Integrated Regional Resource Plan

Parry Sound/Muskoka
May 2022

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Powering Tomorrow.

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List of Acronyms

BKF	Breaker Failure
CEP	Community Energy Plan
CDM	Conservation and Demand Management
DER	Distributed Energy Resources
DG	Distributed Generation
GS	Generating Station
ERP	Enabling Resources Program
HONI	Hydro One Networks Inc.
ICECAP	Integrated Community Energy and Climate Action Plans
IESO	Independent Electricity System Operator
IRRP	Integrated Regional Resource Plan
kV	Kilovolt
LDC	Local Distribution Company
LMC	Load Meeting Capability
LAP	Local Achievable Potential
LTE	Long Term Emergency
LTR	Limited Time Rating
MW	Megawatt
NA	Needs Assessment
NWA	Non-Wires Alternatives
NERC	North American Electric Reliability Corporation
NPCC	Northeast Power Coordinating Council
OEB	Ontario Energy Board
ORTAC	Ontario Resource and Transmission Assessment Criteria
RIP	Regional Infrastructure Plan
SIA	System Impact Assessment
SGBM	South Georgian Bay Muskoka

SSS	Sustainable Severn Sound
TS	Transformer Station
TTC	Total Transfer Capability

This Integrated Regional Resource Plan (IRRP) was prepared by the Independent Electricity System Operator (IESO) pursuant to the terms of its Ontario Energy Board licence, EI-2013- 0066.

This IRRP was prepared on behalf of the Technical Working Group of the Parry Sound/Muskoka sub-region which included the following members:

- Independent Electricity System Operator
- Hydro One Networks Inc. (Distribution)
- Hydro One Networks Inc. (Transmission)
- Alectra Utilities
- Elexicon Energy
- Lakeland Power
- EPCOR Electricity Distribution Ontario Inc.
- Newmarket-Tay Power Distribution Ltd.

The Technical Working Group assessed the reliability of electricity supply to customers in the Parry Sound/Muskoka sub-region over a 20-year period beginning in 2021; developed a plan that considers opportunities for regional coordination in anticipation of potential demand growth and varying supply conditions in the region; and developed an implementation plan for the recommended options, while maintaining flexibility in order to accommodate changes in key conditions over time.

The Parry Sound/Muskoka Technical Working Group members agree with the IRRP's recommendations and support implementation of the plan, subject to obtaining necessary regulatory approvals and appropriate community engagement and consultations. The Parry Sounds/Muskoka Technical Working Group members do not commit to any capital expenditures and must still obtain all necessary regulatory and other approvals to implement recommended actions.

1. Introduction

This IRRP addresses the electricity needs of the Parry Sound/Muskoka sub-region over the next 20 years from 2021 to 2040. The Parry Sound/Muskoka sub-region is located in the South Georgian Bay Muskoka region and it encompasses the Districts of Muskoka and Parry Sounds and the northern part of Simcoe County.

The Parry Sound/Muskoka sub-region is winter peaking. Electrical supply to the sub-region is provided through the autotransformers at Essa TS (near Barrie) and Minden TS and the 230 kV transmission lines and step-down transformers as shown in Figure 1. Generation in the area includes the Des Joachims Hydroelectric Generating Station (GS) and the Henvey Inlet Wind Inlet GS.

The electricity within the sub-region is supplied by six local distribution companies (LDCs): Hydro One Networks, Alectra Utilities, Elexicon Energy, Lakeland Power, EPCOR Electricity Distribution Ontario Inc. and Newmarket-Tay Power Distribution Ltd. The transmission asset owner is Hydro One Networks. This IRRP report was prepared by the IESO on behalf of the Technical Working Group composed of the six LDCs and transmitter.

In Ontario, planning to meet the electrical supply and reliability needs of a large area or region is conducted through regional electricity planning, a process that was formalized by the Ontario Energy Board (OEB) in 2013. In accordance with this process, transmitters, distributors and the IESO are required to carry out regional planning activities for each of the province's 21 electricity planning regions, including the South Georgian Bay Muskoka region, at least once every five years.

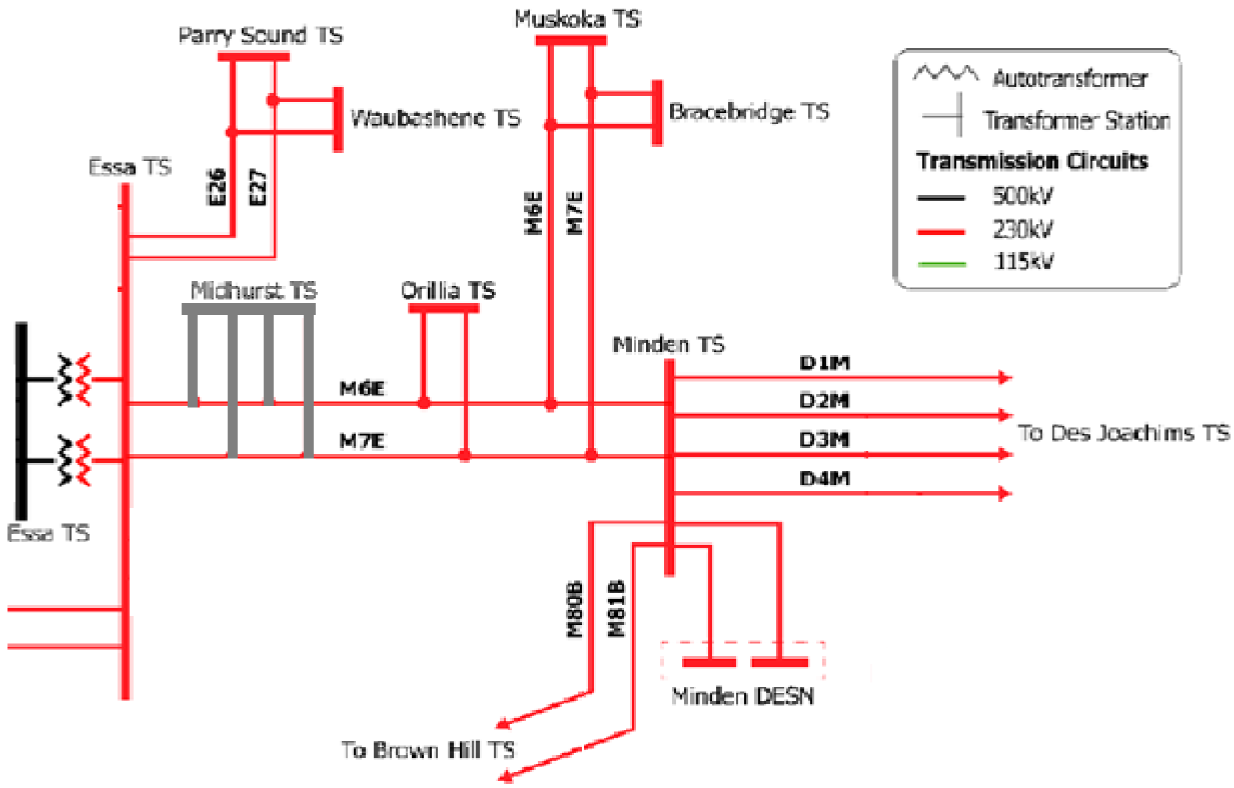
This is the second cycle of regional planning for the Parry Sound/Muskoka sub-region. This cycle began in 2020 with the publication of the South Georgian Bay Muskoka Needs Assessment Report. This was followed by a Scoping Assessment which identified needs that should be addressed through the IRRP process and recommended two IRRPs; one for Parry Sound/Muskoka sub-region and another for Barrie/Innisfil sub-region. A Technical Working Group was then formed to gather data, identify electricity needs in the region and developed recommendations included in this Parry Sound/Muskoka IRRP.

This IRRP report is organized as follows:

- A summary of the recommended plan for the Parry Sound/Muskoka sub-region is provided in Section 2;
- The process and methodology used to develop the plan is discussed in Section 3;
- The context for electricity planning in the Parry Sound/Muskoka sub-region and the study scope are discussed in Section 4;
- The demand forecast and conservation and demand management (CDM) and distributed generation (DG) assumptions are described in section 5;
- Electricity needs in the Parry Sound/Muskoka sub-region are presented in Section 6;
- Alternatives and recommendations to address electricity needs are addressed in Section 7;

- A summary of engagement activities is provided in section 8; and
- The plan conclusion is provided in Section 9.

Figure 1| Parry Sound/ Muskoka Electricity System



2. The Integrated Regional Resource Plan

This IRRP provides recommendations to address the electricity needs of the Parry Sound/Muskoka sub-region over the next 20 years. The needs identified are based on the demand growth anticipated in the region and the capability of the existing transmission system as evaluated through application of the IESO's Ontario Resource and Transmission Assessment Criteria (ORTAC) and reliability standards governed by North American Electric Reliability Corporation (NERC). The IRRP's recommendations are informed by an evaluation of options, representing alternative ways to meet the needs, that considers: reliability, cost, technical feasibility, maximizing the use of the existing electricity system (where economic), and feedback from stakeholders.

The following sections provide details of the needs identified and the recommendations to address these needs. The needs were identified over two main planning horizons, i) 7 to 10 years as near to medium-term and ii) beyond 10 years as longer-term. These planning horizons are distinguished in the IRRP to reflect the different levels of forecast certainty, lead time for development, and planning commitment required over these time horizons.

2.1 Needs in the Near to Medium-Term Horizon and Recommendations

The summary of recommendations for the needs in the near to medium-term horizon is listed in the table below.

Table 1 | Summary of Near/Medium-term Plan for Parry Sound/Muskoka IRRP

Need Description	Recommendation	Lead Responsibility	Required by
Waubaushene TS over its summer 10-day Limited Time Rating (LTR)	Consider incremental, cost-effective CDM to defer the need arising in 2027 until the transformers are replaced for end-of-life. If by 2024 there are no commitments for incremental, cost-effective CDM, implement alternative solution such as advancing the end-of-life replacement of the transformers. The Regional Infrastructure Plan (RIP) will further explore this backstop solution	Technical Working Group Hydro One	2024 2027
Sections of M6E/M7E circuits to reach end-of-life	Like for like replacement	Hydro One	2024

Need Description	Recommendation	Lead Responsibility	Required by
Sections of D1M/D2M circuits to reach end-of-life	Like for like replacement	Hydro One	2028

2.1.1 Consider Incremental Cost Effective CDM at Waubaushene TS

Waubaushene TS peak demand forecast will exceed its 10-day LTR rating by 2027 and the existing transformers are reaching end-of-life in 2030. Assessments as part of this IRRP indicate that incremental, cost-effective CDM is a good candidate for deferring this need until the transformers can be replaced as part of their planned sustainment and is the recommended action. However, no provincial framework for CDM programs in 2027 currently exists, and, therefore, the TWG will continue to monitor these developments following plan completion and explore various pathways for incremental cost-effective CDM. If this CDM cannot be committed by 2024[1], the TWG recommends that a backstop solution be implemented, such as advancement of the end-of-life transformers. The backstop solution will be further explored in the Hydro One led RIP.

2.1.2 Like for Like Replacement for sections of 230 kV circuits M6E/M7E and D1M/D2M

Sections of 230 kV circuits M6E/M7E and D1M/D2M will reach end-of-life by 2024 and 2028 respectively. A like-for-like approach is recommended for the replacement of these assets.

2.2 Needs in Longer-Term Horizon and Recommendations

In the longer-term horizon, minor station capacity needs have been identified at Minden TS starting in 2038. A longer-term supply capacity need has also been identified on 230 kV circuit M6E for a Minden HL7 Breaker Failure (BKF).

While this need is expected to arise in the longer-term, potential options were contemplated to inform future plans. The analysis showed that incremental, cost-effective CDM is potentially a good candidate to defer this need, when considering the need characteristics. Given the time of the need, no firm recommendation is required at this time; however, it is recommended to continue to consider incremental, cost-effective CDM as an option in between planning cycles and bring these insights into the next cycle of regional planning for the region.

2.2.1 Supporting Community Energy Plans and Monitoring Energy Efficiency and Electrification Trends

Three main plans in the sub-region have been identified when pertaining to energy and climate change in communities. These include:

[1] This year has been selected on the basis of the lead-time for the backstop solution, i.e., to advance the end-of-life transformers.

- The Integrated Community Energy Climate Action Plans (ICECAP) for the townships for the Archipelago, Carling, Georgian Bay, McKellar, Seguin, Georgian Bay; the Town Parry Sound; Municipality of McDougall; Chimnissing/Beausoleil, Dokis, Henvey Inlet, Magnetawan, Moose Deer Point, Sawanaga, Wahta Mohawk and Wasauksing First Nations; and Wiikwemkoong Unceded Territory
- Sustainable Seven Sound (SSS) supported by seven municipalities in the County of Simcoe and the district Municipality of Muskoka including the Towns of Midland and Penetanguishene and the Township of Georgian Bay, Severn, Oro-Medonte, Tiny and Tay
- Energy Management Plan for Village of Sundridge and Township of Joly and Strong

The scope varies by municipality and plan but the general aim is to improve energy efficiency, building greater resiliency, lower greenhouse gas emissions, and invest in the local economy.

While the IRRP seeks to align with these plans where possible, not all of the objectives fall within the scope of the regional planning nor the IESO's mandate. For example, absent of provincial government policy, the IESO is technology agnostic and will generally choose the most economic option that adequately resolves the need and meets applicable reliability standards. Greenhouse gas emissions are considered in the IRRP's options analysis by accounting for the carbon price associated with emitting resources, but the IESO does not have emission reduction targets unless directed by government policy. Furthermore, while regional planning is responsible for ensuring electricity ratepayer value and minimizing electricity costs, the IESO relies on government policy for broader socioeconomic considerations.

There are three climate energy plan (CEP) objectives that the IESO and regional planning can play a role in supporting. First, the IESO recognizes that distributed energy resources (DER) are becoming increasingly prevalent and features prominently in many CEPs. DERs can provide benefits to both customers as well as the distribution and transmission systems. By enabling DERs to provide wholesale services, system costs can be reduced and opportunities for customers and investors can be increased. The IESO's Enabling Resources Program (ERP) will produce a 5-10 year plan to enable resources to provide services they cannot or cannot fully currently provide. The ERP has identified storage, hybrids, and DERs as high-priority opportunities. The IESO developed a DER roadmap in the fall of 2021 to provide clarity on IESO objectives, initiatives, and timing for DER integration and is completing a DER Potential Study by June 2022. More information can be found on the Distributed Energy Resource Roadmap engagement page.

Second, the Technical Working Group will continue to support and monitor energy efficiency uptake. Conservation expected to be achieved through codes, standards, and program delivery has already been included in the planning forecast as described in Section 5.4. On September 30, 2020, the IESO received a Ministerial directive to implement a new 2021-2024 CDM Framework. The new CDM Framework will contribute to lowering the net demand as seen on the transmission system and ensures energy efficiency can continue to play a role in meeting the region's needs. The Technical Working Group will monitor uptake of the CDM framework as well as energy efficiency initiatives in CEPs and assess the impact of these additional savings on the timing of local reliability needs.

Finally, the Technical Working Group will monitor electrification trends and their impact on the demand forecast. The Technical Working Group recognizes that many CEPs are calling for ambitious electrification targets as a means to achieve carbon emission reductions. It is not yet clear how impactful electrification will be to the load forecast in the near-term but it could drive significantly higher demand in the long term that will necessitate new electricity supply into the area. While it is still difficult to establish when firm investments or infrastructure reinforcements will be needed, it is prudent to prepare for a future where electricity demand could potentially be significantly higher than forecast.

3. Development of the IRRP

3.1 The Regional Planning Process

In 2013, the OEB created a formal process for regional planning which is carried out by the IESO, in collaboration with the transmitters and LDCs in each planning region. The regional planning formal process sets out 21 different electricity planning regions for the province. Regional planning assesses the interrelated needs of a region over the near, medium, and long term and develops a plan to ensure cost-effective, reliable electricity supply. Regional plans consider the existing electricity infrastructure in an area, forecast growth and customer reliability, evaluate options for addressing needs, and recommend actions to be undertaken.

The process consists of four main components:

1. A Needs Assessment, led by the largest transmitter in the region, which completes an initial screening of a region's electricity needs and determines if there are electricity needs requiring regional coordination;

2. A Scoping Assessment, led by the IESO, which identifies the most appropriate planning approach to address identified needs;

3. An IRRP, also led by the IESO, which proposes recommendations to meet the identified needs requiring coordinated planning; and/or

4. A RIP, led by the transmitter, which provides further details on recommended wires solutions.

Further details on the components of the regional planning process in Ontario and the IESO's approach to regional planning can be found in Appendix A.

In addition to regional planning, there are also bulk system planning and distribution network system planning processes. Bulk system planning typically considers the 230 kV and 500 kV network and examines province-wide system issues whereas distribution network planning considers the supply of electricity within an LDC's system. Regional planning is the intersection of those two.

A review of the regional planning process was finalized in 2021 following the completion of the first cycle of regional planning for all 21 regions. The Regional Planning Process Review Final Report is published on the IESO's website.

3.2 Parry Sound/Muskoka and IRRP Development

The process to develop the Parry Sound/Muskoka IRRP was initiated following the publication of Hydro One's South Georgian Bay Muskoka Needs Assessment report in April 2020 and the IESO's Scoping Assessment report in November 2020. The Scoping Assessment report recommended that the needs identified for the Parry Sound/Muskoka sub-region be considered through an IRRP in a coordinated regional approach. The Technical Working Group was then formed to develop the terms of reference for this IRRP, gather data, identify needs, develop options and recommend solutions in the sub-region.

4. Background and Study Scope

This is the second cycle of regional planning for the Parry Sound/Muskoka sub-region. During the first cycle of regional planning, a Needs Assessment was conducted for the South Georgian Bay Muskoka Region in March 2015 that was led by Hydro One Networks Inc. Transmission. After reviewing the needs identified in the report, the Technical Working Group recommended that further regional coordination should be considered and a Scoping Assessment was published in June 2015 which recommended coordinated planning through an IRRP. Subsequently, the IRRP for Parry Sound/Muskoka was published in December 2016 and the RIP was published in August 2017.

This cycle of regional planning started with a Needs Assessment published by Hydro One in April 2020 which identified a number of needs requiring further regional coordination. This was followed by a Scoping Assessment which was published in November 2020. This report recommended an IRRP be initiated. This report presents an integrated regional electricity plan for the next 20-year period starting from 2021.

4.1 Study Scope

This IRRP was prepared by the IESO on behalf of the Technical Working Group and recommends options to meet the electricity needs of the Parry Sound/Muskoka sub region for the study period with a focus on providing an adequate, reliable supply to support community growth. The plan includes consideration of forecast electricity demand growth, conservation and demand management (CDM), distributed generation (DG), transmission and distribution system capability, relevant community plans, condition of transmission assets and developments on the bulk transmission system.

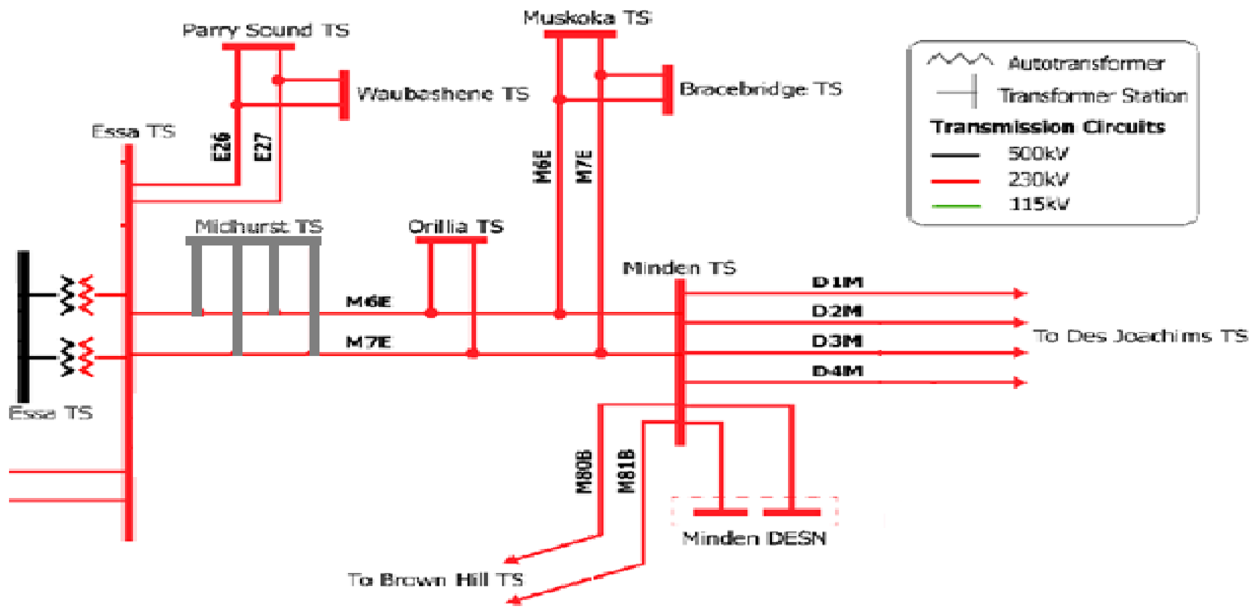
The following transmission facilities were included in the scope of this study:

Step-down transformer stations: Parry Sound TS, Waubaushene TS, Orillia TS, Bracebridge TS, Muskoka TS and Minden TS.

Transmission lines: D1M, D2M, D3M, D4M, E26, E27, M6E, M7E, M80B, M81B

The single line diagram of the Parry Sound Muskoka sub-region is shown in Figure 2 below. Note that Midhurst and Essa are not within the scope of the this IRRP.

Figure 2 | Single Line Diagram of Parry Sound/ Muskoka Sub-Region



The Parry Sound/ Muskoka IRRP was developed by completing the following steps:

- Preparing a 20-year electricity demand forecast and establishing needs over this timeframe;
- Examining the Load Meeting Capability (LMC) and reliability of the existing transmission system, taking into account facility ratings and performance of transmission elements, transformers, local generation, and other facilities such as reactive power devices. Needs were established by applying ORTAC and NERC planning criteria;
- Assessing system needs by applying a contingency-based assessment and reliability performance standards for transmission supply in the IESO controlled grid as described in section 7 of ORTAC;
- Confirming identified end-of-life asset replacement needs and timing with LDCs;
- Establishing alternatives to address system needs, including, where feasible and applicable, possible energy efficiency, generation, transmission and/or distribution, and other approaches such as non-wires alternatives;
- Engaging with the community on needs, findings and possible alternatives;
- Evaluating alternatives to address near and long-term needs; and
- Communicating findings, conclusions and recommendation within a detailed plan.

5. Electricity Demand Forecast

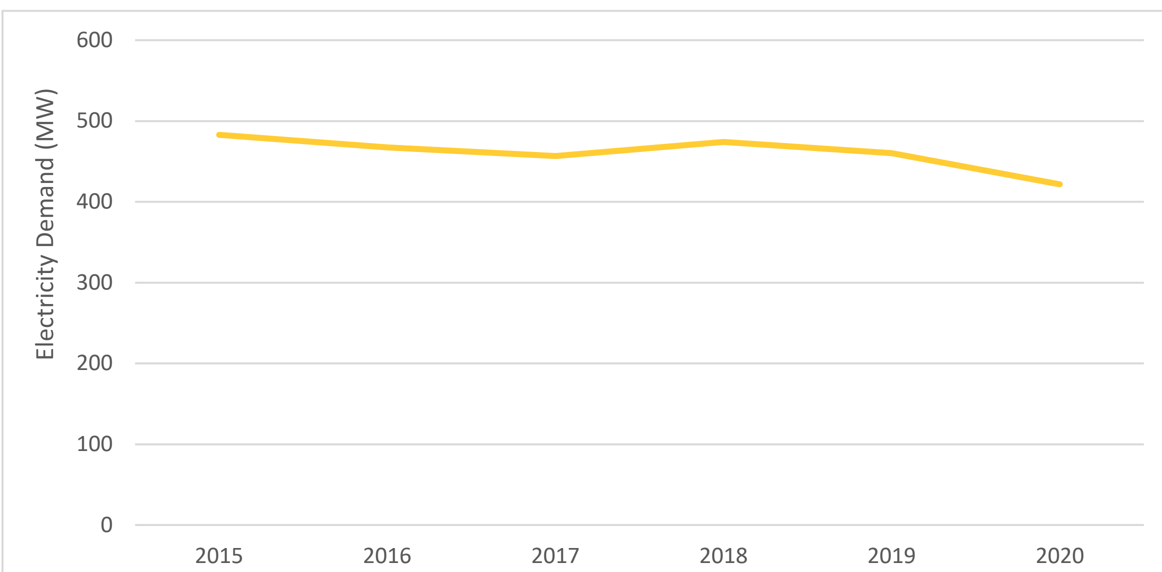
Regional planning in Ontario is driven by the need to meet peak electricity demand requirements in the region under study. This section describes the specific details of the development of the demand forecast for the Parry Sound/Muskoka sub-region. It highlights the assumptions made for peak demand forecasts including the contribution of CDM and distributed generation to reducing peak demand. The resulting net demand forecast, termed the planning forecast, is used in assessing the electricity needs of the area over the planning horizon.

To evaluate the reliability of the electricity system, the regional planning process is typically concerned with the coincident peak demand for a given area. This is the demand observed at each station for the hour of the year in which overall demand in the study area is at a maximum. This differs from a non-coincident peak, which refers to each station's individual peak, regardless of whether these peaks occur at different times. Within the Parry Sound/Muskoka sub-region, the peak loading hour for each year occurs in the winter.

5.1 Historical Electricity Demand

Electricity demand in the Parry Sound/Muskoka sub-region is primarily driven by residential and commercial customers and demand typically peaks during the winter months. However, station capacity needs arise in the summer as the ratings are lower then. The historical demand is shown below in Figure 3. The technical Working Group determined 2020 to be the base year to be used for developing the planning load forecast. The historical peak demand has decreased from 480 MW in 2015 to 420 in 2020.

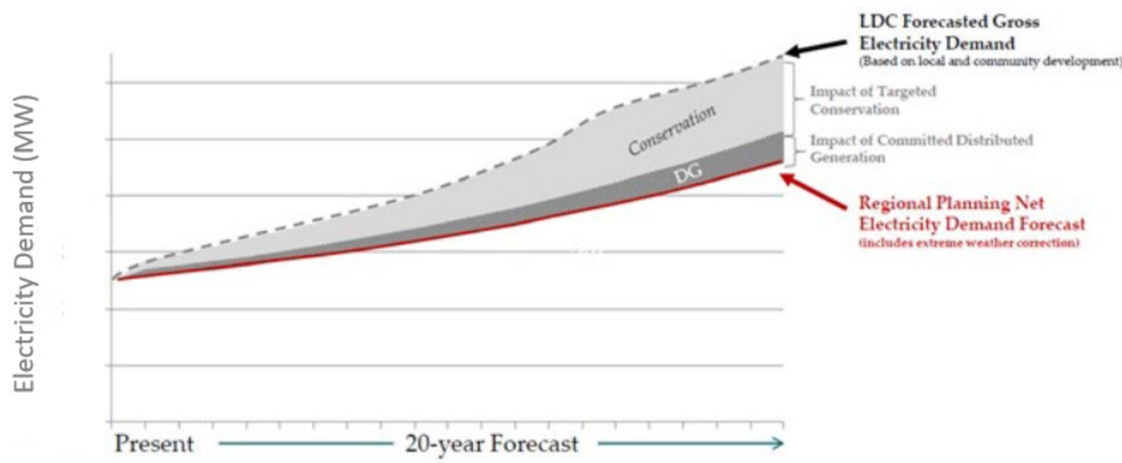
Figure 3 | Historical Winter Peak Demand – Parry Sound/ Muskoka Sub-Region



5.2 Demand Forecast Methodology

A 20-year regional peak demand forecast was developed to assess reliability needs for the Parry Sound/Muskoka sub-region; Figure 4 shows the steps taken to develop this. Gross demand forecasts, which assume the weather conditions of an average year based on historical weather conditions i.e., normal weather, were provided by the LDCs. These forecasts were then modified to reflect the peak demand impacts of provincial conservation savings and DG contracted through previous provincial programs such as FIT and microFIT. The forecasts were then adjusted to reflect extreme weather conditions in order to produce a reference forecast for planning assessments to assess the electricity needs in the region. Additional details related to the development of the demand forecast are provided in Appendix B.

Figure 4 | Illustrative Development of the Demand Forecast



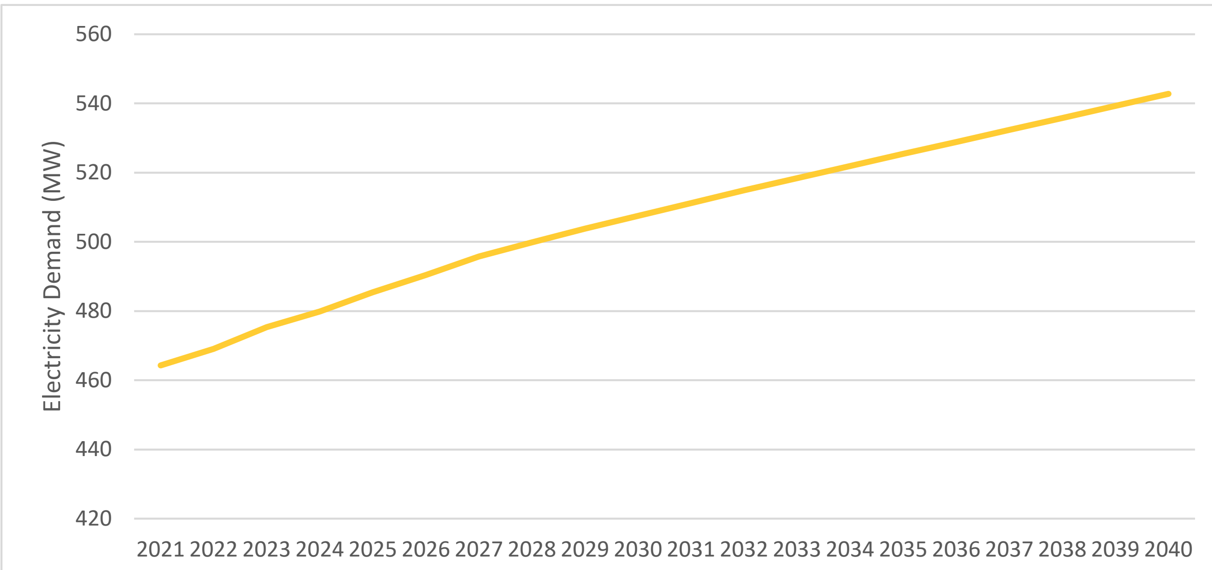
5.3 Gross Demand Forecast

Gross demand forecasts were submitted by each participating LDC in the Parry Sound/Muskoka sub-region. This is because LDCs have better insights of future local demand growth and drivers due to their direct involvement with their customers. This insight includes future connection applications and knowledge regarding typical electrical demand for different types of customer groups. Through engagement for the Parry Sound/Muskoka sub-region, it was communicated that Seguin Township submitted a Minister Zoning Order (MZO) in January 2022 to rezone land along the southern border of the town of Parry Sound for future housing development. The municipality of Parry Sound opposed the MZO application and listed four studies Seguin need to provide before the municipality of Parry Sound can partner with Seguin Township on the project. Also mentioned as part of engagement, was growth of a Parry Sound industrial park. Since these developments had not been committed yet, they were not considered in the gross demand forecasts submitted by the LDCs. These developments will be monitored in between regional planning cycles.

The LDC gross demand forecasts account for increases in demand due to new or intensified development, economic growth, population growth, changes in consumer behaviour, etc. Most LDCs cited alignment with municipal and regional official plans and credited them as a primary source for input data. LDCs are also expected to account for changes in consumer demand resulting from typical efficiency improvements and response to increasing electricity prices, i.e., "natural conservation", but not for the impact of future DG or new conservation measures, such as codes and standards and CDM programs, which are accounted for by the IESO as discussed in Section 5.4 below. The gross LDC forecast assumes median on-peak weather conditions.

More details on the LDCs' load forecast methodology can be found in Appendix B. Figure 5 below shows the total gross coincident LDC forecast for both summer and winter weather.

Figure 5 | LDC Coincident Gross Winter Demand Forecast – Median Weather



5.4 Contribution of Conservation to the Demand Forecast

CDM helps in meeting Ontario's electricity needs by reducing demand. This is achieved through a mix of codes and equipment standards amendments as well as CDM program-related activities.

Demand reduction due to codes and standards are based on expected improvement in the codes for new and renovated buildings and through regulation of minimum efficiency standards for equipment used by specified categories of consumers. Program-related activities include Save on Energy programs, as well as those that are being implemented as part of the 2021-2024 CDM framework.

CDM savings have been applied for the Parry Sound/Muskoka sub-region gross peak demand forecast for median weather, along with DG (as described in section 5.5) to determine the net peak demand for the sub-region. This takes into account both policy-driven conservation through the provincial CDM Framework, as well as expected peak demand impacts due to building codes and equipment standards for the duration of the forecast.

The final estimated conservation peak demand reductions applied to the gross demand forecast is shown in Table 2 for a selection of the forecast years. Additional details are provided on Appendix B.

Table 2 | MW Savings from Conservation and Demand Management

Year	2022	2024	2026	2028	2030	2032	2034	2036	2038	2040
Winter Savings (MW)	7	14	17	19	22	24	24	24	24	24

5.5 Contribution of Distributed Generation to Demand Forecast

Distributed Generation is also factored in to offset the Parry Sound/Muskoka sub-region gross peak demand forecast for median weather. No assumptions were made regarding DG growth as in the long-term, the contribution of DG is expected to diminish as contracts expire. The resources that were included in the DG forecast were comprised of a mix of solar and hydroelectric projects. Specific capacity contribution factors were attributed to each resource type in order to estimate the effective capacity that would be available to shave load during the regional peak hours. Upon applying the associated capacity contribution factors to each resource in the DG list, the data was then aggregated on a station level in order to put together a forecast specifying the estimated peak load reduction due to DG output.

The DGs included in this IRRP are distributed connected from the following sites:

- Minden TS
- Muskoka TS
- Orillia TS
- Parry Sound TS
- Waubaushene TS

Effective winter capacity totaled 29 MW in 2022. The expected annual peak demand contribution of contracted DG in the Parry Sound/Muskoka sub-region and capacity contribution factors can be found in Appendix B.

5.6 Net Extreme Weather Planning Forecast

The net extreme weather planning forecast, also known as the "planning" forecast, is the coincident peak demand forecast for the sub-region and is used to carry out system studies for identifying potential needs in the Parry Sound/Muskoka sub-region. This forecast is created in three steps:

1. The gross median weather forecast, provided by the LDCs, is adjusted to extreme weather conditions, according to the methodology described in Appendix B. The result is the gross extreme weather forecast.
2. The impacts of forecast CDM savings and DGs output are added to the gross extreme weather forecast which results in a net extreme weather forecast, or planning forecast.

3. A coincidence factor is applied to convert the forecast to non-coincident. The coincidence factor is based on the contribution of each station to the group's coincident peak over the past five years. Non-coincident station forecasts are utilized for assessing the capacity adequacy of each transformer station in the sub-region.

The net extreme weather forecasts for the Parry Sound/Muskoka sub-region are shown in Figure 6 and Figure 7 below for summer and winter. For comparison, the figures also show the median gross weather forecast and the extreme gross forecast.

Figure 6 | Summer Net Extreme Weather Demand Forecast

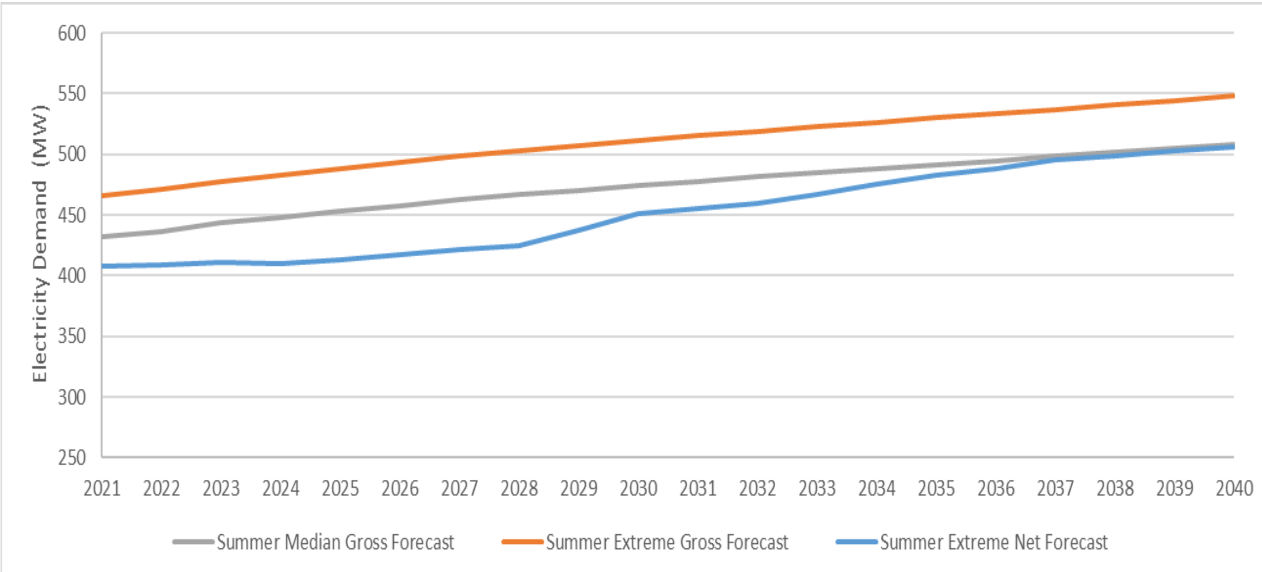
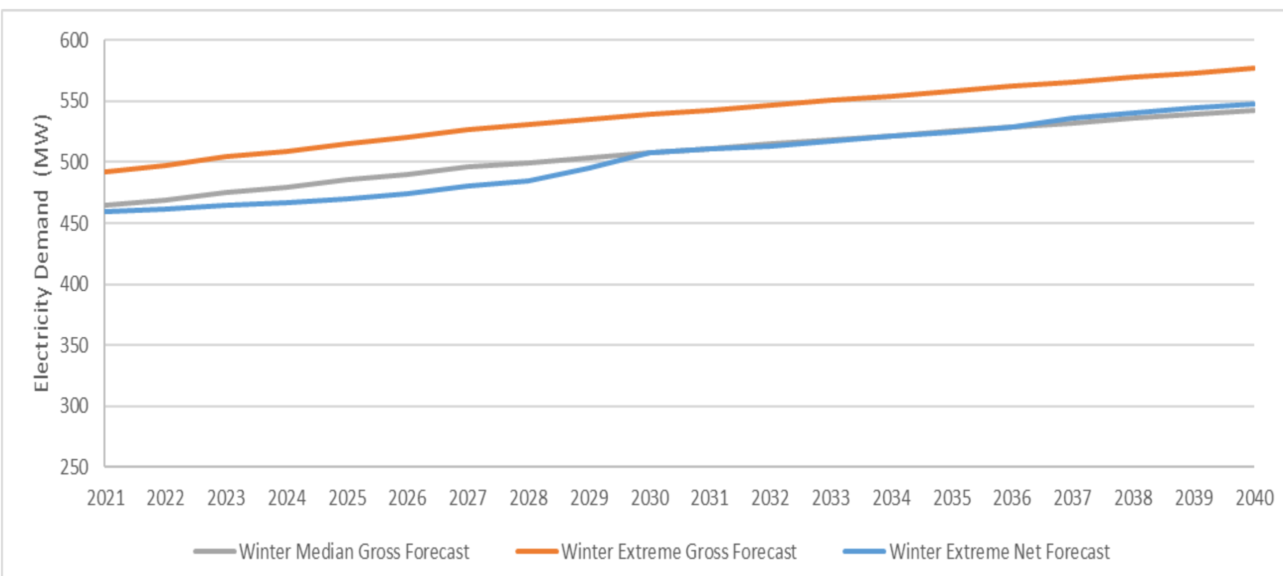


Figure 7 | Winter Net Extreme Weather Demand Forecast



5.7 Load Profiling

In addition to the annual peak demand forecast, hourly load profiles (8,760 hours per year over 20 year forecast horizon) for a number of stations or group of stations with identified needs were developed to characterize their needs with finer granularity. The profiles are based on historical data adjusted for variables that impact demand such as calendar day (e.g. holidays and weekends) and weather (e.g. extreme weather events like ice storms or heat waves) impacts. The profiles are then scaled to match the annual peak forecast for each year. These profiles are used to quantify the magnitude, frequency and duration of needs to better evaluate the suitability of Non-Wires Alternatives (NWA) options.

Additional load profile details including summary tables and hourly heat maps for each need can be found in Appendix B.

5.8 Sensitivity Scenario

A sensitivity scenario was performed for higher demand. This higher demand scenario is to take into account a variety of factors that could drive demand higher; these include but are not limited electric vehicles charging infrastructure and electrified space heating installations in the sub-region. For this, a growth factor of 5% was applied equally to each LDC's station in the sub-region to determine the impact this would have on the need dates identified in system studies.

The higher demand scenario will not be used to drive any firm recommendations for this IRRP; however, it will help the Technical Working Group identify where the future pinch points may be and when they could materialize. This information can be useful for communities conducting Community Energy Plans, for the TWG in determining areas to monitor in future cycles of regional planning, and for communities and stakeholders as they think about various projects in the sub-region.

6. Electricity System Needs

6.1 Needs Assessment Methodology

Based on the net extreme weather planning demand forecast, the transmitter's identified end-of-life asset replacement plans and the application of ORTAC and North American Electric Reliability Corporation (NERC) TPL-001-4 Standard, the Technical Working Group identified electricity needs for the following categories:

- **Station Capacity Needs** describe the electricity system's inability to deliver power to the local distribution network through the regional step-down transformer stations at peak demand. The capacity rating of a transformer station is the maximum demand that can be supplied by the station and is limited by station equipment. Station ratings are often determined based on the 10-day LTR of a station's smallest transformer under the assumption that the largest transformer is out of service. A transformer station can also be limited when downstream or upstream equipment, e.g., breakers, disconnect switches, low-voltage bus or high voltage circuits, is undersized relative to the transformer rating.
- **Supply Capacity Needs** describe the electricity system's inability to provide continuous supply to a local area at peak demand. This is limited by the LMC of the transmission supply to an area. The LMC is determined by evaluating the maximum demand that can be supplied to an area accounting for limitations of the transmission elements, e.g., a transmission line, group of lines, or autotransformer, when subjected to contingencies and criteria prescribed by ORTAC and TPL-001-4. LMC studies are conducted using power system simulations analysis.
- **End-of-life Asset Refurbishment Needs** describe the needs identified by the transmitter with consideration to a variety of factors such as asset age, the asset's expected service life, risk associated with the failure of the asset and its condition. Replacement needs identified in the near-and early mid-term timeframe would typically reflect more condition-based information, while replacement needs identified in the medium to long term are often based on the equipment's expected service life. As such, any recommendations for medium-to long-term needs should reflect the potential for the need date to change as condition information is routinely updated.
- **Load Security and Restoration Needs** describe the electricity system's inability to minimize the impact of potential supply interruptions to customers in the event of a major transmission outage, such as an outage on a double-circuit tower line resulting in the loss of both circuits. Load security describes the total amount of electricity supply that would be interrupted in the event of a major transmission outage. Load restoration describes the electricity system's ability to restore power to those affected by a major transmission outage within reasonable timeframes. The specific load security and restoration requirements are prescribed by Section 7 of ORTAC.

Technical study results can be found in Appendix D. The needs identified are discussed in the section below.

6.2 Needs Identified

Table 3 below summarizes the needs identified by the Parry Sound/Muskoka IRRP.

Table 3 | Summary of Needs for Parry Sound/Muskoka IRRP

No.	Need	Need Description	Need Date
1	Waubaushene Station Capacity	Waubaushene TS demand forecast is over its summer 10-day LTR	2027
2	End-of-Life refurbishment	M6E/M7E section[2]	2024
3	End-of-Life refurbishment	D1M/D2M section	2028
4	M6E/M7E Supply Capacity	After a loss of either M6E or M7E, the remaining circuit will exceed its Long Term Emergency (LTE) rating	2034
5	Minden Station Capacity	Minden TS demand forecast will exceed its summer 10-day LTR	2038

The summary of the location of the needs identified in the Parry Sound/Muskoka sub-region are shown in Figure 8.

Figure 8 | Summary of Location of Needs

[2] Note that the sections of M6E and M7E that are at end-of-life are different than the thermally limited sections

6.2.1 Station Capacity Needs

Table 4 below shows that there are station capacity needs for the Parry Sound/Muskoka sub-region according to the planning forecast. In the near to medium-term, there are station capacity needs at Waubaushene TS. The summer demand forecast for Waubaushene TS exceeds its 10-day LTR by 2027 as seen in Figure 9. In the longer-term, there are capacity needs for Minden TS arising in 2038 as its summer demand forecast exceeds Minden TS 10-day LTR as seen in Figure 10.

Table 4 | Step-down Station Summer Capacity Needs

Station	10-day LTR Rating (MW)	2022 (MW)	2025 (MW)	2030 (MW)	2040 (MW)
Minden TS	52	44.3	44.2	45.8	52.8
Waubaushene TS	94	89.9	91.5	98.6	116.4

Figure 9 | Waubaushene TS Capacity Needs

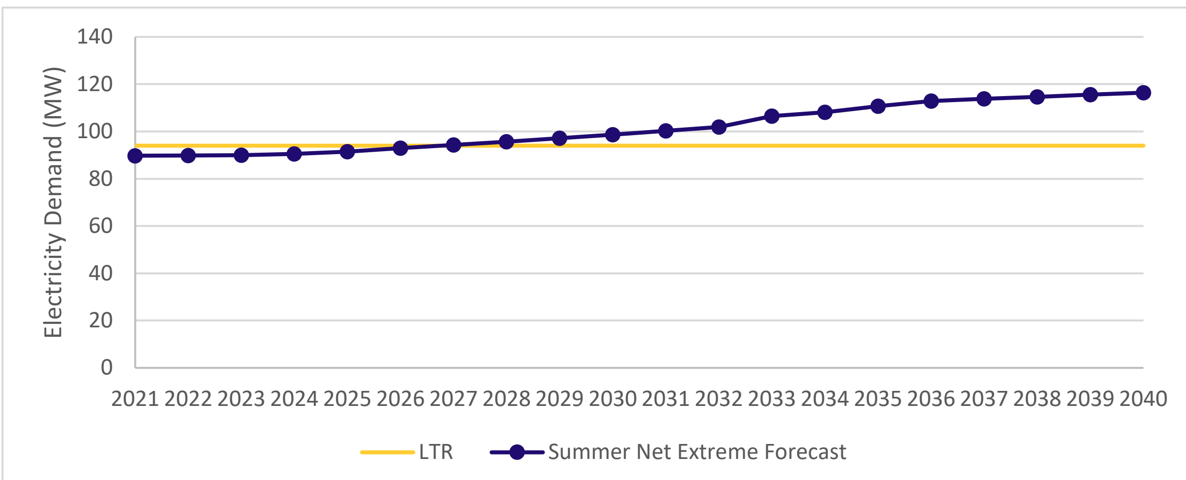
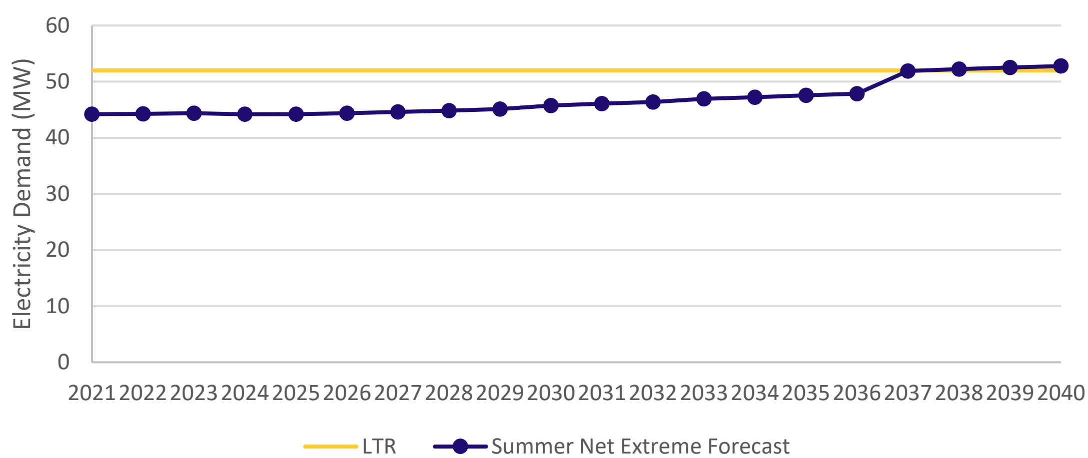


Figure 10 | Minden TS Capacity Needs



In the higher demand sensitivity scenario, the station capacity need is advanced to 2022 for Waubaushene TS and to 2037 for Minden TS.

Besides the station capacity needs identified above, Hydro One's Needs Assessment also identified station capacity need at Parry Sound TS which was identified in the previous cycle of regional planning. The transformers were also assessed at being end-of-life. In order to address the station capacity and end-of-life needs, Hydro One is installing new 230/44 kV 83 MVA transformers which are scheduled to be in service by 2024. The LTRs of the new transformers were applied in the IRRP's assessment of station capacity needs and no further station capacity needs were identified.

6.2.2 Supply Capacity Needs

The circuits M6E and M7E form a 230 kV double circuit from Essa TS to Minden TS. These circuits provide supply to Midhurst, Orillia, Bracebridge and Muskoka. This need occurs for section Minden TS to Cooper Falls JCT (51 km in length) which belongs to the Parry Sound/Muskoka sub-region. M6E section Minden TS to Cooper Falls JCT TS will exceed its LTE rating for a failure of breaker HL7 at Minden HL7 starting in 2038. Also, with M7E already out of service, for loss of Essa T3, M6E is at 133% of its LTE in 2040. Note that in the higher demand sensitivity scenario, this supply capacity need is advanced by two years.

6.2.3 End-of-Life Refurbishment Needs

As per information provided by Hydro One, sections of 230 kV circuits M6E/M7E and D1M/D3M are reaching end-of-life. The in service dates will be 2024 for M6E/M7E and 2028 for D1M/D3M. The end-of-life section includes 25 km from Orillia TS to Cooper Falls JCT for M6E/M7E and 62 km from Minden TS to Otter Creek TS for D1M/D3M.

6.2.4 Load Security and Restoration Needs

There are no load security or restoration needs identified for Parry Sound/Muskoka sub-region for the time frame.

7. Plan Options and Recommendations

In developing the plan, the Technical Working Group considered a range of integrated options. Considerations in assessing alternatives included maximizing use of existing infrastructure, provincial electricity policy, feasibility, cost, and consistency with longer-term needs in the area.

Generally speaking, there are two approaches for addressing regional needs that arise as electricity demand increases:

1. Build new infrastructure to increase the load meeting capability of the area. These are commonly referred to as "wires" options and can include things like new transmission lines, autotransformers, step-down transformer stations, voltage control devices or upgrades to existing infrastructure. Wires options may also include control actions or protection schemes that influence how the system is operated to avoid or to mitigate certain reliability concerns.

2. Install or implement measures to reduce the net peak demand to maintain loading within the system's existing load meeting capability. These are commonly referred to as NWA and can include things like local utility scale generation, distributed energy resources, or conservation and demand management.

The IESO utilized a screening approach for assessing which needs would be best suited to undergoing a detailed assessment for non-wires alternatives, including CDM. The initial screening exercise examined the duration, frequency, timing, and magnitude of the need, as well as cost of traditional wires solutions, for each identified need.

The screening process resulted in NWA being considered for all of the near/medium-term needs to be addressed by the IRRP, except the end-of-life needs. Needs characterization was completed for the Waubaushene TS station capacity need. While the supply capacity need arising on the M6E/M7E circuits is in the longer-term, needs characterization was completed for this need to inform future options.

7.1 Options and Recommendations for Meeting Near/Medium-Term Needs

7.1.1 Waubaushene TS Station Capacity Need

Waubaushene TS will reach end-of-life (EOL) in 2030 and was planned for replacement at this time; however, current needs show an earlier replacement is required. Waubaushene will be over its 10-day summer LTR in 2027.

In terms of non-wires options, the Technical Working Group first reviewed the findings of the Local Achievable Potential (LAP) Study for the Parry Sound and Waubaushene TS service area that was recommended in the last Parry Sound/Muskoka IRRP, and subsequently completed between cycles.

The LAP study was to determine the cost and feasibility of using distributed energy resources (DER) and CDM options to defer needs requiring major capital investments. The LAP explored needs at Parry Sound and Waubaushene and determined that:

1. Dispatchable DERs are required to meet the characteristics of the needs; and
2. There are limited opportunities for dispatchable DER in the area

As part of the development of this IRRP, the Technical Working Group updated the analysis of NWA to ensure it captures the latest information related to option screening, informed by the needs characterization, and options costs. Based on the characteristics of the need, the non-wires alternatives assessment for Waubaushene indicated incremental CDM to be a good candidate for a non-wires solution.

In terms of wires options, the transformers replacement can be advanced and upgraded to larger units to meet the need. However, this requires a lead time of 2-3 years. Another non-wires option considered was energy storage as it is the least cost of the distributed resource options and serves as a benchmark that can be compared with the transformers replacement option.

The table below summarizes the options considered and the net present value of their levelized cost for the Waubaushene station capacity needs.

Table 5 | Options for Waubaushene TS Station Capacity Needs and Costs

	Option	Cost NPV
Wires	Station replacement/upgrade. Transformers are scheduled for replacement in 2030 but this can be advanced and upgraded to larger units. There is an opportunity to align the station capacity needs with EOL replacement; however, a 2-3 year lead time is required	$5 M
Non-wires - Storage	29 MW of storage	$30 M
Non-wires- CDM	Incremental cost effective CDM in the area served by the station	-

It is recommended to consider incremental, cost-effective CDM to defer the need arising in 2027 until the transformers are replaced for end-of-life. If by 2024 there are no commitments for incremental, cost-effective CDM, implement alternative solution such as advancing the end-of-life replacement of the transformers. The RIP will further explore this backstop solution.

7.1.2 D1M/D2M & M6E/M7E (Orillia x Copper) End-of-Life Needs

When equipment reaches the end of its life and requires replacement, a number of options can be considered.

- Replacement of the equipment with "like-for-like" or closest available standard;
- Reconfiguration of existing equipment to "right-size" the replacement option based on:
    - Demand forecast,
    - Changes to the use of the equipment since it was originally installed,
    - Reliability or other system benefits that an alternate configuration may provide; and
- Retirement of equipment, considering the impact on load supply and reliability.

Since no violations were identified for the identified circuits in system studies, a like-for-like replacement with the closest available standard is appropriate and can best address the end-of-life needs at sections of D1M/D2M and M6E/M7E.

7.2 Options and Recommendations for Meeting Longer-Term Needs

For needs appearing in the long term, there is an opportunity to develop and explore options, as specific projects do not need to be committed immediately. This approach is designed to: maintain flexibility; avoid committing ratepayers to investments before they are needed; provide adequate time to assess the success of current and future potential conservation measures in the study area; test emerging technologies; engage with communities and stakeholders; and lay the foundation for informed decisions in the future.

Additionally; the Working Group will monitor changes in growth targets, progress in electrification in the region, and any significant changes in forecast growth. If monitoring activities determine that the region's growth is exceeding the load forecast, it may be necessary to initiate the next iteration of the regional planning process earlier.

7.2.1 Minden Station Capacity Needs

Minden TS is expected to have station capacity needs by 2038. Given the timing of the need, no firm recommendation is required at this time. It is advised to monitor the load growth in the areas and provide enough lead time to capture changes into the next cycle of regional planning where these needs can be revisited.

7.2.2 M6E/M7E (Minden x Copper) System Capacity Need

The IRRP considered a number of options including incremental cost-effective CDM and storage, even though this is a longer-term need. This analysis showed that incremental cost-effective CDM is a potentially well-suited for deferring this need. As such, the Technical Working Group should continue to consider incremental, cost-effective CDM in between cycles and in the next cycle of regional planning in the region.

7.3 Summary of Recommended Actions and Next Steps

Table 6, below, summarizes the specific recommendations that should be implemented to address the electricity supply needs in the Parry Sound/Muskoka sub-region.

Table 6 | Summary of Parry Sound/Muskoka IRRP Recommendations

Need Description	Recommendation	Lead Responsibility	Timeline
Minden TS to reach its summer 10-day LTR	Monitor load growth to ensure load supplying capability is maintained; consider in the next cycle of regional planning	Technical Working Group	2038
Waubaushene TS to reach its summer 10-day LTR	Consider incremental, cost-effective CDM to defer the need arising in 2027 until the transformers are replaced for end-of-life. If by 2024 there are no commitments for incremental, cost-effective CDM, implement alternative solution such as advancing the end-of-life replacement of the transformers. The RIP will further explore this backstop solution	Hydro One	2024/2027
M6E/M7E (Minden TS x Cooper Fls JCT) supply capacity	Monitor demand growth in the area; consider CDM option on next cycle of regional planning as a means of deferring transmission upgrade	Hydro One	2034
Sections of D1M/D2M circuits to reach end-of-life	Like-for-like replacement approach	Hydro One	2028
Sections of M6E/M7E Orillia to Cooper to reach end-of-life	Like-for-like replacement approach	Hydro One	2024

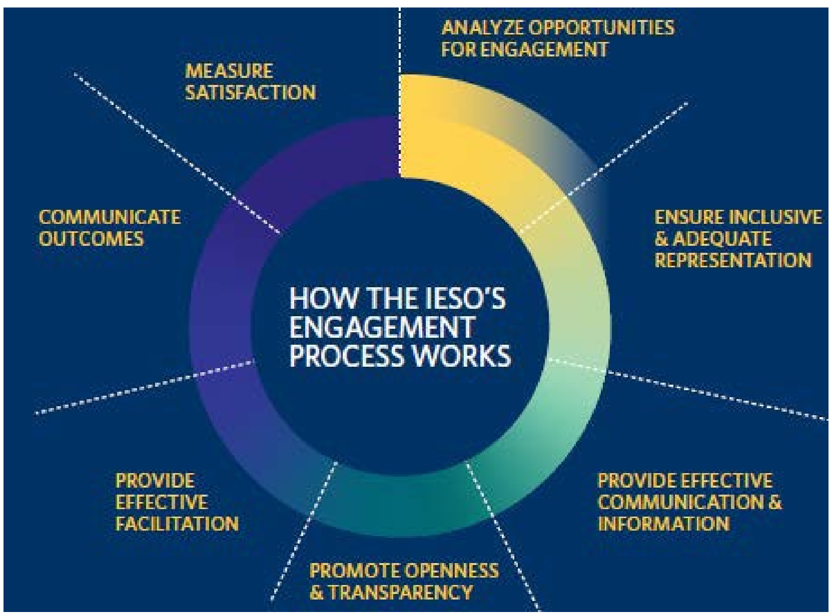
8. Engagement

Engagement is critical in the development of an IRRP. Providing opportunities for input in the regional planning process enables the views and preferences of communities to be considered in the development of the plan, and helps lay the foundation for successful implementation. This section outlines the engagement principles as well as the activities undertaken for the IRRP.

8.1 Engagement Principles

The IESO's engagement principles help ensure that all interested parties are aware of and can contribute to the development of this IRRP. The IESO uses these principles to ensure inclusiveness, sincerity, respect and fairness in its engagements, striving to build trusting relationships as a result.

Figure 11 | The IESO's Engagement Principles



8.2 Creating an Engagement Approach for Parry Sound/Muskoka

The first step in ensuring that any IRRP reflects the needs of community members and interested stakeholders is to create an engagement plan to ensure that all interested parties understand the scope of the IRRP and are adequately informed about the background and issues in order to provide meaningful input on the development of the IRRP for the region.

- Creating the engagement plan for this IRRP involved:
- Discussions to help inform the engagement approach for the planning cycle;

- Developing and implementing engagement tactics to allow for the widest communication of the IESO's planning messages, using multiple channels to reach audiences; and
- Identifying specific stakeholders and communities that should be targeted for one-on-one consultation, based on identified and specific needs.

As a result, the engagement plan for this IRRP included:

- A dedicated webpage on the IESO website to post all meeting materials, feedback received and IESO responses to the feedback throughout the engagement process;
- Regular communication with interested communities and stakeholders by email or through the IESO weekly Bulletin;
- Public webinars;
- Targeted individual and small group meetings; and
- One-on-one outreach with specific stakeholders to ensure that their identified needs are addressed (see Section 8.3).

8.3 Engage Early and Often

The IESO held preliminary discussions to help inform the engagement approach for this new round of planning and establish new relationships with communities and stakeholders in the region.

An invitation was sent to targeted municipalities, Indigenous communities and those with an identified interest in regional issues to announce the commencement of a new regional planning cycle and invite interested parties to provide input on the draft South Georgian Bay/Muskoka Scoping Assessment Outcome Greater before it was finalized. Feedback received encouraged the IESO to consider renewable technologies to help reduce local demand.

Following a written comment window, the final Scoping Assessment Outcome Report was published in November 2020 that identified the need for a coordinated planning approach done through two sub-regional IRRP: Barrie/Innisfil and Parry Sound/Muskoka.

Following these initial discussions and finalization of the Scoping Assessment, the launch of a broader engagement initiative followed with an invitation to subscribers of the South Georgian Bay/Muskoka region to ensure that all interested parties were made aware of this opportunity for input.

Three public webinars were held at major junctures during IRRP development to give interested parties an opportunity to hear about its progress and provide comments on key components. The webinars received cross-representation of stakeholders and community representatives attending the webinar and submitting written feedback during a 21-day comment period.

The three stages of engagement invited input on:

1. The draft engagement plan, the electricity demand forecast and the early identified needs to set the foundation of this planning work.
2. The defined electricity needs for the region and potential options to meet the identified needs.

3. The analysis of options and draft IRRP recommendations.

All interested parties were kept informed throughout this engagement initiative via email to South Georgian Bay/Muskoka region subscribers, municipalities and communities as well as the members of the GTA/Central Regional Electricity Network.

Based on the discussions both through the Parry Sound/Muskoka IRRP outreach activities and broader network dialogue, there appears to be significant community growth planned in more rural area requiring new infrastructure, and broad interest in electrification, renewable energy solutions, net-zero development, and decarbonisation of electricity supply. To that end, ongoing discussions will continue through the IESO's GTA Central Regional Electricity Network to keep interested parties engaged on local developments, priorities and planning initiatives.

All background information, including engagement presentations, recorded webinars, detailed feedback submissions, and responses to comments received, are available on the dedicated IRRP engagement webpage.

8.4 Bringing Municipalities to the Table

The IESO held meetings with municipalities to seek input on their planning and to ensure that these plans were taken into consideration in the development of this IRRP. At major milestones in the IRRP process, meetings with the upper- and lower-tier municipalities in the region were held to discuss: key issues of concern, including forecast regional electricity needs; options for meeting the region's future needs; and, broader community engagement. These meetings helped to inform the municipal/community electricity needs and provided opportunities to strengthen this relationship for ongoing dialogue beyond this IRRP process.

8.5 Engaging with Indigenous Communities

To raise awareness about the regional planning activities underway and invite participation in the engagement process, regular outreach was made to Indigenous communities within the Southern Huron-Perth electricity planning sub-region or that may have interests in the sub-region throughout the development of the plan. This includes the First Nation communities of Alderville, Beausoleil, Chippewas of Georgina Island, Chippewas of Rama, Curve Lake, Henvey Inlet, Hiawatha, Huron-Wendat Nation, Magnetawan, Mississaugas of Scugog Island, Moose Deer Point, Shawanaga, Wahta Mohawks and Wasauksing as well as the Métis Nation Ontario communities of Barrie South-Simcoe Métis Council, Georgian Bay Métis Council and Moon River Métis Council

9. Conclusion

The Parry Sound/Muskoka IRRP identifies electricity needs in the sub-region and opportunities to preserve or enhance system reliability for the next 20 years. This report makes recommendations to address near- to medium-term issues, and lays out actions to monitor, defer, and address long-term needs. The IESO will continue to participate in the Working Group during the next phase of regional planning, the Regional Infrastructure Plan, to provide input and ensure a coordinated approach with bulk system planning where such linkages are identified in the IRRP.

To support the development of the plan, this IRRP includes recommendations with respect to developing alternatives, and monitoring load growth and efficiency achievements. Responsibility for these actions has been assigned to the appropriate members of the Technical Working Group.

The Technical Working Group will meet at regular intervals to monitor developments and track progress toward plan deliverables. In the event that underlying assumptions change significantly, local plans may be revisited through an amendment, or by initiating a new regional planning cycle sooner than the five-year schedule mandated by the OEB.

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