REVENUE LOAD AND CUSTOMER FORECAST

1. INTRODUCTION

This Schedule discusses the forecast electricity demand and related customer forecast in the Hydro Ottawa service territory for 2026-2030. Hydro Ottawa engaged Itron Inc. (Itron) to complete a weather-normal sales and energy forecast for the utility for Bridge years 2024,[1] 2025 and Test years 2026-2030. The revenue load forecast includes total energy and demand sales by rate class, total number of customers and connections, and billing demand. Hydro Ottawa's sales forecasting model remains consistent with previous rate applications and is in accordance with section 2.3 of the OEB's *Chapter 2 Filing Requirements for Electricity Distribution Rate Applications - 2025 Edition for 2026 Rate Applications*, dated December 9, 2024 (Filing Requirements).

The revenue load forecast is used in both cost allocation and rate design for each rate class. In addition to using historical data and statistical modeling to determine the baseline load, the load forecast considers factors such as: the adoption of electric vehicles (EVs), as well as the electrification of commercial transportation and commercial buildings. The revenue load forecast also incorporates energy efficiency measures and conservation programs.

Overall, the results of the revenue load forecast anticipates an increase in electricity MWh and kW demand over the period 2026-2030, fueled by multiple factors. This Schedule provides information on the data and drivers that were incorporated into the forecast.

[1] The 2024 bridge year is calculated using actual data from January to October and forecasted data for November and December.

Hydro Ottawa has completed the OEB's workbooks as required under section 2.3 of OEB's Filing Requirements. The following are Attachments to this Schedule:

- Attachment 3-1-1(A) - OEB Appendix 2-IB - Load Forecast Analysis[2]
- Attachment 3-1-1(B) - Hydro Ottawa Long-Term Electric Energy and Demand Forecast (produced by Itron)

2. LOAD FORECAST METHODOLOGY

To predict future sales and energy use, Iron employed a three-step data-driven process that leverages monthly regression modeling. The first step was to estimate a future load (Baseline Revenue Load Forecast), for the period of November 2024 to the end of 2030, by analyzing historical information, including past MWh and kW sales figures, customer base growth, and energy purchases (MWh) up to October 2024. The model also considers factors that can influence consumption and demand such as historical weather patterns, economic trends, population growth, and end-use saturation and efficiency trends[3] from replacing aging appliances or building envelopes such as windows and doors and lighting fixtures. By analyzing these factors, the model identifies statistically significant variables that explain past energy consumption trends. The Baseline Revenue Load Forecast also assumes no policy changes, technological breakthroughs, or sudden economic or consumer shifts. The second step includes the impact of past conservation and demand management (CDM) programs and future electricity demand-side management (eDSM) programs. Reference Section 10 for more information.

The third step (Electrification and Large Load Requests) focuses on incorporating anticipated change in the revenue load forecast due to the electrification of commercial transportation, commercial buildings, as well as the adoption of EVs. Some of this incremental load relates to

[2] Hydro Ottawa has made adjustments to Appendix 2-IB to include rows for the 2026-2030 forecast and sum for total system MWh.
[3] For more information see Attachment 3-1-1(B) - Hydro Ottawa Long-Term Electric Energy and Demand Forecast, section 3.4

the intentional adoption of low-carbon electrical equipment that would significantly increase electricity demand. To inform this forecast, Hydro Ottawa leveraged its knowledge of developer/customer requests for 200-amp versus 100-amp service, their potential interest for an electric vehicle charging infrastructure, and the types of heating and cooling systems being installed—all factors influencing the size of electricity needs. This was combined with planned construction projects, along with the City of Ottawa's plans and building permit records. The below subsequent sections provide additional information on what information was used to determine the Electrification and Large Load forecast, and the data sources used for the load and customer count forecast.

Hydro Ottawa has prepared the revenue load forecast for Sentinel Lights and Standby Power based on historical trends, as these were not forecasted by Itron due to the low volumes.

For details regarding the forecast methodology, economic assumptions, energy efficient variable and weather normalization factors used to complete the revenue load and customer count forecast, please refer to Attachment 3-1-1(B) - Hydro Ottawa Long-Term Electric Energy and Demand Forecast (produced by Itron).

3. PROPOSED REVENUE LOAD FORECAST

Tables 1 and 2 presents the forecast including the baseline forecast, electrification, large load requests and eDSM assumptions. These assumptions are further explained in this Schedule as well as in Attachment 3-1-1(B) - Hydro Ottawa Long-Term Electric Energy and Demand Forecast.

Table 1 below provides Hydro Ottawa’s proposed revenue load energy forecast by MWh for 2026-2030.

Table 1 – 2026-2030 Proposed Revenue Energy Forecast by Customer Class (MWh)[4]

	2026	2027	2028	2029	2030
Residential	2,601,494	2,628,618	2,663,642	2,682,208	2,713,673
General Service < 50 kW	722,556	722,196	724,707	722,940	722,437
General Service 50 to 1,000 kW	2,461,129	2,453,272	2,453,309	2,442,152	2,434,419
General Service 1,000 to 1,499 kW	371,365	361,115	352,877	351,081	349,718
General Service 1,500 to 4,999 kW	705,932	698,762	693,528	685,488	678,211
Large Use	544,235	566,903	613,629	666,917	701,083
Street Lighting	21,962	22,060	22,158	22,257	22,355
Unmetered Scattered Load	14,392	14,472	14,552	14,633	14,713
Sentinel Lighting	41	40	39	38	38
TOTAL MWh SALES	**7,443,105**	**7,467,438**	**7,538,443**	**7,587,713**	**7,636,647**

Table 2 below provides Hydro Ottawa's Revenue Load Demand Forecast by kW for 2026-2030.

Table 2 – 2026-2030 Proposed Revenue Load Demand Forecast by Customer Class (kW)

	2026	2027	2028	2029	2030
General Service 50 to 1,000 kW Interval	6,202,015	6,182,394	6,182,491	6,154,626	6,135,318
General Service 1,000 to 1,499 kW	785,719	765,820	751,231	747,316	744,341
General Service 1,500 to 4,999 kW	1,518,409	1,501,652	1,489,421	1,470,630	1,453,625
Large Use	1,015,559	1,081,955	1,214,025	1,384,839	1,494,202
Street Lighting	61,129	61,402	61,676	61,949	62,184
Sentinel Lighting	120	114	108	108	108
Standby Power	44,837	44,475	44,248	43,751	43,353
TOTAL KW DEMAND SALES	**9,627,788**	**9,637,812**	**9,743,200**	**9,863,219**	**9,933,131**

[4] This forecast does not include the Dry Core Transformer Charge. Totals may not sum due to rounding.

4. PROPOSED CUSTOMER AND CONNECTION FORECAST

Tables 3 and 4 below provide Hydro Ottawa's monthly average number of customers and connections that are forecasted for the 2026-2030 period. Forecasting customer and connection counts using monthly averages offers a more precise representation of the inherent fluctuations in these datasets, whereas annual averages obscure critical monthly trends. This granular approach, facilitated by monthly averages, leads to more accurate revenue forecasts by better aligning projections with customer variabilities.

Table 3 – 2026-2030 Proposed Monthly Average Number of Customers by Class[5]

	2026	2027	2028	2029	2030
Residential	348,287	351,762	355,313	358,968	362,676
General Service < 50 kW	26,016	26,138	26,264	26,393	26,524
General Service 50 to 1,000 kW	3,053	3,053	3,053	3,053	3,053
General Service 1,000 to 1,499 kW	84	84	84	85	86
General Service 1,500 to 4,999 kW	70	69	69	69	69
Large Use	11	12	13	14	14
Standby Power	6	6	6	6	6
TOTAL CUSTOMERS	**377,527**	**381,124**	**384,802**	**388,588**	**392,428**

Table 4 – 2026-2030 Proposed Monthly Average Number of Connections by Customer Class[6]

	2026	2027	2028	2029	2030
Street Lighting	65,912	66,810	67,708	68,606	69,504
Unmetered Scattered Load	4,263	4,383	4,503	4,622	4,742
Sentinel Lighting	47	46	45	44	43
TOTAL CONNECTIONS	**70,222**	**71,239**	**72,256**	**73,272**	**74,289**

[5] Totals may not sum due to rounding.
[6] Totals may not sum due to rounding.

5. RATE CLASS LEVEL REVENUE FORECAST

For the 2026-2030 class level revenue forecast, please see the Revenue Requirement Workform (RRWF) Excel Attachments listed below:

- Attachment 6-1-1(A) - OEB Workform - 2026 Revenue Requirement Workform
- Attachment 6-1-1(B) - OEB Workform - 2027 Revenue Requirement Workform
- Attachment 6-1-1(C) - OEB Workform - 2028 Revenue Requirement Workform
- Attachment 6-1-1(D) - OEB Workform - 2029 Revenue Requirement Workform
- Attachment 6-1-1(E) - OEB Workform - 2030 Revenue Requirement Workform

6. HISTORICAL ACCURACY OF REVENUE LOAD FORECAST

Hydro Ottawa has provided Excel Attachment 3-1-1(A) - Appendix 2-IB - Load Forecast Analysis, which summarizes the data and develops year-over-year trends in Historical, Bridge and Test year customer counts, consumption and demand. Appendix 2-IB has been completed with the following inputs:

- 2021-2023 Historical actual sales, demand, monthly average customer count and connections.
- 2021-2023 Historical weather-normalized sales and demand.
- 2024-2025 Bridge year revenue load forecast.
- 2026-2030 Proposed test year revenue load forecast.

For analysis and details regarding historical accuracy of load forecast, please refer to Schedule 3-1-2 - Accuracy of Load Forecast and Variance Analyses. For Test years 2026-2030 the following year-over-year observations can be derived through the analyses included in Appendix 2-IB:

- Consumption (kWh) will rise through the 2026-2030 forecast period.

- Demand (kW) shows an increasing trend on average throughout the Test period as a result of increased number of Large Users.
- Customer count and connections are set to continue following expected trends, in line with anticipated growth in the City of Ottawa's population and increased housing completions.

7. COMPONENTS OF LOAD FORECAST FOR 2024-2030

7.1. BASELINE REVENUE FORECAST

As previously mentioned, Hydro Ottawa's forecast utilizes statistical models to forecast step 1 of the baseline revenue energy and demand load forecasts, which predicts the energy use patterns through analysis of historical data (kWh and kW) encompassing usage, weather, economic indicators, and customer growth. Table 5 provides Hydro Ottawa's Baseline Revenue energy forecast for Bridge and Test years 2024-2030. Table 6 provides Hydro Ottawa's Baseline Revenue demand forecast for Bridge and Test years 2024-2030.

Table 5 – 2024-2030 Baseline Revenue Energy Forecast by Customer Class (MWh)[7]

	2024	2025	2026	2027	2028	2029	2030
Residential	2,517,155	2,553,442	2,559,268	2,567,229	2,580,547	2,574,693	2,579,025
General Service < 50 kW	744,614	720,120	721,284	720,347	722,205	719,702	718,382
General Service 50 to 1,000 kW	2,371,696	2,462,214	2,458,067	2,448,819	2,447,282	2,434,352	2,424,651
General Service 1,000 to 1,499 kW	411,870	374,467	370,902	369,024	368,585	366,523	364,863
General Service 1,500 to 4,999 kW	720,493	719,656	713,542	706,225	700,826	692,599	685,115
Large Use	522,339	511,209	506,404	501,543	498,165	491,276	485,810
Street Lighting	21,765	21,864	21,962	22,060	22,158	22,257	22,355
Unmetered Scattered Load	14,249	14,311	14,392	14,472	14,552	14,633	14,713
Sentinel Lighting	42	41	41	40	39	38	38
TOTAL MWh SALES	**7,324,223**	**7,377,325**	**7,365,861**	**7,349,760**	**7,354,359**	**7,316,072**	**7,294,952**

Table 6 – 2024-2030 Baseline Revenue Demand Forecast by Customer Class (kW)[8]

	2024	2025	2026	2027	2028	2029	2030
General Service 50 to 1,000 kW	5,858,863	6,204,716	6,194,358	6,171,260	6,167,420	6,135,125	6,110,895
General Service 1,000 to 1,499 kW	920,505	792,482	784,718	780,628	779,671	775,179	771,564
General Service 1,500 to 4,999 kW	1,548,107	1,556,971	1,542,681	1,525,581	1,512,963	1,493,736	1,476,246
Large Use	950,885	905,343	896,821	888,200	882,209	869,993	860,299
Street Lighting	60,563	60,838	61,129	61,402	61,676	61,949	62,184
Sentinel Lighting	120	120	120	114	108	108	108
Standby Power	46,148	45,172	44,837	44,475	44,248	43,751	43,353
TOTAL KW DEMAND SALES	**9,385,191**	**9,565,642**	**9,524,664**	**9,471,660**	**9,448,295**	**9,379,841**	**9,324,649**

[7] This forecast does not include the Dry Core Transformer Charge. Totals may not sum due to rounding.
[8] Totals may not sum due to rounding.

7.2. ELECTRIFICATION AND LARGE LOAD REQUESTS

Hydro Ottawa's revenue load forecast includes electrification and large load requests based on future customer initiatives aimed at decarbonization and electrification, as well as anticipated commercial and residential transportation electrification. The growing popularity of EVs is expected to increase residential energy consumption, while municipal climate targets are driving the City's investment in electrified transportation. Tables 7 and 8 below provide the electrification and large load energy and demand requests respectively. The negative values in Tables 7 and 8 denote anticipated customer rate reclassification due to the increase in forecasted demand and as such the baseload forecast is being reclassified.

Table 7 – 2024-2030 Electrification And Large Load Energy Requests by Customer Class (MWh)[9]

	2024	2025	2026	2027	2028	2029	2030
Residential	2,210	25,607	42,226	61,388	83,095	107,515	134,648
General Service < 50 kW	60	771	1,272	1,849	2,502	3,238	4,055
General Service 50 to 1,000 kW	146	1,855	3,062	4,453	6,028	7,800	9,769
General Service 1,000 to 1,499 kW	22	282	463	(7,909)	(15,708)	(15,441)	(15,145)
General Service 1,500 to 4,999 kW	15	196	(7,610)	(7,463)	(7,298)	(7,111)	(6,904)
Large Use	5	6,216	37,831	65,361	115,465	175,641	215,273
Street Lighting	-	-	-	-	-	-	-
Unmetered Scattered Load	-	-	-	-	-	-	-
Sentinel Lighting	-	-	-	-	-	-	-
TOTAL MWh SALES	**2,458**	**34,927**	**77,244**	**117,678**	**184,084**	**271,641**	**341,695**

[9] Totals may not sum due to rounding.

Table 8 – 2024-2030 Electrification And Large Load Demand Forecast by Customer Class (kW)[10]

	2024	2025	2026	2027	2028	2029	2030
General Service 50 to 1,000 kW Interval	363	4,637	7,657	11,134	15,071	19,501	24,423
General Service 1,000 to 1,499 kW	48	612	1,001	(14,808)	(28,440)	(27,863)	(27,223)
General Service 1,500 to 4,999 kW	36	457	(24,272)	(23,929)	(23,542)	(23,106)	(22,621)
Large Use	16	18,910	118,738	193,755	331,816	514,846	633,903
Street Lighting	-	-	-	-	-	-	-
Sentinel Lighting	-	-	-	-	-	-	-
Standby Power	-	-	-	-	-	-	-
TOTAL ELECTRIFICATION DEMAND SALES	**463**	**24,616**	**103,124**	**166,152**	**294,905**	**483,378**	**608,482**

8. CUSTOMER CLASS LEVEL INPUTS

The sections below provide additional details on customer class level inputs that were used to develop the revenue load forecast.

8.1. RESIDENTIAL

The growing affordability of EVs, coupled with expanding charging infrastructure, is expected to drive EV adoption, adding to electricity consumption within the residential class. Refer to section 9 below for the forecast methodology and incremental MWh from increased EVs.

In addition, as homeowners increasingly replace gas-powered furnaces with electric alternatives such as heat pumps, their reliance on electricity will rise. Table 9 provides the annual saturation % of electric heat pumps in the residential rate class based on Natural Resources Canada end-use saturation trends. Refer to Attachment 3-1-1(B) - Hydro Ottawa Long-Term Electric

[10] Totals may not sum due to rounding.

Energy and Demand Forecast for additional information. The impact on kWh and kW arising from electric heat pump adoption is included in Tables 5 and 6 - Proposed Baseline Revenue Energy and Demand forecasts as well as in Tables 1 and 2 - Proposed Revenue Energy and Demand Forecast forecasts.

Table 9 – Residential Heat Pump Saturation

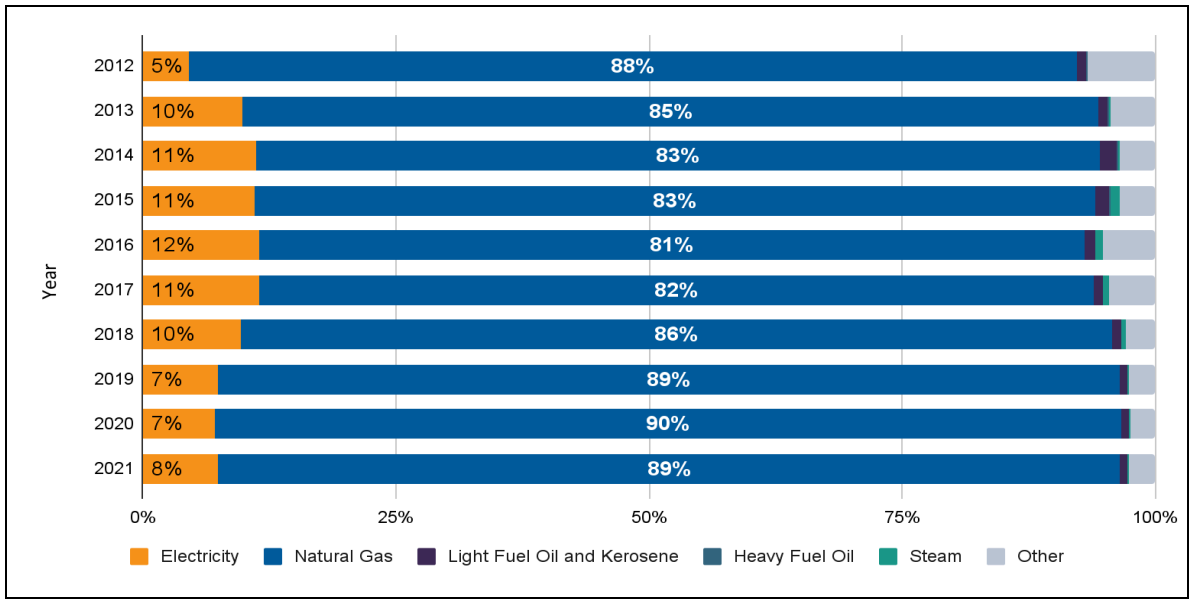
Year	Heat Pump Saturation
2024	7.6%
2025	7.7%
2026	7.9%
2027	8.0%
2028	8.2%
2029	8.4%
2030	8.5%

8.2. GENERAL SERVICE <50kW

The Energy Use Database from Natural Resources Canada's Commercial/Institutional Sector[11] reveals that commercial businesses in Canada dedicate a significant portion of their energy consumption to heating, averaging 58% between 2012 and 2021. Currently, natural gas remains the primary energy source for space heating in Ontario's commercial sector, as illustrated in Figure 1 below. Consequently, the transition to electric-powered heating and cooling systems in these buildings could substantially increase electricity demand in the coming years. However, due to the factors below, Hydro Ottawa did not add incremental electricity demand related to heating and cooling from the General Service <50 kW rate class other than what historical and economic factors would forecast.

[11] Natural Resources Canada's Comprehensive Energy Use Database, *Table 2: Secondary Energy Use and GHG Emissions by End Use*, https://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=CP&sector=com&juris=on&rn=2&year=2021&page=0

Figure 1: Commercial space heating in Ontario for years 2012 to 2022[12]



A recent survey indicates that 88%[13] of smaller businesses in Ontario pay both their electric and gas utility bills. This suggests that the majority of smaller businesses have a financial incentive to participate in energy efficiency programs should a positive outcome be achieved. Research from organizations such as Natural Resources Canada, the Canadian Climate Institute, and the International Energy Agency, state that heat pumps can result in significant cost savings for small businesses.[14] While heat pumps offer a cleaner energy alternative, cost savings are not guaranteed due to the price disparity between gas and electricity.[15] Additionally, factors such as existing system age, building suitability, upfront investment versus potential savings, heating

[12] Source: Natural Resources Canada, *Table 24: Space Heating Secondary Energy Use and GHG Emissions by Energy Source,* https://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=CP&sector=com&juris=on&rn=24&year=2021&page=0

[13] Resource Innovations & NMR Group. (2023). *CDM Framework Small Business Program PY2022 Evaluation Results*, page D-17.

[14] Canadian Climate Institute (2023), *Heat Pumps Pay off* and Natural Resources Canada (2023). *Best practices for sizing supplementary heating systems in heat pump retrofits*. Government of Canada, https://natural-resources.canada.ca/energy-efficiency/homes/local-energy-efficiency-partnerships-leep/leep-videos/best-practices-heat-pump-retrofits/25293

[15] Independent Electricity System Operator, Presentation: *Save on Energy: Electrifying Commercial Buildings*, (June 27, 2024),

demands, operating costs, available incentives, and familiarity with new technology influence adoption rates impact adoption intensities.

The average age of commercial buildings in Ontario is 11.8[16] years, while heating, ventilation, and air conditioning (HVAC) systems typically last 15-25 years. As a result, many businesses or property owners will soon be faced with decisions about replacing heating and cooling systems. This is particularly true for older buildings, with a majority of retail spaces constructed as far back as 1951.[17] During Hydro Ottawa's Test period, these retail spaces may be on either their third, fourth or fifth replacement cycle assuming average HVAC lifecycle of 15, 19, 25 years respectively.

Data from the Heating, Refrigeration and Air Conditioning Institute of Canada reveals a steady increase in heat pump shipments for non-residential spaces from 2016 to 2022.[18] This trend, alongside advancements in heat pump technology, such as the first ENERGY STAR® cold climate designation in 2022,[19] suggests growing interest from commercial customers. However, the high upfront cost as well as the increase in incremental life cycle cost of heat pumps remains a barrier. A recent study by Dunsky revealed that a cold climate air source heat pump for a small commercial building (7,500 ft sq) can cost approximately $74,500.[20] In addition, according to the Independent Electricity System Operator (IESO), the average incremental annual cost to run air source heat pumps (ASHP) sized for small commercial space heating and cooling is $3,900.[21]

[16] Statistics Canada. Table 34-10-0166-01 *Average age measures of non-residential capital stock by industry, by asset, Canada, provinces and territories.*
[17] City of Ottawa, *Pathway Study on Existing Non-Residential Buildings in Ottawa* (2021).
[18] Heating, Refrigeration and Air Conditioning Institute of Canada, *HVACR Quarterly Statistics*.
[19] ENERGY STAR® Program Requirements Product Specification for Central Air Conditioner and Heat Pump Equipment Eligibility Criteria Version 6.1 (Rev. January 2022).
[20] Dunsky, G., et al., *The Economic Value of Ground Source Heat Pumps for Building Sector Decarbonization*, (2018) page 21.
[21] Independent Electricity System Operator, (2024, February). *IESO Prescriptive Measures and Assumptions List.* [PDF]. Independent Electricity System Operator (February 2024).

The Canadian Climate Institute has noted “Strong financial incentives in the form of grants and rebates provided the main catalysts for the dramatic recent increases in heat pump installations in the Maritimes.”[22] This is also evidenced in the IESO’s Save on Energy Program results as noted by participants' responses in the Save on Energy Performance Program (EPP) survey, as “respondents were motivated to participate in EPP for the financial benefits.”[23] While federal[24] and provincial[25] programs offer some support for heat pumps in residential settings or other energy-efficiency upgrades for businesses and industry, the lack of targeted financial incentives for commercial heat pumps may hinder their widespread adoption.

8.3. GENERAL SERVICE >50kW

Recently, hospitals and federal agencies in Ontario have begun undertaking extensive electrification upgrades. These are largely driven by the federal *Canadian Net-Zero Emissions Accountability Act* and provincial sustainability targets, as well as funding from government agencies - for example the Canada Infrastructure Bank's Green Infrastructure funding and Infrastructure Ontario. This surge in public sector electrification is evident in Hydro Ottawa's observed increase in incremental load demand from federal entities including Crown corporations and agencies projected for the 2024 to 2035 timeframe. Prior to specific large load requests, these customers are in the General Service (GS) > 50 to 4,999 kW class; after an extensive service upgrade request, these Customers are anticipated to be reclassified to the Large Use rate class. As noted above, this reclassification is observed in Tables 7 and 8 of the Electrification and Large Load energy and demand sales forecast.

Hydro Ottawa's large commercial incremental load forecast incorporates known and anticipated system expansion requests from these key public sector entities. These requests encompass a

[22] Turner, Chris. "Heat Pumps are Hot in the Maritimes." Canadian Climate Institute, April 2023.
[23] Save on Energy 2021-2024 CDM Framework energy performance program evaluation report YE 2023, page 20
[24] Federal Government of Canada: Canada Greener Homes Initiative and the Green Municipal Fund
[25] Save on Energy. *Save on Energy | Unlock Your Energy Potential at Work and at Home*. https://www.saveonenergy.ca/

range of initiatives, including the integration of EV charging infrastructure, the transition to electric heating and cooling systems, and electric industrial water heating.

9. LIGHT DUTY ELECTRIC VEHICLES

There are several different types of EV chargers, each with distinct charging capacity. EV chargers are categorized by power level: Level 1 (slowest, using standard outlets), Level 2 (faster, common in homes and public spaces), and Level 3 DC Fast Chargers (quickest, found along major travel routes). Level 1 or 2 chargers are common for overnight home charging. Level 2 chargers are also often found in public spaces for multi-hour stays, and dedicated stations provide Level 3 DC Fast Chargers for quick stops. In addition, Level 3 DC Fast Chargers come in varying power outputs (50kW, 100kW, 150kW, etc.). Higher output chargers have different load shapes than lower ones and weather and seasonal changes influence EV usage. More frequent charging might occur in colder months when batteries are less efficient.

Under the same Federal mandate mentioned above, the transportation sector has seen some growth in electricity demands due to the electrification of this sector; in both residential and commercial rate classes. Government incentives, build-out of EV charging infrastructure, consumer interest, and automaker investment encourage adoption of zero-emission vehicles. However, EVs sales are still a smaller fraction of vehicle sales at the end of 2023.

Hydro Ottawa developed the EV forecast integrated into both the revenue energy and demand forecasts using customer data as well as from Statistics Canada to forecast EV adoptions. In addition, actual EV hourly load profiles were used to forecast future impact of EVs on both customer and system peak demands.

Table 10 and Figure 2 below show in Ontario battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs) make up approximately 9.1% of all new motor vehicle sales in 2023[26], with BEVs making up roughly 77% of new light-duty electric vehicles (LDEV). LDEVs are

[26] Statistic Canada, Table: 20-10-0024-01.

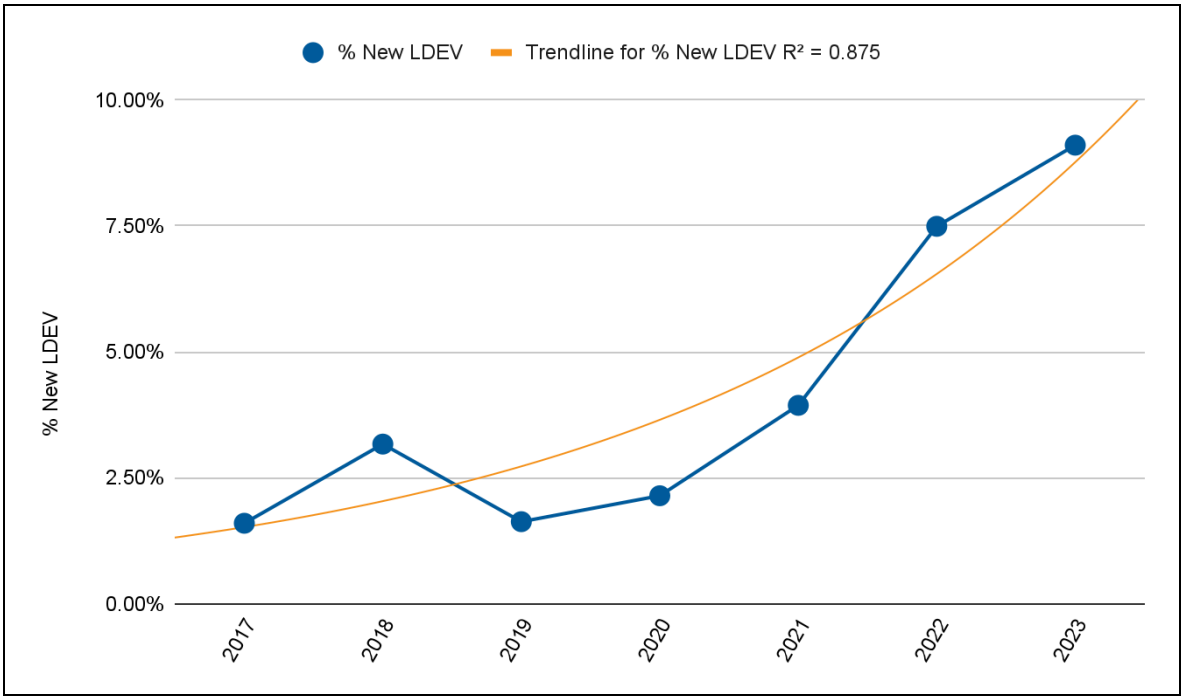
passenger cars, SUVs, and light trucks. Ontario has secured substantial funding to establish full-scale EV manufacturing facilities, fostering a competitive market with increased local supply. However recent EV sales are not as high as anticipated, therefore major automakers are reconsidering (decreasing) their near term strategies on production capacity, model lineup, and marketing initiatives.[27] Hydro Ottawa has incorporated these revised industry trends into the forecasting of EV adoptions.

Table 10 – New LDEV Registrations in Ontario[28]

	2017	2018	2019	2020	2021	2022	2023	Q3 2024
All Type of Vehicles	801,432	798,566	796,079	600,626	627,159	594,498	677,004	535,942
Plug-In Hybrid Electric	3,563	8,214	3,201	2,357	4,980	5,879	11,497	10,965
Battery Electric	4,617	8,544	9,762	10,515	19,716	38,662	50,132	41,349
Total LDEV	**8,180**	**16,758**	**12,963**	**12,872**	**24,696**	**44,541**	**61,629**	**52,314**
% New LDEV	**1.02%**	**2.10%**	**1.63%**	**2.14%**	**3.94%**	**7.49%**	**9.10%**	**9.76%**

[27] Hassan, Sharif. "As some Ontario plants hit the brakes, are Canada's EV ambitions under threat?" The Canadian Press, (September 17, 2024).
[28] Totals may not sum due to rounding.

Figure 2 - LDEV Share of New Vehicle Registrations Ontario



Based on percentage of population, Hydro Ottawa has estimated 5.4% of total vehicles in Ontario reside in Hydro Ottawa's service territory. This percentage was applied to new LDEV registrations for years 2017 to 2023 in Ontario to estimate the total number of LDEV in Hydro Ottawa's territory. The 2021-2023 average annual growth trend of 0.8% was used to estimate the total LDEV for 2024-2030. Table 11 below details the estimated number of LDEV in Hydro Ottawa's service territory for 2023-2030 used to forecast the total incremental MWh impact annually.

Table 11 – 2023-2030 Number of LDEVs Forecast

Year	Total LDEV
2023	9,344
2024	12,464
2025	16,177
2026	20,430
2027	25,161
2028	30,177
2029	35,536
2030	41,226

For Bridge and Test Years Hydro Ottawa apportioned the estimate of LDEVs to different rate classes by analyzing data from the Ministry of Transportation, Zero Emission Vehicle Infrastructure Program (ZEVIP) and customer data. Table 12 outlines the 2024-2030 LDEV MWh forecast.

Table 12 – 2024-2030 LDEV MWh Forecast[29]

	2024	2025	2026	2027	2028	2029	2030	Cumulative[30]
Residential	11,532	14,075	16,619	19,163	21,706	24,420	27,133	134,648
General Service < 50 kW	347	424	500	577	654	735	817	4,055
General Service 50 to 1,499 kW	963	1,175	1,387	1,600	1,812	2,039	2,265	11,241
General Service 1,500 to 4,999 kW	88	108	127	146	166	187	207	1,029
Large Use	27	33	39	45	51	58	64	318
TOTAL MWh SALES	**12,957**	**15,815**	**18,673**	**21,531**	**24,389**	**27,438**	**30,487**	**151,290**

[29] Totals may not sum due to rounding.
[30] 2024-2030.

10. FUTURE ENERGY EFFICIENCY AND DEMAND MANAGEMENT SAVINGS

Hydro Ottawa has factored the effects of eDSM programs into its load forecasts as outlined in Section 2.3.1.3 of the Filing Requirements and in OEB's Non-Wires Solutions (NWS) Guidelines for Electricity Distributors.[31]

Ontario's Minister of Energy and Electrification approved a new 12-year $10.9 billion eDSM framework that came into effect January 1, 2025 and takes place after the current 2021-2024 CDM Framework ends.[32] The eDSM framework focuses on expanding existing energy efficiency programs and introducing new initiatives like the Home Renovation Savings Program.

The assumptions below have been incorporated into the revenue load forecast related to energy efficiencies:

- For 2025-2029 Hydro Ottawa estimated provincial wide annual energy efficiency savings of 2%, 3%, 4%, 5%, 5.5% respectively then 6% from 2030 through to 2035 across various programs with total demand savings of 3,000 MW[33] as announced by the Minister of Energy and Electrification.
- Hydro Ottawa's estimated portion of centrally administered programs' net energy and demand savings were based on IESO's Final Verified 2017 CDM Summary Report proportions for the years 2015 to 2017.[34]
- Energy efficiency savings by rate classes for each program and related persistences are based on information in IESO's annual progress program reports and/or evaluation, measurement, and verification (EMV) reports. In the absence of such information, Hydro Ottawa continues to rely on the IESO's historical Monthly Program Participation and

[31] Ontario Energy Board, *Non-Wires Solutions Guidelines for Electricity Distributors*. EB-2024-0118, (March 28, 2024).
[32] Independent Electricity System Operator, New 12-year energy efficiency framework.(January 9, 2025).
[33] Ontario Ministry of Energy "Ontario Launches New Energy Efficiency Programs to Save You Money" (January 7, 2025).
[34] 2017 was the last year the IESO provided a fully finalized report.

Cost Report, which represents Hydro Ottawa's performance throughout the Conservation First Framework, as of February 15, 2019.

Schedule 9-1-5 - LRAM Variance Account provides detailed information on other assumptions related to achieved and/or projected energy savings in the period 2020 to 2025 by Hydro Ottawa customers, as well as information for claimed historical and projected reductions in electricity consumption and demand. The historical energy savings were consistently used to create the Bridge and Test year revenue load forecast as well as amounts recorded into the Lost Revenue Adjustment Mechanism Variance Account (LRAMVA). As noted above, energy savings for 2026-2030 used either the same assumptions or, where available, updated information from EMV reports.

The cumulative Historical, Bridge and Test year includes conservation as a model variable. For more information on this model variable, refer to Table 3-2: CDM AND EDSM SAVINGS in Attachment 3-1-1(B) - Hydro Ottawa Long-Term Electric Energy and Demand Forecast. Tables 13 and 14 below summarize the energy efficiency adjustments to the revenue load forecast. Table 13 provides Hydro Ottawa’s eDSM energy and demand cumulative adjustments to the energy and demand forecast by MWh for 2024-2030, reflecting the impact of eDSM programs implemented mid-year.

Table 13 – 2024-2030 EDSM Energy Adjustments by Customer Class (MWh)[35]

	2024	2025	2026	2027	2028	2029	2030
Residential	43	11,339	33,290	55,911	79,252	103,366	127,041
General Service < 50 kW	120	4,316	10,755	17,103	23,621	30,462	37,682
General Service 50 to 1,000 kW	241	11,954	38,369	64,644	90,827	117,858	145,851
General Service 1,000 to 1,499 kW	40	1,974	6,337	10,676	15,000	19,464	24,087
General Service 1,500 to 4,999 kW	47	3,996	10,389	16,369	22,515	28,854	35,409
Large Use	58	3,115	7,920	12,781	17,812	23,048	28,514
TOTAL MWh	**549**	**36,694**	**107,060**	**177,484**	**249,027**	**323,052**	**398,584**

Table 14 below provides Hydro Ottawa's demand forecast CDM adjustments by kW for 2024-2030.

Table 14 – 2024-2030 EDSM Demand Adjustments by Customer Class (kW)[36]

	2024	2025	2026	2027	2028	2029	2030
General Service 50 to 1,000 kW	602	29,860	95,836	161,462	226,859	294,375	364,293
General Service 1,000 to 1,499 kW	87	4,300	13,801	23,252	32,670	42,394	52,462
General Service 1,500 to 4,999 kW	108	9,337	24,279	38,254	52,618	67,433	82,752
Large Use	103	5,523	14,045	22,666	31,590	40,873	50,567
TOTAL KW	**900**	**49,020**	**147,961**	**245,634**	**343,737**	**445,075**	**550,074**

[35] Totals may not sum due to rounding.
[36] Totals may not sum due to rounding.

11. PLANNING LOAD FORECAST

Hydro Ottawa's capacity load forecast as well as the revenue load and customer forecast address the energy needs of our customers. Both of these forecasts use the same foundational considerations, factors and assumptions in determining how electricity demand will change. Crucially, the system planning forecast goes a step further as it incorporates detailed analyses of grid capacity at the substation level to ensure uninterrupted power supply in the face of changing demands. For more information on the system planning load forecast, please refer to Section 9.4 of Schedule 2-5-4 - Asset Management Process.

Attachment 3-1-1(A) - OEB Appendix 2-IB - Load Forecast Analysis

(Refer to the attachment in Excel format)

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2024 LONG-TERM ELECTRIC ENERGY AND DEMAND FORECAST REPORT

Prepared For:

Hydro Ottawa, Ontario

FEBRUARY 2025

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1 OVERVIEW

Itron, Inc. completed the 2024 to 2030 Hydro Ottawa sales and energy forecast. The forecast is based on actual sales, customer, and purchase data through October 2024. Forecasts are developed for rate class sales, customers, billing demands, system purchases and system peak demand. This document presents forecast results, assumptions, and an overview of the forecast methodology.

Hydro Ottawa serves approximately 338,000 residential customers and 33,300 nonresidential customers. Total 2023 sales equaled 7,236 GWh with a system peak of 1,492 MW. Residential customer class accounts for approximately 34% of system sales, small commercial 10% of sales (less than 50 kW), medium commercial customers 33% of sales (50 kW to 1,000 kW), and large commercial and industrial (greater than 1,000 kW) 23% of sales; Street lighting, municipal, and DCL account for remaining sales. Itron did not prepare a forecast for the sentinel light and standby rate classes.

Since 2020 Ottawa has experienced strong economic and population growth. Over the last three years economic growth has been averaging over 3% annual growth, with population growth of 2.1% per year. While some of this growth can be attributed to the economic recovery from the 2020 impact of COVID-19, population growth continues to be strong.

Countering economic growth are improvements in energy efficiency. New end-use standards, improvements in thermal shell integrity, and demand management have offset much of the regional population growth and business activity. To capture the efficiency trends, forecasts for the residential and commercial rate classes are estimated with a Statistically Adjusted End-Use Models (SAE) modeling framework. The modeling approach entails explicitly incorporating end-use energy intensity trends as well as population growth, economic activity, and weather conditions into the constructed monthly model variables for cooling, heating, and other end-uses. Anticipated future energy savings from the Independent Electricity System Operator's electricity demand-side management programs (eDSM) were factored into the forecast to create the ‘Baseline’ sales forecast. Detailed eDSM assumptions are outlined in section 3.5.

The forecast is derived from monthly regression models estimated for both rate classes and system peak; system purchases are derived by applying an average loss factor to rate-class sales forecast. Rate class sales, and customer forecast models are estimated for the following rate classes.

- Residential
- GS50 (less than 50 kW)
- GS1000 (50 kW – 1000 kW)
- GS1500 (1000 kW to 1500 kW)
- GS5000 (1500 kW to 5000 kW)
- Large Users (5000 kW plus)
- Street Lighting
- MU
- DCL

Residential sales forecast is derived as the product of average use and customer forecast. The commercial and other customer classes are based on total sales models. Models are estimated with monthly sales from January 2013 to October 2024, except for the street lighting class. The baseline sales forecast (which includes the impact of eDSM and customer reclassification but not electrification and large loads) is expected to average 0.1% annual sales decline through 2030. Including electrification and large loads, sales are expected to average 0.7% annual growth. Table 1-1 shows the class sales forecast, including the impact of eDSM, electrification and large loads.

TABLE 1-1: RATE CLASS FORECAST

Class Sales Forecast (MWh)										
Year	Res	GS 50	GS 50-1000kW	GS 1000-1500kw	GS 1500-5000kw	Large Users	Street Lght	MU	DCL	Total
2018	2,318,157	727,991	2,512,017	426,660	723,849	608,578	31,723	14,861	3,933	7,367,769
2019	2,263,790	724,601	2,491,412	392,965	723,101	602,083	26,731	14,550	4,908	7,244,141
2020	2,441,059	667,394	2,286,157	375,900	652,716	573,822	22,496	14,403	5,455	7,039,403
2021	2,454,365	680,717	2,286,341	396,363	656,488	592,787	22,843	14,083	5,708	7,109,695
2022	2,438,179	728,927	2,393,143	391,706	649,319	563,511	22,059	13,981	6,138	7,206,963
2023	2,441,208	731,845	2,388,204	398,731	687,415	551,066	21,667	14,064	6,349	7,240,548
2024	2,519,364	744,674	2,371,842	411,892	720,509	522,344	21,765	14,249	6,641	7,333,280
2025	2,579,049	720,891	2,464,069	374,749	719,852	517,425	21,864	14,311	6,708	7,418,918
2026	2,601,494	722,556	2,461,129	371,365	705,932	544,235	21,962	14,392	6,708	7,449,773
2027	2,628,618	722,196	2,453,272	361,115	698,762	566,903	22,060	14,472	6,708	7,474,106
2028	2,663,642	724,707	2,453,309	352,877	693,528	613,629	22,158	14,552	6,708	7,545,112
2029	2,682,208	722,940	2,442,152	351,081	685,488	666,917	22,257	14,633	6,708	7,594,383
2030	2,713,673	722,437	2,434,419	349,718	678,211	701,083	22,355	14,713	6,708	7,643,318
2018-23	1.0%	0.1%	-1.0%	-1.3%	-1.0%	-2.0%	-7.3%	-1.1%	10.1%	-0.3%
2024-30	1.2%	-0.5%	0.4%	-2.7%	-1.0%	5.0%	0.4%	0.5%	0.2%	0.7%

System purchase and peak demand forecast are driven by underlying sales forecast. Purchases are calculated as the product of the total sales forecast and monthly adjustment factors that reflect both system losses and timing between monthly sales estimates and monthly purchases. The baseline system peak forecast is derived from a monthly regression model that relates peak demand to heating, cooling, and base-use loads and peak-day weather conditions. Heating, cooling, and base-use load estimates are derived from the rate class sales forecasts. Table 1-2 shows the total sales, purchases and peak demand forecast, including the impact of eDSM, electrification and large loads. The peak forecast including the impact of electrification is derived from an hourly approach, combining electrification and large load energy forecasts with end-use technologies shapes.

TABLE 1-2: SYSTEM FORECAST

Year	Total Sales (MWh)	chg	System Purchases (MWh)	chg	Peak Demand (MW)	chg
2018	7,367,770		7,612,656		1,481	
2019	7,244,140	-1.7%	7,466,399	-1.9%	1,398	-5.6%
2020	7,039,402	-2.8%	7,267,291	-2.7%	1,506	7.8%
2021	7,109,694	1.0%	7,320,052	0.7%	1,414	-6.1%
2022	7,206,964	1.4%	7,431,646	1.5%	1,349	-4.6%
2023	7,240,548	0.5%	7,470,628	0.5%	1,492	10.6%
2024	7,333,280	1.3%	7,560,502	1.2%	1,535	2.9%
2025	7,418,918	1.2%	7,647,880	1.2%	1,541	0.4%
2026	7,449,773	0.4%	7,678,366	0.4%	1,556	1.0%
2027	7,474,106	0.3%	7,702,189	0.3%	1,570	1.0%
2028	7,545,112	1.0%	7,773,356	0.9%	1,585	1.0%
2029	7,594,383	0.7%	7,821,395	0.6%	1,600	0.9%
2030	7,643,318	0.6%	7,869,661	0.6%	1,615	1.0%
2018-23		-0.3%		-0.4%		0.4%
2024-30		0.7%		0.7%		0.9%

2 FORECAST APPROACH

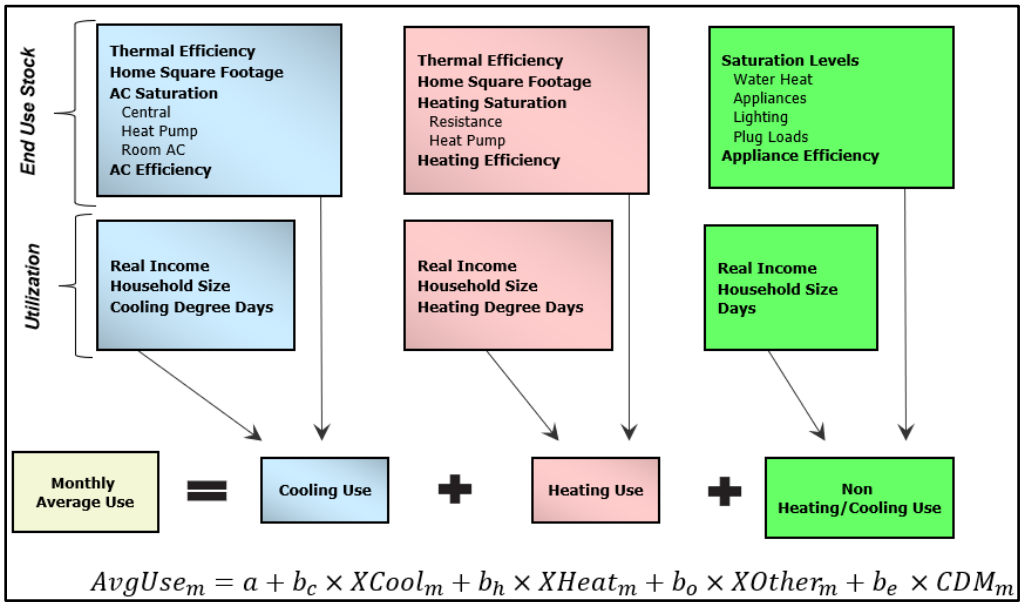
Changes in economic conditions, weather conditions, end-use energy intensity trends, and eDSM drives electricity use and demand through a set of monthly rate class regression models. Rate class sales, and customer forecast models are estimated for the following rate classes.

- Residential
- GS50 (less than 50 kW)
- GS1000 (50 kW – 1000 kW)
- GS1500 (1000 kW to 1500 kW)
- GS5000 (1500 kW to 5000 kW)
- Large Users (5000 kW plus)
- Street Lighting
- MU
- DCL

2.1 RESIDENTIAL BASELINE FORECAST

The residential monthly sales forecast is derived as the product of the average use and customer forecast. Average use is modeled using a Statistically Adjusted End-Use (SAE) modeling framework. This modeling framework integrates end-use saturation and efficiency trends that capture long-term, end-use, energy trends with monthly weather, number of days, and economic drivers that capture the expected utilization of the end-use stock. End-uses are mapped to heating (XHeat), cooling (XOther), and other uses (XOther). Cumulative historical CDM savings are incorporated to capture program savings not captured in the end-use model variables. Figure 2-1 shows the residential average use model.

FIGURE 2-1: RESIDENTIAL SAE EQUATION



The calculated XHeat, XCool, and XOther variables are shown in Figure 2-2 through Figure 2-4.

FIGURE 2-2: RESIDENTIAL XHEAT VARIABLE

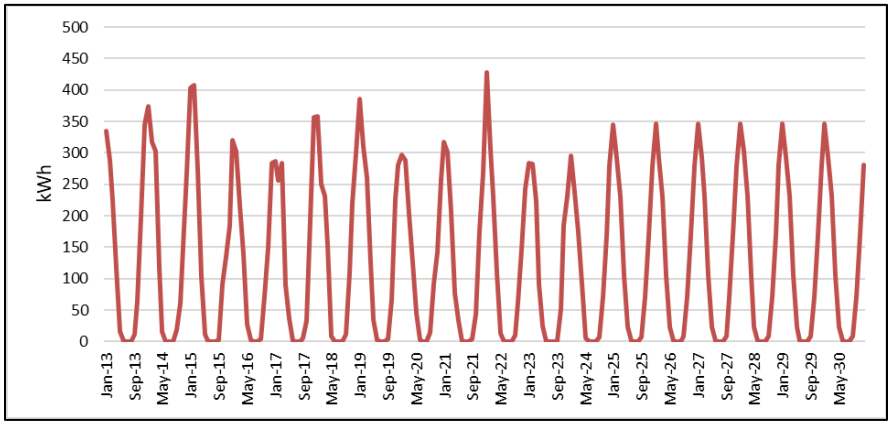


FIGURE 2-3:RESIDENTIAL XCOOL VARIABLE

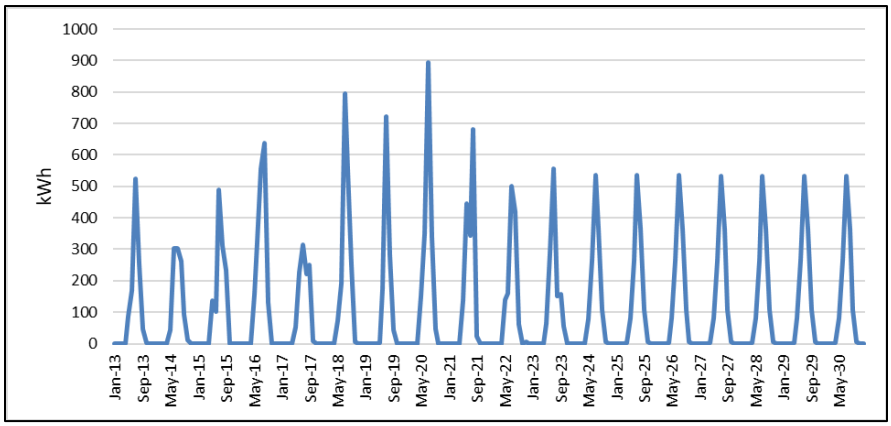
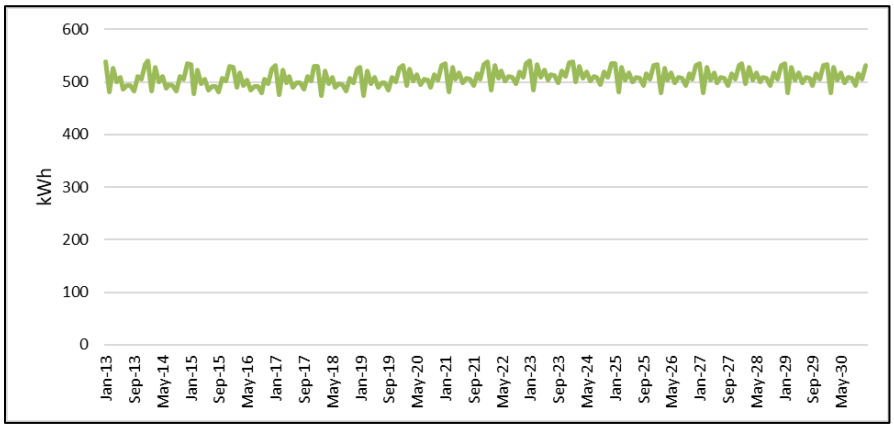


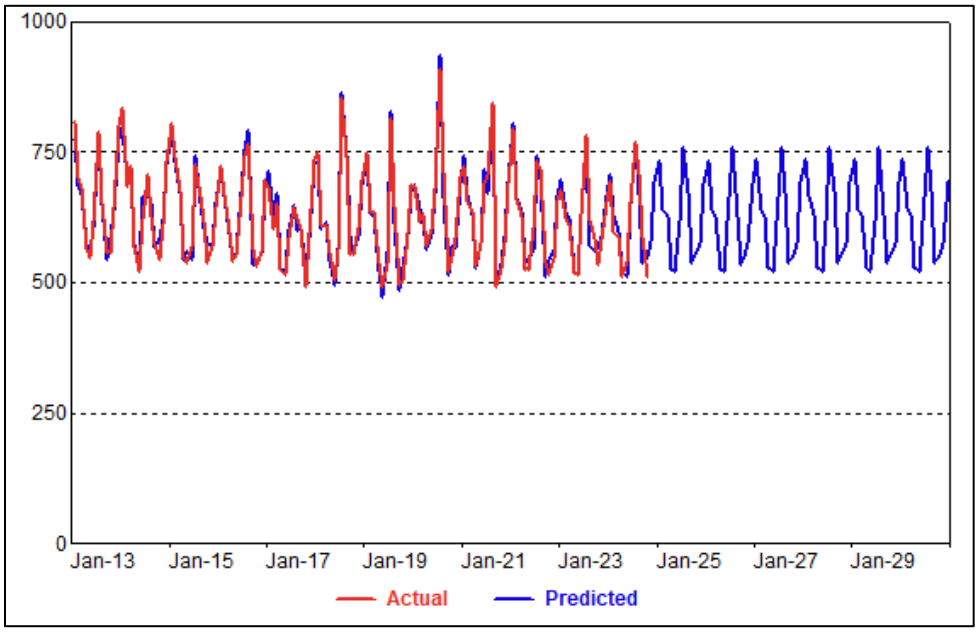
FIGURE 2-4: RESIDENTIAL XOTHER VARIABLE



Cumulative historical CDM is included as a model variable. This variable helps account for efficiency savings above and beyond regional estimates from codes and standards. In 2013 CDM savings per customer were approximately 5 kWh per month (60 kWh per year), this increases to 47 kWh per month (576 kWh per year) by 2023. While the historical increase in savings are significant, a greater portion of that savings occurred in the 2013 to 2019 time period, savings dropped off from 2020-2024. The CDM model variable is held constant at October 2024 levels, efficiency savings from codes and standards are not held constant, resulting in a forecast which captures the impact of historical but not new eDSM. Cumulative incremental eDSM is then subtracted from the forecast results to arrive at the eDSM adjusted forecast. The methodology ensures the impact of eDSM is not greater than the project future eDSM savings.

The residential average use model is estimated as a function of cooling, heating, other use, and CDM per customer savings over the period January 2013 through October 2024. The model is used in generating an average use forecast through December 2030. The estimated model explains historical sales well with an Adjusted R-Squared of 0.95 and a mean absolute percent error (MAPE) of 2.4%. Figure 2-5 shows the actual and model predicted average use.

FIGURE 2-5: ACTUAL AND PREDICTED RESIDENTIAL AVG USE (KWH)

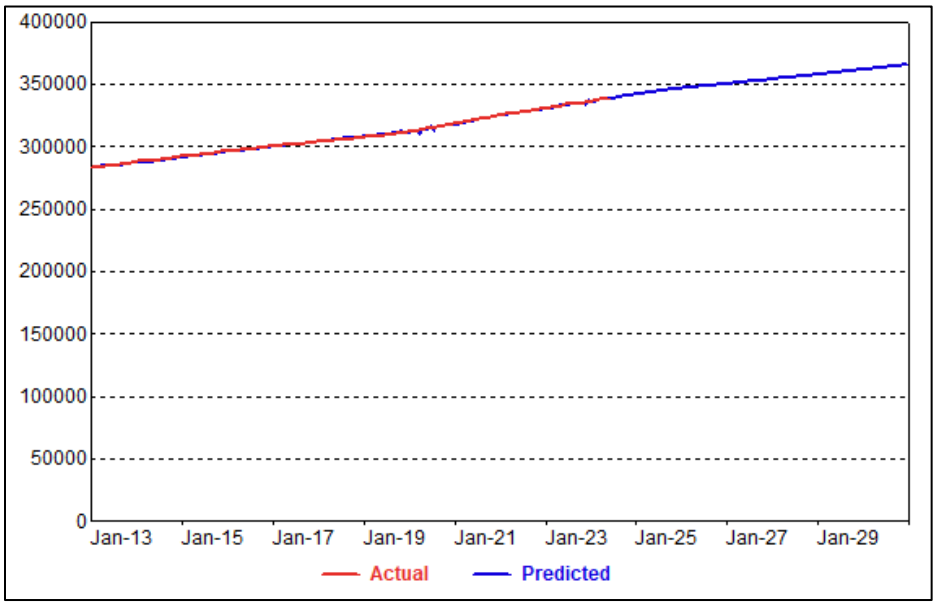


The number of residential customers has increased significantly over the last 3 years, driven by increases in population growth and a change in how multi-unit residential buildings are metered. Hydro Ottawa provided Itron data showing the annual reclassification from bulk meters to individual unit meters. Prior to 2019, many multi-unit residential buildings were bulk metered as one commercial account, this has since changed with some units being individually unit metered. This is occurring in the construction of new multi-unit buildings as well as retro fitting existing buildings. In 2020, 6,454 new customers were added, followed by 6,810 in 2021, considerably higher than the prior year averages of approximately 4,000. Since 2021, growth has slowed but is still above historical averages, 5,284 customers were added in 2023. Population growth is expected to remain high in 2024 with 2.3% growth, followed by 1.5% in 2025 before falling to 1.0% or below after 2026.

The customer forecast is based on a monthly regression model that relates the number of customers to a blended economic variable, using both population and gross domestic product (GDP); the correlation between the number of customers and blended economic variable is extremely high at 0.99. This improved methodology is a change from

the prior forecast and helps explain the historical changes in customer growth since 2020. Figure 2-6 shows the actual and model predicted customers.

FIGURE 2-6: ACTUAL AND PREDICTED RESIDENTIAL CUSTOMERS (COUNT)



The residential sales forecast is the product of average use and customer forecast. Table 2-1 shows the annual average use, average annual customers, and resulting sales forecast. The average use shown is calculated by dividing annual sales by the average annual customers. This baseline forecast includes the impact of eDSM but does not include the impact of electrification.

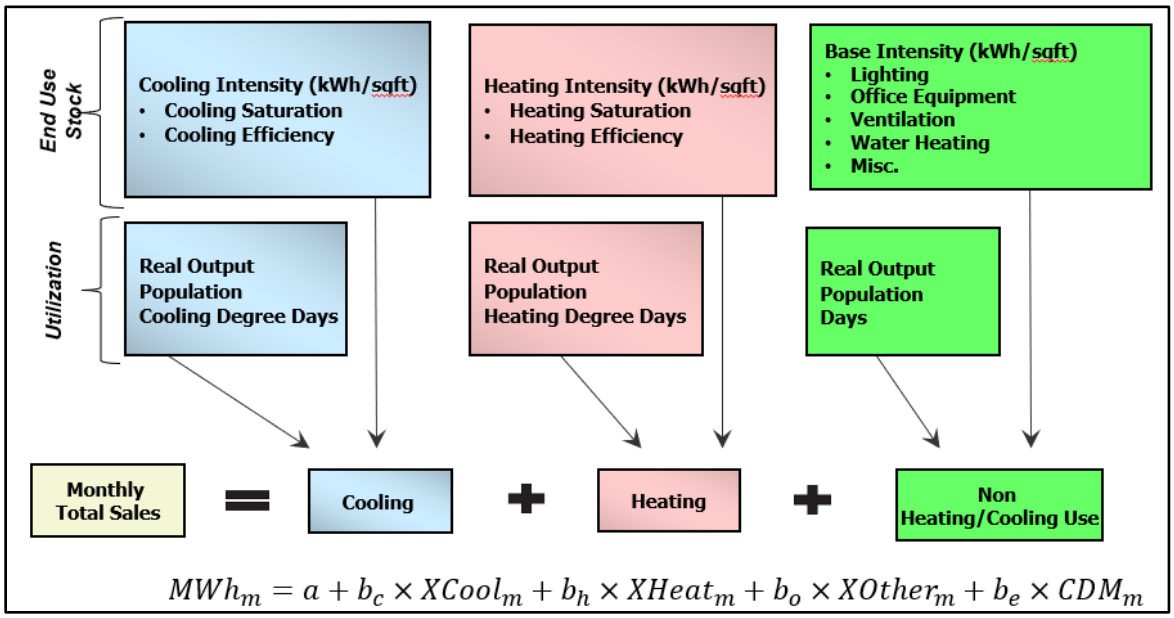
TABLE 2-1: RESIDENTIAL BASELINE FORECAST

Residential Forecast						
Year	Average Use (kWh)	chg	Customers	chg	Sales (MWh)	chg
2018	7,591		305,390		2,318,157	
2019	7,322	-3.5%	309,165	1.2%	2,263,790	-2.3%
2020	7,751	5.9%	314,950	1.9%	2,441,059	7.8%
2021	7,635	-1.5%	321,471	2.1%	2,454,365	0.5%
2022	7,441	-2.5%	327,690	1.9%	2,438,179	-0.7%
2023	7,329	-1.5%	333,103	1.7%	2,441,208	0.1%
2024	7,423	1.3%	339,113	1.8%	2,517,155	3.1%
2025	7,414	-0.1%	344,399	1.6%	2,553,442	1.4%
2026	7,345	-0.9%	348,434	1.2%	2,559,268	0.2%
2027	7,295	-0.7%	351,908	1.0%	2,567,229	0.3%
2028	7,260	-0.5%	355,463	1.0%	2,580,547	0.5%
2029	7,169	-1.2%	359,121	1.0%	2,574,693	-0.2%
2030	7,108	-0.9%	362,831	1.0%	2,579,025	0.2%
2018-23		-0.6%		1.8%		1.1%
2024-30		-0.7%		1.1%		0.4%

2.2 COMMERCIAL BASELINE FORECAST

Hydro Ottawa has multiple commercial rate classes that are defined by customer demand requirements. General service rate classes less than 5000 kW use a SAE specified sales model, forecasting monthly sales as a function of heating requirements (XHeat), cooling requirements (XCool), other use (XOther), and historical CDM. General service rates greater than 5000 kW, lighting, MU, and DCL classes use a general econometric model.
While separate sales forecast models are estimated for each of the SAE specified general service models, the model structure is similar, incorporating end-use efficiency and saturation estimates, weather, and economic drivers. The GS50 and GS1000 sales models include a CDM variable, like the residential model. These CDM variables are held constant at October 2024 levels, efficiency savings from codes and standards are not held constant, resulting in a forecast which captures the impact of historical but not new eDSM. Cumulative incremental eDSM is then subtracted from the forecast results to arrive at the eDSM adjusted forecast. Figure 2-7 shows the general service SAE sales model.

FIGURE 2-7: COMMERCIAL SAE MODEL



The commercial models use a blended economic variable, weighing gross domestic product (GDP) and population together. Population captures an increase in market size and GDP overall business activity. The weights are slightly different for small commercial and large commercial rate classes. The weights are determined by evaluating out of sample model fit statistics for different sets of weights. The variables are geometrically weighted as population and GDP are measured on different scales. Below are the weights used:

- *Small Econ Variable* = $Population_m^{0.5}$ x $GDP_m^{0.5}$
- *Large Econ Variable* = $Population_m^{0.8}$ x $GDP_m^{0.2}$

Commercial sales models are estimated over the period January 2013 to October 2024. The model in-sample fits are relatively strong with Adjusted R-Squared ranging from 0.82 to 0.92 and MAPEs of 2.2% to 3.6%.

Figure 2-8 to Figure 2-11 shows actual and predicted sales for the commercial rate classes. Estimated model coefficients and model statistics are included in Appendix A. Model predicted results exclude the impact of future eDSM, eDSM adjustments are made by subtracting future eDSM savings from the model predicted results.

FIGURE 2-8: ACTUAL AND PREDICTED GS50 SALES (MWH)

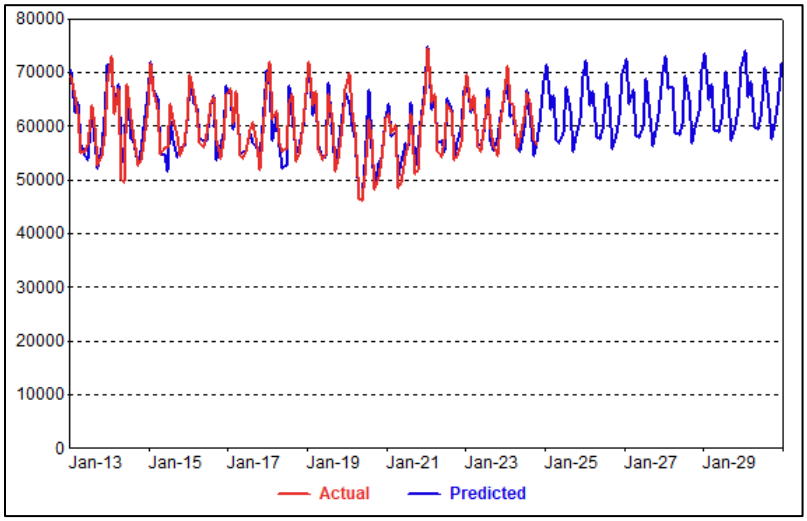


FIGURE 2-9: ACTUAL AND PREDICTED GS1000 SALES (MWH)

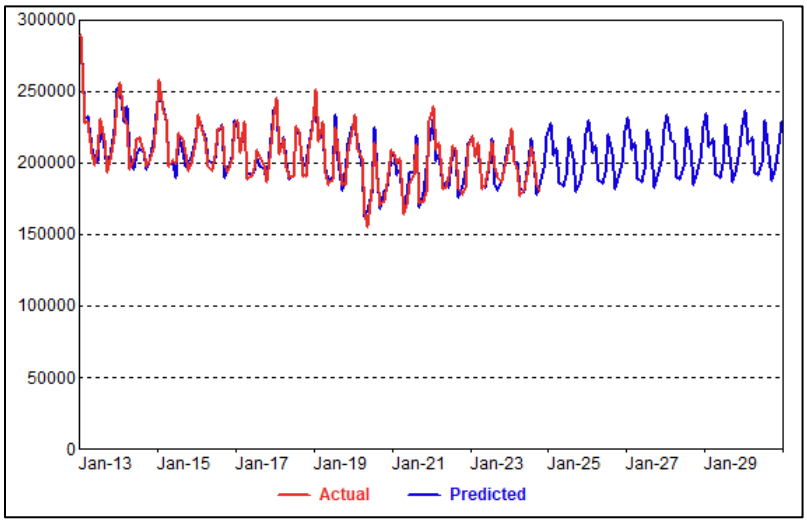


FIGURE 2-10: ACTUAL AND PREDICTED GS1500 SALES (MWH)

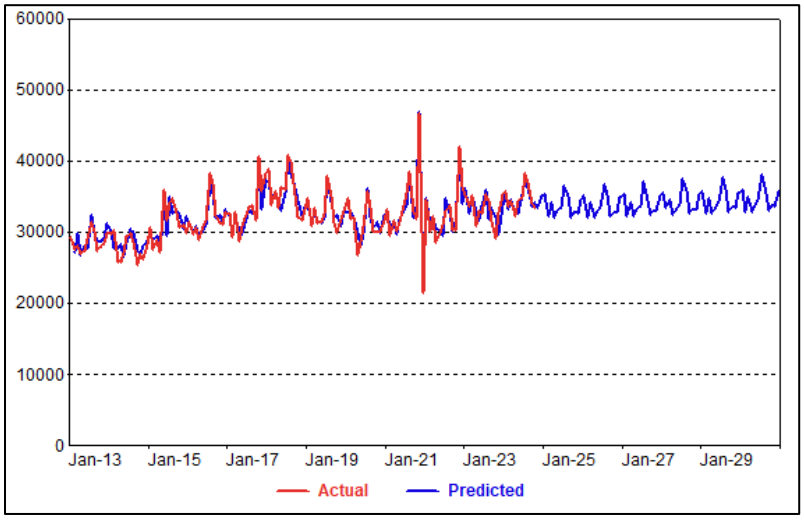


FIGURE 2-11: ACTUAL AND PREDICTED GS5000 SALES (MWH)

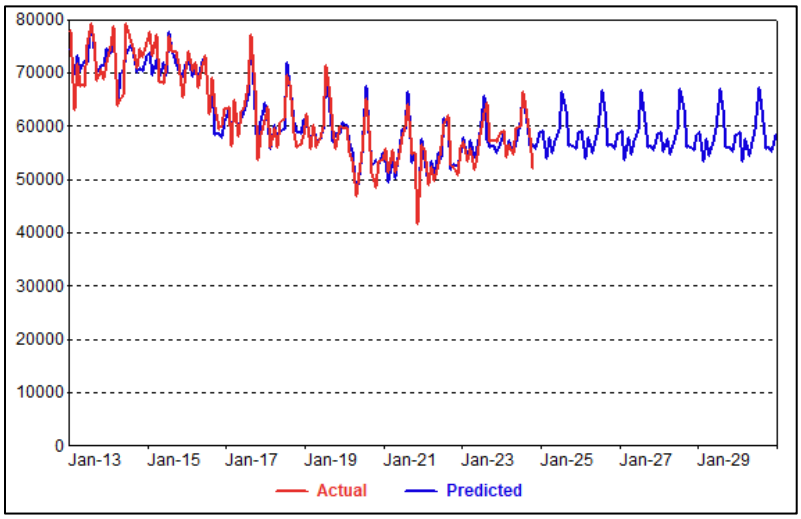


Table 2-2 shows the annual commercial sales baseline forecast for the SAE specified models. This forecast includes the impact of future eDSM but not electrification and large loads.

TABLE 2-2: COMMERCIAL BASELINE SALES FORECAST

Class Sales Forecast (MWh)								
Year	GS 50	chg	GS 1000	chg	GS 1500	chg	GS 5000	chg
2018	727,991		2,512,017		426,660		723,849	
2019	724,601	-0.5%	2,491,412	-0.8%	392,965	-7.9%	723,101	-0.1%
2020	667,394	-7.9%	2,286,157	-8.2%	375,900	-4.3%	652,716	-9.7%
2021	680,717	2.0%	2,286,341	0.0%	396,363	5.4%	656,488	0.6%
2022	728,927	7.1%	2,393,143	4.7%	391,706	-1.2%	649,319	-1.1%
2023	731,845	0.4%	2,388,204	-0.2%	398,731	1.8%	687,415	5.9%
2024	744,614	1.7%	2,371,696	-0.7%	411,870	3.3%	720,493	4.8%
2025	720,120	-3.3%	2,462,214	3.8%	374,467	-9.1%	719,656	-0.1%
2026	721,284	0.2%	2,458,067	-0.2%	370,902	-1.0%	713,542	-0.8%
2027	720,347	-0.1%	2,448,819	-0.4%	369,024	-0.5%	706,225	-1.0%
2028	722,205	0.3%	2,447,282	-0.1%	368,585	-0.1%	700,826	-0.8%
2029	719,702	-0.3%	2,434,352	-0.5%	366,523	-0.6%	692,599	-1.2%
2030	718,382	-0.2%	2,424,651	-0.4%	364,863	-0.5%	685,115	-1.1%
2018-23		0.1%		-1.0%		-1.3%		-1.0%
2024-30		-0.6%		0.4%		-2.0%		-0.8%

Separate models are estimated for commercial customers. GS50 customers are driven by the number of residential customers. The correlation between GS50 customers and residential customers is 0.97. A simple linear trend model is used to forecast customers for the GS1500 rate class. The GS1000 and GS5000 customer forecasts are held constant at their October 2024 levels. Table 2-3 shows the commercial average annual customer forecast, excluding the impact of customer reclassification from commercial electrification and large loads.

TABLE 2-3: COMMERCIAL CUSTOMER FORECAST

Year	GS 50	chg	GS 1000	chg	GS 1500	chg	GS 5000	chg
2018	24,926		3,152		71		68	
2019	25,030	0.4%	3,112	-1.3%	69	-2.8%	67	-1.5%
2020	25,134	0.4%	3,092	-0.6%	79	14.5%	64	-4.5%
2021	25,256	0.5%	3,088	-0.1%	91	14.9%	67	4.7%
2022	25,489	0.9%	2,967	-3.9%	77	-14.9%	60	-10.4%
2023	25,676	0.7%	2,990	0.8%	75	-2.9%	64	6.7%
2024	25,748	0.3%	2,955	-1.2%	85	13.3%	69	7.8%
2025	25,878	0.5%	3,053	3.3%	83	-2.4%	70	1.4%
2026	26,021	0.6%	3,053	0.0%	84	1.2%	70	0.0%
2027	26,143	0.5%	3,053	0.0%	85	1.2%	70	0.0%
2028	26,269	0.5%	3,053	0.0%	86	1.2%	70	0.0%
2029	26,398	0.5%	3,053	0.0%	87	1.2%	70	0.0%
2030	26,529	0.5%	3,053	0.0%	88	1.1%	70	0.0%
2018-23		0.6%		-1.0%		1.8%		-1.0%
2024-30		0.5%		0.6%		0.6%		0.2%

2.3 OTHER RATE CLASSES: LARGE USERS, STREET LIGHTING, MU, DCL

Generalized econometric models are estimated for Large Users, as well as Street Lighting, MU, and DCL. The Large User class is Hydro Ottawa's largest customers, the forecast assumes usage is held constant with adjustments made for anticipated large load requests and eDSM savings. The Street Lighting, MU, and DCL forecasts are not adjusted for eDSM savings.

2.4 BASELINE BILLING DEMAND FORECAST

Several commercial rate classes include a billing demand component. Billing demand is a measure of a customer's highest hourly demand over the billing period. Monthly billing demand regression models are estimated for each rate class. Demands are modeled as a function of monthly sales and monthly binary variables. The models are estimated with actuals from January 2018 to October 2024. The billing demand forecast includes the impact of eDSM savings but not electrification and large loads. Table 2-4 shows the annual rate class baseline billing demand forecast.

TABLE 2-4: RATE CLASS BASELINE BILLING DEMAND FORECAST

Class Billing Demand (kW)										
Year	GS 1000	Chg	GS 1500	Chg	GS 5000	Chg	Large Users	Chg	St Light	Chg
2018	6,225,821		945,939		1,580,853		1,106,784		88,707	
2019	6,032,518	-3.1%	858,540	-9.2%	1,604,681	1.5%	1,064,514	-3.8%	74,394	-16.1%
2020	5,642,604	-6.5%	834,971	-2.7%	1,437,864	-10.4%	1,010,829	-5.0%	62,924	-15.4%
2021	5,617,404	-0.4%	884,109	5.9%	1,404,248	-2.3%	1,028,096	1.7%	63,916	1.6%
2022	5,797,914	3.2%	885,693	0.2%	1,377,470	-1.9%	988,208	-3.9%	61,706	-3.5%
2023	5,891,185	1.6%	897,493	1.3%	1,469,931	6.7%	996,339	0.8%	60,526	-1.9%
2024	5,858,863	-0.5%	920,505	2.6%	1,548,107	5.3%	950,885	-4.6%	60,563	0.1%
2025	6,204,716	5.9%	792,482	-13.9%	1,556,971	0.6%	905,343	-4.8%	60,838	0.5%
2026	6,194,358	-0.2%	784,718	-1.0%	1,542,681	-0.9%	896,821	-0.9%	61,129	0.5%
2027	6,171,260	-0.4%	780,628	-0.5%	1,525,581	-1.1%	888,200	-1.0%	61,402	0.4%
2028	6,167,420	-0.1%	779,671	-0.1%	1,512,963	-0.8%	882,209	-0.7%	61,676	0.4%
2029	6,135,125	-0.5%	775,179	-0.6%	1,493,736	-1.3%	869,993	-1.4%	61,949	0.4%
2030	6,110,895	-0.4%	771,564	-0.5%	1,476,246	-1.2%	860,299	-1.1%	62,184	0.4%
2018-23		-1.0%		-0.9%		-1.3%		-2.0%		-7.1%
2024-30		0.7%		-2.8%		-0.8%		-1.6%		0.4%

2.5 ACCOUNTING FOR CUSTOMER RECLASSIFICATION

Hydro Ottawa general service commercial rate class customers can be reclassified annually, based on their historical billing demand. This causes annual movements in the number of customers in each general service customer class, billing consumption (kWh) and billing demands (kW) between classes, with customers potentially moving up or down in terms of their demand. Hydro Ottawa provided Itron the actual annual reclassifications which included the most recent November 2024 reclassification. Customer counts, kWh, and billing kW were provided, showing which class the customers previously belonged to and which class they would fall under starting in November 2024. This data was used to move customer counts, kWh and kW demand from the customers' historical general service class to

their current rate class in the forecast. The forecast also captures the impact of one Large User customer being disaggregated into multiple customer accounts in smaller commercial classes.

3 FORECAST ASSUMPTIONS & DRIVERS

Several elements and key data inputs drive the sales, customer, and energy forecasts. These include:

- Sales, customers, billing demands, and load data.
- Actual and expected normal weather data.
- Historical CDM and projected eDSM savings.
- Conference Board of Canada's 2024 economic forecast.
- End-use saturation, efficiency and resulting energy intensities (kWh per end-use)
- Electrification and large load forecast assumptions.

3.1 HISTORICAL SALES, CUSTOMER, DEMAND, LOAD DATA

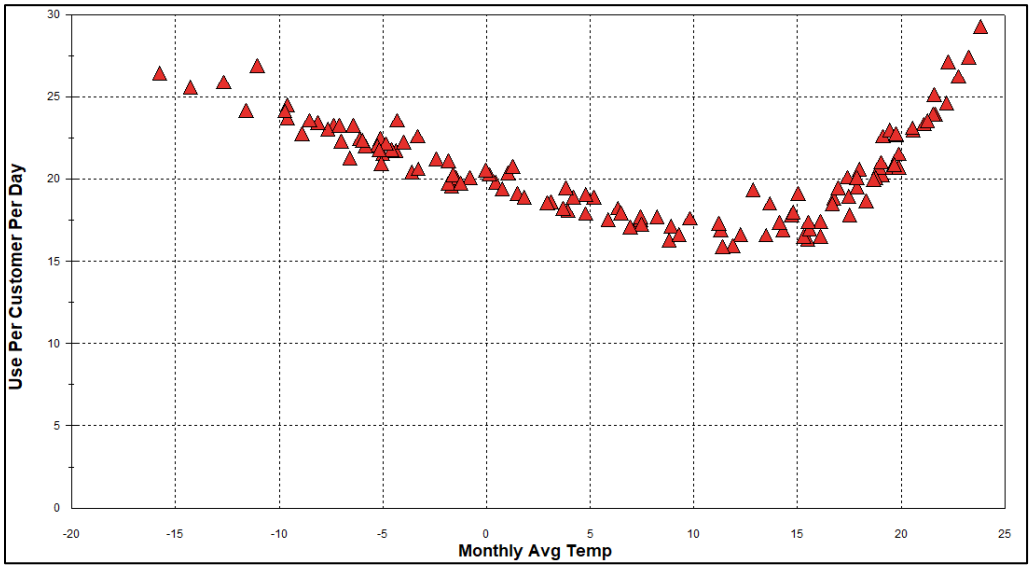
Rate class forecast models are estimated using monthly reported billed sales and customer data from January 2013 through October 2024. Billing demand models are estimated using monthly reported billing demand data from January 2018 through October 2024. The historical billing demand data are more variable than monthly sales, the shorter estimation period results in models with improved statistics, higher adjusted R squared and lower mean absolute percent errors. System peak demand forecast is based on reported monthly peaks from January 2013 to December 2023.

System hourly load data and hourly class level AMI data are used to estimate hourly profiles. Data are available from January 1st, 2020, through December 31st, 2023. These hourly profiles are used to estimate the impact of electrification and large loads on the system hourly peak.

3.2 WEATHER DATA

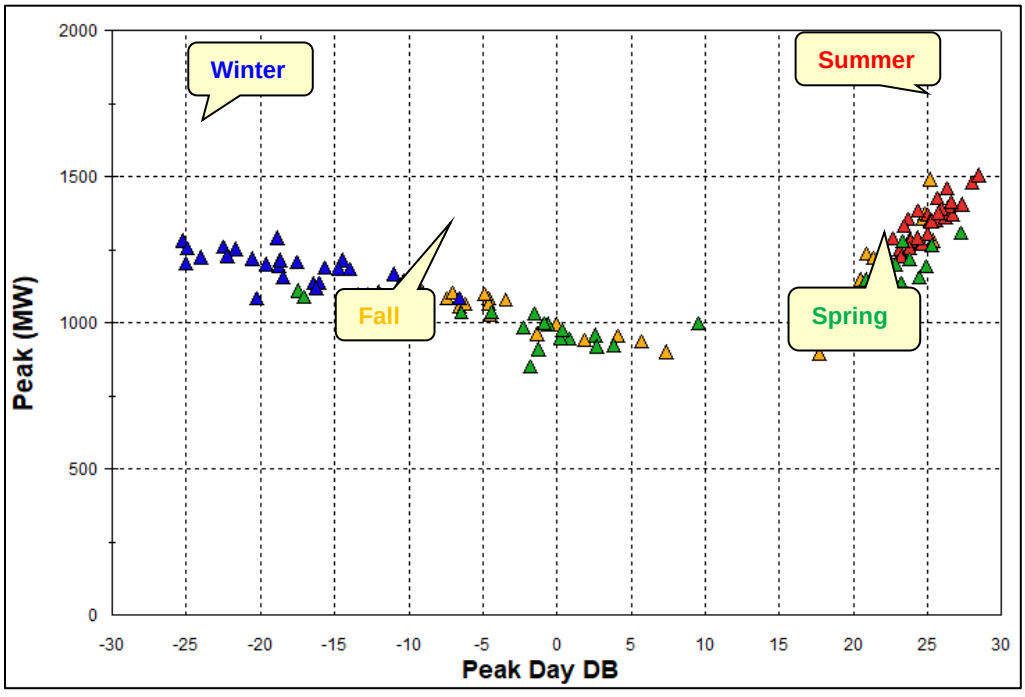
Actual and normal Heating Degree Days (HDD) and Cooling Degree Days (CDD) are calculated from daily average temperature and dew point data for Ottawa. Generally, degree-days are expressed with a basis of 18 degrees Celsius. In the monthly rate class sales models, we found we can improve on the forecast model statistical fit by defining HDD with a 13-degree-day base as there is little heating when temperatures are above 13 degrees. Between 13 degrees and 18 degrees there is little heating or cooling. Figure 3-1 illustrates this point using a scatter plot showing monthly residential average use per day versus monthly average temperature. The level-hand side of the scatter plot begins to slop upwards at temperatures below 13 degrees. On the right-hand side, capturing the cooling response, using increases around 18 degrees. Normal degree-days are calculated using an average by date methodology over the past twenty years, 2004 through 2023.

FIGURE 3-1: RESIDENTIAL USE VS AVERAGE TEMPERATURE



Monthly peak-day HDD and TDD (temperature-humidity based degree-days) are used in forecasting peak demand. Peak-day degree-days are based on the average daily temperature and dew point that occurs on the day of the monthly peak. TDD is a two-day weighted temperature as we found prior-day temperature has a significant impact on demand. The weights are 55% for the day of the peak and 45% for the day prior to the peak. The appropriate breakpoints for the HDD and weighted TDD variables are determined by evaluating the relationship between monthly peak and the peak-day average temperature as shown in Figure 3-2.

FIGURE 3-2: MONTHLY PEAK DEMAND VS TEMPERATURE



From the scatter plot (and initial regression models) the "best" fit TDD variable is where TDD is defined with a temperature-humidity base of 13 degrees and the best breakpoint for calculating the peak-day HDD variable is 10 degrees.

Normal peak-day HDD and TDD are derived as a twenty-year average using a rank and average approach. This approach entails first finding the highest HDD and TDD that occurred in each month over the last twenty years (2004 to 2023), and within each year ranking the degree-days from the highest to the lowest value so that there are 12 monthly ranked HDD and TDD in each year. The ranking across the years is then averaged generating peak-weather TDD and HDD duration curves with 12 average values. The ranked-average TDD and HDD are assigned to specific months based on that peak-month TDD or HDD is most likely to occur. The highest weighted TDD is assigned to July, the next highest August, the third highest June, and so forth. The highest HDD value is assigned to January, the next highest to February, the third highest to December, and so forth.

3.3 ECONOMIC DATA

The sales and demand forecast incorporates the Conference Board of Canada's September 2024 economic forecast for the Ottawa and Gatineau area. The primary economic drivers are population, real personal income (RPI), gross domestic product (GDP), and Employment. Table 3-1 shows the economic drivers.

TABLE 3-1: REGIONAL ECONOMIC FORECAST

Year	Population (000's)	Chg	GDP (Millions $ Real)	Chg	RPI (Millions $ Real)	Chg	Employment (000's)	Chg
2018	1,482		79,524		55,508		746.7	
2019	1,512	2.0%	81,412	2.4%	57,062	2.8%	773.3	3.6%
2020	1,533	1.4%	78,171	-4.0%	60,307	5.7%	727.7	-5.9%
2021	1,554	1.4%	82,077	5.0%	63,482	5.3%	766.6	5.3%
2022	1,588	2.2%	84,898	3.4%	61,900	-2.5%	799.6	4.3%
2023	1,633	2.9%	86,055	1.4%	64,054	3.5%	833.6	4.3%
2024	1,671	2.3%	86,390	0.4%	66,251	3.4%	842.8	1.1%
2025	1,696	1.5%	88,598	2.6%	67,196	1.4%	859.6	2.0%
2026	1,713	1.0%	90,764	2.4%	68,248	1.6%	874.0	1.7%
2027	1,727	0.8%	92,882	2.3%	69,107	1.3%	884.1	1.1%
2028	1,742	0.8%	95,053	2.3%	70,020	1.3%	894.5	1.2%
2029	1,757	0.9%	97,279	2.3%	71,161	1.6%	905.8	1.3%
2030	1,772	0.9%	99,558	2.3%	72,439	1.8%	917.3	1.3%
2018-23		2.0%		1.6%		2.9%		2.3%
2024-30		1.2%		2.1%		1.8%		1.4%

Not surprisingly, COVID-19 had a significant impact on 2020 and 2021 class sales. There was a significant increase in residential sales and a decline in commercial sales as work shifted from the office to the home. While a portion of the change in customer usage can be explained using the Conference Board economic concepts, such as the decreases in GDP and employment, they alone do not completely capture the impact. To capture the impact, select rate class models include a COVID impact variable. This variable is constructed using Google Mobility Report data for the residential, workplace and retail place types for Ontario. Google Mobility Report data tracks daily cell phone locations by place type compared to a pre-COVID baseline. The residential place type active increased while the workplace and retail decreased, this data correlates well to the actual changes in electric sales.

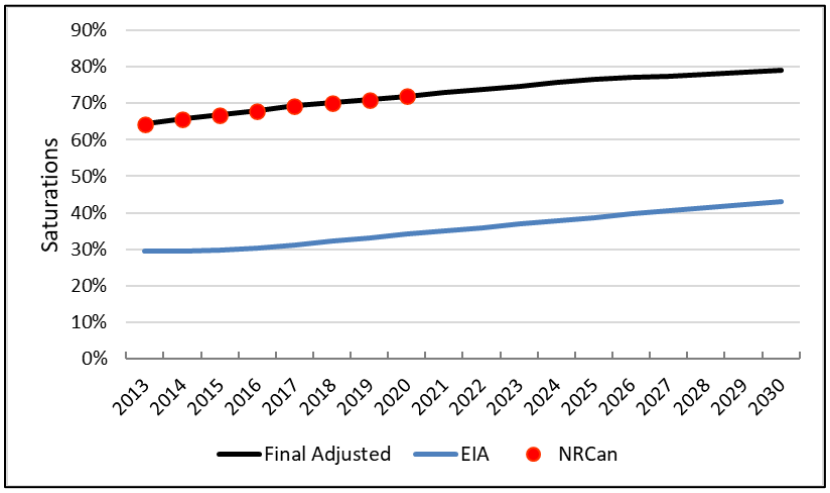
3.4 END-USE SATURATION AND EFFICIENCY TRENDS

End-use intensities are calculated and incorporated into the baseline forecast from end-use saturation estimates (the share of homes that own a specific appliance) and measure of equipment efficiency. As saturation increases, energy intensity increases. As efficiency improves end-use intensity decreases. Declining customer average use is largely attributable to efficiency gains that have been stronger than increases in end-use saturations. Starting residential end-use intensity estimates are based on the Energy Information Administration (EIA) historical and projected end-use saturation, stock efficiency and appliance usage data from the 2023 Annual Energy Outlook (AEO). The AEO forecast is based on the National Energy Modeling System (NEMS) which includes end-use forecast modules for the residential and commercial sectors. Residential data derived from NEMS database include:

- End-use consumption
- End-use stock energy efficiency (for some measures and UECs for others)
- End-use appliance stock (number of existing units)
- End-use saturation (calculated from number of units and number of households).

EIA develops end-use forecasts for nine census divisions. The end-use intensity forecasts are based on the Mid-Atlantic Census Division which includes New York, Pennsylvania and New Jersey. Intensities are modified to reflect Ontario end-use saturation trends; historical and forecasted end-use saturations are calibrated to reported saturation data from Natural Resources Canada for Ontario (NRCan) and Statistics Canada (Stats Can). We assume that the end-use average stock efficiency in Hydro Ottawa's service territory is similar to that of the Mid-Atlantic Census Division. In cases where the NRCan data differed from starting EIA projections, preference was given to Ontario NRCan data. Figure 3-3shows the differences between the EIA and NRCan data and the final adjusted saturation used for the residential central air conditioning end-use. The EIA and NRCan data show similar growth rates but starting saturations are higher for Ontario.

FIGURE 3-3: RESIDENTIAL CENTRAL AC SATURATIONS



NRcan data shows that residential electric heating starting saturations and growth trends are different in Ontario compared to the Mid Atlantic U.S. region. Figure 3-4 shows the difference between the EIA and NRCan data and the final adjusted saturation used for the residential electric resistance. Heat pump saturations were based on Statistics Canada data specific to the Ottawa-Gatineau region for 2019 and 2021, historical and future projections were based on the NRCan data. Figure 3-5 shows the EIA and Stats Can data and the final adjusted saturation used for the residential heat pumps.

FIGURE 3-4: RESIDENTIAL ELECTRIC RESISTANCE HEATING SATURATIONS

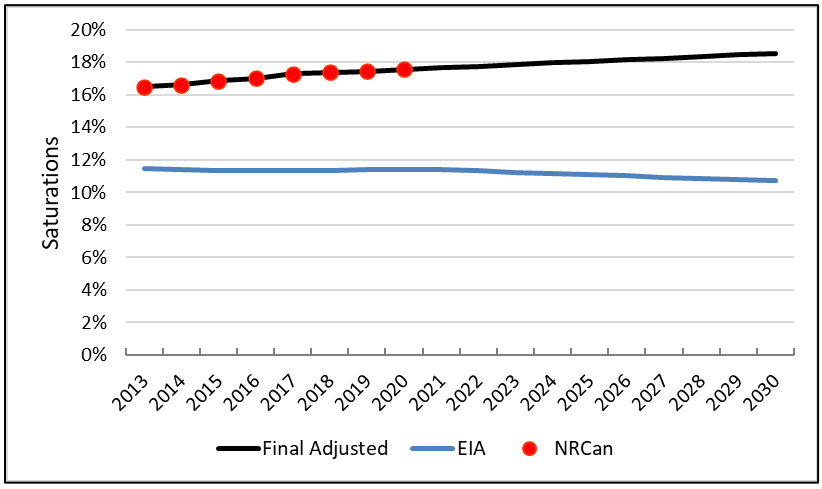
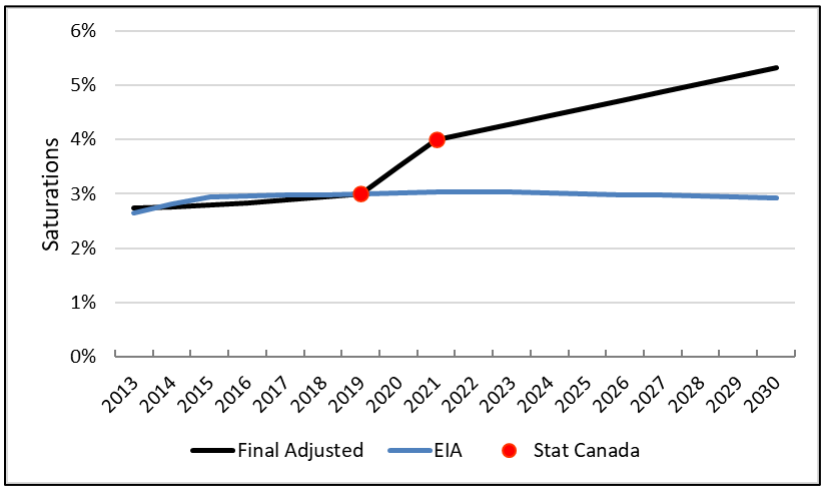
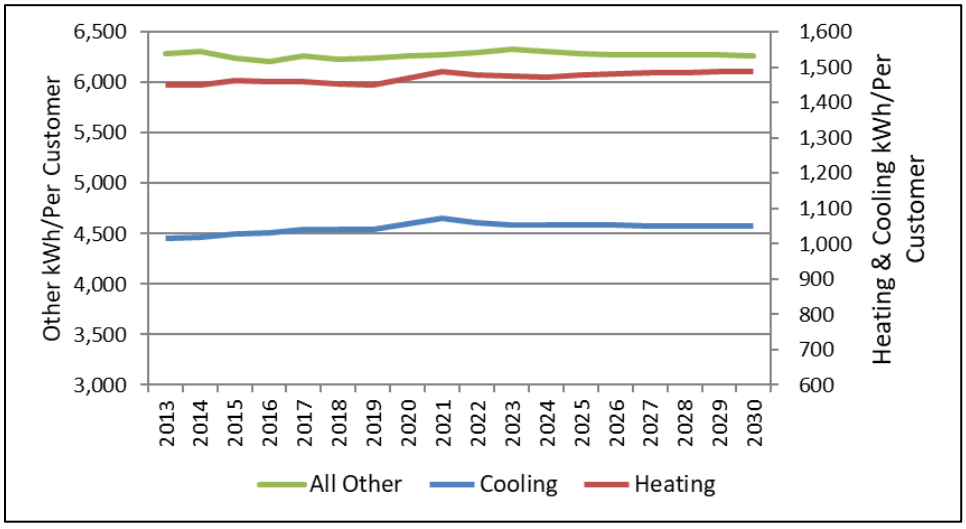


FIGURE 3-5: RESIDENTIAL HEAT PUMP SATURATIONS



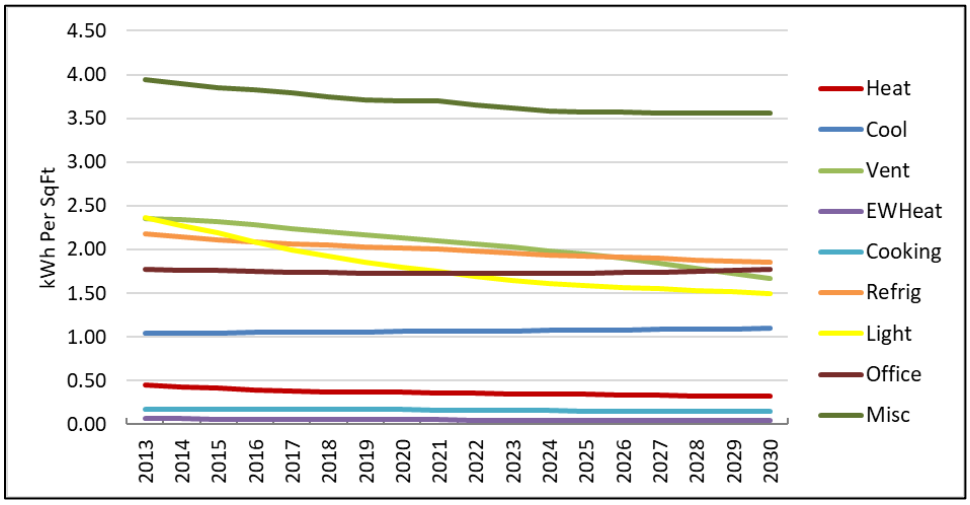
The calibrated and adjusted end-use saturations are combined with end-use efficiencies to calculate intensities, which are inputs into the SAE constructed modeling variables. Figure 3-6 shows the final intensities aggregated to heating, cooling, and other use.

FIGURE 3-6: RESIDENTIAL INTENSITIES



EIA provides commercial end-use forecast by building type. There are 11 building types and 9 end-uses. End-use data includes consumption, average stock efficiency, and square footage. Commercial end-use intensities are derived by dividing commercial end-use consumption by square footage. Unlike residential, commercial calibration is based on a base year consumption, no calibration is made using NRCan data. The build types and end-uses segmentation from NRCan is not a one for one match with EIA build types and end-uses. Figure 3-7 shows the commercial intensities, on a kWh per square foot basis, which are inputs into the SAE constructed modeling variables.

FIGURE 3-7: COMMERCIAL ENERGY INTENSITIES



3.5 ENERGY EFFICIENCY DEMAND MANAGEMENT

Estimated historical CDM savings are directly incorporated into the estimated rate class sales forecast models as a separate model variable. In the residential average use model CDM is on a per customer basis and in the commercial models on a total MWh savings basis. These CDM variables are held constant at their October 2024 levels.

Cumulative incremental new eDSM is then subtracted from the model results to arrive at the eDSM adjusted forecast.

There are two reasons to include CDM as a model variable. First, adding CDM helps explain the decline in customer usage and results in improved model fit statistics. Second, it helps avoid double-counting savings. The CDM coefficient reflects the CDM savings not already captured in the SAE model structure. If none of the CDM savings were captured by the SAE specification, we would expect the coefficient on EDM to be -1.0. If all the CDM impacts were already captured by the model the coefficient would be close to 0 or statistically insignificant.

Sales impact from future eDSM savings are derived by subtracting cumulative new eDSM savings as of October 2024 from the forecast model results. Table 3-2 shows the annual historical CDM and forecasted eDSM savings which are used in the forecast.

TABLE 3-2: CDM AND EDSM SAVINGS

Cumulative CDM & eDSM Saving (MWh)						
Year	Residential	GS50	GS1000	GS1500	GS5000	Large User
2013	20,616	7,385	81,975	10,689	-	-
2014	34,044	16,012	118,923	15,720	-	-
2015	53,784	25,619	151,924	20,330	8,821	6,370
2016	88,655	34,888	183,013	24,785	13,768	12,057
2017	159,552	45,541	212,046	29,055	19,349	34,317
2018	176,325	55,895	231,631	32,037	23,262	35,028
2019	180,374	66,202	251,127	35,083	27,357	35,899
2020	183,289	71,052	262,409	36,940	32,093	36,753
2021	184,870	77,983	276,959	39,362	40,709	38,644
2022	186,089	81,736	283,571	40,567	45,544	39,332
2023	187,479	86,424	291,340	41,997	51,086	53,831
2024	189,751	92,367	303,347	43,979	53,484	56,869
2025	211,380	98,980	333,428	48,947	60,368	61,696
2026	233,653	105,223	358,856	53,147	66,272	66,481
2027	256,621	111,716	384,980	57,461	72,327	71,417
2028	280,337	118,534	411,955	61,916	78,565	76,544
2029	304,847	125,727	439,886	66,529	85,006	81,887
2030	327,687	133,351	468,889	71,319	91,674	87,476

3.6 ELECTRIFICATION AND LARGE LOADS

The forecast includes adjustments for future light-duty transportation to the residential sector. The forecast also reflects anticipated increases in commercial demand driven by customer plans discussed with Hydro Ottawa. These plans include electrifying light-duty transportation, heating/cooling and other reasons known/unknown to Hydro Ottawa. Hydro Ottawa provided Itron with incremental annual commercial electrification MWh and light-duty electric vehicle (EV) MWh estimates by class of customer. Monthly MWh series were generated and the cumulative MWh as of October 2024 were added to the respective classes. Commercial electrification impacts customers in every commercial class from GS<50 to Large User. With electrification and significant increases in demand, these customers all move into the Large Use rate class.

Hydro Ottawa also provided Itron hourly EV charging for typical summer and winter days for both residential and commercial charging. These hourly charging profiles were used in determining the impact of EV charging on system peak.

Table 3-3 and Table 3-4 show the cumulative annual transportation and building electrification forecast.

TABLE 3-3: LIGHT-DUTY VEHICLE ELECTRIFICATION FORECAST

Light-Duty Vehicle Electrification (MWh)						
Year	Residential	GS50	GS1000	GS1500	GS5000	GSLarge User
2024	2,210	60	146	22	15	5
2025	25,607	771	1,857	281	196	60
2026	42,226	1,272	3,065	460	323	100
2027	61,388	1,849	4,457	668	469	145
2028	83,095	2,502	6,034	903	635	196
2029	107,515	3,238	7,807	1,168	821	254
2030	134,648	4,055	9,778	1,462	1,029	318

TABLE 3-4: COMMERCIAL ELECTRIFICATION FORECAST

Commercial Electrification (MWh)	
Year	GSLarge User
2024	0
2025	6,155
2026	29,799
2027	48,702
2028	90,719
2029	150,838
2030	190,406

The electrification forecast and large load forecast are added to the baseline class forecast. Table 3-5 shows the class sales forecast adjusted for electrification and large loads.

TABLE 3-5: SALES FORECAST INCLUDING, CDM, EDSM, ELECTRIFICATION AND LARGE LOADS

Class Sales Forecast (MWh)										
Year	Res	GS 50	GS 50-1000kW	GS 1000-1500kw	GS 1500-5000kw	Large Users	Street Lght	MU	DCL	Total
2018	2,318,157	727,991	2,512,017	426,660	723,849	608,578	31,723	14,861	3,933	7,367,769
2019	2,263,790	724,601	2,491,412	392,965	723,101	602,083	26,731	14,550	4,908	7,244,141
2020	2,441,059	667,394	2,286,157	375,900	652,716	573,822	22,496	14,403	5,455	7,039,403
2021	2,454,365	680,717	2,286,341	396,363	656,488	592,787	22,843	14,083	5,708	7,109,695
2022	2,438,179	728,927	2,393,143	391,706	649,319	563,511	22,059	13,981	6,138	7,206,963
2023	2,441,208	731,845	2,388,204	398,731	687,415	551,066	21,667	14,064	6,349	7,240,548
2024	2,519,364	744,674	2,371,842	411,892	720,509	522,344	21,765	14,249	6,641	7,333,280
2025	2,579,049	720,891	2,464,069	374,749	719,852	517,425	21,864	14,311	6,708	7,418,918
2026	2,601,494	722,556	2,461,129	371,365	705,932	544,235	21,962	14,392	6,708	7,449,773
2027	2,628,618	722,196	2,453,272	361,115	698,762	566,903	22,060	14,472	6,708	7,474,106
2028	2,663,642	724,707	2,453,309	352,877	693,528	613,629	22,158	14,552	6,708	7,545,112
2029	2,682,208	722,940	2,442,152	351,081	685,488	666,917	22,257	14,633	6,708	7,594,383
2030	2,713,673	722,437	2,434,419	349,718	678,211	701,083	22,355	14,713	6,708	7,643,318
2018-23	1.0%	0.1%	-1.0%	-1.3%	-1.0%	-2.0%	-7.3%	-1.1%	10.1%	-0.3%
2024-30	1.2%	-0.5%	0.4%	-2.7%	-1.0%	5.0%	0.4%	0.5%	0.2%	0.7%

4 SYSTEM PURCHASES AND PEAK

The baseline system purchases and peaks forecast is driven by the baseline class level sales forecast. The baseline purchase and peak forecast include the impact of CDM and eDSM but does not include the impact of electrification and large loads.

Transportation and commercial electrification will impact the hourly system shape, possibly changing the time of day and season in which the annual peak occurs. The only way to properly account for the impact of electrification is to produce hourly forecasts of both the system and the end-uses targeted by electrification. In this hourly approach MWh forecasts are combined with hourly profile and layered on top of the baseline hourly forecast. From the aggregated hourly profiles, monthly and annual peaks can be derived.

4.1 BASELINE PURCHASES AND PEAK MODEL

System purchases are calculated by applying monthly adjustment factors to monthly baseline sales forecast. The adjustment factors capture system losses and any differences in timing between estimated monthly sales and measured system purchases. The monthly adjustment factors are based on the historical relationship between purchases and sales between January 2014 and December 2023. While there is some small monthly variation, the average adjustment factor is 1.03.

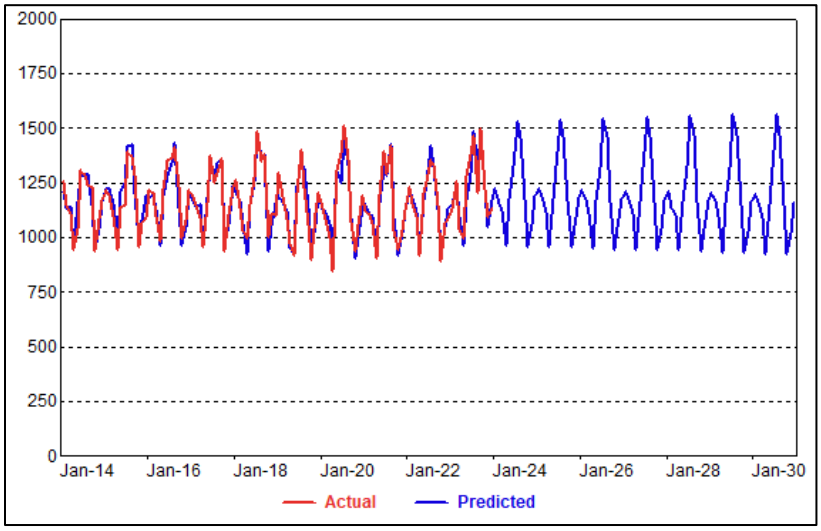
The baseline system peak forecast is derived through a monthly regression model that relates monthly peak demand to heating, cooling, and base load requirements:

$$Peak_m = B_0 + B_1 HeatVar_m + B_2 CoolVar_m + B_3 BaseVar_m + e_m$$

The baseline system peak is driven by the class level baseline sales forecast. The model variables ($HeatVar_m$, $CoolVar_m$, and $BaseVar_m$) incorporate changes in heating, cooling, and base-use energy requirements derived from the rate class sales forecast models as well as peak-day weather conditions. Efficiency impacts on peak are captured through the constructed model variables.

In addition to the end-use variables, the peak model includes monthly binaries for several months to account for non-weather seasonal changes in demand. The model explains past variation relatively well with an adjusted R-squared is 0.89 with a MAPE of 3.2%. Model statistics are included in Appendix A. Figure 4-1 shows the actual and model predicted baseline peak forecast.

FIGURE 4-1: ACTUAL AND PREDICTED BASELINE PEAK FORECAST (MW)



4.2 PURCHASES AND PEAK ADJUSTED FOR ELECTRIFICATION AND LARGE LOADS

Purchases adjusted for electrification are calculated by applying monthly adjustment factors to monthly sales forecasts, in this case the electrified and large loads sales forecasts. The sales and energy forecast combines the baseline forecast with the impact of anticipated electrification and large load.

The electrification and large load peaks are derived through a process of first combining electrification MWh with class and EV, electrification, and large loads hourly profiles. This results in an hourly electrification and large loads forecast which can then be layered on top of a baseline hourly system forecast.

Hourly profiles are estimated for the total system load and each rate class using AMI data. Hourly models are estimated using data from January 1st, 2020, to December 31st, 2023. The models related hourly usage to daily weather conditions, calendar variables such as day of week and holidays, and seasonal shifts. The EV hourly profiles are based on typical daily charging profiles provided by Hydro Ottawa, with distinctions made for summer and winter charging. The commercial building electrification hourly profiles were also provided by Hydro Ottawa. Figure 4-2 And Figure 4-3 show the baseline system, EV, commercial electrification and large loads, and final adjusted forecast for a peak winter and summer day in 2030.

FIGURE 4-2: WINTER PEAK DAY 2030

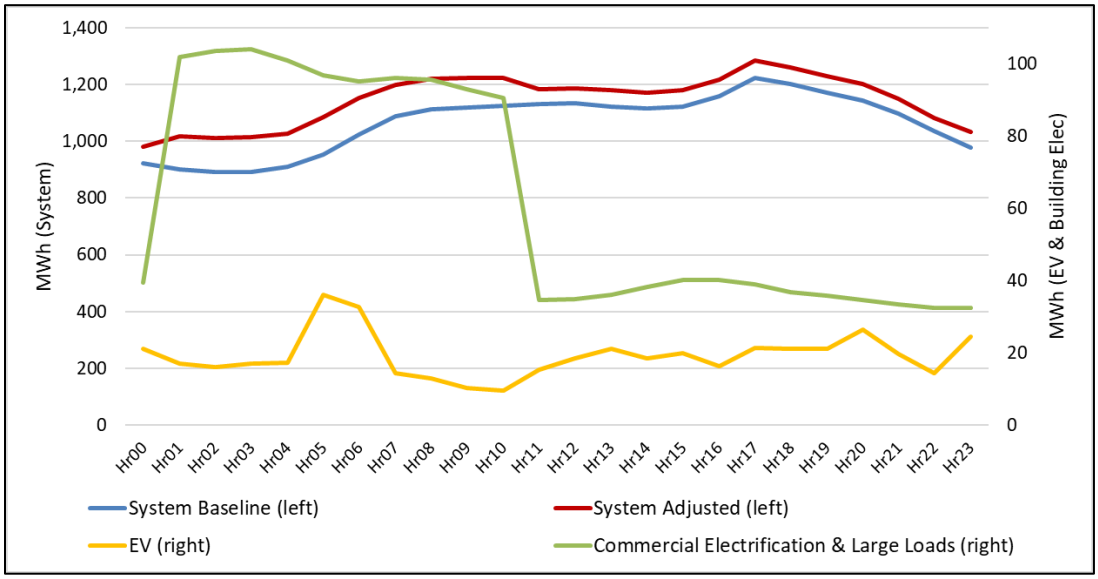
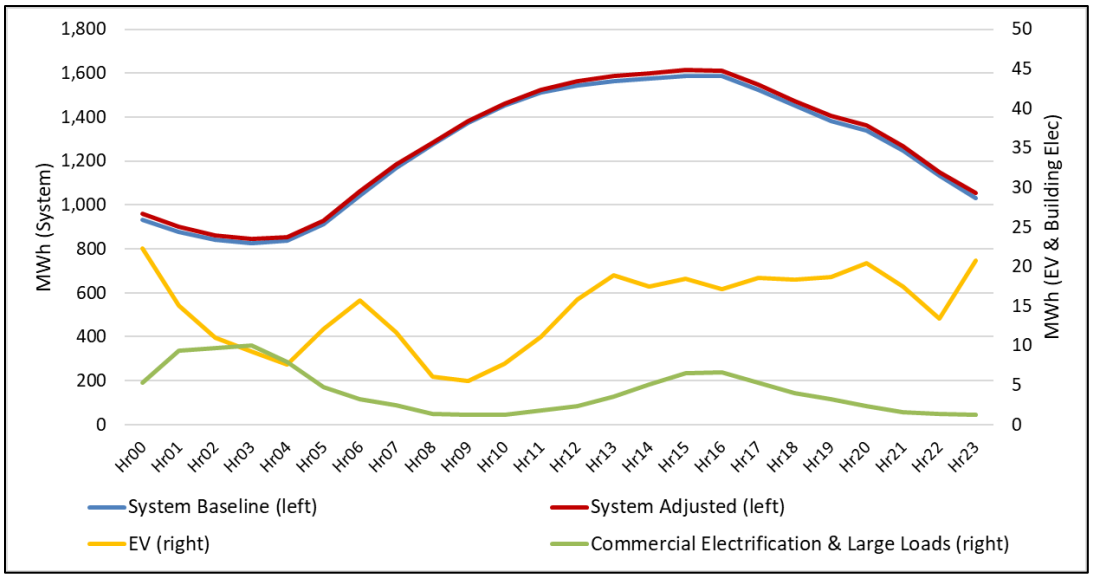


FIGURE 4-3: SUMMER PEAK DAY 2030



Using the adjusted hourly forecast monthly peaks are calculated. Table 4-1 shows the system energy and peak forecast adjusted for electrification.

TABLE 4-1: PURCHASES AND PEAK ADJUSTED FOR ELECTRIFICATION AND LARGE LOADS

Year	Total Sales (MWh)	chg	System Purchases (MWh)	chg	Peak Demand (MW)	chg
2018	7,367,770		7,612,656		1,481	
2019	7,244,140	-1.7%	7,466,399	-1.9%	1,398	-5.6%
2020	7,039,402	-2.8%	7,267,291	-2.7%	1,506	7.8%
2021	7,109,694	1.0%	7,320,052	0.7%	1,414	-6.1%
2022	7,206,964	1.4%	7,431,646	1.5%	1,349	-4.6%
2023	7,240,548	0.5%	7,470,628	0.5%	1,492	10.6%
2024	7,333,280	1.3%	7,560,502	1.2%	1,535	2.9%
2025	7,418,918	1.2%	7,647,880	1.2%	1,541	0.4%
2026	7,449,773	0.4%	7,678,366	0.4%	1,556	1.0%
2027	7,474,106	0.3%	7,702,189	0.3%	1,570	1.0%
2028	7,545,112	1.0%	7,773,356	0.9%	1,585	1.0%
2029	7,594,383	0.7%	7,821,395	0.6%	1,600	0.9%
2030	7,643,318	0.6%	7,869,661	0.6%	1,615	1.0%
2018-23		-0.3%		-0.4%		0.4%
2024-30		0.7%		0.7%		0.9%

5 APPENDIX A: MODEL STATISTICS

Residential Average Use Model

Variable	Coefficient	StdErr	T-Stat	P-Value
mStructRev.XHeatRes_AvgUse	0.646	0.02	32.528	0.00%
mStructRev.XCoolRes_AvgUse	0.51	0.012	40.952	0.00%
mStructRev.XOtherRes_AvgUse	1.046	0.012	90.7	0.00%
mBin.Mar	-27.513	6.23	-4.416	0.00%
mBin.Apr	-28.108	6.357	-4.421	0.00%
mBin.May	-38.093	6.506	-5.855	0.00%
mBin.Nov	-20.384	6.385	-3.193	0.18%
mBin.Yr15	-12.166	6.509	-1.869	6.39%
mBin.Yr16	-22.014	6.254	-3.52	0.06%
COVID.ResIdx	39.497	9.167	4.308	0.00%
CDM.ResCDM_PC_Constant	-1.261	0.122	-10.317	0.00%

Model Statistics	
Iterations	1
Adjusted Observations	142
Deg. of Freedom for Error	131
Adjusted R-Squared	0.95
AIC	6.01
BIC	6.24
Model Sum of Squares	1,085,389
Sum of Squared Errors	49,755
Mean Squared Error	380
Std. Error of Regression	19
Mean Abs. Dev. (MAD)	15
Mean Abs. % Err. (MAPE)	2.40%
Durbin-Watson Statistic	1.99

Residential Customer Model

Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	39154.421	3002.162	13.042	0.00%
mEcon.CustsEconVar	245697.987	2837.162	86.6	0.00%
MA(1)	1.816	0.079	22.917	0.00%
MA(2)	2.07	0.135	15.329	0.00%
MA(3)	1.353	0.135	9.991	0.00%
MA(4)	0.446	0.08	5.587	0.00%

Model Statistics	
Iterations	83
Adjusted Observations	142
Deg. of Freedom for Error	136
Adjusted R-Squared	1.00
AIC	12.47
BIC	12.60
Model Sum of Squares	38,985,101,874
Sum of Squared Errors	34,066,708
Mean Squared Error	250,491
Std. Error of Regression	500
Mean Abs. Dev. (MAD)	401
Mean Abs. % Err. (MAPE)	0.13%
Durbin-Watson Statistic	1.67

GS50 Sales Model

Variable	Coefficient	StdErr	T-Stat	P-Value
mStructRev.XHeatGS50	195488.361	6744.874	28.983	0.00%
mStructRev.XCoolGS50	20201.608	1125.597	17.947	0.00%
mStructRev.XOtherGS50	4017.765	42.459	94.628	0.00%
mBin.Jun14	11619.136	2204.851	5.27	0.00%
mBin.Apr20	-5033.954	2213.7	-2.274	2.46%
mBin.May20	-5366.931	2209.732	-2.429	1.65%
mBin.Yr16	1810.548	684.003	2.647	0.91%
mBin.Yr17	1736.3	682.559	2.544	1.21%
mBin.Yr19	1947.87	723.947	2.691	0.81%
mBin.Sept21Plus	4348.308	672.952	6.462	0.00%
CDM.GS50_Constnat	-0.881	0.129	-6.839	0.00%

Model Statistics	
Iterations	1
Adjusted Observations	142
Deg. of Freedom for Error	131
Adjusted R-Squared	0.87
AIC	15.43
BIC	15.66
Model Sum of Squares	4,375,449,182
Sum of Squared Errors	612,698,326
Mean Squared Error	4,677,086
Std. Error of Regression	2,163
Mean Abs. Dev. (MAD)	1,634
Mean Abs. % Err. (MAPE)	2.77%
Durbin-Watson Statistic	1.43

GS50 Customer Model

Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	13990.563	237.171	58.989	0.00%
mFcstCal.Res_Cust	0.035	0.001	45.773	0.00%
mBin.Yr24Plus	-170.981	44.703	-3.825	0.02%
MA(1)	0.849	0.047	18.223	0.00%

Model Statistics	
Iterations	23
Adjusted Observations	142
Deg. of Freedom for Error	138
Adjusted R-Squared	0.98
AIC	8.71
BIC	8.79
Model Sum of Squares	46,555,762
Sum of Squared Errors	812,462
Mean Squared Error	5,887
Std. Error of Regression	77
Mean Abs. Dev. (MAD)	65
Mean Abs. % Err. (MAPE)	0.26%
Durbin-Watson Statistic	0.60

GS1000 Sales Model

Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	69717.934	15969.66	4.366	0.00%
mStructRev.XHeatGS1000	592738.629	18041.21	32.855	0.00%
mStructRev.XCoolGS1000	65084.755	3023.621	21.525	0.00%
mStructRev.XOtherGS1000	9892.925	1275.745	7.755	0.00%
mBin.Jan13	37579.117	5883.581	6.387	0.00%
mBin.Jul18	-11885.462	5994.875	-1.983	4.95%
CDM.GS1000_Constant	-1.158	0.109	-10.658	0.00%
COVID.ComIdx	-24723.404	2986.789	-8.278	0.00%

Model Statistics	
Iterations	1
Adjusted Observations	142
Deg. of Freedom for Error	134
Adjusted R-Squared	0.92
AIC	17.33
BIC	17.50
Model Sum of Squares	55,356,136,105
Sum of Squared Errors	4,279,786,077
Mean Squared Error	31,938,702
Std. Error of Regression	5,651
Mean Abs. Dev. (MAD)	4,386
Mean Abs. % Err. (MAPE)	2.16%
Durbin-Watson Statistic	1.68

GS1500 Sales Model

Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	7069.092	2661.526	2.656	0.89%
mStructRev.XHeatGS1500	35052.253	5832.064	6.01	0.00%
mStructRev.XCoolGS1500	7085.674	615.205	11.518	0.00%
mStructRev.XOtherGS1500	1757.018	197.857	8.88	0.00%
mBin.Mar14	-4406.484	994.641	-4.43	0.00%
mBin.May15	5353.625	981.087	5.457	0.00%
mBin.Oct17	7369.801	987.52	7.463	0.00%
mBin.Jul16	3061.939	974.573	3.142	0.21%
mBin.Dec21	-12068.27	1117.245	-10.802	0.00%
mBin.Nov21	14487.404	1118.543	12.952	0.00%
mBin.Nov22	9386.923	977.597	9.602	0.00%
AR(1)	0.823	0.049	16.954	0.00%

Model Statistics	
Iterations	11
Adjusted Observations	141
Deg. of Freedom for Error	129
Adjusted R-Squared	0.88
AIC	14.37
BIC	14.62
Model Sum of Squares	1,582,164,485
Sum of Squared Errors	206,168,750
Mean Squared Error	1,598,207
Std. Error of Regression	1,264
Mean Abs. Dev. (MAD)	954
Mean Abs. % Err. (MAPE)	3.00%
Durbin-Watson Statistic	2.09

GS5000 Sales Model

Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	27533.642	7142.421	3.855	0.02%
mStructRev.XHeatGS5000	41523.195	7386.255	5.622	0.00%
mStructRev.XCoolGS5000	16826.308	1205.159	13.962	0.00%
mStructRev.XOtherGS5000	3222.423	553.461	5.822	0.00%
mBin.Feb14	9418.098	2420.084	3.892	0.02%
mBin.Mar14	-9110.975	2353.535	-3.871	0.02%
mBin.Jul16	-4761.504	2411.864	-1.974	5.05%
mBin.Aug17	12871.517	2429.751	5.297	0.00%
mBin.Oct17	-6904.649	2438.898	-2.831	0.54%
mBin.Jul16Plus	-11341.314	888.492	-12.765	0.00%
mBin.Nov21	-13415.638	2334.178	-5.747	0.00%
mBin.Yr17	2687.218	885.143	3.036	0.29%
mBin.Yr22	-2826.061	781.274	-3.617	0.04%
COVID.ComIdx	-7673.842	1288.082	-5.958	0.00%
mBin.TrendVar	-538.741	155.777	-3.458	0.08%
mBin.Yr24Plus	1349.749	981.775	1.375	17.16%

Model Statistics	
Iterations	1
Adjusted Observations	142
Deg. of Freedom for Error	126
Adjusted R-Squared	0.92
AIC	15.58
BIC	15.92
Model Sum of Squares	8,805,519,822
Sum of Squared Errors	668,075,264
Mean Squared Error	5,302,185
Std. Error of Regression	2,303
Mean Abs. Dev. (MAD)	1,662
Mean Abs. % Err. (MAPE)	2.65%
Durbin-Watson Statistic	1.73

Large User Sales Model

Definition	Coefficient	StdErr	T-Stat	P-Value
mBin.Days	1653.476	15.571	106.187	0.00%
mWthr.wgtCDD18GSLrg	53.104	5.06	10.495	0.00%
mBin.Sep13	-7146.265	2366.824	-3.019	0.31%
mBin.Dec13	-6830.545	2371.355	-2.88	0.46%
mBin.Jun15	11160.379	2416.527	4.618	0.00%
mBin.Jun21	19051.421	2385.728	7.986	0.00%
mBin.Apr15Plus	-6431.88	816.086	-7.881	0.00%
mBin.May16Plus	4707.909	748.327	6.291	0.00%
COVID.ComIdx	-13199.407	1081.81	-12.201	0.00%
mBin.Yr22Plus	-4042.068	558.006	-7.244	0.00%
mBin.Yr24Plus	-1664.879	875.263	-1.902	5.93%

Model Statistics	
Iterations	1
Adjusted Observations	142
Deg. of Freedom for Error	131
Adjusted R-Squared	0.82
AIC	15.57
BIC	15.80
Model Sum of Squares	3,430,315,050
Sum of Squared Errors	706,131,271
Mean Squared Error	5,390,315
Std. Error of Regression	2,322
Mean Abs. Dev. (MAD)	1,672
Mean Abs. % Err. (MAPE)	3.66%
Durbin-Watson Statistic	1.82

Street Lighting Sales Model

Variable	Coefficient	StdErr	T-Stat	P-Value
mBin.Jan	2244.851	92.838	24.18	0.00%
mBin.Feb	1882.15	93.71	20.085	0.00%
mBin.Mar	1812.217	94.582	19.16	0.00%
mBin.Apr	1511.444	95.454	15.834	0.00%
mBin.May	1350.927	96.327	14.024	0.00%
mBin.Jun	1200.128	97.2	12.347	0.00%
mBin.Jul	1268.424	98.073	12.933	0.00%
mBin.Aug	1508.129	98.946	15.242	0.00%
mBin.Sep	1661.875	99.82	16.649	0.00%
mBin.Oct	1963.651	100.694	19.501	0.00%
mBin.Nov	2117.259	97.784	21.652	0.00%
mBin.Dec	2306.63	98.644	23.383	0.00%
mBin.TrendVar	8.189	10.637	0.77	46.11%

Model Statistics	
Iterations	1
Adjusted Observations	22
Deg. of Freedom for Error	9
Adjusted R-Squared	1.00
AIC	6.63
BIC	7.27
Model Sum of Squares	2,620,421
Sum of Squared Errors	5,092
Mean Squared Error	566
Std. Error of Regression	24
Mean Abs. Dev. (MAD)	10
Mean Abs. % Err. (MAPE)	0.62%
Durbin-Watson Statistic	2.51

System Peak Demand Model

Variable	Coefficient	StdErr	T-Stat	P-Value
mEndUse.BaseUse	17.11	0.237	72.076	0.00%
mPkVars.HeatVar	1.012	0.116	8.715	0.00%
mPkVars.CoolVar	3.208	0.183	17.494	0.00%
mBin.Yr14	-42.981	15.435	-2.785	0.63%
mBin.Apr	-39.548	19.59	-2.019	4.60%
mBin.May	155.065	20.456	7.581	0.00%
mBin.Jul	-227.882	27.817	-8.192	0.00%
mBin.Oct	-75.529	21.378	-3.533	0.06%
mBin.Sep17	179.325	51.074	3.511	0.07%
mBin.Sep18	221.654	51.079	4.339	0.00%
mBin.May19	-183.208	53.185	-3.445	0.08%
mBin.May20	154.182	53.087	2.904	0.45%
mBin.Sep23	297.552	50.961	5.839	0.00%
mBin.Oct23	265.635	52.729	5.038	0.00%

Model Statistics	
Iterations	1
Adjusted Observations	120
Deg. of Freedom for Error	106
Adjusted R-Squared	0.89
AIC	7.93
BIC	8.26
Model Sum of Squares	2,376,485
Sum of Squared Errors	264,934
Mean Squared Error	2,499
Std. Error of Regression	50
Mean Abs. Dev. (MAD)	37
Mean Abs. % Err. (MAPE)	3.18%
Durbin-Watson Statistic	1.82

Attachment 3-1-1(C) - 1. Load Forecast Data - Customers

Attachment 3-1-1(C) - 2. Load Forecast Data - kWh

Attachment 3-1-1(C) - 3. Load Forecast Data - kW

(Refer to the attachment in Excel format)

ACCURACY OF LOAD FORECAST AND VARIANCE ANALYSIS

1. INTRODUCTION

This Schedule details the variance analysis of the last OEB-Approved revenue load and customer forecast as well as material changes in Historical and Bridge year-over-year trending. Hydro Ottawa's last rebasing application was set under a Custom Incentive Rate-Setting (Custom IR) framework for the 2021-2025 period[1] and included a detailed five-year revenue load and customer forecast. The annual revenue load forecasts were used in Hydro Ottawa's annual update applications submitted to the OEB over the course of the corresponding rate term.[2]

As outlined in Schedule 3-1-1 - Revenue Load and Customer Forecast, Hydro Ottawa has prepared a new five-year detailed revenue load and customer forecast for the 2026-2030 period as part of this Application. Hydro Ottawa retained the services of a third-party expert (Itron Inc.) for the purpose of preparing this revenue load forecast. The utility confirms that it did not develop a detailed revenue load forecast in between the filings of its 2021-2025 and 2026-2030 Custom IR applications.

2. HISTORICAL ACCURACY OF LOAD FORECAST

Tables 1 through 13 in this Schedule summarize Hydro Ottawa's 2021-2025 OEB Approved load forecast and compare its data to both 2021-2023 Historical and 2024-2025 Bridge Year data.

Hydro Ottawa has provided Excel Attachment 3-1-1(A) - Appendix 2-IB - Load Forecast Analysis, which summarizes the data and develops year-over-year trends in historical, bridge and test year customer counts, consumption, and demand. Detailed in Attachment 3-1-1(A) are the year-over-year trending of key components of the revenue load forecast, as follows:

[1] Hydro Ottawa Limited, *2021-2025 Custom Incentive Rate-Setting Distribution Rate Application*, EB-2019-0261 (February 10, 2020).
[2] Ontario Energy Board, *Decision and Order*, EB-2019-0261 (November 19, 2020).

- Monthly Average Customers / Connections;
- Historical actual and historical, bridge and test year weather-normalized consumption (kWh); and
- Historical actual and historical, bridge and test year weather-normalized demand (kW).

Hydro Ottawa has provided detailed variance analysis at the total system level and by rate classes in the sections below. At high level, the following impacts have resulted in increased variances in year-over-year trending and comparison to OEB Approved revenue load forecast for 2021-2025:

- COVID-19 resulted in increased consumption (MWh) for the Residential class, while decreased MWh and kW for all commercial classes;
- Decreased demand (kW) in commercial classes resulted in larger number of rate reclassifications; and
- Higher than anticipated Residential count growth due to increased unit metering in multi-unit buildings.

For details regarding the class level assumptions and data sources in the 2026-2030 revenue load forecast as well as test year analysis, please see Schedule 3-1-1 - Revenue Load and Customer Forecast.

2.1. TOTAL SYSTEM MWH

Table 1 below details the total system revenue MWh for 2021-2025. It provides a comparison of the last OEB-Approved load forecast, Historical and Bridge MWh as well as Historical and Bridge weather normalized MWh.

Table 1 - 2021-2025 Total System MWh

Year	OEB Approved Load Forecast	Historical & Bridge		Historical & Bridge Weather Normalized	
	MWh	MWh	Variance	MWh	Variance
2021	7,120,269	7,135,923	0.22%	7,085,981	(0.48)%
2022	7,163,948	7,231,345	0.94%	7,225,236	0.86%
2023	7,214,868	7,262,785	0.66%	7,329,383	1.59%
2024	7,285,717	7,326,680	0.56%	7,326,681	0.56%
2025	7,320,370	7,412,251	1.26%	7,412,251	1.26%

Variance Analysis

There are immaterial annual variances in Historical and Bridge Years total system MWh compared to OEB Approved load forecast. The year-over-year increase from 2020 to 2021 and 2021 to 2022 can be attributed to business returning to normal operations after COVID-19 shutdowns. The continued year-over-year increases in total system MWh expected for 2024-2025 is a result of increased number of customers and electrification.

2.2. MWH BY CLASS

Tables 2 through 5 below provide Hydro Ottawa's 2021-2025 OEB Approved revenue load forecast, Historical and Bridge Year weather normalized, as well as a comparison of the two energy sales by class MWh and percentage change.

Table 2 - Hydro Ottawa 2021-2025 Sales Forecast (MWh) by class

	2021	2022	2023	2024	2025
Residential	2,258,843	2,280,182	2,305,786	2,339,674	2,359,684
General Service < 50 kW	708,639	710,222	713,228	717,823	719,362
General Service > 50 to 1,499 kW	2,845,259	2,862,639	2,880,207	2,904,475	2,915,967
General Service > 1,500 to 4,999 kW	693,934	698,365	703,557	710,450	714,171
Large Use	575,952	575,413	575,413	577,069	575,413
Street Lighting	23,955	23,893	23,893	23,893	23,893
Unmetered Scattered Load	13,641	13,188	12,737	12,285	11,834
Sentinel Lighting	47	47	47	47	47
TOTAL MWh SALES	**7,120,269**	**7,163,948**	**7,214,868**	**7,285,717**	**7,320,370**

Table 3 - Hydro Ottawa 2021-2025 Weather Normalized Sales (MWh) by class

	Historical			Bridge	
	2021	2022	2023	2024	2025
Residential	2,440,357	2,451,557	2,487,707	2,519,364	2,579,049
General Service < 50 kW	681,533	730,684	742,051	744,674	720,891
General Service > 50 to 1,499 kW	2,683,459	2,791,302	2,820,643	2,783,733	2,838,818
General Service > 1,500 to 4,999 kW	653,434	651,052	691,030	720,509	719,852
Large Use	590,228	564,557	552,178	522,344	517,425
Street Lighting	22,843	22,059	21,667	21,765	21,864
Unmetered Scattered Load	14,083	13,981	14,064	14,249	14,311
Sentinel Lighting	44	44	43	42	41
TOTAL MWh SALES	**7,085,981**	**7,225,236**	**7,329,383**	**7,326,680**	**7,412,251**

Table 4 – Variance in 2021-2025 Forecast vs. Weather-Normalized Actual Sales (MWh)

	Historical			Bridge	
	2021	2022	2023	2024	2025
Residential	181,514	171,375	181,921	179,690	219,365
General Service < 50 kW	(27,106)	20,462	28,823	26,851	1,529
General Service > 50 to 1,499 kW	(161,800)	(71,337)	(59,564)	(120,742)	(77,149)
General Service > 1,500 to 4,999 kW	(40,500)	(47,313)	(12,527)	10,059	5,681
Large Use	14,276	(10,856)	(23,235)	(54,725)	(57,988)
Street Lighting	(1,112)	(1,834)	(2,226)	(2,128)	(2,029)
Unmetered Scattered Load	442	793	1,327	1,964	2,477
Sentinel Lighting	(3)	(3)	(4)	(5)	(6)
TOTAL MWh SALES	**(34,288)**	**61,288**	**114,515**	**40,963**	**91,881**

Table 5 – 2021-2025 Forecast vs. Weather-Normalized Actual Sales - % Change

	Historical			Bridge	
	2021	2022	2023	2024	2025
Residential	8.04%	7.52%	7.89%	7.68%	9.30%
General Service < 50 kW	(3.83)%	2.88%	4.04%	3.74%	0.21%
General Service > 50 to 1,499 kW	(5.69)%	(2.49)%	(2.07)%	(4.16)%	(2.65)%
General Service > 1,500 to 4,999 kW	(5.84)%	(6.77)%	(1.78)%	1.42%	0.80%
Large Use	2.48%	(1.89)%	(4.04)%	(9.48)%	(10.08)%
Street Lighting	(4.64)%	(7.67)%	(9.32)%	(8.91)%	(8.49)%
Unmetered Scattered Load	3.24%	6.01%	10.42%	15.98%	20.93%
Sentinel Lighting	(6.38)%	(6.38)%	(8.51)%	(10.64)%	(12.77)%
TOTAL MWh SALES	**(0.48)%**	**0.86%**	**1.59%**	**0.56%**	**1.26%**

MWh variance analysis by rate class is detailed in section 3 below.

2.3. KW BY CUSTOMER CLASS

Tables 6 through 9 below provide Hydro Ottawa's 2021-2025 OEB Approved, Historical and Bridge Years weather normalized kWs by customer class as well as the comparison by customer class kW and percentage change.

Table 6 – 2021-2025 OEB Approved Demand Sales Forecast by Customer Class (kW)

	2021	2022	2023	2024	2025
General Service > 50 to 1,499 kW	6,871,921	6,898,741	6,925,846	6,966,627	6,980,998
General Service > 1,500 to 4,999 kW	1,537,380	1,545,513	1,555,042	1,567,693	1,574,524
Large Use	1,055,426	1,054,605	1,054,605	1,057,124	1,054,605
Street Lighting	66,556	66,152	66,152	66,152	66,152
Sentinel Lighting	132	132	132	132	132
TOTAL kW	**9,531,414**	**9,565,142**	**9,601,777**	**9,657,728**	**9,676,411**

Table 7 – 2021-2025 Weather-Normalized Demand Sales by Customer Class (kW)

	Historical			Bridge	
	2021	2022	2023	2024	2025
General Service > 50 to 1,499 kW	6,436,436	6,705,455	6,777,247	6,779,780	7,002,448
General Service > 1,500 to 4,999 kW	1,413,782	1,409,101	1,494,964	1,548,143	1,557,428
Large Use	1,044,163	996,205	975,352	950,901	924,253
Street Lighting	63,916	61,708	60,526	60,563	60,838
Sentinel Lighting	122	120	120	120	120
TOTAL kW	**8,958,419**	**9,172,589**	**9,308,209**	**9,339,507**	**9,545,087**

Table 8 – Variance in 2021-2025 Forecast vs. Weather-Normalized Sales (kW)

	Historical			Bridge	
	2021	2022	2023	2024	2025
General Service > 50 to 1,499 kW	(435,485)	(193,286)	(148,599)	(186,847)	21,450
General Service > 1,500 to 4,999 kW	(123,598)	(136,412)	(60,078)	(19,550)	(17,096)
Large Use	(11,263)	(58,400)	(79,253)	(106,223)	(130,352)
Street Lighting	(2,640)	(4,444)	(5,626)	(5,589)	(5,314)
Sentinel Lighting	(10)	(12)	(12)	(12)	(12)
TOTAL	**(572,995)**	**(392,553)**	**(293,568)**	**(318,221)**	**(131,324)**

Table 9 – 2021-2025 Forecast vs. Weather-Normalized Actual kW - % Change

	Historical			Bridge	
	2021	2022	2023	2024	2025
General Service > 50 to 1,499 kW	(6.34)%	(2.80)%	(2.15)%	(2.68)%	0.31%
General Service > 1,500 to 4,999 kW	(8.04)%	(8.83)%	(3.86)%	(1.25)%	(1.09)%
Large Use	(1.07)%	(5.54%	(7.51)%	(10.05)%	(12.36)%
Street Lighting	(3.97)%	(6.72%	(8.50)%	(8.45)%	(8.03)%
Sentinel Lighting	(7.58)%	(9.09%	(9.09)%	(9.09)%	(9.09)%
TOTAL	**(6.01)%**	**(4.10)%**	**(3.06)%**	**(3.29)%**	**(1.36)%**

KW variance analysis by rate class is detailed in section 3 below.

2.4. NUMBER OF CUSTOMERS AND CONNECTIONS BY CLASS

As part of this Application, Hydro Ottawa has updated the calculation of annual month end average customer count to annual monthly average customer count. Using the annual month end average customer count assumes all new customers are connected for an entire month, when in actuality customers are connected throughout the period of the month. This timing difference can result in over estimating fixed charge revenues as customers who are connected part way through the billing cycle are not charged the full fixed charge amount.

The annual monthly average customer count is calculated by first determining the average count for each month; the month end customer count from the prior month plus the month end count for the current month is then divided by two to calculate the average. Once each monthly average is determined the average of twelve months (January to December) is computed to determine the annual monthly average. The same methodology has been applied to the monthly average number of connections. For reference, Table 10 shows the average customer count from the 2021 OEB-approved load forecast compared to the monthly average 2021 OEB-approved customer count.

Table 10 - 2021 OEB Approved Average Customer Count & Monthly Average Customer Count

	Average	Monthly Average
	2021	2021
Residential	316,346	316,217
General Service < 50 kW	25,391	25,384
General Service >50 to 1,499 kW	3,120	3,122
General Service >1,500 to 4,999 kW	68	68
Large Users	11	11
TOTAL CUSTOMERS	**344,936**	**344,802**
Street Lighting	62,806	62,768
Sentinel Lights	55	55
Unmetered Scattered Loads	3,321	3,321
TOTAL CONNECTIONS	**66,182**	**66,144**

Tables 11 though 14 below provide the 2021-2025 OEB Approved, Historical and Bridge Year counts as well as comparison for Hydro Ottawa's monthly average number of customers and connection count and percentage change.

Table 11 – 2021-2025 OEB Approved Forecast Monthly Average Number of Customers and Connections by Class

	2021	2022	2023	2024	2025
Residential	316,217	319,381	322,574	325,798	329,056
General Service < 50 kW	25,384	25,548	25,698	25,841	25,981
General Service >50 to 1,499 kW	3,122	3,088	3,056	3,025	2,993
General Service >1,500 to 4,999 kW	68	68	68	68	68
Large Users	11	11	11	11	11
TOTAL CUSTOMERS	**344,802**	**348,096**	**351,407**	**354,743**	**358,109**
Street Lighting	62,768	63,687	64,607	65,526	66,446
Sentinel Lights	55	55	55	55	55
Unmetered Scattered Loads	3,321	3,321	3,321	3,321	3,321
TOTAL CONNECTIONS	**66,144**	**67,063**	**67,983**	**68,902**	**69,822**

Table 12 – 2021-2025 Historical and Bridge Year Monthly Average of Customers and Connections by Class

	Historical			Bridge	
	2021	2022	2023	2024	2025
Residential	321,187	327,459	332,883	338,868	344,190
General Service < 50 kW	25,243	25,488	25,664	25,745	25,871
General Service >50 to 1,499 kW	3,186	3,045	3,067	3,036	3,136
General Service >1,500 to 4,999 kW	68	60	64	69	70
Large Users	11	10	10	10	10
TOTAL CUSTOMERS	**349,695**	**356,062**	**361,688**	**367,728**	**373,277**
Street Lighting	62,571	63,509	64,008	64,379	65,014
Sentinel Lights	53	53	50	49	48
Unmetered Scattered Loads	3,590	3,685	3,820	4,035	4,143
TOTAL CONNECTIONS	**66,214**	**67,247**	**67,878**	**68,463**	**69,205**

Table 13 – Variance in 2021-2025 Forecast vs. Historical and Bridge Year Customer and Connections Count

	Historical			Bridge	
	2021	2022	2023	2024	2025
Residential	4,970	8,078	10,309	13,070	15,134
General Service < 50 kW	(141)	(60)	(34)	(96)	(110)
General Service >50 to 1,499 kW	64	(43)	11	11	143
General Service >1,500 to 4,999 kW	-	(8)	(4)	1	2
Large Users	-	(1)	(1)	(1)	(1)
TOTAL CUSTOMERS	**4,893**	**7,966**	**10,281**	**12,985**	**15,168**
Street Lighting	(197)	(178)	(599)	(1,147)	(1,432)
Sentinel Lights	(2)	(2)	(5)	(6)	(7)
Unmetered Scattered Loads	269	364	499	714	822
TOTAL CONNECTIONS	**70**	**184**	**(105)**	**(439)**	**(617)**

Table 14 – 2021-2025 Forecast vs. Actual Customer and Connections Count - % Change

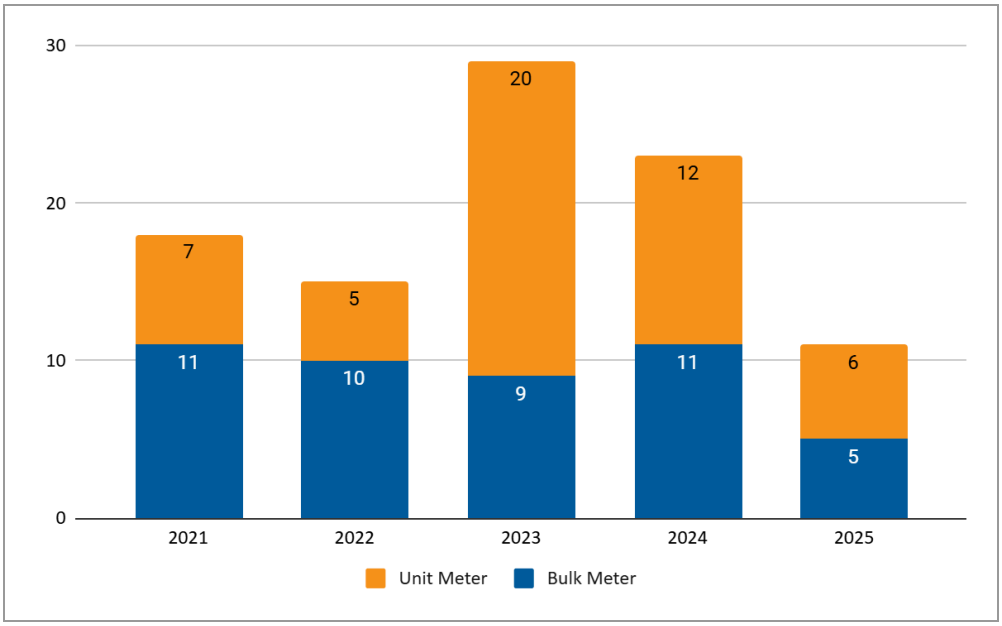
	Historical			Bridge	
	2021	2022	2023	2024	2025
Residential	1.57%	2.53%	3.20%	4.01%	4.60%
General Service < 50 kW	(0.56)%	(0.23)%	(0.13)%	(0.37)%	(0.42)%
General Service >50 to 1,499 kW	2.05%	(1.39)%	0.36%	0.36%	4.78%
General Service >1,500 to 4,999 kW	0.00%	(11.76)%	(5.88)%	1.47%	2.94%
Large Users	0.00%	(9.09)%	(9.09)%	(9.09)%	(9.09)%
TOTAL CUSTOMERS	**1.42%**	**2.29%**	**2.93%**	**3.66%**	**4.24%**
Street Lighting	(0.31)%	(0.28)%	(0.93)%	(1.75)%	(2.16)%
Sentinel Lights	(3.64)%	(3.64)%	(9.09)%	(10.91)%	(12.73)%
Unmetered Scattered Loads	8.10%	10.96%	15.03%	21.50%	24.75%
TOTAL CONNECTIONS	**0.11%**	**0.27%**	**(0.15)%**	**(0.64)%**	**(0.88)%**

3. VARIANCE ANALYSIS BY CUSTOMER CLASS

3.1. RESIDENTIAL

Residential customer count in Historical Years was higher than the OEB-approved load forecast estimate primarily due to increased uptake in unit metering of residential units in newly connected apartment buildings, as compared to connecting a single bulk metered commercial account. In the Historical Years, 62 new multi-unit buildings were connected. The largest growth occurred in 2023, where 29 new multi-unit buildings were connected and 69% of new apartment buildings opted for unit metering. The 29 multi-unit buildings connected 2,000 new residential customers and contributed to approximately 37% of the annual residential count growth. Hydro Ottawa, however, has seen a decrease in the number of multi-unit buildings selecting unit metering. For the 2024-2025 Bridge Years forecast connections, the number of expected new buildings has reduced and only 53% have opted for unit metering. Figure 1 below displays the Historical and Bridge Year trending for newly connected residential multi-unit buildings.

Figure 1 - 2021-2025 New Connections for Residential Muti-Unit Buildings in Ottawa



Over the 2021-2023 period, Hydro Ottawa also retrofitted 16 existing apartment buildings from individual bulk commercial metering to residential unit metering, which resulted in 885 new unit metered residential customers. This Residential growth is also expected to decline in Bridge Years 2024 and 2025. Only five buildings are planned to be retrofitted with an estimated impact of 485 new unit metered residential customers.

The annual total MWh for the residential class was higher than the OEB-approved load forecast due to both increased number of customers and higher than forecast average kWh per customer. Consumption increased in 2021, and can be attributed to work-from-home arrangements as a result of COVID-19. As residential customers are fully fixed, any increase or decrease in consumption does not result in a change to the distribution charge on residential customer bills during the rate period. The increased trend in count and total MWh for the residential class is expected to continue for Bridge Years. Residential average use remains somewhat flat in comparison to 2022, which saw a decrease as some individuals returned to the office. Table 15 shows the forecast average consumption (kWh) per Residential customer class compared to the Historical and Bridge Year weather normalized residential average consumption.

Table 15 - Residential Average kWh per Customer per month

	2021	2022	2023	2024	2025
OEB Approved MWh	2,258,843	2,280,182	2,305,786	2,339,674	2,359,684
OEB Approved Monthly Avg Count	316,217	319,381	322,574	325,798	329,056
Forecast Monthly kWh per Customer	**595**	**595**	**596**	**598**	**598**
Historical & Bridge Weather Norm MWh	2,440,357	2,451,557	2,487,707	2,519,364	2,579,049
Historical & Bridge Monthly Avg Count	321,187	327,459	332,883	338,868	344,190
Actual Monthly kWh per Customer	**633**	**624**	**623**	**620**	**624**

3.2. GENERAL SERVICE <50kW

Immaterial variances exist in customer count for General Service <50kW class compared to the OEB Approved load forecast. A decrease in average kWh per customer in 2021 was most likely

attributed to the COVID-19 shutdowns. Despite lower customer count, higher per customer kWh consumption results in higher total MWh annually for 2022-2023 Historical and forecasted 2024-2025 Bridge Years when compared to OEB Approved MWh. Table 16 includes forecast and Historical and Bridge Year kWh per General Service <50 kW.

Table 16 - General Service <50 kW Average kWh per Customer per Month

	2021	2022	2023	2024	2025
OEB Approved MWh	708,639	710,222	713,228	717,823	719,362
OEB Approved Monthly Avg Count	25,384	25,548	25,698	25,841	25,981
Forecast Monthly kWh per Customer	**2,326**	**2,317**	**2,313**	**2,315**	**2,307**
Historical & Bridge Weather Norm MWh	681,533	730,684	742,051	744,674	720,891
Historical & Bridge Count	25,243	25,488	25,664	25,745	25,871
Actual Monthly kWh per Customer	**2,250**	**2,389**	**2,410**	**2,410**	**2,322**

3.2. GENERAL SERVICE 50-1,499 kW

Compared to OEB-approved, the 2022 Historical and 2024 Bridge Year customer count for General Service 50-1,499 kW was more significantly impacted by customer rate reclassifications. These rate reclassifications also resulted in some Historical year-over-year decreases and Bridge year-over-year increase in customer count. The average consumption (kWh) and demand (kW) per customer was lower than forecast in 2021 due to COVID-19 impacts, which drove the significant changes in customer rate reclassifications. Average kW and kWh per customer returned to near forecast levels in 2022 and expected to remain stable for Bridge Years 2024-2025.

Table 17 - General Service 50-1,499 kW Average kWh and kW Per Customer

	2021	2022	2023	2024	2025
OEB Approved MWh	2,845,259	2,862,639	2,880,207	2,904,475	2,915,967
OEB Approved kW	6,871,921	6,898,741	6,925,846	6,966,627	6,980,998
OEB Approved Monthly Avg Count	3,122	3,088	3,056	3,025	2,993
Forecast Monthly kWh per Customer	**75,946**	**77,252**	**78,540**	**80,013**	**81,189**
Forecast Monthly kW per Customer	**183**	**186**	**189**	**192**	**194**
Historical & Bridge Weather Norm. MWh	2,683,459	2,791,302	2,820,643	2,783,733	2,838,818
Historical & Bridge Weather Normalized kW	6,436,436	6,705,455	6,777,247	6,779,780	7,002,448
Historical & Bridge Count	3,186	3,045	3,067	3,036	3,136
Actual Monthly kWh per Customer	**70,189**	**76,390**	**76,640**	**76,409**	**75,436**
Actual Monthly kW per Customer	**168**	**184**	**184**	**186**	**186**

3.3. GENERAL SERVICE 1,500-4,999 kW

Compared to OEB-approved, the General Service 1,500-4,999 kW class customer count variance in 2022 was due to an increased number of commercial customers reclassified to lower classes as a result of reduced demand from COVID-19 shutdowns. Average consumption (kWh) and demand (kW) returned to usual levels in 2022-2023 and immaterial variances are expected for Bridge Years 2024-2025. Table 18 below details the Historical and Bridge Year weather normalized average kW and kWh per customer and compares it to the 2021-2025 OEB-Approved load forecast.

Table 18 - General Service 1,500-4,999 kW Average kWh and kW Per Customer

	2021	2022	2023	2024	2025
OEB Approved MWh	693,934	698,365	703,557	710,450	714,171
OEB Approved kW	1,537,380	1,545,513	1,555,042	1,567,693	1,574,524
OEB Approved Monthly Avg Count	68	68	68	68	68
Forecast Monthly kWh per Customer	**850,409**	**855,839**	**862,202**	**870,649**	**875,210**
Forecast Monthly kW per Customer	**1,884**	**1,894**	**1,906**	**1,921**	**1,930**
Historical & Bridge Weather Norm. MWh	653,434	651,052	691,030	720,509	719,852
Historical & Bridge Weather Normalized kW	1,413,782	1,409,101	1,494,964	1,548,143	1,557,428
Historical & Bridge Count	68	60	64	69	70
Actual Monthly kWh per Customer	**800,777**	**904,239**	**899,779**	**870,180**	**856,967**
Actual Monthly kW per Customer	**1,733**	**1,957**	**1,947**	**1,870**	**1,854**

3.4. LARGE USER

The main driver of variance in MWh and kW in Large User class is due to customer rate reclassification in 2022 reducing the customer count. Table 19 below displays the average kWh and kW per customer through 2021-2025 compared to OEB-approved load forecast. Please refer to Schedule 3-1-1 - Revenue Load and Customer Forecast for further details.

Table 19 - Large User Average kWh/kW Per Customer

	2021	2022	2023	2024	2025
OEB Approved MWh	575,952	575,413	575,413	577,069	575,413
OEB Approved kW	1,055,426	1,054,605	1,054,605	1,057,124	1,054,605
OEB Approved Monthly Avg Count	11	11	11	11	11
Forecast Monthly kW per Customer	**7,996**	**7,989**	**7,989**	**8,009**	**7,989**
Forecast Monthly kWh per Customer	**4,363,273**	**4,359,187**	**4,359,187**	**4,371,732**	**4,359,187**
Historical & Bridge Weather Norm. MWh	590,228	564,557	552,178	522,344	517,425
Historical & Bridge Weather Normalized kW	1,044,163	996,205	975,352	950,901	924,253
Historical & Bridge Count	11	10	10	10	10
Actual Monthly kW per Customer	**7,910**	**8,302**	**8,128**	**7,924**	**7,702**
Actual Monthly kWh per Customer	**4,471,424**	**4,704,642**	**4,601,483**	**4,352,867**	**4,311,875**

3.4. STREET LIGHTING, SENTINEL LIGHTING, AND UNMETERED LOADS

There are immaterial variances in the number of Street Lighting connections compared to the OEB-approved load forecast for Historical Years 2021-2022. Year-over-year decreases in MWh and kW from 2021 to 2022 and 2022 to 2023 are due to LED conversion. Trending for Bridge Years is expected to remain flat for the Street Light class.

Customers may request legacy sentinel light units to be removed once they are no longer operational or needed. The Sentinel Light program is no longer being offered as all new loads must be metered. All variances in the Sentinel class are as a result of the decreased number of units.

Compared to OEB-approved load forecast, Historical and Bridge Year Unmetered Scattered Loads (USL) has increased in the number of connections and total MWh as a result of newly connected USL services. Growth is mainly being driven by an increased number of traffic and speed cameras.

Attachment 3-1-2(A) - Summary and Variance of Actual and Forecast Data

(Refer to the attachment in Excel format)