide those results.

c. Please provide the source data and calculations for the values in Figure 27.
d. Please describe the meaning of the Load (GWh) column in Figure 27. Please elaborate whether this is energy that is consumed on-site, consumed on-site combined with energy injected to the grid, energy injected to the grid, or another description of energy. Please describe if this energy has been netted in any fashion, and if so the mechanism and timing of such netting.

Request IR-11:

New Technologies (Section 4.4, pp 43-46)

a. Were projected cost declines of home batteries considered in the study? If so, please provide the assumed cost declines.
b. Please provide the assumptions and calculations behind the values in Figure 28.
c. Vehicle-to-grid capabilities of EVs could have a dramatic effect on the load forecast. Please describe the changes in technological, economical, or other variables required until NSPI more fully incorporates V2G into its load forecasts.
d. Please describe what the residential share vehicle means in Figure 28.

Request IR-12:

End-Use Intensities (Section 4.4, pp. 46-48)

a. Please provide the residential end-use intensities that combine both EFurn and HPHeat that are presented in Figure 29.
b. Refer to the following workbooks “2024 LFR Attachment 01 EO”, “2024 LFR Attachment 02 EO”, and “2024 LFR Attachment 03 EO”, please provide EIA’s original data and documentations for the appliance and equipment efficiency data provided in the EIAData” tabs.

Request IR-13:

Commercial and Industrial Growth (Section 4.4, pp 49-50)

a. Please provide the detailed calculations behind the values presented in Figure 32.
b. For the small and medium commercial customers, identify the components of the demand growth in Figure 32. How much is associated with heat pumps for heating, cooling?
c. How much of the growth represents increases in number or size of customers? How many new customers are included in the forecasts each year?

Request IR-14:

Introduction (Section 2.0, citing to Board Decision concerning 2023 Load Forecast). Please explain in detail how NSPI has addressed the Board's direction to include/address each of the following in its 2024 Load Forecast, providing citations to the relevant portions of the 2024 Load Forecast as applicable:

a. the IRP, SGNS, AMI, TVP Pilot outcomes;
b. reviewing the assumptions applied in the model to reduce carbon emissions; and,
c. assessing the historical load of survey sales realization, to compare how the historical load compares with the survey results.

Request IR-15:

Introduction (Section 2.0, citing to Board Decision concerning 2023 Load Forecast). Given the Board's direction for NSPI to consider the outcome of the IRP in its load forecast, and given further that the IRP includes multiple different forecasts of future load, has NSPI considered providing more than one forecast of net system requirement and/or peak load? Please explain in detail.

Request IR-16:

Introduction (Section 2.0, citing to Board Decision concerning 2023 Load Forecast). Please describe in detail any analyses conducted and results obtained in conducting the following, which the Board encouraged NSPI to do in its Decision concerning the 2023 Load Forecast:

a. Evaluate the elasticity used in the SAE model with the elasticity estimation from the TVP Pilot EM&V in matter M11267 and assess if the results provide a more robust model.
b. Evaluate the input variables in the residential model and test, over a period of time, if alternative inputs make the residential model more robust, considering the following:
    - Given the continued population growth in Nova Scotia and ongoing housing shortage, re-evaluate the use of housing completions for the near-term.
    - Consider incorporating household size and age of household residents, to determine if a better understanding on demand load by time of day is achieved.
    - Revisiting the short-term economic inputs provided by the Conference Board of Canada to ensure the data is close to what is used in the forecasts of Canada's major Banks.
    - Revisit the model's EV adoption rates to ensure that the model's inputs are in keeping with the data reported by Statistics Canada and Nova Scotia Open data.
    - With respect to the status of large infrastructure projects, NS Power is encouraged to maintain communications with those customers to ensure system adequacy.

Request IR-17:

Price Data (Section 4.5, pp 52-53)

a. Please provide the data and calculations used to produce the electricity prices shown in Figure 33.
b. The report states: “The SAE models are estimated using a -0.15 price elasticity.” Please provide supporting data for the use of this elasticity. Please also clarify whether the basis for utilization of this price elasticity value has changed in any way, given that the same value has been used in previous forecasts. Please also clarify if NSPI has reviewed the literature for a more recent relevant study than the 2006 National Energy Research Lab study provided in response to IR-15 in 2023.
c. Please provide the technical definitions of the daily price elasticity and inter-period substitution price elasticity present in Figure 34. Please also describe how the definitions of these price elasticities differ from the price elasticity used in the load forecast, -0.15.
d. Have any estimates of price elasticity been calculated specifically for Nova Scotia/Canada or for winter peaking systems? If yes, please explain in detail. If not, please explain why not.

Request IR-18:

Demand Side Management (Section 4.6, pp 54-56).

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.
e. Please provide the inputs and calculations used to create Figure 35.
f. Please identify any changes to the forecast of Annual DSM Savings provide in Figure 35 relative to the same forecast provided in the 2023 Load Forecast Report, and please provide a narrative explanation of any such changes.

Request IR-19:

Demand Side Management Adjustment (Section 4.6, pp 54-56)

a. Please provide the details of the data and statistical analysis that was used to develop the coefficient for the DSM variable in the Residential SAE Model
b. Please provide the details of the data and statistical analysis that were used to develop the coefficient for the DSM variable for the Commercial and Industrial forecast.
c. Please describe any changes in the data and statistical analysis used to develop the coefficient for the DSM variable in the Residential SAE model relative to the data and statistical analysis used to develop coefficient for the DSM variable in the Residential SAE Model for the 2023 Load Forecast Report.
d. Please describe any changes in the data and statistical analysis used to develop the coefficient for the DSM variable for the Commercial and Industrial forecast relative to the data and statistical analysis used to develop coefficient for the DSM variable for the Commercial and Industrial forecast for the 2023 Load Forecast Report.
e. Please provide the statistical measures associated with the coefficients referenced in (a) and (b).
f. Please provide the historical and forecasted annual values of DSM that are used for this forecast for each sector.

Request IR-20:

Residential Sector (Section 5)

a. Please provide the inputs and calculations used to produce the adjustments for residential solar and new customers in the Residential sales forecast.
b. Please provide the source data and calculations behind the results in Figure 37.
c. The report states concerning the COVID-19 variable that, “The impact of the variable to the Residential forecast is approximately +100 GWh in 2024 and beyond….” Please confirm that this means that the modeled effect of COVID-19 in the Residential forecast is a 100 GWh increase in Residential sales, per year. If not confirmed, please explain.
d. The report states that “As the historic sales data begins to encompass more of the post-COVID years it is expected that this variable will continue to decrease in magnitude in future forecasts.” Please explain the basis for the expectation that the COVID-19 variable will continue to decrease in magnitude in future forecasts and detail any data considered and analyses conducted that support this expectation.
e. Has the econometric approach to modeling the ongoing impacts of COVID-19 changed since the previous load forecast? If so, please explain in detail.

f. Has the estimated impact of ongoing changes associated with COVID-19 changed since the previous load forecast? If so, please explain in detail.
g. Please provide the inputs and calculations used to create Figure 39.
h. Please provide the inputs and calculations used to create Figure 40.
i. Please provide the inputs and calculations used to create Figure 41.
j. Please provide the inputs and calculations used to create Figure 42.
k. Please discuss how any proposed regulations under consideration for improved building shell efficiency might affect the values in Figures 40 and 42.
l. Please explain the basis for the assumption that home size will increase.
m. Has the projected change in home size changed since the previous load forecast. If so, please explain why.

Request IR-21:

End-Use Intensity Trends (Section 4.4)

a. The report references critical peak pricing (CPP) and TVP rates as currently being piloted. Does the Company assume that the charging behavior of EV owners will be impacted by either of these pricing mechanisms over the forecast period? If yes, please explain what impact is assumed. If not, then please explain why not.
b. What is the status of the CPP and TVP pilots referenced in (a)? When will these rates be deployed to all customers?
c. Does the anticipated future deployment of CPP, TVP rates, or other novel rate designs have any impact on the load forecast? Please explain.

Request IR-22:

Commercial Sector (Section 6.0).

a. Please explain and quantify the impacts of COVID on the 2022 and 2023 loads.
b. Please explain and quantify the ongoing effects of COVID in the commercial forecast.
c. Please explain and quantify the specific reasons for the differences from the previous forecast, addressing why the current forecast (Figure 43) projects a lesser increase in sales over the forecast period than did the previous forecast.

Request IR-23:

Small General Service (Section 6.1).

a. Please explain and quantify the specific reasons for the differences from the previous forecast.

b. Please identify and quantify in detail the specific components in the forecast model that are causing the increase starting about 2025 as shown in Figure 45.

Request IR-24:

General Service (Section 6.2).

a. Please explain and quantify the specific reasons for the differences from the previous forecast.

b. Please quantity separately and explain the derivation of the effects for (1) EV loads, (2) space heating, (3) DSM programs, (4) increased efficiency. These appear to be driven by the XHeat, XCool and XOther model variables used in Appendix B. But what component changes are driving the changes in these model variables? And how do they differ from those used in the previous forecast?

c. Please explain in detail the sales drop in 2024 related to sales shifting to the RTR participant.

d. Please provide details of the forecast of higher solar generation effects of 198 GWh by 2034. Please further explain whether and if so, why, this projected growth in solar generation is greater than the growth projected in solar generation in the previous load forecast.

Request IR-25:

Large General Service (Section 6.3).

a. Please explain and quantify the specific reasons for the differences from the previous forecast.

b. Please quantify how much of the increase is associated with expansion of institutional facilities and how much from other factors.

Request IR-26:

Small Industrial (Section 7.1).

a. Please explain and quantify the specific reasons for the differences from the previous forecast.

b. Please explain why the sales forecast appears to increase in its growth rate after about 2026.

Request IR-27:

Medium Industrial (Section 7.2).

a. Please explain and quantify the specific reasons for the differences from the previous forecast.
b. Please explain and quantify the factors behind the 0.4 percent rate of decline.

Request IR-28:

Other Industrial (Section 7.3).

a. Please explain and quantify the specific reasons for the differences from the previous forecast.
b. Of the twenty-nine responses that were received from the annual survey, what fraction of the sector load does that represent?
c. What is the aggregate percentage load change from those responses?
d. Based on past experience how reliable are the new project values given in Figure 51?

Request IR-29:

Municipal (Section 7.4).

a. Please provide the total municipal loads in GWh and MW over the forecast period.
b. What changes, if any, are anticipated with the municipal supply in the forecast period?

Request IR-30:

System Losses and Unbilled Sales (Section 8).

a. Please provide the system losses and unbilled sales for each year of the last five years.
b. Please provide information about how system losses vary over a typical year.
c. Please identify and discuss the reasons for any significant changes either in the historical or forecast values of the system losses or unbilled sales.
d. How are unmetered sales represented in the forecast?

Request IR-31:

Net System Requirement (Section 9).

a. Please provide the source data and the calculations used to produce the values in Figure 53.
b. Please provide the source data and the calculations used to produce the values in Figures 54 and 55.

Request IR-32:

Peak Demand and Demand Response (Section 10, pp 81-83)

a. Please provide details about the Demand Response (DR) resources modeled in this analysis. What sectors are represented and what are the potentials in each sector?
b. Refer to the ELCC of 48 percent that is used to reduce the impact of demand response in the forecast.
    a. Please explain how NSPI developed the ELCC of 48 percent.
    b. Please provide all data sources and studies NSPI used to develop this ELCC factor.
    c. Is NSPI aware of any other jurisdictions that use the ELCC of 48 percent or a different factor to derate the impact of demand response? If so, please provide the ELCC data that such jurisdictions are using.
c. Refer to the demand response peak reduction impacts in Figure 56.
    a. Please provide the calculations and assumptions used to produce the DR savings in Figure 56.
    b. How many water heaters and smart thermostats does NSPI assume for its peak reduction estimates for the direct load control programs?
    c. How many water heaters and smart thermostats does NSPI assume for its peak reduction estimates for the TVP rates?
    d. How many program participants does NSPI assume for the business, non-profit & industrial curtailment programs?
    e. Does NSPI assume any demand response impacts from EVs or batteries? If not, explain why not.
    f. Why peak load reductions do not increase after 2029 despite NSPI's load forecast assumes a growing share of electrification on space and water heating end uses?
    g. Please provide the total number of (a) customers with electric space heating and (b) customers with electric water heating by sector from 2024 through 2034, that are modeled in NSPI's load forecast.
    h. Are the demand reduction estimates in Figure 56 exactly the same amounts in the 'Base' program included in the 2022 Evergreen IRP? If not, please explain the difference and why they are different.
    i. How much peak load savings does the 2022 Evergreen IRP assume for demand response?

j. How did the 2022 Evergreen IRP estimate peak demand reductions. How many customers and which end uses or technologies does the IRP assume for estimating the peak load reduction from demand response measures?

d. Please provide the 2023 DSM Programs Evaluation Report mentioned on page 82.

e. Please provide a detailed description of the two-phase demand response pilot project for commercial and industrial customers mentioned on page 83.

f. Please provide more information about the Eco Shift Pilot.

g. Please provide the sources and the derivations of the values in Figure 61. Please also provide the values for the intervening years between 2024 and 2034.

h. Please provide further information about the Unexplained values in Figure 62.

i. Please provide the data and calculations behind the peak share values in Figures 65 and 66 including the actual load values as well as the percentages. Please provide the same data and calculations for 2034.

Request IR-33:

Peak Demand (Section 10 Coincident Peak Demand Research, pp 92-96)

a. Please provide more details about the use of interval data to understand peak loads at the class level.

b. What are the current levels of AMI coverage for the customer classes?

c. What were the loss levels (absolute and percentage) on the 2023 peak day by hour as shown in Figure 67?

d. What are the monthly loss levels as shown in Figure 68?

e. To the extent possible, please quantify and explain the differences in Figure 69 between the Residential coincidental peak load with and without DSM. Please also explain the relationship between these differences and the DSM values in Figure 35 and the demand response values in Figure 56.

f. How is the robustness of the model assessed?

Request IR-34:

Sensitivity Analysis (Section 11 and Appendix D)

a. Please provide in electronic format the data and calculations used to create Figures 70, and 71.

b. Please explain the reasons that these specific weather and economic variables were selected for the sensitivity analysis.

c. Please provide the actual statistical distributions used for those variables and how they were determined.

d. What other variables were considered but not chosen? Please discuss and explain.

Request IR-35:

Sensitivity Analysis (Section 11, 2020 IRP Comparison, pp 97-98)

a. Please provide information about how the evergreen IRP analysis might affect future loads.

Request IR-36:

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-37:

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. Please provide in electronic format the detailed end-use intensity data and its derivation.
c. Please provide in electronic spreadsheet format the source and calculations of the values in the tables on pages 8, 9, and 10.
d. Please provide the data and calculations associated with electric space heat and electric hot water usage.
e. For the XHeat variable please provide the underlying factors (penetration, usage, etc.) driving the change of percentage for HP Heat.
f. For the XCool variable please provide the underlying factors (penetration, usage, etc.) driving the change of percentage for HP Cool.
g. For the XOther variable please provide the underlying factors (penetration, usage, etc.) driving the change of percentage for Other.
h. Has NSPI collaborated with E1 in developing common assumptions for the end-use components? If so, please describe the results of that collaboration.

i. Please note any changes in the model specification relative to the 2023 forecast residential model, and please further quantify the impact of any such changes in specification to the extent possible.

Request IR-38:

Appendix B: Small General Service Model

a. Please provide in electronic spreadsheet format the data and the statistical model parameters and the full results used to produce the commercial model coefficients and statistics tables.
b. Please provide in electronic spreadsheet format the calculation of the XHeat, XCool and XOther variables.
c. Please provide in electronic spreadsheet format the calculations used to produce the commercial sales forecast.
d. Please quantify the adjustments done outside the model for other growth programs PV, EV and DSM and their derivations.
e. Please provide in electronic spreadsheet format the source and calculations of the values in the tables on pages 15-16.
f. Please note any changes in the model specification relative to the 2023 forecast small general service model, and please further quantify the impact of any such changes in specification to the extent possible.

Request IR-39:

Appendix B: General Service Model

a. Please provide in electronic spreadsheet format the data and the statistical model parameters and the full results used to produce the commercial model coefficients and statistics tables.
b. Please provide in electronic spreadsheet format the detailed end-use intensity data and cite its derivation.
c. Please provide in electronic spreadsheet format the calculation of the XHeat, XCool and XOther variables.
d. Please provide in electronic spreadsheet format the source and calculations of the values in the tables on pages 21-22.
e. Please note any changes in the model specification relative to the 2023 forecast general service model, and please further quantify the impact of any such changes in specification to the extent possible.

Request IR-40:

Appendix B: Small Industrial Model

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 2023 forecast small industrial model, and please further quantify the impact of any such changes in specification to the extent possible.

Request IR-41:

Appendix B: Medium Industrial Model

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 2023 forecast medium industrial model, and please further quantify the impact of any such changes in specification to the extent possible.

Request IR-42:

Appendix B: Combined Model for Commercial and Industrial DSM Coefficient

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 describe the method and data used to weigh the X variable.
c. Please explain why the X variables from the General Service model were used to represent both commercial and industrial customers.
d. Were other alternatives considered? If so, please describe and indicate why this approach was preferred.

Request IR-43:

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 provide the customer load values used to construct the aggregate HeatVar, CoolVar, and BaseVar values both for the model development and the forecast.
c. Please provide the details of the large customer class's energy and coincident load factors. Please provide also the historical coincident peak load factors associated with this load.

d. Please note any changes in the model specification relative to the 2023 peak forecast model, and please further quantify the impact of any such changes in specification to the extent possible.

Request IR-44:

Appendix C: Forecast Comparison and Accuracy

a. Is the data in this appendix weather normalized? If so, please provide the raw data and the normalization factors used.

Request IR-45:

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-46:

Nova Scotia Power Electrification Support Overview by E3

a. Please provide any supplemental materials produced by E3 in developing these results.

Request IR-47:

Regulatory Directives:

a. Please provide a summary of all known regulatory targets between 2024 and 2050 relevant to Nova Scotia for each end-use evaluated in the load forecast.

Request IR-48:

Peak Demand (Section 10.0, p. 94):

a. Please provide the generation fuels used to supply system generation, for each month reported in Figure 68.
b. Please summarize the annual peak-load generation mix for each year through 2050.

Request IR-49:

Electric Vehicles (Section 4.4, p. 40):

a. Please provide the percent of all vehicle sales, and electric vehicles as a percent of total vehicle stock for each year through 2050.
b. Please provide the percent of charging that is managed charging for each year through 2050.

Request IR-50:

Peak Load Forecast (Section 10.0, p. 81):

a. Has NSPI studied any sensitivities where the peak load occurs in the summer rather than the winter? If so, please provide such sensitivities and the subsequent forecast peak load. If not, please describe the combination of circumstances that would be required for NSPI to be summer peaking and why these circumstances are infeasible.

Request IR-51:

Municipal (Section 7.4, p. 76):

a. Please elaborate on the difference between load served to municipal electric utilities in each year and the load planned to cover the obligations of serving the municipal electric utilities. Please provide numerical examples and long-term time-series trends if available.

Request IR-52:

End-Use Peak Shares (Section 10.0, pp. 91-92):

a. Please provide the underlying data used to create Figure 65 and Figure 66.

Request IR-53:

Forecast Sensitivities (Section 10.0, pp. 97-99):

a. Please describe if and/or how the P10/P90 probability analysis is used in decision making regarding system planning.
b. Please describe how the P10/P90 sensitivity is the same as or differs from a 90/10 forecast methodology.
c. Please clarify if the load forecast referenced throughout the report is a 50/50 or 90/10 forecast. Please describe the rationale for selecting the type of forecast. If it is neither 50/50 or 90/10, please describe how the forecast compares to 50/50 or 90/10 forecast methodologies.

Request IR-54:

End-Use Intensity Trends (Section 4.4, pp. 30-50):

a. For each end-use discussed in Section 4.4 End-Use Intensity trends, is it NSPI's view that forecast uptake used by NSPI has the highest probability of occurring, among potential forecast uptakes?
b. Compare and contrast each forecast uptake to a socially optimal uptake, least-cost uptake, most carbon-abating uptake, uptake with the highest regulatory target compliance, and/or other uptakes that are optimal for a particular variable, if available. In essence, what variable is each end-use uptake forecast optimizing for?
    - Please specify any instances where the optimizing variable changes over time.
c. Please highlight any instances of an end-use uptake forecasts which do not reflect the forecast that NSPI believes has the highest probability of occurring.
d. Does NSPI utilize any end-use forecasts which meet regulatory compliance requirements, but NSPI does not view that end-use forecast as the forecast with the highest probability of occurring? Please provide details if so.