Generation Planning & Transmission Capacity
Capacity Planning, Asset Management
Toronto Hydro-Electric System Limited
500 Commissioners Street, 3rd Floor
Toronto, Ontario, M4M 3N7

Distributed Energy Resource (DER) Application Form

This Application Form is for FIT, Large Renewable Procurement (LRP), Net Metering, Load Displacement or Energy Storage Generators. All applicable sections must be completed and all the required documents must be submitted with this form.

Section A - Administrative Information

Program: *(choose one)*	☒ FIT ☐ Net Metering ☐ Load Displacement ☐ Energy Storage ☐ Large Renewable Procurement (LRP) ☐ Closed Transition ☐ Other, please specify:
Existing DER on the property:	☒ Yes ☐ No IESO Contract # for existing generator(s) if applicable:

If existing DER(s) on property, select resource technology below

☒ Solar Photovoltaic ☐ Renewable Biomass ☐ Wind ☐ Bio-gas ☒ Co-generation/CHP
☐ Energy Storage Type, please specify:
☐ Other, please specify:

Section B - Contact Information

	Toronto Hydro Service Location – site of project	**Distributed Energy Resource Owner** – owner of project	**Engineering Consultant** - (Electrical/Developer)
Company/ Person			
Address Street			
City			
Postal Code			
Contact Name			
Telephone			
Cell			
E-mail			

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Section C - Billing Contact

☉ Toronto Hydro Customer ○ DER Owner ○ Engineering Consultant
○ Other (please specify): _____

_____

_____

Section D - Project Description

Dates:	Proposed Start of Construction: (dd/mm/yyyy)				
	Proposed In-Service: (dd/mm/yyyy)				
Account:	If you are an HST registrant, provide your HST number:		- RT		
	Toronto Hydro Account Number:				
Generator/ Storage *(if applicable)*:	Distributed Energy Resource (DER):		☐ Synchronous ☐ Induction ☐ Inverter ☐ Other, please specify:		
	Resource Technology: *(select all applicable)*		☐ Solar Photovoltaic ☐ Renewable Biomass ☐ Wind ☐ Bio-gas ☐ Co-generation/CHP ☐ Other, please specify:		
		Generator		**Storage**	
	Manufacturer				
	Model Number				
	Power Factor (p.u)				
	[A]: Number of Units:				
	[B]: Rating of Each Unit:	kW	KVA	kWh	KVA
	➢ Proposed Total Capacity: = **[A] × [B]**	kW	KVA	kWh	KVA
	Number of Phases:	○ one	☉ three		
	Output Voltage (V):				
	Connection Configuration	○ delta	☉ star		

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Mode of Operation:	Load Displacement?	☐ Yes, existing load new load ☐ No	kW kW
	Power Export?	☐ Yes ☐ No	kW
	Peak Period Only?	☐ Yes ☐ No	kW

- Please be advised that the nameplate capacity for Solar PV systems is determined by taking the lesser of.
  i. The sum of the manufacturer's capacity ratings (in kW) for normal operation (e.g., continuous output ratings) of the installed solar modules (i.e. panels) of the Facility; or,
  ii. The sum of the manufacturer's capacity ratings (in kW) for normal operation (e.g., continuous output ratings) of the installed inverters of the Facility.

Section E - Single Line Diagram (SLD)

Provide an updated SLD of the Generating Facility, signed by a Professional Engineer, which includes the Interface Point/Point of Common Coupling ("PCC") to Toronto Hydro's distribution system.

The SLD shall contain details on the following:

- Electrical equipment at the embedded generation facility, principal ratings, impedances, winding configurations, neutral grounding methods, etc.
- Protective relaying, synchronizing and revenue metering arrangements. The device numbers should be in accordance with IEEE Standard Electrical Power System Device Function Numbers (ANSI/IEEE C37.2).
- Only dual winding transformers are acceptable for connection to the Toronto Hydro system.
- Provide the details at the connection point. Toronto Hydro Transformer Station, Toronto Hydro Feeder ID, Transformer Location number and ratings

Note: If the project includes upgrades to existing Embedded Generation facilities, show the existing and new electrical equipment.

SLD Drawing Number: _____ Rev.: _____

Single Line Diagram Checklist

Item Description	Check as applicable
Toronto Hydro Transformer Station, Feeder ID, Transformer Location number and ratings (obtained from Pre-Assessment)	☐
Disconnecting device at the interface (PCC) point with Toronto Hydro system	☐
Load break switches	☐
Fuses / circuit Breakers	☐

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Interface step-up transformer (intermediate transformer)	☐
Current Transformers and Voltage Transformers (quantity, location, connection, ratio)	☐
Power cables (length, type, impedance)	☐
Power factor correction capacitors and their switching arrangements (particularly for induction units)	☐
Generators (rotating / static) / Motors/ PV Inverter system	☐
Surge arresters	☐
Other Information	☐
Drawing attached/Mailed separately	☐

Section F - Location and Site Plan

Provide a site plan outlining existing facilities and proposed embedded generator location. The site plan should include approximate line route for connection to Toronto Hydro, as well as roads, lot numbers, and nearby power lines.

Provide meter room layout showing locations of all equipment and approximate clearances.

Drawing Number: _____ Rev. __

Section G - Protection Philosophy

Provide a document describing the protection philosophy for detecting and clearing:

- Internal faults within the Embedded Generation facility;
- External phase and ground faults (in Toronto Hydro's distribution system);
- Certain abnormal system conditions such as over / under voltage, over / under frequency, open phase(s);
- Islanding
- Tripping matrix

Drawing Number: _____ Rev. __

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Section H - Monitoring and Control

Monitoring and control readiness is required for the Embedded Generation facility. Real time monitoring is necessary for safety and control coordination with Toronto Hydro's control centre.

Provisions for monitoring and control will include, but not be limited to:

a) The ability to obtain operational data
b) The ability to control the state (on/off) of the generator

For further information about the monitoring and control requirements, refer to '**FIT Monitoring and Control Requirements**', found on Toronto Hydro's FIT webpage.

Please provide:

1. Details/documentation on the communication protocol and equipment to be used; and
2. A Single Line Diagram, signed by a Professional Engineer, illustrating the monitoring and control configuration.

Customer Name (Print): _____

Customer Signature: _____ **Date:** _____

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Connection Impact Assessment (CIA) Generator Form

For projects over 10kW, a Connection Impact Assessment (CIA) must be performed by Toronto Hydro. A CIA is a more detailed assessment of the proposed project's impact on the Toronto Hydro electricity grid.

Note: Sections A through H of the Embedded Generation Connection Application Form are applicable to this CIA Generator Form.

Section I - Application Type

☐ New CIA Application ☒ CIA Revision

Section J - Embedded Generator Fault Contributions at the Interface Point/PCC

All values to be at the nominal connection voltage to Toronto 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 (MVA)			
Phase-to-phase fault (MVA)			
Single Phase to ground fault (MVA)			
R_1		R_0	
X_1		X_0	
X_1/R_1		X_0/R_0	

Section K - Generator Facility Characteristics

For SPC/Inverter type units	a.	Rated Power:	kW	kVA
	b.	Terminal voltage		V
	c.	Line - interactive type (i.e. intended for parallel operation with electric utility)	☐ Yes ☒ No	
	d.	Power factor		
	e.	Battery backup provided	☐ Yes ☒ No	
	f.	Maximum fault current for terminal faults		A
	g.	Standards according to which built		
	h.	Manufacturer		
	i.	Model Number		
	j.	Provide Manufacturer's technical brochure and specification sheet		Doc. No

** Technical Information on inverter shall be provided with the connection application.
Only Canadian Standards Association (CSA) approved inverters are acceptable.

A single-phase inverter can **ONLY** connect on a single-phase system and a three-phase inverter **MUST** be used on a three-phase system. Single-phase inverters **WILL NOT** be allowed to connect on three-phase systems. Please contact Toronto Hydro for further information regarding the use of multiple inverters on a project site.

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For Synchronous Units:	**Nominal Rating**				
	a.	Rated Power:			kVA
	b.	Rated Voltage:			kV_{LL}
	c.	Rated Current:			A
	d.	Active Generation:			kW
	e.	Power Factor:			p.u
	f.	Number of Poles:			
	g.	Starting inrush current (multiple of full load)			p.u
	h.	Minimum power limit for stable operation			kW
	i.	Max Reactive Power:			kVAR
	j.	Min Reactive Power:			kVAR
	Impedances				
			R	**X**	
	k.	Steady State, Z:			p.u
	l.	Transient, Z':			p.u
	m.	Subtransient, Z'':			p.u
	n.	Zero Sequence, Z_0:			p.u
	o.	Negative Sequence, Z_2:			p.u
	p.	Grounding, Z_g:			ohms
	q.	Unsaturated reactances on:			kVA base
					kV base
	Configuration				
	r.	Generator terminal connection		☐ delta ☒ star	
	s.	Grounding method of star connected generator		☐ Solid ☒ Ungrounded	
				☐ Impedance:	
				R:	Ohms
				X:	Ohms
	Performance and Capability				
	t.	Limits of range of reactive power Lagging (over-excited)			kVAR
				Power factor	
	u.	Limits of range of reactive power Leading (under-excited)			kVAR
				Power factor	
	v.	Provide a plot of generator capability curve (MW output vs. MVAR)			Dwg No
	w.	Generator connecting on (phase):		☐ single ☒ three	
	x.	Type and characteristics of exciter:			
	y.	Document Number:		Rev.	

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For Induction Units	a.	Rated Power:			kVA
	b.	Rated Voltage:			kV_{LL}
	c.	Rated Current:			A
	d.	Active Generation:			kW
	e.	Efficiency			%
	f.	Power Factor			p.u
	g.	Rated speed			RPM
	h.	Slip regulation interval			%
	i.	Rated slip			
	j.	Subtransient Impedance, Z'':	R:		p.u
			X:		p.u
	k.	Actual power factor at delivery point (after power factor correction):		Full output:	p.u
				No output:	p.u
	l.	Generator reactive power requirements:		Full output:	kVAR
				No output:	kVAR
	m.	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	
	n.	Starting inrush current limited to (multiple of full load current)			p.u
	o.	Locked rotor current (at rated voltage)			p.u
	p.	Fault current vs. time curves (for various types of faults near the generator)			Dwg No
	q.	Document Number:		Rev.	

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Interface Step-Up Transformer: (dual winding only)	i)	Transformer rating		kVA
	ii)	Manufacturer		
	iii)	Nominal voltage of high voltage winding		kV
	iv)	Lightning impulse level of high voltage winding, full wave		kV
	v)	Nominal voltage of low voltage winding		kV
	vi)	Number of phases		
	vii)	Construction (core or shell)		
	viii)	Number of legs		
	ix)	Impedances on:		kVA base
				kV base
			R:	p.u
			X:	p.u
	x)	High voltage winding connection	◯ delta ◉ star	
		Grounding method of star connected high voltage winding neutral	◯ Solid ◉ Ungrounded	
			☐ Impedance:	
			R:	Ohms
			X:	Ohms
	xi)	Low voltage winding connection	◯ delta ◉ star	
		Grounding method of star connected high voltage winding neutral	◯ Solid ◉ Ungrounded	
			☐ Impedance:	
			R:	Ohms
			X :	Ohms
	xii)	Tapping range, location and type of tap changer		
	xiii)	Expected tap settings	HV	kV
			LV	kV

Note: The term "High Voltage", used above, refers to the connection voltage to Toronto Hydro's distribution system, and "Low Voltage", used above, refers to the generation or any other intermediate voltage

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Intermediate Transformer: (dual winding only)	i)	Transformer rating			kVA
	ii)	Manufacturer			
	iii)	Nominal voltage of high voltage winding			kV
	v)	Nominal voltage of low voltage winding			kV
	v)	Impedances on:			kVA base
					kV base
			R:		p.u
			X:		p.u
	vi)	High voltage winding connection	◯ delta ◉ star		
		Grounding method of star connected high voltage winding neutral	◯ Solid ◉ Ungrounded		
			☐ Impedance:		
			R:		Ohms
			X:		Ohms
	vii)	Low voltage winding connection	◯ delta ◉ star		
		Grounding method of star connected high voltage winding neutral	◯ Solid ◉ Ungrounded		
			☐ Impedance:		
			R:		Ohms
			X:		Ohms
	viii)	Tapping range, location & type of tap changer			
	ix)	Expected tap settings	HV		kV
			LV		kV

Note: 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

Section L - Load Information					
i)	Maximum continuous load:				
	Total		kVA		kW
	Generator Auxiliary Load Only		kVA		kW
ii)	Maximum start up load		kVA		kW
iii)	Largest motor size that would be started		hp		kW
iv)	Maximum inrush current of the motor (multiple of full-load current)				p.u
v)	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				

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	power into Toronto Hydro's system will be prevented	
Section M - Operation Information		
Mode of Operation		_____
Annual Capacity Factor		_____ %
Prospective number of annual scheduled starts / stops, and timing thereof		_____

Section N - Expected Monthly Generation, Consumption and Output From the Facility

	Total Generation (a)		Total Internal Consumption (b)		Total Output (To Toronto Hydro 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.*

Other Relevant Information:

Any material revisions to the design, planned equipment or plans for the embedded generation facility shall be filed with Toronto Hydro and a new CIA will be prepared as per Distribution System Code (DSC) section 6.2.15. The new CIA will be performed at the Generator's expense.

Customer Name (Print): _____

_____

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Customer Signature: **Date:**