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| IESO Logo | Technical Feasibility Study ApplicationLoad Facilities |

Submit this form by email to 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 IESO 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 the following address:

**Independent Electricity System Operator**
2635 Lakeshore Rd. West
Mississauga, ON

L5J 4R9

**Attn: Connection Assessments**

**Subject: *Technical* *Feasibility Study Application – Load Facilities***

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 its licence. All information submitted will be assigned the appropriate confidentiality level upon receipt.

*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.*

## Part 1 – General Information

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

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

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| **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

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| 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** |

## 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. The undersigned also declares that the subject project is not being developed in response to an IESO procurement as stipulated in the applicable Market Manual pertaining to connection assessment and approval. |
| Name (Please Print)       |  | Title      |
| Signature      |  | Date      |

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| Generic Information | *Bold-Italic* | Essential |
|  | Typical values will be assumed if data not provided |
|  | 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** | ***An overview of the protective relaying schemes to be employed together with an explanation of the manner in which they are to be deployed.*** | Attach file |
| *(This information is to be provided if requested by the IESO)* | 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 for protection components

(e.g. primary relaying, auxiliary relaying, communication),* 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 |
| **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.******If the Project is to include a load rejection or generation rejection scheme, this should also be described.*** | Attach file |

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| Load Facilities | *Bold-Italic* | Essential |
|  | Typical values will be assumed if data not provided |
|  | Only required upon request |

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| **Load Schedule** |  | ***Date*** | ***Peak Load*** | ***Power Factor*** | **Load Factor** |
| Commissioning  |       | MW |       | % |       | % |       |
| ***Initial***  |       | ***MW*** |       | ***%*** |       | % |       |
| ***Ultimate***  |       | ***MW*** |       | ***%*** |       | % |       |
| **Nature of Load** | Composition (e.g. % industrial, % commercial, % residential) |       |       |       |
| ***Requirement for dual supply*** |       |
| ***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(upon request)** | Harmonics (frequency, magnitude) |       |       |
| Flicker (voltage change, frequency) |       |       |
| Phase Imbalance (%) |       |
| Variable Speed Drives | Demand (kVA) |       | Description       |
| Enter text or attach file |
| Welding Equipment | Demand (kVA)  |       | Description       |
| Enter text or attach file |
| Static Converters | Demand (kVA)  |       | Description       |
| Enter text or attach file |
| Furnace | Demand (kVA) |       | Description       |
| Enter text or attach file |
| Other discontinuous or harmonic rich load | Demand (kVA) |       | Description       |
| Enter text or attach file |
| Capacitors | Demand (kVA) |       | Description       |
| Enter text or attach file |
| Generators | Total Size (kVA) |       | Description       |
| 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 |       |       |       |       |       |       |       |       |
| **Motors ≥ 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 |       |

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| Load Facilities (Continued) | *Bold-Italic* | Essential |
|  | Typical values will be assumed if data not provided |
|  | Only required upon request |

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| **Induction Motors ≥ 25,000 HP or≥ 500 HP per request** | ***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** | ***Identifier*** |       |
| ***Rated output (MVA or HP)*** |       |
| ***X’’d (unsaturated subtransient reactance in per unit on machine base)*** |       |
| ***For each synchronous motor rated ≥ 5000 HP***  |       |
| ***Rotational inertia constant H of motor and load(s)*** |       |
| ***Unsaturated reactances (per unit on machine base)***  |       |
| ***Xd*** | ***X’d*** | ***X’’d*** | ***Xq*** | ***X’q*** | ***X’’q*** | ***Xl*** | ***X2*** | ***Xo*** |
|       |       |       |       |       |       |       |       |       |
| ***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 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 diagram |

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

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| **Overhead Circuits****(For each section)** | ***Identifier*** |       |
| ***Terminal station(s)*** |       |       |       |
| ***Voltage (kV)*** |       |
| ***Length (km)*** |       |
| ***Identifier(s) and length of circuit(s) on common towers*** |       |       |
| ***Positive sequence impedance (R, X, B)*** |       |       |       |
| ***Zero sequence impedance (Ro, Xo, Bo)*** |       |       |       |
| Winter (10ºC) continuous and 15 minute thermal ratings (A) |       |       |
| ***Summer (30ºC) continuous and 15 minute thermal ratings (A)*** |       |       |
| **Overhead Circuits****(For each segment)** | ***Identifier*** |       |
| ***Length (km)*** |       |
| ***Distance from the “from” terminal (km)*** |       |
| ***Maximum operating temperature ( ºC)*** |       |
| ***Phase conductor size (kcmil)*** |       |
| ***Phase conductor type (ASC,ACSR)\**** |       |
| ***Phase conductor stranding (# of Al strands/ # of Steel strands)*** |       |       |
| ***Phase conductors per bundle and spacing (m)*** |       |       |
| Geometry of all phase and sky wires for each tower type |       |
| Ground resistivity (ohms) |       |
| Skywire size (kcmil) |       |
| Skywire type (Alumoweld, EHS, HS)\* |       |
| Skywire stranding (# of Al strands/ # of Steel strands) |       |       |
| Skywire number if more than one |       |
| Identifier and length of circuits sharing the same right of way |       |       |
| Mutual impedance to other circuits (Zzero) |       |       |
| **Underground Circuits** | ***Identifier*** |       |
| ***Complete steady state and dynamic electrical and physical parameters******of conductors, insulators and surrounding material*** |       |
|       |
| **Buses** | Identifier |       |
| Station |       |
| 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) |       |

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

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| **Transformers**  | ***Identifier*** |       |
| ***Station*** |       |
| Manufacturer |       |
| Serial Number  |       |
| Construction (e.g. shell or core)  |       |
| Configuration (e.g. 3 phase or three single phase) |       |
| Temperature rise (ºC) |       |
| Cooling types ( e.g. ONAN, ONAF, OFAF) |       |       |       |
| ***Associated Thermal Rating for each cooling type (MVA)*** |       |       |       |
| Winter (10ºC) continuous, 15 minute and 10 day thermal ratings (A) |       |       |       |
| ***Summer (30ºC) continuous ,15 minute, and 10 day thermal ratings (A)*** |       |       |       |
| ***Connection for each winding H, X, Y (e.g. wye, delta, zig-zag)*** |       |       |       |
| ***Rated voltage for each winding (kV)*** |       |       |       |
| ***Rated capability for each winding (MVA)*** |       |       |       |
| Impedance to ground for each winding H, X, Y (ohms)Indicate: U – ungrounded or R – Resistance; X – Reactance (e.g. 16 R) |       |       |       |
| **Positive Sequence Impedance** | (see IEEE C57.12.90 for measurement techniques) | Positive Sequence Impedance (%) | HX | HY | XY |
| R |       |       |       |
| ***X*** |       |       |       |
| ***Base MVA*** |       |       |       |
| **Zero Sequence Impedance****(data is required for transformers with1 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*** |       |       |       |       |
| In-service off-load tap (kV) |  |
| ***Off –load taps (kV)*** |       |       |       |       |       |
| ***On-load taps (kV) (max tap, min tap, number of steps)*** |       |       |       |
| Core and Excitation Losses (kW, kVAr) |       |       |

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

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| **Shunt Capacitors** | ***Identifier*** |       |
| ***Station*** |       |
| Manufacturer |       |
| Serial Number |       |
| ***Rated voltage (kV)*** |       |
| ***Rated capability (MVAr)*** |       |
| Discharge time (ms) |       |
| Current limiting reactor (ohms) |       |
| Synchronous closing unit |       |
| Bank arrangement (e.g. delta, wye, double-wye, etc) |       |
| Description of protection | Attach file |
| Description of automatic switching | Attach file |
| ***Anticipated switching restrictions*** | Attach file |
| **Circuit Breakers**  | ***Identifier*** |       |
| ***Station*** |       |
| Manufacturer |       |
| Serial Number |       |
| ***Rated voltage (kV)*** |       |
| ***Interrupting time (ms)*** |       |
| Interrupting media (e.g. air, oil, SF6) |       |
| ***Rated continuous current (A)*** |       |
| ***Rated symmetrical short circuit capability (A)*** |       |
| **Shunt Reactors** | ***Identifier*** |       |
| ***Station*** |       |
| Manufacturer |       |
| Serial Number |       |
| ***Rated voltage (kV)*** |       |
| ***Rated capability (Mvar)*** |       |
| Winding configuration (e.g. delta, wye) |       |
| Description of protection | Attach file |
| Description of automatic switching | Attach file |
| ***Description of anticipated switching restrictions*** | Attach file |

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

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| **Switches** | Identifier |       |
| Station |       |
| Manufacturer |       |
| Serial number |       |
| Voltage rating (kV) |       |
| Type (e.g. disconnect, interrupt) |       |
| Continuous current rating (amps) |       |
| **Wavetraps** | Identifier |       |
| Station |       |
| Manufacturer |       |
| Serial number |       |
| Continuous current rating (amps) |       |
| **Current****Transformers** | Identifier |       |
| Station |       |
| Manufacturer |       |
| Serial number |       |
| Continuous current rating (amps) |       |
| **DC Lines** | ***Identifier*** |       |
| ***Complete steady state (loadflow) parameters and dynamic parameters*** |       |
| **FACTS Devices** | ***Identifier*** |       |
| ***Complete steady state (loadflow) parameters and dynamic parameters*** |       |

\*If the conductor type is new then additional information may be requested.