

Form B - Part A

**Request for a Connection Impact Assessment
Review/Update To Connect Embedded Generation to
Niagara Peninsula Energy's Electrical Distribution
System**

Please highlight in yellow any information below that has changed since previously providing the information.

Section 1: General Connection Information

Note: ALL of the information in "Section 1: General Connection Information" must be completed in full. Failure to provide complete information may delay the processing of the data.

All technical documents must be signed and sealed by a licensed Ontario Professional Engineer.

Date: _____ (dd / mm / yyyy)

1. Proposed In-Service Date: _____

2. Project Name: _____

3. Project Dates: Proposed Start of Construction: _____ (dd/mm/yyyy)
Proposed In-Service: _____ (dd/mm/yyyy)

4. Project Size: Number of Units _____
Nameplate Rating of Each Unit _____ kW
Number of Phases (1 or 3) _____
Proposed Total Capacity _____ kW

5. Project Location: Address: _____

6. Niagara Peninsula Energy Account Number (if applicable): _____

7. Program Type: Load Displacement Net Metering
 Other: _____

8. Project Information:

Project Developer:

Company/Person:	
Contact Person:	
Mailing Address:	
Telephone:	
Fax:	
Email	

Project Owner (if not same as Project Developer):

Company/Person:	
Contact Person:	
Mailing Address:	
Telephone:	
Fax:	
Email	

Engineering Consultant (Electrical)

Company/Person:	
Contact Person:	
Mailing Address:	
Telephone:	
Fax:	
Email	

- 10. Project Type:** Wind Turbine Hydraulic Turbine Steam Turbine Solar
 Diesel Engine Gas Turbine Fuel Cell Biomass
 Co-generation/CHP (Combined Heat & Power)
 Other (Please Specify) _____

10. Location and Site Plan

Provide Site Plan with approximate line routings for connection to nearby Niagara Peninsula Energy facilities. The Site Plan should include roads, concession and lot numbers and nearby power lines.

Drawing / Sketch No. _____, Rev. _____

11. Proposed connection voltage to Niagara Peninsula Energy's distribution system (if known) :
_____ kV

Section 2: Connection Impact Assessment Information

Note:

- (a) It is important that the Generator provide ALL the information requested below, if applicable. All information is required to complete the first step of the process to move to the new Queue structure. Indicate "Not Applicable" where appropriate.
- (b) In certain circumstances, Niagara Peninsula Energy may require additional information to conduct the Connection Impact Assessment. Should this be the case the Generator will be duly advised.

Provide detailed and updated SLD of the EG facility including the interface point to the Niagara Peninsula Energy distribution system. This drawing shall include as a minimum:

- Electrical equipment at EG's facilities, their principal ratings, impedances, winding configurations, neutral grounding methods etc.
- Protective relaying, synchronizing and revenue metering arrangements. The device numbers should be in accordance with those adopted in the ANSI / IEEE Standard C37.2 – 1979: IEEE Standard Electrical Power System Device Function Numbers.

The SLD shall include the following, as applicable:

- Disconnecting device at the interface (connection) point with the Niagara Peninsula Energy distribution system
 - Load break switches
 - Fuses
 - Circuit breakers
 - Interface step-up transformer
 - Intermediate transformer(s)
 - CTs and VTs (quantity, location, connection, ratio)
 - Generators (rotating / static)
 - Power factor correction capacitors and their switching arrangements (particularly for induction units)
 - Motors
 - Power cables
 - Surge arresters
 - Any other relevant electrical equipment.
- SLD Drawing Number: _____, Rev. _____
 - Attached
 - Mailed Separately

1. Generator Facility Fault Contributions for Faults at the Interface Point/PCC

All values to be at the nominal connection voltage to Niagara Peninsula Energy's distribution system, i.e. the high voltage side of the Facility interface (step-up) transformer.

Maximum Symmetrical (all generators online)

- Three phase fault _____ kA
- Phase-to-phase fault _____ kA
- Single Phase to ground fault _____ kA

2. Generator Characteristics:

- a. Number of generating unit(s): _____
- b. Manufacturer / Type or Model No. _____ / _____
- c. Rated capacity of each unit _____

Gross _____ kW _____ kVA
 Net _____ kW _____ kVA

If unit outputs are different, please fill in additional sheets to provide the information.

d. Type of generating unit:

- Synchronous Induction Static Power Converters (SPC)
 Other, please specify _____

e. Rated frequency _____ Hz

f. Number of phases one three

g. **For Synchronous Units:**

- i) Generation voltage _____ kV
 ii) Rated current _____ A
 iii) Rated power factor of generating unit (s) _____ p.u
 iv) Type and characteristics of exciter _____

- v) Minimum power limit for stable operation _____ kW
 vi) Unsaturated reactances on: _____ kVA base _____ kV base
 Direct axis synchronous reactance, Xd _____ pu
 Direct axis transient reactance, Xd' _____ pu
 Direct axis subtransient reactance, Xd'' _____ pu
 Negative sequence reactance, X2 _____ pu
 Zero sequence reactance, X0 _____ pu

- vii) Limits of range of reactive power
 Lagging (over-excited) _____ kVAR
 Leading (under-excited) _____ kVAR

- viii) Provide a plot of generator capability curve (MW output vs MVAR)
 Document Number: _____, Rev. _____

h. **For Induction Units:**

- i) Generation voltage _____ kV
 ii) Rated design power factor _____ p.u
 iii) Rated speed _____ RPM
 iv) Slip regulation interval _____ %
 v) Rated slip _____ %
 vi) Actual power factor at delivery point (after p.f. correction):
 - Full output _____ p.u.
 - No output _____ p.u.
 vii) Generator reactive power requirements:
 - Full output _____ kVAR
 - No output _____ kVAR
 viii) Total power factor correction installed _____ kVAR
 - Number of regulating steps _____
 - Power factor correction switched per step _____ kVAR
 - Power factor correction capacitors are automatically
 switched off when generator breaker opens Yes No
 ix) Starting inrush current limited to _____ p.u.
 (multiple of full load current)
 x) Locked rotor current (at rated voltage) _____ p.u.
 xi) Fault current vs time curves (for various types of faults near the generator) _____ Dwg No

i. **For SPC / Inverter type units:**

- i) Terminal voltage _____ V
 - ii) Line - interactive type (i.e. intended for parallel operation with electric utility) Yes No
 - iii) Power factor _____
 - iv) Battery backup provided Yes No
 - v) Maximum fault current for terminal faults _____ A
 - vi) Standards according to which built _____
 - vii) Provide Manufacturer's technical brochure and specification sheet _____ Doc. No _____
- j. Niagara Peninsula Energy uses distribution modeling software from Dromey Design DESS v 6.1.4. Describe how your equipment should be modeled for load flow, voltage study and short circuit analysis.
- _____
- _____
- _____

3. Interface Step-Up Transformer Characteristics:

- a. Transformer rating _____ kVA
- b. Manufacturer _____
- c. Nominal voltage of high voltage winding _____ kV
- d. Lightning impulse level of high voltage winding, full wave _____ kV
- e. Nominal voltage of low voltage winding _____ kV
- f. Number of phases _____
- g. Construction (core or shell) _____
- h. Number of legs _____
- i. Impedances on: _____ kVA base _____ kV base
R: _____ p.u. X: _____ p.u.
- j. High voltage winding connection delta star
Grounding method of star connected high voltage winding neutral
 Solid Ungrounded
Impedance: R _____ X _____ ohms
- k. Low voltage winding connection delta star
Grounding method of star connected low voltage winding neutral
 Solid Ungrounded Impedance: R _____ X _____ ohms
- l. Tapping range, location and type of tap changer _____
- m. Expected tap settings HV _____ kV, LV _____ kV

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.

4. Intermediate Transformer Characteristics (if applicable):

- a. Transformer rating _____ kVA
- b. Manufacturer _____
- c. Nominal voltage of high voltage winding _____ kV
- d. Nominal voltage of low voltage winding _____ kV
- e. High voltage winding connection delta star
Grounding method of star connected high voltage winding neutral
 Solid Ungrounded Impedance: R _____ X _____ ohms
- f. Low voltage winding connection delta star
Grounding method of star connected low voltage winding neutral

- Solid Ungrounded Impedance: R _____ X _____ ohms
g. Impedances on _____ kVA base _____ kV base
 R: _____ p.u. X: _____ p.u.
h. Tapping range, location and type of tap changer _____
i. Expected tap settings HV _____ kV, LV _____ kV

Note: The term 'High Voltage' refers to the intermediate voltage that is input to the interface step-up transformer, and 'Low Voltage' refers to the generation voltage.

Note:

(a) The term "High Voltage", used above, refers to the intermediate voltage that is input to the interface step-up transformer, and "Low Voltage", used above, refers to the generation voltage.

4. Generating Facility Load Information

- a. Maximum continuous load:
- Total: _____ kVA _____ kW
 - Generator Auxiliary Load Only: _____ kVA _____ kW
- b. Maximum start up load: _____ kVA _____ kW
- a. Largest motor size that would be started: _____ HP _____ kW
- b. Maximum inrush current of the motor (multiple of full-load current): _____ p.u.
- c. For load displacement generators:
- Max. present load at Generator's facility: _____ kVA _____ kW
 - Max. future load at Generator's facility (excluding Auxiliary Loads):
_____ kVA _____ kW
 - Indicate the means by which injection of power into Niagara Peninsula Energy's system will be prevented. _____

5. Operation Information:

- Annual Capacity Factor: _____ %
- Prospective number of annual scheduled starts / stops, and timing: _____

6. Expected Monthly Generation, Consumption and Output From the Facility:

Expected:	Total Generation (a)		Total Internal Consumption (b)		Total Output (To Niagara Peninsula Energy' Distribution System) (a-b)*	
	kWh	Peak kW	kWh	Peak kW	kWh	Peak kW
January						
February						
March						
April						
May						
June						
July						
August						
September						
October						
November						
December						

* This value would be negative when the generators are not in operation or when the internal consumption exceeds generation.

7. Protection Design, Philosophy and Logic

- Provide a document describing the protection philosophy for detecting and clearing:
- Internal faults within the EG 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

Document Number:

_____, Rev. _____

- Include a tripping matrix or similar information in the document.

Note: EG shall install utility grade relays for the interface protection. The protection design shall incorporate facilities for testing and calibrating the relays by secondary injection.

Please do not feel inhibited by the space provided here. Use as much space and as many additional sheets as are required to describe how the Generator protection will deal with faults, outages, disturbances or other events on the distribution system and for the generator itself.

Protective Device	Range of Available Settings	Trip Time	Trip Set Point	Describe operation for disconnecting the generator or inverter in the event of a distribution system outage	Describe operation for disconnecting the generator or inverter in the event of a distribution system short circuit (three phase and single phase to ground)
27 Phase Undervoltage Instantaneous					
27 Phase Undervoltage					
50 Phase Instantaneous Overcurrent					
50Gground Instantaneous Overcurrent:					
51 Phase Time Overcurrent					
51G Ground Time Overcurrent					
59 Phase Overvoltage Instantaneous					

59 Phase Overvoltage					
81 Under Frequency					
81 Over Frequency					
87 Transformer Differential					
Other					

8. Connection and Operation Information

- a. Synchronizing and paralleling scheme / procedure _____ Doc. / Dwg. No.
- b. The generator is designed with auto-connection scheme Yes No

9. Document List

Item No.	Description	Reference No.	No. of Pages
1			
2			
3			
4			
5			
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10. Drawing List

Item No.	Description	Reference No.	No. of Pages
1			
2			
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7			
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11. Other Comments, Specifications and Exceptions (attach additional sheets if needed)

12. Applicant and Project Design / Engineering Signature

To the best of my knowledge, all the information provided in this Application Form is complete and correct.

Applicant Signature

Date

Project Design / Engineering

Date

- **Return this form to: Niagara Peninsula Energy Inc., 7447 Pin Oak Drive, Niagara Falls, ON L2E 6S9. Attn: Paul Uguccione**
- **E mail: paul.uguccioni@npei.ca**
- **Phone: (905) 356-2681 Ext. 6126**

Form B - Part B

LDC Supplemental Information

1. LDC Name: Niagara Peninsula Energy
Contact Person: Paul Uguccione
Mailing Address: 7447 Pin Oak Drive
Niagara Falls, ON L2E 6S9
Telephone: (905) 356-2681 Ext. 6126
E-mail: paul.uguccioni@npei.ca

2. Feeder Details:

Provide details of the distribution feeder to which the proposed EG facility is to be connected.

Feeder Name: _____
Hydro One Transformer Station Name: _____
Feeder Conductor size and configuration (3 wire or 4 wire): _____
Feeder Max Load (Ampere): _____
Feeder Minimum Load (Ampere): _____
[Note: Feeder maximum/minimum load is the recorded maximum/minimum load of the feeder for the last two years]
Any other generator connected on the feeder Yes No (Provide details below)
Total number of Generator customers on the feeder (other than the proposed generator) _____
Number of units _____ Total Capacity: _____ kW _____ kVA

3. Provide LDC Connection Impact Assessment of the EG facility up to Hydro One TS

4. Load information

Maximum load of the facility _____ kVA _____ kW
Maximum load current (referred to the nominal voltage at the connection point to Hydro One system) _____ A
Maximum inrush current (referred to the nominal voltage at the connection point to Hydro One system) _____ A

5. Expected Monthly Generation, Consumption and Output From the Facility:

Expected:	Total Generation (a)		Total Internal Consumption Niagara Peninsula Energy (b)		Total Output (To Hydro One Transmission Station) (a-b)*	
	kWh	Peak kW	kWh	Peak kW	kWh	Peak kW
January						
February						
March						
April						
May						
June						
July						
August						
September						
October						
November						
December						

* This value would be negative when the generators are not in operation or when the internal consumption exceeds generation.