# *IESO Logo*System Impact Assessment Application

# *for Transmission* *Facilities*

Submit this form by email to connection.assessments@ieso.ca to inform about your new connection or modification to an existing connection.

To 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.

**Subject: *System Impact Assessment Application for Transmission Facilities***

All information submitted in this process will be used by the Independent Electricity System Operator (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 its licence. All information submitted will be treated in accordance with the IESO’s confidentiality policy.

Since complete 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 to be able to undertake the Assessment. The data sheets also identify those data for which the IESO will use appropriate values should the Applicant not provide suitable data.

Whenever it is necessary for the IESO 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.

## Part 1 – General Information

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| Connection Applicant’s Organization Name (Must be a licensed *transmitter* ):       |
| Project Name[[1]](#footnote-1):       |
| Facility Name (if existing):       |
| Address or GPS coordinates in decimal degrees of the Project (if a new 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 $40,000

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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 – 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 |
| Bold | Not used |
| Normal | Typical values will be assumed if data not provided |
| Normal | Only required upon request |

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| In-Service Dates | ***Initial in-service date (start of commissioning):*** |       |
| ***Permanent in-service date:*** |       |
| **Protection System Description** | ***A functional description of all protective schemes shall be provided to allow a detailed analysis of all credible contingencies.******These descriptions shall include, but are not limited to, the following:**** ***Operating times and settings for protection components***

***(e.g. primary relaying, auxiliary relaying, communication, synchrocheck relaying for automatic and manual reclosure),**** ***General models for normal and delayed (breaker failure) fault clearing, and***
* ***Exceptions to the general model (e.g. LEO, HIROP).***

***For all recognized contingencies, the functional description must enable fault clearing times at all terminals to be determined for both normal and delayed clearing.*** | 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 neighbouring Ontario transmitter’s facilities.***  | 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 switch into-service or out-of-service any capacitors or reactors.******If the Project is to include a generation rejection or load rejection scheme, these should also be described.*** | Attach file |

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| Connection Facilities (cont) | *Bold-Italic* | Essential |
| Bold | Not used |
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| If the connection 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 connection 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 sky wires for each tower type (m) |       |
| Ground resistivity (ohm-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 (A)******(see table below for rating assumptions)*** |       |       |       |
| ***Summer thermal ratings: Continuous, Long-term, Short-term (A)******(see table below for rating assumptions)*** |       |       |       |
| **Overhead Transmission Lines - Rating Assumptions for System Impact Assessment studies** |
| **Rating** | **Conductor Temperature** | **Pre-load** | **Ambient Temp** | **Wind Speed** |
| **Continuous** | 93°C (or sag temperature if lower) | N/A | **Summer**35°C **Winter**10°C | 0 to 4 km/h |
| **Long-Term Emergency****(Limited to 50 h/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 High Aluminum Content (HAC) conductors) | Continuous Rating at 93°C |

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

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| Connection Facilities (cont) | *Bold-Italic* | Essential |
| Bold | Not used |
| Normal | Typical values will be assumed if data not provided |
| Normal | Only required upon request |

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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 |       |
| 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 |
| Bold | Not used |
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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 unit 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 (10°C) continuous, 10-DAY and 15-MIN thermal ratings | (A) |       |       |       |
| (MVA) |       |       |       |
| ***Summer (35°C) 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 |
| Bold | Not used |
| Normal | Typical values will be assumed if data not provided |
| Normal | Only required upon request |

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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 |
| Bold | Not used |
| Normal | Typical values will be assumed if data not provided |
| Normal | Only required upon request |

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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(typically used for taps only – asymmetrical may not be necessary) | ***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)*** |       |       |
| **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 capability (kA)*** |       |
| **Wavetraps** | Identifier |       |
| Station |       |
| Manufacturer |       |
| Serial number (must be provided prior to Connection) |       |
| Continuous current rating (amps) |       |
| **DC Lines** | ***Identifier*** |       |
| ***Complete steady state (loadflow) parameters and dynamic parameters*** |       |
| **FACTS Devices**(e.g., dynamic reactive devices, series compensation, etc.) | ***Identifier*** |       |
| ***Complete steady state (loadflow) 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, IESO Market Registration (market.registration@ieso.ca) must approve the facility name prior to registration. [↑](#footnote-ref-1)