Peterborough to Kingston Integrated Regional Resource Plan (DRAFT)

DRAFT Forecast Methodology Document
September 11, 2025

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Powering Tomorrow.

This methodology document was prepared by IESO, with inputs from Elexicon, Hydro One Networks Inc. and Utilities Kingston.

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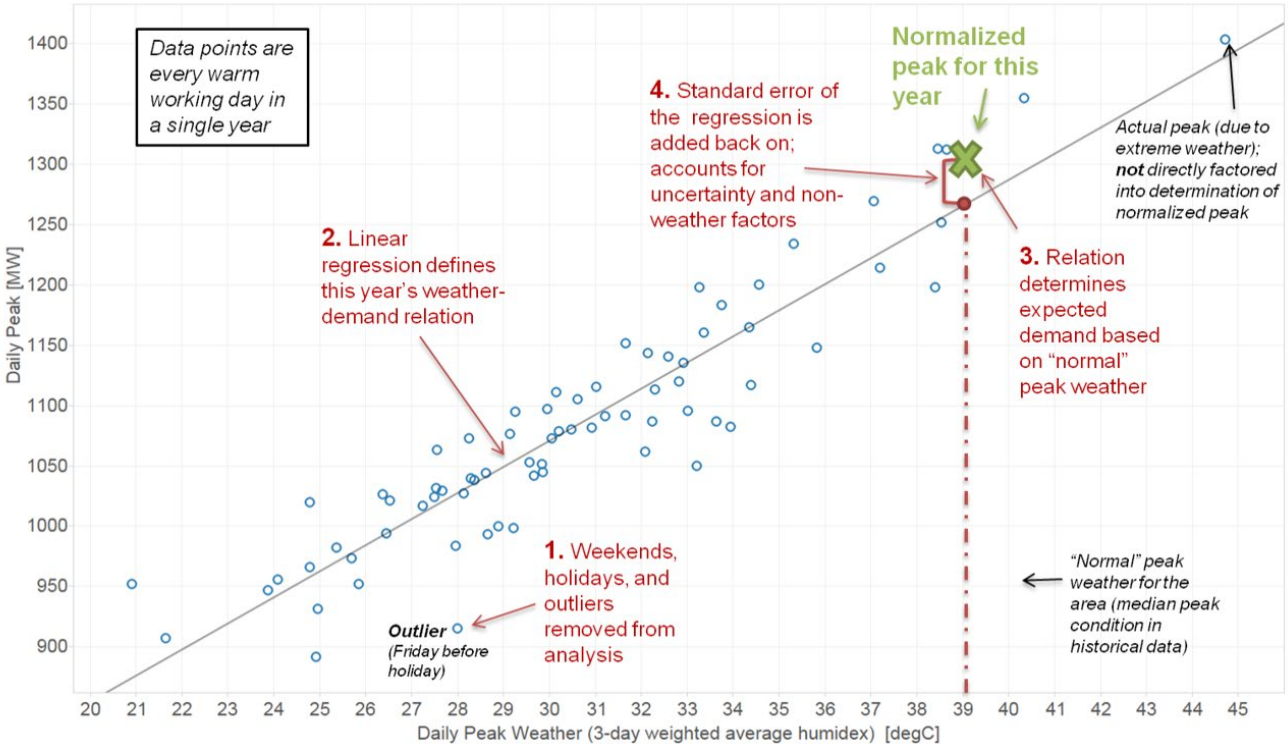
1. Demand Forecast and Methodology

1.1 Method for Accounting for Weather Impact on Demand

Weather has a large influence on the demand for electricity, so to develop a standardized starting point for the forecast, the historical electricity demand information is weather-normalized. This section details the weather normalization process used to establish the starting point for regional demand forecasts.

First, the historical loads were adjusted to reflect the median peak weather conditions for each transformer station in the area for the forecast base year (i.e., 2024 for the Peterborough to Kingston (PtoK) IRRP). Median peak refers to what peak demand would be expected if the most likely, or 50th percentile, weather conditions were observed. This means that in any given year there is an estimated 50% chance of exceeding this peak, and a 50% chance of not meeting this peak. The methodological steps are described in Figure 1 and were undertaken for both the summer and winter seasons.

Figure 1 | Method for Determining Weather-Normalized Peak (Illustrative)



The station-level 2024 median weather summer and winter peaks were provided to each LDC. This data was used as a starting point from which the LDCs could develop 20-year gross median demand forecast using their preferred methodologies (described in the next sections).

Once the 20-year, median peak demand forecasts were submitted to the IESO, the normal weather forecast was adjusted to reflect the impact of extreme weather conditions on electricity demand and

forecast demand savings from electricity Demand Side Management (eDSM) and contracted Distributed Generation (DG) were netted out of the forecast to create the final planning forecast. In accordance with the Load Forecast Guideline for Ontario published by the Ontario Energy Board (OEB) the forecast is adjusted to extreme weather.

1.2 Elexicon Energy Inc: Gross Forecast Methodology and Assumptions

Elexicon Energy Inc. (formerly Veridian and Whitby Hydro), through its subsidiary of Elexicon Corporation, serves homes and businesses in the municipalities of Port Hope and Belleville within Eastern Ontario. The service territory for Elexicon Energy in the PtoK region is shown below in Figure 2.

Figure 2 | Elexicon Energy Service Territory Map in the PtoK Region

1.2.1 Forecast Methodology

Elexicon developed three different load growths of the forecast including customer growth, electric vehicles, and building electrification as described in the following sections. These load growth drivers were derived through municipal and regional growth plan, federal adoption targets, and historical data trends. These load growths were combined and applied to the starting point provided from the IESO to develop the reference forecast.

1.2.2 Forecast Assumptions

1.2.2.1 Customer Growth

A bottom-up approach was applied using projected growth for residential and business archetypes and their associated load impacts, as well as known connection requests from large industrial loads.

Residential

Elexicon used both the Northumberland County Official Plan for Port Hope, and the City of Belleville Growth Forecast provided forecasted number of homes by municipality and utilized it as a base growth forecast for residential growth. Archetype distribution (e.g., single-detached, row houses) was derived through averaging the StatsCan Census (2006–2021) data. Load per household type was derived from StatsCan annual energy consumption and the Ontario Energy Board (OEB) average provincial energy consumption.

Commercial and Industrial

Using StatsCan historical business counts and employment numbers, a business-to-employee ratio was developed per district and by business type. The forecasted employment growth was then converted to a business count projection by type. Business types were then mapped to average load impacts with load per business type derived from ELX OEB Yearbook. In addition to this forecasted growth, known connection requests for large upcoming residential/industrial loads were also incorporated.

1.2.2.2 Building Electrification

The forecast incorporates anticipated increases in peak demand from space heating and cooling, including impacts from both new construction and retrofits of existing buildings

1.2.2.3 Electric Vehicles

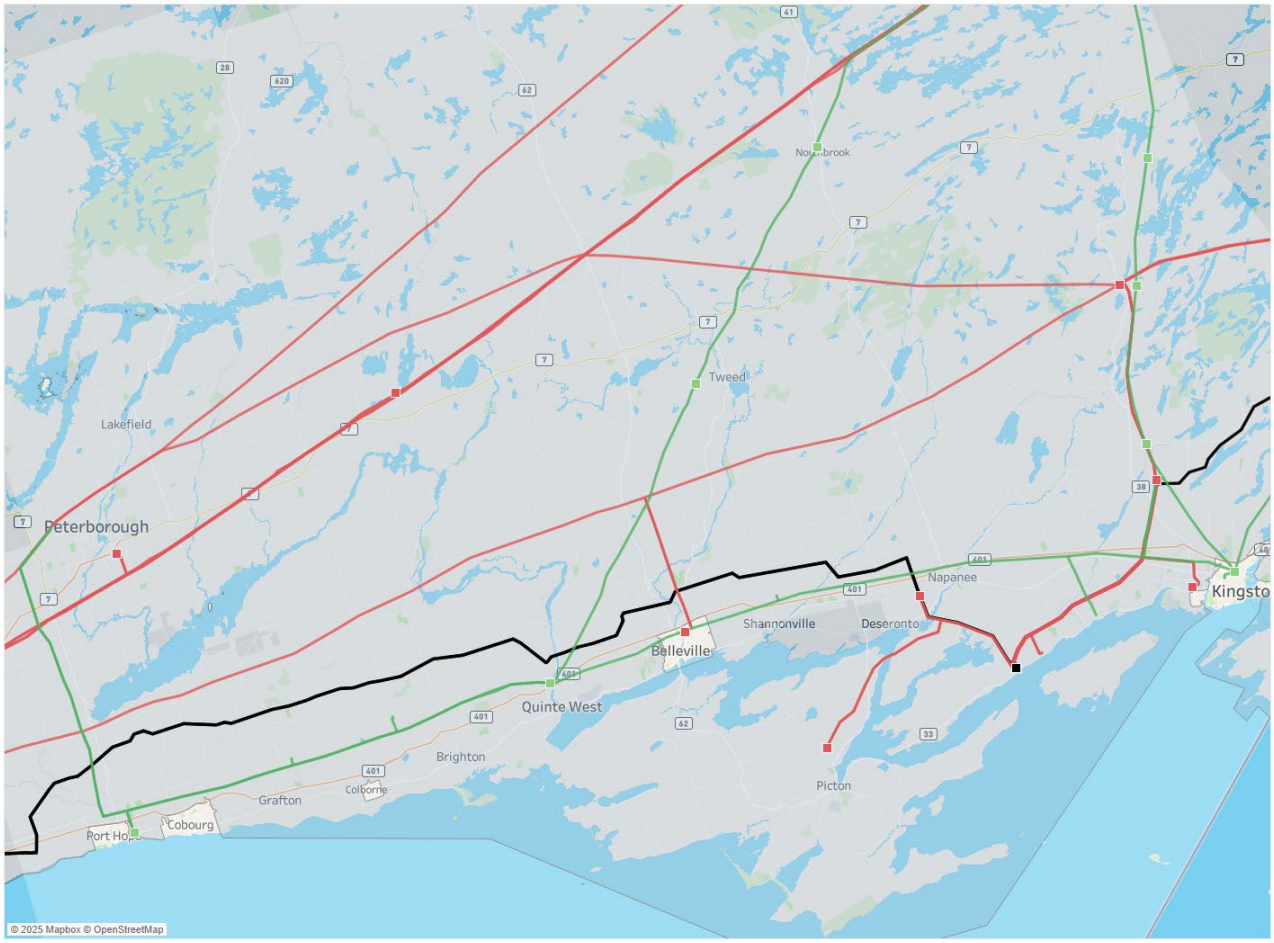
Peak load impacts of Electric Vehicles (EV) charging were forecasted based on assumptions regarding EV sales targets, Internal Combustion Engine (ICE) retirement rates, and EV load impacts.

Elexicon projected the vehicle population based on population forecasts, vehicle-per-person ratios, and business counts for medium and heavy-duty vehicles. EV sales targets were based on federal policies for zero-emission vehicles. The peak impact of different types of electric vehicles, as provided by NRCan, was used to calculate EV load impacts.

1.3 Hydro One Networks Inc. Distribution: Gross Forecast Methodology and Assumptions

Hydro One Networks Inc. Distribution (Hydro One Distribution) services the areas of PtoK region that are not serviced by other LDCs. It supplies power through several 230kV and 115kV stations that are included in the study area for the PtoK Forecast.

Figure 3 | Hydro One Service Territory Map in the PtoK Region



1.3.1 Forecast Methodology

Hydro One Distribution employed both econometric and end-use approaches to develop forecasts for the PtoK IRRP. These forecasts were derived by leveraging provincial load forecasts (including historical load, actual and projected economic and demographic factors, municipal energy plans, etc.), which were adjusted for stations in PtoK based on their historical relationship. Additionally, local information, including Municipal Energy Plans, Official Plans and local and regional demographic and economic factors, was incorporated to the forecast to ensure its alignment with local and regional conditions.

1.3.2 Forecast Assumptions

1.3.2.1 GDP and Housing Assumptions

Hydro One used Ontario's GDP annual growth rates and Ontario housing growths for the planning forecast which are outlined in **Table 1** and **Table 2** below.

Table 1 | Ontario GDP Annual Growth Rate

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Ontario GDP Annual Growth Rates (%)	0.92	1.68	1.96	2.09	2.02	1.90	1.92	1.95	2.07	2.07
	2035	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**
	1.98	2.05	2.02	1.97	1.92	1.92	1.90	1.89	1.88	1.85

Table 2 | Ontario Housing Growth

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Ontario Housing (thousands)	71.6	82.8	86.5	89.9	85.0	85.9	86.6	87.1	102.2	102.7
	2035	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**
	103.2	103.8	104.0	103.9	103.7	103.3	103.0	103.0	103.1	103.0

1.3.2.2 Other Drivers of Load Growth

EVs and electrification assumptions are based on the latest government mandates and initiatives in this regard.

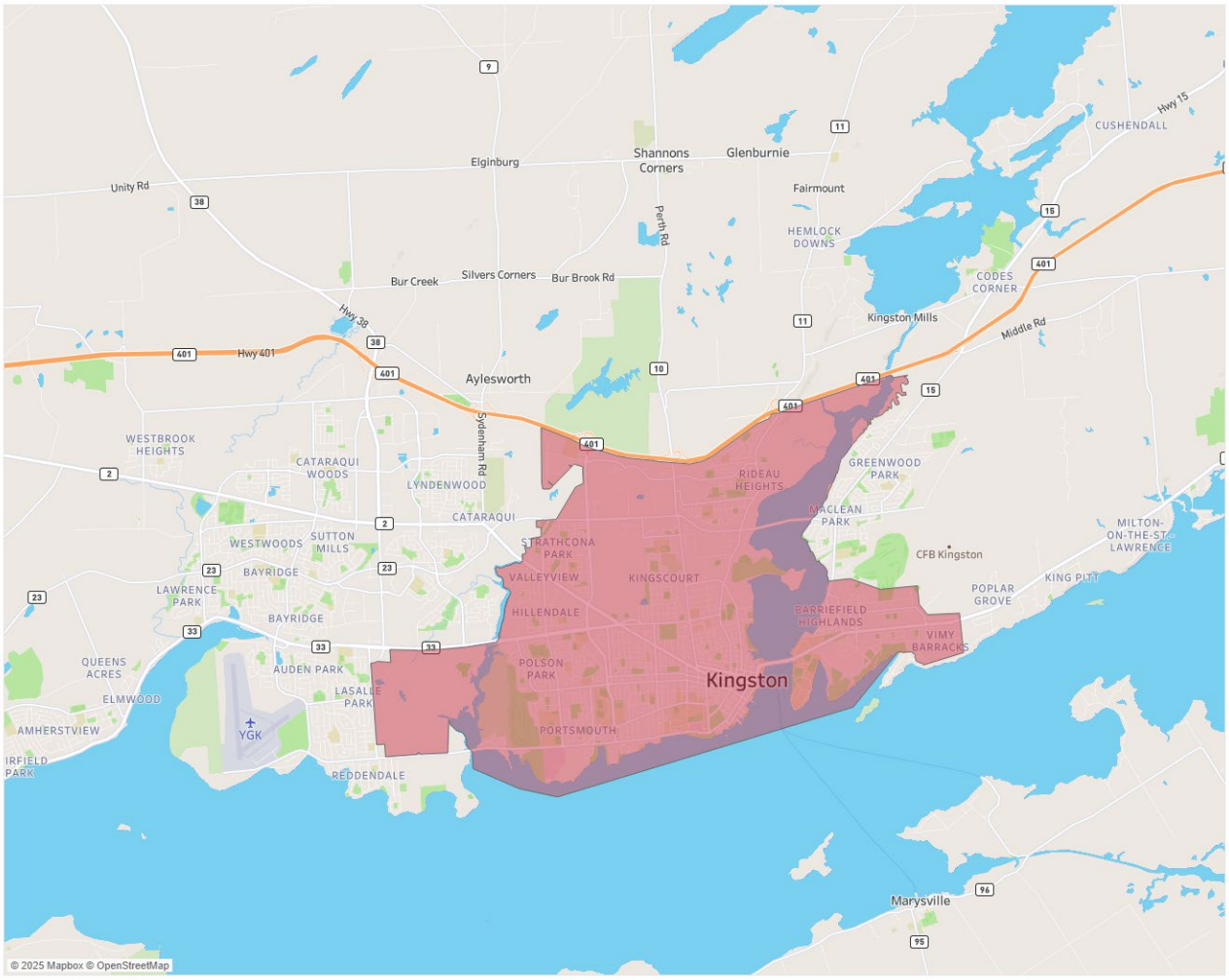
1.4 Kingston Hydro Corporation Forecast Methodology and Assumptions

As the affiliate service provider to Kingston Hydro, Utilities Kingston (UK) manages, operates and maintains the electrical distribution assets in the core area of the City of Kingston, serving approximately 28,000 customers. UK's residential customers (88.6% by customer count) accounted for 26.2% of the total annual energy consumption in 2020 whereas the remaining commercial/institutional customers (11.4% by customer count) accounted for 73.8% of the total annual energy consumption. UK's energy consumption and system demand are heavily influenced by federal institutions, municipal facilities, universities, schools and hospitals (I-MUSH Sector).

UK is supplied by the Hydro One Frontenac and Gardiner Transformer Stations (TS) through the Hydro One transmission system at primary voltages of 115 kV and 230 kV respectively. Seven 44 kV (46 kV class) feeders distribute electricity through UK's service area to large customers and 17 municipal substations (MS). The 44 kV sub-transmission voltage is stepped down to 4.16 kV (5 kV

class) and now 13.8 kV (15 kV class) at UK MS facilities to facilitate distribution of electricity to small and medium size customers.

Figure 4 | Kingston Hydro Corporation Service Territory Map in the PtoK Region



1.4.1 Factors that Affect Electricity Demand

Prior to 2019, UK was consistently a winter-peaking utility. However, winter gross demand has been trending down, and the summer gross demand has been trending up since 2014. In 2020, the gross winter and gross summer demand started to reach parity. This demand trend is attributed to several factors including the closure of Kingston Penitentiary in 2013, UK's success in achieving and in some instances exceeding provincial CDM and Energy Efficiency targets over the 2015-2018 timeframe and provincial Time of Use (TOU) and Global Adjustment programs which came into effect around 2015. Embedded generation has had a significant impact on the net summer demand and has reduced the gross summer demand by 4.3 to 9.8MW since 2021. This reduction in summer net demand is attributed to a cogeneration facility and distributed solar generation.

UK's largest customers are anticipating significant growth in electricity demand over the next few decades due to City planning policies that encourage intensification of development and global climate change mitigation efforts such as the electrification of transportation (e.g. electric vehicles) and the electrification of heating (e.g. heat pumps, etc.). The I-MUSH sector in Kingston is expected to lead the way with net-zero energy targets ranging from 2040 to no later than 2050.

1.4.2 Forecast Methodology and Assumptions

In developing the load forecasts, UK gathers development projection data from the local municipalities and developers to determine areas and timing of planned development as well as land uses. This information is then converted to electrical demand quantities and analyzed against past trends. A "High" forecast is then developed for each TS that is consistent with load growth potential within the service area of that station and overall system growth. UK uses a mix of historic growth trends and forward-looking economic forecasts to select a growth rate for its "reference forecast" and "medium forecast". The City forecast considers housing unit and employment forecasts from a recent report prepared by an economist firm for the City of Kingston.

The "high" forecast includes estimates for the electrification of heating and transportation from the City and two large institutional customers who all have net-zero targets. In the future, a mix of new "hybrid" and "all electric" heating is anticipated. Both types of heating utilize heat pump technology except on extremely cold days, where the "hybrid" system relies on natural gas back-up and the "all-electric" system relies on electric resistive back-up heating.

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