System Impact Assessment Application (IESO)/ Customer Impact Assessment Application (Hydro One) for Load Facilities

Submit this form to the **Independent Electricity System Operator** and also to **Hydro One Networks Inc.**:

Independent Electricity System Operator	**Hydro One Networks Inc.**
connection.assessments@ieso.ca To the extent possible, the documents and drawings should be submitted in .pdf format. Signed documents should be scanned in .pdf format. Connection applicants intending to send documents in a different format are encouraged to contact the Connection Assessments in advance. Hard copies of the application forms and supporting documents are not required. Where the supporting documentation (e.g. single line diagram) is not suitable for email submission, it should be submitted by mail or courier to: **Independent Electricity System Operator** 2635 Lakeshore Rd. West Mississauga, ON L5J 4R9 **Attn: Connection Assessments**	483 Bay Street, TCT 6 Toronto, ON M5G 2P5 **Attn: Director, Account Management** Fax number: (416) 345-5957 cbrlargeaccounts@hydroone.com

Subject: **System Impact Assessment Application (IESO)/Customer Impact Assessment Application (Hydro One) for Load Facilities**

All information submitted in this process will be used by the Independent Electricity System Operator (IESO) and Hydro One Networks Inc. (Hydro One) solely in support of their obligations under the *Electricity Act, 1998*, the *Ontario Energy Board Act, 1998,* the *Market Rules*, the Transmission System Code and associated policies, codes, standards and procedures and their licenses. All information submitted will be treated in accordance with the IESO's and Hydro One confidentiality policies. The undersigned consents to the sharing of all such information between the IESO and Hydro One.

Since specific equipment data may not yet be available for this Project, the accompanying data sheets have been modified to identify those data that are essential for the IESO and Hydro One to be able to undertake both Assessments. The data sheets also identify those data for which the IESO or Hydro One will use suitable typical values should the Applicant not provide them.

Whenever it is necessary for the IESO or Hydro One to use typical (generally conservative) values for the Assessment of the Connection Application, then it will be the responsibility of the Applicant to ensure that the equipment that is eventually installed meets or exceeds these values.

Applicants are responsible for providing as-built equipment data prior to connection, for the equipment that is constructed and is to be put into service. Timelines for providing as-built data are specified on the Hydro One and IESO websites.

PART 1 – GENERAL INFORMATION

Organization Name (Load):
Organization Short Name: (Maximum 12 keystrokes)
Project Name:
Location of Project:

Authorized Representative	
Name:	
Position / Title:	
Company:	
Address:	
City/Town:	
Province/State:	
Postal/Zip Code:	Country:
Telephone No.:	Fax No.:
Email Address:	

Primary Contact	
Name:	
Position/Title:	
Company:	
Address:	
City/Town:	
Province/State:	
Postal/Zip Code:	Country:
Telephone No.:	Fax No.:
E-mail Address:	

PART 2 – PAYMENT OF $20,000 DEPOSIT TO THE IESO FOR SYSTEM IMPACT ASSESSMENT (SIA).

Method of Payment (choose one)

☐ Certified cheque payable to the IESO	☐ Attached
☐ Deposit to IESO Account	☐ Receipt Attached
☐ Electronic Wire Payment to IESO Account	☐ Receipt Attached

For direct deposit or electronic wire payments, reference the following IESO account:

TD Bank, Institution ID # 0004, Transit # 10202, Account # 0690-0429444

Purchase Order (PO) # (if applicable) (The PO # will be referenced on the final invoice and is not a replacement for the deposit)

PART 3 – PAYMENT TO HYDRO ONE

Payment to Hydro One along with the terms and conditions will be outlined in the Scope of the Study Agreement, which will be discussed with the Applicant upon receipt of the application form. Cost for the Customer Impact Assessment (CIA) will be based on the cost terms contained in the study agreement in accordance with Hydro One's OEB approved Connection Procedures.

PART 4 – CERTIFICATION

The undersigned hereby declares that the information contained in and submitted in support of this document is, to the best of the connection applicant's knowledge, complete and accurate. By signature the connection applicant agrees that information may be provided to the affected transmitter(s) and posted on the IESO Web site as stipulated in the applicable Market Manual pertaining to connection assessment and approval.

Name (Please Print) Title

Signature Date

Generic Information

Bold-Italic	Essential for Assessment
Bold	Essential for Hydro One - to be provided prior to Connection
Normal	Typical values will be assumed if data not provided
Normal	Only required upon request

Project Dates	***Start of Construction***	
	Electrical backfeed (energized stations)	
	Permanent in-service date:	
Protection System Description	***An overview of the protective relaying schemes to be employed together with an explanation of the manner in which they are to be deployed.*** ***A simplified tripping matrix as per schedule E, exhibit E-2 of the Transmission System Code (TSC), appendix 1 for load customers.***	Attach file
Detailed Single-Line Diagram(s)	***A detailed single-line diagram showing the equipment and the protection and telemetry points. The locations of the proposed connections on to existing lines, or into existing transformer/ switching stations, are also to be included.*** ***Details are to be included of any existing facilities that are to be replaced or removed from service. Out-of-service dates are to be provided whenever these do not coincide with the in-service dates for the new facilities.***	Attach file
Geographic Map including GPS Coordinates	***A large-scale map or drawing showing the location of the exact point of the proposed interconnection with Hydro One facilities (or other transmitters including lot number and concession number for the project).***	Attach file
Control Schemes	***Describe any control schemes that are to be used to automatically change the tap positions for any of the transformers, or to automatically switch into-service or out-of-service any reactive compensation devices.***	Attach file

All files and diagrams provided as attachments are to be signed and sealed by a Professional Engineer.

Load Facilities

Bold-Italic	Essential for Assessment
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Load Schedule		***Date***	***Peak Load (MW)***	***Power Factor (%)***	**Load Factor (%)**
	Existing load				
	Additional load				
	Ultimate load				
Nature of Load	Composition (e.g. % industrial, % commercial, % residential)				
	Requirement for dual supply			Enter text or attach file	
	Description of unusual sensitivity to voltage or frequency fluctuations			Enter text or attach file	
	Description of unusual consequences of power outages			Enter text or attach file	
Power Quality	Harmonics (frequency, magnitude)				
	Flicker (voltage change, frequency)				
	Phase Imbalance (%)				
	Variable Speed Drives	Demand (kVA)	Enter text or attach file		
	Welding Equipment	Demand (kVA)	Enter text or attach file		
	Static Converters	Demand (kVA)	Enter text or attach file		
	Furnace	Demand (kVA)	Enter text or attach file		
	Other discontinuous or harmonic rich load	Demand (kVA)	Enter text or attach file		
	Capacitors	Demand (kVA)	Enter text or attach file		
	Generators	Total Size (kVA)	Enter text or attach file		

Load Shape		November to April (Winter) Maximum Demand				May to October (Summer) Maximum Demand			
		Weekday		Weekend		Weekday		Weekend	
	Hours	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar
	0-4								
	4-8								
	8-12								
	12-16								
	16-20								
	20-24								

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Load Facilities (Continued)

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All Motors ≥500 HP Complete one table for each motor ≥500 HP	***Type (e.g. squirrel cage, wound rotor, synchronous)***	
	Rated capability (MVA)	
	Rated power factor	
	Starting method (e.g. full-voltage, resistive, reduced voltage, delta-wye)	
	Starts per day	
Induction Motors ≥25,000 HP Complete one table for each induction motor ≥25,000 HP Data may be requested for certain induction motors ≥500 HP	***Identifier***	
	Rated capability (MVA or HP)	
	Rated torque (per unit on machine base)	
	Rated slip (per unit on machine base)	
	Starting torque (per unit on machine base)	
	Starting current (per unit on machine base)	
	Starting power factor	
	Peak torque (per unit on machine base)	
	Locked rotor current (per unit on machine base)	
Synchronous Motors ≥ 500 HP Complete one table for each motor ≥500 HP	***Identifier***	
	Rated output (MVA or HP)	
	X''d (unsaturated subtransient reactance in per unit based on machine base)	
Synchronous Motors ≥5000 HP Complete one table for each synchronous motor ≥500 HP	***Identifier***	
	Rated capability (MVA or HP)	
	Rotational inertia constant H of motor and load(s)	

Unsaturated reactances in per unit based on machine base

Xd	***X'd***	***X''d***	***Xq***	***X'q***	***X''q***	***X_l***	***X_2***	***X_0***

Open circuit time constants (s)

T'do	***T''do***	***T'qo***	***T''qo***

Armature resistance (Ra) (per unit on machine base)

EXCITATION SYSTEM MODEL

A block diagram suitable for stability studies or an IEEE standard model type with all in-service parameter values for the exciter. Models for stabilizers, under-excitation limiters, and over-excitation limiters shall be provided where applicable. For each synchronous motor 10 MVA or larger.	Attach file

Connection (Transmission) Facilities

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If the connection from the load to the transmitter consists of different sections, then the applicant must complete a table for each overhead circuit section and for each underground circuit section.

Provide a detailed single line diagram of the load facilities.

Transmission connection	***Point of connection to IESO controlled grid:*** ***- circuit operating nomenclature or terminal station name***			
	- circuit section			
	- tower number			
	- GPS coordinates			
Overhead Circuit section Complete one table for each overhead circuit section	***Identifier (to be provided on drawing)***			
	Voltage (kV)			
	Length (km)			
	Phase conductor size (kcmil)			
	Phase conductor type (ASC, ACSR, ACSS, ACCR, etc.)[1]			
	Phase conductor stranding (# of Al strands, # of Steel strands)			
	Phase conductors per bundle, spacing if more than one (mm)			
	Geometry of all phase and skywires for each tower type (m)			
	Ground resistivity (ohms-meters)			
	Skywire size (kcmil)			
	Skywire type (Alumoweld, EHS, HS)[1]			
	Skywire stranding (# of Al strands, # of Steel strands)			
	Skywire number if more than one			
	Positive sequence impedance (R, X in ohms, B in mhos or if in per unit specify bases)			
	Zero sequence impedance (Ro, Xo in ohms, Bo in mhos or if in per unit specify bases)			
	Mutual Impedance (parallel circuit identifier, Rm, Xm in ohms or if in per unit specify bases)			
	Winter thermal : Continuous, Long-term, Short-term ***(see table below for rating assumptions***			
	Summer thermal ratings: Continuous, Long-term, Short-term ***(see table below for rating assumptions***			

Overhead Transmission Lines - Rating Assumptions for System Impact Assessment studies

Rating	**Conductor Temperature**	**Pre-load**	**Summer**	
			Ambient Temp	**Wind Speed**
Continuous	93°C (or sag temperature if lower)	N/A	**Summer** 35°C South of Barrie & 30°C North of Barrie **Winter** 10°C	0 to 4 km/hr 15 km/hr within 50 km of wind farm**
Long-Term Emergency **(Limited to 50 hr/year on all conductors)**	127°C (or sag temperature if lower)	N/A		
Short-Term Emergency **(15-minute limited-time rating)**	150°C (or sag temperature if lower) (Limited to 127°C for HAC* conductors])	Continuous Rating at 93°C		

1 If the conductor type is new then additional information may be required.

2 If the location of the project is north of the City of Barrie, then provide summer ratings based on 30°C and 4 km/h wind speed

Connection (Transmission) Facilities (cont)

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Underground Circuit Section Complete one table for each underground circuit section	***Identifier (to be provided on drawing)***				
	Voltage (kV)				
	Length (km)				
	BIL rating				
	Phase conductor size (kcmil)				
	Distance from the "from" terminal (km)				
	Maximum operating temperature (ºC)				
	Phase conductor type [1]				
	Insulation type				
	Semiconductor shield type				
	Shield grounding				
	Metallic sheath type				
	External layer type				
	Geometry of all phases				
	Ground resistivity (ohms-meters)				
	Cable construction				
	Installation type (e.g. direct buried, in duct, etc.)				
	Positive sequence impedance (R, X in ohms, B in mhos or if in per unit specify bases)				
	Zero sequence impedance (Ro, Xo in ohms, Bo in mhos or if in per unit specify bases)				
	Continuous, 15-Minute and 24-Hour thermal ratings (A)	***Winter***			
		Summer			
Main Buses Complete one table for each bus	Identifier (to be provided on drawing)				
	Station				
	Voltage (kV)				
	Summer continuous (A)				
	Winter continuous (A)				
	Maximum operating temperature (ºC)				
	Conductor size (kcmil)				
	Conductor type (ASC, ASCR, Al tube)				
Surge Arresters	Identifier				
	Station				
	Manufacturer				
	Serial number				
	Voltage rating (kV)				
	Type (e.g. ZnO, SiC)				
	Class (e.g. secondary, distribution, intermediate, station)				

1 If the conductor type is new then additional information may be required.

Connection (Transmission) Facilities (cont)

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Transformers Complete one table for each transformer	***Number and Identifier of identical units (e.g., 3 units - T1, T2, T3)***						
	Station						
	Serial Number (must be provided prior to Connection)						
	Manufacturer						
	Configuration (e.g. 3 phase or three single phase units)						
	Phase Location if single phase (e.g. R, W, B)						
	Cooling types (e.g. ONAN, ONAF, OFAF)						
	Associated Thermal Rating for each cooling type (MVA)						
	Winter (10ºC) continuous, 10-DAY and 15-MIN thermal ratings	(A)					
		(MVA)					
	Summer (35ºC) continuous, 10-DAY and 15-MIN thermal ratings[1]	(A)					
		(MVA)					
	Connection for each winding H, X, Y (e.g. wye, delta, zig-zag)						
	Rated voltage for each winding, e.g. HV, LV, tertiary (kV)						
	Rated capability for tertiary winding, if applicable (A, MVA)						
	Impedance to ground for each winding H, X, Y (ohms) (U – Ungrounded; R – Resistance; X – Reactance, e.g. 16 R)						
	Off–load taps (kV)						
	In-service off-load tap position (kV)						
	Under-load taps (max tap (kV), min tap (kV)), number of steps)						
Positive Sequence Impedance	(see IEEE C57.12.90 for measurement techniques)	***Positive Sequence Impedance (%)***	***HX***		***HY***		***XY***
		R					
		X					
		Base MVA					
Zero Sequence Impedance (only required for transformers with 1 or 2 external neutrals)	H winding energized all others open	Closed Tertiary	H		X	HX	XH
		R					
		X					
		Base MVA					
	H winding energized X winding shorted	Open Tertiary	H		X	HX	XH
		R					
		X					
		Base MVA					

1 If the location of the project is north of the City of Barrie, then provide summer ratings based on 30°C and 4 km/h wind speed

Connection (Transmission) Facilities (cont)

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Shunt Capacitors Complete one table for each type of shunt capacitor	***Identifier***	
	Station	
	Manufacturer	
	Serial number (must be provided prior to Connection)	
	Rated voltage (kV)	
	Rated capability (Mvar)	
	Discharge time (ms)	
	Current limiting reactor (mH or Ω)	
	Bank arrangement (e.g. delta, wye, double-wye, etc)	
	Surge capacitor (µF)	
	Description of automatic switching	Attach file
	Anticipated switching restrictions	Attach file
Shunt Reactors Complete one table for each type of shunt reactor	***Identifier***	
	Station	
	Manufacturer	
	Serial number (must be provided prior to Connection)	
	Rated voltage (kV)	
	Rated capability (Mvar)	
	Winding configuration (e.g. delta, wye)	
	Description of automatic switching	Attach file
	Description of anticipated switching restrictions	Attach file

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Connection Transmission Facilities (cont)

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Circuit Breakers Complete one table for each type of circuit breaker	***Identifier***	
	Station	
	Manufacturer	
	Serial number (must be provided prior to Connection)	
	Maximum continuous rated voltage (kV)	
	Interrupting time (ms)	
	Interrupting media (e.g. air, oil, SF_6)	
	Rated continuous current (A)	
	Rated symmetrical and asymmetrical short circuit capability (kA)	
Circuit Switchers Complete one table for each type of circuit switcher	***Identifier***	
	Station	
	Manufacturer	
	Serial number (must be provided prior to Connection)	
	Maximum continuous rated voltage (kV)	
	Interrupting time (ms)	
	Interrupting media (e.g. air, oil, SF_6)	
	BIL voltage (kV)	
	Rated continuous current (A)	
	Rated symmetrical short circuit capability (kA)	
Disconnect Switches Complete one table for each type of disconnect switch	***Identifier***	
	Station	
	Manufacturer	
	Serial number (must be provided prior to Connection)	
	Maximum continuous rated voltage (kV)	
	Continuous current rating (amps) (Non-Ground Switches only)	
	Rated symmetrical short circuit capability (kA)	
Wavetraps	Identifier	
	Station	
	Manufacturer	
	Serial number (must be provided prior to Connection)	
	Continuous current rating (amps)	
DC Lines	***Identifier***	
	Complete steady state (load flow) parameters and dynamic	
FACTS Devices (e.g., dynamic reactive devices, series compensation, etc.)	***Identifier***	
	Complete steady state (load flow) parameters and dynamic parameters	