Windsor-Essex

REGIONAL INFRASTRUCTURE PLAN

December 22, 2015

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Prepared and endorsed by:

Company
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DISCLAIMER

This Regional Infrastructure Plan ("RIP") report was prepared for the purpose of developing an electricity infrastructure plan to address all near and mid-term needs identified in previous planning phases and also any additional near and mid-term needs identified based on new and/or updated information provided by the RIP Working Group.

The preferred solution(s) that have been identified in this report may be reevaluated based on the findings of further analysis. The load forecast and results reported in this RIP report are based on the information provided and assumptions made by the participants of the RIP Working Group.

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EXECUTIVE SUMMARY

THIS REGIONAL INFRASTRUCTURE PLAN ("RIP") WAS PREPARED BY HYDRO ONE AND THE WORKING GROUP IN ACCORDANCE WITH THE ONTARIO TRANSMISSION SYSTEM CODE REQUIREMENTS. IT IDENTIFIES INVESTMENTS IN TRANSMISSION FACILITIES, DISTRIBUTION FACILITIES, OR BOTH, THAT SHOULD BE DEVELOPED AND IMPLEMENTED TO MEET THE ELECTRICITY INFRASTRUCTURE NEEDS WITHIN THE WINDSOR-ESSEX REGION.

The participants of the RIP Working Group included members from the following organizations:

- Hydro One Networks Inc. (Transmission)
- Independent Electricity System Operator
- E.L.K. Energy Inc.
- Entegrus Powerlines Inc.
- EnWin Utilities Ltd.
- Essex Powerlines Corporation
- Hydro One Networks Inc. (Distribution)

This RIP provides a consolidated summary of needs and recommended plans for Windsor-Essex Region. No long-term needs (10 to 20 years) and associated plans have been identified.

This RIP is the final phase of the regional planning process and it follows the completion of the Windsor-Essex Region Integrated Regional Resource Plan ("IRRP") by the IESO in April 2015 [1].

The major infrastructure investments planned, or being planned, for the Windsor-Essex Region over the near and medium-term identified in the various phases of the regional planning process are given in the table below.

No.	Project	I/S Date	Cost
1*	Supply to Essex County Transmission Reinforcement (SECTR TX) Project	June 2018	$77.4M
2*	Supply to Essex County Transmission Reinforcement (SECTR DX) Project	June 2018	$19.3M
3	Replacement of Keith end-of-life autotransformers	2020	$45M
4	Replacement of Kingsville end-of-life transformers	2018	$12M
5	230kV/115kV circuit and 27.6kV feeder reconfiguration at Keith TS due to Gordie Howe International Bridge (GHIB) Project	2018	$63M
6	Additional feeder position at Malden TS	TBD	TBD
7	Decommission of Tilbury TS	2019	TBD
8	Decommission of T1 Transformer at Keith TS	TBD	TBD

* These projects address the needs identified in the Windsor-Essex IRRP study for the region in the near and medium-term.

In accordance with the Regional Planning process, the Regional Plan should be reviewed and/or updated at least every five years. Should there be any new needs that emerge due to a change in load forecast or any other reason, the next regional planning cycle will be started earlier to address the need.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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1. INTRODUCTION

THIS REPORT PRESENTS THE REGIONAL INFRASTRUCTURE PLAN ("RIP") TO ADDRESS THE ELECTRICITY NEEDS OF THE WINDSOR-ESSEX REGION.

The report was prepared by Hydro One Networks Inc. (Transmission) ("Hydro One") and documents the results of the joint study carried out by Hydro One, EnWin Utilities Ltd. ("EnWin"), Essex Powerlines Corporation, E.L.K. Energy Inc. ("E.L.K Energy"), Entegrus Inc. ("Entegrus"), Hydro One Networks Inc. (Distribution) ("Hydro One Distribution), and the Independent Electricity System Operator ("IESO") in accordance with the regional planning process established by the Ontario Energy Board ("OEB") in 2013.

The Windsor-Essex Region comprises the City of Windsor, Town of Amherstburg, Town of Essex, Town of Kingsville, Town of Lakeshore, Town of LaSalle, Municipality of Leamington, Town of Tecumseh, the western portion of the Municipality of Chatham-Kent and the Township of Pelee Island. The map of the region is shown in Figure 1-1 below.

The Windsor-Essex area is supplied from a combination of generation located in the region and from the Ontario grid via a network of 230 kV and 115 kV transmission lines and stations. The region peak electricity demand of about 800 MW is provided from three 230 kV and fourteen 115 kV step-down transformer stations.

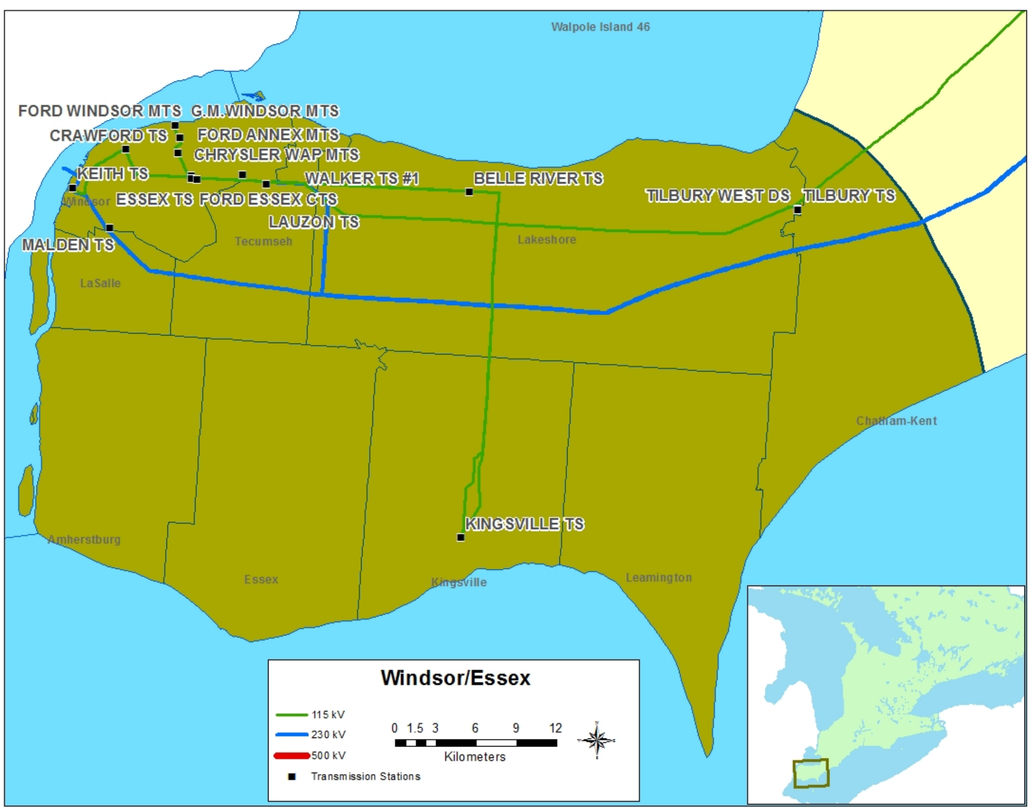

Figure 1-1 Geographical Map of Windsor-Essex Region

1.1 Scope and Objectives

This RIP report examines the needs in the Windsor-Essex Region. Its objectives are to: identify new supply needs that may have emerged since previous planning phases (e.g., Needs Assessment ("NA"), Scoping Assessment ("SA"), Local Plan ("LP"), and/or Integrated Regional Resource Plan ("IRRP")); assess and develop wires plans to address these needs; provide the status of wires planning currently underway or completed for specific needs; and identify investments in transmission and distribution facilities or both that should be developed and implemented to meet the electricity infrastructure needs within the region.

Planning activities for the Windsor-Essex Region were already underway before the new regional planning process was introduced. The NA and SA phases were deemed to be complete and the Windsor-Essex Region was identified as a "transitional" region. The planning status for the region was considered to be in the IRRP phase of the regional planning process. An IRRP for the region was completed in April 2015.

The RIP reviews factors such as the load forecast, transmission and distribution system capability along with any updates with respect to local plans, conservation and demand management ("CDM"), renewable and non-renewable generation development, and other electricity system and local drivers that may impact the need and alternatives under consideration.

The scope of this RIP is as follows:

- A consolidated report of the needs and relevant plans to address near and mid-term needs (2015-2025) identified in previous planning phases (NA, SA, LP, and/or IRRP).
- Identification of any new needs over the 2015-2025 period and a wires plan to address these needs based on new and/or updated information.
- Develop a plan to address any longer term needs identified by the Working Group.

The IRRP or RIP Working Group did not identify any long term needs at this time. If required, further assessment will be undertaken in the next planning cycle because adequate time is available to plan for required facilities.

1.2 Structure

The rest of the report is organized as follows:

- Section 2 provides an overview of the regional planning process.
- Section 3 describes the region.
- Section 4 describes the transmission work completed over the last ten years.
- Section 5 describes the load forecast and study assumptions used in this assessment.
- Section 6 describes the regional needs.
- Section 7 provides a summary of regional plans.
- Section 8 provides summary of other projects.
- Section 9 provides the conclusion and next steps.

2. REGIONAL PLANNING PROCESS

2.1 Overview

Planning for the electricity system in Ontario is done at essentially three levels: bulk system planning, regional system planning, and distribution system planning. These levels differ in the facilities that are considered and the scope of impact on the electricity system. Planning at the bulk system level typically looks at issues that impact the system on a provincial level, while planning at the regional and distribution levels looks at issues on a more regional or localized level.

Regional planning looks at supply and reliability issues at a regional or local area level. Therefore, it largely considers the 115 kV and 230 kV portions of the power system that supply various parts of the province.

2.2 Regional Planning Process

A structured regional planning process was established by the Ontario Energy Board in 2013 through amendments to the Transmission System Code ("TSC") and Distribution System Code ("DSC"). The process consists of four phases: the Needs Assessment [1] ("NA"), the Scoping Assessment ("SA"), the Integrated Regional Resource Plan ("IRRP"), and the Regional Infrastructure Plan ("RIP").

The regional planning process begins with the NA phase which is led by the transmitter to determine if there are regional needs. The NA phase identifies the needs and the Working Group determines whether further regional coordination is necessary to address them. If no further regional coordination is required, further planning is undertaken by the transmitter and the impacted local distribution company ("LDC") or customer and develops a Local Plan ("LP") to address them. These needs are local in nature and can be best addressed by a straight forward wires solution.

In situations where identified needs require coordination at the regional or sub-regional levels, the IESO initiates the SA phase. During this phase, the IESO, in collaboration with the transmitter and impacted LDCs, reviews the information collected as part of the NA phase, along with additional information on potential non-wires alternatives, and makes a decision on the most appropriate regional planning approach. The approach is either a RIP, which is led by the transmitter, or an IRRP, which is led by the IESO. If more than one sub-region was identified in the NA phase, it is possible that a different approach could be taken for different sub-regions.

The IRRP phase will generally assess infrastructure (wires) versus resource (CDM and Distributed Generation) options at a higher or more macro level, but sufficient to permit a comparison of options. If the IRRP phase identifies that infrastructure options may be most appropriate to meet a need, the RIP phase will conduct detailed planning to identify and assess the specific wires alternatives and recommend a preferred wires solution. Similarly, resource options which the IRRP identifies as best suited to meet a

[1] Also referred to as Needs Screening

need are then further planned in greater detail by the IESO. The IRRP phase also includes IESO led stakeholder engagement with municipalities and establishes a Local Advisory Committee in the region or sub-region. Since the Windsor-Essex Region was in transition to the new regional planning process, the IESO led IRRP engagement for this region was initiated after the completion of the IRRP.

The RIP phase is the final stage of the regional planning process and involves: confirmation of previously identified needs; identification of any new needs that may have emerged since the start of the planning cycle; and development of a wires plan to address the needs where a wires solution would be the best overall approach. This phase is led and coordinated by the transmitter and the deliverable of this stage is a comprehensive report of a wires plan for the region. Once completed, this report can be referenced in rate filing submissions or as part of LDC rate applications with a planning status letter provided by the transmitter. Reflecting the timelines provisions of the RIP, plan level stakeholder engagement is not undertaken at this stage. However, stakeholder engagement at a project specific level will be conducted as part of the project approval requirement.

The regional planning process specifies a 20 year planning assessment period for the IRRP. The RIP focuses on the wires options and, given the forecast uncertainty and the fact that adequate time is available to identify and plan new wire facilities in subsequent planning cycles, a study period of 10 years is considered adequate for the RIP. The exception would be the case where major transmission infrastructure investments are required. In these cases the RIP would review and assess longer term needs and develop a longer term plan.

To efficiently manage the regional planning process in the region, Hydro One has been undertaking wires planning activities in collaboration with the IESO and LDCs for the region as part of and/or in parallel with:

- Planning activities that were already underway in the region prior to the new regional planning process taking effect.
- Participating in and conducting wires planning as part of the IRRP for the region.
- Working and planning connection capacity requirements with the LDCs.

Figure 2-1 illustrates the various phases of the regional planning process (NA, SA, IRRP, and RIP) and their respective phase trigger, lead, and outcome.

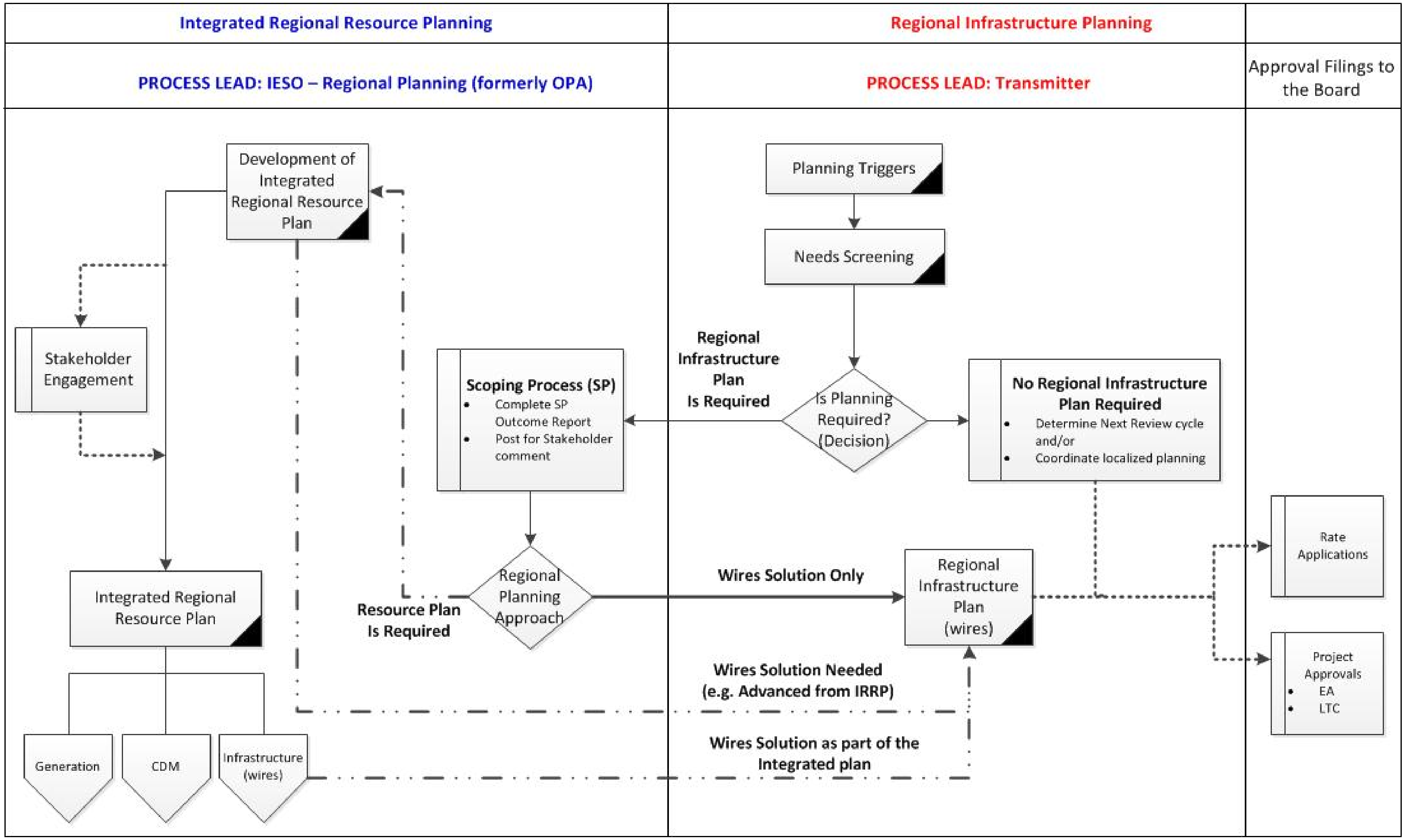

Figure 2-1 Regional Planning Process Flowchart

2.3 RIP Methodology

The RIP process is a four step process as shown in Figure 2-2 below.

1. Data Gathering: The first step of the RIP process is the review of planning assessment data collected in the previous stages of the regional planning process. Hydro One collects this information and reviews it with the Working Group to reconfirm or update the information as required. The data collected includes:
   - Net peak demand forecast at the transformer station level. This includes the effect of any distributed generation or conservation and demand management programs.
   - Existing area network and capabilities including any bulk system power flow assumptions.
   - Other data and assumptions as applicable such as asset conditions; load transfer capabilities, and previously committed transmission and distribution system plans.
2. Technical Assessment: The second step is a technical assessment to review the adequacy of the regional system including any previously identified needs. Additional near and mid-term needs may be identified at this stage.
3. Alternative Development: The third step is the development of wires options to address the needs and to come up with a preferred alternative based on an assessment of technical considerations, feasibility, environmental impact and costs.
4. Implementation Plan: The fourth and last step is the development of the implementation plan for the preferred alternative.

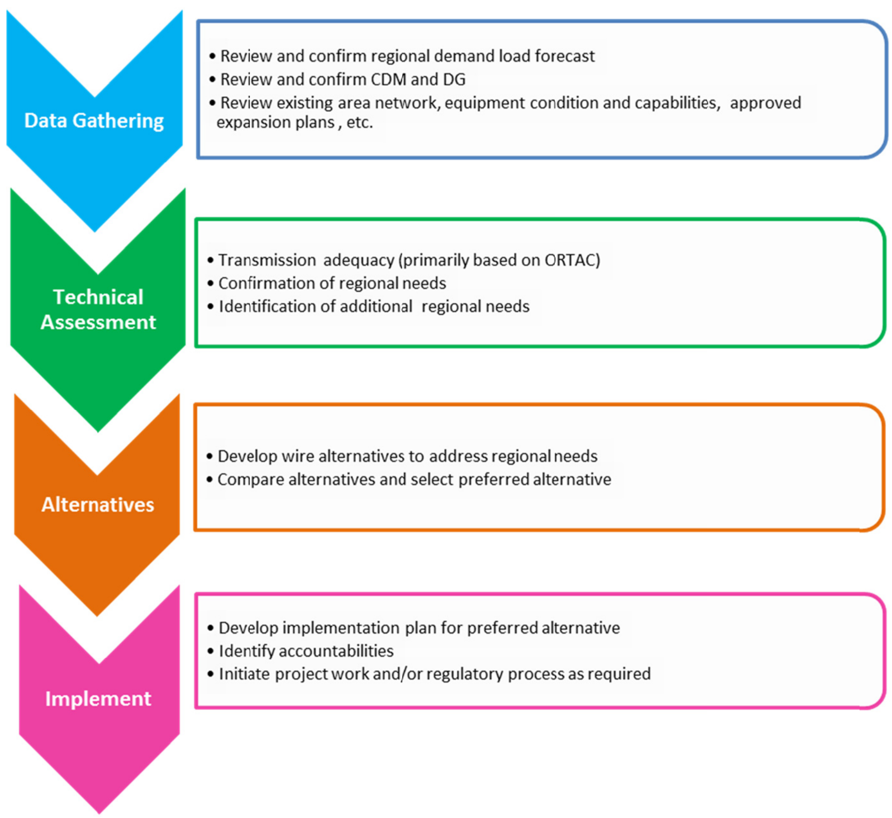

Figure 2-2 RIP Methodology

3. REGIONAL CHARACTERISTICS

THE WINDSOR-ESSEX REGION COMPRISES THE CITY OF WINDSOR, TOWN OF AMHERSTBURG, TOWN OF ESSEX, TOWN OF KINGSVILLE, TOWN OF LAKESHORE, TOWN OF LASALLE, MUNICIPALITY OF LEAMINGTON, TOWN OF TECUMSEH, THE WESTERN PORTION OF THE MUNICIPALITY OF CHATHAM-KENT AND THE TOWNSHIP OF PELEE ISLAND.

The region is served by five LDCs: EnWin, Essex Powerlines Corporation, E.L.K. Energy, Entegrus, and Hydro One Distribution, whose service territories are shown in Figure 3-1. EnWin and Hydro One Distribution are directly connected to the transmission system, while the three other LDCs have low voltage connections.

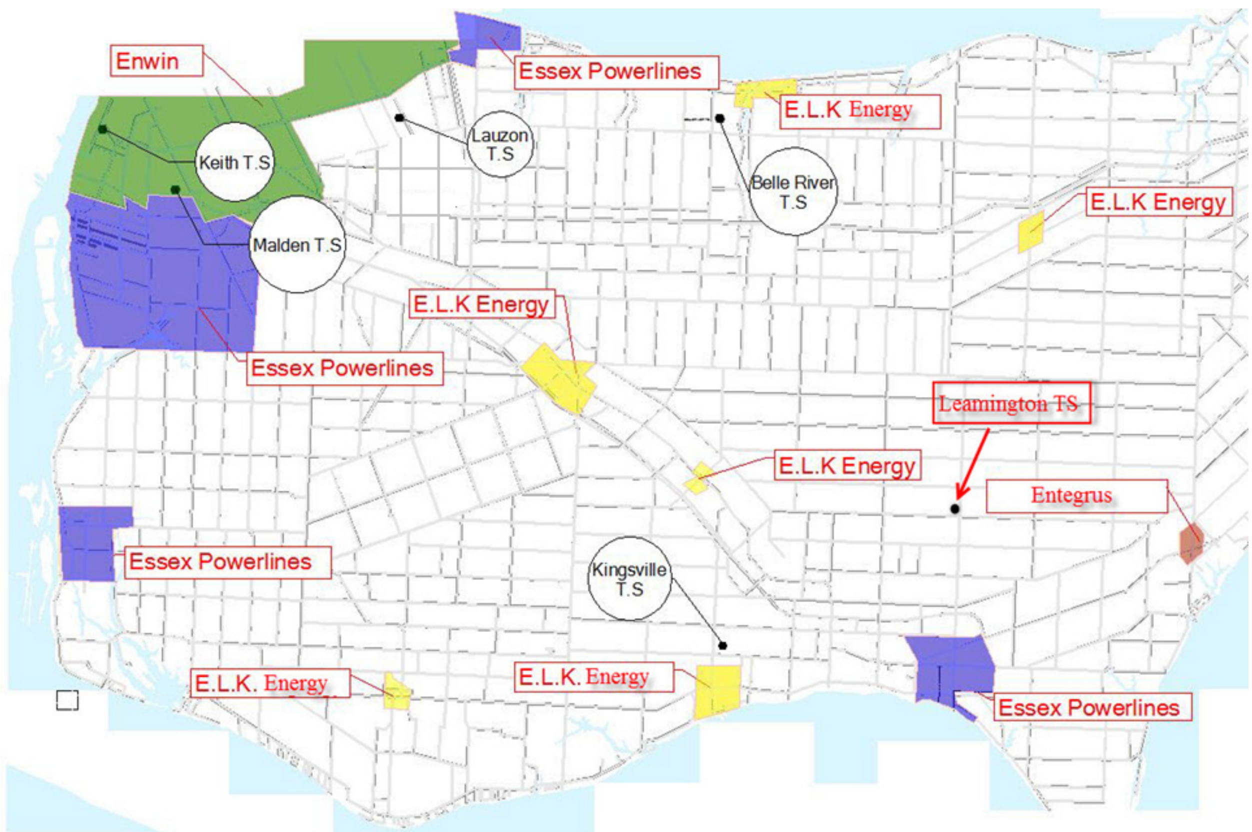

Figure 3-1 LDC Service Territories

The region peak electricity demand of about 800 MW is supplied from a combination of local generation and from connection to the Ontario grid via a network of 230 kV and 115 kV transmission lines and stations shown in Figure 3-2 below.

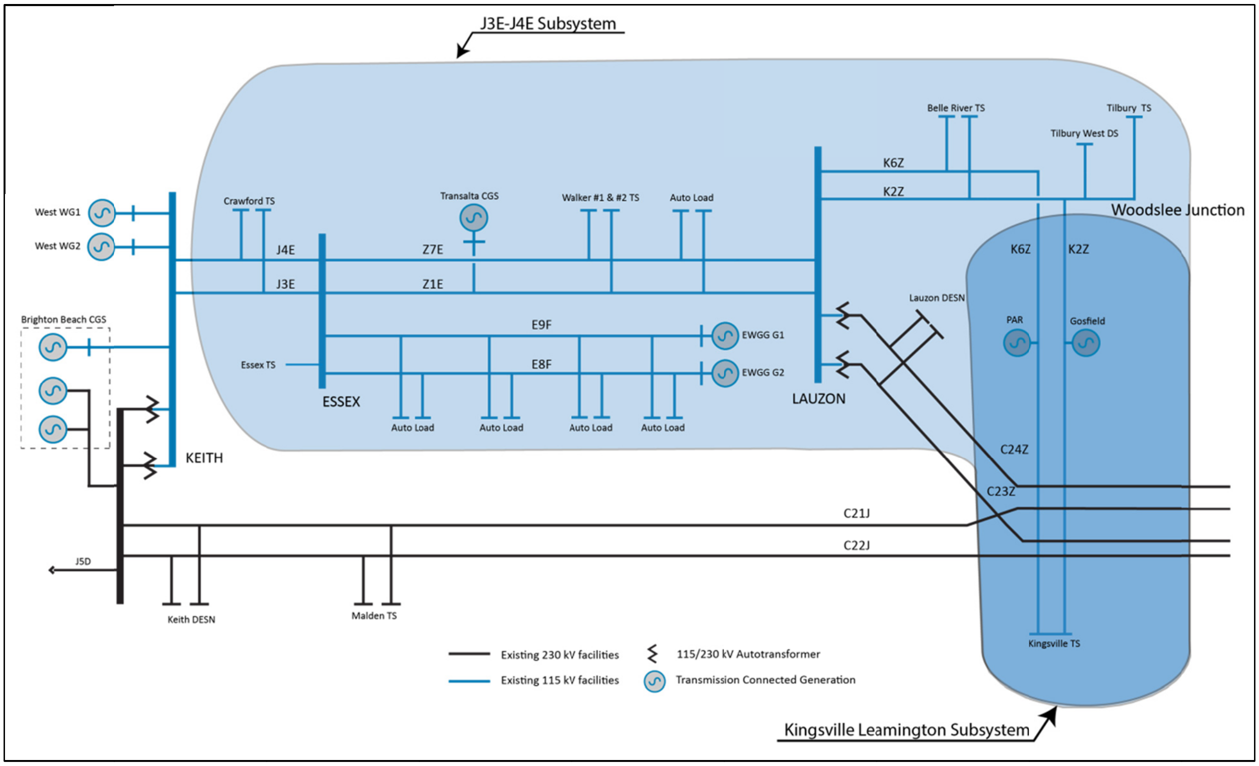

Figure 3-2 Windsor-Essex Area Subsystems/Single Line Diagram

The main transmission corridor in the region connects with the rest of the Hydro One system at Chatham Switching Station ("SS") and connects the Ontario transmission system with the Michigan transmission system at Keith TS.

The region's 115 kV network connects to the 230 kV transmission system at Keith TS and Lauzon TS via two auto-transformers in each station. About 65% of the area load is supplied by fourteen step-down transformers stations connected to the 115 kV network, while the balance is supplied by three step-down transformer stations connected to the 230 kV network. Table 3-1 lists the region's step-down transformer stations.

There are six customer-owned generating plants in the region connecting at the 230 kV and 115 kV levels with a combined contract capacity of 927 MW. In addition, the distributed generation connected at various locations to low-voltage ("LV") feeders in the region account for about 65 MW of effective capacity. Table 3-1 list the region's transmission connected generations.

The transmission system in the region can be divided into two "nested" sub-systems:

- The Kingsville-Leamington subsystem: customers supplied from Kingsville TS and
- The J3E-J4E subsystem: customers supplied from stations connected to the Windsor-Essex 115 kV system, as well as customers supplied from the 230/27.6 kV Lauzon DESN.

As can be noted in Figure 3-2 below, the Kingsville-Leamington subsystem is nested within the J3E-J4E subsystem. Therefore, increasing supply to the Kingsville-Leamington subsystem or transferring load from the existing Kingsville TS to a new 230 kV TS will impact the supply and demand balance in the J3E-J4E subsystem.

Table 3-1 Stations Included in the Windsor-Essex Region

Station (DESN)	Voltage Level (kV)	Supply Circuits	Connected Customer(s)
Belle River TS (T1/T2)	115/27.6	K2Z/K6Z	Hydro One Distribution
Kingsville TS (T1/T2/T3/T4)	115/27.6	K2Z/K6Z	E.L.K. Energy Essex Powerlines Corp. Hydro One Networks Inc.
Lauzon TS (T5/T6/T7/T8)	230/27.6	C23Z/C24Z	EnWin Utilities Ltd. Hydro One Distribution
Tilbury West DS	115/27.6	K2Z	Hydro One Distribution
Tilbury TS (T1)	115/27.6	K2Z	Hydro One Distribution
Chrysler WAP MTS	115/27.6	E8F/E9F	EnWin Utilities Ltd.
Crawford TS (T3/T4)	115/27.6	J3E/J4E	EnWin Utilities Ltd.
Essex TS (T5/T6)	115/27.6	Z7E/	EnWin Utilities Ltd.
Ford Annex MTS	115/27.6	E8F/E9F	EnWin Utilities Ltd.
Ford Essex CTS	115/13.8	Z1E/Z7E	EnWin Utilities Ltd.
Ford Windsor MTS	115/27.6	E8F/E9F	EnWin Utilities Ltd.
G.M. Windsor MTS	115/27.6	E8F/E9F	EnWin Utilities Ltd.
Keith TS (T1)	115/27.6	C21J/C22J	Brighton Beach Power LP West Windsor Power EnWin Utilities Ltd. Essex Powerlines Corp. Hydro One Distribution
Keith TS (T22/T23)	230/27.6	C21J/C22J	
Malden TS (T1/T2)	230/ 27.6	C21J/C22J	EnWin Utilities Ltd. Essex Powerlines Corp. Hydro One Distribution
Walker MTS #2	115/27.6	Z1E/Z7E	EnWin Utilities Ltd.
Walker TS #1 (T3/T4)	115/27.6	Z1E/Z7E	EnWin Utilities Ltd.

Table 3-2 Transmission Connected Generation Facilities in the Region

Technology	Station Name	Contract Expiry Date	Connection Point	Contract Capacity (MW)	Summer Effective Capacity (MW)
Combined Cycle Generating Facility	Brighton Beach Power Station	Dec. 31, 2024	Keith TS	541	526
Combined Heat and Power (CHP)	West Windsor Power	May 31, 2031	J2N (Keith TS)	128	107
	TransAlta Windsor	Dec. 1, 2031	Z1E	74	74
	East Windsor Cogeneration Centre	Nov. 5, 2029	E8F/E9F	84	80
Renewables	Gosfield Wind Project	Jan. 12, 2029	K2Z	51	8
	Point Aux Roches Wind Farm	Dec. 5, 2031	K6Z	49	8

4. TRANSMISSION FACILITIES COMPLETED OVER THE LAST TEN YEARS OR CURRENTLY UNDERWAY

OVER THE LAST 10 YEARS A NUMBER OF TRANSMISSION PROJECTS HAVE BEEN COMPLETED OR ARE UNDERWAY BY HYDRO ONE, AIMED AT IMPROVING THE SUPPLY TO THE WINDSOR-ESSEX REGION. A BRIEF LISTING OF THE COMPLETED PROJECTS OVER THE LAST 10 YEARS IS GIVEN BELOW:

- Belle River TS (May 2006): Built a new 2-25/33/42 MVA 115/27.6 kV transformer station in the Town of Lakeshore supplied from 115 kV circuits K2Z/K6Z. The station provides additional load supply capability to meet the load requirements of Hydro One Distribution customers in the Town of Lakeshore. The connection of new station required the untwining of K6Z to obtain two circuits (K2Z and K6Z) with K6Z on the north side of the towers. The new K2Z circuit section which only extends to Belle River TS was then connected to the then existing K2Z circuit just outside of Lauzon TS.

- Essex TS (October 2008): The station was refurbished with new 2-50/66/83 MVA 115/27.6 kV transformers. The 115 kV supply circuits were reconfigured to mitigate exposure to customer load loss for loss of a single transmission element under certain system conditions.

- Malden TS: Transformer T2 75/100/125 230/27.6 kV was replaced (July 2010) and T1 was replaced (December 2011).

- Keith TS: T23 transformer 50/67/83 MVA 230/27.6 kV was replaced (October 2008) and T22 transformer 50/67/83 MVA 230/27.6 kV was replaced (December 2013).

- Walker TS #1: Reactor installation for short circuit mitigation (June 2011).

- Kingsville TS: Reactor installation for short circuit mitigation (November 2011).

- Keith TS: Reactor installation for short circuit mitigation (April 2012).

- Lauzon TS: Three breakers were replaced: SC2Q (June 2012), SC3E (April 2012) and SC4J (April 2012).

- Keith TS: Six breakers were replaced: SC11K (May 2014), SC11SC (May 2014), SC1B (June 2014), T11P (August 2014), T12P (October 2014), SC2Y (January 2015).

The following projects are currently underway:

- Crawford TS: is a 115/28 kV, with two 50/67/83 MVA units in Windsor. It supplies the downtown Windsor area with a current peak load of 60 MW. The existing T3 transformer is at the end-of-life with leaky fittings and headboard. The T3 fire suppression system and separation wall also needs to be upgraded to current standards. The current plan is to replace T3 transformer and install neutral grounding reactors on the T3 and T4 transformer units. The project includes protection and control upgrades and relocation of battery, necessary spill containment facilities at Crawford TS. The project is under execution for $8.46 million with an in-service date of December 15, 2016. There are no cost implications for the LDCs. Once this project is complete the station will meet the current design standards.

5. LOAD FORECAST AND OTHER ASSUMPTIONS

THE FORECASTS REFLECT THE EXPECTED PEAK DEMAND AT EACH STATION UNDER EXTREME WEATHER CONDITIONS, BASED ON FACTORS SUCH AS POPULATION, HOUSEHOLD AND ECONOMIC GROWTH, CONSISTENT WITH MUNICIPAL PLANNING ASSUMPTIONS.

5.1 Historical Demand

The peak demand in the Windsor-Essex Region has declined from a high of 1060 MW in the summer of 2006 to approximately 800 MW in both 2013 and 2014.

Figure 5-1 shows the historical summer peak demand observed in the region from 2004 to 2014. A noticeable peak in 2006 is coincident with the all-time peak in Ontario power demand, while a dip in 2008 and 2009 shows the area's response to the global recession. There is a large concentration of automotive manufacturing facilities in the City of Windsor. The sector is a major economic driver and electricity user within the region. The decline in Ontario's manufacturing sector and the 2008/09 economic downturn have both contributed to a decline in electricity use in the region.

While the manufacturing sector continues to face challenges in recovering, economic diversification is changing the region's growth and electricity use. The five-year Windsor-Essex Regional Economic Roadmap, released in 2011, identifies nine industry groups that hold growth potential for the region, including advanced manufacturing, tourism, and agri-business.

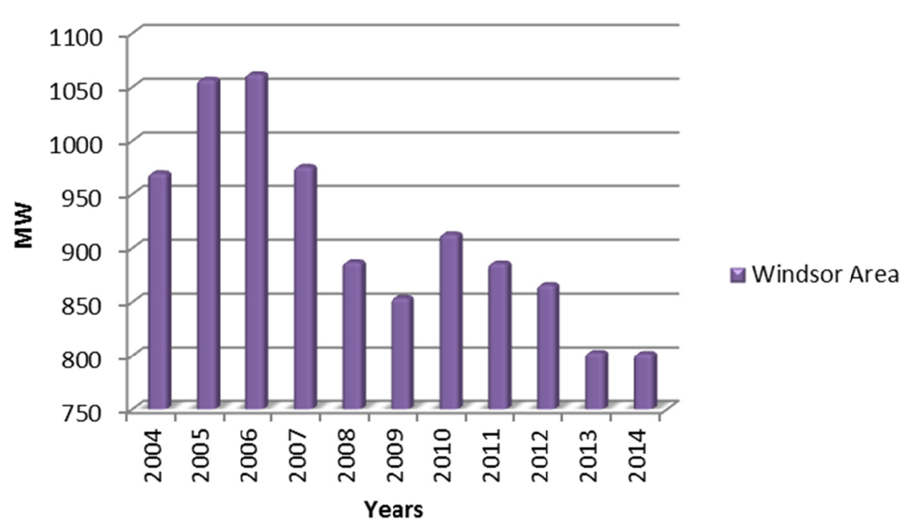

Figure 5-1 Historical Load Demand in Windsor-Essex Region

The peak demand in the Kingsville-Leamington area has also experienced fluctuations over the 2004-2014 period as shown in Figure 6-1.

5.2 Contribution of CDM and DG

In developing the planning forecast, the following process was used to assess the Windsor-Essex Region:

a) First, "gross demand" is established. Gross demand reflects the forecast developed and provided by the area LDCs and is influenced by a number of factors such as economic, household and population growth.
b) Second, "net demand" is derived by reducing the gross demand by expected savings from improved building codes and equipment standards, customer response to time-of-use pricing, and projected province-wide CDM programs. This information is provided by the IESO.
c) Lastly, a "planning forecast" is determined by reducing net demand by the contribution in the area from existing, committed and forecast DG. This information is provided by the IESO.

5.3 Gross and Net Demand Forecast

Summer peak gross non-coincident demand forecasts for the 20-year planning horizon were provided by EnWin and Hydro One Distribution, the two LDCs which are directly connected to the transmission system, for each of the transformer stations in the area. The forecasts from Hydro One Distribution include forecasts provided by the appropriate embedded LDCs.

The development of the load forecast for this RIP report followed a two-stage process:

(a) Using the forecast provided by the LDCs, the year by year growth rate for each station was first developed.
(b) The 2014 summer actual peak load, corrected for extreme weather, for each station was obtained.
(c) The growth rates from (a) were then applied to the 2014 summer peak load of (b) to obtain the gross load forecast for each station for extreme weather conditions.

The gross load forecasts, for extreme weather conditions, by station and by subsystem are shown in Appendix A. This load forecast reflects the following:

- A shift of load, commencing in 2016, from Walker TS #1 and #2 to Essex TS and GM MTS.
- Reduction in Kingsville TS load.
- Increase in loads at Keith TS, Crawford TS and Lauzon TS.

The gross load forecasts, for extreme weather conditions, by station and by subsystem are shown in Appendix A. Figure 5-2 is a graph of the Windsor – Essex Region extreme weather peak summer non-coincident load forecast. The overall region will experience an average annual growth rate of just less than 1%, while the Kingsville-Leamington area average growth rate would be about 1.6%.

Figure 5-2 also shows the load forecast from the IRRP report. The two forecasts are not materially different; hence the load forecast in this RIP report will not alter the conclusions of the IRRP.

The Reference Planning forecast (Appendix D) for each station is obtained by reducing the gross load forecast for the station by the amount of forecast conservation and DG. The conservation forecast (Appendix B) and the DG forecast (Appendix C) are the same as used in the IRRP report.

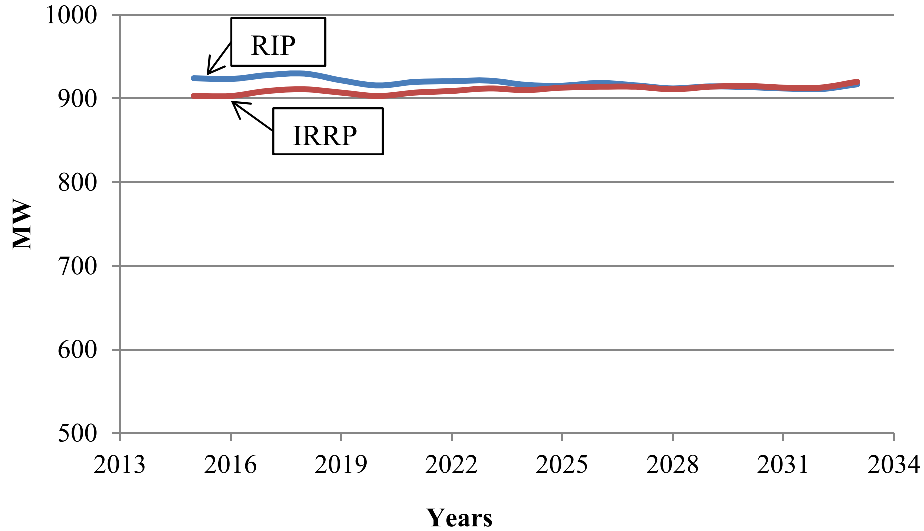

Figure 5-2 Reference Forecast in Windsor-Essex Region

5.4 Other Study Assumptions

The following other assumptions are made in this report.

1) The Study period for the RIP assessment is 2015-2025.
2) All planned facilities for which work has been initiated and are listed in Section 4 are assumed to be in-service.
3) Summer is the critical period with respect to line and transformer loadings. The assessment is therefore based on summer peak loads.
4) Station capacity adequacy is assessed by comparing the non-coincident peak load with the station's normal planning supply capacity. Load is assumed at 90% lagging power factor, unless known.
5) Normal planning supply capacity for Hydro One transformer stations in this Region is determined by the summer 10-Day Limited Time Rating (LTR), while some LDCs use different methodologies for determining transformer station LTR.

6. REGIONAL NEEDS

THIS SECTION SUMMARIZES THE WINDSOR-ESSEX REGION NEEDS OVER THE NEAR AND MID TERM. NO LONG TERM NEEDS HAVE BEEN IDENTIFIED.

Earlier studies by the IESO, ("Windsor-Essex Region Integrated Regional Resource Plan" - April 28, 2015, Supply to Essex County Transmission Reinforcement Project, January 2014) identified two near-term needs in the region. These needs are:

- **Minimize the Impact of Supply Interruptions in the J3E-J4E Subsystem:** The existing system lacks the capability to restore power to customers in the J3E-J4E subsystem in accordance with the ORTAC criteria, i.e., restoration of all loads within 8 hours. Based on current and forecast demand, up to 170 MW 0f the load interrupted cannot be restored by 2017.

- **Additional Supply Capacity in the Kingsville-Leamington Area:** Demand in the Kingsville-Leamington subsystem has already exceeded the load meeting capability of 120 MW in recent 3 years and is expected to continue to exceed the supply capacity over the forecast period. Figure 6-1 below shows the historical and forecast demand and supply capabilities in the Kingsville-Leamington subsystem after conservation and DG are taken into consideration.

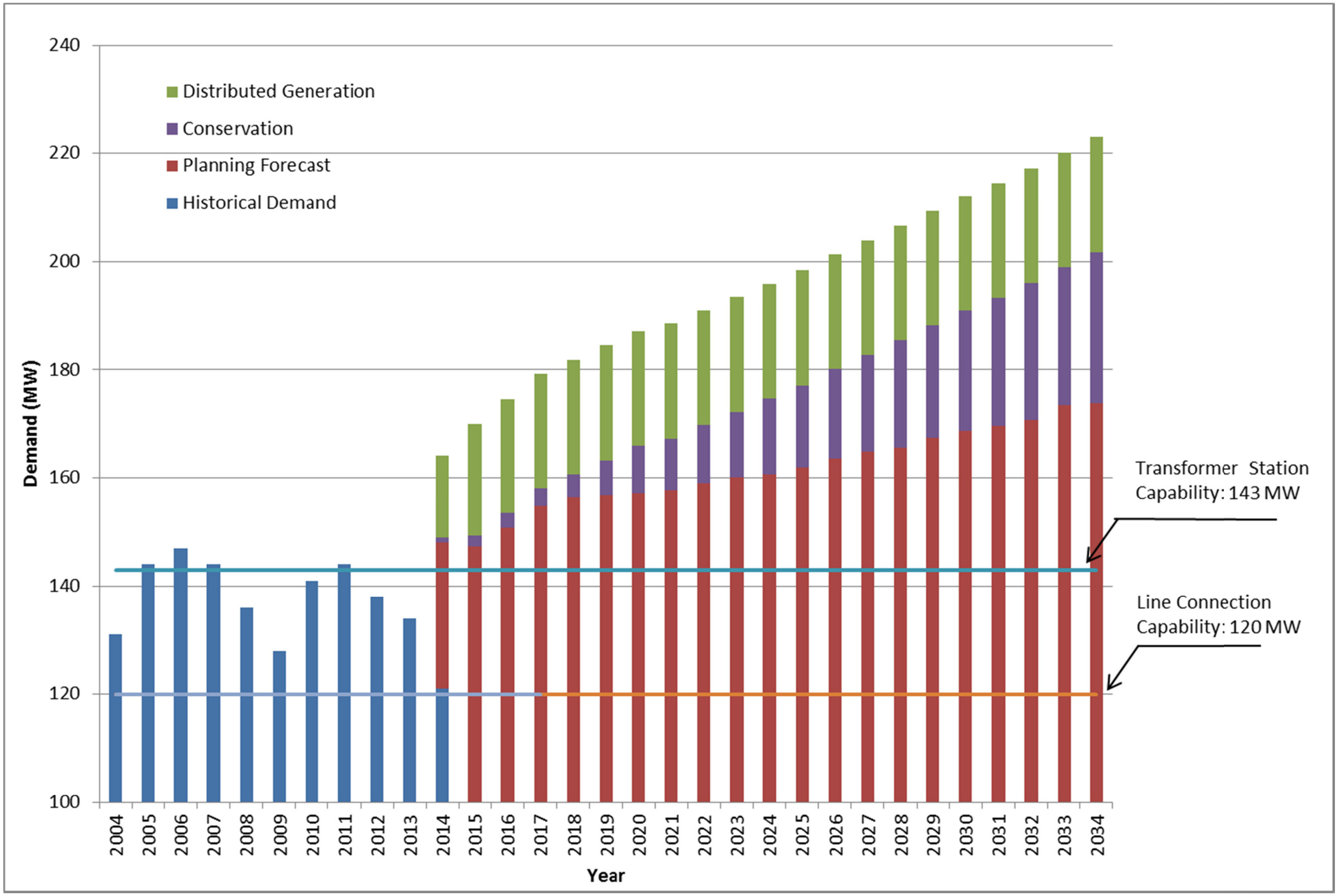

Figure 6-1 Historical and Forecast Demand of Kingsville-Leamington Subsystem

In addition, Hydro One has also identified infrastructure and major equipment which need replacement during the study period. The current plan is essentially a like-for-like replacement of 3 step-down transformers at Kingsville TS and 2 auto-transformers at Keith TS.

These regional needs are summarized in Table 6-1 and include needs for which work is already underway and/or being addressed. A detailed description and status of work initiated or planned to meet these needs is given in Section 7.

Table 6-1 Summary of Needs

Type	Needs	Timeline	Process
Capacity to Meet Demand	Kingsville-Leamington Subsystem	2018	**IRRP**
Minimize the Impact of Interruption	J3E-J4E Subsystem	2018	**IRRP**
Aging Equipment Replacement	3 transformers at Kingsville TS are at end-of-life	Near-Term	**RIP**
Aging Equipment Replacement	2 autotransformers at Keith TS are at end-of-life	Near-Term	**RIP**

7. REGIONAL INFRASTRUCTURE PLANS

THIS SECTION PRESENTS WIRES ALTERNATIVES AND THE CURRENT PREFERRED WIRES SOLUTION FOR ADDRESSING THE ELECTRICAL SUPPLY NEEDS FOR THE WINDSOR-ESSEX REGION.

7.1 Supply to Essex County Transmission Reinforcement (SECTR) Project

7.1.1 Description

The SECTR project as presented in the IRRP is an integrated solution to address both the J3E-J4E subsystem restoration need and the Kingsville – Leamington capacity need. As illustrated in Figure 7-1 the project consists of the installation of a new 230 kV supplied transformer station near Leamington connected to the existing C21J/C22J circuits via a new 13 km double-circuit 230 kV connection line on a new right-of-way.

The total cost of this project is $96.7M made up of:

(a) Build 230/27.6 – 27.6 kV 75/100/125 MVA Leamington TS with six LV breaker positions, plus other required switchgear: $32.1M
(b) Build a 13 km 2-circuit 230 kV line on a new right-of-way tapping into existing 230 kV circuits C21J/C22J plus Optical Ground Wire: $45.3M.
(c) Carry out distribution work for Leamington TS: $19.3M. Other additional distribution work includes two additional feeder positions at Leamington TS, and protection upgrades for in-service Kingsville DG transferred to Leamington TS.

With the establishment of Leamington TS, load will be transferred from Kingsville TS to the new station, such that the Kingsville TS load will be reduced to about 50 MW. As discussed in the IRRP report, this presents an opportunity to downsize the station from four transformers to two transformers, and would result in a combined supply capability in the Kingsville-Leamington area of 210 MW.

Figure 7-2 is a preliminary plan for the transfer of Kingsville TS feeders to Leamington TS. Feeders which are shown in blue will be completely transferred to Leamington TS, and the ones shown in green will be partially transferred to Leamington TS.

7.1.2 Recommended Plan and Current Status

Hydro One filed an application on January 22, 2014 with the OEB under Section 92 of the OEB Act for an order granting leave to construct approximately 13 km of new 230 kV transmission lines on steel lattice towers on a new right of way in the Windsor-Essex area and the installation of optic ground wire for system telecommunication purposes on existing C21J/C23Z towers near Leamington Junction and on new 230 kV towers. The application included a request for OEB approval of the methodology for allocating project cost to Hydro One Distribution, embedded LDCs and Sub-Transmission class customers.

On February 12, 2015, Hydro One filed an updated application that included the new 230/27.6 kV Leamington Transformer Station (Leamington TS). The OEB decided that the proceeding would be addressed in two phases. Phase 1 would only deal with the leave to construct application and Phase 2 of the proceeding would deal with cost allocation. Phase 1 of the SECTR S.92 proceeding has concluded and the "Leave to Construct" approval was granted by the OEB on July 16, 2015. The expected in-service date for the SECTR Project is June 2018. Phase 2 of the proceeding is continuing via an OEB policy review rather than the originally planned adjudicative process.

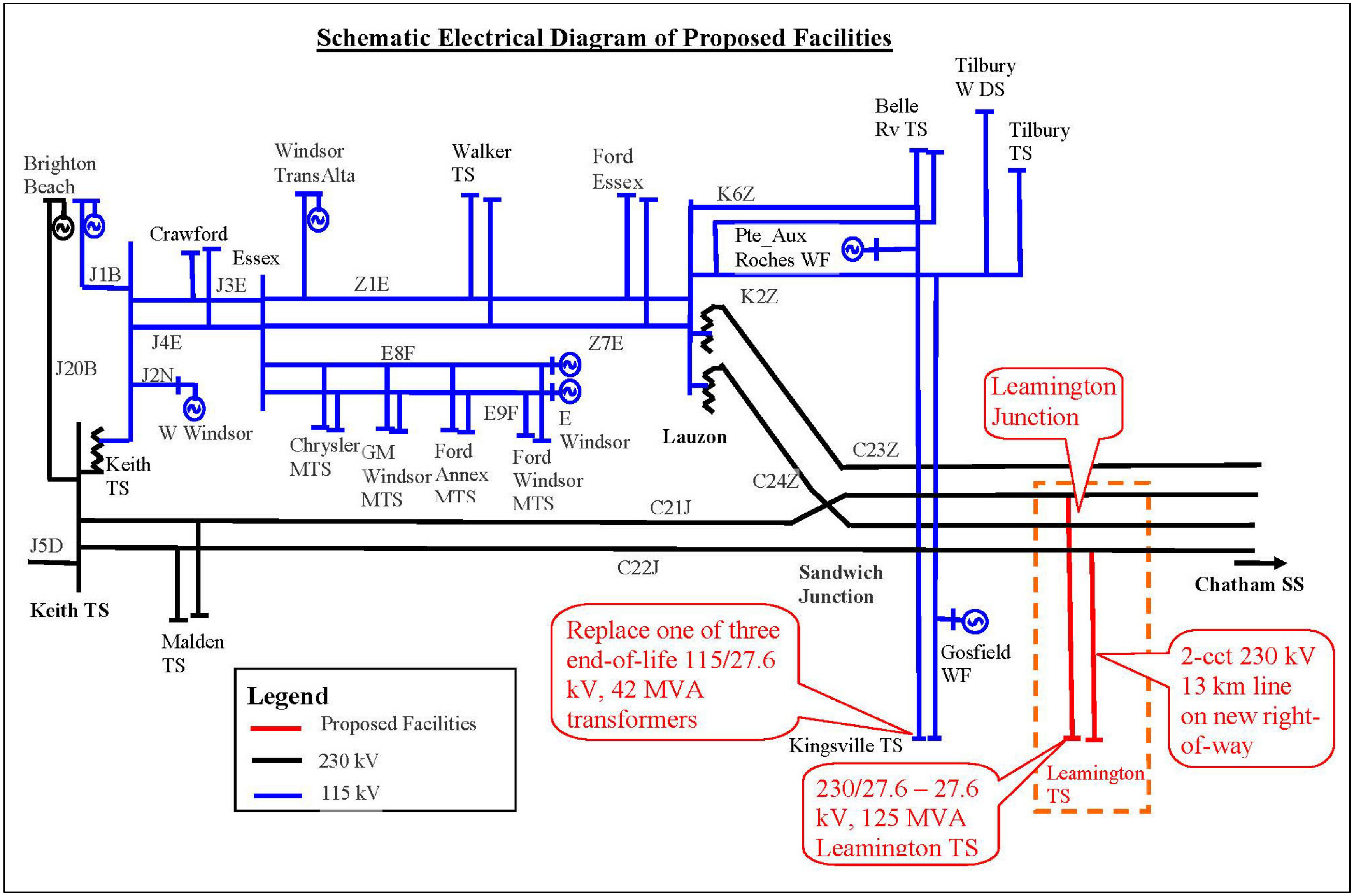

Figure 7-1 Schematic Electrical Diagram of the Proposed Facilities

Figure 7-2 Preliminary Distribution Feeder Plans for SECTR Project

7.2 Keith TS End-of-Life Auto-Transformer Replacement

7.2.1 Description

Keith TS is equipped with 2-230/115 kV 115 MVA autotransformers. These autotransformers are 1950's vintage and near end-of-life and require replacement.

7.2.2 Recommended Plan and Current Status

Due to SECTR project additional capacity will not be required and the end-of-life autotransformers at Keith TS will be replaced with equivalent like-for-like 125 MVA units. The expected in-service date is 2020. There are no cost implications for the LDCs.

7.3 Kingsville TS End-of-Life Transformer Replacement

7.3.1 Description

Kingsville TS is equipped with 4-115/27.6 kV 25/33/42 MVA transformers. One of these transformers was recently replaced, but the other three are 1950's vintage and will require replacement in the near future.

Due to SECTR project and the associated reduction in load at Kingsville TS, the station may be downsized and reconfigured as a two-transformer station. Hydro One Distribution is further reassessing to justify retaining the four-transformer arrangement if they receive additional request for connections at Kingsville area.

7.3.2 Recommended Plan

Hydro One Distribution to complete their connection capacity assessment as part of distribution system planning before Q3 2016 so that replacement and reconfiguration plan can be finalized by Hydro One in a timely manner.

7.4 Gordie Howe International Bridge (GHIB)

7.4.1 Description

The Gordie Howe International Bridge (GHIB) is a construction project under a bi-lateral agreement between the federal governments of Canada and the USA, and the governments of Ontario and Michigan, to construct a new border crossing between Windsor and Detroit. It will comprise a 12 km westerly extension of Hwy 401 to a site near Keith Transformer Station, where a new customs plaza and a new bridge over the Detroit River will be constructed. The highway will be extended by the Ministry of Transportation of Ontario (MTO), while the customs plaza and the bridge will be constructed by Transport Canada.

The GHIB project is multi-faceted in its impacts on Hydro One facilities and operations at Keith TS including: transmission lines, fiber lines and feeders relocation; insulation contamination due to salt spray effects from new bridge; relocation of access routes; possible security issues for staff accessing and working at the station; impacts on existing utilities (water/sewer/gas). In addition, the GHIB project will reduce the footprint of the station and encumber egress from the station. Consequently, this project will impact future expansion work at the station and possibly limit the extent to which the station can be developed relative to its ultimate plan development over the long term.

7.4.2 Recommended Plan and Current Status

In order to mitigate these impacts, as illustrated in Figure 7-3 below, additional real estate is required for future expansion to the north of McKee Rd. The existing transmission lines and feeders will also need to egress the station via underground cables so as not to interfere with the bridge operations.

The cost of this project will be fully recovered from the Windsor Detroit Bridge Authority (WDBA). A Transmission Assets Modification Agreement (TAMA) with the WDBA is expected to be finalized by early January 2016. Approvals for executing the project are expected by March 2016 for a planned in-service date by the end of 2018.

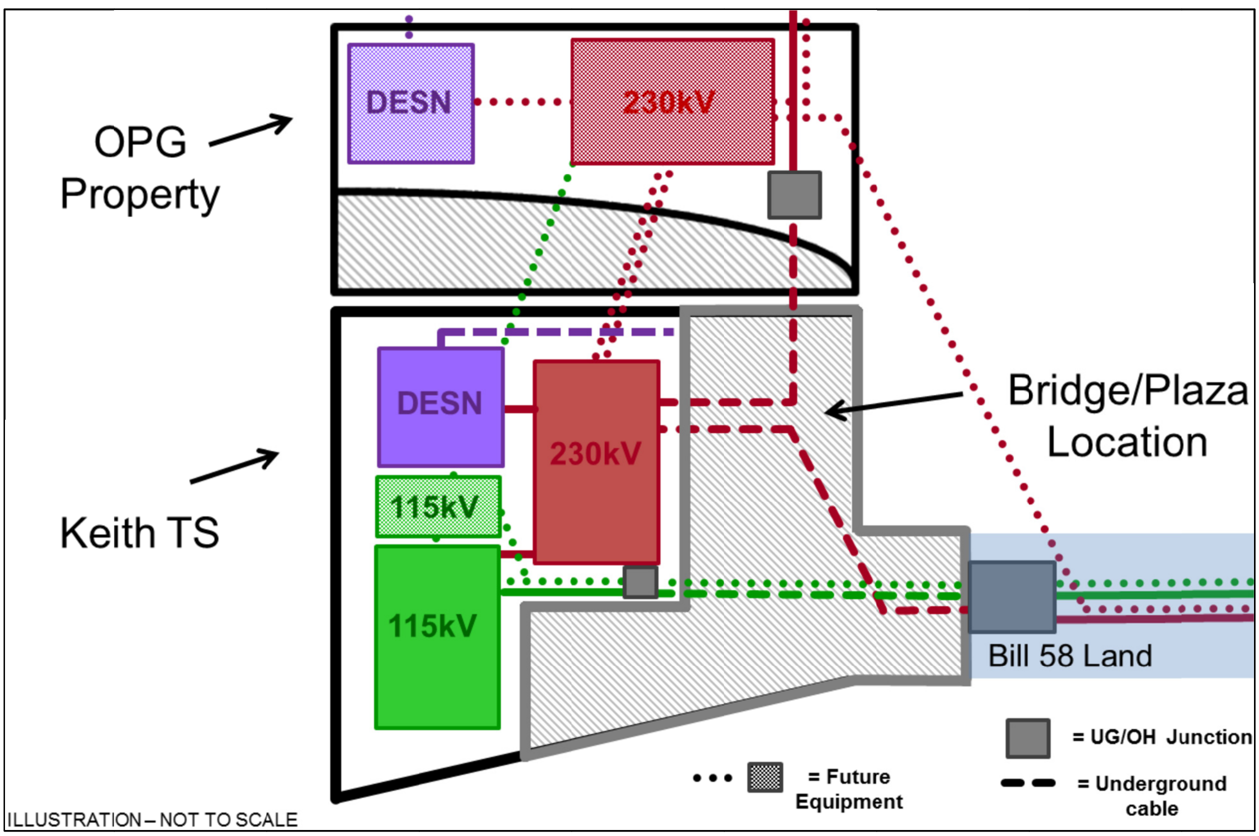

Figure 7-3 Gordie Howe International Bridge (GHIB) Project

8. OTHER PROJECTS

There are other wires projects that are currently under development and pending decision in the Windsor-Essex Region. These projects are local in nature and being planned and developed by Hydro One and relevant LDC as discussed below.

8.1 Malden TS Additional Feeder Positions

8.1.1 Description

Due to the load increase that's expected from the planned Detroit River International Crossing work and local highway construction, Essex Power has identified a need for two additional 28 kV feeder positions to be constructed at Malden TS.

The Malden transformer station is currently equipped with two 75/125 MVA transformers, 12 feeder positions and two capacitor banks and this plan involves expanding the station to 14 feeders. The two transformers at Malden TS were recently replaced, and there is additional capacity available at the station to meet the load requirement of the customer.

Based on a preliminary estimate the following will be the cost for the different layouts:

- Installation of two 28kV feeder breaker positions with feeder tie with underground feeder egress to outside station fence by 1 meter. Estimated cost of about $1.1M
- Installation of one 28kV feeder breaker position with no feeder tie with underground feeder egress to outside station fence by 1 meter. Estimated cost of about $875k
- Installation of one 28kV feeder breaker position with a break before make connection to alternate bus with underground feeder egress to outside station fence by 1 meter. Estimated cost of about $925k

8.1.2 Recommended Plan and/or Current Status

The above options have been provided to Essex Powerlines Corp. Hydro One is awaiting its decision on the preferred option expected to be made in 2016.

8.2 Tilbury TS Transformer End-of-Life Replacement

8.2.1 Description

Tilbury West HVDS and Tilbury TS are both supplied from 115 kV circuit K2Z and are adjacent to each other. The two stations supply the Town of Tilbury and surrounding area. Tilbury West HVDS consists of 2 x 15/20/25 MVA, 115/27.6 kV transformers of 1980's vintage with two feeder positions; and Tilbury TS consists of 1 x 6/8 MVA 115/27.6 kV transformer of 1950's vintage with one feeder position. The

2014 peak load at Tilbury TS was 1.0 MW, and 16 MW at Tilbury West HVDS. The future load levels over the next 10 years at these stations are not expected to grow significantly.

Tilbury TS is near its end-of-life, and a decision to replace or retire should be made by 2017. Following three options are under consideration for Tilbury TS:

(1) Transfer Tilbury TS load (M1 feeder) to Tilbury West DS and decommission Tilbury TS at a cost of about $1.7M. This option is feasible as there is sufficient capacity at Tilbury West HVDS to accommodate both the Tilbury West HVDS forecast load and the Tilbury TS forecast load into the long term. Further, Tilbury West HVDS has sufficient capacity to accommodate its existing DG connections plus the existing 5 MW solar DG currently connected to Tilbury TS.

(2) Refurbish Tilbury TS at a cost of about $5M. This option would retain the supply capacity level and supply diversity that currently exists.

(3) Build a new DESN station at Tilbury TS with dual 115kV circuit supply from the K2Z and K6Z for an expected cost of about $20M. This would include building the 115kV line out from Tilbury Junction to the TS and a complete new station.

8.2.2 Recommended Plan and Current Status

Option 1 is the least cost alternative. It is recommended that Hydro One will have further discussions with the LDCs regarding these options and associated costs. These discussions are expected in 2016, and a decision is expected to be made by no later than 2017. Project construction is planned to commence in 2018 for an expected in-service in 2019. Depending on the option selected, costs may have to be recovered from the LDCs consistent with the TSC.

8.3 Keith TS T1 Transformer End-of-Life Replacement

8.3.1 Description

Keith TS transformer T1 (25/33/42 MVA 115/27.6 kV) is of 1950's vintage and it is approaching end-of-life. EnWin is the only LDC supplied from this Keith T1 and exclusively serves a single customer Nemak. The peak load was 8 MW in 2014. The load growth is expected to remain at this level in the long-term.

There is sufficient capacity at the Keith DESN station to accommodate both the forecast at Keith DESN load plus the forecast Keith TS T1 load over the next 10 years.

Following three possible options are considered to address the end-of life issue for Keith TS T1:

(1) Replace Keith TS T1.

(2) Transfer Keith TS T1 load to Keith T22/T23 DESN station.

(3) Resupply Nemak from another EnWin feeder connected to Keith T22/T23 DESN.

8.3.2 Recommended Plan and Current Status

It is recommended to develop cost estimates for each of the option. Following that Hydro One will initiate discussions with EnWin to review the options and decide on a preferred option.

Cost estimates are expected in Q1 of 2016 and selection of a preferred option is expected before the end of 2016. Discussions will then ensue with Hydro One and EnWin regarding planned construction dates.

9. CONCLUSION

THIS REGIONAL INFRASTRUCTURE PLAN REPORT CONCLUDES THE REGIONAL PLANNING PROCESS FOR THE WINDSOR-ESSEX REGION. THIS REPORT MEETS THE INTENT OF THE PROCESS DESCRIBED IN SECTION 2 WHICH IS ENDORSED BY THE OEB AND MANDATED IN THE TSC AND DSC.

This RIP report provides a single consolidated source of information for infrastructure plans in the Windsor-Essex Region. It develops and outlines a plan for investments in transmission and/or distribution facilities to meet the electricity needs within the region. The RIP report was developed in collaboration of a Technical Working Group consisting of representation from the LDCs in the region, the IESO, and led by Hydro One consistent with the requirements set out in the TSC, DSC and the PPWG report.

This report highlights several near-term needs in the region for which implementation plans have already been developed and are planned for completion in the next five years. Table 9-1 provides a status of these projects along with their cost and timelines. Projects requiring further planning on scoping and pending decisions on the preferred alternative are provided in Table 9-2. Over the next five years, the total transmission and distribution investments associated with these projects is approximately $215M - $225M.

Table 9-1 Project Under Development

Project/Plan	Cost	I/S	Performed by
Supply to Essex County Transmission Reinforcement “SECTR TX”	$77.4 Million	March 2018	Hydro One
Supply to Essex County Transmission Reinforcement “SECTR DX”	$19.3 Million	March 2018 (first stage)	Hydro One Distribution
Replacement of Keith end-of-life autotransformers	$45 Million	2020	Hydro One
Replacement of Kingsville end-of-life transformers	$12 Million	2018	Hydro One
230kV/115kV circuit and 27.6kV feeder reconfiguration at Keith TS due to Gordie Howe International Bridge (GHIB) Project	$63 Million	October 2018	Hydro One
Transformer replacement and station refurbishment at Crawford TS	$8.46 Million	December 2016	Hydro One

Table 9-2 Project Pending Decision

Project/Plan	Cost	I/S	Performed by
Additional feeder position at Malden TS	TBD	TBD	Hydro One
Replacement of Tilbury end-of-life transformer	TBD	2019	Hydro One
Keith TS end-of-life T1 Transformer	TBD	TBD	Hydro One

There are no long-term needs in this region that requires plans to be developed at this time. As with any region, the Windsor-Essex Region is monitored as part of Hydro One and LDC operations. Should there be a need that emerges earlier due to a change in load forecast or any other reason, the next regional planning cycle will be started earlier to address the need.

10. REFERENCES

[1] Independent Electricity System Operator. “Windsor-Essex Region Integrated Regional Resource Plan”. April 28, 2015.
http://www.ieso.ca/Documents/Regional-Planning/Windsor_Essex/2015-Windsor-Essex-IRRP-Report.pdf

APPENDIX A. GROSS FORECAST BY SUBSYSTEM & STATION

J3E/J4E Sub System	LTR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Gross Demand (extreme weather)		Forecast																			
Kingsville TS	158	133	137	141	145	146	147	148	149	150	151	152	153	155	156	157	158	159	160	161	162
Belle River TS	59	46	46	47	48	49	50	51	52	53	53	54	55	56	57	58	59	60	61	62	63
Tilbury West DS	34	17	17	17	17	18	18	18	18	18	19	19	19	19	19	19	19	19	19	20	20
Tilbury TS	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Lauzon TS	225	191	193	195	197	199	201	203	204	206	208	209	211	213	215	217	219	221	223	224	226
Walker TS #1	99	71	79	76	77	77	78	78	79	79	80	80	81	81	82	82	83	83	84	84	85
Walker TS #2	99	95	111	92	92	93	93	94	94	95	96	96	97	97	98	99	99	100	100	101	102
Essex TS	116	55	63	73	73	74	74	75	75	76	76	77	77	78	78	78	79	79	80	80	81
Crawford TS	90	83	84	84	85	85	86	86	87	87	88	88	89	89	90	90	91	91	92	93	93
Chrysler	65	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
Ford Powerhouse	65	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
General Motors	43	2	0	14	14	14	14	14	14	14	14	14	14	14	15	15	15	15	15	15	15
Ford Annex	43	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Ford Essex Engine Plant	43	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Subtotal	**N/A**	**769**	**807**	**816**	**824**	**830**	**836**	**843**	**849**	**854**	**860**	**866**	**872**	**878**	**884**	**891**	**897**	**903**	**909**	**916**	**922**

Additional Stations in the Windsor Essex Region	LTR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Gross Demand (extreme weather)		Forecast																			
Keith TS T1	54	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Keith TS T22/T23	114	68	67	67	67	67	67	67	68	68	68	68	68	68	68	68	68	69	69	69	69
Malden TS	200	117	118	119	120	120	121	122	124	124	125	126	127	127	128	129	130	131	131	132	133
Windsor Essex Total	**N/A**	**962**	**1000**	**1009**	**1019**	**1026**	**1033**	**1041**	**1048**	**1055**	**1061**	**1068**	**1074**	**1082**	**1089**	**1096**	**1104**	**1111**	**1118**	**1125**	**1133**

Kingsville Leamington Sub system	LTR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Gross Demand (weather normal)		Forecast																			
Total	**N/A**	**155**	**160**	**165**	**169**	**172**	**174**	**177**	**178**	**181**	**183**	**186**	**188**	**191**	**193**	**196**	**199**	**201**	**204**	**206**	**209**

APPENDIX B. CONSERVATION ASSUMPTIONS BY SUBSYSTEM & STATION

J3E/J4E Sub System	LTR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Conservation		Forecast																			
Kingsville TS	158	1	2	3	3	4	6	9	10	11	12	14	15	16	18	20	21	22	24	25	26
Belle River TS	59	0	1	1	1	1	2	3	3	3	4	4	5	5	5	6	6	7	7	8	8
Tilbury West DS	34	0	0	0	0	0	1	1	1	1	1	2	2	2	2	2	2	2	3	3	3
Tilbury TS	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lauzon TS	225	1	3	4	4	5	8	11	12	13	14	17	18	19	21	23	24	26	28	29	30
Walker TS #1	99	1	1	2	2	2	4	5	5	6	6	7	8	8	9	10	11	11	12	13	13
Walker TS #2	99	1	1	2	2	3	4	6	6	7	8	9	10	10	11	13	13	14	15	16	16
Essex TS	116	0	1	1	1	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	9
Crawford TS	90	1	1	1	2	2	3	4	4	5	5	6	7	7	8	9	9	10	10	11	11
Chrysler	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ford Powerhouse	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
General Motors	43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ford Annex	43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ford Essex Engine Plant	43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal	**N/A**	**5**	**10**	**14**	**16**	**20**	**31**	**41**	**45**	**50**	**55**	**64**	**69**	**75**	**81**	**89**	**94**	**100**	**107**	**114**	**115**

Additional Stations in the Windsor Essex Region	LTR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Conservation		Forecast																			
Keith TS T1	54	0	1	1	1	1	2	3	3	3	3	4	4	5	5	6	6	7	7	8	8
Keith TS T22/T23	114	0	1	1	1	1	2	3	3	3	3	4	4	5	5	6	6	7	7	8	8
Malden TS	200	1	2	2	3	3	5	7	7	8	9	11	11	12	14	15	16	17	18	19	19
Windsor Essex Total	**N/A**	**7**	**12**	**18**	**20**	**26**	**40**	**53**	**58**	**65**	**72**	**83**	**89**	**97**	**105**	**116**	**122**	**130**	**139**	**148**	**149**

Kingsville Leamington Sub system	LTR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Conservation		Forecast																			
Total	**N/A**	**1**	**2**	**3**	**3**	**4**	**6**	**9**	**10**	**11**	**12**	**14**	**15**	**16**	**18**	**20**	**21**	**22**	**24**	**25**	**26**

APPENDIX C. DISTRIBUTED GENERATION ASSUMPTIONS BY SUBSYSTEM & STATION

J3E/J4E Sub System Distributed Generation	LTR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
		Forecast																			
Kingsville TS	158	15	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
Belle River TS	59	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Tilbury West DS	34	2	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Tilbury TS	10	2	7	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Lauzon TS	225	8	16	18	19	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Walker TS #1	99	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Walker TS #2	99	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Essex TS	116	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Crawford TS	90	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Chrysler	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ford Powerhouse	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
General Motors	43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ford Annex	43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ford Essex Engine Plant	43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal	**N/A**	**35**	**59**	**64**	**66**	**68**	**68**	**68**	**68**	**68**	**68**	**68**	**68**	**68**	**68**	**68**	**68**	**68**	**68**	**68**	**68**

Additional Stations in the Windsor Essex Region Distributed Generation	LTR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
		Forecast																			
Keith TS T1	54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Keith TS T22/T23	114	21	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Malden TS	200	9	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Windsor Essex Total	**N/A**	**65**	**63**	**69**	**71**	**73**	**73**	**73**	**73**	**73**	**73**	**73**	**73**	**73**	**73**	**73**	**73**	**73**	**73**	**73**	**73**

Kingsville Leamington Sub system Distributed Generation	LTR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
		Forecast																			
Total	**N/A**	**15**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**

APPENDIX D. REFERENCE PLANNING FORECAST BY SUBSYSTEM & STATION

J3E/J4E Sub System	LTR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Gross Demand (extreme weather)		*Forecast*																			
Kingsville TS	158	133	114	117	121	121	120	118	118	118	118	117	117	118	117	116	116	116	115	115	115
Belle River TS	59	46	43	44	44	45	45	45	46	47	46	47	47	48	49	49	50	50	51	51	52
Tilbury West DS	34	17	7	7	7	8	7	7	7	7	8	7	7	7	7	7	7	7	6	7	7
Tilbury TS	10	1	-6	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7
Lauzon TS	225	191	174	173	174	174	173	172	172	173	174	172	173	174	174	174	175	175	175	175	176
Walker TS #1	99	71	76	72	73	73	72	71	72	71	72	71	71	71	71	70	70	70	70	69	70
Walker TS #2	99	95	109	89	89	89	88	87	87	87	87	86	86	86	86	85	85	85	84	84	85
Essex TS	116	55	62	71	71	71	70	71	70	71	70	71	70	71	70	70	70	70	70	70	71
Crawford TS	90	83	82	82	81	81	81	80	81	80	81	80	80	80	80	79	80	79	80	80	80
Chrysler	65	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
Ford Powerhouse	65	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
General Motors	43	2	0	14	14	14	14	14	14	14	14	14	14	14	15	15	15	15	15	15	15
Ford Annex	43	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Ford Essex Engine Plant	43	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Subtotal	**N/A**	**769**	**737**	**738**	**742**	**743**	**737**	**733**	**736**	**736**	**737**	**734**	**733**	**737**	**735**	**733**	**735**	**735**	**733**	**734**	**738**

Additional Stations in the Windsor Essex Region	LTR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Gross Demand (extreme weather)		*Forecast*																			
Keith TS T1	54	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Keith TS T22/T23	114	68	64	64	64	64	63	62	63	63	63	62	62	61	61	60	60	60	60	59	59
Malden TS	200	117	115	114	114	114	113	112	114	113	113	112	113	112	111	111	111	111	110	110	111
Windsor Essex Total	**N/A**	**962**	**924**	**923**	**928**	**930**	**922**	**916**	**920**	**921**	**921**	**916**	**915**	**919**	**916**	**912**	**915**	**914**	**912**	**911**	**917**

Kingsville Leamington Sub system	LTR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Gross Demand (weather normal)		*Forecast*																			
Total	**N/A**	**155**	**147**	**151**	**155**	**156**	**157**	**157**	**158**	**159**	**160**	**161**	**162**	**164**	**165**	**166**	**167**	**169**	**169**	**171**	**173**

APPENDIX E. LIST OF ACRONYMS

A	Ampere
BES	Bulk Electric System
BPS	Bulk Power System
CDM	Conservation and Demand Management
CIA	Customer Impact Assessment
CGS	Customer Generating Station
CTS	Customer Transformer Station
DESN	Dual Element Spot Network
DG	Distributed Generation
DS	Distribution Station
DSC	Distribution System Code
GS	Generating Station
GTA	Greater Toronto Area
HV	High Voltage
HVDS	High Voltage Distribution Station
IESO	Independent Electricity System Operator
IRRP	Integrated Regional Resource Plan
kV	Kilovolt
LDC	Local Distribution Company
LP	Local Plan
LTE	Long Term Emergency
LTR	Limited Time Rating
LV	Low Voltage
MTS	Municipal Transformer Station
MW	Megawatt
MVA	Mega Volt-Ampere
MVAR	Mega Volt-Ampere Reactive
NA	Needs Assessment
NERC	North American Electric Reliability Corporation
NGS	Nuclear Generating Station
NPCC	Northeast Power Coordinating Council Inc.
NUG	Non-Utility Generator
OEB	Ontario Energy Board
OPA	Ontario Power Authority
OPG	Ontario Power Generation
ORTAC	Ontario Resource and Transmission Assessment Criteria
PF	Power Factor
PPWG	Planning Process Working Group
RIP	Regional Infrastructure Plan
ROW	Right-of-Way
SA	Scoping Assessment
SIA	System Impact Assessment
SPS	Special Protection Scheme
SS	Switching Station
TS	Transformer Station
TSC	Transmission System Code
UFLS	Under Frequency Load Shedding
ULTC	Under Load Tap Changer
UVLS	Under Voltage Load Rejection Scheme