# IESO logoSystem Impact Assessment Application (IESO)/

# Customer Impact Assessment Application (transmitter)

# for Load Facilities

Submit this form to the **Independent Electricity System Operator** and also to the applicable *transmitter*to inform about your new connection or modification to an existing connection:

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| **Independent Electricity System Operator**connection.assessments@ieso.caTo the extent possible, the documents and drawings should be submitted in .pdf format. Signed documents should be scanned in .pdf format or electronically signed by a method accepted by the IESO (if using electronic signature contact Connection Assessments to confirm the method is acceptable). Connection applicants intending to send documents in a different format are encouraged to contact Connection Assessments in advance.Hard copies of the application forms and supporting documents are not required. Where the supporting documentation is not suitable for email submission, contact Connection Assessments via email for instructions. | **Select the transmitter:**[ ]  **Hydro One Networks Inc.**LargeAccounts@HydroOne.com[ ]  **Hydro One Sault Ste. Marie LP**LargeAccounts@HydroOne.com[ ]  **Canadian Niagara Power Inc.**Engineering@fortisontario.com[ ]  **Five Nations Energy Inc.**tiserhoff@fivenations.ca[ ]  **Upper Canada Transmission, Inc.**jeff.damen@nexteraenergy.com[ ]  **Wataynikaneyap Power GP Inc.**WatayRegulatory@wataypower.ca[ ]  **Other Transmitter**Name (fill in):      Note: This is not an application form for a Connection Impact Assessment by a licensed electricity distributor. |

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

All information submitted in this process will be used by the Independent Electricity System Operator (IESO) and the *transmitter* 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 the *transmitter’s* confidentiality policies. The undersigned consents to the sharing of all such information between the IESO and the *transmitter*.

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 the *transmitter* to be able to undertake both Assessments. The data sheets also identify those data for which the IESO or the *transmitter* will use suitable typical values should the Applicant not provide them.

Whenever it is necessary for the IESO or the *transmitter* 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 should use this form for the assessment of spare equipment on site or on order from manufacturers to replace major components (e.g. main power transformers, reactive power control devices etc.) in case of failure.

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 IESO website. Contact the *transmitter* for their timelines to provide as-built data.

## Part 1 – General Information

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| Connection Applicant’s Organization Name:      |
| Distribution Customer Organization Name (if project is embedded in a licensed electricity distributor’s distribution system):       |
| Project Name[[1]](#footnote-1):       |
| Facility Name (if existing and connected directly to the IESO-controlled grid):       |
| Distributor’s Transformer Facility Name (if an embedded load is connecting to a licensed electricity distributor’s distribution system, i.e. TS, DS or MTS name):       |
| Address or GPS coordinates in decimal degrees of the Project (if a new or embedded facility):       |

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| **Authorized Representative (For existing market participants, this person must be registered in Online IESO. For non-market participants, this person must have the authority to bind the company.)** |
| Name:       |
| Position / Title:       |
| Company:       |
| Address:       |
| City/Town:       | Province/State:       |
| Postal/Zip Code:       | Country:       |
| Telephone No.:       |  |
| Email Address:       |

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| Project Contact (This person will be the contact to provide technical information for the project. This person may be a third party consultant.) |
| Name:       |
| Position/Title:       |
| Company:       |
| Address:       |
| City/Town:       | Province/State:       |
| Postal/Zip Code:       | Country:       |
| Telephone No.:       |  |
| E-mail Address:       |

## Part 2 – Required deposit of $20,000 to the IESO for System Impact Assessment (SIA).

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| The payment of the deposit must be submitted, if required, after the IESO accepts the application form and assigns a unique CAA ID. The notification email containing the CAA ID will contain further instructions on how to submit the deposit payment. |

## Part 3 – Payment to the transmitter

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| Payment to the *transmitter* along with the terms and conditions will be outlined in the Study Agreement, which will be discussed between the connection applicant and *transmitter* upon receipt of the application form. Contact your *transmitter* for details. |

## Part 4 – Certification

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| 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 website as stipulated in the applicable Market Manual pertaining to connection assessment and approval. |
| Name of Authorized Representative       |  | Title       |
| Signature |  | Date       |

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| Generic Information | *Bold-Italic* | Essential for Assessment |
| Bold | Essential for the transmitter - to be provided prior to Connection |
| Normal | Typical values will be assumed if data not provided |
| Normal | Only required upon request |

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| 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 the transmitter’s facilities (or other impacted 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.

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| 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) |       |       |
| Rapid Voltage Changes (% magnitude and frequency of occurrence) |       |       |
| Flicker Indicies (Pst, Plt) |       |       |
| 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 |       |       |       |       |       |       |       |       |

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

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| Load Facilities (Continued) | *Bold-Italic* | Essential for Assessment |
| Bold | Essential for the transmitter - to be provided prior to Connection |
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| Normal | Only required upon request |

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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 HPData 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 ≥5000 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*** | ***Xl*** | ***X2*** | ***X0*** |
|       |       |       |       |       |       |       |       |       |
| ***Open circuit time constants (s)*** |  |
| ***T’do*** | ***T’’do*** | ***T’qo*** | ***T’’qo*** |
|       |       |       |       |
| ***Armature resistance (Ra) (per unit on machine base)***  |       |

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| **EXCITATION SYSTEM MODEL**  |   |
| A list of parameters suitable for stability studies 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 |

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| Connection Facilities | *Bold-Italic* | Essential for Assessment |
| Bold | Essential for the transmitter - to be provided prior to Connection |
| Normal | Typical values will be assumed if not given |
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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)** |       |       |
| ***Base Voltage VB (Applicable to positive & zero sequences and mutual impedances) All values in per km*** |       |
| ***Base MVAB (Applicable to positive & zero sequences and mutual impedances) All values in per km*** |       |
| ***Winter thermal ratings: 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)*** |       |       |       |

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| **Overhead Transmission Lines - Rating Assumptions for System Impact Assessment studies** |
| **Rating** | **Conductor Temperature** | **Pre-load** |  |
| **Ambient Temp** | **Wind Speed** |
| **Continuous** | 93oC (or sag temperature if lower) | N/A | **Summer**35oC **Winter**10oC | 0 to 4 km/h |
| **Long-Term Emergency****(Limited to 50 h/year on all conductors)** | 127oC (or sag temperature if lower) | N/A |
| **Short-Term Emergency****(15-minute limited-time rating)** | 150oC (or sag temperature if lower) (Limited to 127oC for HAC\* conductors]) | Continuous Rating at 93oC |

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

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| Connection Facilities (cont) | *Bold-Italic* | Essential for Assessment |
| **Bold** | Essential for the transmitter - to be provided prior to Connection |
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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)*** |       |       |       |
| ***Base Voltage VB (Applicable to positive & zero sequences and mutual impedances) All values in per km*** |       |
| ***Base MVAB (Applicable to positive & zero sequences and mutual impedances) All values in per km*** |       |
| ***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 |       |
| Duty cycle 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.

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| Connection Facilities (cont) | *Bold-Italic* | Essential for Assessment |
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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*** | (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 energizedall others open | Closed Tertiary  | H | X | HX | XH |
| R |       |       |       |       |
| *X* |       |       |       |       |
| *Base MVA* |       |       |       |       |
| H winding energizedX winding shorted | Open Tertiary  | H | X | HX | XH |
| R |       |       |       |       |
| *X* |       |       |       |       |
| *Base MVA* |       |       |       |       |

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| Connection Facilities (cont) | *Bold-Italic* | Essential for Assessment |
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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 Facilities (cont) | *Bold-Italic* | Essential for Assessment |
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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)*** |       |
| ***Maximum 30 minute rated voltage (kV)*** |       |
| ***Interrupting time (ms)*** |       |
| ***Interrupting medium (e.g. air, oil, SF6)*** |       |
| ***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)*** |       |
| ***Maximum 30 minute rated voltage (kV)*** |       |
| ***Interrupting time (ms)*** |       |
| ***Interrupting medium (e.g. air, oil, SF6)*** |       |
| ***BIL voltage (kV)*** |       |
| ***Rated continuous current (A)*** |       |
| ***Rated symmetrical short circuit capability (kA)*** |       |
| **Disconnect Switches /Mid Span Openers**Complete one table for each disconnect switch/mid span opener with different technical specifications | ***Identifier*** |       |
| ***Station*** |       |
| Manufacturer |       |
| **Serial number** (must be provided prior to Connection) |       |
| ***Maximum continuous rated voltage (kV)*** |       |
| ***Maximum 30 minute rated voltage (kV)*** |       |
| ***Rated continuous current (A) (Non-Ground Switches only)*** |       |
| ***Rated symmetrical short circuit withstand 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 parameters*** |       |
| **FACTS Devices**(e.g., dynamic reactive devices, series compensation, etc.) | ***Identifier*** |       |
| ***Complete steady state (load flow) parameters and dynamic parameters*** |       |

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

1. If your project is a new facility to be connected to the IESO-controlled grid, the *transmitter* and IESO Market Registration (market.registration@ieso.ca) must approve the facility name prior to registration. [↑](#footnote-ref-1)