TORONTO REGION SCOPING ASSESSMENT OUTCOME REPORT

FEBRUARY 9, 2018

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Toronto Region Participants

Company
Independent Electricity System Operator
Hydro One Networks Inc. (Transmission)
Toronto Hydro-Electric System Limited
Alectra Utilities Corporation
Veridian Connections Inc.
Hydro One Networks Inc. (Distribution)

1 Toronto Region Scoping Assessment Outcome

Scoping Assessment Outcome Report Summary			
Region:	Toronto		
Start Date	November 10, 2017	**End Date**	February 9, 2018

1. Introduction

This Scoping Assessment Outcome report has been prepared in accordance with 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 process and timelines through changes to the Transmission System Code and Distribution System Code later in 2013.

The Toronto region has already undergone one regional planning cycle which was formally completed in 2016. In mid-2017, Hydro One identified that several end-of-life infrastructure needs would occur within the next 10 years in the City of Toronto. Based on this information, as well as the scale of the long-term needs identified in the previous regional planning cycle,[1] it was determined that the next regional planning cycle should be triggered. As a result, a new Needs Assessment report was developed for the Toronto region.[2]

The Needs Assessment report, published on October 24, 2017, concluded that several power system needs in the region require further regional coordination and more comprehensive planning to address. This triggered the IESO-led Scoping Assessment process, which is the second stage in the Regional Planning process, and the outcomes of which are reported in this document.

During the Scoping Assessment, the participants reviewed the nature and timing of all the known needs in Toronto to determine the most appropriate planning approach going forward. The planning approaches considered include an Integrated Regional Resource Plan ("IRRP") – where non-wires options have potential to address needs; a Regional Infrastructure Plan ("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.

[1] See the Central Toronto Integrated Regional Resource Plan, Section 8. Link: http://www.ieso.ca/en/get-involved/regional-planning/gta-and-central-ontario/central-toronto-sub-region

[2] The Needs Assessment contains a summary of known power system needs in the region. It is the first stage of the regional planning process. The 2017 Needs Assessment report for Toronto can be found at: https://www.hydroone.com/abouthydroone/CorporateInformation/regionalplans/metrotoronto/Documents/Needs%20Assessment%20-%20Toronto%20Region%20-%20Final.pdf

This Scoping Assessment report:

- Lists the needs requiring more comprehensive planning, as identified in the Needs Assessment report;
- Recommends an IRRP as the appropriate regional planning approach for the Region, given the need for regional coordination and/or more comprehensive planning;
- Establishes a Terms of Reference for the IRRP; and
- Establishes the composition of the Working Group for the IRRP.

2. Team

The Scoping Assessment was carried out by a study team representing the following Regional Participants:

- Independent Electricity System Operator ("IESO");
- Hydro One Networks Inc. ("Hydro One Transmission");
- Toronto Hydro-Electric System Limited ("Toronto Hydro");
- Alectra Utilities Corporation;
- Veridian Connections Inc.; and
- Hydro One Networks Inc. ("Hydro One Distribution").

3. Categories of Needs, Analysis and Results

I. Overview of the Region

The Toronto electricity planning region includes the area within the municipal boundary of the City of Toronto. The region is supplied by thirty-five 230 kV and 115 kV transmission stations, as shown in Figure 1-1. Eighteen 230/27.6 kV step-down transformer stations supply the eastern, northern and western parts of the region. The central area of Toronto is supplied by two 230/115 kV autotransformer stations (Leaside TS and Manby TS), two 115/27.6 kV step-down stations, and fifteen 115/13.8 kV step-down stations. The Central Toronto area is shown in Figure 1-2.[3] A small number of distribution feeders from Toronto also supply customers in the City of Mississauga and City of Pickering.

[3] Refer to the 2015 Central Toronto IRRP for more detail about the electricity system service the City of Toronto, and Central Toronto. Note that the 2015 IRRP also included three 230/27.6 kV transmission stations within the study area. For the purpose of this regional plan, Central Toronto is defined as the area supplied by the legacy City of Toronto (pre-amalgamation) 115 kV transmission network.

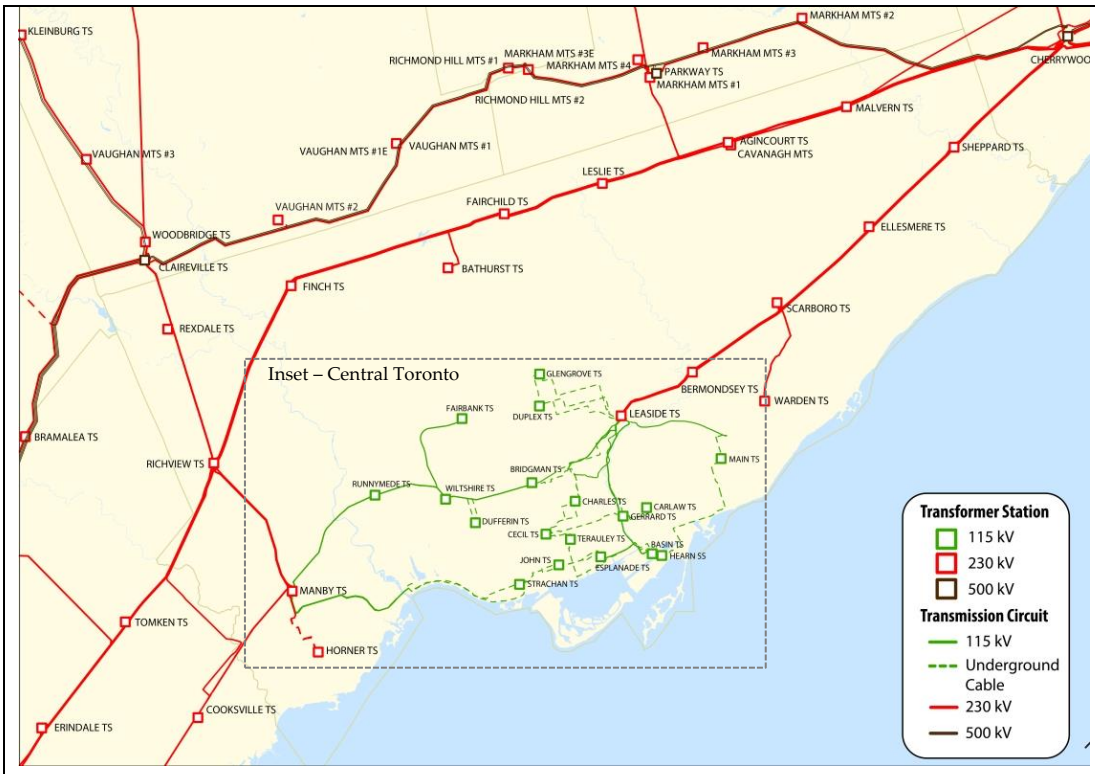


Figure 1-1 Electricity Infrastructure in the Toronto Region

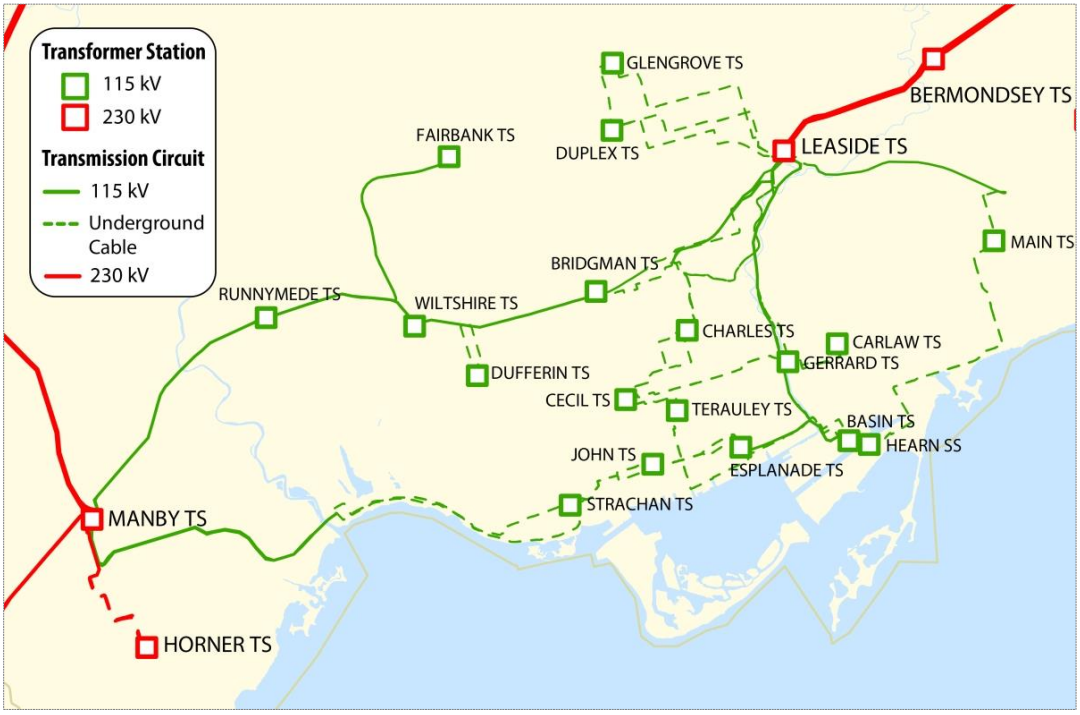


Figure 1-2 Electrical Supply in Central Toronto (Inset)

The peak summertime electricity demand in Toronto is approximately 5,000 MW (including 2,000 MW of demand in Central Toronto).[4] Since the provincial launch of Conservation and Demand Management ("CDM") programs in 2006, about 300 MW of electricity demand reductions have been successfully implemented in Toronto.

The 550 MW Portlands Energy Centre, located near downtown Toronto, is a natural gas-fired combined cycle power plant. This is the single largest source of generation within Toronto (connected to the Hearn SS shown in Figure 1-2).

Numerous distributed energy resource ("DER") facilities are located throughout the City. For example, through previous procurements such as the Feed-in Tariff program, Renewable Energy Standard Offer Program, and Combined Heat and Power ("CHP") Standard Offer Program, approximately 1,700 individual renewable and CHP facilities have either been contracted for, or placed in service in the City of Toronto. The total combined electrical supply capacity of these projects is 115 megawatts ("MW").[5]

II. Background

The first cycle of the regional planning process for the Toronto Region was formally completed in January 2016 with the publication of Hydro One's RIP for the Central Toronto area. An IRRP was completed for Central Toronto in April 2015, and in February 2017, an update was made to the plan resulting from plans to convert commuter heavy rail (Metrolinx - GO) from diesel to electric power.

In mid-2017, Hydro One identified a number of transmission system end-of-life needs in Toronto over the next 10 years. The scale and timing of these end-of-life needs highlighted a need for the initiation of another regional planning cycle. As a result, Hydro One initiated a Needs Assessment, which officially started the next regional planning cycle for the region. The Needs Assessment was completed in October 2017. The report identified a number of needs which require further regional coordination. As a result, this Scoping Assessment was completed.

III. Needs Identified

The Toronto Region Needs Assessment identified new needs, and reaffirmed the needs identified in the previous RIP/IRRP cycle. These needs will be assessed in detail in subsequent planning stages, considering other local factors, including initiatives affecting electrical demand, which are priorities of the City of Toronto (e.g., Greenhouse gas emission reduction

[4] The peak electricity demand in summer 2006 was 5,305 MW; in summer 2017, demand was 4,746 MW.
[5] This translates to about 44 MW of "effective" capacity that system planners can count on during the peak demand period (assuming 34% capacity factor for solar PV, 13.6% for wind, and 100% for all other fuel types, including CHP).

targets, presently articulated through the TranformTO strategy).

Table 1-1 lists these needs, their expected timing, and their level of prioritization for assessment and development of solution(s) based on factors such as the expected timing and magnitude of the need, including the lead time required to develop and implement solution(s). The needs are divided into three groups, where Group 1 needs should be assessed first. The assessment of these needs will consider their inter-dependencies in order to achieve the most economic and efficient solutions (refer to Appendix A). The 2017 Needs Assessment report for the Toronto Region contains additional details about these system needs.[6] Other needs identified in the Needs Assessment not listed in Table 1 will proceed with Local Planning or Regional Infrastructure Planning, as appropriate.

Table 1-1: Summary of Needs

Facilities	Need	Expected Timing
Group 1 Priority		
Main transformer station ("TS")	End-of-life of transformers T3 and T4, 115 kV line disconnect switches, installation of 115 kV Current Voltage Transformers	2021-2022
John TS	End-of-life of transformers T1, T2, T3, T4, T6, and 115 kV breakers	2024-2025
C5E/C7E 115kV underground transmission cables	End-of-life of underground cables from Esplanade TS to Terauley TS in downtown Toronto	2024-2025
H1L/H3L/H6LC/H8LC 115 kV overhead transmission lines	End-of-life of the overhead line sections between Bloor Street and Leaside Junction	2020-2021
L9C/L12C 115kV overhead transmission lines	End-of-life of the overhead line sections between Leaside TS and Balfour Junction	2021-2022
H2JK 115kV underground transmission cable H9EJ/H10EJ 115 kV overhead line section	Capacity on the underground cable H2JK between Don Fleet Junction and Esplanade TS Request to relocate the underground cable H2JK and overhead line H9EJ/H10EJ between Cherry Street and Don Fleet Junction due to Metrolinx Don Yard Expansion	2026 for line capacity need (timing to be updated based on demand outlook) Timing of possible relocation is to be determined
Group 2 Priority		
Manby TS	End-of-life of major station equipment including: autotransformers T7, T9, and T12, step-down transformer T13, and the 230 kV yard	2024-2025

[6] The 2017 Needs Assessment report for Toronto can be found at: https://www.hydroone.com/abouthydroone/CorporateInformation/regionalplans/metrotoronto/Documents/Needs%20Assessment%20-%20Toronto%20Region%20-%20Final.pdf

Bermondsey TS	End-of-life of transformers T3 and T4	2022-2023
East Harbor / Port Lands Area and Basin TS	Area transformation capacity to accommodate city growth	2025+ (timing to be updated based on demand outlook)
Leaside TS 230/115kV autotransformers (six in total)	Transformation Capacity, and risk of voltage collapse affecting Leaside 115 kV subsystem	Beyond 2027 (timing to be updated based on demand outlook)
Group 3 Priority		
Transmission lines/circuits: C14L+C17L (Warden TS and Bermondsey TS); C5E+C7E (Terauley TS); and K3W+K1W (Fairbank TS and Wiltshire TS)	Ability to restore load following double circuit outages	To be determined based on demand outlook
Leaside TS to Wiltshire TS 115 kV transmission corridor	Line capacity to accommodate city growth	2034 (timing to be updated based on demand outlook)
Manby TS 230/115kV autotransformers (six in total)	Transformation capacity to accommodate city growth	Beyond 2035 (timing to be updated based on demand outlook)
Manby West to Riverside Junction 115kV transmission corridor	Line capacity to accommodate city growth	Beyond 2035 (timing to be updated based on demand outlook)

Figure 2-1 shows the location of each of the needs listed in the above Table.

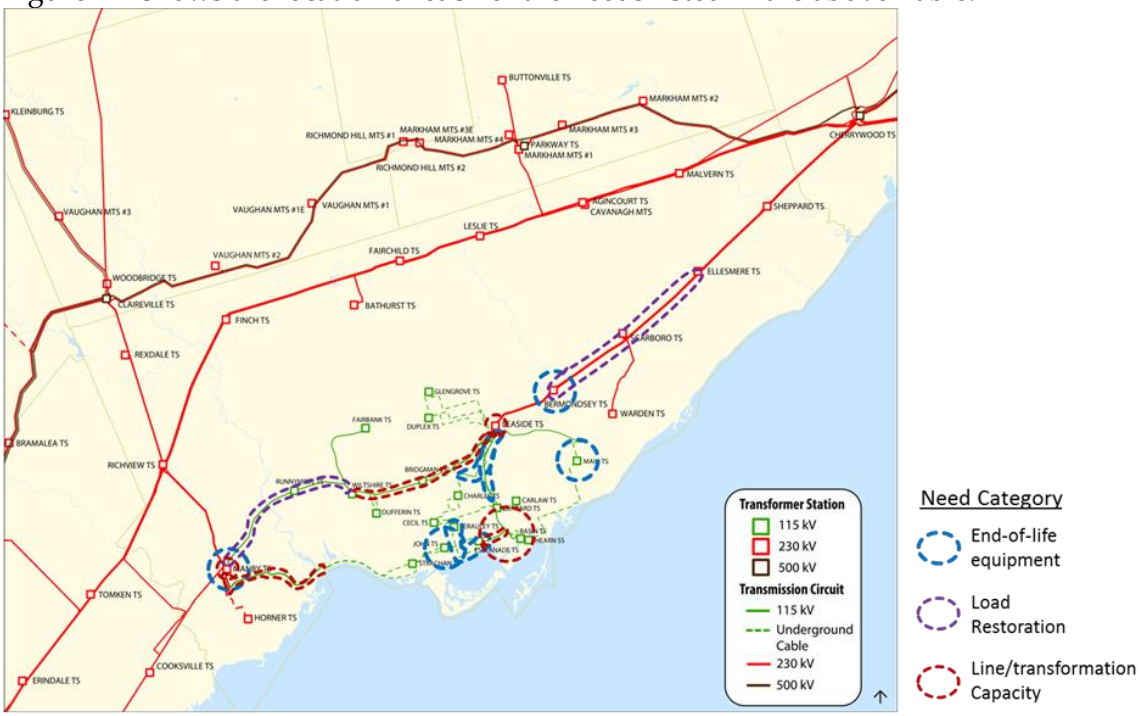


Figure 2-3 Location of Needs in the Toronto Region

IV. Results

The participants met to review the needs and timing for solutions, and to discuss the planning approaches available to address them. The review included discussion of the location of the needs within the region, and whether the region should be further divided into sub-regions to simplify subsequent regional planning stages. The scope of the discussion also included which participants from within the region would comprise the Working Group tasked with developing the Regional Plan.

The participants agreed that for each of the needs identified, a range of alternatives including wires and non-wires solutions should be assessed. Furthermore, a Local Advisory Committee that was established in 2016 to provide advice on regional planning activities in the City of Toronto has expressed that alternatives to conventional wires require deeper consideration in future plans. For these reasons, it was agreed that an IRRP should be undertaken to further assess these needs. The scope of an IRRP includes an assessment of Conservation and Demand Management, distributed energy resources, and other community-based solutions. A Terms of Reference for the IRRP is attached as Appendix A.

The participants also agreed, for the purpose of the next Regional Plan, that the City of Toronto should not be divided into sub-regions. While most of the needs identified impact electricity infrastructure in the downtown area, some needs have been identified in other parts of Toronto, outside of the central part of Toronto.

Lastly, because none of the needs identified directly impact facilities that supply customers of Alectra Utilities Corporation, Veridian Connections Inc., or Hydro One Distribution, it was agreed that the core Working Group for the IRRP will include the IESO, Toronto Hydro, and Hydro One Transmission. The other utilities will be informed and invited to participate if any needs, or proposed solutions, may affect their facilities or customers.

4. Conclusions

The Scoping Assessment concludes that:

- Based on the available information, an IRRP is to be undertaken for the Toronto Region.
- No sub-regions within Toronto will be created for the IRRP; the region should be treated whole for the purpose of developing a comprehensive plan.
- The implementation of recommendations from the previous IRRP should continue.
- The composition of the IRRP Working Group will include the IESO, Toronto Hydro, and Hydro One Transmission. Other Local Distribution Companies in the region will be informed of any needs or solutions that may affect their facilities or customers.

The Terms of Reference for the Toronto IRRP is attached in Appendix A.

List of Acronyms

CDM	Conservation and Demand Management
CHP	Combined Heat and Power
DER	Distributed Energy Resources
FIT	Feed-in-Tariff
IESO	Independent Electricity System Operator
IRRP	Integrated Regional Resource Plan
kV	Kilovolt
LAC	Local Advisory Committee
LDC	Local Distribution Company
MW	Megawatt (equal to 1,000 kilowatts, or one million watts)
NA	Needs Assessment
NERC	North American Electric Reliability Corporation
NPCC	Northeast Power Coordinating Council
OEB	Ontario Energy Board
ORTAC	Ontario Resource and Transmission Assessment Criteria
RIP	Regional Infrastructure Plan
RPP	Regional Planning Process
SA	Scoping Assessment
SOP	Standard Offer Program
TS	Transformer Station or Transmission Station

Appendix A: Terms of Reference

The Toronto Region IRRP

1. Introduction

These Terms of Reference establish the objectives, scope, roles and responsibilities, deliverables and timelines for an Integrated Regional Resource Plan ("IRRP") for the Toronto region.

Based on the power system needs identified throughout the region (including a number of end-of-life transmission stations and lines in the near term and medium term), strong urban growth and intensification projections in the City of Toronto, expansion of electrified transit, and potential opportunities for demand and supply solutions, an IRRP is the appropriate planning approach for this region.

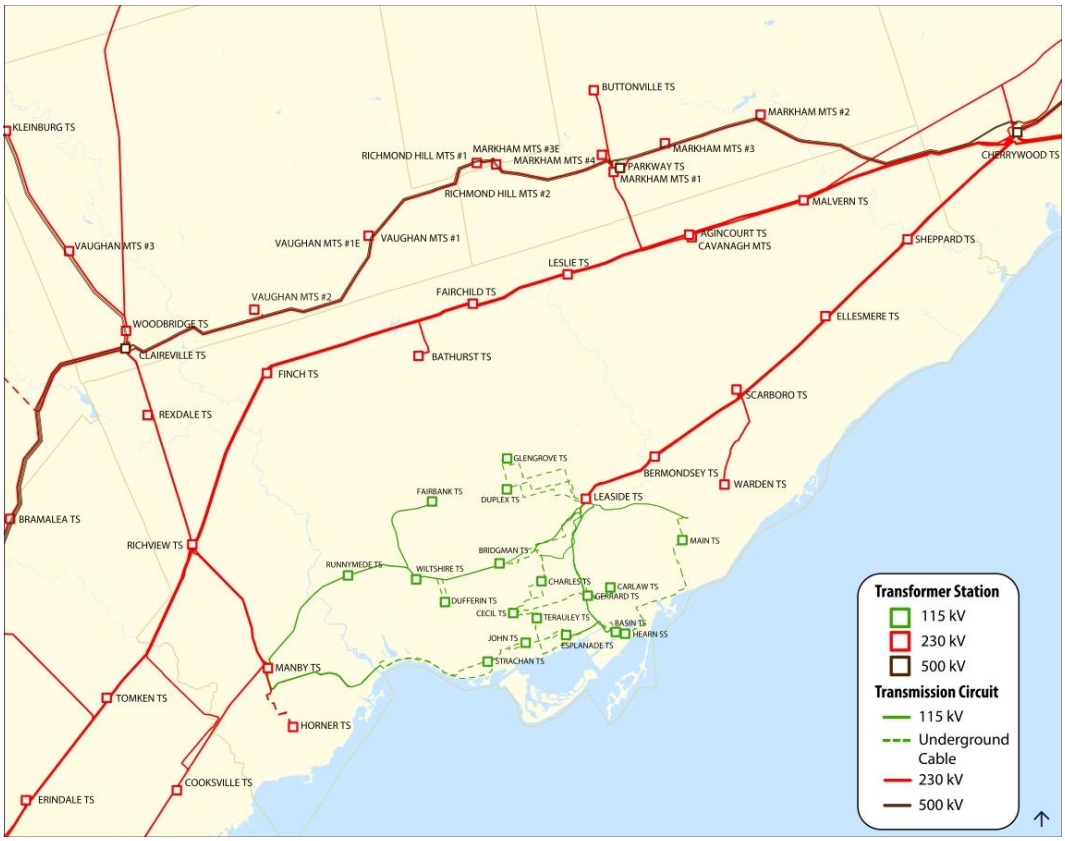
The Toronto Region

The Toronto electricity planning region includes the area within the municipal boundary of the City of Toronto. The region is supplied by thirty-five 230 kilovolt ("kV") and 115 kV transmission stations as shown in Figure A-1. Eighteen 230/27.6 kV step-down transformer stations supply the eastern, northern and western parts of the region. The central area, including the downtown core, is supplied by two 230/115 kV autotransformer stations (Leaside TS and Manby TS),[7] that, in turn, supply seventeen 115 kV step-down stations (fifteen at 13.8 kV and two at 27.6 kV at the distribution side).

For the purpose of this IRRP, no divisions are proposed that would create any sub-regions to assess within the City of Toronto.

[7] The 2015 Central Toronto IRRP also included three 230/27.6 kV transformer stations within the study area. For the purpose of the IRRP going forward, the Central Toronto area is defined as the area supplied by the legacy City of Toronto 115 kV transmission network (pre-amalgamation), which includes the areas supplied by Leaside TS and Manby TS.

Figure A-1 Electricity Infrastructure in the Toronto Region



Source: IESO

2. Objectives

1. Assess the adequacy and reliability of the portion of the IESO-controlled grid[8] that provides electricity supply to the Toronto region over the next 25 years.[9]
2. Account for major asset renewal/end-of-life needs, capacity needs, enhancing reliability and resilience, uncertainty in the outlook for electricity demand, and local priorities in developing a comprehensive plan.
3. Evaluate opportunities for cost effective non-wires alternatives, including conservation and demand management ("CDM") and distributed energy resources ("DER"), as well as wires approaches for addressing the needs identified.
4. Develop an implementation plan that maintains flexibility in order to accommodate changes in key assumptions over time. The implementation plan should identify actions

[8] The scope of the assessment includes transmission stations.

[9] The typical planning horizon in a regional study is 20 years; however, Toronto Hydro produces a long-range forecast spanning 25 years and this forecast will be used as the basis for assessing long-term system needs in the IRRP.

for near-term needs, preparation work for medium-term needs, and planning direction for the long-term.

3. Scope

3.1 Needs to be Addressed

The IRRP will develop and recommend an integrated plan to meet the needs of the Toronto region. The plan is a joint initiative involving Toronto Hydro, Hydro One Transmission, and the IESO,[10] and will account for input from the community through engagement activities. The plan will integrate the electricity demand outlook scenarios, CDM, DER uptake, transmission and distribution system capabilities, and align with relevant community plans and other bulk system developments, as applicable.

The scope of the Toronto IRRP includes the following needs, as identified in the Needs Assessment:

Facilities	Need	Expected Timing[11]
Group 1 Priority		
Main transformer station ("TS")	End-of-life of transformers T3 and T4, 115 kV line disconnect switches, installation of 115 kV Current Voltage Transformers	2021-2022
John TS	End-of-life of transformers T1, T2, T3, T4, T6, and 115 kV breakers	2024-2025
C5E/C7E 115kV underground transmission cables	End-of-life of underground cables from Esplanade TS to Terauley TS in downtown Toronto	2024-2025
H1L/H3L/H6LC/H8LC 115 kV overhead transmission lines	End-of-life of the overhead line sections between Bloor Street and Leaside Junction	2020-2021
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H2JK 115kV underground transmission cable H9EJ/H10EJ 115 kV overhead line section	Capacity on the underground cable H2JK between Don Fleet Junction and Esplanade TS Request to relocate the underground cable H2JK and overhead line H9EJ/H10EJ between Cherry Street and Don Fleet Junction due to Metrolinx Don Yard	2026 for line capacity need (timing to be updated based on demand outlook) Timing of possible relocation is to be determined

[10] Alectra Utilities, Veridian Connections and Hydro One Distribution are also supplied by feeders from Toronto. These utilities may also be involved in the regional plan, as needed.

[11] For end-of-life needs, the date refers to the anticipated timing that a solution will need to be in place. These timelines will be subject to further review and analysis in subsequent planning stages.

	Expansion	
Group 2 Priority		
Manby TS refurbishment	End-of-life of major station equipment including: autotransformers T7, T9, and T12, step-down transformer T13, and the 230 kV yard	2024-2025
Bermondsey TS	End-of-life of transformers T3 and T4	2022-2023
East Harbor / Port Lands Area and Basin TS	Area transformation capacity to accommodate city growth	2025+ (timing to be updated based on demand outlook)
Leaside TS 230/115kV autotransformers (six in total)	Transformation Capacity, and risk of voltage collapse affecting Leaside 115 kV subsystem	Beyond 2027 (timing to be updated based on demand outlook)
Group 3 Priority		
Transmission lines/circuits: C14L+C17L (Warden TS and Bermondsey TS); C5E+C7E (Terauley TS); and K3W+K1W (Fairbank TS and Wiltshire TS)	Ability to restore load following double circuit outages	To be determined based on demand outlook
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Manby TS 230/115kV autotransformers (six in total)	Transformation capacity to accommodate city growth	Beyond 2035 (timing to be updated based on demand outlook)
Manby West to Riverside Junction 115kV transmission corridor	Line capacity to accommodate city growth	Beyond 2035 (timing to be updated based on demand outlook)

Other identified needs in the Needs Assessment not listed in the table above will proceed with Local Planning or Regional Infrastructure Planning as appropriate.

Since within the needs identified there are a number of inter-dependencies (i.e. it is possible that one solution could address multiple needs), the Working Group will consider these needs together when developing solutions. The Working Group will seek to find solutions for near and/or medium-term needs that can also address certain needs in the future. These inter-dependencies, or related needs, are listed as follows.

- Main TS (Group 1) and Leaside TS 230/115kV autotransformers (Group 2)
- C5E/C7E 115kV underground transmission cables (Group 1) and C5E+C7E load restoration (Group 3)
- H1L/H3L/H6LC/H8LC 115 kV overhead transmission lines (Group 1) and East Harbor / Port Lands Area and Basin TS (Group 2)

- Manby TS refurbishment (Group 2) and Manby TS 230/115kV autotransformers (Group 3)
- Bermondsey TS (Group 2) and C14L+C17L load restoration (Group 3)

Other inter-dependencies may be considered in the plan, such as reviewing together all transmission line and cable needs that facilitate load transfers between Manby and Leaside sub-systems.

3.2 Activities

The IRRP process will consist of the activities as listed below. The activities and anticipated timelines are summarized in Table A-1 at the end of this document. The first major planning activity following preparation of this Terms of Reference is the development of electricity demand outlooks to serve as the basis for conducting system assessments. The timing for initiating the assessment (Activity 3) and all subsequent plan development activities will be contingent on the Working Group agreeing on the demand outlooks to be used.

1) Develop an electricity demand outlook for the Toronto region. This outlook may be comprised of a number of electricity demand scenarios that account for uncertain elements that can affect (e.g., raise or lower) the need for electricity in the region.
    a. Summarize Toronto's committed long-term policy goals and plans, taking into account local and provincial policy goals, commitments, and climate change action plans.
    b. Develop a discussion paper to set context and seek informed advice on a vision for the electricity sector.
2) Confirm baseline technical assumptions including infrastructure ratings, system topology and relevant base cases for simulating the performance of the electric power system. Collect information on:
    a. Transformer, line and cable continuous ratings, long-term and short-term emergency ratings;
    b. Known reliability issues and load transfer capabilities;
    c. Customer load breakdown by transformer station;
    d. Historical and present CDM peak demand savings and installed/effective DER capacity, by transformer station.
3) Perform assessments of the capacity, reliability and security of the electric power system under each demand outlook scenario.
    a. Confirm and/or refine the needs listed earlier in this section using the demand outlook; establish the sensitivity of each need to different demand outlook scenarios.

    b. Identify additional infrastructure capacity needs and any additional load restoration needs; if new needs are discovered, determine the appropriate planning approach for addressing them.

4) Identify options for addressing the needs, including, non-wires and wires alternatives. Where necessary, develop portfolios of solutions comprising a number of options that, when combined, can address a need or multiple needs.
    a. Collect information about the attributes of each option: cost, performance, timing, risk, etc.
    b. Complete a local achievable potential study of CDM and DER at the transformer station level, for stations with an identified capacity need within the study period.
    c. Develop a methodology for calculating local avoided costs as a means of informing further evaluations of the local alternatives;[12]
    d. Seek cost-effective opportunities to manage growth first, by identifying opportunities to reduce electricity demand.
5) Evaluate options using criteria including, but not limited to the areas of: technical feasibility and timing, economics, reliability performance, risk, environmental, regulatory, and social factors. Evaluation criteria will be informed through community engagement activities and reflect attributes deemed important to the community-at-large.
6) Develop recommendations for actions and document in an implementation plan, to address needs in the near-term and medium-term.
7) Develop a long-term plan for the electricity system in Toronto to address the long-term needs that were identified, taking into account uncertainty inherent in long-term planning, local and provincial policy goals, commitments, and climate change action plans.
    a. Discuss possible ways the power system in Toronto could evolve to address potential long-term needs, support the achievement of Toronto's long-term policy goals and plans, and support the achievement of the long-term vision for the electricity sector.
    b. During the development of the plan, seek community and stakeholder input to confirm the long-term vision, expected impacts on the electricity system, and inform the recommended actions through engagement.
8) Complete an IRRP report documenting the near-term and medium-term needs, recommendations, and implementation actions; and long-term plan recommendations.

[12] Local avoided (or "avoidable") costs are specific to a particular need or project, and are location and time-specific. They may not be generally applicable across a broader area (meaning that there is not likely to be a single average value that can be equally applied for Toronto). Further, these avoided costs will only be provided for planned investments that can practically be deferred or avoided. Determinations on the applicability and usefulness of local avoidable cost estimates will need to be made on a need or project-specific basis.

In order to carry out this scope of work, the working group will consider the data and assumptions outlined in section 4 below.

4. Data and Assumptions

The plan will consider the following data and assumptions:

- Demand Data
    - Historical coincident and non-coincident peak demand information and trends for the region
    - Historical weather correction, for median and extreme conditions
    - Gross peak demand forecast scenarios by TS, etc.
    - Coincident peak demand data
    - Identified potential future load customers, including transit expansions, electrification of personal vehicles, and possible impacts due to provincial and local GHG emissions reduction policies and targets

- Conservation and Demand Management
    - LDC CDM plans
    - Incorporation of verified LDC results and other CDM programs/opportunities in the area
    - Long-term conservation forecast for LDC customers, based on region's share of the Long-Term Energy Plan target
    - Conservation potential studies, if available
    - Potential for CDM at transmission-connected customers' facilities, if applicable
    - Load segmentation data for each TS based on customer type (residential, commercial, institutional, industrial)
    - Local building codes, energy performance requirements, etc.

- Local resources
    - Existing local generation resources, including distributed energy resources ("DER"), district energy resources, customer-based generation, and Non-Utility Generators, as applicable
    - Existing or committed renewable generation from Feed-in-Tariff ("FIT") and non-FIT procurements
    - Expected performance/dependability/output of local generation resources coincident with the local peak demand period
    - Future district energy plans, combined heat and power, energy storage, or other generation proposals, including requirements for on-site back-up and emergency generation

- Relevant local plans, as applicable
    - LDC Distribution System Plans

- Community Energy Plans and Municipal Energy Plans
- City policies with an impact on electricity usage, including TransformTO
- Municipal Growth Plans
- Future transit plans impacting electricity use, including personal vehicle electrification

- Criteria, codes and other requirements
  - Ontario Resource and Transmission Assessment Criteria ("ORTAC")
    - Supply capability
    - Load security
    - Load restoration requirements
  - NERC Reliability Standards and NPCC Reliability Criteria and Directories, as applicable
  - OEB Transmission System Code
  - OEB Distribution System Code
  - Reliability considerations, such as the frequency and duration of interruptions to transmission delivery points
  - Other applicable requirements, including municipal requirements

- Existing system capability
  - Transmission line ratings as per transmitter records
  - System Limits as modelled, defined and determined by the IESO and incorporated into the IESO Power Flow base cases
  - Transformer station ratings (10-day LTR) as per asset owner
  - Load transfer capabilities
  - Technical and operating characteristics of local generation

- End-of-life asset considerations/sustainment plans
  - Transmission assets
  - Distribution assets, as applicable

- Other considerations, as applicable

5. Working Group

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

- Independent Electricity System Operator *(Lead for the IRRP)*
- Toronto Hydro-Electric System Limited
- Hydro One Networks Inc. (Transmission)

Authority and Funding

Each entity involved in the study will be responsible for preparing regulatory applications and/or including in its regulatory applications the actions/tasks agreed upon for 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.

5. Engagement

The Working Group will develop a comprehensive stakeholder engagement plan, taking into account the advice of the Local Advisory Committee, according to the Activities Timeline shown in Section 6.

Engagement activities will also be informed through meetings with municipal representatives within the planning area, Indigenous communities that may have an interest in the planning area, and the Métis Nation of Ontario. All will be invited to discuss regional planning, the development of the IRRP, and integrated solutions.

Table A-1 Summary of IRRP Timelines and Activities

	Activity	Lead Responsibility	Deliverable(s)	Timeframe
1	**Prepare Terms of Reference considering stakeholder input**	*IESO*	- Finalized Terms of Reference	Q1 2018
2	**Develop the Planning Outlooks / Forecasts**			
	- Establish historical coincident and non-coincident peak demand information	*IESO*	- Long-term planning forecast scenarios	Q1 2018
	- Establish historical weather correction, median and extreme conditions	*IESO*		
	- Establish gross peak demand outlook and scenarios accounting for uncertainty (coincident peak demand forecast at the transformer station level)	*LDC*		
	- Provide customer segmentation data, by peak demand share, for each transformer station	*LDC*		
	- Establish existing, committed and potential DER and historical DER performance	*IESO and LDC*		
	- Establish near- and long-term conservation forecasts based on LDC CDM plans and LTEP CDM targets	*IESO*		
	- Develop outlook scenarios - including the impacts of CDM, DER and extreme weather conditions	*IESO*		
3	**Provide information on load transfer capabilities under normal and emergency conditions**	*LDC*	- Load transfer capabilities under normal and emergency conditions	Q2 2018
4	**Provide and review relevant community plans and objectives**	*LDC and IESO*	- Summary of community plans, goals, objectives	Q2 2018
5	**Develop discussion paper/ white paper to inform discussions around a long-term vision for Toronto's electricity system**	*IESO*	- Discussion paper	Q3 2018
6	**Complete system studies to identify needs over the demand forecast period** [13] - Review and finalize base case, include bulk system assumptions as identified in the key assumptions - Apply reliability criteria as defined in ORTAC to demand forecast scenarios - Confirm and refine the need(s) and timing/load levels	*IESO, LDC, Hydro One Transmission*	- Summary of needs based on demand forecast scenarios for the planning horizon	Q3-Q4 2018

[13] The timing for initiating the assessment and all subsequent plan development activities will be contingent on the Working Group agreeing on the demand outlooks to be used.

	Activity	Lead Responsibility	Deliverable(s)	Timeframe
7	**Develop Options and Alternatives (Near-term and Medium-term)**		- Develop flexible planning options with timelines and key attributes, accounting for demand outlook scenarios	Q4 2018 - Q1 2019
	Develop CDM options	*IESO and LDC*		
	Develop local generation and DER options	*IESO and LDC*		
	Develop transmission and distribution options	*IESO, Hydro One, and LDC*		
	Develop options involving other electricity initiatives (e.g., smart grid, storage)	*IESO/ LDC with support as needed*		
	Develop portfolios of integrated alternatives	*All*		
	Technical comparison and evaluation	*All*		
8	**Plan and Undertake Community & Stakeholder Engagement**			
	- Engagement with local municipalities and Indigenous communities within study area with focus on needs	*All*	- Community and Stakeholder Engagement Plan - Input from affected communities	Q4 2018
	- Undertake community and stakeholder engagement on options	*All*		Q1 2019
	- Summarize input and incorporate feedback, revise options	*All*		
9	**Develop recommendations to support actions to address near-term and medium-term needs** - Implementation plan	*All*	- Implementation plan - Monitoring activities and identification of decision triggers - Procedures for annual review	Q2-Q3 2019
10	**Develop long-term recommendations** - Long-term vision for electric power system	*All*	- Long-term plan and supporting recommendations	Q2-Q3 2019
11	**Prepare the IRRP report detailing the recommended near, medium and long-term plan for approval by all parties**	*IESO*	- IRRP report	Q3 2019