Schedule A
Section 1.0

Generator Connection Assessment Review Form

10 kW to 10 MW

Appendix 5
Distributed Generation Connection Impact Assessment Review
To connect 10kW – 10MW to
Greater Sudbury Hydro's Electrical Distribution System

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) ______________ Contact Person Name: ______________________________

Signature: ______________________________

1. Project Name: ____

2. Project Dates: (dd/mm/yyyy)

Proposed Start of Construction: ______________________________

Proposed In-Service: ______________________________

3. Project Size:

Number of Units ______________________________

Nameplate Rating of Each Unit (kW) ______________________________

Number of Phases (1 or 3) ______________________________

Proposed Total Capacity (kW) ______________________________

4. Applicant Contact Information: (the party that will be contractually obligated for this generating facility)

Company Name ____

Street Address ____

Mailing Address (if different) ____

Representative Name ____

Representative Title ____

Phone Number (Main) ______________________ Cell ______________________

Fax Number ______________________ Email ______________________

5. Facility Contact Information: (where the generating facility will be installed)

Company Name ______________________

Street Address ______________________

Mailing Address (if different) ______________________

Representative Name ______________________

Representative Title ______________________

Phone Number (Main) ______________ Cell ______________

Fax Number ______________ Email ______________

6. Consultant:

Company ______________________

Street Address ______________________

Mailing Address (if different) ______________________

Representative Name ______________________

Representative Title ______________________

Phone Number (Main) ______________ Cell ______________

Fax Number ______________ Email ______________

7. Intent of Generation:

☐ Sale of Power ☐ Load Displacement

8. 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) ______________________

9. Generator Facility Type:

Generation Facility Voltage (Volts): ______________ ☐ AC ☐ DC

Type: Rotating generators: ☐ Synchronous ☐ Induction ☐ N/A

☐ Other (Please Specify) ______________________

Non-Rotating DC generation: ☐ Photovoltaic Arrays ☐ Fuel Cells ☐ Batteries

☐ Other (Please Specify) ______________________

10. Location and Site Plan:

Provide Site Plan with approximate line routings for connection to nearby Greater Sudbury Hydro's facilities. The Site Plan should include roads, concession and lot numbers and nearby power lines.

Drawing / Sketch No. ______________________________ Rev. __________

11. Location and Site Plan:

Proposed connection voltage to the LDC's distribution system (if known): ________________ kV

Section 2: Impact Assessment Information

Note:

(a) It is important that the Generator provides 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 the LDC may require additional information to conduct the Impact Assessment. Should this be the case the Generator will be duly advised.

Date: (dd/mm/yyyy) ______________ Contact Person Name: ______________________________

Signature: ______________________________

1. Single Line Diagram (SLD):

Provide a SLD of the Generating Facility including the Interface Point/Point of Common Coupling ("PCC") to Greater Sudbury Hydro's distribution system.

Drawing / Sketch No. ____________________________ Rev. ________

☐ Attached
☐ Mailed Separately

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

All values to be at the nominal connection voltage to Greater Sudbury Hydro'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) ______________________

3. Generator Facility 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 facility voltage (kV): ____________

ii) Rated current (A): ____________

iii) Rated power factor of generating unit (s): ____________ p.u.

iv) Power factor operating range. (Specify lag or lead): from ______ p.u. to ______ p.u.

v) Unsaturated reactances on: ______ kVA base, ______ kV base

Direct axis synchronous reactance, Xd ______ p.u.

Direct axis transient reactance, Xd' ______ p.u.

Direct axis subtransient reactance, Xd" ______ p.u.

vi) Time Constants:

Direct axis open circuit transient, T' ______ seconds

Direct axis open circuit subtransient, T" ______ seconds

vii) Provide a plot of generator capability curve: (MW output vs MVAR)

Document Number: ____________ Rev. ______

☐ Attached
☐ Separate Mailing

viii) Generator Inertia constant (on machine base), if available

H = ______ seconds (generator only)

H = ______ seconds (generator & turbine)

h. For Induction Units:

i) Generation facility voltage (kV): ____________

ii) Rated current (A): ____________

iii) Rated power factor of generating unit (s): ____________ p.u.

iv) Power factor operating range. (Specify lag or lead): from ______ p.u. to ______ p.u.

v) Unsaturated reactances on: ______ kVA base, ______ kV base

Direct axis synchronous reactance, Xd ______ p.u.

Direct axis transient reactance, Xd' ______ p.u.

Direct axis subtransient reactance, Xd" ______ p.u.

vi) Time Constants:

Direct axis open circuit transient, T' ______ seconds

Direct axis open circuit subtransient, T" ______ seconds

vii) Actual power factor at PCC (after p.f. correction):

Full output: ______ p.u.

No output: ______ p.u.

viii) Generator reactive power requirements:

Full output: ______ kVAR

No output: ______ kVAR

ix) 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 open:

☐ Yes ☐ No

x) Maximum starting inrush current (multiple of full load current): ______ p.u.

xi) Generator Inertia constant (on machine base), if available

H = ______ seconds (generator only)

H = ______ seconds (generator & turbine)

i. For SPC / Inverter type units:

i. Manufacturer / Type or Model No.: ______ / ______

ii. Inverter AC output voltage: ______ Volts

iii. Inverter AC output current: ______ Amps

iv. Number of phases: ☐ One ☐ Three

v. Inverter output frequency: ______ Hz

vi. Type of inverter: ☐ Self-Commutated ☐ Line Commutated

☐ Other (Please Specify):

vii. Inverter rated power factor: ______ %

viii. Inverter power factor adjustment range, if applicable (specify lag or lead:

from ______ p.u. to ______ p.u.

ix. Are power factor correction capacitors used? ☐ Yes ☐ No

x. If yes, total power factor correction installed: ______ kVAR

xi. Number of capacitor steps: ______

xii. Are power factor correction capacitors automatically switched off when inverter breaker opens?

☐ Yes ☐ No

xiii. Is the inverter paralleling equipment and / or design pre-certified? ☐ Yes ☐ No

xiv. If yes, to which standard(s), e.g. CSA C22.2 No. 107.1-01, UL 1741: ______

xv. Maximum inrush current upon inverter start-up (multiple of full-load current): ______ p.u.

xvi. Modelling parameters recommended by SPC/Inverter/Converter Manufacturer.

Describe how your equipment should be modeled for load flow, voltage study and short circuit analysis.

______

______

______

______

4. Interface (Step-Up) Transformer Characteristics:

a. Transformer rating: ______ kVA

b. Manufacturer (if known): ______

c. Number of phases: ☐ Yes ☐ No

d. Nominal voltage of high voltage winding: ______ kV

e. Nominal voltage of low voltage winding: ______ kV

f. High voltage winding connection: ______

g. Grounding method of star connected high voltage winding neutral; if applicable

☐ Solid ☐ Ungrounded ☐ Impedance: R ______ X ______ ohms

h. Low voltage winding connection: ______

i. Grounding method of star connected low voltage winding neutral; if applicable

☐ Solid ☐ Ungrounded ☐ Impedance: R ________ X ________ ohms

j. Impedances on: ______________ kVA base ______________ kV base

R: ______________ p.u. X: ______________ p.u.

Note:

(a) The term "High Voltage", used above, refers to the connection voltage to Greater Sudbury Hydro's distribution system, and "Low Voltage", used above, refers to the generation or any other intermediate voltage.

(b) Studies will be conducted at nominal voltages (i.e. tap changer at neutral position)

5. Intermediate Transformer Characteristics (if applicable):

a. Transformer rating: ______________ kVA

b. Manufacturer (if known): ______________________________

c. Number of phases: ☐ Yes ☐ No

d. Nominal voltage of high voltage winding: ______________ KV

e. Nominal voltage of low voltage winding: ______________ kV

f. High voltage winding connection: ______________

g. Grounding method of star connected high voltage winding neutral; if applicable

☐ Solid ☐ Ungrounded ☐ Impedance: R ________ X ________ ohms

h. Low voltage winding connection: ______________

i. Grounding method of star connected low voltage winding neutral; if applicable

☐ Solid ☐ Ungrounded ☐ Impedance: R ________ X ________ ohms

j. Impedances on: ______________ kVA base ______________ kV base

R: ______________ p.u. X: ______________ p.u.

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.

6. Generating Facility Load Information

a. Maximum continuous load:

- Total: ________ kVA ________ kW
- Generator Auxiliary Load Only: ________ kVA ________ kW

b. Maximum start up load: ________ kVA ________ kW

c. Largest motor size that would be started: ________ HP ________ kW

d. Maximum inrush current of the motor (multiple of full-load current): ______________ p.u.

e. 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 Greater Sudbury Hydro's system will be prevented.

____

7. Operation Information:

- Mode of Operation: ____________________
- Annual Capacity Factor: ____________________ %
- Prospective number of annual scheduled starts / stops, and timing thereof: ____________________

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

Expected:	**Total Generation (a)**		**Total Internal Consumption (b)**		**Total Output (To the LDC's 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.

9. Protection Design, Philosophy and Logic

Either at the CIA stage or the design review stage it will be necessary to determine the protection philosophy, co-ordination and trip logic. If it is available now please provide it. If it is not, it can be deferred and submitted if the project goes ahead. 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					

10. Other Comments, Specifications and Exceptions (attach additional sheets if needed)

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____

____

____

11. 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 the LDC.**