

May 10, 2011

Mr. John Sabiston  
Manager, Transmission Plans - West  
Hydro One Networks Inc.  
483 Bay Street  
Toronto, Ontario  
M5G 2P5



Dear Mr. Sabiston:

***Install 2 ohm bus tie reactors at Kingsville TS, Longwood TS, Caledonia TS, Keith TS DESN 1 and Clarke TS***  
***Notification of Conditional Approval of Connection Proposal***  
***CAA ID Number: 2011-EX540***

Thank you for the information regarding the proposed installation of 2  $\Omega$  bus tie reactors and bypass switches at Kingsville TS, Longwood TS, Caledonia TS, Keith TS DESN 1 and Clarke TS to increase the short circuit capacity.

The IESO has concluded that the proposed changes will not result in a material adverse impact on the reliability of the integrated power system. The IESO is therefore pleased to grant **conditional approval** for the modification detailed in the attached expedited System Impact Assessment report. Please note that any material changes to your proposal may require a re-assessment by the IESO, and may nullify your conditional approval.

You may now initiate the IESO's "Market Entry" process. To do so, please contact Market Entry at [market.entry@ieso.ca](mailto:market.entry@ieso.ca) at least eight months prior to your expected energization date. The SIA report, attached hereto, details the requirements that your company must fulfill during this process, including demonstrating that the equipment *as installed* will not be materially different from the equipment *as approved* by the IESO. The document entitled "**External Guidelines for Connection to the IESO**", provided in the approval email describes the key steps in the Market Entry process.

When your company has successfully completed the IESO's "Facility Registration/Market Entry" process, the IESO will provide you with a "final" approval, thereby confirming that the equipment is fully authorized to connect to the IESO-controlled grid.

For further information, please contact me via [connection.assessments@ieso.ca](mailto:connection.assessments@ieso.ca).

Yours truly,

Michael Falvo  
Manager – Market Facilitation  
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cc: IESO Records

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All information submitted in this process will be used by the IESO solely in support of its obligations under the *Electricity Act, 1998*, the *Ontario Energy Board Act, 1998*, the *Market Rules* and associated policies, standards and procedures and in accordance with its licence. All information submitted will be assigned the appropriate confidentiality level upon receipt.

**Final Report - Expedited System Impact Assessment**  
**Hydro One Networks Inc.**

**1.0 GENERAL DESCRIPTION & PROPOSED MODIFICATIONS**

The planned incorporation of microFIT generation in Ontario will increase the symmetrical three-phase fault levels at several associated locations above the TSC's fault limits.

Hydro One is proposing to install 2  $\Omega$  bus tie reactors and bypass switches at the following transmission stations to increase the short circuit capacity.

The proposed list of station is as follows:

- Kingsville TS
- Longwood TS
- Caledonia TS
- Keith TS DESN 1
- Clarke TS

The bus tie reactor by-pass switches at Longwood TS, Caledonia TS, Keith TS DESN and Clark TS will be closed automatically in less than 10 cycles when one of the 2 transformer breakers opens. The bus tie reactor by-pass switch at Kingsville TS will be closed automatically in less than 10 cycles when two or more of the 4 transformer breakers opens.

A typical bus tie reactor configuration for a station with 4 transformers is shown in Figure 1 at the end of this document. A typical bus tie reactor configuration for a station with 2 transformers is shown in Figure 2 at the end of this document.

The planned in-service dates of new reactors will be communicated to the IESO.

**2.0 TECHNICAL SPECIFICATIONS**

The technical specifications for the new bus tie reactors are listed in the table below.

<b>New Bus Tie Reactor Specifications</b>	
<b>Kingsville TS, Longwood TS, Caledonia TS, Keith TS and Clarke TS</b>	
<b>Configuration</b>	3 single phase units
<b>Nominal Voltage (kV)</b>	27.6
<b>Reactance at 60 Hz</b>	2 $\Omega$ per phase
<b>Continuous Current Rating (A)</b>	2000 (min rms)
<b>Symmetrical Fault Current (kA)</b>	10 (min)

The specifications of any additional LV equipment (< 50 kV) needed for these reactors are not relevant to this assessment and therefore are not included in this report.

**2.1 Kingsville TS**

The planned incorporation of four wind farms in the Chatham-Kent-Essex area will increase the symmetrical three-phase fault level at the Kingsville TS 27.6 kV bus. The installation of 2  $\Omega$  reactors between the Y1 and B1 buses will reduce the fault level to:

- Y1 Bus – 14.2 kA (3  $\Phi$ )
- B1 Bus – 11.05 kA (3  $\Phi$ )

**Install 2 ohm bus tie reactors at Kingsville TS, Longwood TS, Caledonia TS, Keith TS DESN 1, Clarke TS and Hamilton Nebo TS DESN 1**  
**CAA ID# 2011-EX540**

## **2.2 Longwood TS**

The planned incorporation of small scale renewable generation projects in the Strathroy area will increase the symmetrical three-phase fault level at the Longwood TS 27.6 kV bus. The installation of 2  $\Omega$  reactors between the J and Q buses will reduce the fault level to:

- J Bus – 11.78 kA (3  $\Phi$ )
- Q Bus – 11.78 kA (3  $\Phi$ )

## **2.3 Caledonia TS**

The planned incorporation of renewable energy in the Southern will increase the symmetrical three-phase fault level at the Caledonia TS 27.6 kV bus. The installation of 2  $\Omega$  reactors between the B and Y buses will reduce the fault level to:

- B Bus – 12.622 kA (3  $\Phi$ )
- Y Bus – 12.276 kA (3  $\Phi$ )

## **2.4 Keith TS**

The planned incorporation of small scale renewable generation projects in the Windsor area will increase the symmetrical three-phase fault level at the Keith TS 27.6 kV bus. The installation of 2  $\Omega$  reactors between the B and Y buses will reduce the fault level to:

- B Bus – 12.088 kA (3  $\Phi$ )
- Y Bus – 11.867 kA (3  $\Phi$ )

## **2.5 Clarke TS**

The planned incorporation of new solar generation at London Clarke TS will increase the symmetrical three-phase fault level at the Clarke BY 27.6 kV bus. The installation of 2  $\Omega$  reactors between the B and Y buses will reduce the three phase fault level to:

- B-Y Bus – 11.8 kA (3  $\Phi$ )

## **3.0 REQUIREMENTS**

The proponent must notify the IESO as soon as it becomes aware of any changes to the assumptions made in the connection assessment. The IESO will determine whether these changes require a re-assessment.

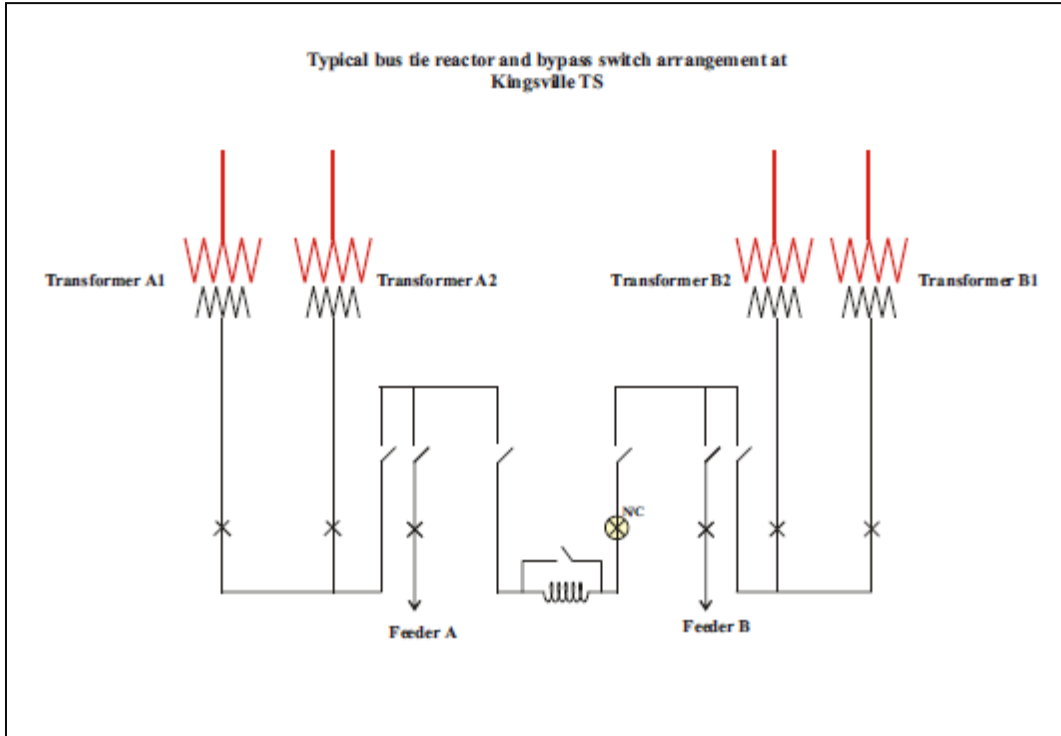
In accordance with the telemetry requirements for transmitters (see Appendices 4.16, 4.20 and 4.21 of the Market Rules) the connection applicant must install equipment at this project with specific performance standards to provide telemetry data to the IESO. The data is to consist of certain equipment status and operating quantities which will be identified during the IESO Market Entry Process.

## **4.0 ASSESSMENT & CONCLUSIONS**

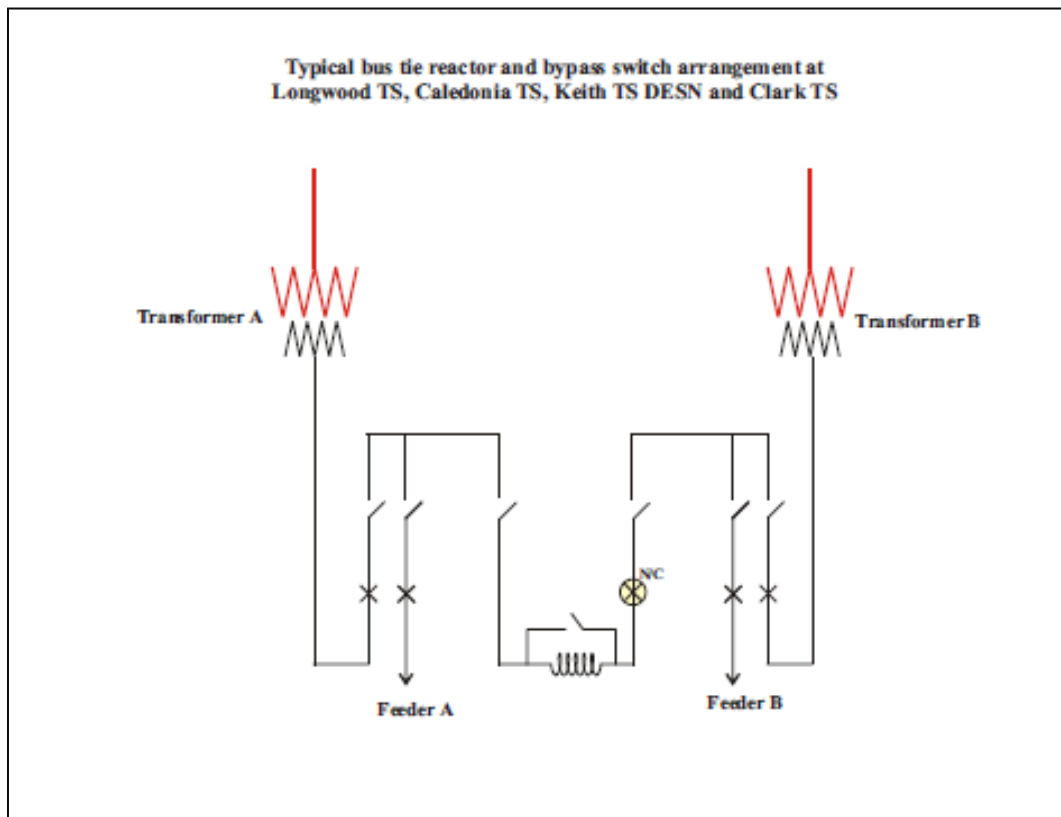
The voltage drops across the bus tie reactors during a contingency of the loss of one transformer breaker (2 breakers at Kingsville) must be taken into account by the LDCs.

This expedited System Impact Assessment concludes that the installation of these reactors is not expected to have a material adverse impact on the IESO-controlled grid.

**Install 2 ohm bus tie reactors at Kingsville TS, Longwood TS, Caledonia TS, Keith TS DESN 1, Clarke TS and Hamilton Nebo TS DESN 1**  
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**Figure 1 – Typical Bus Tie Reactor Configuration for 4 Transformer station**



**Figure 2 – Typical Bus Tie Reactor Configuration for 2 Transformer station**