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Request IR-1:

Figure 3: Historic and Forecast Net System Requirement and System Peak shows that System Peak growth from 2023 to 2024F is -3.7% and the NSR growth from 2024F to 2025F is -0.7%.

(a) NS Power states on page 7 at lines 4 to 5 “higher growth in the near term due to more new customer additions and higher average use when adjusted for weather in 2023”. Why does NS Power anticipate a reduction in NSR in 2025?

(b) Given the growth in customers and NSR in 2024F why does NS Power expect a reduction of 3.7% in system peak?

Response IR-1:

(a) NSR is expected to decline from 2024 to 2025 due to the impact of customers migrating to the Licensed Retail Supplier (LRS) under the Renewable to Retail program as outlined in Section 4.7 of the report, and the shift of municipal load from bundled service to third-party supply as outlined in Section 7.4 of the report.

(b) The reduction in system peak is due to the extreme nature of the 2023 peak as discussed in more detail in Section 10 of the report. The actual 2023 peak, which occurred at a temperature of -22.8 degrees Celsius, is contrasted against the 2024 forecast peak, which is assumed to occur at the normal (10-year average) peak temperature of -14.4 degrees Celsius.

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1 **Request IR-2:**

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3 **Figure 5: 10 Year Normal Monthly HDD and CDDs on page 19 of the Report, please explain**
4 **why there are HDD in July and August.**

5
6 **Response IR-2:**

7
8 Heating degree days (HDD) and cooling degree days (CDD) represent how far the daily average
9 temperature is above or below a particular set point temperature, in this case 18 degrees Celsius,
10 and July and August often have days with an average temperature below 18.

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1 **Request IR-3:**

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3 **Page 19 explains that to reflect global warming, a trend is applied to the annual HDD and**
4 **CDD variables using an analysis of 30 years of data and a 10-year moving average which**
5 **finds that HDD are declining by 17 per year and CDD are increasing by 1.4 per year. These**
6 **are the same figures presented in the 2023 Load Forecast on page 19. Are the changes in**
7 **HDD and CDD re-estimated every year? If not, why not?**

8
9 **(a) Does NS Power find that load is increasing on days that qualify as CDD, as more**
10 **people may be inclined to switch to their heat pumps to cooling?**

11
12 **(i) Although the number of CDD is not increasing at the same rate that HDD are**
13 **decreasing, with the availability of cooling units in Nova Scotia, does NS Power**
14 **consider that CDD may be driving load at a greater rate than in the past?**
15 **Please discuss.**

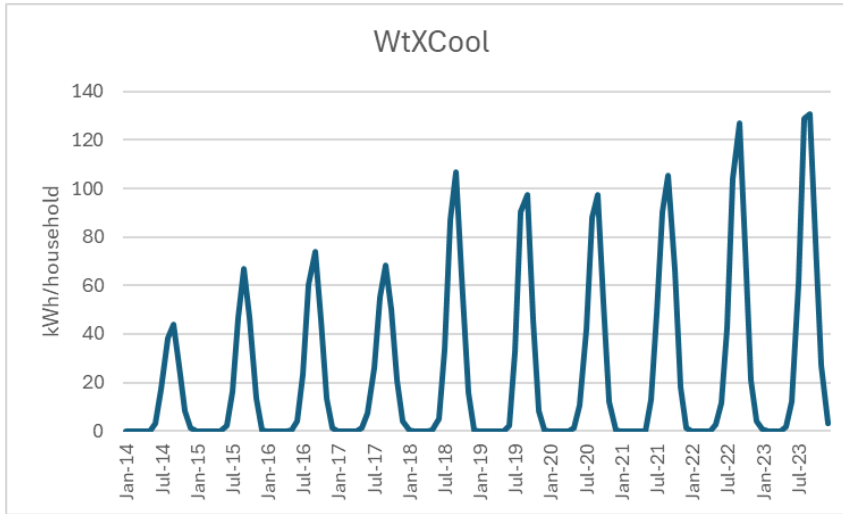
16
17 **Response IR-3:**

18
19 **Yes, the trends are re-calculated each year.**

20
21 **(a) Daily analysis is not part of the load forecast, but in general load is increasing on days that**
22 **qualify as CDD due to the impact of air conditioning load as heat pumps become more**
23 **widely used. This can be seen in the changes to the WtXCool variable over time as shown**
24 **in the following graph:**

2024 Load Forecast Report (NSUARB M11689)
NSPI Responses to NSUARB Information Requests

NON-CONFIDENTIAL



- 1
- 2
- 3 (i) The increasing number of cooling degree days (CDD) will drive additional cooling
- 4 load, but they are increasing at a very slow rate (+1.4 per year on a 10-year average
- 5 of 115). The larger impact is the rate of heat-pump adoption.

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Request IR-4:

In Figures 7 and 8, the values applied in the equations and the resulting R^2 have changed from the 2023 Load Forecast Report.

(a) Please explain the changed values in the equation.

(b) Please briefly discuss the change in R^2 and fit of the model.

Response IR-4:

(a) As discussed in response to NSUARB IR-3, the trends are updated annually, and with the updated data set (1994-2023 compared to 1993-2022) the regression equations changes.

(b) The R^2 values have not changed significantly from 2023. The R^2 value for HDD decreased from 0.9045 in 2023 to 0.9007 in 2024, implying that the fit of the 2023 data set was better, while the R^2 value for CDD increased from 0.6999 in 2023 to 0.7484 in 2024, implying that the fit of the 2024 data set is better. In both cases the trends continue to show a good fit with the data.

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Request IR-5:

Page 23 of the Report indicates that NS Power expects Nova Scotia's annual population growth peaked in 2023.

(a) Why does NS Power consider that the trend of population growth will not continue into the near term?

(i) And how does this expectation compare with Provincial government's population target of 2 million by 2060?

(b) Figure 11 shows that population expectations have been reduced from the 2023 Load Forecast Report, now showing a more gradual change from 2023 to 2024. However, there appears to be a significant drop in population growth after 2024 with year over year growth below 5,000 starting in 2028. In the 2023 Load Forecast Report these years were above 5,000. Please explain the reason for the change in expectations.

(i) Please provide the source data for Figure 11, and the data used to estimate *ResEcon*, *SmlGenVar* and *GenVar*.

Response IR-5:

(a) The forecast for population is provided by the Conference Board of Canada; NS Power does not forecast population independently. The forecast does assume that the population will continue to grow throughout the forecast period, but the *rate* of growth will slow. At the moment, there are no specific policies or programs in place that would change the rate of population growth beyond demographics and current trends; the Provincial population target of 2 million by 2060 is aspirational and not taken into account.

2024 Load Forecast Report (NSUARB M11689)
NSPI Responses to NSUARB Information Requests

NON-CONFIDENTIAL

1 (b) The change is due to the updated forecast from the Conference Board of Canada; NS Power
2 does not have the details of the Conference Board's forecast. Source data for Figure 11 and
3 data used to estimate ResEcon, SmlGenVar and GenVar are provided in Synapse IR-05
4 Attachment 1.

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Request IR-6:

Page 23 of the Report states “NS Power is aware of the ongoing housing shortage in the province and will continue to monitor any government initiatives that address the shortage and increase housing supply.” Has NS Power adjusted the housing completion forecast in anticipation of the 2,600 housing units to be added in Halifax between 2023 and 2026 under the Housing Accelerator Fund?

Response IR-6:

No specific adjustment has been made for the Housing Accelerator Fund as it was still in progress when the forecast was developed; however, it is assumed that the additional new housing units will fall within the underlying uncertainty of the housing completion forecast.

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Request IR-7:

In reference to Economic Drivers, please explain why the following data has changed from the 2023 Load Forecast Report.

(a) Figure 13: Residential Economic Drivers for the years 2014 to 2017 and 2022 under New Construction and 2022 for Household Compensation.

(b) Figure 14: Commercial Economic Drivers 2022 Non-Manufacturing GDP and 2014, 2015-2018, 2020 and 2022 under Non-Manufacturing Employment.

(c) Figure 14: Commercial Economic Drivers, 2027 Non-Manufacturing GDP has improved from the 2023 Load Forecast Report, please explain the factors that are anticipated to improve this metric.

(d) Figure 15: Industrial Economic Drivers, 2014, 2016-2019 and 2022 under Manufacturing Employment.

Response IR-7:

For the 2022 values in all cases, the forecast provided by the Conference Board of Canada is usually produced in December of the previous year, so the 2022 values in the 2023 forecast may be subsequently revised.

(a) New Construction data is provided by the Conference Board of Canada, who list the CMHC as one of their sources. NS Power is not aware of why the historic series changes, but the CMHC and Statistics Canada do revise the underlying historic data from time to time. New construction numbers are only used in the forecast period, so there is no impact from a change to the historic series.

2024 Load Forecast Report (NSUARB M11689)
NSPI Responses to NSUARB Information Requests

NON-CONFIDENTIAL

- 1 (b) NS Power is not aware of why the historic series changes, but Statistics Canada lists a
2 change to NAICS 2022 version 1.0 in their Survey of Employment, Payrolls and Hours¹
3 in March 2023, which may have resulted in revisions to historic employment numbers.
4
- 5 (c) No details were provided by the Conference Board of Canada on the changes to their
6 forecasts.
7
- 8 (d) Please refer to part (b).

¹ [Summary of changes - Surveys and statistical programs - Survey of Employment, Payrolls and Hours \(SEPH\)](https://www150.statcan.gc.ca/n1/pub/28-263-x/2023001/article/00001-eng.htm)
([statcan.gc.ca](https://www150.statcan.gc.ca/n1/pub/28-263-x/2023001/article/00001-eng.htm))

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Request IR-8:

Figure 16: Economic Forecast Comparison employs data from three of Canada's Big 5 banks and National Bank. Board Staff find this table provides a useful comparison against the Conference Board of Canada forecast.

(a) Are there any specific reasons as to why NS Power omitted Bank of Nova Scotia published in October 2023 and Canadian Imperial Bank of Commerce published in February 2024?

(b) The Employment 2024 projected by the Conference Board of Canada is 0.2% which is lower than all the banks projections in the table. Has NS Power adjusted this metric in its forecast to reflect the Banks' forecast? If so, please explain how.

(i) If not, why not?

Response IR-8:

(a) Bank of Nova Scotia was omitted as their forecast only provided a value for 2024. Canadian Imperial Bank of Commerce was omitted as it was felt that a sampling of four banks was sufficient for comparison with the Conference Board of Canada data.

(b) The Conference Board of Canada data underestimates employment growth for 2024 compared to the bank forecasts, but over-estimates for 2025 compared to three of the four bank forecasts. It was felt that the two differences offset each other over the long term and no adjustment was needed.

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Request IR-9:

Page 30 of the Report explains that space heating forecasts use an adoption rate needed to meet stated emission goals over a 20-year period.

(a) What is the uptake rate applied to meet emission goals?

(b) Does the rate vary over time?

(i) Given many homes in Nova Scotia use oil for home heating as the primary or secondary energy source, does the model project a slow uptake in the near term?

(c) Can the modeled uptake rate be confirmed with actuals from 2021, 2022 and 2023?

Response IR-9:

(a-b) For residential customers the current forecast for adoption will result in almost all customers using heat pumps by 2050. There are no specific drivers of the uptake rate. It is assumed that heat pump installations will continue at present rates (approximately 20,000 per year) and gradually decline as saturation is achieved. The commercial saturation rate is based on the estimates provided by E3 that would be needed to achieve emissions goals and is based on a stock rollover model.

(c) The uptake rate for residential heat pumps is shown in the following table (forecast values can also be found in Figure 21 of the report):

2024 Load Forecast Report (NSUARB M11689)
NSPI Responses to NSUARB Information Requests

NON-CONFIDENTIAL

	Heat Pump Installations
2021 (actual)	16,781
2022 (actual)	20,783
2023 (actual)	20,874
2024 (forecast)	21,187
2025 (forecast)	21,399
2026 (forecast)	21,185
2027 (forecast)	20,973
2028 (forecast)	20,239
2029 (forecast)	19,531
2030 (forecast)	18,847
2031 (forecast)	18,187
2032 (forecast)	17,278
2033 (forecast)	16,414
2034 (forecast)	15,593

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Request IR-10:

Page 31 of the Report explains that the Residential Space Heating forecast assumes a 100% heat pump saturation by 2050. On what evidence is the 100% saturation assumption based? Please provide examples where 100% saturation has been achieved.

Response IR-10:

The assumption of 100 percent saturation by 2050 is based on the assumption that in order to meet the federal and provincial net-zero carbon reduction goals, primary heating will need to be provided by a source other than fossil fuels. Based on present technology, heat pumps are the most likely candidate to provide residential and commercial heating. There are no existing examples from other jurisdictions where 100 percent saturation of electric heating has been achieved as there are no jurisdictions that have fully implemented and achieved a net-zero carbon policy.

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Request IR-11:

In reference to Figure 21: Heat Pump Forecast on page 34.

(a) In the 2023 Load Forecast Report, NS Power forecast 20,887 total cumulative new installs. Is there an actual figure available? If so, has it been incorporated into the forecast model?

(b) The report explains that the heat pump part of the intensities was adjusted to reflect the large unexplained variance in winter that is considered to be weather dependent. Is this assumption based on data presented on particularly cold days in 2023?

(i) Is this the result of the 2023 Polar Vortex? If so, does that justify a permanent adjustment to the intensities? Please explain.

(c) The report notes that there are increased heating hours from more customers working from home. Has there been an increase in cooling intensity to reflect greater work from home employment? Please explain.

Response IR-11:

(a) Please refer to NSUARB IR-09 for 2023 actuals. Yes, actual heat pump numbers are incorporated in the forecast.

(b) The adjustment of heating intensities is not based on daily load or the Polar Vortex but rather overall load over the winter months/full year, and specifically the variance in load with respect to the variance in overall weather.

2024 Load Forecast Report (NSUARB M11689)
NSPI Responses to NSUARB Information Requests

NON-CONFIDENTIAL

- 1 (c) Cooling intensity has also increased but is of a smaller magnitude compared to heating.
2 No specific adjustments have been made for the cooling variable as the model results
3 provide a good fit with actuals in the summer months.

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Request IR-12:

Figure 23: Water Heater Forecast projects the percentage saturation for 2024 to 2034. In the 2023 Load Forecast Report, it was projected that 71% would be achieved in 2023. What level of saturation was actually achieved in 2023?

(a) Why has the overall percentage saturation for 2025-2028 been scaled upward?

Response IR-12:

NS Power does not directly quantify actual historical electric water heater saturation due to lack of reliable sources. Forecasted water heater saturation was calibrated by a NS Power customer survey performed in 2019 which indicated that 63 percent of homes had electric hot water heaters, and saturation is assumed to have increased since then as some customers converting to heat pumps also convert their water heater to electric as outlined on page 35.

(a) The saturation of water heaters is dependent on the assumptions related to heat pump uptake, and as the heat pump numbers were updated for the 2024 forecast the resulting saturation of water heaters changed. The resulting increase between the 2023 and 2024 forecasts is very small. The reason that the values for 2025-2028 appear to have been scaled upwards, whereas values for the other years appear to remain constant, is because data used in the figures are rounded to the nearest whole number; if values had been given to 1 decimal place, it would be evident that *all* forecasted saturation numbers had changed slightly. This is shown in the table below (values for 2025-2028 in bold).

2024 Load Forecast Report (NSUARB M11689)
NSPI Responses to NSUARB Information Requests

NON-CONFIDENTIAL

Year	Water heater saturation forecast			
	Value in report		Value with 1 decimal place	
	2023	2024	2023	2024
2023	71%	NA	70.6%	70.6%
2024	73%	73%	73.0%	73.2%
2025	75%	76%	75.3%	75.6%
2026	77%	78%	77.3%	77.7%
2027	79%	80%	79.2%	79.7%
2028	81%	82%	81.1%	81.6%
2029	83%	83%	82.8%	83.4%
2030	84%	84%	83.9%	84.4%
2031	85%	85%	84.9%	85.5%
2032	86%	86%	85.9%	86.4%
2033	87%	87%	86.8%	87.4%

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Request IR-13:

On page 39, the report discusses the peak impact assumptions for charging. NS Power identifies that the model assumes 70% of charging is managed and 30% is unmanaged.

(a) What are these percentages based on?

(b) Have other utilities found this ratio to be stable?

Response IR-13:

(a) The level of managed charging was estimated based on E3's experience in other jurisdictions. Managed charging consists of rate-related (behavioural) incentives as well as direct control management.

(b) The ratio was not compared with other utilities, but many other jurisdictions encourage off-peak charging through rate mechanisms, including participation in existing time of use rates.

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1 **Request IR-14:**

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3 **Figure 27: PV Impact to Energy (cumulative) presents the projections of Total New Installs.**
4 **Board Staff note that the 2024 to 2033 projections have been revised from the 2023 Load**
5 **Forecast Report. Please explain why these revisions were made.**

6
7 **Response IR-14:**

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9 The forecast was revised to reflect the continued trends and expected increase in commercial
10 participation in PV installs in accordance with the recent establishment of the commercial net
11 metering program based on corresponding legislation (installation of up to 1,000 kW for
12 commercial customers).

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Request IR-15:

Figure 30: Historic and Projected Small General Commercial End-Use Intensity and Figure 31: Historic and Projected General Commercial End-Use Intensity show that End-Use Intensities kWh/m² have changed from those applied in the 2023 report in the Attachments.

(a) Please explain why the historic intensities have been revised.

(b) Please explain the drivers leading to changes in projected intensities.

Response IR-15:

(a) As with economic forecasts, appliance information is also subject to historic revisions. In the commercial sector, most of the changes to end use intensities are related to updated EIA inputs to the forecast.

(b) NS Power is not provided with the underlying drivers of the EIA data.

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Request IR-16:

Figure 32: Commercial and Industrial Electrification Forecasts (cumulative) present values that are different from the 2023 Load Forecast Report. Please explain the factors that have changed from the 2023 report, resulting in lower estimates.

Response IR-16:

As outlined in Sections 6.3 and 7.3, an analysis comparing past forecasts to actuals indicated that past estimates of project completion were too high. The commercial and industrial electrification forecasts were revised based on lower estimates of customer projects likely to take place over the forecast period.

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Request IR-17:

Page 52 of the Report discusses the price impact to sales through imposed price elasticities and explains that the SAE models use a price elasticity of -0.15. In matter M11683 NS Power identified that -0.15 would be applied in the Load Forecast Report. As part of the Report in M11683 NS Power submitted as Appendix C Testimony on The Effect of Restructuring on Price Elasticities of Demand and Supply by Steves and Lerner for the California Energy Commission in 1996.

(a) Table 1 in Appendix C presents short and long run elasticities for Residential, Commercial and Industrial classes noting that customer classes have different demand and response to changes in cost which is why they estimate by class. Why has NS Power not applied different elasticities to its rate classes?

(b) Appendix C also notes that customers have a greater chance to respond to changes in price over time, therefore applying a short run and long run elasticity would make modeling more robust. Why has NS Power not followed the same approach?

Response IR-17:

(a) The price elasticity is the same between classes for simplicity. As outlined in the reference provided, price elasticity can vary widely between jurisdictions and between classes, so determining the correct value for each class wouldn't necessarily provide a reliable or more accurate result. In addition, price elasticity in the SAE models has a relatively small impact on future sales when compared to assumptions around the underlying end uses.

(b) A long run elasticity would represent longer term changes in the underlying use of energy; for example, changes to the fuel sources for heating or purchasing more efficient appliances as they reach end of life. These longer-term changes are driven by the end use components of the SAE model and therefore a separate elasticity is not required.

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Request IR-18:

Page 60 of the Report examines residential sales and discusses the province's population growth and new housing. Lines 10-12 state "The Conference Board of Canada predicts continued population growth, with almost 87,000 more people in the province by 2034." However, this figure is lower than forecast for 2033 of 92,000 as presented in the 2023 Load Forecast Report.

(a) Does NS Power consider previous population projections were over-optimistic?

(b) How does NS Power reconcile the population growth against deaths and projected emigrations?

Response IR-18:

(a) No. Total population by 2034 is predicted to be 1.140 million for both the 2023 and 2024 forecasts, the decrease in total change is due to a higher than expected population count for 2022 and 2023 in the current forecast.

(b) The population numbers include the impacts of births, deaths, immigration and emigration. NS Power does not conduct an evaluation of population growth against deaths and emigrations.

2024 Load Forecast Report (NSUARB M11689)
NSPI Responses to NSUARB Information Requests

NON-CONFIDENTIAL

1 **Request IR-19:**

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3 **On page 60, the Report notes that the structural index, which considers building shell**
4 **efficiency, is based on estimates from 2013. This appears to be stale data. Has NS Power**
5 **considered other more recent sources of building efficiency?**

6
7 **Response IR-19:**

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9 NS Power is not aware of more recent sources of building efficiency data.

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1 **Request IR-20:**

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3 **Figure 40: Building Characteristics and Structural Index; the forecast for BSE Heat EIA**
4 **(New England), BSE Heat NS decreased from the figures presented in the 2023 Load**
5 **Forecast Report, while Floor Area increased. Please explain the changes.**

6
7 **Response IR-20:**

8
9 The BSE Heat values are provided by Itron and are derived from EIA data, NS Power does not
10 have information on the reasons for the decrease. The increase in floor area is due to revised
11 Natural Resource Canada numbers that increased the floor area estimates in 2017-2020.

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Request IR-21:

Section 6.0 examines the Commercial Sector and indicates that a detailed breakdown of the two commercial SAE models are in Attachments 6 and 7. Page 65 explains that the variable was added in 2023 to account for continued lag in sales. However, Statistics Canada, Table 36-10-0402-01, reports the economic growth in Nova Scotia since 2020 has been positive: 2021 6.0%; 2022 3.0%; and 2023 1.3%. Please explain why it is appropriate for the model to continue using the COVID variable.

(a) In Attachments 2 and 3, the economic inputs are a decade out of date. Will NS Power use current information in future reports?

Response IR-21:

The lag in sales refers to energy sales in the commercial class. Figure 44 illustrates the disconnect between economic indicators (strong growth in GDP and employment in 2021/2022) and commercial sales (flat between 2020 and 2021, less growth between 2021 and 2022). The variable was added to the regression to help explain that disconnect. Commercial energy sales were flat again in 2023, indicating that the COVID variable is still warranted.

(a) Yes, NS Power will update the information in future reports.

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1 **Request IR-22:**

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3 **Section 9.0 reviews the Net System Requirement (NSR). Please explain the specific factors**
4 **that result in a decrease in NSR in 2025 and 2026 and either how they level out or are offset**
5 **by other factors in 2027 to 2034.**

6
7 **Response IR-22:**

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9 Please refer to NSUARB IR-01 for an explanation of the change in NSR in 2025. 2026 sees
10 additional load shift to the RTR market as explained in Section 4.7 of the report. 2027 through
11 2034 are influenced by many factors including EV adoption, continued electrification of heating,
12 new customers, adoption of solar and DSM, among others outlined throughout the report.

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1 **Request IR-23:**

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3 **Figure 55: Forecast Components indicate that the model expects Renewable to Retail (RTR)**
4 **will lead to an increase of 139 GWh for the Other category. Please explain this category and**
5 **the expected increase in GWh from RTR.**

6
7 **Response IR-23:**

8
9 The 139 GWh in the Other category is related to the associated Energy Balancing Service (EBS)
10 tariff as described in Section 4.7 of the report.

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1 **Request IR-24:**

2
3 **Section 10 Peak Demand forecast estimates that the system peak is higher in the near term**
4 **because of heating load. Please explain why heating load is expected to stabilize and not**
5 **increase with customer growth and increased heat pump saturation.**

6
7 **Response IR-24:**

8
9 As outlined in the report in Section 4.4, heating load is expected to continue increasing in the
10 forecast period, but the peak impact of heating is expected to be partly mitigated by the adoption
11 of hybrid heating systems.

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1 **Request IR-25:**

2
3 **Figure 62: Forecast Peak Variance vs Actuals** presents data on the actual system peak that
4 **took place on February 4, 2023. Board Staff note that this table is different from Figure 67**
5 **in the 2023 Load Forecast Report which presented system peak data for the same event.**
6 **Please explain the reason for the discrepancies.**

7
8 **Response IR-25:**

9
10 Figure 67 in the 2023 report was based on preliminary data, the correct value of 2455MW was
11 provided on line 6 of page 87 of the report, and the correct value was provided in the 2024 report.

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Request IR-26:

In Appendix D, NS Power’s sensitivity analysis incorporates total GWh and Peak MW of firm supply for two hydrogen facilities in 2034. Please explain why NS Power is only anticipating two hydrogen facilities by the end of the forecast period.

(a) Please provide a table demonstrating overtime the demand on load from these facilities as they begin operations and increase their demand for firm supply.

Response IR-26:

NS Power has been actively engaged with two hydrogen proponents that have advanced planning phases for their facilities and submitted load requirements to be studied. Any additional prospective hydrogen facilities have not provided sufficient project details, including load requirements, to be included in the load forecast. The sensitivities in Appendix D provide a directional assessment of the potential load impacts should these facilities reach the production stage. The numbers are preliminary and are not available in detail over the time period of the forecast.