

# 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:		
<b>2. Project Dates:</b> (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)	
<b>4. Applicant Contact</b> Company Name Street Address	Information: (the party that will be contrac	cually obligated for this generating facility)
Mailing Address (if diffe Representative Name	rent)	
Representative Title Phone Number (Main)	Cel	

Email

Fax Number



# 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 (Com	pined Heat & Power)		
Other (Please Specify)			
9. Generator Facility Type	2:		
Generation Facility Voltage (	/olts):	□ AC □	] DC
Type: Rotating generators:	Synchronous	Induction	□ N/A
	Other (Please Sp	ecify)	
Non-Rotating DC generation:	🗌 Photovoltaic Arra	ys 🗌 Fuel Cells	Batteries
	Other (Please Sp	ecify)	



## 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 Sudbury Hydro's distribution system.	including the Interface Poin	t/Point of Common Coupling ("PCC") to Greater

Drawing / Sketch No.

Rev.

AttachedMailed 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 Sp	ecify)	

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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 facto	or of generating unit (s	):			p.u.	
iv) Power factor opera	ating range. (Specify la	ag or lead):	from	p.u.	to	p.u.
v) Unsaturated reacta	ances on:		kVA base,	_	k١	/ base
Direct axis synchr	onous reactance,	Xd		p.u.		
Direct axis transie	nt reactance,	Xd'		p.u.		
Direct axis subtra	nsient reactance,	Xd"		p.u.		
vi) Time Constants:				_		
Direct axis open c	ircuit transient,	Τ'		second	S	
Direct axis open c	ircuit subtransient,	Т"		second	S	
vii) Provide a plot of g	generator capability cu	rve: (MW outp	out vs MVAR)	_		
Document Numbe	r:			Rev.		
☐ Attach ☐ Separ	ed ate Mailing			-		
viii) Generator Inertia	constant (on machine	e base), if avai	lable			
H =		seconds (	generator only)			
H =		seconds (	generator & turbine)			
h. For Induction Units: i) Generation facility	voltage (kV):					
ii) Rated current (A)	·					
iii) Rated power facto	or of generating unit (s	):			p.u.	_
iv) Power factor opera	ating range. (Specify la	ag or lead):	from	p.u.	to	p.u.
v) Unsaturated reacta	ances on:		kVA base,	-	k١	/ base
Direct axis synchr	onous reactance,	Xd		p.u.		

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Direct axis transient react	ance,	Xd'		p.u.
Direct axis subtransient re	eactance,	Xd"		p.u.
vi) Time Constants:				
Direct axis open circuit tra	ansient,	Τ'		seconds
Direct axis open circuit su	btransient,	Τ"		seconds
vii) Actual power factor at PC Full output:	C (after p.f. c	orrection): p.u.		
No output:		p.u.		
viii) Generator reactive power Full output:	r requirement	s: kVAR		
No output:		kVAR		
ix) Total power factor correct	ion installed:		kVAR	
,				
Number of regulating st	eps:			
Number of regulating st	eps: switched per s	step:	kvar	
Number of regulating standard Power factor correction No Yes No X) Maximum starting inrush correction Inertia constant	eps: switched per s capacitors are current (multip t (on machine	e automatically s ble of full load cu	kVAR witched off wher urrent):	n generator breaker o p.u
Number of regulating st Power factor correction Power factor correction Yes No x) Maximum starting inrush c xi) Generator Inertia constant H =	eps: switched per s capacitors are current (multip t (on machine	step: automatically s ble of full load cu base), if availal seconds (g	kVAR witched off wher urrent): ble enerator only)	n generator breaker o p.u
Number of regulating sta Power factor correction a Power factor correction a Power factor correction a Yes No x) Maximum starting inrush o xi) Generator Inertia constant H = H =	eps: switched per s capacitors are current (multip t (on machine	step: automatically s ble of full load cu base), if availat seconds (g seconds (g	kVAR witched off wher urrent): ble enerator only) enerator & turbir	n generator breaker o p.u 
Number of regulating sta Power factor correction a Power factor correction a Power factor correction a Yes No x) Maximum starting inrush o xi) Generator Inertia constan H = H = H =	eps: switched per s capacitors are current (multip t (on machine	step: e automatically s ble of full load cu base), if availa seconds (g seconds (g	kVAR witched off wher urrent): ble enerator only) enerator & turbir	n generator breaker o p.u 
Number of regulating sta Power factor correction a Power factor correction a Power factor correction a Power factor correction a Yes No x) Maximum starting inrush o xi) Generator Inertia constant H = H = H = Or SPC / Inverter type units: i. Manufacturer / Type or Model	eps: switched per s capacitors are current (multip t (on machine	step: e automatically s ble of full load cu base), if availa seconds (g seconds (g	kVAR witched off wher urrent): ble enerator only) enerator & turbir	n generator breaker o p.u 
Number of regulating sta Power factor correction a Power factor correction a Power factor correction a Power factor correction a Yes No x) Maximum starting inrush o xi) Generator Inertia constant H = H = H = Tor SPC / Inverter type units: i. Manufacturer / Type or Model ii. Inverter AC output voltage:	eps: switched per s capacitors are current (multip t (on machine	step: automatically s ble of full load cu base), if availa seconds (g seconds (g	kVAR witched off wher urrent): ble enerator only) enerator & turbir / Volts	n generator breaker o p.u 
Number of regulating sta Power factor correction a Power factor correction a Power factor correction a Power factor correction a Yes No x) Maximum starting inrush o xi) Generator Inertia constant H = H = Tor SPC / Inverter type units: i. Manufacturer / Type or Model ii. Inverter AC output voltage: iii. Inverter AC output current:	eps: switched per s capacitors are current (multip t (on machine	step: e automatically s ble of full load cu base), if availal seconds (g seconds (g	kVAR witched off wher urrent): ble enerator only) enerator & turbir / Volts Amps	n generator breaker o p.u 
Number of regulating st Power factor correction a Power factor correction a Power factor correction a Power factor correction a Yes No x) Maximum starting inrush o xi) Generator Inertia constant H = H = Tor SPC / Inverter type units: i. Manufacturer / Type or Model ii. Inverter AC output voltage: iii. Inverter AC output current: iv. Number of phases:	eps: switched per s capacitors are current (multip t (on machine	step: automatically s ble of full load cu base), if availal seconds (g seconds (g	kVAR witched off wher urrent): ble enerator only) enerator & turbir / Volts Amps	n generator breaker o p.u 
Number of regulating st Power factor correction a Power factor correction a Power factor correction a Power factor correction a Power factor correction a Yes No x) Maximum starting inrush o xi) Generator Inertia constant H = H = Tr SPC / Inverter type units: i. Manufacturer / Type or Model ii. Inverter AC output voltage: iii. Inverter AC output voltage: iii. Inverter AC output current: iv. Number of phases: v. Inverter output frequency:	eps: switched per s capacitors are current (multip t (on machine	step: e automatically s ble of full load cu e base), if availal seconds (g seconds (g	kVAR witched off wher urrent): ble enerator only) enerator & turbir / Volts Amps Hz	n generator breaker o p.u 

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vii. Inverter rated p	ower factor:			C	%		
viii. Inverter power	factor adjustment ra	ange, if applica	able (sp	pecify lag o	r lead:		
		fr	rom		p.u.	to	p.u
ix. Are power factor	correction capacito	rs used?	] Yes	🗌 No			
x. If yes, total powe	er factor correction in	nstalled:				kVAR	
xi. Number of capac	citor steps:						
xii. Are power facto	or correction capacito	ors automatica	ally swi	tched off w	hen inver	ter breake	er opens?
		C	] Yes	🗌 No			
xiii. Is the inverter p	paralleling equipmer	nt and / or des	ign pre	-certified?		🗌 Yes	🗌 No
xiv. If yes, to which	standard(s), e.g. C	SA C22.2 No.	107.1-(	01, UL 174	1:		
xv. Maximum inrusł	n current upon inver	ter start-up (n	nultiple	of full-loa	d current)	:	p.u
					<b>.</b> .	r	
xvi. Modelling parar Describe how your e	neters recommende	d by SPC/Inve	orter/Co	onverter Ma	study and	l short cir	cuit analysi
xvi. Modelling parar Describe how your e	equipment should be	d by SPC/Inve	rter/Cc load flo	onverter Ma	study and	I short cir	cuit analysis
xvi. Modelling parar Describe how your e Interface (Step- a. Transformer ratir	equipment should be	d by SPC/Inve e modeled for l Characteristic	rter/Co load flo cs:	onverter Ma	study and	I short cir	cuit analysis
xvi. Modelling parar Describe how your e Interface (Step- a. Transformer ratir b. Manufacturer (if l	equipment should be	d by SPC/Inve e modeled for l Characteristic	cs:	onverter Ma	study and	I short cir	cuit analysis
xvi. Modelling parar Describe how your e Interface (Step- a. Transformer ratir b. Manufacturer (if l c. Number of phase	equipment should be equipment should be up) Transformer ( ng: known): s:	d by SPC/Inve	cs:	onverter Ma	study and	I short cir	cuit analysis
xvi. Modelling parar Describe how your e Interface (Step- a. Transformer ratir b. Manufacturer (if l c. Number of phase d. Nominal voltage	equipment should be equipment should be eup) Transformer ( ng: known): s: □ Yes of high voltage wind	d by SPC/Inve modeled for l Characteristic kVA	cs:	onverter Ma	study and	I short cir	cuit analysis
xvi. Modelling parar Describe how your of Interface (Step- a. Transformer ratir b. Manufacturer (if l c. Number of phase d. Nominal voltage of e. Nominal voltage of	•Up) Transformer (         •Up) Transformer (         ng:         known):         s:	d by SPC/Inve	cs:	onverter Ma	study and	l short cir	cuit analysis
xvi. Modelling parar Describe how your of <b>Interface (Step-</b> a. Transformer ratir b. Manufacturer (if l c. Number of phase d. Nominal voltage of e. Nominal voltage of f. High voltage wind	•Up) Transformer (         •Up) Transformer (         ng:         known):         s:       Image:         of high voltage winding         of low voltage winding         ling connection:	d by SPC/Inve	cs:	onverter Ma	study and	l short cir	cuit analysis
xvi. Modelling parar Describe how your of Interface (Step- a. Transformer ratir b. Manufacturer (if l c. Number of phase d. Nominal voltage e. Nominal voltage f. High voltage wind g. Grounding metho	equipment should be         equipment should	d by SPC/Inve	rter/Co	nverter Ma	study and	kV kV	cuit analysis
xvi. Modelling parar Describe how your e Interface (Step- a. Transformer ratir b. Manufacturer (if l c. Number of phase d. Nominal voltage e. Nominal voltage f. High voltage wind g. Grounding methor G Solid	equipment should be equipment should be equipment should be rup) Transformer ( ng: known): s:	d by SPC/Inve	cs: vinding	onverter Ma ow, voltage	study and study and applicable	I short cir 	cuit analysis

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i. Grounding meth	od of star connecte	ed low voltage wind	ding neutral;	if applicable		
Solid Solid	Ungrounded	Impedance	: R	Х		ohms
j. Impedances on:		kVA base		kV base		
R	:	p.u. X:		p.u.		
(a) The term Hydro's d other inte (b) Studies w	"High Voltage", istribution syster rmediate voltage ill be conducted a	used above, ref n, and "Low Vol at nominal voltag	ers to the o tage", used les (i.e. tap	connection vo above, refers changer at ne	itage to to the <u>c</u> utral pos	Greater Sug generation o sition)
a Transformer rat	ing:		plicable):			
h. Manufacturor (i	f known):					
		- <b>D</b> N-				
c. Number of phas	ses: Lire	S [] NO			10/	
d. Nominal voltag	e of high voltage w	inding:			KV	
e. Nominal voltage	e of low voltage wir	nding:			kV	
f. High voltage wi	nding connection:					
g. Grounding met	nod of star connect	ed high voltage wi	nding neutral	; if applicable	- -	
Solid Solid	Ungrounded	Impedance	: R	Х		ohms
h. Low voltage wii	nding connection:					
i. Grounding meth	od of star connecte	ed low voltage wind	ding neutral;	if applicable	_	
Solid	Ungrounded	Impedance	: R	х		ohms
j. Impedances on:		kVA base		kV base		
R	:	p.u. X:		p.u.		
e: (a) The term interface voltage.	"High Voltage", step-up transfor	used above, refe mer, and "Low	ers to the in Voltage",	termediate v used above,	oltage th refers to	at is input t the genei
Generating Fa	cility Load Inform	ation				
a. Maximum conti	nuous load:					
• Total:			kVA	kW		
· Concrator A	viliary Load Only		KVA	KVV		

c. Largest motor size that would be started: HP

kW

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d. Maximum inrush currer	nt of the motor (multip	le of full-load	current):
e. For load displacement	jenerators:		
<ul> <li>Max. present load facility:</li> </ul>	d at Generator's		kVA

- Max. future load at Generator's facility (excluding Auxiliary Loads):
- Indicate the means by which injection of power into Greater Sudbury Hydro's system will be prevented.

kVA

%

### 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	Total Output (To the LDC's Distribution System) (a-b)*	
	kWh	Peak kW	kWh	Peak kW	kWh	Peak kW
January						
February						
March						
April						
Мау						
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.

p.u.

kW

kW



## 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, coordination 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.

				Describe	Describe operation
				operation for	for disconnecting the
				disconnecting	generator or inverter
				the generator or	in the event of a
				inverter in the	distribution system
	Range of			event of a	short circuit (three
Protective	Available			distribution	phase and single
Device	Settings	Trin Time	Trin Set Point	system outage	phase to ground)
27 Phase	oottiingo			eyeten eutage	p
Undervoltage					
Instantanoous					
Instantaneous					
27 Phase					
Undervoltage					
ondervoltage					
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					
91 Over					
of Over					
Frequency					
87 Transformer					
Differential					
Other					



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

#### 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

Project Design / Engineering

Date

Date

\* Return this form to the LDC.