Evidence Regarding Nova Scotia Power's 2025 Load Forecast

Evidence RE: M12349

Prepared for the Nova Scotia Utility and Review Board

September 10, 2025

AUTHORS

Kenji Takahashi
Aidan Glaser Schoff
Selma Sharaf
Ben Havumaki

Synapse Energy Economics, Inc.

485 Massachusetts Avenue, Suite 3
Cambridge, Massachusetts 02139

617.661.3248 | www.synapse-energy.com

CONTENTS

1. INTRODUCTION

Synapse Energy Economics Inc. (Synapse) presents this evidence to document its review of the *2025 Load Forecast Report* [1] (Report) of Nova Scotia Power, Inc. (NSPI), and recommended improvements. Synapse has reviewed these forecasts for many years and observes overall positive trends in their expository quality. This year's iteration shows that NSPI continues to enhance the caliber of the forecast.

Synapse notes that the 2025 forecast is generally more conservative than last year's, with projected increases in annual sales and peak load trending back toward the levels of the 2022 forecast. While it anticipates a notable bump in both energy and peak load in 2025, it shows growth slowing considerably in subsequent years, with a projected compound annual growth rate in annual sales of 0.2 percent per year over the entire forecast period, and of 1.2 percent for peak.

The principal drivers of growth in both energy sales and peak load are the forecast increases in the number of electric vehicles (EVs), in the adoption of electric heating end uses, and in the total number of customers. However, NSPI has reduced its projection for EV growth in the province and has also raised its forecast for the Renewable to Retail (RTR) market, which together contribute to reducing the forecast increases in energy and peak relative to last year's load forecast.

Consistent with previous forecasts, NSPI's 2025 load forecast is composed of three discrete elements:

1. The Statistically Adjusted End-Use (SAE) model forecast, based on customer end uses;
2. The set of demand-side management (DSM) adjustments applied to the SAE forecast values; and
3. Other factors applied by NSPI to reflect customer growth and specific program adjustments.

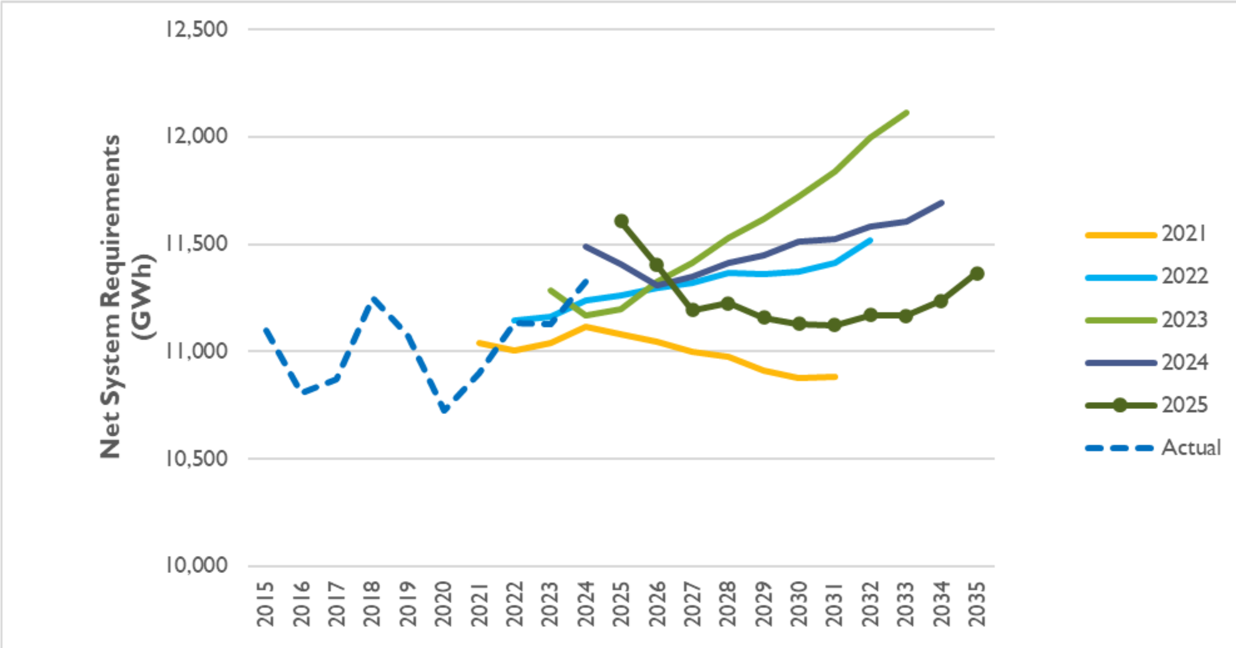
We discuss each of those components in this evidence.

1.1. Forecast Comparisons

To begin, we compare the 2025 forecast with those of recent years. Figure 1 shows both actual historical energy requirements and recent forecasts. Energy loads declined substantially between 2010 and 2013, as many industries in the province contracted. Since 2015, actual loads have been relatively flat. This year's load forecast reflects changing conditions, driven by a reduction in expected EV adoption, as well as an expansion of the RTR program. Altogether, this results in a lower forecast for 2027 and subsequent years when compared with the projections for the same period in the 2022, 2023, and 2024 load forecasts.

[1] Nova Scotia Power, Inc. *2025 Load Forecast Report*, June 27, 2025 (2025 Load Forecast).

Figure 1. Net system requirements



Source: Synapse, from Figure 3 in NSPI's 2025 Load Forecast Report (2025 Load Forecast) and responses to 2024 Synapse IR-1.

The 2025 forecast predicts a 242 gigawatt-hour (GWh) decrease—2.1 percent—in the net system requirement (NSR) from 2025 to 2035. NS Power lays out the components of this change in Figure 59 of its report, as shown in Table 1. The "Model" growth is primarily a result of electrification of heating loads along with greater cooling usage. Other factors increasing load are growth in new customers and electric vehicles (EV). Offsetting these increases are rooftop solar, DSM, and sales through the RTR market. In addition, adjustments made to reflect hybrid heating assumptions also reduce the total net system requirement. We discuss several of these factors in more detail in this evidence.

Table 1. Net system requirement components

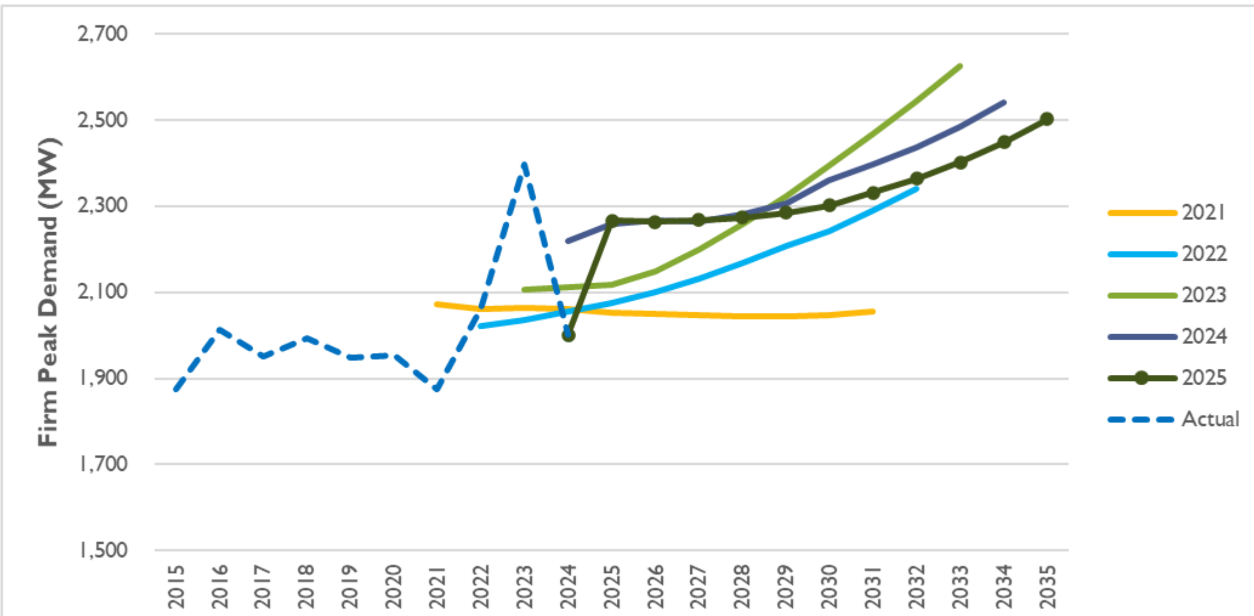
	Residential	Commercial	Industrial	Municipal and other	Losses	NSR
2025 forecast (GWh)	**5,289**	**3,135**	**2,258**	**148**	**777**	**11,607**
Model	303	251	38	-77	28	544
New Customers	403	36				439
Solar	-622	-252				-875
EV	418	290				708
Commercial & industrial electrification		9	22			31
Large customer projects		9	50			43
Hybrid model adjustment	-202	-85				-287
Renewable to Retail (RTR)	-117	-176	-128	135		-269
Demand-side management (DSM)	-265	-202	-53	-3	-51	-575
2035 forecast	**5,205**	**3,014**	**2,187**	**203**	**755**	**11,365**

Source: Synapse, adapted from values in Figure 59 in the 2025 Load Forecast.

The historical trend for firm peak demand shows a general increase, as shown in Figure 2. We plotted the actual rather than the weather-normalized historical peaks to give a sense of the year-to- year variations. The 2025 forecast is initially similar to the 2023 forecast, but then shows growth slowing due to lower modeled EV impacts. The increase over the forecast period is 235 MW, or 10.4 percent. This forecast increase is mostly driven by increased electrification.

The components producing this change are specified in Figure 65 of the Report (reproduced below as Table 2). The modeled values are the outputs of the SAE modeling, and what follows are various adjustments made to arrive at the firm peak.

Figure 2. Firm peak demand



Source: Synapse, from Figure 2 in the 2025 Load Forecast and Synapse IR-20 Att 01 EO.

Table 2. 2025 Peak contribution components (MW)

	Modeled peak	Res. heat peak	EVs	DR	Hybrid	C&I elect.	Large cust.	DSM	Firm peak	Inter. cust.	System peak
2025	2,180	2	3	-4	-	0	96	-11	2,267	132	2,403
2035	2,455	17	121	-37	-48	4	105	-114	2,502	132	2,672
2035 (max non-coincident EV peak)	2,455	17	178	-37	-48	4	105	-114	2,559	132	2,729

Source: Figure 65 in the 2025 Load Forecast.

NS Power provides the percent error and mean absolute percent error for the firm peak forecast in Figure C5 of Appendix C. In aggregate, the average percent error of the forecast is between -1 percent and 1 percent for lead times of four years or less. For lead times of five to 10 years, the firm peak demand is under-forecast, by an amount that generally increases with longer lead time.

1.2. Sector Overview

Table 3 shows the forecast energy use by sector. Overall, municipal and other load is the only sector with a projected increase. The remaining sectors show modest decreases between 2025 and 2035.

Table 3. Sector energy requirements (GWh)

	Residential	Commercial	Industrial	Municipal and other	Losses	Total
2025	5,289	3,135	2,258	148	777	11,607
2035	5,205	3,014	2,187	203	755	11,365
Change	-84	-121	-71	55	-22	-242
Percent change	-2%	-4%	-3%	37%	-3%	-2%

Source: Synapse, from Table A1 in the 2025 Load Forecast.

In general, the forecast seems reasonable, assuming that the projections of growth in RTR sales and behind-the-meter solar are reasonable. The following sections examine specific forecast components and note where there are questions and possible improvements.

1.3. DSM Overview

Demand-side management plays a substantial role in reducing energy use and, to a lesser degree, peak loads. Specific effects appear in Figures 40 and 59 of the Report. Overall, NSPI projects that DSM will reduce the 2035 load by 575 GWh, or about 5 percent.

It should be noted, however, that the modeled incremental DSM Program savings are reduced from their nominal levels. This reflects the fact that the SAE regression models use historical data that included embedded effects from previous DSM programs. To avoid double-counting, an adjustment factor needs to be applied to reduce the nominal incremental savings assumed over the forecast period. This factor is determined statistically, and for the residential sector it was estimated that 58.6 percent of the DSM program savings are not in the statistical model results. For the commercial and industrial sectors, that value was estimated at 43 percent. This indicates that a little more than half of the DSM program nominal savings are included in the statistical forecast methodology.[2]

If future DSM savings were to increase faster than historical DSM savings, then an analysis based on the historical data would likely undercount the savings. However, as can be seen in Table 4, that is not assumed to be the case. Overall, DSM is playing a major role in limiting energy growth in the province.

[2] 2025 Load Forecast, section 4.6.

We note that NSPI's suggested potential approach is reasonable: to treat any incremental savings above historical norms as *not* embedded in forecast variables, but instead to subtract these out at their full nominal value over the relevant period of time.[3]

Table 4. DSM program savings versus forecast adjustments

Year	Forecast residential DSM savings (GWh)	Forecast commercial DSM savings (GWh)	Forecast industrial DSM savings (GWh)	DSM captured by residential end-use forecast (GWh)	DSM captured by comm./ ind. end-use forecast (GWh)	DSM adjustment for residential with coefficient (GWh)	DSM adjustment for comm./ind. with coefficient (GWh)
2025	65.6	71.3	12.6	38.5	47.6	27.2	36.3
2026	69.6	56.7	10.0	40.8	37.8	28.8	28.9
2027	71.6	55.7	9.8	41.9	37.2	29.6	28.4
2028	73.0	62.9	11.1	42.8	42.0	30.2	32.0
2029	73.7	52.2	9.2	43.2	34.8	30.5	26.6
2030	73.3	51.0	9.0	43.0	34.0	30.3	26.0
2031	74.1	48.0	8.5	43.4	32.1	30.7	24.5
2032	73.2	46.8	8.3	42.9	31.2	30.3	23.8
2033	71.3	43.4	7.7	41.8	28.9	29.5	22.1
2034	69.1	44.0	7.8	40.5	29.4	28.6	22.4
2035	66.0	42.5	7.5	38.7	28.3	27.3	21.6

Source: Synapse, from Figure 40 in 2025 Load Forecast.

1.4. Board Directives from Matter 11689

In its Decision concerning NSPI's 2024 forecast, in Matter 11689, dated October 22, 2024, the Board issued several directives to NSPI for its 2025 forecast and also encouraged NSPI to address or otherwise attend to multiple other issue areas in this year's evidence.

First, the Board directed NSPI to implement several recommendations that it agreed to in the 2025 Load Forecast Report, including to:

- reassess the validity of the work-from-home variable;
- investigate trends in increasing maximum average temperature and cloud cover;
- update the Capacity Value Study for demand response before the next IRP analysis; and
- continue to investigate the unexplained variance between forecast and actual NSR for the residential sector.

In addition, the Board directed NS Power to:

- report in the 2025 Load Forecast Report on the findings of its continued investigation into the 2023 unexplained variance, and

[3] 2025 Load Forecast, page 55.

- investigate whether adjustments are needed in the 10-Year Forecast Classes to account for the Canadian Mortgage and Housing Corporation's (CMHC) housing completions data limitations.

The Board also encouraged NS Power to evaluate the input variables in the residential model and test, over a period of time, whether alternative inputs make the residential model more robust, given the Provincial Government's population growth targets, changes to building permitting and funding such as the Housing Accelerator, and a re-evaluation of the use of housing completions for the near term. It further encouraged NS Power to:

- continue to provide a comparison of the short-term economic inputs provided by the Conference Board of Canada to ensure the data is close to what is used in the forecast of Canada's Big Five Banks;
- revisit the model's EV adoption rates to ensure the model's input aligns with the data reported by Statistics Canada and Nova Scotia Open data; and
- continue to test the TVP elasticity in the load forecast as the elasticity changes over the course of the TVP Pilot.

NSPI's responses to these directives are addressed through the sections that follow. Overall, we find that NSPI has been reasonably responsive to the Board's Decision in Matter M11689, with some specific exceptions that are specifically called out in our analysis.

1.5. Recommendations from the Previous Forecast Review

The Synapse Evidence regarding the 2024 forecast and the resulting Board Order put forward several recommendations for improving the forecast.[4] The Evidence also included questions for NSPI. These recommendations and questions are reproduced in Appendix A to this report.

[4] Synapse 2024 Evidence, pages 32–33.

2. ENERGY FORECAST

In this section, we begin with a review of NSPI's modeling methodology, and then we consider in turn the modeling approaches and results for each of the sectors.

2.1. Major Inputs and Regression Models

In addition to changes in end-use technology, the forecast is influenced by economic, demographic, and weather-related factors.

Changes in overall economic health drive the utilization of the end-use stock. NSPI sources economic projections for the province from the latest Conference Board of Canada (CBoC) 20-year forecast. Importantly, the impact of potential trade tariffs on end use is not included separately in the forecast but is part of a sensitivity analysis of the long-term forecast.

NSPI uses the CBoC housing completion forecast, subject to an adjustment in the near term. NSPI increases the housing completion timeseries from 2025 to 2030 by 20 percent, to correct for historical underestimated forecasting by the Conference Board.[5] NSPI notes that this correction also aligns the housing start forecast with forecasts by banks.[6] NSPI also demonstrates that its residential customer forecast is aligned with the new Halifax Regional Municipality's Housing Accelerator Fund.[7]

The regression statistics as reported in NSPI's Appendix B are acceptable, although other models with different input variables could have been investigated. In terms of the impacts as reported in NSPI's Appendix B, the change in *average* energy use for existing customers increased by 5.8 percent over the forecast period, mainly due to the electrification of heating and cooling. Meanwhile, new customers increased the total residential by 7.6 percent.[8]

The treatment of a COVID and work-from-home variable is discussed in a later section of this Evidence, and so is the treatment of DSM effects.

For the commercial (General Services) models, NSPI continues to use non-manufacturing gross domestic product and non-manufacturing employment. In the industrial sector, NSPI uses manufacturing gross domestic product and manufacturing employment. A longer regression timescale was used for the industrial models, as that produces better statistics. We consider these to be reasonable choices.

The forecast now gives more consideration to long-term weather trends. NSPI analyzed the trend in heating degree days (HDDs) and cooling degree days (CDDs) over time, considering the effects of climate change. As one might expect, there has been a decline in HDDs and an increase in CDDs. The HDDs trend

[5] 2025 Load Forecast, pages 25–26.
[6] 2025 Load Forecast, pages 30-31.
[7] 2025 Load Forecast, page 26.
[8] 2025 Load Forecast, Appendix B, page 8.

used for this forecast was -16 HDDs per year. The CDD trend was +1.4 CDDs per year. These are roughly the same as those used in the previous forecast. NSPI now incorporates these trends into the forecasts. The 12-hour lagged temperature in the peak model has shifted to a rolling 10-year average, which is -14.2°C, in order to reduce year-to-year temperature fluctuations.[9] These data should be analyzed and updated on a regular basis.

Recommendations and considerations

The impacts of trade tariffs are an ongoing uncertainty. We recommend that the 2026 forecast include an analysis of the extent that 2025 trade tariffs with the United States are incremental to the economic forecast established by the Conference Board of Canada. If the trade tariffs are not appropriately incorporated into the forecast, NSPI should develop a methodology to incorporate the tariffs into their economic forecast.

2.2. Residential Sector

The residential sector currently represents about 46 percent of the total customer load. Forecast residential load, accounting for the load-reducing effects of DSM programs, decreases by about 1.6 percent over the forecast period. Without DSM programs, the increase would be about 3.9 percent.[10]

The two largest contributors to the increase in the residential load forecast over the modeled period are the increase in new customers and the growth in EV load. New customers, estimated based upon projected new housing construction, add about 7.6 percent to load between 2025 and 2035. Since the previous forecast, NS Power has used area median income (AMI) data and customer segmentation to refine this projection, resulting in a slight reduction in the assumed consumption by new customers. A rise in EV charging also increases load, by about 7.9 percent over the modeled period. The increase in distributed solar photovoltaic (PV) adoption and incremental DSM offset some of this load growth.

The residential forecast is formulated from a regression-based SAE model, which includes several inputs that are, in turn, functions of bottom-up analyses of customer load drivers. Included in the SAE model is a term for customer heating (XHeat), a term for customer cooling (XCool), and a term for other end uses (XOther). The SAE model also includes a terms for historical (embedded) DSM savings, another to capture the impact of increased work-from-home activity as a result of COVID, and several binary terms to account for variances in consumption associated with specific months (i.e., time-fixed effects).[11]

We will next discuss the residential SAE model in some detail to better understand the drivers behind the forecast.

[9] 2025 Load Forecast, page 20.

[10] 2025 Load Forecast, page 61.

[11] 2025 Load Forecast, Appendix B, pages 1-8.

The **XHeat** variable is the product of the HeatUse and HeatIndex terms. *HeatUse* represents (a) heating degree days, (b) household income, (c) household size, and (d) energy price. *HeatIndex* represents (a) heating saturation, (b) equipment efficiency, (c) building shell integrity, and (d) building size. The major change drivers for XHeat are electric (resistance) heat, heat pumps, and, to a lesser extent, secondary heat. The net change over the forecast period is a 7.7 percent increase.

The **XCool** variable is the product of the CoolUse and CoolIndex terms. *CoolUse* represents (a) cooling degree days, (b) household income, (c) household size, and (d) energy price. *CoolIndex* represents (a) cooling saturation, (b) equipment efficiency, (c) building shell integrity, and (d) building size. The major change driver for XCool is growth in the use of heat pumps for cooling. The net effect is to increase XCool by 58.4 percent.[12]

The **XOther** variable is the product of the OtherUse and OtherIndex terms. *OtherUse* represents (a) seasonal use pattern, (b) household income, (c) household size, and (d) energy price. *OtherIndex* represents (a) other appliance saturation and (b) efficiency trends. The primary change drivers for XOther are water heating (increased electric heater saturation), reductions in lighting use, and decreased television use. The net effect is to decrease XOther by 1.3 percent.[13]

There are many factors driving the SAE model regressions, and it is difficult to untangle all the effects. However, Appendix B of the Report provides a rough summary of the overall effects of the major terms on the average use. For the residential average use, 48 percent is associated with heating, 5 percent with cooling, and 50 percent with other uses. For existing customers, average heating load increases by 3.7 percent, average cooling load increases by 2.7 percent, and the average load associated with other end uses decreases by 0.6 percent over the forecast period.

The output of the SAE model is an average consumption value for residential customers. To formulate the overall residential class forecast, NSPI multiplies the average consumption value by the number of existing customers (fixed through the forecast period), then adds new customer load, new EV load, incremental PV generation, and incremental RTR sales before finally accounting for incremental DSM. To represent these various effects, we reproduce below a table from page 8 of NSPI’s Appendix B. The first column shows the SAE regression model results, and the other columns reflect various adjustments to the forecast.

[12] 2025 Load Forecast, Appendix B, pages 2, 8-9.

[13] 2025 Load Forecast, Appendix B, pages 2, 9.

Table 5. Residential load post-regression (GWh)

	Existing customer average use from regression model (kWh per year)	New cust. load	EVs	Solar	RTR	Hybrid	Res. DSM adjust.	Res. sales	Total res. DSM (at meter)	DSM captured by end-uses
2025	10,475	62	11	(27)	0	0	(24)	5,289	(59)	(35)
2035	11,078	464	429	(650)	(117)	(202)	(291)	5,204	(703)	(412)
Change to load	5.8%	7.6%	7.9%	-11.7%	-2.2%	-3.8%	-5.0%	-1.6%		

Note: Residential sales are the sum of existing customer load, new customer load, and EV load, minus solar load, RTR, hybrid, and DSM.

Source: Appendix B from 2025 Load Forecast

In addition to the outsized contribution of EVs and new customer load to the overall growth in residential consumption, Table 5 also shows that average consumption for existing customers is projected to increase by about 5.8 percent over the forecast period. This increase is largely the result of electrification, as NSPI projects growing adoption of heat pumps for heating and cooling, as well as growing adoption of electric water heating.

In the sections that follow, we examine in more detail specific contributions to load and provide feedback and recommendations for improvement where warranted.

Heat pumps

In the 2025 Load Forecast, NSPI assumes significant growth in heat pump adoption over time and identifies residential and commercial heat pump adoption as a major long-term driver of electricity load growth.

The forecast growth in heat pump use explains much of the growth in average electricity consumption for existing residential customers. Between 2025 and 2035, their average electricity usage is predicted to increase by 5.8 percent, from 10,475 kWh to 11,078 kWh. The XHeat load is responsible for a 3.7 percent load increase—about 64 percent of the total increase—and the Xcool load variable is responsible for a 2.7 percent load increase—or about 47 percent of the total increase.[14] NSPI presents the changes in energy intensities for XHeat and XCool by component (e.g., HP Heat, Secondary Heat, Furnace Fans) in Appendix B, on pages 8 and 9. Nearly all these increases in heating and cooling are driven by growing use of heat pumps, which contributes to a 33.3 percent increase in the XHeat load intensities and a 25.2 percent increase in XCool load intensities.

In total energy terms, Figure 47 of the 2025 Load Forecast quantifies the projected residential space heating and cooling loads attributable to heat pumps. By 2035, heat pump heating load is projected to

[14] 2025 Load Forecast, Appendix B, page 8.

increase by 685 GWh and cooling load by 102 GWh, for a combined total of 787 GWh—approximately 15 percent of forecast total residential sales.[15] These increases are partially offset by a projected 542 GWh decline in electric baseboard. In addition, heat pumps are expected to displace some fossil fuel heating, resulting in additional (unreported) energy savings on the non-electric side.

Residential heat pump forecast

Similar to its 2024 load forecast, NSPI takes different approaches to estimate consumption from electric heating for residential and commercial customers. For residential customers, NSPI's end-use load forecast explicitly models a growing level of heat pump saturation over time. NSPI's end-use model starts with the current heat pump saturation of 48 percent in 2025 (an increase of 4 percentage points relative to the 2024 level) and assumes that the saturation increases to 80 percent by 2035 and 100 percent by 2050.[16] This projected growth is supported by sustained financial incentives—including $300 per ton for qualifying mini splits, $500 per ton for qualifying ducted systems, and up to $15,000 for oil-to-electric conversions for low- and moderate-income households. Heat pump installations in 2024 reached about 22,250 units, up by about 5 percent (about 1,000 units) from the previous year's estimate for 2024.[17]

As with NSPI's previous forecasts, NSPI forecasts only all electric heat pumps within its SAE model and later makes adjustments for the potential load impacts from hybrid heat pumps that retain non-electric backup heating systems for the coldest periods. For this analysis, NSPI maintains its reliance on the "hybrid" space heating scenario developed by third-party consultant E3, in which a portion of customers use hybrid space heating systems. NSPI considers that this hybrid assumption is consistent with NSPI's 2023 Electrification Strategy and serves as a peak mitigation strategy. NSPI makes this hybrid heating adjustment by taking the differences in energy and peak load impacts from heat pumps between NSPI's SAE outputs and the E3 study's modeling outputs, as shown in Table 6. By 2035, NSPI applies a downward adjustment of 289 GWh to energy forecasts and 31 MW to peak forecasts to align with E3's modeling.[18] These adjustments are applied annually and presented in Figure 46 of the 2025 Load Forecast report as "Hybrid Adjust."

Table 6. NSPI's analysis of the impacts of hybrid heating on heat pump (HP) load

Year	NS Power HP energy (GWh)	E3 HP energy (GWh)	Change in energy forecast (GWh)	NS Power HP peak (MW)	E3 HP peak (MW)	Change in peak forecast (MW)
2030	235	74	-161	97	83	-14
2035	494	205	-289	207	176	-31

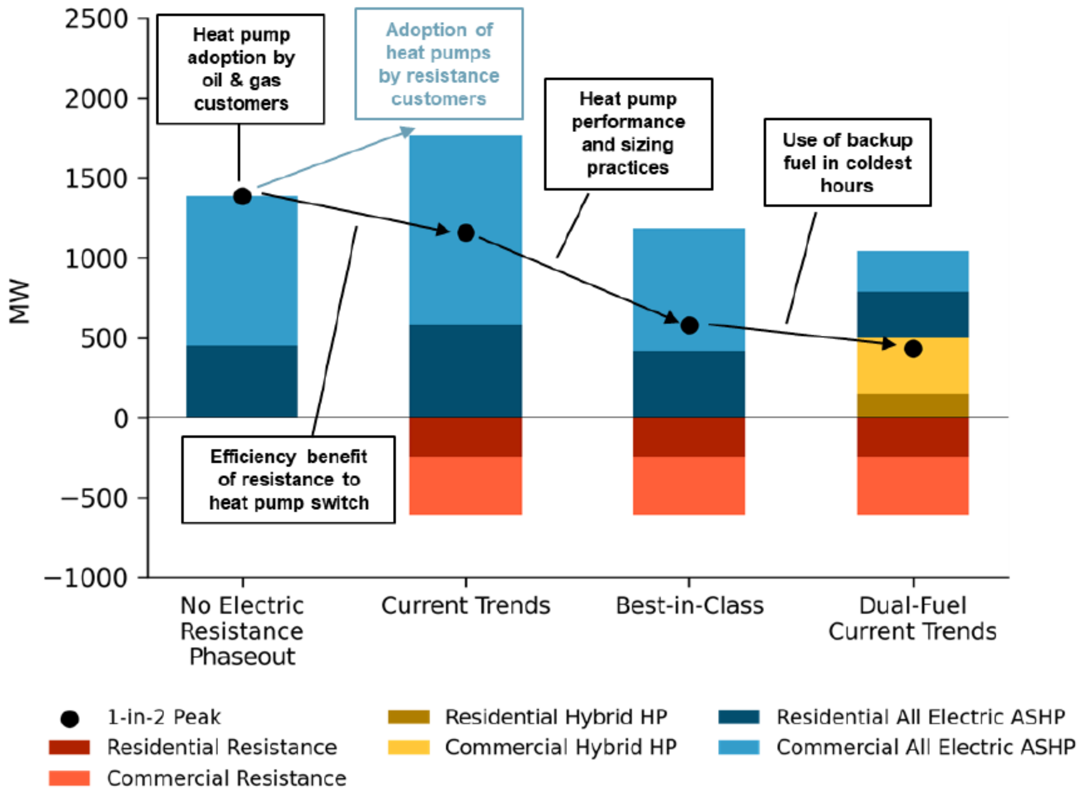
[15] 2025 Load Forecast, Figure 46, page 61.
[16] 2025 NSPI Load Forecast, Section 4.4.1, pages 33 and 36.
[17] 2025 NSPI Load Forecast, Section 4.4.1, page 32.
[18] 2025 NSPI Load Forecast, Section 4.4.1, pages 34–35.

However, this approach is problematic. The E3 study (2022) assumed a lower starting saturation rate of 40 percent in 2025 and a lower 2035 value of 75 percent, compared with NSPI's 48 percent and 80 percent, respectively.[19, 20, 21] If both models used the same saturation rates and per-unit energy intensities, the adjustment would be straightforward. But given these disparities—and the likelihood of additional differences in efficiency assumptions—it is not valid to estimate hybrid effects by directly comparing the two models' outputs.

A better method would be for NSPI to retain its own modeled heat pump load impacts as the foundation of its forecast, and apply a scaling factor derived from E3's hybrid heating analysis. For example, E3's 2023 study (commissioned by NSPI) evaluates four scenarios: three that assume full electrification and one that incorporates hybrid heating.[22] As shown in Figure 3, the total winter peak impact from all-electric heat pumps is estimated at about 1,750 MW in the *Current Trends* scenario, versus about 1,050 MW in the *Dual-Fuel Current Trends* scenario. This implies that the dual-fuel (hybrid) scenario results in a 40 percent lower peak load impact. NSPI could use this relative reduction to scale its own forecast to reflect the mitigating effect of hybrid systems. However, before applying such an adjustment, NSPI should ensure that the heat pump saturation levels are the same across both E3 scenarios—including both all-electric and hybrid systems—so that any differences in peak impacts reflect only the assumed share of hybrid heating. NSPI should also assess whether the share of hybrid heating assumed in the 2023 E3 study is appropriate for the Nova Scotia context.

[19] 2025 NSPI Load Forecast, Figure 20, page 34.
[20] NSPI response to Synapse IR-26 (e)(iii).
[21] 2025 NSPI Load Forecast, Figure 24, page 36.
[22] E3. 2023. *The Economics of Electrification in Nova Scotia*. Developed for Nova Scotia Power. Available at: https://www.ethree.com/wp-content/uploads/2023/12/E3_NS-Power_Electrification-Report.pdf.

Figure 3. E3 2023 study's estimates of non-coincident peak load impacts, by scenario



Source: E3. 2023. The Economics of Electrification in Nova Scotia. Figure 3-11, page 51. Available at: *https://www.ethree.com/wp-content/uploads/2023/12/E3_NS-Power_Electrification-Report.pdf*.

Commercial heat pump forecast

For commercial customers, NSPI models electric heating as a single category and does not distinguish among specific technologies (e.g., heat pumps versus resistance heating).[23] It calculates electric heating loads based on two key inputs: the electric heating stock forecast and the heating efficiency improvement forecast. We identified issues with both.

The stock forecast begins at 55 percent in 2025 and increases to 72 percent by 2035 and 81 percent by 2040.[24] To estimate annual saturation rates, NSPI applies a simple linear trajectory from the current level to the 2040 saturation rate assumed the E3 study. However, NSPI offers no justification for adopting this E3 target.

For its efficiency improvement forecast, NSPI assumes a 1.2 percent annual improvement through 2029, based on historical data from 2011 and 2012. After 2029, NSPI reduces the assumed efficiency

[23] Response to Synapse IR-26 (f)(ii).
[24] 2025 NSPI Load Forecast, Section 4.4.1, Figure 22, page 35.

improvement rate to just 0.1 percent per year, based on a source that appears to come from U.S. Energy Information Administration (EIA), but is not actually specified by NSPI.[25]

NSPI's approach to efficiency improvement is problematic. First, it is unclear why these data sources were selected to model future efficiency gains, especially when neither is likely to capture the impact of widespread heat pump adoption. Second, assuming only a 0.1 percent improvement from 2030 to 2035 likely understates the potential impact of electric heat pumps, since heat pumps are two to three times more efficient than electric resistance systems.

Future AMI-based enhancements

NSPI has indicated that, going forward, it will investigate the use of AMI data to better understand how changes in end-use technologies—such as increased adoption of electric heating—affect class- and system-level load shapes.[26] This effort will include examining the sensitivity of residential peak magnitude and timing to the presence of electric heating, and conducting research targeted at specific end uses to refine saturation and intensity values used in its SAE models. We strongly support this new initiative, which is consistent with our recommendations in previous years. It represents an important step toward improving the accuracy and transparency of NSPI's load forecasting by grounding assumptions in observed customer usage patterns.

Recommendations and considerations

For its residential heat pump forecast, NSPI should retain its own modeled heat pump load impacts as the foundation of the forecast and apply a scaling factor based on the difference between E3's hybrid and non-hybrid scenarios. This adjustment would allow NSPI to incorporate the mitigating effects of hybrid heating while preserving its own saturation assumptions and ensuring consistency across sectors. Over the longer term, NSPI should develop the capability to model hybrid electric heating explicitly within its load forecasting framework—not only for residential forecasts, but also for commercial heating—rather than relying on simplified post-modeling corrections. This recommendation builds on the guidance we provided in our 2024 evidence and remains critical for improving the accuracy and transparency of future forecasts. In both the residential and commercial sectors, NSPI should also validate its heat pump displacement and intensity assumptions using AMI data or other empirical sources. We strongly support NSPI's new commitment to analyzing AMI data and encourage the utility to prioritize this effort as it works to refine its modeling of electric heating impacts.

[25] 2025 LFR Attachment 03 EO – Commercial General Intensities. "Efficiency" tab.

[26] 2025 Load Forecast, page 90.

Water heaters

For water heaters, the 2025 forecast continues to assume that a portion of customers converting oil heating systems to heat pumps will also switch to electric hot water tanks due to annual operating savings. This effect is represented in the model through the XOther term.[27] Based on Figure 25 of NSPI's 2025 report, electric water heater saturation is projected to rise from 76 percent in 2025 to 90 percent by 2035, while non-electric water heating saturation will correspondingly decline. This trajectory implies that more than half of the remaining non-electric water heating customers are expected to convert within the forecast horizon. Because electric water heating is projected to increase in both saturation and intensity, and it has been shown in NSPI's demand response pilot to contribute measurable peak reductions of 385 W per unit when controlled, these assumptions warrant careful monitoring.[28]

The load forecast does not explicitly present net effects on system energy, but Appendix B indicates a 4.7 percent increase in XOther, driven by water heating usage between 2025 and 2035.[29] Furthermore, the modeled saturation path and increasing average intensity (from 1,674 kWh per household in 2025 to 1,916 kWh per household in 2035) suggest steady upward pressure on residential sales (section 4.4.2, page 37). NSPI notes that efficiency improvements of heat pump water heaters are not incorporated into the forecast, citing still-limited uptake (163 installations in 2022 and 141 in 2023, per EfficiencyOne's DSM evaluation) despite an available rebate of $400.[30]

On the demand response side, NSPI and EfficiencyOne continue to collaborate on direct load control of water heaters. The earlier pilot involving 201 water heater controllers demonstrated measurable winter peak demand reductions of roughly 385 W per unit, with some variation by event duration and time of day (section 10.0, pages 77–78). After quality issues caused the removal of the initial controllers in 2023–2024, new devices were procured in 2024 and rolled into EfficiencyOne's Eco Shift program, with more than 800 controllers installed (section 10.0, page 78). NSPI states that lessons from these pilots will be used to refine future load forecasts.

Recommendations and considerations

We recommend that NSPI begin modeling heat pump water heaters as a separate end-use technology in its next load forecast. This is a continuation of the recommendation we made in our previous Evidence, and it remains important because of the forecast surge in overall electric water heater saturation. While NSPI has argued that current uptake of heat pump water heaters is too low to warrant separate treatment, we disagree. Even at low adoption levels, modeling heat pump water heaters explicitly is necessary for accuracy and transparency, as they have very different load and peak characteristics than conventional electric resistance tanks. Incorporating them now also prepares the forecast to reflect their growing market presence over the next decade. Distinguishing between the two technologies will

[27] 2025 Load Forecast report, Appendix B, page 9
[28] 2025 Load Forecast report, Section 4.4.2, pages 37; Section 10.0, pages 77–78.
[29] 2025 Load Forecast report, Appendix B, page 9
[30] 2025 Load Forecast report, Section 4.4.2, page 37.

improve the precision of the forecast while aligning with Nova Scotia's broader electrification and peak management goals.

Electric vehicles

NSPI forecasts new EV load separately from its SAE modeling. Both federal and provincial EV incentives ended in 2025, and NSPI adjusted its EV forecast accordingly. NSPI lowered the near-term adoption forecast based on sales and registration data from the first quarter of 2025 and smoothed the curve out to the 100 percent sales mandate for 2035. This resulted in a 74 percent decrease in the forecast number of EV registrations projected in 2025 relative to the previous forecast.[31] This is also lower than the low scenario in the "Ensuring ZEV Adoption in Nova Scotia" prepared by Dunsky Energy+Climate Advisors, which models a case in which sales in Nova Scotia lag federal EV mandates.[32]

In addition to the elimination of rebates, the consumer carbon levy in Canada ended in April 2025, reducing the price of gasoline and making EVs less attractive to consumers. NSPI states that this development "is considered but not used directly in the forecast," as there has not been enough time to collect data on the impact of the policy change on sales volumes.[33]

The forecast predicts that there will be "over 160,000" EVs in Nova Scotia by 2035, including cumulative sales of 159,663 new EVs through the forecast timeframe.[34] NSPI projects that the new EVs expected to be sold between 2025 and 2035 will produce a total energy load of 718 GWh, with peak load impacts of 106 MW for a base case and 152 MW for a sensitivity case.[35] By 2035, it projects that EVs will represent 7 percent of energy sales and 5 to 7 percent of the peak load across all sectors.[36]

Unlike the previous forecast, the 2025 forecast bases the peak impact of light-duty charging at home on AMI data from 2023 and 2024. NSPI estimates an "EV effect" of 3,820 kWh per year per customer and a coincident peak impact of 0.39 kW for at-home charging, using a difference-in-differences analysis. It is unclear how NSPI developed its managed charging assumptions for light-duty vehicles. The impacts of commercial charging and medium and heavy-duty vehicle charging continue to be based on E3's EV Load Shaping Tool, which assumes managed charging for these categories.[37]

---

31 Response to Synapse IR-9(d).

32 2025 Load Forecast, page 38.

33 Response to Synapse IR-9(e).

34 2025 Load Forecast, Figure 29.

35 2025 Load Forecast, Figure 29.

36 2025 Load Forecast, Figure 3, Figure 29, Figure 65.

37 Response to Synapse IR-9h.

Recommendations and considerations

NSPI should monitor the impact of the removal of the carbon levy on EV sales and adjust the forecast as needed. NSPI should also provide additional details about its managed charging assumptions in the next load forecast, particularly for light-duty vehicles. Furthermore, NSPI should develop and describe strategies to incentivize managed charging as EV adoption grows, such as through rate design or other programmatic options.

Solar generation

As noted previously, NSPI forecasts new PV generation separately from its SAE modeling. Solar generation can either be small-scale at the customer level, or larger utility-scale. The load forecast considers the customer-level impacts of distributed small-scale solar participating in net metering. While the number of total installations remains small in Nova Scotia, the number of new installations per year is projected to increase by a factor of more than 23 over the forecast period. This is slightly higher than in the 2024 forecast. NSPI further forecasts a net reduction of 1,023 GWh in the combined residential and commercial energy load.[38]

Because of the timing of the system peak, NSPI continues to predict no effect on the winter peak load. In response to a request to monitor the coincidence of solar generation with monthly system peaks, NSPI confirmed that it had updated the coincidence factors based on 2024 data. These factors are based on both weather patterns and the timing of system peak.[39]

Recommendations and considerations

NSPI should continue to evaluate and update its solar installation projections and coincidence factors for solar so they align with the latest data.

Solar-plus-battery

The report discusses solar and battery storage combinations but does not expect them to have much effect on future loads. This approach is consistent with last year’s forecast but should be re-evaluated regularly. NSPI states that initial costs are a barrier for these resources, but Time Variable Pricing (TVP) rates might accelerate the technology learning curve. With a high penetration of battery systems, the peak impacts could be substantial and are worth exploring, especially if they can help avoid new peaking resource investments.

[38] 2025 Load Forecast, Appendix D, page 9.

[39] 2025 Load Forecast, page 85.

Recommendations and considerations

NSPI should begin to incorporate the impacts of rate design and other incentives that may encourage solar-plus-battery adoption into its analysis.

New customers

The final piece of the residential forecast is the contribution of new customers to load, which is discussed in section 5.0 of NSPI's report. As noted previously, NSPI forecasts new customer contribution to residential load separately from its SAE modeling – that is, new customer load is calculated outside of the regression model.[40]

To estimate growth in new customers, the residential load forecast uses projected housing completions, which are correlated to growth in customers. New customers are expected to add about 464 GWh (7.6 percent) to the residential load by 2035, a modest increase in the growth rate relative to last year's forecast.[41]

For this year's forecast, NSPI revisited its assumptions about single-family home and multi-unit building electricity consumption with the help of AMI data. In the past, NSPI assumed annual consumption totals of 16,000 kWh per year for single-family homes and 4,860 kWh per year for residential accounts within multi-unit buildings. Based on its review of AMI data, NSPI now estimates that *new* single-family homes consume 14,626 kWh per year, and residential units in *new* multi-unit buildings consume 4,101 kWh per year. NSPI further notes an interesting divergence in consumption trends: single-family home usage has been increasing, while multi-unit building dwelling consumption has fallen. There are many factors contributing to trends in consumption in both single-family and multi-unit buildings.[42] NSPI notes that increasing building size and increasing efficiency tend to cancel each other out, ultimately yielding "steady average use per residential customer" over time.[43]

Overall, NSPI explains that the "updated reduction in new customer load is offset by higher new customer counts in the current forecast when compared with 2024."[44]

In the past, Synapse has expressed concerns about the strength of the relationship between new housing and customer growth. In the Board's Decision on the 2024 Load Forecast, it directed NSPI to evaluate the continued reliance on housing completions as a proxy for customer growth and instructed NSPI to consider alternatives. The Board cited "the Provincial Government's population growth targets,

[40] 2025 Load Forecast, page 57.
[41] 2024 Load Forecast, Appendix B, page 8 and 2025 Load Forecast, Appendix B, page 8.
[42] 2025 Load Forecast, pages 59-60.
[43] 2025 Load Forecast, page 60.
[44] 2025 Load Forecast, page 60.

[and] changes to building permitting and funding such as the Housing Accelerator" as reasons to re-evaluate the use of housing completions in the load forecast.[45]

In response, in the 2025 Load Forecast, NSPI reaffirmed its reliance on housing completions, stating that these "continue to be highly correlated with residential customer count" and pointing to historical data in Figure 13 to illustrate the close correlation between housing completions and customer change.[46] Noting that the Conference Board's forecast for housing completions has systematically underestimated actual levels by an average of 20 percent over the past five years, NSPI has manually adjusted the forecast for the next five years upward by 20 percent.[47] NSPI further indicated its plans to monitor other government initiatives that could affect housing supply.[48]

Synapse is satisfied by the use of projected housing completions as a proxy for growth in new customers. However, there may be confounding issues affecting the reliability of this forecast. While actual housing completions appear to be correlated closely with actual customer additions, the changes in provincial targets and past systematic under-forecasting of completions raise concerns about the accuracy of NSPI's forecast for completions. It is also not clear that the simple 20 percent upward adjustment applied by NSPI to the Conference Board's forecast will yield accurate projections.

Recommendations and Considerations

NSPI should monitor the accuracy of its projections of housing completions, and consider changes to this methodology.

Price elasticity

NSPI demonstrated that the inter-period substitution price elasticity from the TVP rates is in line with the price elasticity used in the SAE models, which is -0.15. We concur with NSPI that -0.15 is a reasonable elasticity to use in light of recent TVP pilot.

COVID-19 work-from-home effects

In the 2025 Load Forecast, NSPI has modified its approach to modeling COVID-19 work-from-home impacts, now employing a quasi-binary variable only to explain usage in 2020–2024, but concluding that any enduring changes will be accounting for the remaining model variables for 2025 and onward.[49] Meanwhile, the COVID-19 variable has been removed entirely from the General Service models, though NSPI does use binary shift variables to explain post-COVID consumption changes.[50] While NSPI's choice

[45] NSUARB Decision in Matter 11689, page 8.
[46] 2025 Load Forecast, page 25.
[47] 2025 Load Forecast, page 25.
[48] 2025 Load Forecast, page 26.
[49] 2025 Load Forecast, page 57.
[50] 2025 Load Forecast, Appendix B, pages 10 and 16.

of specific inputs for this variable for 2020–2024 in the residential model could be better supported, Synapse agrees with NSPI's overall approach in phasing out reliance on the separate COVID-19 variable.

2.3. Commercial Sector

The commercial sector represents approximately 27 percent of the customer load in 2025 and decreases by about 3.9 percent over the forecast period. Commercial sales from are anticipated to drop beginning in 2025 and only partly recover over the forecast period. This is primarily driven by the impact of an increased uptake in RTR, a lower EV forecast, and a higher solar generation forecast. Elsewhere in this memo, Synapse reviews these forecast components and finds them reasonable. Thus, the commercial sector forecasts seem reasonable.

2.4. Industrial Sector

The industrial sector represents about 20 percent of the customer load and shows a projected decline of about 3.1 percent over the period 2025–2035. This projection may be contrasted with the 2024 load forecast, which anticipated the industrial load decreasing by about 1 percent over its 10-year horizon.

The industrial forecast is based on historical sales information, statistical models, and customer surveys—not on end-use modeling. There are three subsectors of industrial customers: (1) small, (2) medium, and (3) other (primarily large). The small sector is expected to grow by 0.1 percent per year, driven by economic growth, with incremental sales through the RTR market partially offsetting this load increase. The medium sector is expected to decline by 1.4 percent per year over the forecast period as load migrates to RTR providers. Load for the other (large) category, which represents approximately two-thirds of the industrial load, is projected to remain essentially flat.

The forecast projects increased electrification of the industrial sector, with a total load increase of 27 GWh by 2035—3 GWh less than was projected in last year's forecast.[51] This is only 1.2 percent of total estimated industrial load in 2035.

This forecast assumes the continuation of current major customers throughout the forecast period. Significant changes in those operations represent an uncertainty in the industrial forecast.

Overall, the industrial forecast appears reasonable, given the inherent uncertainties.

Recommendations and considerations

We ask NSPI to explore the impacts of potential increases in industrial RTR participation.

[51] Load Forecast 2025, Figure 37.

2.5. Commercial and Industrial Electrification

The forecasts for large commercial and industrial electrification are presented in Figure 37 of the Report.[52] The forecast rates of growth in electrification appear to be generally consistent with those in the previous year's forecast, though this year's projections are slightly lower overall.

2.6. The Municipal Sector

The municipal sector represents a minimal 148 GWh of the customer load in 2025. It is expected to increase to 202 GWh in 2027 and remain at that level going forward.[53] The municipal sector is the only class energy requirement that is projected to be higher in 2035 than in 2025. We note that municipal load is assumed to be served by a third party after 2025. NS Power must provide backup capacity and thus must plan to serve the customers' full peak demand in the Load Forecast. However, we find that it is unreasonable to further assume that NS Power will serve their peak demand throughout all hours of the year. It is thus unclear why the Municipal sector is forecast to have a higher energy requirement in 2025 and beyond relative to recent historical amounts of energy being served.

Recommendations and considerations

We ask NSPI to differentiate how it forecasts annual energy relative to peak load for the Municipal sector, given that the Municipal load is assumed to be fully served by a third party through the entire forecast period.

2.7. Energy Forecast and DSM Effects

Future DSM savings used in this forecast are presented in Figure 40 of the Report. The DSM savings remain fairly modest. For example, the residential 2025 savings of 65.6 GWh represent about 1.2 percent of the residential load. The DSM reduction to the SAE residential model results are more than half the size of the nominal savings, since some of the total anticipated residential savings are driven by historical effects that are already embedded in the model results.

To account for past savings that are embedded in the residential results, the residential statistical model includes the variable *AvgEESavings*.

The coefficient has been moderately variable over recent forecasts. This year the coefficient is -0.414. The past coefficients were -0.556 in 2024, -0.425 in 2023, -0.512 in 2022, and -0.587 in 2021. This means that the SAE model is currently embedding more DSM savings than in recent years. The net effect of DSM savings is -265 GWh in 2035 for the residential sector.[54]

[52] Impacts of electrification for the other commercial subsectors is included in the modeling for those subsectors.

[53] Load Forecast 2025, Appendix A – Forecast Values.

[54] 2024 Load Forecast, Figure 59.

For the commercial/industrial adjustments, the factor is -0.433, which is very close to last year's value of -0.448. The net load impacts of DSM in 2025 are projected at -202 GWh for the commercial sector and at -53 GWh for the industrial sector.

The adjustment coefficients do vary from year to year, so the forecast impacts have some degree of uncertainty. The adjustments discussed in the Report appear reasonable to us. Since these factors are statistically derived, however, there is necessarily some associated uncertainty. Overall, we feel that this type of approach and the proposed magnitudes of the adjustments are appropriate for this forecast.

3. PEAK FORECAST

As shown in Figures 2 of the Report, this year's peak forecast is similar to last year's, though it increases at a slightly lower rate. The projected increase in the system peak is 1.2 percent per year between 2025 and 2035, while the 2024 forecast anticipated 1.4 percent annual growth between 2024 and 2034. The reduction in peak growth is attributed to lower forecast growth in EV adoption.

A major observable distinction between the 2025 and 2024 forecasts is in the forecast growth from 2024 to 2025. Since the actual 2024 peak was about 14.9 percent lower than the previous year's peak, the 2025 forecast now anticipates a much larger increase of about 15.1 percent from 2024 to 2025. In Figure 67, NSPI provides the weather normalized peak forecast, including an adjusted 2024 value that is much closer to the 2023 peak. NSPI further elucidates the components driving the variance between the forecast and actual peak for 2024, showing that weather and wind together explain 132 MW of the total 277 MW variance; the rest of the variance is attributed to interruptible load (57 MW), the morning timing of the peak (121 MW), and an unexplained component (33 MW).

Tables 8 and 9 show both the peak load contributions in the 2025 and 2024 forecast, respectively. The peak is first modeled statistically using historical data and economic and demographic projections to produce a Modeled Peak, and then NSPI applies various adjustments to arrive at the system peak. We note that a peak increase of 269 MW by 2035 means an increase in capacity requirements of about 322 MW (using a 20 percent planning reserve margin).

Table 7. 2025 Peak contribution components (MW)

	Modeled peak	Res. heat peak	EV	DR	Hybrid	C&I Elect.	Large cust.	DSM	Firm peak	Inter. cust.	System peak
2025	2,180	2	3	-4	-	0	96	-11	2,267	132	2,403
2035	2,455	17	121	-37	-48	4	105	-114	2,502	132	2,672
2035 (max non-coincident EV peak)	2,455	17	178	-37	-48	4	105	-114	2,559	132	2,729

Source: Figure 65 in the 2025 Load Forecast.

Table 8. 2024 Peak contribution components (MW)

	Modeled peak	Res. heat peak	EV	DR	Hybrid	C&I elect.	Large cust.	DSM	Firm peak	Inter. cust.	System peak
2024	2,125	2	6	-1	-	0	104	-16	2,219	144	2,365
2034	2,505	13	156	-37	-68	4	115	-145	2,542	147	2,727
2034 (no EV mitigation)	2,505	13	281	-37	-68	4	115	-145	2,670	147	2,851

Source: Figure 61 in the 2024 Load Forecast.

3.1. Electric Vehicles

The contribution from EVs in the baseline and maximum non-coincident peak case are lower in the 2025 forecast than the 2024 forecast. The baseline contribution of EVs to peak demand in 2025 is 0.7 kW per vehicle, which is lower than the 0.9 kW per vehicle used in 2024.[55]

The coincident peak impact for at-home charging of light-duty vehicles (LDVs) was estimated to be 0.39 kW per vehicle—using a difference-in-difference technique with recent AMI data.[56] NSPI then estimates the peak impact as 0.7 kW per vehicle in aggregate when combining LDVs with medium- and heavy-duty vehicles (MDVs and HDVs). NSPI should make clearer the proportion of the overall peak impact of electric vehicles that is attributable to the separate categories LDVs, MDVs, and HDVs. This would make it easier to understand which category of vehicle is causing increases to the peak.

3.2. Other End Uses

In Section 2.2, we discussed certain concerns about NS Power's approach to modeling its "hybrid" heating scenario, its approach to modeling water heater penetration, and the associated implications for peak forecasting of these methodologies and their drawbacks. It is not clear, prospectively, what the impacts of adopting our recommended changes would be on NS Power's peak forecast, but we note the existence of specific uncertainty in the modeled peak resulting from these issues in the approach to assessing water heater and heat pump energy and peak effects, since NS Power uses an end-use approach to formulating its peak forecast.[57]

3.3. Demand-side Management

To develop its peak impact forecast from demand response, NSPI used the demand response target included in its 2022 IRP (a target of 75 MW by 2025); pushed back the implementation timeframe so that this target is attained by 2028 to reflect the current program implementation schedule; and then derated the total peak load reduction by applying an effective load carrying capacity (ELCC) of 48 percent.[58] The contribution of DSM peaks at 39 MW from 2029 to 2031 and then falls to 37 MW by 2034.[59] This trajectory is identical to the DSM forecast in the 2024 forecast.[60] NSPI does not project any increase in demand response after 2029, although it projects considerable load increase from space and water heating through 2035, which provides a greater level of winter peak load reduction potential through demand response.

[55] 2025 Load Forecast, page 41.
[56] 2025 Load Forecast, page 41.
[57] 2025 Load Forecast, page 76.
[58] 2025 Load Forecast, page 76.
[59] 2025 Load Forecast, Figure 60.
[60] 2024 Load Forecast, Figure 56.

NS Power was directed by the Board to "update the Capacity Value Study for demand response before the next IRP analysis."[61] In the 2025 Load Forecast, NS Power indicated that it intends to focus on demand response in the next ELCC study.[62] In responses to discovery, NS Power clarified that it may not be possible to incorporate the next ELCC study into the 2026 Load Forecast.[63]

We appreciate that NS Power is elevating the ELCC of demand response in the next ELCC study and recognize that an update of such a value is outside of the scope of this load forecast. However, as Synapse noted with regard to the 2024 load forecast, there is cause for concern with NS Power's current ELCC assumptions. In brief, these concerns are:

- That NS Power's ELCC factor is derived from a 2019 study that is of uncertain applicability to NS Power's specific DR program offerings;
- That NS Power does not consider interactive effects between resources, which can make the whole portfolio ELCC greater than the sum of individual component ELCCs; and
- That NS Power does not consider the potential for new demand response opportunities that may arise with increasing electrification.[64]

We look forward to NS Power's forthcoming review and potential update to its ELCC assumptions.

Recommendations and considerations

NSPI should timely conduct an analysis of portfolio ELCC and develop an ELCC value for demand response based on a portfolio ELCC. Furthermore, NSPI should analyze a greater level of demand response programs, consistent with a greater level of peak loads due to electrification.

3.4. AMI Data

NS Power states the following about the use of AMI data in enhancing its peak forecast: "Going forward, AMI data will be investigated for assessment of the impact of changing end-use stocks on class- and system-level load shapes, for example quantifying sensitivity of the residential peak magnitude and timing with the presence of electric heating. Research targeted at specific end uses may also allow for potential refinements of saturation and intensity values used in the forecasting SAE models."

We are very supportive of NS Power's intention to utilize AMI data to enhance its load forecast, and it appears that consideration of these data in this forecast has already yielded benefits. We encourage NSPI to continue with these enhancements.

[61] 2024 Load Forecast Board Order, p. 8.
[62] 2025 Load Forecast, pp. 76 – 77.
[63] Response to Synapse Request IR-13(c).
[64] Synapse 2024 Evidence, pages 28–29.

4. SENSITIVITY ANALYSIS

The 2025 Report presents a sensitivity analysis in Section 11 and Appendix D to account for uncertainty in the load forecast inputs.

The sensitivities assessed a set of weather and economic drivers. Figure D5 shows that the peak forecast is equally sensitive to monthly heating degree days (HDD) and peak HDD temperature. Figures D6 and D7 show that the energy forecast is more sensitive to weather in the near-term and equally sensitive to weather and economics in the long-term. These results appear to be reasonable.

Figure D8 presents the relative impact of various forecast components, as well as other possible scenarios not included in the forecast. Both the energy and peak demand forecasts are most sensitive to DSM, highlighting the importance of this component. Some of the possible scenarios have interacting effects (e.g., the impact of two additional hydrogen production facilities on peak load could be counteracted by achieving a 5 percent battery share by 2035). NSPI is continuing to evaluate the potential impacts of the proposed hydrogen facilities and should continue to also assess the plausibility of all the listed scenarios and their combinations.

As we did last year, we note that NSPI's load forecast only includes a single reference scenario for all the key resources and end uses (e.g., heat pumps, EVs, DSM and demand response). It is critical to evaluate a range of possible futures. In fact, NSPI's IRP proceedings test various load scenarios including a few DSM scenarios and electrification scenarios. For the major resources and end-uses that pose uncertainties about their future adoption rates, in particular heat pumps, EVs, DSM, and demand response, we highly recommend that NSPI develop a few different scenarios (e.g., low case and high case) in addition to the reference case. This will be particularly important for EVs, given the uncertainty associated with the impact of the end of rebates.

Recommendations and considerations

NSPI should assess the likelihood that each "other possible scenario" in Figure D8 materializes and consider adding additional analyses based on strategies for mitigated projected peak.

For the major resources and end uses that pose uncertainties about their future adoption rates, in particular heat pumps, EVs, DSM, and demand response, we again recommend that NSPI develop a few different scenarios (e.g., low case and high case) in addition to the reference case.

5. QUESTIONS AND RECOMMENDATIONS

In this Evidence we ask for further clarifications and make several recommendations:

1. The impacts of trade tariffs are an ongoing uncertainty. We recommend that the 2026 forecast include an analysis of the extent that 2025 trade tariffs with the United States are incremental to the economic forecast established by the Conference Board of Canada. If the trade tariffs are not appropriately incorporated into the forecast, NSPI should develop a methodology to incorporate the tariffs into its economic forecast.

2. For its residential heat pump forecast, NSPI should retain its own modeled heat pump load impacts as the foundation of the forecast and apply a scaling factor based on the difference between E3's hybrid and non-hybrid scenarios. This adjustment would allow NSPI to incorporate the mitigating effects of hybrid heating, while preserving its own saturation assumptions and ensuring consistency across sectors. Over the longer term, NSPI should develop the capability to model hybrid electric heating explicitly within its load forecasting framework—not only for residential forecasts, but also for commercial heating—rather than relying on simplified post-modeling corrections. This recommendation builds on the guidance we provided in our 2024 Evidence and remains critical for improving the accuracy and transparency of future forecasts. In both the residential and commercial sectors, NSPI should also validate its heat pump displacement and intensity assumptions using AMI data or other empirical sources. We strongly support NSPI's new commitment to analyzing AMI data and encourage the utility to prioritize this effort as it works to refine its modeling of electric heating impacts.

3. We recommend that NSPI begin modeling heat pump water heaters as a separate end use technology in its next load forecast. This is a continuation of the recommendation made in our 2024 Evidence, and it remains important because of the forecast surge in overall electric water heater saturation. While NSPI has argued that current uptake of heat pump water heaters is too low to warrant separate treatment, we disagree. Even at low adoption levels, modeling heat pump water heaters explicitly is necessary for accuracy and transparency, since they have very different load and peak characteristics than conventional electric resistance tanks. In addition, incorporating them now prepares the forecast to reflect their growing market presence over the next decade. Distinguishing between the two technologies will improve the precision of the forecast while aligning with Nova Scotia's broader electrification and peak management goals.

4. NSPI should monitor the impact of the removal of the carbon levy on EV sales and adjust the forecast as needed. NSPI should also provide additional detail about its managed charging assumptions in the next load forecast, particularly for light-duty vehicles. Furthermore, NSPI should develop and describe strategies to incentivize managed charging as EV adoption grows, such as through rate design or other programmatic options.

5. NSPI should continue to evaluate and update its solar installation projections and coincidence factors for solar so they align with the latest data.

6. NSPI should begin to incorporate the impacts of rate design and other incentives that may encourage solar-plus-battery adoption into its analysis.

7. NSPI should monitor the accuracy of its projections of housing completions, and consider changes to this methodology.
8. We ask NSPI to explore the impacts of potential increases in industrial RTR participation.
9. We ask NSPI to differentiate how it forecasts annual energy relative to peak load for the Municipal sector, given that the Municipal load is assumed to be fully served by a third party through the entire forecast period.
10. NSPI should timely conduct an analysis of portfolio ELCC and develop an ELCC value for demand response based on a portfolio ELCC. NSPI should also analyze a greater level of demand response programs, consistent with a greater level of peak loads due to electrification.
11. NSPI should assess the likelihood that each "other possible scenario" in Figure D8 materializes and consider adding additional analyses based on strategies for mitigated projected peak.
12. For the major resources and end-uses that pose uncertainties about their future adoption rates, in particular heat pumps, EVs, DSM, and demand response, we again recommend that NSPI develop a few different scenarios (e.g., low case and high case) in addition to the reference case.

We support NSPI's ongoing efforts to improve the transparency and accuracy of the load forecast. There is still more to do, but overall, NS Power's Report is very well done and satisfactorily explains the underlying factors driving the forecast.

Appendix A. Questions and Recommendations from 2024 Evidence of Synapse Energy Economics

1. We ask that NSPI explore the benefits of increasing DSM levels in the future.

2. We ask NSPI to continue to investigate the energy and peak load effects of heat pumps in future forecasts, especially given the variance between NSPI's analysis and E3's for both whole home heat pumps and hybrid heat pumps and the increasing availability of AMI data that is expected in the future. NSPI should seek to validate any assumptions about the extent to which heat pumps displace legacy fossil-based heating equipment, and NSPI should also seek to validate any other assumptions about customer usage of secondary heating equipment. Finally, NSPI should model hybrid electric heating within its model instead of making a simplified adjustment based on E3's hybrid scenario.

3. We recommend that NSPI model heat pump water heaters as a separate end-use technology in the next load forecast.

4. NSPI should carefully monitor EV adoption and update its forecast as needed. As part of this update, NSPI should examine the reasonableness of the Dunsky's low scenario for Nova Scotia. NSPI should also continue to examine load impacts from EVs including peak load impacts from EV managed charging and a reasonable share of EVs that can be under managed charging programs and reflect the results of the analysis in the next load forecast. Further, NSPI should develop and implement rate designs and other programmatic options to reduce on-peak EV charging as penetration increases. These load management strategies should be reflected in the next load forecast with greater detail, with all assumptions supported empirically to the maximum extent possible.

5. NSPI should continue to monitor the coincidence of solar generation with month system peaks and make updates to coincidence factors as warranted.

6. NSPI should continue to investigate and report on opportunities for incentivizing cost-effective deployment of battery storage, including through rate design. NSPI should also continue to investigate the use of EV batteries, especially for peak management.

7. NSPI should validate the use of new home construction as a proxy for customer growth, addressing concerns about potential shortcomings of this proxy variable.

8. We ask that NSPI reassess its modeling approach for COVID-19 impacts on the residential class. NSPI should continue to collect data on work-for-home behavior, and it should make modifications to its modeling approach as warranted. We also reiterate the Board's 2023 suggestion to consider the impacts of household demographics on residential load.

9. Given that significant changes to the load forecast relative to the previous year's forecast owing to revisions to assumptions about EV and solar penetration and the impacts of the RTR and hybrid heating, NSPI should address the range of possibilities (sensitivities) in these domains to produce a more robust forecast.

10. We further ask that NSPI explore the potential impacts of solar and DSM on the Large General Service forecast.
11. We ask NSPI to explore the likelihood and impacts of greater industrial electrification levels.
12. We ask NSPI to explore the potential for greater industrial savings.
13. We ask NSPI to explore the impacts of real time rates.
14. We ask NSPI to explore the impacts of increases in industrial RTR.
15. If DSM program savings are increased above historical levels, then the adjustment factors probably should be adjusted upward to reflect greater levels of incremental savings.
16. We ask NSPI to investigate what can be done with time-of-use rates and other measures to mitigate the peak load increases for all these components, especially for the C&I sectors.
17. NSPI should conduct an analysis of portfolio ELCC and develop an ELCC value for demand response based on a portfolio ELCC. Further, NSPI should analyze a greater level of demand response programs, that are consistent with a greater level of peak loads due to electrification.
18. We ask NSPI to further explore and evaluate the impacts of thermal storage, heat pump water heaters, and induction cooking technologies.
19. We ask NSPI to quantify specifically the electrification and EV impacts for the commercial sector and to consider how this can be moderated.
20. For the major resources and end uses that pose uncertainties about their future adoption rates, in particular heat pumps, EVs, DSM, and demand response, we highly recommend that NSPI develop a few different scenarios (e.g., low case and high case) in addition to the reference case.
21. NSPI should also evaluate the possibility of a higher than forecast peak in light of the systematic under-forecasting of peak that is noted above.
22. Finally, we recommend that there be future sensitivity analyses based upon thoughtful/critical examination of realistic but aggressive proactive actions to mitigate projected peak increases using newly available technology.