

Instructions for Connection Impact Assessment Application (CIA) For connection to the LDC distribution grid

Distributed Energy Resources (DERs) with a project size greater than 10 kilowatts (kW) are required to complete a Connection Impact Assessment (CIA) Application, or simply reference to it when requesting a Transmission Connection Impact Assessment (TCIA) or a Distribution Connection Impact Assessment (DCIA).

Once completed, the CIA Application must be approved by LDC prior to connecting to the LDC distribution grid. As per the Conditions of Service, the CIA Application will also become part of the required servicing (electrical installation, maintenance and operating) agreements.

Through this process, LDC will be the applicant's contact with the provincial transmission system provider (e.g. Hydro One Networks Inc. (HONI)) and, if necessary, the provincial market operator, the Independent Electricity System Operator (IESO).

Please refer to LDC's standards listed below (see "Quick Reference" section) and LDC 's Conditions of Service located at www.LDC.com .

How to Submit The CIA Application

The CIA Application must be completed accurately and in its entirety before it is submitted to the LDC for consideration. Any missing or inaccurate information will result in a delay and return of the incomplete form to the contact person identified on the CIA Application. Completed forms can be submitted by mail or email.

LDC

Attn: **ADDRESS**

Electronic submissions can be sent to CIA@LDC.com if they meet the following criteria:

1. The documents submitted for review and approval must be in non-editable PDF format;
2. The scanned resolution of the CIA Application and the attachments in PDF must be at least 300x300 dpi resolution, with the exception of the Single Line Diagram (SLD), which must be at least 600x600 dpi;
3. The engineering signature, seal and number must not be electronically placed and must be clearly legible;
4. The originals must be retained for a period of at least the life of the DER System, or the life of the contract period, whichever is longer; and are made available to LDC within one week upon request.

Instructions

These instructions are provided to help you complete the CIA Application. It is vital that you read and understand the instructions before completing the form. If you have any questions, please email CIA@LDC.com or call **999-999-9999 ext. 9999**.

For technical requirements associated with your connection, refer to the LDC standards referenced below and at www.LDC.com.

Quick Reference

- **XXX**
- **XXX**

Payment

Payment is required prior to LDC starting the Connection Impact Assessment (CIA); however, in the meantime, we may review the electronically submitted application for completeness. Send a certified cheque, bank draft or money order payable to LDC and reference this application. Payment can be dropped off or mailed to the address noted in the next section. **The applicant will receive an estimate for any additional costs, such as for HONI's Connection Impact Assessment, and any additional work that is required.**

Note: Applicants are advised NOT to incur any expenses associated with the proposed project until LDC provides written approval by means of an "Offer-to-Connect" and has jointly signed the Connection Cost Recovery Agreement (CCRA).

Acronyms and Terms

CIA: Connection Impact Assessment. Note: There is a **transmission system CIA (TSCIA)** or distribution system CIA (DCIA).

CoS: Conditions of Service for LDC (see "Quick Reference")

DER: Distributed Energy Resource

HONI: Hydro One Networks Inc.

PCC: **Point of Common Coupling** is also referred to as the "Supply Point," or "Point of Supply." This is the point where any affect by the generation begins to influence the electrical service of others on the grid. **Note:** this most likely is not the point where the DER connects to the load system.

SLD: Single Line Diagram (electrical)

Note: The CIA Application and any accompanying technical pages must be signed, sealed and numbered by a Professional Engineer licensed in the province of Ontario.

Cover page

Indicate the project name and address in the upper right corner of the form.

Application (Re)Submission Date

Enter the date in the international date standard to avoid confusion (e.g. YYYY/MM/DD).

Application Type

If this submission is the first application for the proposed project, select "New CIA Application."

If this submission is to follow-up on a previously submitted Form B, select "CIA Revision / Rework."

If this submission is to add more generation to an existing generation agreement, select "CIA for Incremental Generation."

1. Original CIA Project ID Number

Enter the CIA Project ID number if provided by the LDC. The "Proponent Name" is the name of the payee for the energy sold to the grid and may be the same as the generation facility owner or the premise owner.

2. Project intend

There are three generation contract types. Select the one that applies to the project and add the contract number, if applicable.

3. IESO Reference Number and Date

Please provide the application reference number the IESO provided following your application for the Power Purchase Agreement or other. Please also include the application date.

4. Proposed In-Service Date

Indicate the date you expect the project to be energized. This date is only used as a reference and has no influence on the process timeline.

5. DER Facility Capacity Rating

- The "Total rating" is the nameplate rating of all the DERs connected to the same PCC. In the case of inverter based generation, the nameplate will be the lesser of the inverter based rating or the generating source connected to the inverter. For example, a 100 kW solar array supplying a 150kW inverter would have a generation facility rating of 100 kW; similarly, a 150kW solar array supplying a 100 kW inverter would have a generation facility rating of 100 kW. If there is no existing generation, enter "0" in the field "a) i."
- For "DER connecting on," note the LDC's standards: a single-phase inverter can connect onto a single phase system; however, a three-phase inverter must be used on a three-phase system.

6. Project Location

Indicate the municipal address and other information. Global Positioning System (GPS) co-ordinates shall be provided in the format NAO 83, Modified Transverse Mercator, Zone 9 and three degree standard in the notation of either X, Y; degrees: minutes : seconds (i.e. 45:26:45.25 -75:20:88.1); or decimal format (i.e. 45.35415375.9845542).

7. Project Information

Please fill out all the contact information for the DER owner, host customer and consultant. Select one as the single point of contact. The contact you select will receive the final CIA by the preferred method of contact indicated on the form. **Note:** The "host customer" is the property owner who granted permission for this project on their property.

8. DER Type

Complete the checkbox.

9. Resource Technology

Complete the checkbox.

10. Customer Information

- Host Customer account information

If the generation facility will be connecting to an existing **LDC** PCC, please provide the associated account detail. If more than one **LDC** account exists, provide the details for the relevant premise owner's account (typically the common element account prefixed by "PL #"). This is not the account that **LDC** will use to compensate for energy sold to the grid.

- Generator HST registration number

Enter the harmonized sales tax number registered with the Canada Revenue Agency that will be used when settling the new generation account (if applicable).

11. Location and Site Plan

Provide a site plan for the generating facility and host premise that identifies roads, concession property line, easements and lot numbers. Identify the PCC location and the location of all proposed generator power lines on public (if applicable) and private property. The supporting documentation must be signed and sealed by a Professional Engineer licensed in the province of Ontario. A separate distribution operating plan showing the location of nearby power lines was provided by **LDC** during the initial consultation period. This information must be included with **Appendix A** and thus does not need to be signed and sealed by an engineer.

12. Connection to LDC's Distribution System

The information entered in the table must be included in the SLD. The detail information on the cabling/conductor for the alternating current (AC) segment of the generation system (i.e. from the ownership demarcation point - per LDC's Conditions of Service; may or may not be the same as the PCC - to the inverter) should include: cable/conductor type, size, length in meters, impedances per meter; as well as any existing parallel runs. If there are more runs than described, add them in a separate document. Please refer to the demarcation point definition in LDC's Conditions of Service.

13. Single Line Diagram (SLD)

Provide a SLD of the generating facility including the PCC to LDC's distribution system. Requirements for the SLD are described in this document (refer to the SLD Example). The diagram must be signed and sealed by a Professional Engineer licensed in the province of Ontario.

14. Protection Scheme, Tripping Matrix and Equipment Setting

Equipment specification sheets must be submitted with the application yet do not require a signature and seal by a Professional Engineer. However, a document stating the protection scheme for detecting and clearing the listed situations and the equipment settings that will support the stated scheme must also be included with signature and seal by a Professional Engineer licensed in the province of Ontario. Please also include a tripping matrix or similar information in the document. The situations to detect and clear are:

- Internal faults within the generator facility;
- External phase and ground faults in LDC's distribution system;
- Certain abnormal system conditions such as over/under voltage, over/under frequency, open phase(s);
- Islanding; and
- Backflow towards the DER.

Note: The DER owner is responsible for installing utility grade relays for the interface protection. The engineered protection design shall incorporate facilities for testing and calibrating the relays by secondary injection. The supporting documentation shall be signed and sealed by a Professional Engineer licensed in the province of Ontario.

In addition, if the premise is serviced such that it can be supplied by a different feeder, an interlock is needed to prevent the operation of the generator on the alternate feeder. The CIA is provided for connection to the normal supply feeder only.

15. Characteristics of Existing Generators and

16. Characteristics of New Generators

Please provide the number of generating units. For example, enter

the number of individual photovoltaic panels, or individual rotating generation units. Information on inverters and transformers is requested later in the form.

Enter the rated alternating current (AC) frequency for the unit model to be used as specified in the equipment sheet; if direct current (DC), enter DC. For generator phases, in the case where many units exist, select "single phase" if all units are connected to one concentration point as a single phase system connected to an inverter; or select "three phase" if the many units are grouped into three different concentration points and each point makes a phase for an inverter.

For rotating generators, enter the type and limits of reactive power (kVAR and power factor (PF)), inrush current and the specific information needed based on the generator type in the specified unit. If the generator is not a rotating machine, then select "not applicable."

When an inverter is installed, indicate the manufacturer, model number and quantity of each. Details are needed for each unique unit along with the specifications sheets. Note the LDC standards (see "Quick Reference") governing the number of phases expected based on the service entrance. If there is protection against power flowing from the Source Disconnect switch towards the inverter, enter the information on the method or device used in the "Input protection" block.

If there is more than one type of generator or inverter, please complete additional forms as needed. Kindly number each sheet.

17. Interface Step-Up Transformer Characteristics

For the interface transformer, enter the information only if the transformer is customer owned and follow the completion instructions under 'Intermediate Transformer Characteristics.' If LDC owns the transformer, the information will be provided during the initial consultation and should appear in Appendix A so it will not need an engineer's signature or seal.

The interface transformer is the servicing transformer that changes the voltage from the distribution system to the premise distribution voltage (service entrance voltage).

18. Intermediate Transformer Characteristics

The intermediate transformer is used to change the inverter output voltage to the premise distribution voltage. Identified in LDC's standards (see "Quick Reference") are additional requirements when an intermediate transformer is used, such as loss-of-phase protection. Include the product specification sheet and settings (signed and sealed by a Professional Engineer licensed in the province of Ontario) for the extra devices needed.

For winding connection, specify either star (wye) or delta. For grounding method, specify ungrounded, solid or impedance grounded. If impedance grounded, provide the R and X ohmic values.

Note: The term "high voltage" refers to the connection voltage to LDC's distribution system and "low voltage" refers to the generation or any other intermediate voltage.

"Nomenclature" is the identification label given the transformer. Typically the operating diagram reflects the transformer and the associated nomenclature.

19. Load Information

This information is needed only if a new energy account is needed or if the existing energy account will reflect a change in load profile because of premise renovation or expansion, for example. If no load change is anticipated, indicate "not applicable" or "unknown," in which case the CIA will be completed based on the past customer load profile at the PCC.

20. Attached Documents

List all documents that will be submitted for evaluation including the file/document reference number and number of pages.

Attachments may include yet, be not limited to:

- All specifications for electrical equipment used (i.e. solar panels, windmills, inverters, rotating generators, etc.);
- Protection scheme;
- Tripping matrix and equipment setting (signed and sealed by a Professional Engineer licensed in the province of Ontario). if applicable;
- Loss of phase protection product sheet (settings to be included in the Protection scheme, tripping matrix and equipment setting document); and
- Rights of Access document for the CIA. This can be a memorandum of understanding (MOU) with the host customer similar to a Common Element agreement (signed by all participating parties i.e. the host customer and generator owner).

21. Attached Drawings

List all the drawings that will be submitted for evaluation including the file/document reference number and number of pages.

Drawings may include but are not limited to:

- Location and site plan (signed and sealed by a Professional Engineer licensed in the province of Ontario); and
- An SLD signed and sealed by a Professional Engineer licensed in the province of Ontario.

Note: Ensure that the documents and drawing number and revision date is reflected in the file name and matches what is noted elsewhere in CIA Application.

Single Line Diagram Example

The Single Line Diagram (SLD) must contain the information requested and shown in the SLD example below or the CIA Application may be deemed incomplete. A more indicative connection estimate, the next step after the CIA is completed, is predicated on the completeness and accuracy of the SLD. Also, a LDC approved construction and 'as-built' SLD is needed before LDC connects the generation facility to the distribution grid.

The following example includes the minimum requirements required for the application.

