PARRY SOUND / MUSKOKA SUB-REGION INTEGRATED REGIONAL RESOURCE PLAN

Part of the South Georgian Bay/Muskoka Planning Region | December 16, 2016

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Integrated Regional Resource Plan

Parry Sound/Muskoka

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

This IRRP was prepared on behalf of the Parry Sound/Muskoka Sub-region Working Group (the "Working Group"), which included the following members:

- Independent Electricity System Operator
- Hydro One Networks Inc. (Distribution)
- Hydro One Networks Inc. (Transmission)
- Lakeland Power Distribution Ltd.
- Midland Power Utility Corporation
- Newmarket-Tay Power Distribution Ltd.
- Orillia Power Distribution Corporation
- PowerStream Inc.
- Veridian Connections Inc.

The Working Group assessed the reliability of electricity supply to customers in the Parry Sound/Muskoka Sub-region over a 20-year period; developed a flexible, comprehensive, integrated plan that considers opportunities for coordination in anticipation of potential demand growth scenarios and varying supply conditions in the Parry Sound/Muskoka Sub-region; and developed recommended actions, while maintaining flexibility in order to accommodate changes in key assumptions over time.

The Working Group members agree with the IRRP's recommendations and support implementation of the plan, subject to obtaining necessary regulatory approvals and appropriate community consultations.

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Abbreviations	Descriptions
CCAP	Climate Change Action Plan
CDM or Conservation	Conservation and Demand Management
CEP	Community Energy Plans
CFF	Conservation First Framework
CHP	Combined Heat and Power
DG	Distributed Generation
DR	Demand Response
FIT	Feed-in Tariff
GHG	Greenhouse Gas
Hydro One	Hydro One Networks Inc. (Distribution and Transmission)
IAP	Industrial Accelerator Program
IESO	Independent Electricity System Operator
IRRP	Integrated Regional Resource Plan
kV	Kilovolt
LAC	Local Advisory Committee
Lakeland Power	Lakeland Power Distribution Ltd.
LDC	Local Distribution Company
LMC	Load Meeting Capability
LTEP	(2013) Long-Term Energy Plan
LTR	Limited Time Rating
Midland PUC	Midland Power Utility Corporation
MW	Megawatt
Newmarket-Tay Power	Newmarket-Tay Power Distribution Ltd.
OEB or Board	Ontario Energy Board
OPA	Ontario Power Authority
Orillia Power	Orillia Power Distribution Corporation

Abbreviations	Descriptions
ORTAC	Ontario Resource and Transmission Assessment Criteria
OWA	Ontario Waterpower Association
PowerStream	PowerStream Inc.
PPWG	Planning Process Working Group
PPWG Report	Planning Process Working Group Report to the Board
RIP	Regional Infrastructure Plan
TOU	Time-of-Use
TS	Transformer Station
TWh	Terawatt-Hours
Veridian Connections	Veridian Connections Inc.
Working Group	Technical Working Group for Parry Sound/Muskoka Sub-region IRRP

1. Introduction

This Integrated Regional Resource Plan ("IRRP") for the Parry Sound/Muskoka Sub-region addresses the electricity needs for the sub-region over the next 20 years from 2015 to 2034 ("study period"). The IRRP was prepared by the Independent Electricity System Operator ("IESO") on behalf of the Technical Working Group (the "Working Group") for the Parry Sound/Muskoka Sub-region composed of the IESO, Hydro One Distribution and Hydro One Transmission[1], Lakeland Power Distribution Ltd. ("Lakeland Power"), Midland Power Utility Corporation ("Midland PUC"), Newmarket-Tay Power Distribution Ltd. ("Newmarket-Tay Power"), Orillia Power Distribution Corporation ("Orillia Power"), PowerStream Inc. ("PowerStream") and Veridian Connections Inc. ("Veridian Connections").

The area covered by the Parry Sound/Muskoka IRRP is a Sub-region of the South Georgian Bay/ Muskoka Region identified through the Ontario Energy Board ("OEB" or "Board") regional planning process. This sub-region roughly encompasses the Districts of Muskoka and Parry Sound and the northern part of Simcoe County. This sub-region is characterized by:

- **Diverse communities**: In addition to the "unorganized areas"[2] in the Parry Sound District, there are eight First Nation communities and 35 municipalities located in this sub-region, all of which are listed in Section 4.1. The communities have different local priorities and electricity needs. Some communities are engaging in community energy planning activities.

- **Large geographical area:** A mix of long and expansive 230 kilovolt ("kV") transmission, 44 kV sub-transmission and low-voltage distribution infrastructure are required to deliver electricity supply to the various communities and customers across this sub-region. The geography and sparsely populated areas make it challenging and costly to develop and maintain infrastructure.

- **Use of Electric Space and Water Heating:** Due to limited access to natural gas infrastructure in this sub-region, many communities rely on electric space and water heating, especially during the winter season. In addition to electricity, some customers also rely on other fuel types, such as wood, to meet their heating requirements.

[1] For the purpose of this report, "Hydro One Transmission" and "Hydro One Distribution" are used to differentiate the transmission and distribution accountabilities of Hydro One Networks Inc. ("Hydro One"), respectively.
[2] Unorganized areas are parts of the province where there is no municipal level of government. Services in these unorganized districts are typically administered by local services boards.

- **Modest Growth:** While relatively slower growth is expected in the manufacturing sector, growing First Nation communities, developments in the tourism and retail sector, and potential local economic development could contribute to higher electricity demand in the sub-region. Seasonal population driven by tourism and recreational activities may also increase electricity requirements over the longer term.

This IRRP fulfills the requirements for the sub-region as required by the IESO's OEB electricity licence. IRRPs are required to be reviewed on a 5-year cycle so that plans can be updated to reflect the changing electricity outlook. This IRRP will be revisited in 2021, or earlier if significant changes occur relative to the current forecast.

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 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;
- Demand forecast and conservation and demand management ("CDM" or "conservation") and distributed generation ("DG") assumptions are described in Section 5;
- Needs in the Parry Sound/Muskoka Sub-region are presented in Section 6;
- Options to address regional and local needs are addressed in Section 7;
- Recommended actions are set out in Section 8;
- A summary of community, Indigenous and stakeholder engagement to date is provided in Section 9; and
- A conclusion is provided in Section 10.

2. The Integrated Regional Resource Plan

The Parry Sound/Muskoka IRRP addresses the sub-region's electricity needs over the next 20 years, based on application of the IESO's Ontario Resource and Transmission Assessment Criteria ("ORTAC"). The IRRP was developed in consideration of a number of factors, including reliability, cost, technical feasibility, flexibility and also the diverse needs and unique characteristics of the sub-region.

The needs and recommended actions are summarized below.

2.1 Need to Minimize the Frequency and Duration of Power Outages

Customers and communities in the Parry Sound/Muskoka Sub-region experience more frequent and prolonged power outages relative to other communities and electricity customers in the province. Any outage along the 230 kV transmission, 44 kV sub-transmission and low-voltage distribution lines can interrupt the electricity supply to the communities and customers. Results from the service reliability performance assessment show that a number of 44 kV sub-transmission systems in this sub-region are performing below provincial average[3] in terms of frequency and duration of outages. Long 44 kV sub-transmission lines and off-road facilities are the main causes for frequent and prolonged outages for this sub-region. Lengthy distribution lines also typically exhibit lower levels of reliability because of increased exposure to trees and wildlife, and they sustain more damage from poor weather. Limited access to off-road facilities makes it difficult for repair crews to detect early signs of equipment failures, do preventative maintenance and restore power in a timely manner.

While major 230 kV transmission outages have been relatively infrequent in the Parry Sound/Muskoka Sub-region, the existing 230 kV transmission system has limited ability to restore power in a timely manner and minimize the number of customers impacted in the event of a major 230 kV transmission outage and does meet Ontario's planning criteria.

The Working Group has recommended a set of actions to minimize the frequency and duration of 44 kV related power outages and to bring the 230 kV transmission system in compliance with Ontario's planning standards.

[3] On average, customers being supplied from a typical 44 kV sub-transmission line in Ontario experience outages about two times a year with outages typically lasting 5 hours or less.

Recommended Actions

1. **Inform communities and Local Advisory Committee ("LAC")[4] members of the 44 kV sub-transmission system service reliability performance and the on-going maintenance and improvement initiatives in the Parry Sound/Muskoka Sub-region.**

   Hydro One Distribution will examine options to improve the reliability performance on the 44 kV sub-transmission system as part of their planning process. Hydro One Distribution will provide an update on measures to improve 44 kV sub-transmission system service reliability performance including any proposed capital plans. This update will be provided by end of 2017.

   The ability to implement any proposed capital investment plans will be contingent on the outcome of Hydro One Distribution's 2018-2022 rate filing application with the OEB.

2. **Examine the cost benefit and cost responsibility of options to resupply customers in Bracebridge, Gravenhurst, Muskoka Lakes and surrounding areas from alternate transformer station**

   Hydro One Distribution, Lakeland Power and Veridian Connections will examine various options to improve service reliability performance of the 44 kV sub-transmission system supplying the Bracebridge/Gravenhurst/Muskoka Lakes and surrounding areas, including the option to resupply customers in Bracebridge, Gravenhurst, Muskoka Lakes and surrounding areas from an alternate transformer station. The cost-benefit and cost responsibility of these options will be considered. The affected LDCs will discuss their assessment and decision with the Working Group through the regional planning process. This action is expected to be completed by the end of 2017. The results will be shared with LAC members and affected communities.

[4] A LAC for the Parry Sound/Muskoka Sub-region was established to allow community representatives to provide input on the status of local growth and developments, local planning priorities, energy planning activities (e.g., community energy planning), and opportunities to implement community-based energy solutions.

3. **Install two 230 kV motorized switches at Orillia TS**

   To restore power to customers in a timely manner in the event of a major outage on the Muskoka-Orillia 230 kV sub-system, the Working Group recommends proceeding with the installation of two 230 kV motorized switches at the Orillia Transformer Station ("TS"). The IESO will provide a letter to Hydro One Transmission to initiate project development work for the two 230 kV motorized switches at Orillia TS in 2017. Based on typical development timeline of switching facilities, the project is expected to be in-service by the end of 2020.

4. **Explore opportunities to improve resilience and service reliability at the community level**

   Some communities are engaged in community energy planning activities and interested in developing distributed energy resources. The IESO can facilitate discussions with First Nation communities, municipalities and LAC members on the opportunities to improve system resilience and service reliability through community energy planning and distributed energy resources and the cost-benefit of these opportunities.

2.2 Need to Provide Adequate Supply to Support Growth

Despite the relatively slow growth in this sub-region, the transformers supplying the Parry Sound and Waubaushene areas are approaching their maximum capacity in the near term. Additionally, the electricity demand on the 230 kV transmission system supplying the Orillia and Muskoka area may exceed capacity over the longer term.

Actions need to be taken to ensure that the regional electricity system has adequate supply to support growth in this sub-region over the planning period.

Recommended Actions

1. **Resupply some customers in the Parry Sound and Waubaushene areas from neighbouring transformer stations using existing and new distribution facilities to maximize the use of the existing system**

   The electricity demand at the Parry Sound TS has already exceeded the transformers' capacity. To manage the near-term demand growth in the area, about 6 Megawatts ("MW") at Parry Sound TS will be resupplied from Muskoka TS. To facilitate the transfer of load from Parry Sound TS to Muskoka TS, it is recommended that Hydro One Distribution seek approval to construct 44 kV feeder tie between the Muskoka TS M5 and M1 feeders. The siting and routing of these facilities will be determined as part of the project development

process. Based on the typical project development timeline for 44 kV sub-transmission reinforcements, the project is expected to be in-service by 2020.

The electricity demand at Waubaushene TS is approaching it's transformer's capacity limits. To manage the near-term demand growth in the area, about 4 MW at Waubaushene TS will be resupplied from Orillia TS by 2020. If required, another 7 MW at Waubaushene TS can be resupplied from Midhurst TS upon completion of Barrie Area Transmission Reinforcement in the early 2020s. This can be done using existing distribution system and no new facilities will be required.

Midhurst TS is a major transformer station supplying the Barrie/Innisfil Sub-region. Resupplying some of the customers in the Waubaushene area from Midhurst TS could impact the timing and need for a new transformer station in the Barrie/Innisfil Sub-region over the longer term. As such, the Working Group will need to coordinate with the Barrie/Innisfil IRRP Working Group to monitor and manage the demand growth in the Waubaushene and Barrie/Innisfil Sub-region.

2. **Determine the cost and feasibility of using distributed energy resources and local conservation and demand management options to defer major capital investments in the Parry Sound/Muskoka Sub-region**

With the relatively slow electricity demand growth forecast for this sub-region, there is an opportunity to use targeted local conservation and demand management, distribution-connected generation and/or other distributed energy resources to defer major capital investments that might otherwise be required (e.g., transformer upgrades at Parry Sound TS and Waubaushene TS, reinforcements on the Muskoka-Orillia Sub-system).

The Working Group will initiate a local achievable potential study in the Parry Sound/Muskoka Sub-region to determine the cost and feasibility of using distributed energy resources and local demand management options to defer those major capital investments. A range of distributed energy resources and local demand management options may be suitable, including focused marketing and/or incentive adders to existing conservation programs, new conservation and demand management programs, local demand response, behind-the-meter generation and energy storage. These options will be considered as part of the study. This study will be initiated in early 2017 by the LDCs. The IESO will assist and provide funding for the study.

The Working Group will also work closely with communities to leverage local knowledge and community energy planning activities and to identify opportunities for targeted conservation and energy efficiency programs in First Nation communities and municipalities.

3. **Determine whether it is cost effective to advance the end-of-life replacement and to replace the aging assets with upgraded/upsized facilities at Parry Sound TS and Waubaushene TS**

   The transformers at Parry Sound TS and Waubaushene TS were installed in the early 1970's and therefore these transformers could be reaching end-of-life in the early 2030s. On an annual basis, Hydro One Transmission will provide updated information on the condition of aging equipment at the Parry Sound TS and Waubaushene TS. This information will be shared with the LAC and the Working Group. The IESO will continue to monitor the demand growth at Parry Sound TS and Waubaushene TS to determine whether it is cost effective to advance the end-of-life replacement and to replace aging assets with upgraded/upsized facilities. This need will be revisited in the next iteration of the plan.

4. **Monitor electricity demand growth closely to determine the timing of any investment decisions relating to the Muskoka-Orillia 230 kV sub-system**

   On an annual basis, the IESO will review electricity demand growth on the Muskoka-Orillia 230 kV sub-system with the Working Group and members of the LAC. This information will be used to determine if and when an investment decision for the Muskoka-Orillia 230 kV is required. This need will be revisited in the next iteration of the plan.

3. Development of the Integrated Regional Resource Plan

3.1 The Regional Planning Process

In Ontario, planning to meet the electricity needs of customers at a regional level is done through regional planning. Regional planning assesses the interrelated needs of a region—defined by common electricity supply infrastructure—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.

Regional planning has been conducted on an as needed basis in Ontario for many years. Most recently, the former Ontario Power Authority ("OPA") carried out planning activities to address regional electricity supply needs. The OPA conducted joint regional planning studies with distributors, transmitters, the IESO and other stakeholders in regions where a need for coordinated regional planning had been identified.

In the fall of 2012, the Board convened a Planning Process Working Group ("PPWG") to develop a more structured, transparent, and systematic regional planning process. This group was composed of industry stakeholders including electricity agencies, utilities, and stakeholders, and in May 2013, the PPWG released its report to the Board[5] ("PPWG Report"), setting out the new regional planning process. Twenty-one electricity planning regions were identified in the PPWG Report, and a phased schedule for completion was outlined. The Board endorsed the PPWG Report and formalized the process timelines through changes to the Transmission System Code and Distribution System Code in August 2013, as well as through changes to the OPA's licence in October 2013. The OPA's licence changes required it to lead a number of aspects of regional planning. After the merger of the IESO and the OPA on January 1, 2015, the regional planning roles identified in the OPA's licence were to become the responsibility of the new IESO.

The regional planning process begins with a Needs Screening performed by the transmitter, which determines whether there are needs requiring regional coordination. If regional planning is required, the IESO then conducts a Scoping Assessment to determine whether a comprehensive IRRP is required, which considers conservation, generation, transmission, and

[5] http://www.ontarioenergyboard.ca/OEB/_Documents/EB-2011-0043/PPWG_Regional_Planning_Report_to_the_Board_App.pdf

distribution solutions, or whether a more limited "wires" solution is the only option such that a transmission and distribution focused Regional Infrastructure Plan ("RIP") can be undertaken instead. The Scoping Assessment assesses what type of planning is required for each region. There may also be regions where infrastructure investments do not require regional coordination and so can be planned directly by the distributor and transmitter outside of the regional planning process. At the conclusion of the Scoping Assessment, the IESO produces a report that includes the results of the Needs Screening process and a preliminary Terms of Reference. If an IRRP is the identified outcome, the IESO is required to complete the IRRP within 18 months. If an RIP is the identified outcome, the transmitter takes the lead and has six months to complete it. It should be noted that a RIP may be initiated after the Scoping Assessment or after the completion of all IRRPs within a planning region; the transmitter may also initiate and produce a RIP report for every region. Both RIPs and IRRPs are to be updated at least every five years. The draft Scoping Assessment Outcome Report is posted to the IESO's website for a 2-week comment period prior to finalization.

The final IRRPs and RIPs are posted on the IESO's and relevant transmitter's websites, and may be referenced and submitted to the Board as supporting evidence in rate or "Leave to Construct" applications for specific infrastructure investments. These documents are also useful for municipalities, First Nation communities and Métis for planning, conservation and energy management purposes, as information for individual large customers that may be involved in the region, and for other parties seeking an understanding of local electricity growth, CDM and infrastructure requirements. Regional planning is not the only type of electricity planning that is undertaken in Ontario. As shown in Figure 3-1, there are three levels of planning that are carried out for the electricity system in Ontario:

- Bulk system planning
- Regional system planning
- Distribution system planning

Planning at the bulk system level typically considers the 230 kV and 500 kV network and examines province-wide system issues. Bulk system planning considers not only the major transmission facilities or "wires", but it also assesses the resources needed to adequately supply the province. This type of planning is typically carried out by the IESO pursuant to government policy. Distribution planning, which is carried out by Local Distribution Companies ("LDCs"), considers specific investments in an LDC's territory at distribution level voltages.

Regional planning can overlap with bulk system planning. For example, overlaps can occur at interface points where there may be regional resource options to address a bulk system issue. Similarly, regional planning can overlap with the distribution planning of LDCs. For example, overlaps can occur when a distribution solution addresses the needs of the broader local area or region. Therefore, it is important for regional planning to be coordinated with both bulk and distribution system planning as it is the link between all levels of planning.

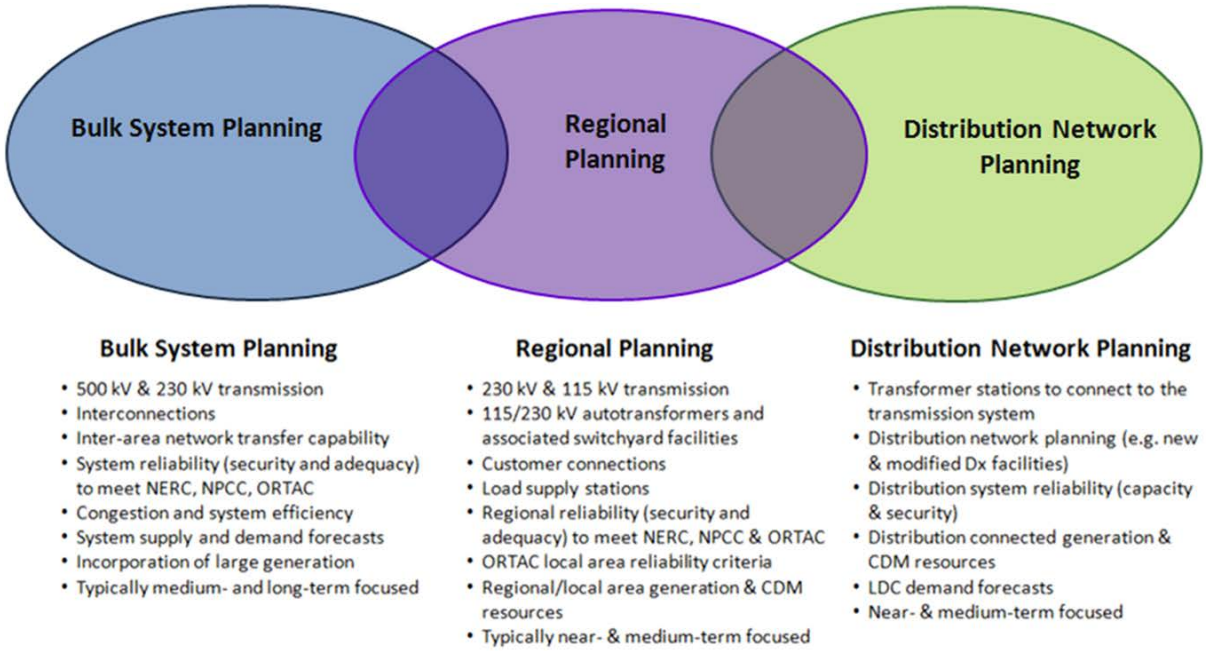


Figure 3-1: Levels of Electricity System Planning

By recognizing the linkages with bulk and distribution system planning, and coordinating multiple needs identified within a region over the long term, the regional planning process provides a comprehensive assessment of a region's electricity needs. Regional planning aligns near- and long-term solutions and puts specific investments and recommendations coming out of the plan in perspective. Furthermore, regional planning optimizes ratepayer interests by avoiding piecemeal planning and asset duplication, and allows Ontario ratepayer interests to be represented along with the interests of LDC ratepayers, and individual large customers. IRRPs evaluate the multiple options that are available to meet the needs, including conservation, generation, and "wires" solutions. Regional plans also provide greater transparency through engagement in the planning process, and by making plans available to the public.

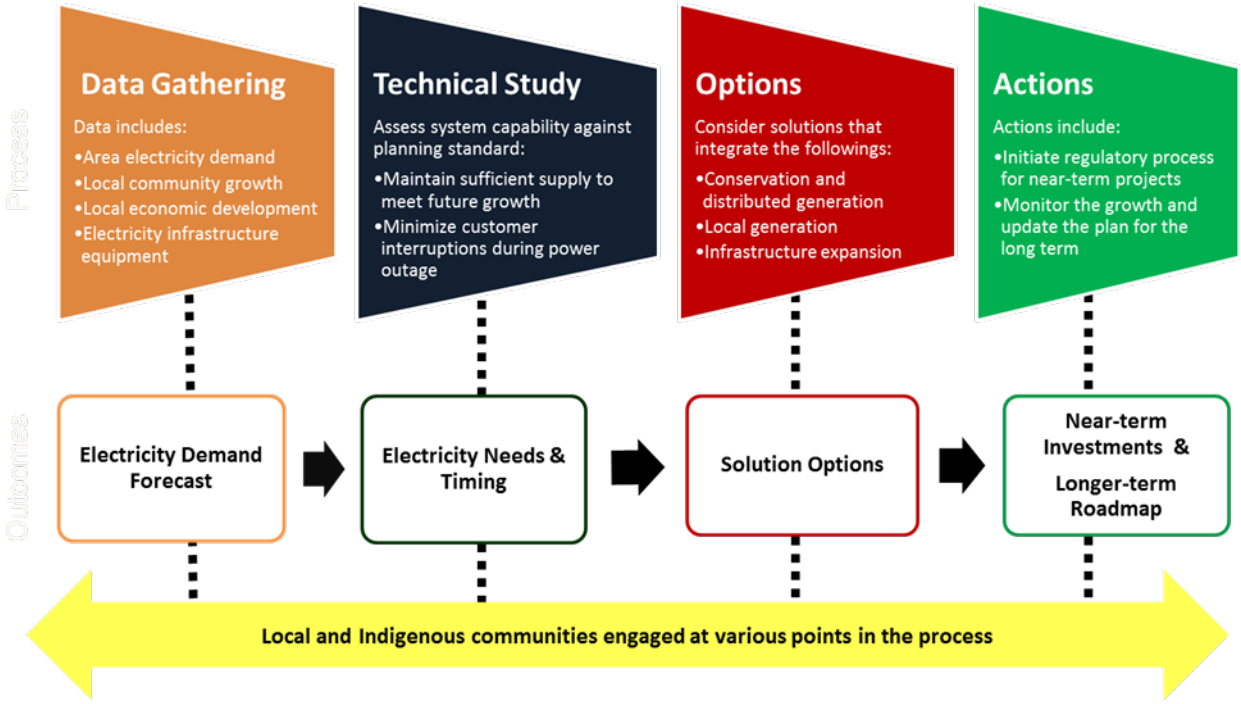
3.2 The IESO's Approach to Integrated Regional Resource Planning

IRRPs assess electricity system needs for a region over a 20-year period. The 20-year outlook anticipates long-term trends in a region, so that near-term actions are developed within the context of a longer-term vision. This enables coordination and consistency with the long-term plan, rather than simply reacting to immediate needs.

The IRRP describes the Working Group's recommendations for system enhancements based on different scenarios. The Working Group also recommends staging options to mitigate reliability and cost risks related to demand forecast uncertainty associated with large individual customers. The IRRP seeks to ensure flexibility is maintained such that changing long-term conditions may be accommodated.

In developing this IRRP, the Working Group followed a number of steps. These steps included: data gathering, including development of electricity demand forecasts; technical studies to determine electricity needs and the timing of these needs; the development of potential options; and, preparation of a recommended plan including actions for the near and longer term. Throughout this process, engagement was carried out with local municipalities, First Nation communities, Métis community councils and local stakeholders. These steps are illustrated in Figure 3-2 below.

Figure 3-2: Steps in the IRRP Process



This IRRP documents the inputs, findings, and recommendations developed through the process described above, and provides recommended actions for the various entities responsible for plan implementation.

3.3 Parry Sound/Muskoka Sub-region Working Group and IRRP Development

In 2014, the lead transmitter – Hydro One Transmission – initiated a Needs Screening process for the South Georgian Bay/Muskoka planning region. The South Georgian Bay/Muskoka Needs Screening study team determined that there was a need for coordinated regional planning, resulting in the initiation of the Scoping Assessment process.

The South Georgian Bay/Muskoka Scoping Assessment Outcome Report [6] was finalized on June 22, 2015 and identified two sub-regions for coordinated regional planning: Parry Sound/Muskoka and Barrie/Innisfil. The two sub-regions are shown in Figure 3-3.

[6] South Georgian Bay/Muskoka Region Scoping Assessment Outcomes report (see IESO website: whttp://www.iemo.com/Documents/Regional-Planning/South-Georgian-Bay-Muskoka/SGBM-Scoping-Process-Outcome-Report-Final-20150622.pdf)

Figure 3-3: South Georgian Bay/Muskoka Region and Sub-regions

Subsequently, the Working Groups were formed to carry out the IRRP for the Parry Sound/Muskoka and Barrie/Innisfil Sub-regions. According to the OEB regional planning process, the Working Groups had 18 months to develop the IRRP.

In addition to the formation of the Working Groups, a LAC for the Parry Sound/Muskoka was established to allow community representatives to provide input on the status of local growth and developments, local planning priorities, energy planning activities (e.g., community energy planning), and opportunities to implement community-based energy solutions. Further detail regarding community and stakeholder engagement activities is provided in Section 9.

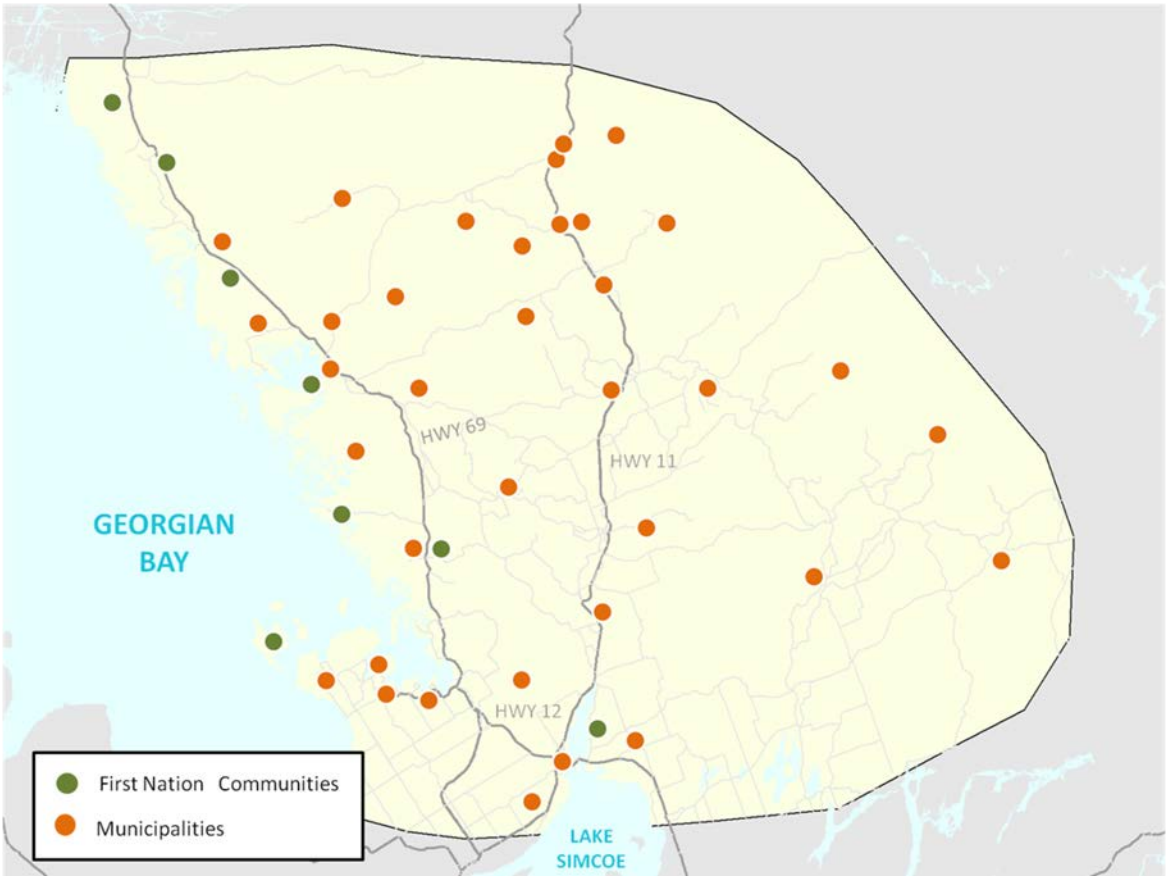
4. Background and Study Scope

The study scope of the IRRP is described in Section 4.1. Section 4.2 describes the electricity system supplying the Parry Sound/Muskoka Sub-region.

4.1 Parry Sound/Muskoka - Study Scope

The Parry Sound/Muskoka Sub-region roughly encompasses the Districts of Muskoka and Parry Sound and the northern part of Simcoe County. The approximate geographical boundaries of the sub-region are shown in Figure 4-1.

Figure 4-1: Geographical Boundaries of the Parry Sound/Muskoka Sub-region



The Parry Sound/Muskoka Sub-region includes the following First Nation communities:

- Henvey Inlet
- Magnetawan
- Shawanaga
- Wasauksing
- Moose Deer Point
- Beausoleil
- Wahta Mohawks
- Chippewas of Rama

The sub-region also includes the following municipalities:

- City of Orillia
- Municipality of Highlands East
- Municipality of Magnetawan
- Municipality of McDougall
- Municipality of Whitestone
- Town of Bracebridge
- Town of Gravenhurst
- Town of Huntsville
- Town of Kearney
- Town of Midland
- Town of Parry Sound
- Town of Penetanguishene
- Township of Algonquin Highlands
- Township of Armour
- Township of Carling
- Township of Georgian Bay
- Township of Joly
- Township of Lake of Bays
- Township of McKellar
- Township of McMurrich-Monteith
- Township of Minden Hills
- Township of Muskoka Lakes
- Township of Oro-Medonte
- Township of Perry
- Township of Ramara
- Township of Ryerson
- Township of Seguin

- Township of Severn
- Township of Strong
- Township of Tay
- Township of the Archipelago
- Township of Tiny
- United Townships of Dysart, Dudley, Harcourt, Guilford, Harburn, Bruton, Havelock, Eyre and Clyde
- Village of Burk's Falls
- Village of Sundridge

In addition, there are a number of unorganized areas in the District of Parry Sound.

The Parry Sound/Muskoka IRRP assesses the reliability and adequacy of the regional electricity system supplying the Parry Sound/Muskoka Sub-region and identifies integrated solutions for the 20-year period from 2015 to 2034. The electricity system supplying the Parry Sound/Muskoka Sub-region is described in more detail in Section 4.2.

It is important to note that connection assessments of generation resources procured under programs, such as the Feed-in-Tariff, are beyond the scope of this IRRP. Generation projects participating in procurement programs will be assessed according to the rules and specifications of those programs. However, the peak demand contribution from generation resources already contracted through such programs are taken into account in the demand forecast as described in Section 5.3.3.

4.2 Electricity System Supplying Parry Sound/Muskoka Sub-region

The electricity system supplying the Parry Sound/Muskoka Sub-region consists of local generation resources, 230 kV regional transmission, 44 kV sub-transmission and low voltage distribution networks. Local generation resources provide important sources of electricity supply to the communities and customers in this sub-region. However, local generation sources are not sufficient and are supplemented with power delivered to the sub-region from the rest of the province through the 230 kV transmission system. From the 230 kV transmission system power is delivered to communities and customers through the 44 kV sub-transmission and low-voltage distribution networks. The following sub-sections discuss these components in more detail.

4.2.1 Local Generation Resources

Local generation in the Parry Sound/Muskoka Sub-region is primarily hydroelectric and solar. The total installed capacity of local generation is approximately 126 MW comprised of approximately 28 MW hydroelectric, 97 MW solar, and 1 MW combined heat and power ("CHP").

In Ontario, the electricity system is designed to meet regional coincident peak demand – i.e., the one-hour period each year when total demand for electricity in the region is the highest. While hydroelectric and solar resources are potential sources of energy, only a portion of their generation capacity can be relied upon at the time of peak due to the variable nature of these resources. In the Parry Sound/Muskoka Sub-region, electricity demand typically peaks during the evening in the winter season. For the purpose of infrastructure planning, the installed capacity of distributed and variable generation is accordingly adjusted to reflect the reliable power output at the time of the local winter peak.

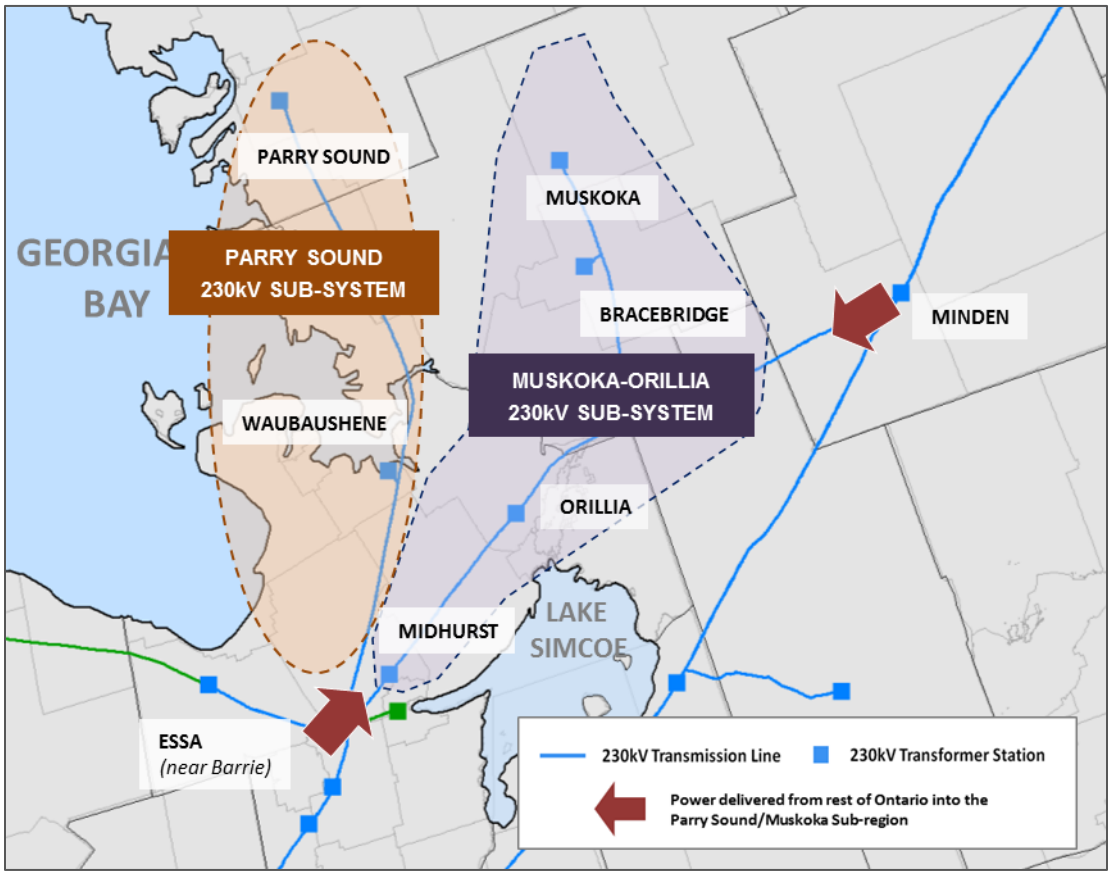
Hydroelectric facilities in the area are relatively small, generally less than 2 MW, however there are a couple facilities as large as 10 MW. The output of these facilities also depends on the availability of water resources and the operation of the facilities. To determine the dependable level of output at the time of peak, historical performance data of the hydroelectric generation facilities in the sub-region were used. The results are an assumed 34% capacity contribution from these resources.

Similarly, the solar facilities in the sub-region are also relatively small, with most being less than 0.5 MW, however there are a couple facilities as large as 10 MW. While the installed capacity of solar is high in the region, there is limited availability of solar power during the time of local peak, which occurs during the evening in the winter. It is assumed that solar would not provide any capacity at the time of local peak.

4.2.2 230 kV Transmission System

Power is delivered from the rest of the province into the Sub-region through the 230 kV transmission system at Essa (near Barrie) and Minden. As shown in Figure 4-2, the 230 kV transmission system supplies seven customers and utility-owned transformer stations. For the purpose of regional planning, the sub-region is further sub-divided into two regional 230 kV sub-systems: Muskoka-Orillia 230 kV sub-system and Parry Sound 230 kV sub-system.

Figure 4-2: Parry Sound/Muskoka Sub-region – 230 kV Transmission System

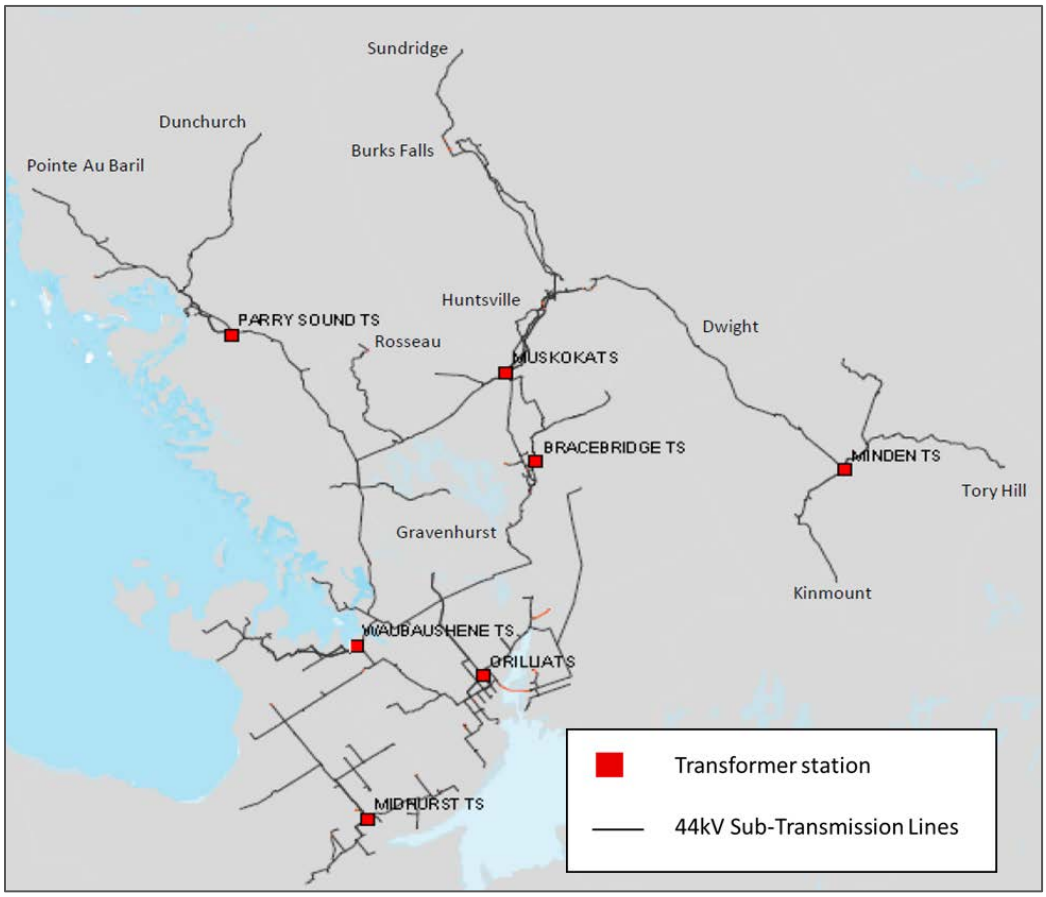


Since Midhurst TS primarily supplies the customers in the Barrie/Innisfil Sub-region, it is considered within the scope of the Barrie/Innisfil IRRP. However, Midhurst TS is supplied by the Muskoka-Orillia 230 kV sub-system and could impact the electricity supply to the Parry Sound/Muskoka Sub-region. Therefore, when assessing the reliability and adequacy of the Muskoka-Orillia 230 kV sub-system, the electricity demand growth at Midhurst TS needs to be considered in this IRRP.

4.2.3 44 kV Sub-transmission and Low-Voltage Distribution System

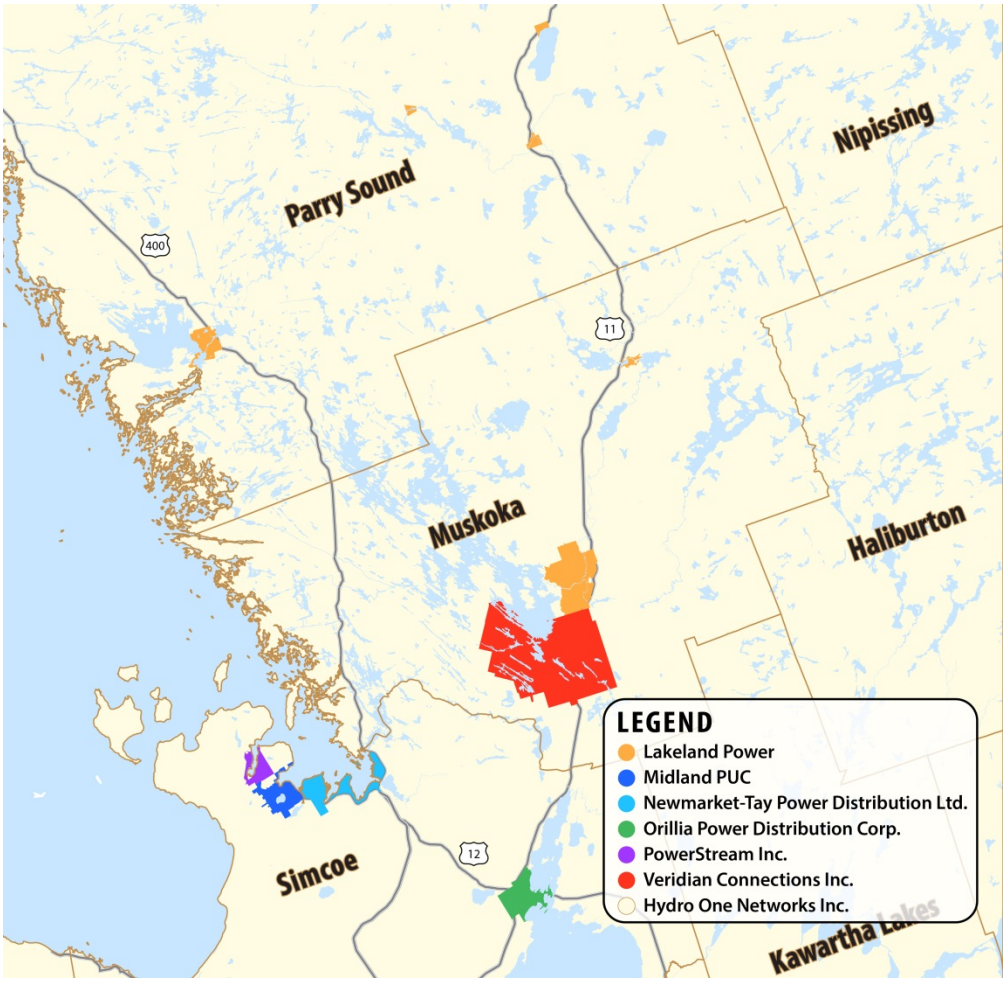
From the 230 kV sub-systems, power is delivered through transformer stations to the 44 kV sub-transmission system majority of which is operated by Hydro One Distribution in the Parry Sound/Muskoka Sub-region. As illustrated in Figure 4-3, given the large geography and sparsely populated areas, many communities and customers in this Sub-region are supplied by long 44 kV sub-transmission lines and a single source of supply.

Figure 4-3: 44 kV Sub-transmission System in the Parry Sound/Muskoka Sub-region



From the 44 kV sub-transmission system, power is delivered to the low voltage distribution network, which supplies various communities across the sub-region. The low-voltage distribution system is managed and operated by seven LDCs: Lakeland Power, Midland PUC, Newmarket-Tay Power, Orillia Power, PowerStream, Veridian Connections, and Hydro One Distribution, as shown in Figure 4-4.

Figure 4-4: Local Distribution Companies Service Areas



Distribution system planning is beyond the scope of the regional planning process. Issues related to the distribution system may be discussed in this IRRP for context, but will be addressed through the local distribution planning process led by the Local Distribution Companies ("LDCs").

Details regarding the characteristics of the LDC service areas can be found in Appendix A.

5. Demand Forecast

Regional electricity systems in Ontario are designed to meet regional coincident peak demand – the one-hour period each year when total regional demand for electricity is the highest.

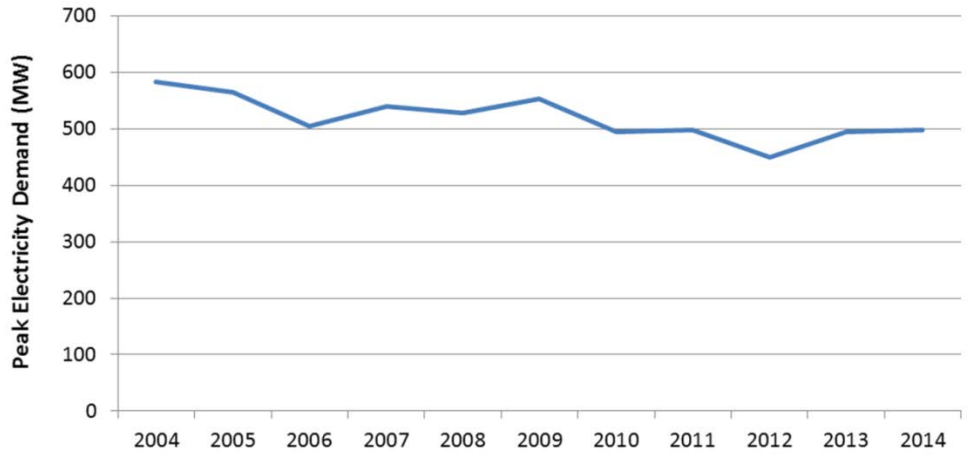
This section describes the development of the regional electricity demand forecast for the Parry Sound/Muskoka Sub-region. Section 5.1 describes historical electricity demand trends in the sub-region from 2004 to 2014. Section 5.2 provides an overview of the demand forecast methodology used in this study, and Section 5.3 summarizes the planning forecast for the sub-region.

5.1 Historical Electricity Demand 2004-2014

Electricity demand in this sub-region is primarily driven by residential and commercial customers. Due to limited access to natural gas infrastructure in this sub-region, many communities rely on electric space and water heating, especially during the winter season. As such, the electricity demand in this sub-region typically peaks during the winter months. This sub-region also supports a mix of economic activities including tourism, retail, healthcare and manufacturing industries. Seasonal population driven by tourism and recreation activities also contributes to the electricity demand requirements in this sub-region.

Demand has declined slightly between 2004 and 2010 but has been relatively stable since then at around 500 MW, as shown in Figure 5-1. The historical demand shown below was adjusted to account for weather-related impacts.

Figure 5-1: Historical Peak Demand - Parry Sound/Muskoka Sub-region (2004-2014)



5.2 Methodology for Establishing Planning Forecast

A planning forecast was developed to assess reliability of the Parry Sound/Muskoka Sub-region electricity system over the planning period (2015 to 2034). For the purpose of regional planning, the planning forecast considers the following components:

- Gross winter demand forecast scenarios for distribution-connected and transmission-connected customers,
- Estimated peak demand savings from meeting provincial energy conservation targets, and
- Expected peak demand capacity contribution from DG.

The gross demand forecast was developed based on the expected peak demand projections for distribution-connected and transmission-connected customers in the Parry Sound/Muskoka Sub-region. To develop the planning forecast, the gross demand forecast was modified to reflect the estimated peak demand savings from meeting provincial energy conservation targets and from existing and contracted DG.

Using a planning forecast that is net of provincial conservation targets is consistent with the province's Conservation First policy. However, this assumes that the targets will be met and that the targets, which are energy-based, will produce the expected local peak demand impacts. An important aspect of plan implementation will be monitoring the actual peak demand impacts of conservation programs delivered by the LDCs and, adapting the plan accordingly.

The methodology and assumptions used for the development of the planning forecast are described in detail in Appendix A.

5.3 Development of Planning Forecast

5.3.1 Gross Demand Forecast

The gross demand forecast was provided by the seven LDCs in this sub-region, based on customer connection requests, local economic development and growth assumptions outlined in Ontario's *Places to Grow Act, 2005*, which are reflected in municipal and regional plans.

A modest increase in electricity demand is forecast in this sub-region over the next 20 years. While slower growth is expected in the sub-region's manufacturing sector, growing Indigenous communities, new residential and commercial developments, seasonal population and potential local economic development such as the Parry Sound Airport Development and

Rama Road Corridor Economic Employment District, will contribute to growing electricity demand in the sub-region. Electric space and water heating requirements from communities, and aforementioned new residential and commercial developments will continue to be a major driver of peak electricity demand in this sub-region. Based on the information provided by the LDCs, gross demand is expected to grow 1.1% annually over the planning period.

Given the diverse communities and geography of this sub-region, electricity demand growth is not uniformly distributed across the sub-region. Only a small increase in electricity demand is expected in the northern Simcoe County, Minden and Parry Sound. Most of the electricity growth is forecast to be concentrated in Muskoka, Orillia and surrounding areas. For example, in Orillia, additional planned developments, including condominium and waterfront development and new retail, commercial, industrial and institutional customers may materialize within the 20-year planning period resulting in as much as an additional 20-22 MW of peak demand. For the purpose of regional planning, this potential load was considered as part of the sensitivity analysis.

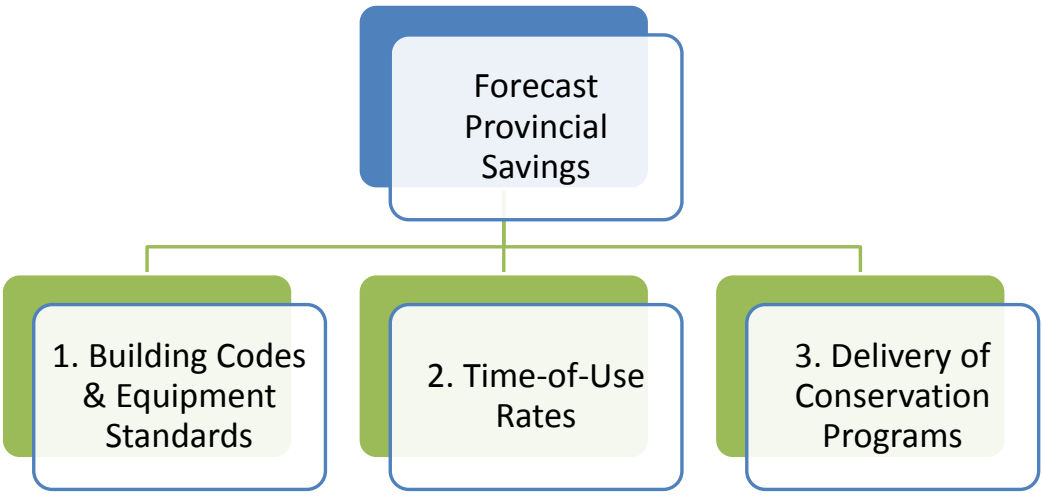
The specific forecasting methodology and assumptions for the gross demand forecast can be found in Appendix A.

5.3.2 Expected Peak Demand Savings from Provincial Conservation Targets

Conservation is incented and achieved through a mix of program-related activities, rate structures, and mandated efficiencies from building codes and equipment standards. Conservation plays a key role in maximizing the utilization of existing infrastructure and maintaining reliable supply by keeping demand within equipment capability. The conservation savings forecast for the Parry Sound/Muskoka Sub-region have been applied to the gross peak demand forecast, along with DG resources (described in Section 5.2), to determine the planning forecast in this sub-region.

In December 2013 the Ministry of Energy released a revised Long-Term Energy Plan ("LTEP") that outlined a provincial conservation target of 30 terawatt-hours ("TWh") of energy savings by 2032. The expected peak demand savings from meeting this target were estimated for the Parry Sound/Muskoka Sub-region. To estimate the impact of the conservation savings in the sub-region, the forecast provincial savings were divided into three main categories, as illustrated in Figure 5-2.

Figure 5-2: Categories of Conservation Savings



1. *Savings due to Building Codes & Equipment Standards*
2. *Savings due to Time-of-Use Rate structures*
3. *Savings due to the delivery of Conservation Programs*

The impact of estimated savings for each category was further broken down for the Parry Sound/Muskoka Sub-region by the residential, commercial and industrial customer sectors. The IESO worked together with the LDCs to establish a methodology to estimate the electrical demand impacts of the energy targets by the three customer sectors. This provides a better resolution of forecast conservation, as conservation potential estimates vary by sector due to different energy consumption characteristics and applicable measures.

For the Parry Sound/Muskoka Sub-region, LDCs were requested to provide breakdowns of their gross demand forecast, and electrical demand by sector for the forecast at each transformer station. For each transformer station where the LDC could not provide gross load segmentation, the IESO and the LDC worked together using best available information and assumptions to derive sectoral gross demand. For example, LDC information found in the OEB's Yearbook of Electricity Distributors was used to help estimate the breakdown of demand. Once sectoral gross demand at each transformer station was estimated, the next step was to estimate peak demand savings for each conservation category: building codes and equipment standards, time-of-use rates, and delivery of conservation programs. The estimates for each of the three savings groups were done separately due to their unique characteristics and available

data. The final estimated conservation peak demand reduction, 35 MW by 2034, was then applied to the gross demand to create the planning forecast.

Additional conservation forecast details are provided in Appendix A.

5.3.3 Expected Peak Demand Contribution of Existing and Contracted Distributed Generation

As of 2015, about 123 MW of DG was contracted and/or existing in the Parry Sound/Muskoka Sub-region. The majority of the contracted and installed capacity is solar projects. The sub-region also has several hydroelectric power facilities and one CHP facility.

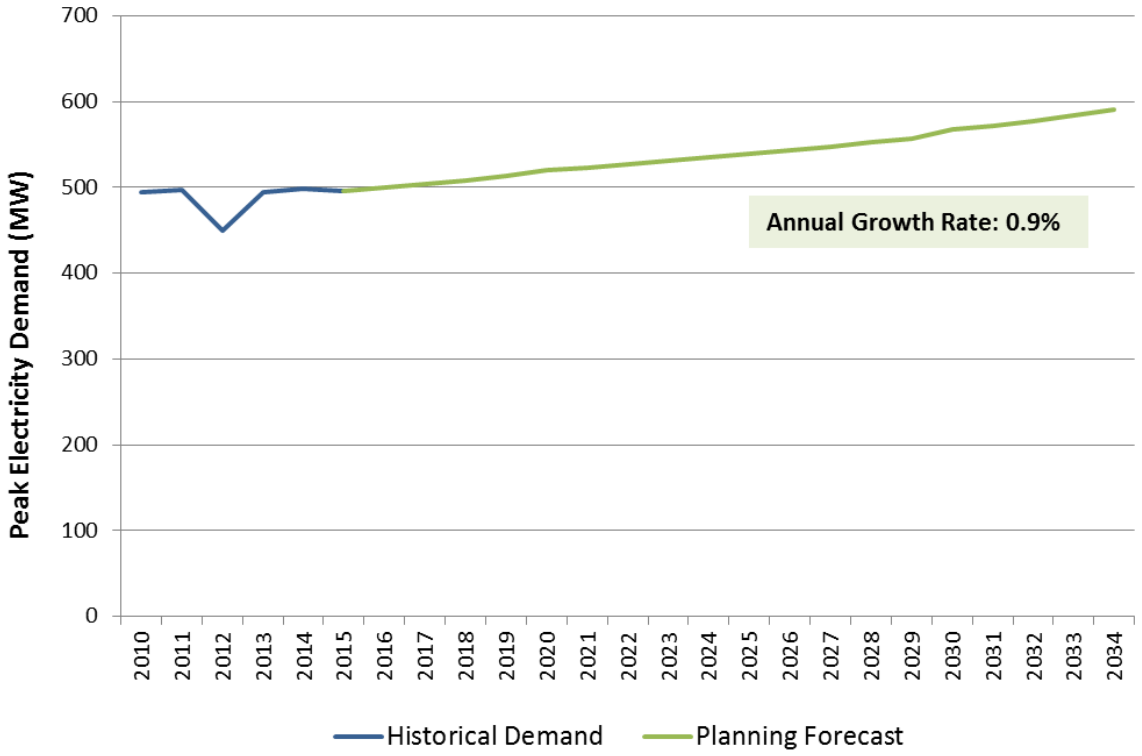
As the peak for the sub-region tends to occur during the winter evening hours, solar resources do not provide capacity contribution, however the other DG resources do have an impact on the peak. For the purpose of developing the planning forecast, contracted DG is expected to reduce the regional peak demand by as much as 11 MW over the next 20 years. Future DG uptake was, as noted, not included in the planning forecast and is instead considered as an option for meeting identified needs.

The expected annual peak demand contribution of contracted DG in the Parry Sound/Muskoka Sub-region can be found in Appendix A.

5.3.4 Planning Forecast

Figure 5-3 shows the planning forecast for the Parry Sound/Muskoka Sub-region for the planning period from 2015 to 2034 (using a base year of 2014). The planning forecast takes into consideration the gross demand forecast scenarios, estimated peak demand savings from provincial energy conservation targets, and existing and contracted DG. Based on the planning forecast, the electricity demand in the sub-region is expected to grow 0.9% annually, with an incremental peak demand growth of 100 MW over the planning period.

Figure 5-3: Parry Sound/Muskoka Sub-region Planning Forecast (2015-2034)



As discussed in Section 4.2.2, Midhurst TS primarily supplies the customers in the Barrie/Innisfil Sub-region. As a result, the Parry Sound/Muskoka Sub-region demand forecast shown above does not include electricity demand from Midhurst TS.

Further details related to the demand forecast scenarios can be found in Appendix A.

6. Needs

This section outlines the needs assessment methodology and identifies regional electricity supply and reliability needs over the 20-year planning period.

6.1 Needs Assessment Methodology

The IESO's ORTAC,[7] the provincial standard for assessing the reliability of the transmission system, was applied to assess supply capacity and reliability needs. ORTAC includes criteria related to the assessment of the bulk transmission system, as well as the assessment of local or regional reliability (see Appendix B for more details).

Through the application of these criteria, three broad categories of needs can be identified:

- **Transformer Station Capacity** is the electricity system's ability to deliver power to the local distribution network through the regional transformer stations. This is limited by the load meeting capability ("LMC") of the step-down transformer stations in the local area, which is the maximum demand that can be supplied from the transformer stations based on equipment rating and outage conditions.
- **Supply Capacity** is the electricity system's ability to provide continuous supply to a local area. This is limited by the LMC of the transmission line or sub-system, which is the maximum demand that can be supplied on a transmission line or sub-system under applicable transmission and generation outage scenarios as prescribed by ORTAC; it is determined through power system simulations analysis (See Appendix B for more details). Supply capacity needs are identified when peak demand on a transmission line or sub-system exceeds its LMC.
- **Load Security and Restoration** is the electricity system's ability 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 prescribed by ORTAC are described in Appendix B.

[7] http://www.ieso.ca/imoweb/pubs/marketadmin/imo_req_0041_transmissionassessmentcriteria.pdf

In addition, the needs assessment may also identify needs related to service reliability performance, equipment end-of-life and planned sustainment activities. Service reliability and performance is measured based on customers' exposure to power outages on the distribution and transmission system, and is expressed in terms of frequency (i.e., number of outages a year) and duration (e.g., length of time before the power is restored). Equipment reaching the end of its life and planned sustainment activities may impact the needs assessment and options development. Transmission assets reaching end-of-life are typically replaced with assets of equivalent capacity and specification. The need to replace aging transmission assets may present opportunities to better align investments with evolving power system priorities. This may involve up-sizing equipment in areas with capacity needs, or downsizing or even removing equipment that is no longer considered useful. Such instances may also present opportunities to enhance or reconfigure assets for infrastructure hardening to improve system resilience.

6.2 Regional and Local Electricity Reliability Needs

Through the needs assessments, the Working Group has identified the need: (1) to minimize the frequency and duration of power outages and (2) to provide adequate supply to support growth in the Parry Sound/Muskoka Sub-region. The following sections further describe these needs.

6.2.1 Need to Minimize the Frequency and Duration of Power Outages

As discussed in Section 4.2, while there is local generation in this sub-region, communities and customers primarily rely on the 230 kV transmission, 44 kV sub-transmission and low-voltage distribution lines to deliver power from the rest of the province into the Parry Sound/Muskoka Sub-region. Outages along any of these lines (i.e., 230 kV, 44 kV, low voltage distribution lines) could interrupt the electricity supply to communities and customers in the Parry Sound/Muskoka Sub-region.

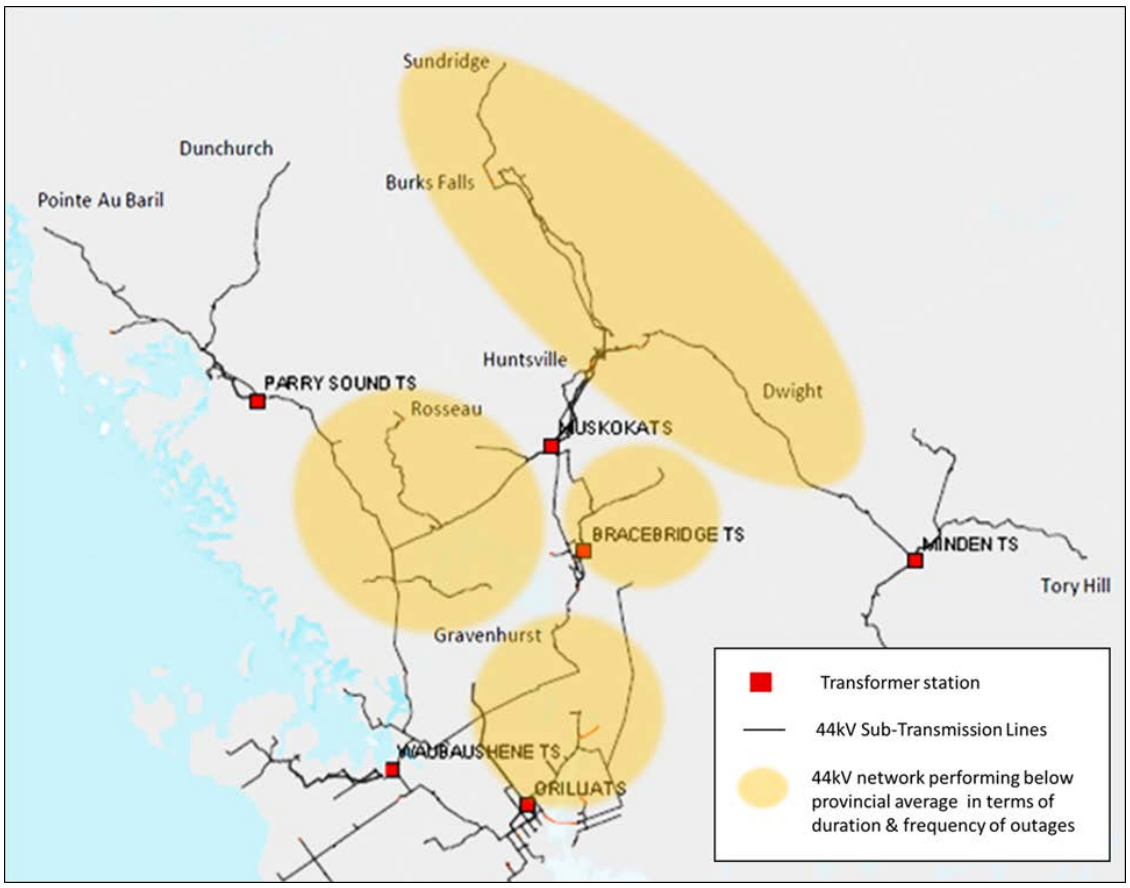
In this sub-region, customers and communities experience more frequent and prolonged power outages in comparison to customers and communities in other areas of the province. The consequences of extended power outages can have impacts for customers and society at large. For example, the Working Group has heard from communities and customers in this sub-region that below-average reliability is an impediment to economic development.

To better understand the causes of these power outages, the Working Group examined the service reliability and performance of the 44 kV sub-transmission system, and the load restoration capability and security of the 230 kV transmission line supplying the Parry Sound/Muskoka Sub-region. The results from the needs assessments are summarized below.

44 kV Sub-Transmission Service Reliability and Performance

In response to community and customers' concerns regarding power outages in this sub-region, the Working Group examined historical service reliability and performance of the 44 kV sub-transmission system over the last five years. Results from the assessment show that a number of 44 kV sub-transmission systems in this sub-region are performing below average in terms of frequency and duration of outages (as shown in Figure 6-1). On average, customers being supplied from a typical 44 kV sub-transmission line in Ontario experience outages about two times a year with outages typically lasting 5 hours or less. Based on the historical service reliability and performance data over the last five years, the outages for many of the 44 kV sub-transmission system in the Parry Sound/Muskoka Sub-region are almost double the provincial average in terms of frequency and duration.

Figure 6-1: 44 kV sub-transmission systems that are performing below provincial average in terms of frequency and duration of outages in the Parry Sound/Muskoka Sub-region



The service reliability and performance of the 44 kV sub-transmission system is impacted by a number of factors, including a facility's exposure to various elements, age and maintenance of equipment, length and configuration of the network, and the repair crew's accessibility to facilities. Lengthy 44 kV sub-transmission lines and off-road facilities are the main reasons for frequent and prolonged outages in the Parry Sound/Muskoka Sub-region.

- **Lengthy 44 kV sub-transmission lines:** As a large and sparsely populated geographical area, this sub-region is supplied by 44 kV sub-transmission lines that are typically longer than other 44 kV sub-transmission lines in Ontario. The average length of a 44 kV sub-transmission line in Ontario is about 45 km. Most of the 44 kV sub-transmission systems in the Parry Sound/Muskoka Sub-region range from 40 to 100 km in length. Long sub-transmission lines typically exhibit lower levels of reliability because of increased exposure to trees and wildlife. Tree contact has been identified as one of the major causes of 44 kV sub-transmission outages in this sub-region. Furthermore, with longer

44 kV sub-transmission lines, repair crews require additional time to identify and isolate causes of any outages.

- **Off-Road Facilities:** Many of the 44 kV sub-transmission systems are located off-roads. Due to limited access to off-road facilities, repair crews have difficulty detecting early signs of equipment failure, performing preventative maintenance and restoring power in a timely manner.

The detailed summary of the reliability performances of these 44 kV sub-transmission systems can be found in Appendix C.

Load Restoration and Security on the 230 kV Transmission System

Outage statistics from Hydro One Transmission indicate that have been three major outages involving the loss of both 230 kV transmission circuits in the sub-region since 1990. These outages lasted no more than 2-3 hours. While major 230 kV transmission outages have been relatively infrequent and short in duration in the Parry Sound/Muskoka Sub-region, the existing 230 kV transmission system supplying the Orillia and Muskoka area has limited ability to restore power in a timely manner and minimize the number of customers interrupted in the event of a major 230 kV transmission outage. As discussed in Section 6.1, the 230 kV transmission system should be designed in accordance with the load restoration and security criteria outlined in ORTAC (see Appendix B).

Based on the needs assessment, the Muskoka-Orillia 230 kV sub-system does not meet the ORTAC load restoration criteria and may violate the load security criteria over the longer term depending on the electricity demand growth in the area. The Muskoka-Orillia 230 kV sub-system is a 171 km double-circuit 230 kV transmission line (M6/7E) between Barrie and Minden. This system currently supplies four transformer stations and supplies about 465 MW of peak demand.[8] In the event of a major outage involving the loss of both transmission circuits on the Muskoka-Orillia 230 kV sub-system, all customers supplied by this transmission line would be interrupted. The existing system cannot restore any power to customers within 30 minutes. As

[8] Muskoka-Orillia 230 kV sub-system includes the electricity demand at Orillia TS, Muskoka TS, Midhurst TS, and Bracebridge TS. Although Midhurst is part of Barrie/Innisfil IRRP, it is supplied by the Muskoka-Orillia 230 kV sub-system and could have an impact on the electricity supply to the Parry Sound/Muskoka Sub-region.

a result, the Muskoka-Orillia 230 kV sub-system does not meet the ORTAC 30 minute load restoration criteria.

Based on the planning forecast, the winter demand on the Muskoka-Orillia 230 kV sub-system is expected to increase to 621 MW by 2034. According to ORTAC load security criteria, no more than 600 MW of electricity supply can be interrupted following a major outage. Depending on the electricity demand growth, the Muskoka-Orillia 230 kV sub-system may violate the load security criteria over the longer term.

Action is required to improve the load restoration and security for the Muskoka-Orillia 230 kV sub-system and to bring the 230 kV transmission system in compliance with Ontario's planning standards.

6.2.2 Need to Provide Adequate Supply to Support Growth

To ensure there is an adequate and reliable source of electricity supply for the customers and communities in the Parry Sound/Muskoka Sub-region, the electricity system will need to have sufficient supply to support forecast electricity demand growth and to comply with ORTAC. Results from the needs assessment indicate that transformers at Waubaushene TS and Parry Sound TS are at, or nearing capacity and will be in violation of ORTAC in the near term. Over the longer term, electricity demand growth could also exceed the supply capability of the Muskoka-Orillia 230 kV sub-system. The following sections further discuss these near- and longer-term supply capacity needs.

Demand Exceeds Capability at Parry Sound TS and Waubaushene TS in the Near-Term

The transformers supplying the Town of Parry Sound and surrounding areas can supply up to 52 MW at the time of local peak (Parry Sound TS LMC = 52 MW). The electricity demand in the area has already exceeded the capability of these transformers over the last couple of years. For example, during the winter of 2015, these transformers supplied up to 61 MW at the time of local peak, exceeding the LMC of Parry Sound TS by about 9 MW. Near-term action is required to ensure that the electricity system in the area has adequate supply to support growth. Over the planning period, the electricity demand supplied by Parry Sound TS is forecast to grow less than 1 MW per year so that by 2034 Parry Sound TS would need to supply about 74 MW.

Similarly, Waubaushene TS, supplying Waubaushene and the surrounding area can supply up to 99 MW at the time of local peak (Waubaushene TS LMC = 99 MW). Today, Waubaushene TS

supplies about 96 MW of electricity demand. The transformers at this station are nearing capacity and electricity demand growth is expected to exceed capability by 2017. Near-term action is required to ensure that the electricity system has adequate supply to support future growth. The electricity demand supplied by Waubaushene TS is expected grow modestly at less than 1 MW per year. Based on the planning forecast, Waubaushene TS is expected to supply about 111 MW of electricity demand by 2034.

Demand may exceed the capability of Muskoka-Orillia 230 kV sub-system over the longer term

The Muskoka-Orillia 230 kV sub-system can supply up to 600 MW at the time of peak (Muskoka-Orillia 230 kV sub-system LMC = 600 MW). Today, the Muskoka-Orillia 230 kV sub-system supplies up to 454 MW.[9] Given the modest electricity demand growth in this area, electricity demand is not expected to exceed its capability until the early 2030s based on the planning forecast.

Given the uncertainty associated with the long-term electricity demand forecast, it is sufficient to monitor demand growth before proceeding with an investment decision. Section 7.2.2 provides a high-level discussion of options to address this potential need over the longer term.

6.3 Other Electricity Needs and Considerations

In addition to the regional and local electricity reliability needs outlined in Section 6.2, the Working Group identified other electricity needs and considerations that could impact the regional electricity supply. These issues are discussed in more detail below.

6.3.1 End-of-Life Replacements and Sustainment Activities

The Minden 230/44 kV transformers are scheduled for end-of-life replacements within the next five years. Hydro One is preparing a plan to replace all the aging equipment at Minden TS in the next few years. The aging 25/42 MVA transformers are to be replaced with 50/83 MVA transformers to address the capacity needs at the station. This sustainment decision was made prior to the initiation of this IRRP.

[9] Muskoka-Orillia 230 kV sub-system includes the electricity demand at Orillia TS, Muskoka TS, Midhurst TS, and Bracebridge TS. Although Midhurst TS is considered as part of Barrie/Innisfil IRRP, it is supplied by the Muskoka-Orillia 230 kV sub-system and has an impact on the electricity supply to the Parry Sound/Muskoka Sub-region.

In addition to the near-term sustainment activities, the Working Group also identified potential assets that could be reaching end-of-life over the planning period. The expected service life of a transformer is about 60 years. The transformers at Parry Sound TS and Waubaushene TS were installed in the early 1970s and therefore these transformers could be reaching end-of-life in the early 2030s. There may be opportunities to align end-of-life facility replacements with solutions to address longer-term needs in the sub-region.

6.3.2 Community Energy Planning

A number of communities in the sub-region are in the process of developing community energy plans ("CEP(s)"). At the time of this report, seven of the eight First Nation communities have received funding from the IESO through the Aboriginal Community Energy Plan program to develop CEPs. The Municipal Energy Plan Program[10] administrated by the provincial government supports municipalities in their efforts to develop CEPs.

Through community energy planning activities, communities will have a better understanding of their local energy needs and emissions footprint, be able to identify opportunities for energy efficiency and emissions reduction, and develop plans to meet their goals in consideration of local economic development. These CEPs examine broader energy needs, such as transportation, natural gas and electricity, and consider other objectives including net zero energy, electrification, and emissions reductions.

On June 8, 2016, the Ontario government released Ontario's Climate Change Action Plan ("CCAP"), which outlines policy to reduce the use of fossil fuel and to encourage the move toward a low carbon economy. In response to this policy direction, a CEP may include recommendations to promote electrification and other forms of fuel switching, such as shifting from natural gas to electric-power heat pumps and from gasoline to electric vehicles, to achieve a goal of reducing greenhouse gas ("GHG") emissions. As such, the outcomes from CEPs may drive additional requirements on the electricity system and should be monitored closely through the regional planning process. Furthermore, with the increased access to distributed energy resources, CEPs may identify opportunities for community-based energy solutions, such as district energy, CHP, or microgrids. Depending on the timing, location and magnitude of the

[10] For more information on the Ministry of Energy MEP Program: http://www.energy.gov.on.ca/en/municipal-energy/

needs, community-based energy solutions can be considered as potential options to address regional electricity needs.

6.3.3 Power Quality

A large customer in the sub-region is experiencing issues related to power quality. Power quality issues are defined as disturbances to the customer's electricity supply as a result of voltage. Voltage issues can be caused by customers' equipment and/or system voltage performance. The solutions and cost responsibility of investments to address power quality issues may vary depending on the root causes of the problem. The Working Group agreed that power quality issues need to be better understood and should be examined on a case-by-case basis by the area LDCs, transmitter and customers.

6.4 Needs Summary

Table 6-1 provides a summary of the regional supply and reliability needs in the Parry Sound/Muskoka Sub-region.

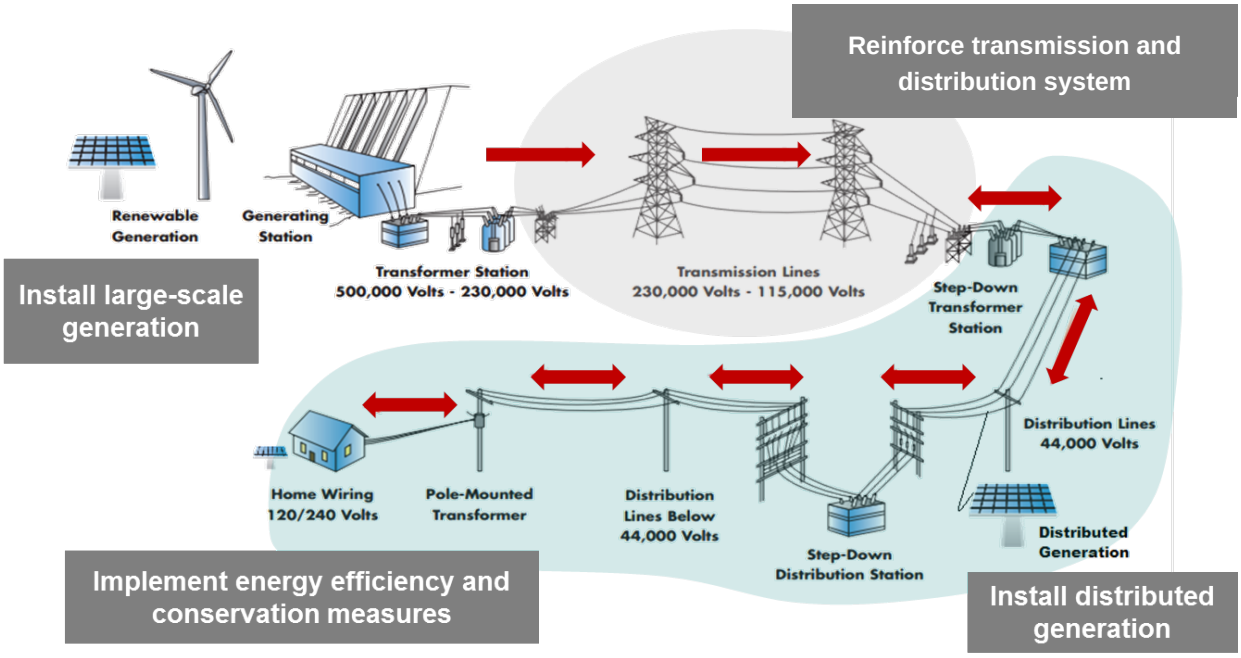
Table 6-1: Summary of Regional and Local Reliability Needs

Local and Regional Electricity Reliability Needs	Components	Status
Need to Minimize the Frequency and Duration of Power Outages	44 kV sub-transmission systems	Performing below provincial average in terms of frequency and duration of 44 kV sub-transmission outages
	Muskoka-Orillia 230 kV sub-system	Limited ability to restore power to customers in a timely manner in the event of a 230 kV transmission outage involving the loss of both transmission circuits. The sub-system does not meet the ORTAC load restoration criteria
		Electricity demand growth may exceed 600 MW and could violate the ORTAC load security criteria in the early 2030s
Provide Adequate Supply to Support Growth	Parry Sound TS	Electricity demand growth already exceeds system capability today
	Waubaushene TS	Electricity demand growth forecast to exceed system capability in 2017
	Muskoka-Orillia 230 kV sub-system	Electricity demand growth could exceed system capability in the early 2030s

7. Options to Address Regional and Local Electricity Needs

As shown in Figure 7-1, traditionally power has been generated from large, centralized generation sources. To provide electricity supply to the various communities across Ontario, power has been delivered through transmission and distribution infrastructure. To address regional and local electricity needs, one approach is therefore to reinforce the transmission and distribution infrastructure supplying the local area. However, in recent years, communities and customers have been exploring opportunities to reduce their reliance on the provincial electricity system by meeting their electricity needs with local, distributed energy resources and community-based solutions. This approach includes a combination of emerging technologies and conservation programs, such as targeted DR and conservation programs, DG and advanced storage technologies, micro-grid and smart-grid technologies, and more efficient and integrated process systems combining heat and power.

Figure 7-1: Options to Address Electricity Needs



Options Evaluation

When evaluating alternatives, the Working Group considered a number of factors, including technical feasibility, cost, flexibility, alignment with planning policies and priorities and consistency with long-term needs and options. Solutions that maximized the use of existing infrastructure were given priority.

Investing in new electricity infrastructure, such as a new transmission line or a generation facility requires substantial capital investment, has environmental/land-use impacts and has a long-service life. As such, it is important to take into the consideration the longer-term cost implications, value and potential risks (e.g., stranded or underutilized assets) when recommending an investment. Furthermore, these facilities typically require long lead times to obtain approvals and complete construction. For these reasons, decisions on new facilities must take into account these considerations and be made with sufficient lead time to ensure they are available when needed.

When assessing the need for infrastructure investments, it is important to strike a balance between overbuilding infrastructure (e.g., committing to infrastructure when there is insufficient demand to justify the investment) and under-investing (e.g., avoiding or deferring investment despite insufficient infrastructure to support growth in the region). Typically, demand management and energy efficiency programs can be implemented within six months, or up to two years for larger projects, whereas transmission and distribution facilities can take five to seven years to come into service. The lead time for generation development is typically two to three years, but could be longer depending on the size and technology type.

Finally, the issue of how much is appropriate to invest and who pays needs to be addressed. In regional planning, depending on the type and classification of assets, the costs may be shared by all provincial ratepayers or recovered only by the specific customers they serve (e.g., LDC, industrial customers). In some cases, a combination of cost-sharing may occur when there are both provincial and local benefits. Notably, the Working Group has heard concerns from communities about affordability. Given the high cost of electricity, it is important consider how investments impact local ratepayers.

Near-Term Actions and Long-Term Planning Considerations

For the near and medium term, the IRRP identifies specific actions and investments for immediate implementation. This ensures that necessary resources will be in-service in time to address more pressing needs. For the long term, the IRRP identifies potential options to meet needs that may arise in 10-20 years. It is not necessary to recommend specific projects at this time (nor would it be prudent given forecast uncertainty and the potential for technological change). Instead, the long-term plan focuses on developing and maintaining the viability of long-term options, engaging with communities, and gathering information to lay the groundwork for making decisions on future options.

As discussed in Section 6, actions need to be taken to (1) minimize the frequency and duration of power outages, and (2) ensure that the regional electricity system has adequate supply to support growth. In developing the 20-year plan, the Working Group examined a wide range of integrated solutions to address these local and regional needs. These options are discussed in the following section.

7.1 Minimize the Frequency and Duration of Power Outages

To minimize the frequency and duration of power outages, the Working Group examined options to improve service reliability and performance on the 44 kV sub-transmission system and to address load restoration and security needs on the 230 kV transmission system.

7.1.1 Options to Improve Service Reliability and Performance on the 44 kV Sub-transmission System

44 kV Sub-Transmission Maintenance and Outage Mitigation Initiatives

Hydro One Distribution owns and operates the 44 kV sub-transmission system in the Parry Sound/Muskoka Sub-region. Currently, Hydro One Distribution has a number of on-going maintenance and outage mitigation initiatives, including vegetation management, line patrols and grid modernization, to help reduce the frequency and duration of outages on the 44 kV sub-transmission system. These initiatives are summarized in Table 7-1.

Table 7-1: Status of Current Maintenance and Outage Mitigation Initiatives in the Parry Sound/Muskoka Sub-region

Initiatives	Status
Vegetation Management Program	▪ Vegetation management was last completed in these areas in 2015/2016 ▪ Full clearing for these areas is planned for 2021/2022 ▪ Hydro One has committed $20 million in 2016 in the districts of Muskoka and Parry Sound to reduce tree-related outages for its customers
Line Patrols	▪ Data is collected to help identify and prioritize the need to replace distribution poles and/or potentially defective equipment ▪ Last line patrolling cycle for these priorities areas occurred between 2010-2012 ▪ The next line patrolling cycle is scheduled for 2016 to 2021

Mid-cycle Hazard Tree Program	▪ Visual inspection to identify potential risk of tree-related contact ▪ This program will be conducted in this sub-region in 2018/2019
Distribution Management System & Grid Modernization	▪ Distribution management system will be implemented in this sub-region by the end of 2016 and will enable operators to have greater grid visibility and to respond to outages in a timely manner ▪ A broader grid modernization initiative is underway to identify opportunities for distribution automation (e.g., remote fault indicators, automated switches), which can help operators diagnose the sources of the outages and respond in a timely manner

In addition to these on-going maintenance programs and initiatives, Hydro One Distribution may take additional measures to further improve service reliability and performance on the 44 kV sub-transmission systems. These include:

- Install distribution automation and fast-acting switching devices to restore power in a timely manner
- Relocate "Off-Road" 44 kV sub-transmission system lines to roadside to facilitate access for maintenance crews
- Strengthen ties within the 44 kV sub-transmission system to allow adjacent 44 kV lines to serve as a back-up supply in the event of an outage

The cost, feasibility and effectiveness of these measures depend on the solution type, geography and nature of the 44 kV sub-transmission system and will need to be examined on a case-by-case basis. Hydro One Distribution will assess these options through the distribution planning process and will provide an update to the communities and LACs on plans to improve 44 kV sub-transmission system service reliability performance, including any proposed capital plans, by the end of 2017. The ability to implement any proposed capital investment plans will be contingent on the outcome of Hydro One Distribution's 2018-2022 rate filing application with the OEB.

Option to Resupply Customers from Bracebridge TS

Currently, the Town of Bracebridge, the Town of Gravenhurst, the Township of Muskoka Lakes, and the Township of Seguin are supplied by lengthy 44 kV sub-transmission system lines (60-100 km in length) from Muskoka TS and Orillia TS. To reduce 44 kV sub-transmission line exposure, new 44 kV sub-transmission lines can be built (~ up to 15 km) to resupply these

areas from Bracebridge TS. These new 44 kV sub-transmission lines to Bracebridge TS cost about $3 to $6 million.

Today, Bracebridge TS supplies one industrial customer. The electricity demand from this industrial customer has decreased significantly over several years. Over the longer term, there should be sufficient capacity at Bracebridge TS to supply some of the customers in the Town of Bracebridge, the Town of Gravenhurst, the Township of Muskoka Lakes, and surrounding areas.

As discussed in Section 6.2.1, outages on the transmission system or transformer stations are relatively infrequent in this sub-region. However, due to the current system configuration at Bracebridge TS,[11] all power being supplied by the Bracebridge TS will be interrupted in the event of an outage at the TS or on the 230 kV transmission line.

Operational measures could help mitigate customers' exposure to outages on the 230 kV transmission system supplying Bracebridge TS. In the event of an outage on the 230 kV system, customers could rely on the Muskoka TS or Orillia TS as a backup supply and vice versa. In addition, a second TS and/or a combination of switching facilities could be installed to minimize the impact of potential 230 kV transmission system outages. The cost of these transmission reinforcements could range from $5 to $30 million.

Going forward, Hydro One Transmission, Hydro One Distribution, Lakeland Power and Veridian Connections will examine the cost-benefit and cost-responsibility of options to improve the service reliability performance of the 44 kV sub-transmission system supplying the Bracebridge/Gravenhurst/Muskoka Lakes and surrounding areas and will discuss these findings with the Working Group through the regional planning process. This action is expected to be completed by the end of 2017. The results from these discussions will be shared with LAC members and affected communities.

[11] In Ontario, most transformer stations are designed to have two transformers to provide redundancy during outages on the transmission system. In the event that one transformer is out-of-service, the remaining TS could still provide a continuous supply to the customers. Because Bracebridge TS was originally designed to serve the needs of the specific industrial customer, the station only has a single transformer.

7.1.2 Options to Improve Load Restoration and Security on the Muskoka-Orillia 230 kV Transmission System

Distribution Option

One option to restore electricity supply to customers following a major outage on the Muskoka-Orillia 230 kV sub-system is to resupply these customers from neighbouring 230 kV transmission system (e.g., Parry Sound 230 kV sub-system) using the distribution network. The extent to which these customers can be resupplied through the distribution network is highly variable and depends on various factors such as load level at neighbouring stations, distance between stations, voltage of neighbouring distribution systems, time of day and operating procedures in place on the distribution system. Based on information provided by the LDCs, only about 20 to 30 MW can be resupplied from neighbouring stations within 30 minutes following a major outage on the Muskoka-Orillia 230 kV sub-system. In order to meet the ORTAC load restoration at today's demand level, the system will need to restore at least 200 MW within 30 minutes following the transmission outage. As such, this option is not sufficient to meet the ORTAC load restoration criteria.

Transmission Option

In the event of a 230 kV transmission outage, fast-acting isolating devices can be installed to minimize the impact of supply interruption to customers. There are two types of fast-acting isolating devices: (1) motorized switches and (2) breakers.

Motorized switches can be used to isolate sections of the transmission line within 30 minutes following a major transmission outage and would enable power to be restored to customers in a timely manner. This is particularly important in remote areas, where repair crew may have limited access to the infrastructure. Grid operators can operate these switches remotely to isolate sections affected by an outage in a timely manner. The cost of these switches ranges from $5 to $7 million.

As an alternative solution, breakers can immediately isolate sections of the transmission line that are not directly impacted by the outage. Since breakers can reduce the total number of customers that would be affected by a transmission outage, it can be an effective solution to address the longer-term load security needs on Muskoka-Orillia 230 kV sub-system. Since additional infrastructure and protection and control systems are required for breakers, the cost of breakers is usually 3-4 times more than for motorized switches ($20 to $25 million). Given the

uncertainty of the demand forecast over the longer term and the substantial cost of installing breakers, the Working Group agreed that installing breakers on the Muskoka-Orillia 230 kV sub-system is not required at this time. A summary of options to improve load restoration and load security on Muskoka-Orillia 230 kV sub-system can be found in Appendix E.

In consideration of the cost-benefit of these options, the Working Group recommends proceeding with the installation of two 230 kV motorized switches at Orillia TS. With these switches, about 50% of the electricity supply to customers on the Muskoka-Orillia 230 kV sub-system could be restored within 30 minutes in the event of an outage on the 230 kV transmission system, meeting the ORTAC 30 minute load restoration criteria.

To bring the 230 kV transmission system in compliance with Ontario's planning standard, the IESO will provide a letter to Hydro One Transmission to initiate project development work for the two 230 kV motorized switches at Orillia TS. Based on project development timeline for switching facilities, the project is expected to be in-service by the end of 2020.

7.1.3 Opportunities to Use Community-Based Solutions to Improve Resilience and Service Reliability

In addition to the transmission and distribution options discussed above, there may be opportunities to improve system resilience and service reliability at the community level using distributed energy resources and emerging technologies, such as residential solar-storage technology, micro-grids and on-site generation. Many of the community-based solutions are still in the early stages of development. The Working Group needs to better understand the cost and feasibility of these options. Depending on the interest from First Nation communities, municipalities and the LAC, the Working Group can facilitate discussions on the cost-benefit of opportunities to improve system resilience and the service reliability through community-based solutions. A good opportunity for these discussions may be through community energy planning activities.

7.2 Provide Adequate Supply to Support Growth

To ensure that the regional electricity system has adequate supply to support growth, the Working Group examined options to address the near-term needs at Parry Sound TS and Waubaushene TS and the longer-term supply capacity needs on the Muskoka-Orillia 230 kV sub-system.

The following section discusses these options in more detail.

7.2.1 Options to Provide Additional Transformer Station Capacity at Parry Sound TS and Waubaushene TS

Distribution Option

To free up supply capacity at Parry Sound TS and Waubaushene TS, some customers in the Parry Sound and Waubaushene areas can be resupplied from neighbouring transformer stations using existing and/or new 44 kV sub-transmission facilities.

To manage the near-term demand growth in the area, about 4 MW at Waubaushene TS can be resupplied from Orillia TS using the existing 44 kV sub-transmission infrastructure by 2020. If required, another 7 MW at Waubaushene TS can be resupplied from Midhurst TS upon completion of Barrie Area Transmission Reinforcement in the early 2020s. This can be done using existing distribution system and no new facilities will be required. This option would address the needs at Waubaushene TS over the planning period at minimal cost and would maximize the use of existing facilities. Midhurst TS is a major transformer station supplying the Barrie/Innisfil Sub-region. Resupplying some of the customers in Waubaushene from Midhurst TS could have an impact on the timing and need for a new TS in the Barrie/Innisfil Sub-region over the longer term. As such, the Working Group will need to coordinate with the Barrie/Innisfil IRRP Working Group to monitor and manage the demand growth in the Waubaushene and Barrie/Innisfil areas.

Similarly, to manage the near-term growth in the area, about 6 MW at the Parry Sound TS can be resupplied from Muskoka TS. There is sufficient capacity at Muskoka TS to supply these customers over the planning period. To facilitate the transfer of load from Parry Sound TS to Muskoka TS, Hydro One will need to seek approval to construct 44 kV feeder tie between the Muskoka TS M5 and M1 feeders (estimated cost of about $7 million). The siting and routing of these facilities will be determined as part of the project development process. Based on the typical project development timeline for 44 kV sub-transmission reinforcements, the project is expected to be in-service by 2020. These reinforcements would substantially address the near-term supply needs at Parry Sound TS and would also improve service reliability for the Townships of Muskoka Lakes and Seguin.

In the near term, the Working Group recommends resupplying some customers in the Parry Sound and Waubaushene areas from neighbouring transformer stations. This option will fully

address the supply needs at Waubaushene TS over the planning period and will help manage near-term demand at Parry Sound TS at a minimal cost. Even after implementing these near-term measures, about 16 MW of additional supply will still be required to address the supply needs at Parry Sound TS over the planning period. As such, other options will need to be considered to address the supply needs at Parry Sound TS over the planning period.

Transmission Option

Transformers at the existing Parry Sound TS and Waubaushene TS can be upgraded to enable more power to be delivered to the Parry Sound and Waubaushene areas. This option costs about $25 to $30 million for each transformer station upgrade.

Transmission-Connected Generation Facilities

Since the need is at the transformer station level, transmission-connected generation facilities would not address the need. The Working Group therefore did not consider it.

Community-Based Solution: Local Demand Management and Distributed Energy Resources

With the relatively slow electricity demand growth forecast for this sub-region, there is an opportunity to use targeted conservation and local demand management, distribution-connected generation and/or other distributed energy resources to defer the transformer upgrade at Parry Sound TS and Waubaushene TS. In order to defer the transformer upgrades, LDCs would need to reduce the electricity demand by about 1 MW annually at each of these transformer stations. Based on economic analysis, the LDCs can save about $2 million for every year of deferred capital. More details related to the capital deferral analysis can be found in Appendix D.

Through discussions with the LDCs and communities, the Working Group has identified a number of potential community-based solutions to address supply needs in the Parry Sound and Waubaushene areas. For example:

- **Heating efficiency:** As discussed in Section 5.1, the electricity demand peak in this sub-region is driven by electric space and water heating. There may be opportunities to reduce the peak demand by improving heating efficiency in the area.

  While a large portion of the communities in this sub-region rely on electric heating, some customers also rely on other fuel types, such as wood, to meet their heating

requirements. In some cases, communities may have some access to natural gas infrastructure. Through initiatives, such as home energy audits, retrofit programs and community energy planning activities, the Working Group can work with communities to better understand the heating requirements and energy baseline (e.g., heating fuel, housing insulation) and identify opportunities to improve heating efficiencies in the Parry Sound/Muskoka Sub-region.

- **Local hydroelectric potential:** Based on information provided by the Ontario Waterpower Association ("OWA"), there is about 38 MW of hydroelectric potential in the Parry Sound District. As discussed in Section 4.2.1, many of the hydroelectric resources are run-of-the-river facilities with limited storage capability. As such, only a portion of their installed capacity can be relied upon at the time of local peak. Furthermore, much of these potential hydroelectric resources are located far from existing transmission and distribution infrastructure. To access this potential, additional transmission and distribution infrastructure may be required. More details related to these hydroelectric potential can be found in Appendix F.

- **Pilots and emerging technologies:** Many LDCs are engaging in pilots and studies to better understand the costs and feasibility of community based solutions and **e**merging technologies, such as residential solar-storage technology, microgrids, and thermal energy storage. These emerging technologies can potentially help reduce a community's reliance on the provincial grid during the time of local peak.

At this time, the Working Group has limited information on the cost and feasibility of distributed energy resources and local demand management. More work is needed to determine whether it is cost effective and feasible to rely on these solutions to address the local need. To better understand the cost and feasibility of implementing distributed energy solutions and demand management in the Parry Sound/Muskoka Sub-region, the Working Group recommends initiating a local achievable potential ("LAP") study for the Parry Sound/Muskoka Sub-region in early 2017. The study will examine the cost and feasibility of a range of distributed energy resources and local demand management options including incentive adders to existing conservation programs, new conservation and demand management programs, local demand response, behind-the-meter generation and energy storage. The study may also examine options to manage new demand from increased electrification that may result from Ontario's CCAP. This study will be initiated in early 2017 by the LDCs. The IESO will assist and provide funding for the LAP study.

As well, the Working Group will work closely with communities to leverage local knowledge and community energy planning activities and to identify opportunities for targeted conservation and energy efficiency opportunities in First Nation communities and municipalities.

End-of-Life Replacement Considerations

As discussed in Section 6.3.1, transformers at Parry Sound TS and Waubaushene TS could be reaching their end-of-life in the early 2030s. Depending on the electricity demand growth, it may be cost effective to advance the end-of-life replacement of these aging assets with upgraded/upsized facilities.

To determine if there is an opportunity to align the end-of-life facility replacement with solutions to address supply need at Parry Sound TS and Waubaushene TS, the Working Group will actively monitor and assess the conditions of these transformers and electricity demand growth. The Working Group will revisit this need in the next iteration of the plan.

7.2.2 Options to Provide Additional Supply Capacity on Muskoka-Orillia 230 kV sub-system over the Longer Term

As discussed in Section 6.2.2, about 20 MW of additional supply capacity will be required on the Muskoka-Orillia 230 kV sub-system in the early 2030s. Given the uncertainty with the demand growth and the fact that the need does not arise until late in the planning period, early development work for major electricity infrastructure projects is not required at this time. However, it is important to continue to monitor demand closely to determine if and when an investment decision for the Muskoka-Orillia 230 kV sub-system is required. To lay the ground work for the next planning cycle, the Working Group has explored potential options to address the longer-term needs on Muskoka-Orillia 230 kV sub-system.

Distribution Option

To free up supply capacity on the Muskoka-Orillia 230 kV sub-system, one option is to supply some of customers on the Muskoka-Orillia 230 kV sub-system from the transformer stations on the Parry Sound 230 kV sub-system using existing and/or new 44 kV sub-transmission facilities. However, as discussed in Section 6.2.2 , electricity demand at Parry Sound TS and Waubaushene TS has already exceeded the TS capacity and would not have sufficient capacity to supply additional customers. This option was therefore ruled out by the Working Group.

Transmission Options

Installing switching facilities or upgrading sections of the transmission lines can enable more power to be delivered into the Muskoka-Orillia 230 kV sub-system. These enhancements may be subject to regulatory approvals, such as a Class Environmental Assessment and utilities' rate filings. The lead time to develop these facilities is typically three to five years.

The costs of these transmission reinforcements range from $20 to $30 million depending on the reinforcements requirements. Cost responsibility for the transmission reinforcements would be determined as part of the regulatory application review process.

This option should be considered and revisited in the next iteration of the plan.

Transmission-Connected Generation Option

Siting transmission-connected generation facilities can be effective for addressing supply capacity on Muskoka-Orillia 230 kV sub-system. A 20 MW generation facility connected to Muskoka-Orillia 230 kV sub-system can address the potential supply capacity needs arising in the early 2030s.

There are a number of factors that need to be considered when siting localized generation, and any decisions would need to align with the recommendations found in the August 2013 report entitled "Engaging Local Communities in Ontario's Electricity Planning Continuum"[12] prepared for the Minister of Energy by the former OPA and the IESO.

As the requirements in the Parry Sound/Muskoka Sub-region are for additional capacity during times of peak demand, a large, transmission-connected generation solution would need to be capable of being dispatched when needed, and operate at an appropriate capacity factor. In some cases, additional transmission reinforcements may also be required.

The cost of a large, localized generation resource depends on the size, fuel type, technology and the degree to which it can contribute to the local and provincial system capacity or energy needs. The fuel availability will also need to be taken into consideration. The lead time for generation development is typically two to three years, but it could be longer depending on the size and technology type.

[12] http://www.ieso.ca/Pages/Participate/Regional-Planning/Local-Advisory-Committees.aspx

This option should be considered and revisited in the next iteration of the plan.

Community-Based Solutions: Local Demand Management and Distributed Energy Resources

With the modest electricity demand growth in this sub-region, there is an opportunity to use targeted local demand management, distribution-connected generation and/or other distributed energy resources to manage demand on the Muskoka-Orillia 230 kV sub-system and to defer major capital investments and infrastructure development over the longer term. As discussed in Section 7.2.1, the Working Group will initiate a LAP study to determine the cost and feasibility of using distributed energy resources and local demand management options to defer major capital investments (e.g., transmission reinforcements). In conjunction with the study, the Working Group will continue to work closely with communities to coordinate community-energy planning activities and to identify opportunities for targeted CDM opportunities in First Nation communities and municipalities.

This option should be considered and revisited in the next iteration of the plan.

8. Recommended Actions

The recommended actions to minimize the frequency and duration of power outages and to provide adequate supply to support growth in the Parry Sound/Muskoka Sub-region over the planning period are outlined in Tables 8-1 and 8-2, along with the proposed timing and the parties that will lead the implementation.

The Working Group will continue to meet regularly during the implementation phase of this IRRP to monitor developments in the sub-region and to track progress toward these deliverables and this information will be shared and discussed with the LAC.

Table 8-1: Recommended Actions to Minimize Frequency and Duration of Power Outages

Recommendations		Action(s)/Deliverable(s)	Lead Responsibility	Timeframe
1	**Inform communities and LAC members of the 44 kV sub-transmission service reliability performance and the on-going maintenance and improvement initiatives in the Parry Sound/Muskoka Sub-region**	Provide an update to communities and LAC members on the 44 kV sub-transmission service reliability performance improvements including any proposed capital plans The ability to implement any proposed capital investment plans will be contingent on the outcome of Hydro One Distribution's 2018-2022 rate filing application with the OEB.	Hydro One Distribution	End of year 2017
2	**Examine the cost benefit and cost responsibility of options to resupply customers in Bracebridge, Gravenhurst, Muskoka Lakes and surrounding areas from alternate transformer station**	Discuss findings and decision with the Working Group through the regional planning process Share the results with LAC members and affected communities	Hydro One Distribution, Lakeland Power and Veridian Connections	To be completed by Q4 2017

3	**Install two 230 kV motorized switches at Orillia TS to restore power to customers in timely manner in the event of a major outage on the Muskoka-Orillia 230 kV sub-system**	Prepare a letter to Hydro One Transmission to initiate project development work	IESO	Early 2017
		Design, develop and construct two 230 kV motorized switches	Hydro One Transmission	In-service by end of 2020
4	**Explore opportunities to improve resilience and service reliability at the community level**	Facilitate discussions with First Nation communities, municipalities and LAC members on the cost-benefit and opportunities to improve system resilience and service reliability through community energy planning	IESO	On-going

Table 8-2: Recommended Actions to Provide Adequate Supply to Support Growth

Recommendations		Action(s)/Deliverable(s)	Lead Responsibility	Timeframe
1	**Resupply some customers in the Parry Sound and Waubaushene areas from neighbouring transformer stations using existing and new distribution facilities to maximize the use of the existing system**	Seek approval to construct 44 kV feeder tie between the Muskoka TS M5 and M1 feeders to facilitate the transfer of load from Parry Sound TS to Muskoka TS	Hydro One Distribution	In-service by 2020
		Transfer up to 4 MW from Waubaushene TS to Orillia TS Transfer up to 6 MW from Parry Sound TS to Muskoka TS	Hydro One Distribution	Prior to 2020
		Transfer up to 7 MW from Waubaushene TS to Midhurst TS (if required)	Hydro One Distribution	Early 2020s upon completion of

				Barrie Area Transmission Reinforcement
		Coordinate with the Barrie/Innisfil IRRP Working Group to monitor and manage demand growth in the Waubaushene and Barrie/Innisfil areas	IESO	On-going
2	**Determine the cost and feasibility of using distributed energy resources and local CDM options to defer major capital investments in the Parry Sound/Muskoka Sub-region**	Initiate a LAP study to determine the cost and feasibility of using distributed energy resources and local conservation and demand management options to defer major capital investments (e.g., transmission reinforcements)	IESO to assist and provide funding LDCs to carry out the study	Initiate study in early 2017
		Work closely with communities to leverage local knowledge and community energy planning activities and to identify opportunities for targeted conservation and demand management opportunities in First Nation communities and municipalities.	IESO	On-going
3	**Determine whether it is cost effective to advance the end-of-life replacement and to replace the aging assets with upgraded/upsized facilities at Parry Sound TS and Waubaushene TS**	Review electricity demand growth at Parry Sound TS and Waubaushene TS with LAC members	IESO	Annually
		Monitor and provide updated information on the condition of aging equipment at Waubaushene TS and Parry Sound TS to the LAC and the Working Group	Hydro One Transmission	Annually

		Determine whether it is cost effective to advance the end-of-life replacement and to replace the aging assets with upgraded/upsized facilities.	IESO	Annually
4	**Monitor electricity demand growth closely to determine if and when an investment decision on the Muskoka-Orillia 230 kV sub-system is required**	Review electricity demand growth on the Muskoka-Orillia 230 kV sub-system with LAC members	IESO	Annually

9. Community and Stakeholder Engagement

Community engagement is an important aspect of the regional planning process. Providing opportunities for input in the regional planning process enables the views and preferences of the community 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 engagement activities undertaken to date and next steps for the Parry Sound/Muskoka IRRP.

A phased community engagement approach was undertaken for the Parry Sound/Muskoka IRRP based on the core principles of creating transparency, engaging early and often, and bringing communities to the table. These principles were established as a result of the IESO's outreach with Ontarians in 2013 to determine how to improve the regional planning and siting process, and they now guide IRRP outreach with communities and will ensure this dialogue continues as the plan moves forward.

Figure 9-1: Summary of the Parry Sound/Muskoka Community Engagement Process

9.1 Creating Transparency

To start the dialogue on the Parry Sound/Muskoka IRRP and build transparency in the planning process, a number of information resources were created for the plan. A dedicated web page was created on the IESO website including a map of the regional planning area, information on why an IRRP was being developed for the Parry Sound/Muskoka Sub-region, the IRRP terms of reference and a listing of the organizations involved. A dedicated email subscription service was also established for the broader South Georgian Bay/Muskoka planning region where communities and stakeholders could subscribe to receive email updates about the IRRP.

9.2 Engage Early and Often

Early communication and engagement activities for the Parry Sound/Muskoka IRRP were initiated in September 2015 as part of a series of meetings with communities and stakeholders to discuss electricity planning initiatives across the Parry Sound/Muskoka Sub-region. The main objective of the meetings from a regional planning perspective was to introduce attendees to the regional planning process. This included the South Georgian Bay/Muskoka Scoping Assessment process for the regional planning studies being initiated in the area, as well as discussions of upcoming engagement activities. Various meetings were held with a broad range of attendees including municipal representatives, First Nation community members, and local industrial customers.

9.2.1 South Georgian Bay/Muskoka Region Scoping Assessment Outcome Report

The draft South Georgian Bay/Muskoka Region Scoping Report was posted to the IESO website in May 2015 for comment, and a final version was posted on June, 22, 2015. The report was led by the IESO, and developed in collaboration with regional participants, including Hydro One Networks, Lakeland Power, Midland PUC, Newmarket-Tay Power, Orillia Power, PowerStream, and Veridian Connections.

9.2.2 First Nation Community Meetings

On September 24, 2015 the IESO met with Chief Denise Restoule and Councillor Roger Restoule of Dokis First Nation, Chief Barron King of Moose Deer Point First Nation, Chief Warren Tabobondung of Wasauksing First Nation and community representatives. The feedback received focused on the concern that any necessary future infrastructure be planned so that environmental disturbance is minimized and traditional land and space considerations for each

community be respected during the planning process. Community members also expressed the preference to have meetings with communities and municipalities at the same time to ensure that everyone is engaged in the same dialogue. Feedback was also shared that communities would like distributed generation proponents to have the same strong relationship with First Nation communities as they do with municipalities to provide communities with a firsthand opportunity to present and protect their needs.

The IESO remains open to additional meetings to support further engagement of the IRRP.

9.2.3 Municipal Meetings

Meetings with area municipalities are one of the first steps in engagement for all regional plans. In September 2015, the Working Group held municipal meetings in Huntsville and Parry Sound to discuss findings for the South Georgian Bay/Muskoka Region and next steps in the process, including identifying potential options to strengthen reliability in the area, increase supply capacity and replaced aging electricity infrastructure nearing end-of-life. Attendees provided insight on population forecasting, challenges with reliability in the area, and the importance of public and community engagement as the planning process develops. It was also indicated that there was a preference for a LAC for each of the two sub-regions instead of one committee for the larger South Georgian Bay/Muskoka Region.

9.3 Bringing Communities to the Table

To continue the dialogue on regional planning, a LAC was established for the Parry Sound/Muskoka Sub-region in spring 2016. The role of the LAC is to provide advice and recommendations on the development of the regional plan as well as to provide input on broader community engagement. LACs are comprised of municipal, Indigenous, environmental, business, sustainability and community representatives. There is currently one general LAC in the planning area, which includes First Nation and Métis representation. The possibility of also forming a First Nation LAC, comprised of representatives from the First Nation communities in the planning area remains, should First Nation communities request an additional forum for community discussions. All general LAC meetings are open to the public

and meeting information is posted on the dedicated engagement webpage, which in this case is the IESO's Parry Sound/Muskoka engagement webpage.[13]

Development of the Parry Sound/Muskoka LAC was completed through a request for nominations process promoted by the following activities: advertisements in nine local newspapers across the planning area; digital (website) advertising in communities throughout the planning area; emails sent to municipal representatives across the region; letters to the Chiefs of the First Nation communities in the area inviting them to appoint a representative to the LAC, and an e-blast sent to the IESO's South Georgian Bay/Muskoka subscribers list.

On June 20, 2016, the Working Group held the inaugural LAC meeting in the Town of Gravenhurst. The focus of the meeting was to introduce the regional planning process to the newly formed LAC, provide an overview of the electricity infrastructure supplying the area, and touch upon key electricity needs and issues in the Parry Sound/ Muskoka Sub-region to be discussed in greater detail at subsequent LAC meetings.

The second LAC meeting was held on September 26, 2016 in the Town of Dwight. LAC members were presented with the draft IRRP recommendations, and had the opportunity to provide their feedback following the meeting to help inform the final report. Materials from both meetings can be accessed online on the IESO's website.[14]

Copies of the meeting summaries from the Parry Sound/Muskoka LAC meetings can be found in Appendix G.

At the September 2016 meeting, the members of the Parry Sound/Muskoka LAC expressed their interest in continuing to meet on a regular basis following the posting of the IRRP. As a result, the LAC will continue to meet until the start of the next planning cycle in 2018. Information about LAC meetings will continue to be posted on the IESO Parry Sound/Muskoka Sub-region engagement webpage and email notifications of meetings will continue to be sent to the broader South Georgian Bay/Muskoka email subscriber list.

[13] http://www.ieso.ca/Pages/Participate/Regional-Planning/South-Georgian-Bay-Muskoka/Parry-Sound-Muskoka-sub-region.aspx
[14] http://www.ieso.ca/Pages/Participate/Regional-Planning/South-Georgian-Bay-Muskoka/Parry-Sound-Muskoka-sub-region.aspx

10. Conclusion

This report documents the regional planning process that has been carried out for the Parry Sound/Muskoka Sub-region and fulfills the OEB's regional planning requirement for the sub-region. The IRRP identifies electricity needs in this sub-region over the 20-year period from 2015 to 2034 and recommends a set of actions to minimize the frequency and duration of power outages and to ensure that the regional electricity system has adequate supply to support growth.

The Parry Sound/Muskoka Sub-region Working Group will continue to meet regularly throughout the implementation of the plan to monitor progress and developments in the sub-region, and will produce annual updates that will be posted on the IESO website[15]. To support development of the plan, a number of actions have been identified to develop alternatives, engage with communities, and monitor growth in the area. Responsibility has been assigned to appropriate members of the Working Group for these actions. Information gathered and lessons learned from these activities will inform development of the next iteration of the IRRP for the Parry Sound/Muskoka Sub-region. The plan will be revisited according to the OEB-mandated 5-year schedule.

[15] IESO website (http://www.iemo.com/Pages/Ontario%27s-Power-System/Regional-Planning/South-Georgian-Bay-Muskoka/default.aspx)