



Windsor-Essex Scoping Assessment Outcome Report

May 17, 2023

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1. Introduction

This Scoping Assessment Outcome Report is part of the Ontario Energy Board’s (OEB) endorsed Regional Planning Process, as defined through the Transmission System Code, Distribution System Code, and Independent Electricity System Operator (IESO) license.

The new cycle of the regional planning for the Windsor-Essex region started on October 23, 2022. Information and links to earlier products are available on the [IESO webpage](#). The Needs Assessment is the first step in the regional planning process and was carried out by the Windsor-Essex Technical Working Group (TWG) and led by Hydro One Networks Inc. (Hydro One Transmission). The [Needs Assessment Report](#), which was published on February 15, 2022, provided updates on previously identified needs, identified a number of new asset renewal and supply capacity needs, and recommended that further regional coordination is required. Results from the Needs Assessment were used as an input into the Scoping Assessment to determine the nature of the planning process required.

During the Scoping Assessment, the TWG reviewed the nature and timing of known needs to determine the most appropriate planning approach, as well as the best geographic grouping of the needs in order to efficiently facilitate further studies. The planning approaches considered include:

- An Integrated Regional Resource Plan (IRRP) – through which a greater range of options, including non-wires alternatives, are to be considered and/or closer coordination with communities and stakeholders is required;
- A Regional Infrastructure Plan led by the transmitter – which considers more straight-forward wires only options with limited engagement; or
- A Local Plan undertaken by the transmitter and affected local distribution company (LDC) – for which 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 must be studied and the geographic grouping of the needs;
- Determines the appropriate regional planning approach and scope for each sub-region (when applicable) where more comprehensive planning is required;
- Establishes a terms of reference for an IRRP if an IRRP is required; and
- Establishes the composition of the TWG for each sub-region (when applicable).



2. Technical Working Group

This report was prepared by the Windsor-Essex Region TWG, led by the IESO. The report presents the results of the assessment based on information provided by Hydro One, the LDCs, and the IESO. Participants of the TWG include:

- Enwin Utilities Ltd. (Enwin);
- Essex Powerlines Corporation (Essex Powerlines);
- E.L.K Energy Inc. (E.L.K. Energy);
- Entegrus Inc. (Entegrus);
- Hydro One Networks Inc. (Hydro One Distribution);
- Hydro One Transmission; and
- IESO.

3. Categories of Needs, Analysis, and Results

3.1 Overview of the Region

The Windsor-Essex region consists of the City of Windsor, the Municipality of Leamington, the Towns of Amherstburg, Essex, Kingsville, Lakeshore, LaSalle, Tecumseh, and the Township of Pelee, as well as the western portion of the Municipality of Chatham-Kent. The region also includes a number of Indigenous communities including Aamjiwnaang First Nation, Caldwell First Nation, Chippewas of the Thames, Haudenosaunee Confederacy Chiefs Council/Haudenosaunee Development Institute, Oneida Nation of the Thames, Six Nations of the Grand River, and Walpole Island First Nation (Bkejwanong Territory). For electricity planning purposes, the region is defined by electricity infrastructure boundaries, not municipal boundaries. It is one of seven planning regions in Southwest Ontario, adjacent to the Chatham-Kent/Lambton/Sarnia region to the east.

This region, shown in Figure 1 below, is served by five LDCs who form part of the TWG: Enwin, Essex Powerlines, E.L.K. Energy, Entegrus, and Hydro One Distribution. Enwin and Hydro One Distribution are directly connected to the transmission system, while the three other LDCs have low voltage connections to Hydro One distribution feeders.

Figure 1. Electricity System in the Windsor-Essex Region

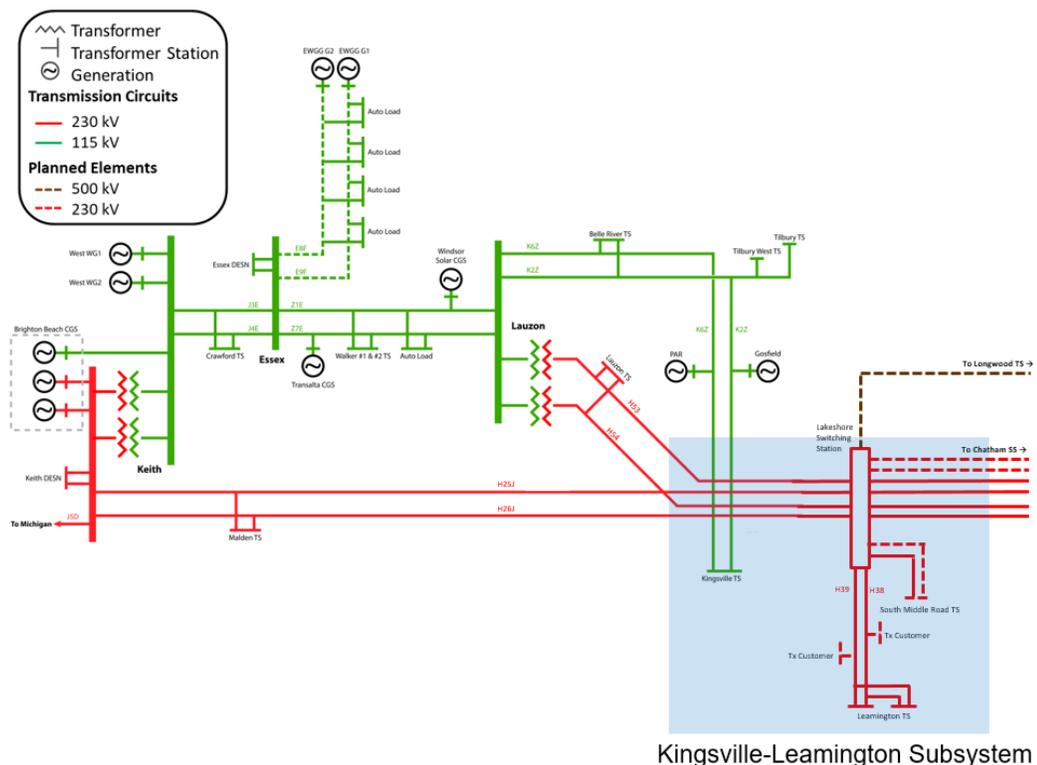


The population of Windsor-Essex region is approximately 400,000 people, with close to 10,000 new residents welcomed between 2021 and 2022 according to the latest census. Electricity demand in the region is growing at a rapid pace, as agriculture and manufacturing continue to develop. The Kingsville-Leamington area within the Windsor-Essex region is home to North America’s largest concentration of greenhouse vegetable production. Growth has been driven by strong indoor agricultural growth, mainly vegetable greenhouses, as well as in part, cannabis, specifically through existing greenhouses switching to lit indoor facilities, expansion of greenhouse facilities, and supplemental load to support the agricultural sector. In addition, Windsor remains the country’s manufacturing and automotive powerhouse, with significant recent investments in electric vehicle battery manufacturing. While agriculture has been driving electricity demand growth and needs in the region over the last few years, especially in winter, economic development across the region, electrification, and local climate action plans are expected to be key factors for future electricity needs.

Within the Windsor-Essex region, the Kingsville-Leamington sub-system has been identified as a distinct pocket, primarily supplying the booming greenhouse loads. The Kingsville-Leamington sub-system includes the load supplied by, and generation connected to: Kingsville Transformer Station (TS), Leamington TS, and the new Lakeshore TS and South Middle Rd TS.

Further sub-regions may be defined through the course of regional planning, as forecast demand and needs are further examined.

Figure 2. Kingsville-Leamington Sub-System in the Windsor-Essex Region



3.2 Previous Electricity Planning in Windsor-Essex

The previous cycle of regional planning for the Windsor-Essex region was carried out during 2017-2019. The TWG had decided that an IRRP was required for the region because a range of options (including non-wires alternatives) had to be considered for the needs, and engagement with communities and stakeholders was required.

The Windsor-Essex IRRP was published in September 2019. The IRRP used a 20-year demand forecast and made recommendations to monitor long-term needs in the region while providing clear direction on actions required in the near-term.

Recommendations made in the IRRP and subsequent plans are summarized in the sections below. Electricity planning in Ontario typically occurs on a cyclical basis. However, due to the rapidly growing agricultural sector, planning in southwestern Ontario has been occurring on a continuum over the last five years, with no signs of slowing down. The [2019 Windsor-Essex bulk study](#) occurred in parallel with the 2019 Windsor-Essex IRRP, focused on increasing the overall transfer capability of the bulk transmission system west of Chatham in order to reliably supply the forecast load growth in the Kingsville-Leamington area and Windsor-Essex region. In 2021, the West of London (WOL) bulk plan considered the area from outside the western edge of the City of London, to the City of Sarnia in the northwest, and to the City of Windsor in the west. This plan looked to address remaining bulk transmission system constraints east of Chatham, ensure adequate supply to the larger WOL area, and, given the expiry of generation contracts in the area, identify any transmission constraints limiting the ability of supply resources and imports within WOL to meet provincial needs. In tandem, the 2022 Windsor-Essex Addendum was undertaken to address remaining local needs in Kingsville and Leamington. 2019 Windsor-Essex IRRP

- IESO Grid Innovation Fund targeted call for indoor agriculture projects – two projects contracted within Kingsville-Leamington, with support being provided between 2020 – 2023.
- Light-Emitting Diode (“LED”) Incentive for greenhouses – on-going program till 2024.
- Upsize Keith TS end-of-life 230/115 kV autotransformers T11/T12 from 125 MVA to 250 MVA – work underway, expected completion 2023.
- Upsize Lauzon TS DESN 1 end-of-life stepdown transformers T5/T6 – expected completion in 2026.
- Decommission Keith TS end-of-life T1 (115 kV/27.6 kV) transformer – complete.

2019 Windsor-Essex Bulk Plan

- Build a new switching station at the Leamington Junction – in-service as of 2022.
- Build a new 230 kV double circuit transmission line from the existing Chatham Switching Station (SS) to the new switching station at the Leamington Junction – work underway, expected completion in 2025.

2020 Windsor-Essex Regional Infrastructure Plan

- Build a new supply station, South Middle Road DESN 1, connected to Lakeshore TS - completed in 2022.
- Build a second new supply station, South Middle Road DESN 2, connected to Lakeshore TS – work underway, expected completion in 2025.

2021 West of London Bulk Plan

- Build a new 230 kV double circuit transmission line from Lambton TS southwards to Chatham SS (St. Clair line) and associated station facility expansions or upgrades required at the terminal stations – development underway, expected completion in 2028.
- Begin bilateral negotiations for Brighton Beach Generating Station, to support the area’s needs in the near-term until the Lambton-to-Chatham transmission line is in-service – work underway, expected completion in 2024.
- Build a single circuit 500 kV transmission line from Longwood TS to Lakeshore TS – development underway, expected completion 2030.
- Acquire 550 MW of new or existing local resources – needed by 2035, with procurements underway so resources may be in-service earlier.

2022 Windsor-Essex Addendum

- Initiate engagement and approvals for two new 230 kV DESNs and double-circuit connection lines from Lakeshore TS, including the option for a new 230 kV line between Leamington TS and the new DESNs in the Environmental Assessment – on hold pending customer commitment.
- Transfer load in excess of the Kingsville TS station load meeting capability to the new DESNs once in-service – on hold until DESNs proceed.
- Initiate engagement with customers to determine cost-justified measures (new 230 kV line, distributed energy resources, and/or distribution load transfer capability) that can mitigate the load restoration need – on hold until DESNs proceed.

Other Developments

In addition, the government of Ontario issued an [Order-in-Council](#) (OIC) in April 2022 declaring the three transmission line projects recommended as part of the regional and bulk plans above as priorities, specifically –

- The Chatham to Lakeshore Line,
- St. Clair Line, and
- One single circuit 500 kV line from Longwood to Lakeshore.

This would streamline the OEB’s regulatory approval process and designate Hydro One as the transmitter for the priority projects. The government also asked Hydro One in the OIC to undertake development work and seek approvals for two future projects:

- A second 500-kilovolt line from Longwood Transformer Station to Lakeshore Transformer Station, with scope to be further refined through planning by the IESO, and

- A 230-kilovolt line that would run from the Windsor area to Lakeshore Transformer station, with scope to be further refined through planning by the IESO.

3.3 Transmission Needs Identified

The recent Windsor-Essex Needs Assessment report identified a number of transmission system issues that need to be addressed during this cycle of regional planning using a 10-year station level demand forecast developed by the LDCs, updated asset condition information, as well as the conservation and demand management (CDM) and distributed generation (DG) forecast provided by the IESO. Table 1 below lists these regional needs and their timing. Their locations are shown in Figure 3.

Table 1. Newly Identified Needs to be Addressed in this Planning Cycle

Need #	Need	Timing	Need Description
1	Kingsville-Leamington Sub-System Station Capacities	2023-2024	Various transformer stations within the Kingsville-Leamington sub-system become overloaded, specifically Kingsville TS, Leamington TS DESN 1 and 2, South Middle Road TS DESN 1 and 2.
2	Kingsville-Leamington Sub-System Load Security and Restoration	2023-2028 ¹	For South Middle Road TS DESN 1 and 2 following the loss of H75 and/or H76, and for stations connected to H38 and H39 following the loss of one or both of those circuits.
3	Lauzon TS ² (T7/T8 DESN) Station Capacity	2023-2025	Transformer station becomes overloaded, additional supply capacity needed.
4	Belle River TS Station Capacity	2023	Transformer station becomes overloaded, additional supply capacity needed.

¹ The use of the Lakeshore Remedial Action Scheme (RAS) is allowed until the transmission reinforcements are in-service, deferring this need until 2028.

² The station capacity need at Lauzon TS may result in a change to the current end-of-life plan to replace the transformers like-for-like.

Figure 3. Geographic Location of Needs Identified in the Needs Assessment



3.4 Analysis of Needs

The TWG has outlined the needs in the Windsor-Essex region and potential planning approaches to address them.

Kingsville-Leamington Sub-System Station Capacity Needs

Based on a non-coincident forecast, Kingsville TS, Leamington T1/T2 and T3/T4 DESNs and South Middle Road T1/T2 and T3/T4 DESNs are all expected to be loaded above their long-term emergency ratings during the 10-year forecast period in both summer and winter.

This area was identified as a high load growth area with possible capacity needs in the previous cycle of regional planning. The 2022 Windsor-Essex Addendum recommended two new DESN stations and associated connection lines, as well as energy efficiency measures be pursued over the 20-year forecast period. Currently, the transmission projects have been put on hold by Hydro One Transmission, pending customer commitment.

In terms of energy efficiency measures, to date, the IESO has provided \$65.2 M in incentives to nearly 50 local growers to install LED grow lights that will result in over 600 GWh in energy savings and approximately 2.2 MW in demand savings. The IESO has also invested over \$1.1 M to test energy efficient measures in greenhouses including low intensity LEDs and Artificial Intelligence. In addition, in collaboration with the OEB, the IESO is providing \$3.9 million to test a near real-time, local electricity market to tap into local energy supplies in Leamington. Investment continues as, directed by the Minister of Energy on October 4, 2022, the IESO will launch four new or enhanced CDM programs this spring to meet near-term system needs, including continued targeted support for

greenhouse growers in Southwest Ontario and enhancements to the Save on Energy Local Initiatives program.

The TWG recommends that the capacity needs for the identified stations be further reviewed in an IRRP to examine the timing of the need due to effects of the recommended energy efficiency measures, and to examine opportunities for integrated solutions involving both wires and non-wires solutions.

Kingsville-Leamington Sub-System Load Security and Restoration Needs

Leamington TS DESN 1 and 2 and two customer stations are connected to the 230 kV double-circuits H38 and H39 from Lakeshore TS. Following the loss of either of those circuits, the amount of load loss violates security criteria (is more than 150 MW). Following the loss of both circuits, the load restoration criteria are violated – load in excess of 250 MW cannot be restored in 30 minutes, and load in excess of 150 MW cannot be restored in 4 hours. In the previous cycle of regional planning, the addendum outlined load restoration needs for Leamington TS and Kingsville TS and recommended that Hydro One and its customers determine cost-justified measures (new 230 kV line between Leamington TS and the new stations, distributed energy resources, and/or opportunities for distribution load transfer capability) that can mitigate the load restoration needs. Currently, these projects have been put on hold by Hydro One Transmission, pending customer commitment.

South Middle Road TS DESN 1 and 2 are connected to the 230 kV double-circuits H75 and H76 from Lakeshore. Following the loss of either of those circuits and a supply circuit between Lakeshore TS and Chatham SS load rejection may occur. Following the loss of both circuits, the load restoration criteria are violated – load in excess of 250 MW cannot be restored in 30 minutes, and load in excess of 150 MW cannot be restored in 4 hours.

The TWG recommends that these load restoration and load security needs be further reviewed in an IRRP to examine potential opportunities for coordination with supply capacity requirements in the area and opportunities for integrated solutions involving both wires and non-wires solutions.

Lauzon TS Station Capacity Need

Based on a non-coincident forecast, Lauzon TS T7/T8 DESN is expected to be loaded above its long-term emergency ratings during the 10-year forecast period. This is due to higher near-term growth forecast in the outskirts of the city, based on LDC and municipal input. These transformers are reaching end-of-life, so there is the opportunity to coordinate the station capacity need with the asset replacement plans. However, this may require station reconfiguration if larger transformers are needed.

The TWG recommends that the capacity need for Lauzon TS T7/T8 DESN be further reviewed in an IRRP to examine the timing of the need, opportunity to coordinate with the asset replacement, and opportunities for integrated solutions involving both wires and non-wires solutions.

Belle River TS Station Capacity Need

Based on a non-coincident forecast, Belle River TS is expected to be loaded above its long-term emergency ratings during the 10-year forecast period. In the previous cycle of regional planning, Belle River was identified as a growth area with capacity needs. The TWG recommended energy

efficiency measures be pursued over the 20-year forecast period, and it was selected as a target area for the IESO's local initiatives program.

The TWG recommends that the capacity needs for Belle River TS be further reviewed in an IRRP to examine the timing of the need due to peak demand savings of the recommended energy efficiency measures, and to examine opportunities for integrated solutions involving both wires and non-wires solutions.

Additional Considerations Associated with Economic Development and Electrification Targets

In 2019, the County of Essex, City of Windsor, and other local municipalities declared a climate emergency and called for cooperation in reducing greenhouse gas emissions in the region. The County of Essex and City of Windsor each established energy plans (currently being updated) that support local economic development while taking climate change action and improving energy performance. In particular, understanding industrial growth in the automotive sector, primarily based in Windsor, as well as agricultural growth in the Kingsville-Leamington area, will inform growth projections in the region.

For the upcoming IRRP, the TWG will engage with stakeholders and communities to ensure growth plans in these areas are considered and reflected in the IRRP electricity demand forecast. The TWG will engage with the local municipalities, the greenhouse sector, industrial customers, and other stakeholders on the impacts of potential economic development, energy or climate change action plans, electrification, and other local planning initiatives. Outcomes of these discussions will inform considerations (e.g., timing and magnitude of demand growth, energy efficiency, local energy programs and projects, etc.) that can be used to refine the demand forecast scenario(s) considered in the IRRP.

On-going Resource Procurements

After more than a decade of strong supply, Ontario is entering a period of emerging electricity system needs, driven by increasing demand due to expanding electrification and increasing business investment, the retirement of the Pickering nuclear plant, the refurbishment of other nuclear generating units, as well as expiring contracts for existing facilities.

Ontario is proceeding with its plan to procure new electricity generation and storage through a competitive process. As directed by the Minister of Energy on October 7, 2022, these procurements will acquire the 4,000 MW of capacity necessary, including at least 2,500 MW of stand-alone energy storage resources, up to 1,500 MW of natural gas generation, with the remainder coming from other resources. To address these needs, the IESO is competitively securing 1,500 MW and 300 MW of capacity through an expedited procurement process "the Expedited Process" (E-LT1 RFP) and the Same Technology Upgrade Solicitation respectively. The IESO expects to procure an additional 2,200 MW from the subsequent Long-Term Request for Proposals (LT1 RFP).

Through that process, the IESO identified Windsor-Essex as a preferred location, see [Locational Considerations](#) document for details. When the results of those procurements are announced, any impact will need to be considered in this regional plan.

Pathways to Decarbonization Report

In December 2022, the IESO published its [Pathways to Decarbonization](#) Report. This report was created in response to the Ministry of Energy's request to evaluate a moratorium on new natural gas generating stations in Ontario and to develop an achievable pathway to decarbonization in the electricity system. The report considered the resource and bulk system implications for meeting two time specific scenarios:

- A "2035 Moratorium" scenario, which considers the potential results of a moratorium on natural gas generation in Ontario's electricity sector, with a phase out by 2035, where feasible. This scenario also considered the impact of greater uptake of electrified transportation options, among other electrification objectives.
- A "2050 Pathways" scenario, which goes beyond the 2035 Moratorium case to consider the phase out of all greenhouse gas (GHG) emitting generation resources, as well as significant demand growth based on theoretical, aggressive, policy-driven electrification in three major sectors: transportation, building heat and industrial process.

The IESO recognizes the government of Ontario is [actively consulting](#) on the Pathways to Decarbonization report. Outcomes of that consultation may inform the IESO's approach to this regional plan. As such, the Terms of Reference for the Windsor-Essex IRRP may be amended at a future time to account for additional objectives, activities, and assumptions required to align deliverables with new provincial direction.

Early Development Projects

As referenced in Section 3.2, other than the recommended projects from previous regional and bulk plans, the government issued an OIC advising Hydro One to concurrently conduct early development work on a second 500 kV transmission from Longwood into the region, and a 230 kV line between Lakeshore and the Windsor area.

The need and scope for these additional projects are dependent on a number of moving pieces – including industrial load growth, greenhouse load development, and the on-going resource procurements. The TWG will continue to study future growth and needs through this cycle of electricity planning for Windsor-Essex and applicable bulk studies as required to refine the need and of these projects, as required. **Recommendation**

Based on the needs identified in the Needs Assessment and opportunities to consider solutions in a coordinated manner, an IRRP is recommended for the Windsor-Essex region. Due to the number and complexity of needs, the greater number of potential solutions to consider, and the additional engagement needed with stakeholders and communities to consider potential economic development, energy/climate change action plans, and other local planning initiatives in the electricity demand forecast scenarios, the full 18-month IRRP timeline is expected to be required.



4. Conclusions and Next Steps

The Scoping Assessment concludes that an IRRP should be undertaken to identify, evaluate, and recommend solutions to address the needs identified for the Windsor-Essex region.

The IRRP will include opportunities for engagement with local stakeholders (including municipalities, the greenhouse sector, and other community representatives) on the impacts of any initiatives focused on energy, economic development, and/or reducing GHG emissions, and how the IRRP can coordinate with these plans. This could include economic development plans, Community Energy Plans, net-zero strategies, or similar. Particular attention will be paid to opportunities for information sharing and/or coordination of goals and outcomes.

The draft Terms of Reference for the Windsor-Essex region IRRP is attached in Appendix 2.

Appendix 1 – List of Acronyms

Acronym	Definition
CDM	Conservation and Demand Management
DER	Distributed Energy Resource
DESN	Dual Element Spot Network
DG	Distributed Generation
GHG	Greenhouse Gas
IESO	Independent Electricity System Operator
IRRP	Integrated Regional Resource Plan
LDC	Local Distribution Company
LED	Light-Emitting Diode
MVA	Megavolt ampere
MW	Megawatt
OEB	Ontario Energy Board
ORTAC	Ontario Resource Transmission Assessment Criteria
RAS	Remedial Action Scheme
SS	Switching Station
TS	Transformer Station
TWG	Technical Working Group

Appendix 2 – Windsor-Essex IRRP Terms of Reference

1. Introduction and Background

Based on the near- and mid-term capacity needs identified within the region, continued forecast growth, and opportunities to consider solutions in a coordinated manner, an IRRP should be undertaken for the Windsor-Essex region.

These Terms of Reference establish the objectives, scope, key assumptions, roles and responsibilities, activities, deliverables, and timelines for the Windsor-Essex IRRP.

Windsor-Essex Region

The Windsor-Essex region primarily encompasses the City of Windsor, the Municipality of Leamington, the Towns of Amherstburg, Essex, Kingsville, Lakeshore, LaSalle, Tecumseh, and the Township of Pelee, as well as the western portion of the Municipality of Chatham-Kent. The region also includes a number of Indigenous communities including Aamjiwnaang First Nation, Caldwell First Nation, Chippewas of the Thames, Haudenosaunee Confederacy Chiefs Council/Haudenosaunee Development Institute, Oneida Nation of the Thames, Six Nations of the Grand River and Walpole Island First Nation (Bkejwanong Territory). For electricity planning purposes, the region is defined by electricity infrastructure boundaries, not municipal boundaries. It is one of seven planning regions in Southwest Ontario, adjacent to the Chatham-Kent/Lambton/Sarnia region to the east.

The Windsor-Essex region is currently a summer-peaking region. However, the Kingsville-Leamington area is an exception, due to the artificial crop lighting demand in the agricultural sector, which may lead to the region becoming winter-peaking in the future.

The approximate geographical boundaries of the sub-region are shown in Figure A-1.

Figure A-4. Electricity System in the Windsor-Essex Region



Windsor-Essex Region Electricity System

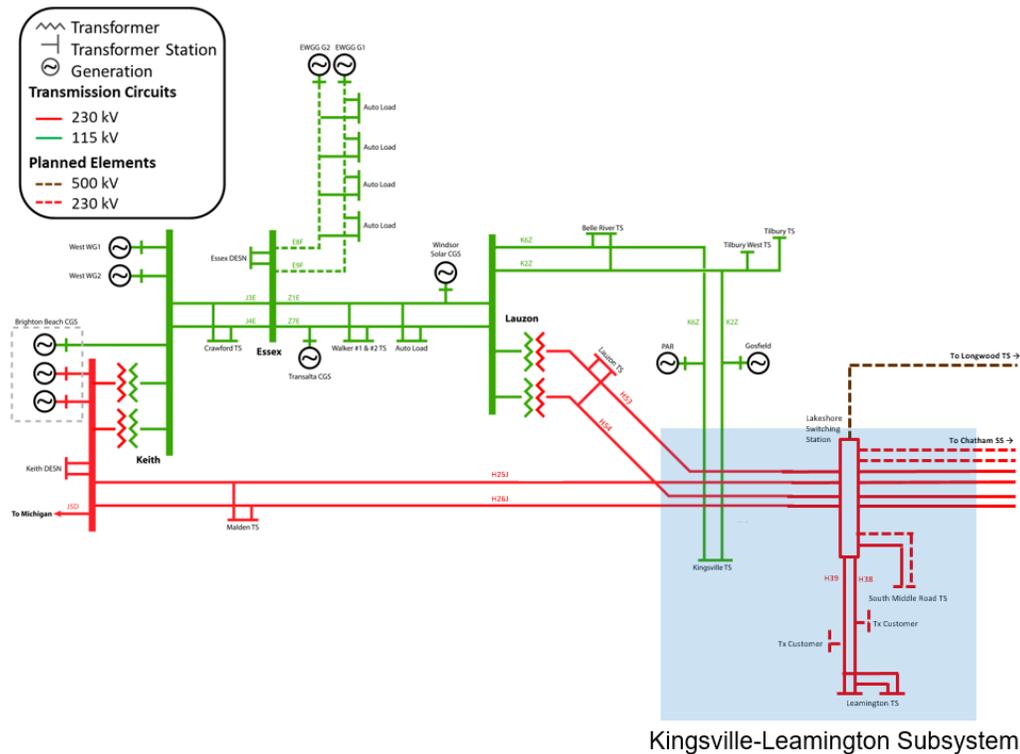
The following infrastructure is within the scope of this plan:

- 230 kV connected stations – Malden TS, Keith TS, Lauzon TS, Leamington TS, Lakeshore TS, South Middle Rd TS;
- 115 kV connected stations – Crawford TS, Essex TS, Walker TS #1, Walker TS #2, Belle River TS, Tilbury West Distribution System, Kingsville TS;
- Five customer-owned transformer stations on the 115 kV system;
- Two customer-owned transformer stations on the 230 kV system;
- 230 kV transmission lines – C42H (C23Z), C43H (C24Z), C64H (C21J), C65H (C22J), C87H (end of 2025), C88H (in-service end of 2025), H25J (C21J), H26J (C22J), H53 (C23Z), H54, J5D;
- 115 kV transmission lines – J3E/J4E, Z1E/Z7E, K2Z/K6Z;
- 115 kV transmission cables – E8F/E9F;
- 230/115 kV auto-transformers at Keith TS and Lauzon TS; and
- Existing local generation assets.
- The Windsor-Essex region has one relevant electrical sub-system that has been identified. The Kingsville-Leamington sub-system includes the load supplied by, and generation connected to: Kingsville TS, Leamington TS, and the new Lakeshore TS and South Middle Rd TS.

Within the Windsor-Essex region, the Kingsville-Leamington sub-system has been identified as a distinct pocket, primarily supplying the booming greenhouse loads. The Kingsville-Leamington sub-system includes the load supplied by, and generation connected to: Kingsville Transformer Station (TS), Leamington TS, and the new Lakeshore TS and South Middle Rd TS.

Further sub-regions may be defined through the course of regional planning, as forecast demand and needs are further examined.

The electricity system supplying the Windsor-Essex region and Kingsville-Leamington sub-system is



shown in Figure A-2. **Figure A-2 | Windsor-Essex region Electricity System**

2. Objectives

1. To assess the adequacy of electricity supply to customers in the Windsor-Essex region over the next 20 years.
2. Account for major asset renewal needs, capacity needs, enhancing reliability and resilience, uncertainty in the outlook for electricity demand, and local priorities in developing a comprehensive plan.
3. Consider potential impacts of electrification targets and other policy decisions on needs identified and recommended outcomes, consistent with provincial direction.
4. Evaluate opportunities for cost effective non-wires alternatives, including CDM and DER, as well as wires approaches for addressing the needs identified.
5. Develop an implementation plan that maintains flexibility in order to accommodate changes in key assumptions over time. The implementation plan should identify actions for near-term needs, preparation work for medium-term needs, and planning direction for the long-term.

3. Scope

This IRRP will develop and recommend an integrated plan to meet the needs of the Windsor-Essex region. The plan is a joint initiative involving the Technical Working Group as defined in Appendix Section 6. The plan will integrate forecast electricity demand growth and CDM in the area with transmission and distribution system capability, asset replacement plans, relevant community plans, bulk system developments, and generation procurement initiatives.

The scope of the Windsor-Essex IRRP includes the following needs, as identified in the Needs Assessment:

Table 2. Needs Identified in the Needs Assessment as Required Further Study

Need #	Need	Timing	Need Description
1	Kingsville-Leamington sub-system Station Capacities	2023-2024	Various transformer stations within the Kingsville-Leamington sub-system become overloaded, specifically Kingsville TS, Leamington TS DESN 1 and 2, South Middle Road TS DESN 1 and 2.
2	Kingsville-Leamington Sub-System Load Security and Restoration	2023-2028 ³	For South Middle Road TS DESN 1 and 2 following the loss of H75 and/or H76, and for stations connected to H38 and H39 following the loss of one or both of those circuits.
3	Lauzon TS ⁴ (T7/T8 DESN) Station Capacity	2023-2025	Transformer station becomes overloaded, additional supply capacity needed.
4	Belle River TS Station Capacity	2023	Transformer station becomes overloaded, additional supply capacity needed.

Other identified needs in the Needs Assessment not listed in the table above will proceed with Local Planning or Regional Infrastructure Planning as appropriate. Hydro One will keep the Technical Working Group informed on project development.

Additional Considerations Associated with Economic Development and Electrification Targets

In 2019, the County of Essex, City of Windsor, and other local municipalities declared a climate emergency and called for cooperation in reducing greenhouse gas emissions in the region. The County of Essex and City of Windsor each established energy plans (currently being updated) that support local economic development while taking climate change action and improving energy performance. In particular, understanding industrial growth in the automotive sector, primarily based

³ The use of the Lakeshore RAS is allowed until the transmission reinforcements are in-service, deferring this need until 2028.

⁴ The station capacity need at Lauzon TS may result in a change to the current end of life plan to replace the transformers like-for-like.

in Windsor, as well as agricultural growth in the Kingsville-Leamington area, will inform growth projections in the region.

For the upcoming IRRP, the TWG will engage with stakeholders and communities to ensure growth plans in these areas are considered and reflected in the IRRP electricity demand forecast. The TWG will engage with the local municipalities, the greenhouse sector, industrial customers, and other stakeholders on the impacts of potential economic development, energy or climate change action plans, electrification, and other local planning initiatives. Outcomes of these discussions will inform considerations (e.g., timing and magnitude of demand growth, energy efficiency, local energy programs and projects, etc.) that can be used to refine the demand forecast scenario(s) considered in the IRRP.

On-going Resource Procurements

After more than a decade of strong supply, Ontario is entering a period of emerging electricity system needs, driven by increasing demand due to expanding electrification and increasing business investment, the retirement of the Pickering nuclear plant, the refurbishment of other nuclear generating units, as well as expiring contracts for existing facilities.

Ontario is proceeding with its plan to procure new electricity generation and storage through a competitive process. [As directed by the Minister of Energy on October 7, 2022](#), these procurements will acquire the 4,000 MW of capacity necessary, including at least 2,500 MW of stand-alone energy storage resources, up to 1,500 MW of natural gas generation, with the remainder coming from other resources. To address these needs, the IESO is competitively securing 1,500 MW and 300 MW of capacity through an expedited procurement process “the Expedited Process” (E-LT1 RFP) and the Same Technology Upgrade Solicitation respectively. The IESO expects to procure an additional 2,200 MW from the subsequent Long-Term Request for Proposals (LT1 RFP).

Through that process, the IESO identified Windsor-Essex as a preferred location, see [Locational Considerations](#) document for details. When the results of those procurements are announced, any impact will need to be considered in this regional plan.

Pathways to Decarbonization Report

In December 2022, the IESO published its [Pathways to Decarbonization](#) Report. This report was created in response to the Ministry of Energy’s request to evaluate a moratorium on new natural gas generating stations in Ontario and to develop an achievable pathway to decarbonization in the electricity system. The report considered the resource and bulk system implications for meeting two time specific scenarios:

- A “2035 Moratorium” scenario, which considers the potential results of a moratorium on natural gas generation in Ontario’s electricity sector, with a phase out by 2035, where feasible. This scenario also considered the impact of greater uptake of electrified transportation options, among other electrification objectives.
- A “2050 Pathways” scenario, which goes beyond the 2035 Moratorium case to consider the phase out of all GHG emitting generation resources, as well as significant demand growth based on theoretical, aggressive, policy-driven electrification in three major sectors: transportation, building heat and industrial process.

The IESO recognizes the government of Ontario is [actively consulting](#) on the Pathways to Decarbonization report. Outcomes of that consultation may inform the IESO’s approach to this

regional plan. As such, the Terms of Reference for the Windsor-Essex IRRP may be amended at a future time to account for additional objectives, activities, and assumptions required to align deliverables with new provincial direction.

Early Development Projects

Other than the recommended projects from previous regional and bulk plans, the government issued an OIC advising Hydro One to concurrently conduct early development work on a second 500 kV transmission from Longwood into the region, and a 230 kV line between Lakeshore and the Windsor area.

The need and scope for these additional projects are dependent on a number of moving pieces – including industrial load growth, greenhouse load development, and the on-going resource procurements. The TWG will continue to study future growth and needs through this cycle of electricity planning for Windsor-Essex and applicable bulk studies as required to refine the need and of these projects, as required.

4. Activities

The IRRP process will consist of the activities listed below. The activities and anticipated timelines are summarized in Section 8 of this document. The first major planning activity following preparation of this Terms of Reference is the development of the electricity demand forecast, which serves as the basis for system assessments. The timing for initiating the assessment (Activity 3) and all subsequent plan development activities will be contingent on the TWG first agreeing on the demand forecast to be used.

- Develop an electricity demand forecast for the Windsor-Essex region. This 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:
- 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:
 - Transformer, line and cable continuous ratings, long-term and short-term emergency ratings;
 - Known reliability issues and load transfer capabilities;
 - Customer load breakdown by transformer station;
 - Historical and present CDM peak demand savings and installed/effective DER capacity, by transformer station.
- Perform assessments of the capacity, reliability, and security of the electric power system under each demand outlook scenario.
 - 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.
 - Identify additional infrastructure capacity needs and any additional load restoration needs; if new needs are discovered, determine the appropriate planning approach for addressing them.

- 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.
 - Collect information about the attributes of each option: cost, performance, timing, risk, etc.
 - Develop cost estimates for all screened-in options as a means of informing further evaluations of alternatives.
 - Seek cost-effective opportunities to manage growth, by identifying opportunities to reduce electricity demand.
- 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.
- Develop recommendations for actions and document them in an implementation plan, to address needs in the near-term and medium-term.
- Develop a long-term plan for the electricity system in Windsor-Essex to address the identified long-term needs, taking into account uncertainty inherent in long-term planning, local and provincial policy goals, commitments, and climate change action plans.
 - Discuss possible ways the power system in Windsor-Essex could evolve to address potential long-term needs, support the achievement of local and provincial long-term policy goals and plans, and support the achievement of the long-term vision for the electricity sector.
 - 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.
- Complete an IRRP report documenting the near-term and medium-term needs, recommendations, and implementation actions; and long-term plan recommendations.

In order to carry out this scope of work, the TWG will consider the data and assumptions outlined in Section 5 below.

5. Data and Assumptions

The plan will consider the following data and assumptions:

Demand Data

- Historical coincident peak demand information
- Historical weather correction, median and extreme conditions
- Gross peak demand forecast scenarios
- 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 and non-Feed-in-Tariff 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
- Community Climate Action or Adaptation Plans
- Municipal Growth Plans
- Indigenous Community Energy Plans

Criteria, Codes, and Other Requirements

- Ontario Resource and Transmission Assessment Criteria
- North American Electric Reliability Corporation and Northeast Power Coordinating Council 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 long-term emergency rating) as per asset owner
- Load transfer capability
- Technical and operating characteristics of local generation

End-of-Life Asset Considerations/Sustainment Plans

- Transmission assets
- Distribution assets, as applicable

Other considerations, As Applicable

6. Technical Working Group

The TWG will consist of planning representative/s from the following organizations:

- E.L.K. Energy Inc.
- Entegrus Powerlines Inc.
- Enwin Utilities Ltd.
- Essex Powerlines Corporation
- Hydro One Networks Inc. Distribution
- Hydro One Networks Inc. Transmission

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.

7. 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 TWG is committed to conducting plan-level engagement throughout the development of the Windsor-Essex region 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 5 will help to inform the scope of community and stakeholder engagement to be considered for this IRRP.

8. Activities, Timeline, and Primary Accountability

Activity	Lead Responsibility	Deliverable(s)	Timeframe
1. Prepare Terms of Reference considering stakeholder input	IESO	Finalized Terms of Reference	Q2 2023
2. Develop the planning forecast		Long-term planning forecast scenarios	Q2-Q4 2023

Activity	Lead Responsibility	Deliverable(s)	Timeframe
Establish historical coincident and non-coincident 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 planning forecast scenarios for sensitivity analyses	IESO		
3. Reconfirm load transfer capabilities for stations in the region	LDCs	Load transfer capabilities under normal and emergency conditions	Q1 2024
4. Provide and review relevant community plans, if applicable	LDCs, Indigenous communities, and IESO	Relevant community plans	Q1 2024
5. Complete system studies to identify needs	IESO, Hydro One Transmission	Summary of needs based on demand forecast scenarios for the 20-year planning horizon	Q1-Q2 2024
<ul style="list-style-type: none"> - Obtain PSS/E base case - Include bulk system assumptions as identified in Key Assumptions - Apply reliability criteria as defined in ORTAC to demand forecast scenarios - Confirm and refine the need(s) and timing/load levels 			
6. Develop options and alternatives		Develop flexible planning options for forecast scenarios	Q2 2024
Conduct a screening to identify which non-wires options warrant further analysis	IESO		

Activity	Lead Responsibility	Deliverable(s)	Timeframe
Produce hourly forecasts for each transformer station 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		
Confirm the transmission and distribution alternatives: advancement of end of life transformer replacement plans and/or load transfers	IESO, Hydro One Transmission and LDCs		
Develop portfolios of integrated alternatives	All		
Technical comparison and evaluation	All		
7. Plan and undertake community & stakeholder outreach and engagement	IESO	Community and Stakeholder Engagement Plan Input from local municipalities, First Nation communities, and Métis organizations	Ongoing
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 organizations	All		
Develop communications materials	All		
Undertake community and stakeholder engagement	All		
Summarize input and incorporate feedback	All		

Activity	Lead Responsibility	Deliverable(s)	Timeframe
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 2024
9. Prepare the IRRP report detailing the recommended near, medium and long-term plan for approval by TWG	IESO	IRRP report	Q4 2024

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