Ottawa Area Sub-region IRRP Forecasting Methodology

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1. Hydro Ottawa Forecast Methodology

1.1 Methodology

Hydro Ottawa engaged a consultant to develop scenarios for modeling future decarbonization system loads. To forecast and assess the impact of decarbonization initiatives on the service territory and distribution system, the consultant considered known and anticipated policy drivers and trends, as well as existing decarbonization and emissions reduction studies.

The scenarios used the 2022 weather-normalized summer coincident peak at the system level as the baseline. The residential and commercial customer segment baseload was developed by using population growth rates from the Medium Projection scenario in the City of Ottawa's *New Official Plan*, while federal and large customer growth rates were based on decarbonization and sustainability plans.

New electrification loads were developed across the following five categories: transportation electrification, residential electrification, commercial electrification, federal building electrification, and large customer electrification. Each category was projected using a decarbonization curve and additional assumptions about the technology employed to meet specific needs such as space heating or water heating.

Three decarbonization scenarios were investigated:

1. **Policy Guided**: this scenario adheres to policy-driven decarbonization; total compliance to Canadas 2030 Emissions Reduction Plan, Electric Vehicle Availability Standard, and the Canadian Net-Zero Emissions Accountability Act.
2. **Reference**: this scenario incorporates known trends into the policy-driven decarbonization; observed trends in load growth and electrification were paired with short-term planning projections to temper the pace of decarbonization in the near-term while still meeting Canada's 2030 Emissions Reduction Plan and Canda's 2050 decarbonization goals.
3. **Dual Fuel**: This scenario assumes hybrid space heating using low-carbon gas when temperature fall below -10°C.

The electric vehicle, transit and electrified heating targets for each decarbonization scenario are outlined in Table 1 below.

Table 1 | Hydro Ottawa Decarbonization Scenarios

Scenario	Electric Vehicles	Transit	Electrified Heating
Policy Guided	EV adoption meets federal targets	Electric buses meet Ottawa targets	Complete electrification
Reference	EV adoption meets federal targets	Electric buses meet Ottawa targets	Partial electrification with moderate heat pump adoption
	Adoption of rate incentive		Remaining pipeline gas assumed as low-carbon fuels
Dual Fuel	EV adoption meets federal targets	Electric buses meet Ottawa targets	Partial electrification with moderate heat pump adoption
	Adoption of rate incentive		Dual-fuel heating assumptions below -10°C
			Remaining pipeline gas assumed as low-carbon fuels

The IESO considers two scenarios for the IRRP demand forecast: a Base Forecast and a High Electrification (extreme) Forecast.

Hydro Ottawa's Reference scenario was used for the IRRP's Base Forecast and the Policy Guided Scenario was used for the IRRPs High Electrification Forecast. For sensitivity analysis the Dual Fuel Scenario was also shared with the IRRP working group.

1.2 Assumptions

1.2.1 EV Assumptions

Hydro Ottawa's EV projections rely on the Government of Canada's (GOC) *Electric Vehicle Availability Standard*. All three scenarios align with the GOC's sales targets for new light-duty vehicles (LDV) of 60% by 2030 and 100% by 2035, with medium-duty vehicles (MDV) and heavy-duty vehicles (HDV) projected as 10% of LDV sales by 2050.

The Reference and Dual Fuel scenario assume 75% of EV drivers adopt the Ontario Government's ultra-low overnight (ULO) rate incentive until 2030 and a new rate incentive optimized to flatten future system-level load curves applied beyond 2030. The Policy Guided scenario does not assume EV load shifting as a result of rate incentives.

1.2.2 Electrified Heating Assumptions

Residential electrification included load from space heating and water heating. NRCan data was used to quantify energy consumption by end use and fuel type. Space heating and water heating were electrified based on expected technology share (heat pumps or electric resistance). A blended coefficient of performance was employed to convert the amount of energy used by natural gas to electricity or low carbon fuels such as hydrogen or Renewable Natural Gas.

Historical weather data in Ottawa was used to project electrified heating space heating load curves over the course of a year. For water heating, efficiency metrics were applied to known energy demand from natural gas-fired residential water heating and known load profiles from regions with similar climates to create annual hourly load projections. Blended efficiency metrics for both space heating and water heating were reduced in all scenarios for hours at or below -10°C based on historical weather data. This was to account for the assumed diminished efficiency of air-source heat pump technology in temperatures experience in Ottawa's climate.

Electrification for commercial, federal and large customers included potential electrification load from space heating, water heating, space cooling, and auxiliary equipment. Space heating, space cooling, and water heating were electrified based on fuel share (electric vs low carbon gas). A blended coefficient of performance was employed to convert the amount of energy used by natural gas to electricity. Like the residential sector, blended efficiency metrics for both space heating and water heating were reduced in all scenarios for hours at or below -10°C based on historical weather data.

1.2.3 Transit Assumptions

Electric bus projections were based on the Zero Emissions by 2040 forecast in the City of Ottawa's Energy Evolution Strategy, which projects full electrification of the bus fleet by 2040.

1.3 References

The following plans were referenced to define the scenarios described in Section 1.1:

- 2030 Emissions Reduction Plan – Canada's Next Steps for Clean Air and a Strong Economy, Environment and Climate Change Canada
- Canada's Action Plan for Clean On-Road Transportation, Government of Canada
- Climate Change Master Plan, City of Ottawa
- Community Energy Transition Strategy, City of Ottawa
- Electric Vehicle Availability Standard, Government of Canada
- Energy Evolution, City of Ottawa
- Greely Community Design Plan, City of Ottawa
- Green Energy Act, City of Ottawa
- Net Zero 2050, Ontario Energy Association
- Official Plans & Community Energy Plans, City of Ottawa
- Pathway Study on Transportation in Ottawa, Sustainability Solutions Group

- Pathways to Decarbonization, IESO
- Pathways to Net-Zero Emissions for Ontario, Enbridge
- Russell Township Strategic Plan, Township of Russell
- Zero Emissions Bus Program, OC Transpo

2. Hydro One Forecast Methodology

2.1 Methodology

Hydro One employed both econometric and end-use approaches to develop forecasts for the Ottawa Area Sub-region IRRP. These forecasts were derived by leveraging provincial load forecasts, which were adjusted for stations in Ottawa 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 and ensure its alignment with local and regional conditions.

2.2 Assumptions

2.2.1 GDP and Housing Assumptions

Hydro One used different Ontario's GDP annual growth rates and Ontario housing growths for Reference Case and High Electrification Forecast which are outlined in Table 2 below.

Table 2 | Ontario GDP Annual Growth Rate and Housing

Scenario		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Base Forecast	Ontario GDP Annual Growth Rates (%)	0.3	1.8	2.4	2.6	2.4	2.0	2.0	1.7	1.8	1.8
	Ontario Housing (thousands)	85,879	81,110	55,603	55,430	55,436	55,533	56,922	60,424	62,191	62,857
High Electrification Forecast	Ontario GDP Annual Growth Rates (%)	0.5	2.0	2.6	2.8	2.6	2.5	2.5	2.2	2.3	2.3
	Ontario Housing (thousands)	88,879	84,110	83,603	70,430	70,436	70,533	71,922	75,424	77,191	77,857

Scenario		2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Base Forecast	Ontario GDP Annual Growth Rates (%)	1.8	1.6	1.8	1.7	1.7	1.8	1.7	1.7	1.6	1.6
	Ontario Housing (thousands)	63,524	64,191	64,857	65,524	66,191	66,857	67,524	68,191	68,857	69,524
High Electrification Forecast	Ontario GDP Annual Growth Rates (%)	2.3	2.1	2.3	2.2	2.2	2.3	2.2	2.2	2.1	2.1
	Ontario Housing (thousands)	78,524	79,191	79,857	80,524	81,191	81,857	82,524	83,191	83,857	84,524

2.2.2 EV, Heat Pump, and Electrification of Transit Assumptions

EVs and electrification assumptions are based on latest government mandates and initiatives in this regard. Hydro One has an aggregate forecast of electrification, which includes heat pumps, alternative use of electricity for heating load and the transit system.

The aggregate forecast helps to have a consistent forecast for a variety of heating options. For example, if natural gas combined with hydrogen is used in place of a heat pump, then electricity used for making the hydrogen is counted for in the aggregate in place of electricity usage of heat pumps.

2.2.3 Other Drivers of Load Growth

The main forecast drivers are Ontario GDP and housing starts. Load growth in the area relative to provincial trends and local information including community/municipal energy plans, were also considered.

A review of the community energy plans indicated that they are consistent with Canada's decarbonization policy. In addition to the Ottawa plan that relates to all communities/suburbs of Ottawa and corresponding stations, the community energy plans reviewed included those for Cumberland County that relates to Cumberland DS and Bilberry Creek TS; Greely Community for Greely DS, and Township of Russell for Russell DS.

2.3 References

The following plans were referenced to define the forecasts, as described in Section 2.2.3:

- Energy Evolution, City of Ottawa
- Cumberland Energy Authority Energy Plans
- Greely Community Design Plan
- Township of Russell Strategic Plan

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