Niagara Region Scoping Assessment Outcome Report

August 24, 2021

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1. Introduction

This Scoping Assessment Outcome Report is part of the Ontario Energy Board's (OEB or Board) regional planning process. The Board endorsed the Planning Process Working Group's Report to the Board in May 2013 and formalized the regional planning process and timelines through changes to the Transmission System Code and Distribution System Code in August 2013.

The first cycle of the regional planning process for the Niagara region was completed in March 2017 with the publishing of the Regional Infrastructure Plan (RIP). Two needs were identified, but no further regional coordination was required. Subsequently, the Niagara RIP consisted of the lead transmitter's (Hydro One Networks Inc., or "Hydro One") Needs Assessment (April 2016) and Local Planning Report (November 2016). It outlined recommendations to address the needs identified, including the uprating of a conductor section and the monitoring of the power factor at a transformer station.

The new cycle of the regional planning process for the Niagara region started on March 25, 2021. The Needs Assessment is the first step in the regional planning process and was carried out by the Study Team led by Hydro One. This report was finalized on May 24, 2021, and identified some needs that may require further regional coordination. This need information was an input into the Scoping Assessment. The Study Team reviewed the nature and timing of all the known needs in the region to determine the most appropriate planning approach. It also considered past or ongoing initiatives in the region.

The Scoping Assessment considers three potential planning approaches for the region (or sub-regions, if applicable), including: an IRRP – where both wires and non-wires options have potential to address needs; a RIP – which considers wires-only options; or a local plan undertaken by the transmitter and affected local distribution company – where no further regional coordination is needed.

This Scoping Assessment report:

- Lists the needs requiring more comprehensive planning, as identified in the Needs Assessment report;
- Reassesses the areas that need to be studied and the geographic grouping of the needs (if required);
- Determines the appropriate regional planning approach and scope where a need for regional coordination or more comprehensive planning is identified;
- Establishes a terms of reference for an IRRP, if an IRRP is required; and
- Establishes the composition of the Technical Working Group.

2. Study Team

The Scoping Assessment was carried out with the following participants:

- Alectra Utilities
- Canadian Niagara Power Inc.
- Grimsby Power Inc.
- Hydro One Networks Inc. (Distribution)
- Hydro One Networks Inc. (Transmission)
- Independent Electricity System Operator (IESO)
- Niagara on the Lake Hydro Inc.
- Niagara Peninsula Energy Inc.
- Welland Hydro Electric System Corp.

3. Categories of Needs, Analysis, and Results

3.1 Overview of the Region

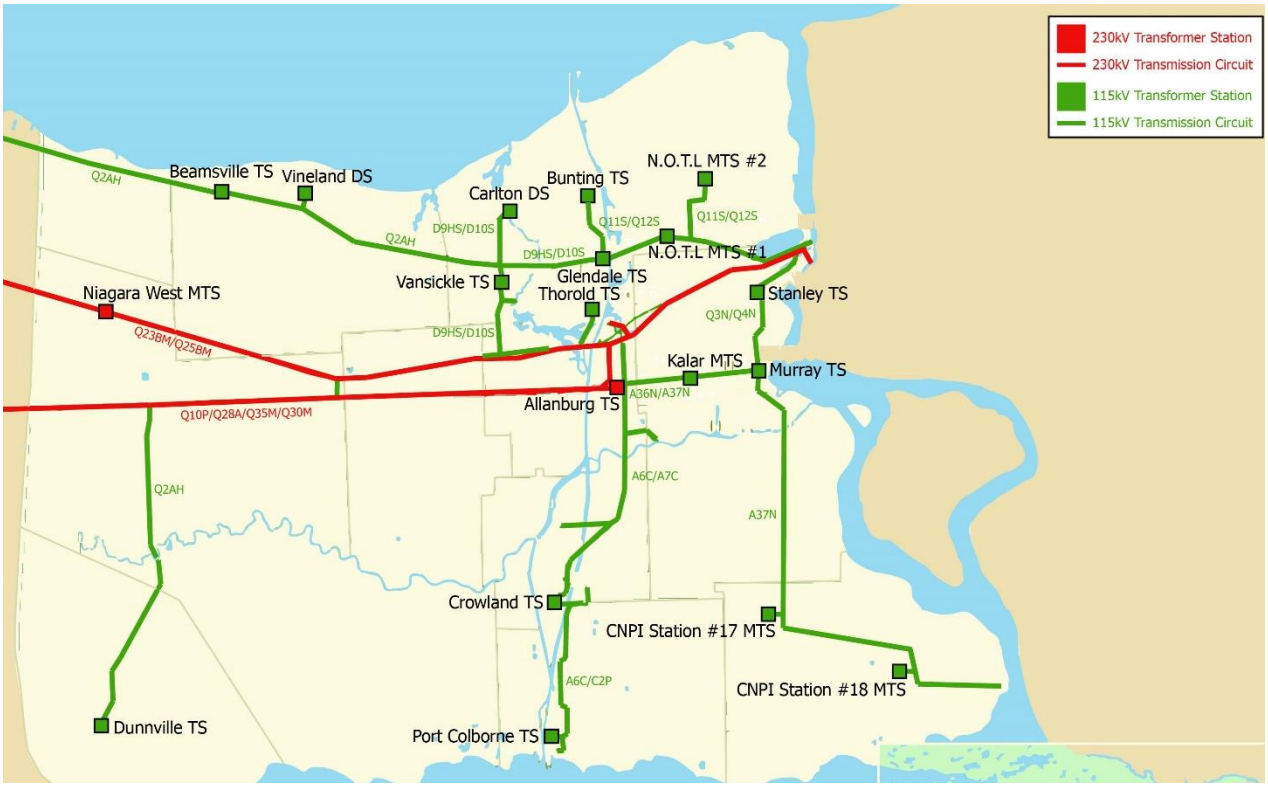
The Niagara region is located between Lake Ontario and Lake Erie, and includes one upper-tier municipality (Regional Municipality of Niagara) and 12 lower-tier municipalities: Fort Erie, Grimsby, Lincoln, Niagara Falls, Niagara-on-the-Lake, Pelham, Port Colborne, St. Catharines, Thorold, Wainfleet, Welland, and West Lincoln. For electricity planning purposes, the planning region is defined by electricity infrastructure boundaries, not municipal boundaries.

This region also includes the following First Nations and Métis Nation of Ontario (MNO) councils:

- Mississaugas of the New Credit
- Oneida Nation of the Thames
- Six Nations of the Grand River (Six Nations Elected Council and Haudenosaunee Confederacy Chiefs Council)
- MNO Niagara Region Métis Council

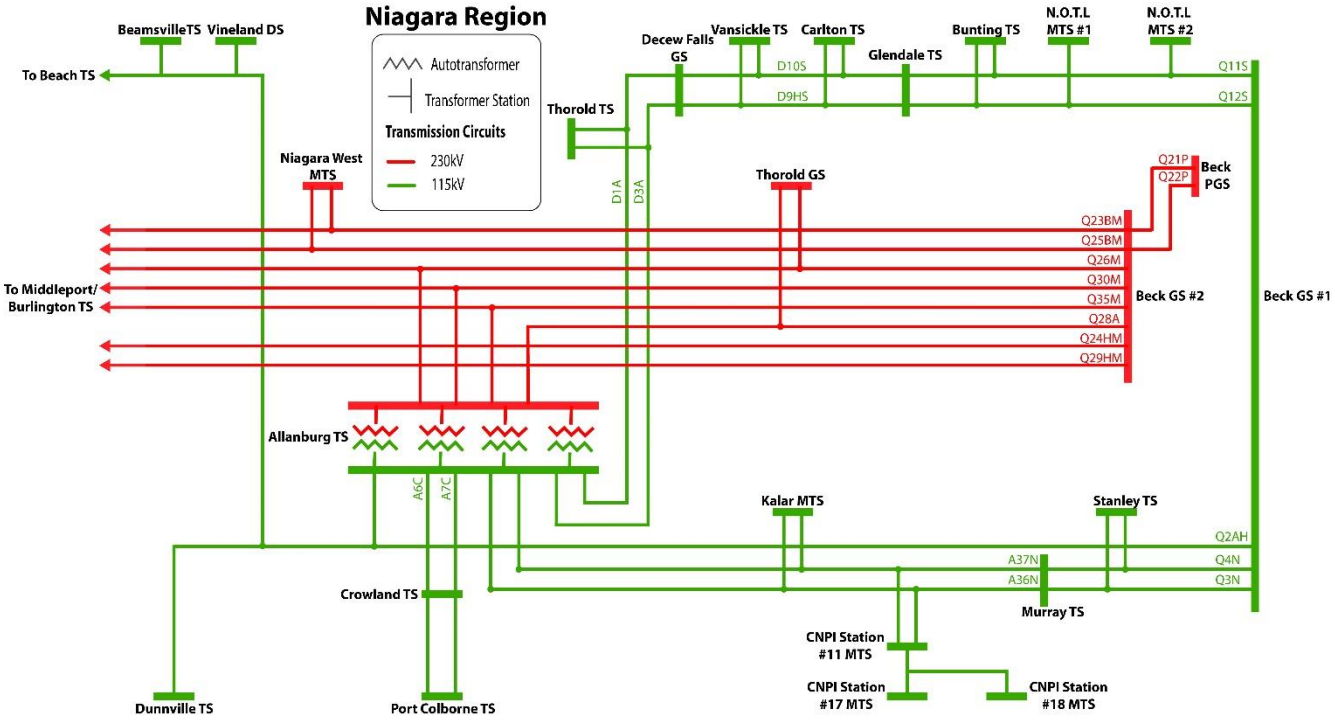
An overview of the Niagara region and the location of the electrical infrastructure is shown in Figure 3-1. This region is summer-peaking (i.e., electricity demand is highest during the summer months), and is characterized by some forecast load growth, particularly in areas near the Welland Canal.

Figure 3-1 | Overview of the Niagara Region



The region is currently supplied from 115 kV and 230 kV transmission lines and stations that connect at the Allanburg transformer station (TS). The four 230/115 kV autotransformers at Allanburg TS provide the major source of supply to the area. The Niagara region is also characterized by large transmission-connected generating facilities, such as: Sir Adam Beck #1, Sir Adam Beck #2, Decew Falls GS, and Thorold GS. An overview of the electrical infrastructure that currently supplies the region is provided in the single line diagram in Figure 3-2.

Figure 3-2 | Electricity Infrastructure in the Niagara Region



3.2 Background of the Previous Planning Process

The regional planning process was formalized by the OEB in August 2013. To prioritize and manage the process, Ontario was organized into 21 regions based on electricity infrastructure boundaries; each of which were assigned to one of three groups based on urgency of need, where Group 1 Regions were being reviewed first. The Niagara region was part of the Group 3 planning regions.

In April 2016, Hydro One Transmission published the first Needs Assessment report for the Niagara region. The scope of the report included a review of system capability, reliability assessments, and asset sustainment timelines for the region. The report identified two needs that did not require further regional coordination. In November 2016, Hydro One Transmission published a Local Planning Report. The Regional Infrastructure Plan (RIP) was subsequently finalized in March 2017, and consisted of the Needs Assessment and Local Planning Report. Section 3.3.1 documents the status of the transmission reinforcements and activities that were recommended during the first cycle of regional planning for Niagara.

This current, second regional planning cycle started with the Needs Assessment report published by Hydro One in May 2021. The needs identified in the Needs Assessment report form the basis of the analysis for this Scoping Assessment and are discussed in further detail in Section 3.3.

3.3 Needs Identified

Hydro One's Needs Assessment provided an update on needs identified in the previous planning cycle and the implementation of projects recommended to address them. Furthermore, it identified new needs in the Niagara region based on the most up-to-date sustainment plans and a new 10-year demand forecast. A summary of the current projects and plans underway to respond to existing needs, plus the new needs, are outlined below.

3.3.1 Projects and Plans Underway

The Needs Assessment report lists the needs identified from the previous planning cycle, and provides an update on the status of project implementation. Table 3-1 below summarizes this. These projects provide a basis for future assessments and should be accounted for in this planning cycle.

Table 3-1 | Needs Identified in the Previous Cycle and Implementation Plan Update

Need	Solution and Timing
• Thermal overload on 115 kV Q4N circuit (Beck SS #1 x Portal Junction section) under high generation scenarios at Sir Adam Beck GS #1	• Uprated conductor section as part of the Beck #1 SS Refurbishment project • In-service in 2019
• Low power factor at Thorold TS	• Continued monitoring between Hydro One Transmission and Hydro One Distribution

In 2019, NOTL Hydro also proceeded with two transformer upsizings: the existing 115.5/29.5 kV 25 MVA T2 transformer at NOTL DS was replaced with the existing 115.5/28.4/16.4 kV 41.5 MVA T1 transformer at NOTL York MTS #1, which in turn was replaced with a new 115/27.6 kV 83 MVA transformer. These facilities came in-service in 2021.

3.3.2 Needs to be Addressed in the Current Planning Cycle

The Needs Assessment then identified new or updated needs in the Niagara region using the 10-year station-level non-coincident demand forecast provided by the local distribution companies (LDCs), updated end-of-life asset condition information from Hydro One, as well as the conservation and demand management (CDM) and distributed generation (DG) forecast provided by the IESO. Table 3-2 below lists these regional needs and their timing. Their locations are shown in Figure 3-3.

Table 3-2 | Updated Regional Needs Identified in the Needs Assessment

Need #	Station/Circuit	Description of Need
1	Beamsville TS	• Summer station capacity will be exceeded starting in 2027
2	Crowland TS	• Existing transformers T5 and T6 will reach end-of-life in the near-term, and new 115/27.6 kV 83 MVA replacement transformers will be in-service by 2024 • Summer station capacity will be exceeded starting in 2028

Figure 3-3 | Geographic Location of Needs Identified in the Needs Assessment

3.3.3 Analysis of Needs and Identification of Region

The Study Team has discussed the needs in the Niagara region and potential planning approaches to address them. The station capacity needs are driven by forecast load growth, and the Study Team noted multiple factors that may have an impact on their estimated magnitude and timing. For instance, there is the potential for the needs to materialize with a greater magnitude or sooner depending on the methodology used for extreme summer weather correction. The impact of the COVID-19 pandemic on 2020 electricity demand (i.e., the year used as the starting point for the Needs Assessment forecast) may also influence the forecast temporarily or in the near-term. Moreover, there may be value in exploring the affects of other local development projects – whether

they are related to specific industries or economic development plans (i.e., greenhouse facilities[1], Thorold Multimodal Hub), or community energy plans or targets.

The following transmission infrastructure falls within this region's boundaries:

- Transformer stations: Allanburg TS, Beamsville TS, Bunting TS, Carlton TS, Crowland TS, Dunnville TS, Glendale TS, Kalar MTS, Murray TS, Niagara West MTS, NOTL York MTS, NOTL #2 MTS, Port Colborne TS, Stanley TS, Thorold TS, Vansickle TS, Vineland DS, CNPI #11 MTS, CNPI #17 MTS, CNPI #18 MTS
- 115 kV transmission circuits: Q3N/Q4N, Q11S/Q12S, Q2AH, A36N/A37N, A6C/A7C, D1A/D3A, D9HS/D10S
- 230 kV transmission circuits: Q23BM, Q24HM, Q25BM, Q26M, Q28A, Q29HM, Q30M, Q35M

According to the Needs Assessment, Beamsville TS will require additional supply capacity starting in 2027, growing gradually to about 2 MW by 2030. However, this is based on the preliminary non-coincident load forecast from the Needs Assessment; the Working Group has indicated that the station's historical load should be examined further and that the need year may be sooner than 2027. The station is not expected to reach end-of-life in the Needs Assessment's 10-year timing horizon, but replacement with larger units is a possible solution. In addition, given the slow rate of growth and size of need relative to the station load, there is basis to explore and evaluate any non-wires potential and load transfer capability to nearby stations, such as Vineland DS or Niagara West MTS, in the area.[2]

Similarly, Crowland TS requires additional supply capacity starting in 2028. The transformers at Crowland TS are reaching their end of life in the near-term, and are scheduled to be replaced with like-for-like 115/27.6 kV 83 MVA units in 2024. The capacity need, growing to about 10 MW by 2030, is also characterized by supply constraints on the 27.6 distribution feeder level. A new transformer station, load transfers to nearby stations (such as Port Colborne TS), and non-wires alternatives should be assessed as part of identifying an integrated solution to address the capacity and end-of-life needs.

Recommendation: There is a need to evaluate integrated solutions to address the region's mid-term capacity needs. Though relatively small in magnitude, these needs will involve multiple stakeholders (LDCs, transmitter, community members, and municipalities) and could trigger investments impacting local ratepayers. Moreover, although the needs are currently forecast to arise in the mid-term (5 to 10 years out) according to the Needs Assessment, waiting for the next regional planning cycle for Niagara could limit the set of feasible options to address the needs. Therefore, an IRRP of a smaller scope is proposed to study the Niagara region, with a target completion of within 12 months.

[1] The IESO commissioned the Greenhouse Energy Profile Study in 2019 to assess potential energy use in the indoor agriculture sector across five regions – of which Niagara was one.

[2] Winona TS, though formally defined as part of the Burlington to Nanticoke planning region, is also a nearby station that could be considered for load transfers if required.

4. Conclusion and Next Steps

The Scoping Assessment concludes that a small IRRP be undertaken to address the needs in the Niagara region, with a target completion of one year. The Terms of Reference for the Niagara IRRP is attached in Appendix 2.

Appendix 1 – List of Acronyms

Acronym	Definition
CDM	Conservation and Demand Management
CNPI	Canadian Niagara Power Inc.
DG	Distributed Generation
DS	Distribution Station
EOL	End-of-Life, end of life
FIT	Feed-in-Tariff
GS	Generating Station
IESO	Independent Electricity System Operator
IRRP	Integrated Regional Resource Plan
kV	kilovolt
LDC	Local Distribution Company
LTR	Limited Time Rating
MNO	Métis Nation of Ontario
MTS	Municipal Transformer Station
MVA	Megavolt ampere
MW	Megawatt
NERC	North American Electric Reliability Corporation
NOTL	Niagara-on-the-Lake
NPCC	Northeast Power Coordinating Council
OEB	Ontario Energy Board

Acronym	Definition
ORTAC	Ontario Resource and Transmission Assessment Criteria
PSS\E	Power System Simulator for Engineering
RIP	Regional Infrastructure Plan
SS	Switching Station
TS	Transformer Station

Appendix 2 – Niagara Region Integrated Regional Resource Plan (IRRP) Terms of Reference

1. Introduction and Background

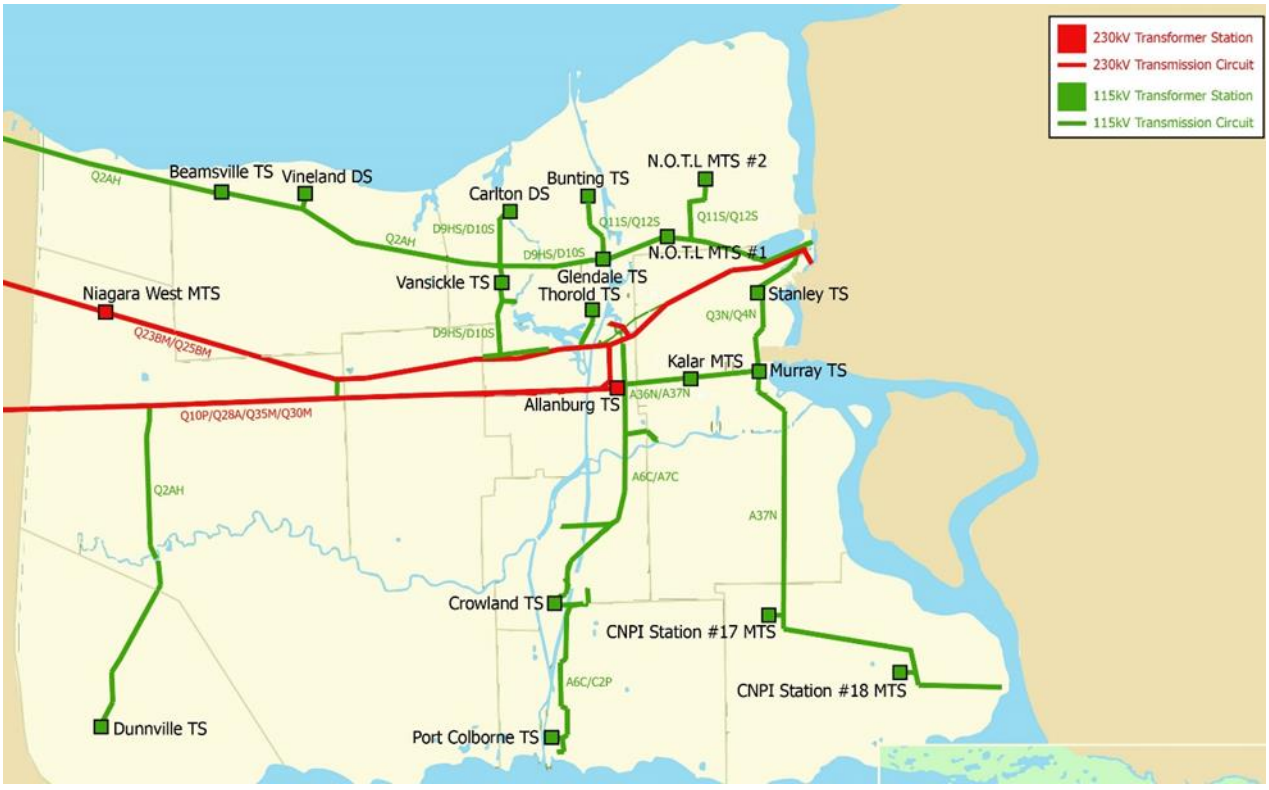
These Terms of Reference establish the objectives, scope, key assumptions, roles and responsibilities, activities, deliverables, and timelines for an IRRP of the Niagara region.

Based on the potential for demand growth within this region, limits on the capability of the transmission capacity supplying the area, and opportunities for coordinating demand and supply options, an integrated regional resource planning approach is recommended.

Niagara Region

The Niagara region is summer-peaking and supplied primarily from 230/115 kV autotransformers at Allanburg TS, with local generation at Sir Adam Beck #1, Sir Adam Beck #2, Decew Falls GS, and Thorold GS. The approximate geographical boundaries of the region are shown in Figure A-3.

Figure A-3 | Overview of the Niagara Region



The region includes the Regional Municipality of Niagara and 12 lower-tier municipalities:

- Fort Erie
- Grimsby
- Lincoln
- Niagara Falls
- Niagara-on-the-Lake
- Pelham
- Port Colborne
- St. Catharines
- Thorold
- Wainfleet
- Welland
- West Lincoln

The Niagara region includes the following First Nations and Métis Nation of Ontario (MNO) councils:

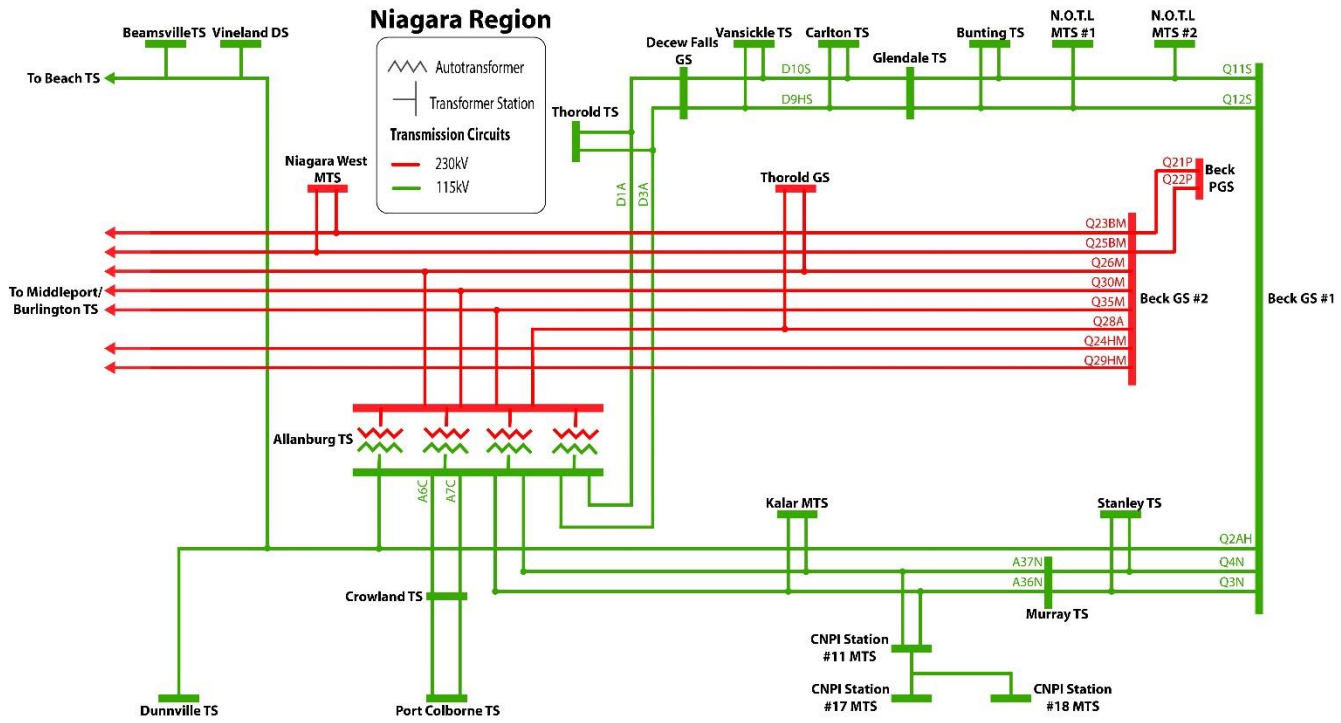
- Mississaugas of the New Credit
- Oneida Nation of the Thames
- Six Nations of the Grand River (Six Nations Elected Council and Haudenosaunee Confederacy Chiefs Council)
- MNO Niagara Region Métis Council

Engagement on this regional plan may be extended to include additional communities outside of the IRRP area boundaries.

Niagara Region Electricity System

The electricity system supplying the Niagara region is shown in Figure A-4.

Figure A-4 | Niagara Region Electricity System



Background

In the last regional planning cycle, the Niagara Needs Assessment and Local Planning Report (for the Q4N need), cumulatively comprising the Niagara RIP, were published in April 2016 and November 2016, respectively. Hydro One Transmission assessed and implemented work to increase the thermal rating of the Beck SS #1 x Portal Junction section of the Q4N circuit, to address thermal overloads under high generation conditions. This circuit upgrade was completed in 2019. The previous planning studies also recommended the continued monitoring of the power factor at Thorold TS by Hydro One Transmission and Hydro One Distribution.

2. Objectives

1. To assess the adequacy of electricity supply to customers in the Niagara region over the next 20 years.
2. To develop a flexible, comprehensive, integrated electricity plan for the Niagara region.
3. To develop an implementation plan, while maintaining flexibility in order to accommodate changes in key assumptions over time.

3. Scope

This IRRP will develop and recommend an integrated plan to meet the needs of the Niagara region. The plan is a joint initiative involving Alectra Utilities, Canadian Niagara Power Inc., Grimsby Power Inc., Hydro One Distribution, Niagara on the Lake Hydro Inc., Niagara Peninsula Energy Inc., Welland Hydro Electric System Corp., Hydro One Transmission, and the IESO, and will incorporate input from

community engagement. The plan will also integrate forecast electricity demand growth, conservation and demand management in the area with transmission and distribution system capability, end-of-life of major facilities in the area, relevant community plans, any relevant bulk system developments, and generation uptake.

This IRRP will address regional needs in the Niagara region. Specifically, the following existing infrastructure is included in the scope of this study:

- Transformer stations: Allanburg TS, Beamsville TS, Bunting TS, Carlton TS, Crowland TS, Dunnville TS, Glendale TS, Kalar MTS, Murray TS, Niagara West MTS, NOTL York MTS, NOTL #2 MTS, Port Colborne TS, Stanley TS, Thorold TS, Vansickle TS, Vineland DS, CNPI #11 MTS, CNPI #17 MTS, CNPI #18 MTS
- 115 kV transmission circuits: Q3N/Q4N, Q11S/Q12S, Q2AH, A36N/A37N, A6C/A7C, D1A/D3A, D9HS/D10S
- 230 kV transmission circuits: Q23BM, Q24HM, Q25BM, Q26M, Q28A, Q29HM, Q30M, Q35M

The Niagara IRRP will:

- Prepare a 20-year electricity demand forecast for the appropriate stations and establish needs over this timeframe;
- Examine the load meeting capability and reliability of the existing transmission system supplying the Niagara region, taking into account facility ratings and performance of transmission elements, transformers, local generation, and other facilities such as reactive power devices;
- Establish feasible integrated alternatives including a mix of CDM, generation, transmission and distribution facilities, and other electricity system initiatives in order to address the needs of the Niagara region; and
- Evaluate options using decision-making criteria including but not limited to: technical feasibility, economics, reliability performance, and environmental and social factors.

4. Data and Assumptions

The plan will consider the following data and assumptions:

- Demand Data
    - Historical coincident peak demand information for the region
    - Historical weather correction, median and extreme conditions
    - Gross peak demand forecast scenarios by region and TS, etc.
    - Coincident peak demand data, including transmission-connected customers
    - Identified potential future load customers
    - Customer/load segmentation information (e.g. residential, commercial, industrial) by TS
- Conservation and Demand Management

    - Conservation forecast for LDC customers, based on region's share of current energy efficiency programs
    - Potential for CDM at transmission-connected customers' facilities
- Local resources
    - Existing local generation, including distributed generation, district energy, customer-based generation, Non-Utility Generators, and hydroelectric facilities as applicable
    - Existing or committed renewable generation from Feed-in-Tariff (FIT) and non-FIT procurements
    - Future district energy plans, combined heat and power, energy storage, or other generation proposals
- Relevant local plans, as applicable
    - LDC Distribution System Plans
    - Community Energy Plans and Municipal Energy Plans
    - Municipal Growth Plans
    - Indigenous Community Energy Plans
- Criteria, codes and other requirements
    - Ontario Resource and Transmission Assessment Criteria (ORTAC)
    - Supply capability
    - Load security
    - Load restoration requirements
    - NERC and NPCC reliability criteria, as applicable
    - OEB Transmission System Code
    - OEB Distribution System Code
    - Reliability considerations, such as the frequency and duration of interruptions to customers
    - Other applicable requirements
- Existing system capability
    - Transmission line ratings as per transmitter records
    - System capability as per current IESO PSS/E base cases
    - Transformer station ratings (10-day LTR) as per asset owner
    - Load transfer capability
    - Technical and operating characteristics of local generation

- End-of-life asset considerations/sustainment plans
- Other considerations, as applicable

5. Technical Working Group

The core Technical Working Group will consist of planning representatives from the following organizations:

- Independent Electricity System Operator *(Team Lead for IRRP)*
- Alectra Utilities
- Canadian Niagara Power Inc.
- Grimsby Power Inc.
- Hydro One Networks Inc. (Distribution)
- Hydro One Networks Inc. (Transmission)
- Niagara on the Lake Hydro Inc.
- Niagara Peninsula Energy Inc.
- Welland Hydro Electric System Corp.

Authority and Funding

Each entity involved in the study will be responsible for complying with regulatory requirements as applicable to the actions/tasks assigned to that entity under the implementation plan resulting from this IRRP. For the duration of the study process, each participant is responsible for their own funding.

6. Engagement

Integrating early and sustained engagement with communities and stakeholders in the planning process was recommended to and adopted by the provincial government to enhance the regional planning and siting processes in 2013. These recommendations were subsequently referenced in the 2013 Long Term Energy Plan. As such, the Technical Working Group is committed to conducting plan-level engagement throughout the development of the Niagara IRRP.

The first step in engagement will consist of the development of a public engagement plan, which will be made available for comment before it is finalized. The data and assumptions as outlined in Section 4.0 will help to inform the scope of community and stakeholder engagement to be considered for this IRRP.

7. Activities, Timeline, and Primary Accountability

Activity	Lead Responsibility	Deliverable(s)	Timeframe
1. Prepare Terms of Reference considering stakeholder input	IESO	Finalized Terms of Reference	Q3 2021
2. Develop the summer planning forecast for Beamsville TS and Crowland TS		Long-term planning forecast scenarios	Q3 – Q4 2021
Establish historical coincident (for the Niagara region) and non-coincident (for Beamsville TS, Crowland TS) peak demand information	IESO		
Establish historical weather correction, median and extreme conditions	IESO		
Establish gross peak demand forecast	LDCs		
Establish existing, committed, and potential DG	IESO, LDCs		
Establish near- and long-term conservation forecast based on planned energy efficiency activities and codes and standards	IESO		
Develop a high planning forecast scenario for sensitivity analyses, as appropriate (including but not limited to: consideration of electric vehicle/transportation trends and potential impact on Niagara region demand)	IESO		
3. Confirm load transfer capabilities from Beamsville TS and Crowland TS	LDCs	Load transfer capabilities under normal and emergency conditions	Q3 – Q4 2021
4. Provide and review relevant community plans, if applicable	LDCs, public stakeholders, and IESO	Relevant community plans	Q4 2021 – Q1 2022

Activity	Lead Responsibility	Deliverable(s)	Timeframe
5. Complete system studies to identify needs over a 20-year time horizon - Obtain PSS/E base case - Apply reliability criteria as defined in ORTAC to demand forecast scenarios - Confirm and refine the need(s) and timing/load levels	IESO, Hydro One Transmission	Summary of needs based on demand forecast scenarios for the 20-year planning horizon	Q1 – Q2 2022
6. Develop options and alternatives		Develop flexible planning options for forecast scenarios	Q1 – Q2 2022
Conduct a screening to identify which non-wires options warrant further analysis	IESO		
Produce hourly forecasts for Beamsville TS and Crowland TS to enable detailed needs characterization and support options development	IESO		
Develop screened-in energy efficiency options	IESO and LDCs		
Develop screened-in local generation/demand management options	IESO and LDCs		
Develop the transmission and distribution alternatives (i.e., alignment with EOL sustainment plans, load transfers)	IESO, Hydro One Transmission, and LDCs		
Develop portfolios of integrated alternatives	IESO, Hydro One Transmission, and LDCs		
Technical comparison and evaluation	IESO, Hydro One Transmission, and LDCs		

Activity	Lead Responsibility	Deliverable(s)	Timeframe
7. Plan and undertake community & stakeholder engagement		Community and Stakeholder Engagement Plan Input from local communities, First Nation communities, and Métis Nation of Ontario	Ongoing as required
Early engagement including with local municipalities and First Nation communities within study area, First Nation communities who may have an interest in the study area, and the Métis Nation of Ontario	IESO, Hydro One Transmission, and LDCs		
Develop communications materials	IESO, Hydro One Transmission, and LDCs		
Undertake community and stakeholder engagement	IESO, Hydro One Transmission, and LDCs		
Summarize input and incorporate feedback	IESO, Hydro One Transmission, and LDCs		
8. Develop long-term recommendations and implementation plan based on community and stakeholder input	IESO	Implementation plan Monitoring activities and identification of decision triggers Procedures for annual review	Q2 – Q3 2022
9. Prepare the IRRP report detailing the recommended near, medium, and long-term plan for approval by all parties	IESO	IRRP report	Q3 2022

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