Hydro One FIT Process for LDCs

April 27, 2010

Agenda for Today

1. Overview of LDC FIT process for Capacity Allocation Exempt and Mainstream FIT Projects
   - CIA process Overview
   - Threshold CIA Concept
   - Capacity & Project Tracking
2. Q & A Session

Committed to Connecting Renewable

- We know generators rely on us to manage our obligations in a manner that brings certainty to the timing of their projects.
- We understand that what we do and when we do it can have financial implications for generators. We will continue to work with generators to identify their issues proactively on technical solutions.
- As stewards of the Province's transmission and distribution system, we must identify solutions that ensure power quality and protect the integrity and reliability of the system for everyone in Ontario.

hydro one

Renewable Connections: Status 2010

- Hydro One has connected 112 generators to its distribution system totaling 377 MW and has more than 500 MW of RESOP contracted generation which the Company expects to connect in 2010.
- The Company has connected more than 5,500 MW of new generation to the transmission system since 2004 and in addition, there is almost 2,500 MW committed for connection to transmission.
- 1900 MW is renewable wind and hydro.

LDC CIA Application's

- LDC submits CIA application on behalf of the proponent for any projects > 10 kW
- Applications are submitted by the LDC to Hydro One's Business Customer Centre (BCC)
- HONI CIA completed in conjunction with the LDC's CIA
- Final CIA and documents for next steps returned to the LDC by the BCC
- An incomplete application will result in delays.

LDC CIA Application's - Three Categories

- LDC owned feeders (Connected to HONI TS)
- LDC Embedded feeders (Connected to HONI) feeder
- Upstream LDC (HONI embedded in an LDC) feeder

LDC Owned Feeder CIA

- Requires only a TS review from Hydro One because the feeder is owned by the LDC
- A streamlined process using Threshold CIA may apply
- 60 day turn around

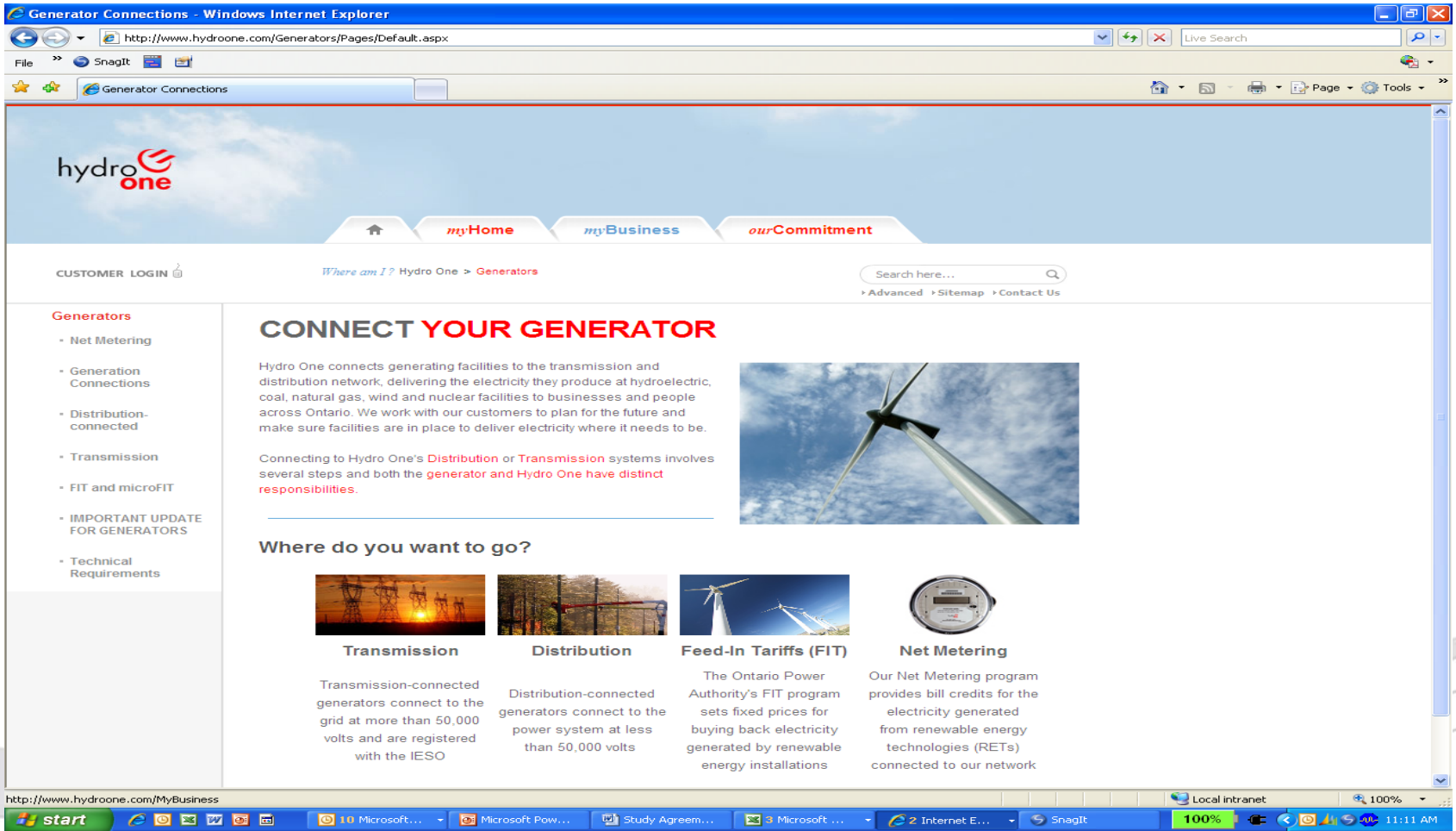
LDC Embedded Feeder CIA

- Requires a TS and feeder review from Hydro One because the feeder is embedded in Hydro One Dx
- Streamlined CIA process does not apply
- 120 days to process the CIA as more than one LDC is involved

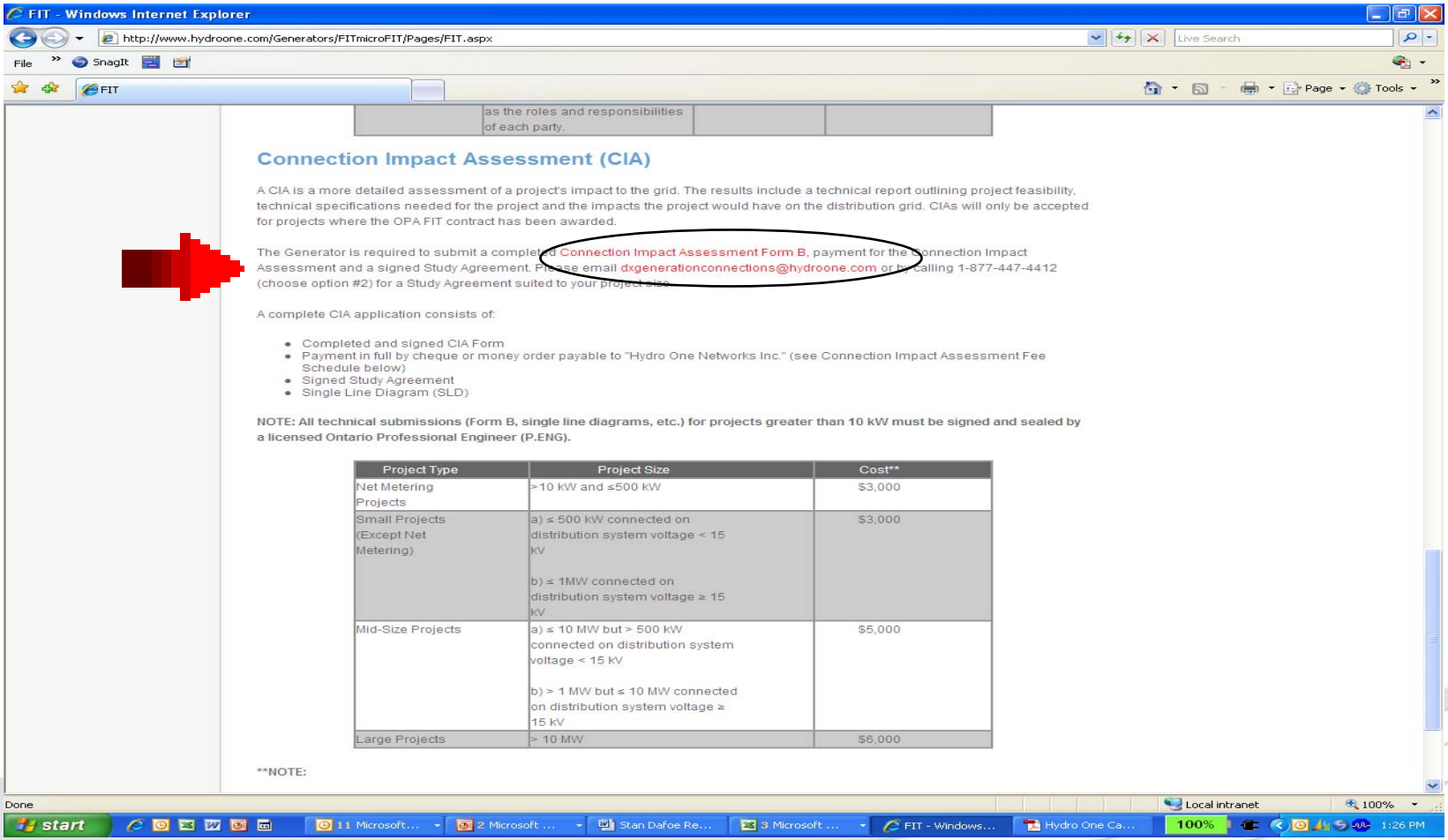
Upstream LDC CIA

- Hydro One requires a CIA from the LDC where we are embedded in an LDC feeder.
- Hydro One applies to the LDC for a CIA and signs a connection agreement on behalf of the generator connecting to Hydro One's feeder.
- 120 days to process the CIA as more than one LDC is involved

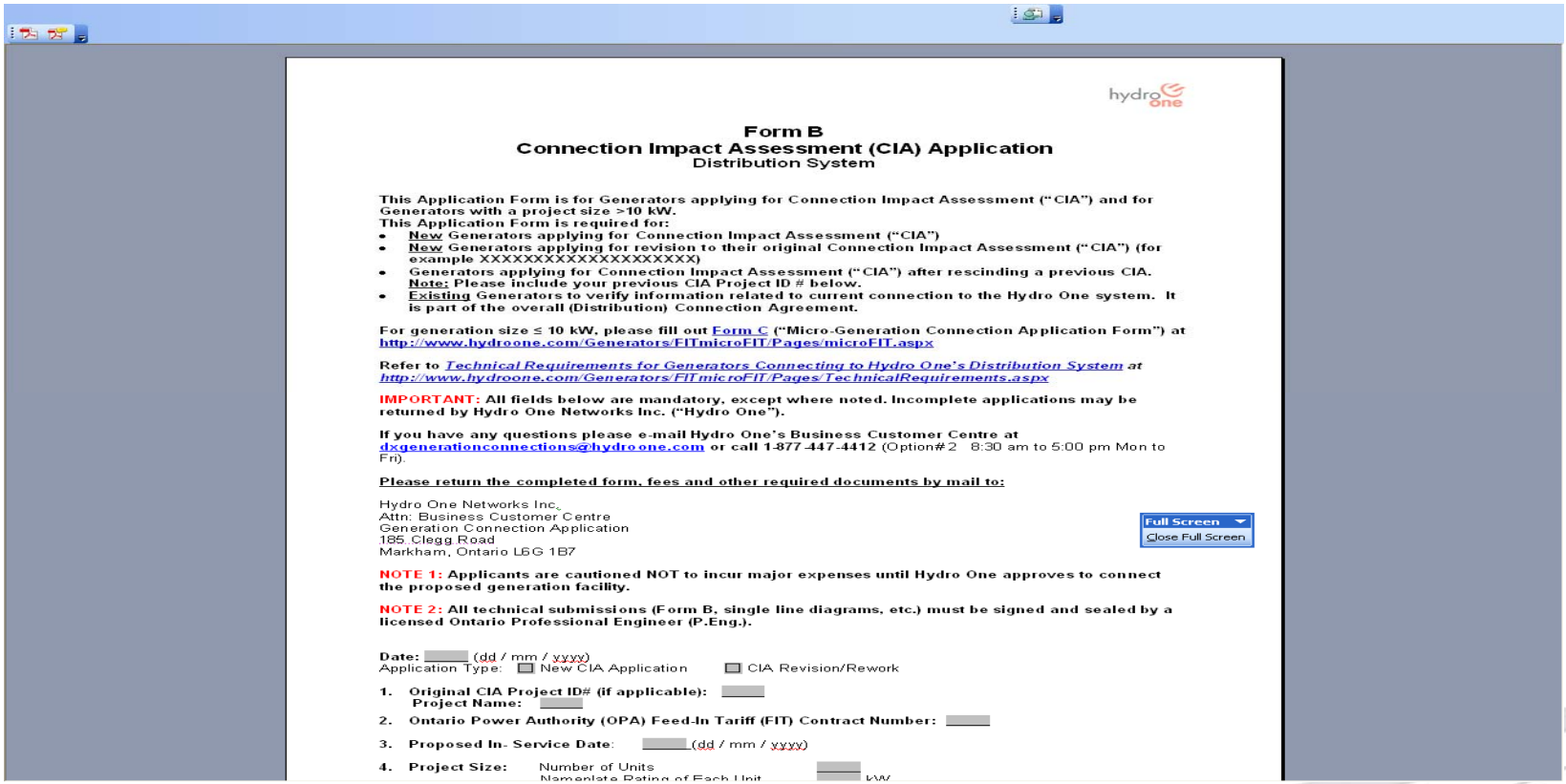
Hydro One Generation Connections



BCC Links


FIT - Windows Internet Explorer
http://www.hydroone.com/Generators/FITmicroFIT/Pages/FIT.aspx
as the roles and responsibilities of each party.
Connection Impact Assessment (CIA)
A CIA is a more detailed assessment of a project's impact to the grid. The results include a technical report outlining project feasibility, technical specifications needed for the project and the impacts the project would have on the distribution grid. CIAs will only be accepted for projects where the OPA FIT contract has been awarded.
The Generator is required to submit a completed Connection Impact Assessment Form B, payment for the Connection Impact Assessment and a signed Study Agreement. Please email dxgenerationconnections@hydroone.com or by calling 1-877-447-4412 (choose option #2) for a Study Agreement suited to your project size.
A complete CIA application consists of:
Completed and signed CIA Form
Payment in full by cheque or money order payable to "Hydro One Networks Inc." (see Connection Impact Assessment Fee Schedule below)
Signed Study Agreement
Single Line Diagram (SLD)
NOTE: All technical submissions (Form B, single line diagrams, etc.) for projects greater than 10 kW must be signed and sealed by a licensed Ontario Professional Engineer (P.ENG).
Project Type
Project Size
Cost**
Net Metering Projects
>10 kW and ≤500 kW
$3,000
Small Projects (Except Net Metering)
a) ≤ 500 kW connected on distribution system voltage < 15 kV
b) ≤ 1MW connected on distribution system voltage ≥ 15 kV
$3,000
Mid-Size Projects
a) ≤ 10 MW but > 500 kW connected on distribution system voltage < 15 kV
b) > 1 MW but ≤ 10 MW connected on distribution system voltage ≥ 15 kV
$5,000
Large Projects
> 10 MW
$6,000
**NOTE:

CIA Form B



Form B
Connection Impact Assessment (CIA) Application
Distribution System

This Application Form is for Generators applying for Connection Impact Assessment ("CIA") and for Generators with a project size >10 kW.
This Application Form is required for:

- New Generators applying for Connection Impact Assessment ("CIA")
- New Generators applying for revision to their original Connection Impact Assessment ("CIA") (for example XXXXXXXXXXXXXXXXX)
- Generators applying for Connection Impact Assessment ("CIA") after rescinding a previous CIA. Note: Please include your previous CIA Project ID # below.
- Existing Generators to verify information related to current connection to the Hydro One system. It is part of the overall (Distribution) Connection Agreement.

For generation size ≤ 10 kW, please fill out Form C ("Micro-Generation Connection Application Form") at http://www.hydroone.com/Generators/FITmicroFIT/Pages/microFIT.aspx

Refer to *Technical Requirements for Generators Connecting to Hydro One's Distribution System* at http://www.hydroone.com/Generators/FITmicroFIT/Pages/TechnicalRequirements.aspx

IMPORTANT: All fields below are mandatory, except where noted. Incomplete applications may be returned by Hydro One Networks Inc. ("Hydro One").

If you have any questions please e-mail Hydro One's Business Customer Centre at dxgenerationconnections@hydroone.com or call 1-877-447-4412 (Option#2 8:30 am to 5:00 pm Mon to Fri).

Please return the completed form, fees and other required documents by mail to:

Hydro One Networks Inc.
Attn: Business Customer Centre
Generation Connection Application
185 Clegg Road
Markham, Ontario L6G 1B7

Full Screen
Close Full Screen

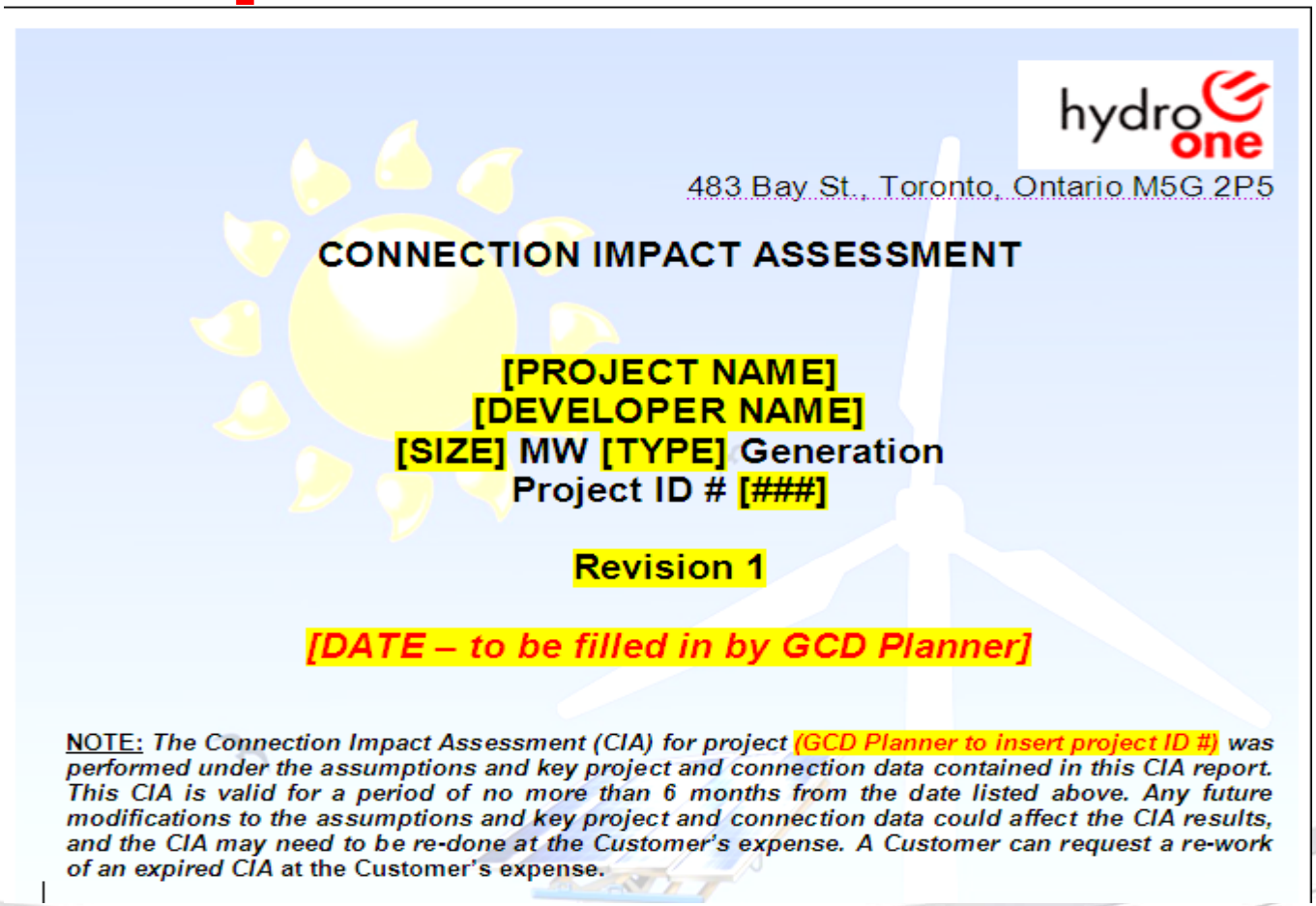
NOTE 1: Applicants are cautioned NOT to incur major expenses until Hydro One approves to connect the proposed generation facility.

NOTE 2: All technical submissions (Form B, single line diagrams, etc.) must be signed and sealed by a licensed Ontario Professional Engineer (P.Eng.).

Date: _____ (dd / mm / yyyy)
Application Type: ☐ New CIA Application ☐ CIA Revision/Rework

1. Original CIA Project ID# (if applicable): _____
   Project Name: _____
2. Ontario Power Authority (OPA) Feed-In Tariff (FIT) Contract Number: _____
3. Proposed In- Service Date: _____ (dd / mm / yyyy)
4. Project Size: Number of Units _____
   Nameplate Rating of Each Unit _____ kW

CIA Report



hydro one

483 Bay St., Toronto, Ontario M5G 2P5

CONNECTION IMPACT ASSESSMENT

[PROJECT NAME]
[DEVELOPER NAME]
[SIZE] MW [TYPE] Generation
Project ID # [###]

Revision 1

[DATE – to be filled in by GCD Planner]

NOTE: *The Connection Impact Assessment (CIA) for project (GCD Planner to insert project ID #) was performed under the assumptions and key project and connection data contained in this CIA report. This CIA is valid for a period of no more than 6 months from the date listed above. Any future modifications to the assumptions and key project and connection data could affect the CIA results, and the CIA may need to be re-done at the Customer's expense. A Customer can request a re-work of an expired CIA* at the Customer's expense.

hydro one

Streamlined Process – Threshold CIA

- The Threshold CIA is
  - A "bundled" allocation of capacity up to 1MW where the list of projects is already known
  - An allocation of capacity for up to 1MW when the list of projects is not known
- The Threshold CIA may only include:
  - Inverter based generation only; non-inverter based generation will require individual CIAs
  - 1 MW limit per Threshold CIA
  - When nearing the station capacity, no Threshold CIA will be produced.

Threshold CIA - Final Product

- Body of report will contain connection requirements, Appendices will refer to individual projects when identified by an application in advance
- CCA maybe needed for every DG projects included in the threshold CIA.
- On a periodic basis HONI will ask for a list of DG included in each CIA.

Connecting Distributed Generation

- Connecting generators to distribution is a new experience:
  - Generation connected to long feeders
  - Short circuit considerations
  - Transformer station capacity
- Comparison with other jurisdictions
  - This is a learning experience for all

Challenges with Station Capacity

- Capacity is fluid, not static
  - System load is continually changing, new generation outside of FIT
- Newly connected renewable generator sites are uncovering unforeseen impacts to the grid system
  - Long Feeder, Short Circuit Considerations, Transformer Limitations
- Objective is to balance requirement to protect the performance and reliability of the system with the objective to accommodate new renewable sources of generation
  - Required to ensure that new renewables can be connected in a way which does not adversely impact load customers
  - In everyone's best interests to ensure that new renewable generation is viewed by broader public as a reliable source of energy

Station Capacity Limits Definition

- Consistent with the Distribution System Code, the following technical capacity limit has been determined by Hydro One:
  - Reverse power flow is not to exceed 60% of station capacity to protect the system in a situation where 1 transformer is out of service
- Short Circuit levels at the station low voltage bus must be within Transmission System Code limits

HONI Experience with Station Capacity

In preparation for FIT, Hydro One reviewed station capacity considering actual experience and new information.

Highlights:

- Some dual secondary winding transformers do not allow for reverse power flow conditions
- There was a reduction in minimum system load
- Short Circuit levels are already high at some stations

Short Circuit

- Short circuit limitations were previously identified after a Connection Impact Assessment (CIA) was completed
- Some short circuit limitations are presently identified on Hydro One's List of Allocated Capacity and on OPA's Connection Availability Table
- Short circuit information was provided to the OPA. But this information will not be considered in TAT. The evaluation will be done during the CIA.

Thermal Capacity Conclusions

- The station capacity shown on Hydro One's List of Allocated Capacity and OPA's Connection Availability Table reflects:
  - Dual secondary winding transformer capacity
  - Reduction in system load
  - More detailed analysis

List of Allocated Capacity

- Station capacity on Hydro One's List of Allocated Capacity was adjusted in preparation for FIT
- The Connection Availability Table posted by the OPA at FIT launch includes station capacity values
- OPA's values account for RESOP contracts awarded at the time of FIT launch
- Station capacity values represent the technical capability of the station to accept new generation

List of Allocated Capacity (Old)

AGIMAK DS Thermal Capacity (MW) = 7 Short Circuit Capacity (MVA) = 652		
	F1	F2
Allocated Capacity (MW)	0	0

AGINCOURT TS Thermal Capacity (MW) = Sum of Buses Short Circuit Capacity (MVA) = N/A											
Thermal Bus Capacity (MW)	B = 11						Y = 11				
Short Circuit Bus Capacity (MVA)	B = 124						Y = 125				
	M2	M4	M6	M9	M10	M12	M1	M3	M5	M7	M11
Allocated Capacity (MW)	0	0	0	0	0	0	0	0	0	0	0

Station may supply another LDC's territory. Refer to OPA FIT LDC locator tool to find LDC.

*ALBION TS Thermal Capacity (MW) = Sum of Buses Short Circuit Capacity (MVA) = N/A		
Thermal Bus Capacity (MW)	BQ = 9	JY = 9
Short Circuit Bus Capacity (MVA)	BQ = 113	JY = 112
For any information or inquiries please contact Hydro Ottawa		

Station may supply another LDC's territory. Refer to OPA FIT LDC locator tool to find LDC.

ALEXANDER DS Thermal Capacity (MW) = 16 Short Circuit Capacity (MVA) = N/A		
	F1	F4
Allocated Capacity (MW)	5.5	5.4

ALEXANDER DS is downstream of SOUTH MARCH TS M6

ALLANBURG TS Thermal Capacity (MW) = 22 Short Circuit Capacity (MVA) = 196			
	M6	M7	M8
Allocated Capacity (MW)	0	0	0

ALLISTON TS Thermal Capacity (MW) = 62 Short Circuit Capacity (MVA) = 467						
	M1	M2	M3	M4	M5	M6
Allocated Capacity (MW)	0	0	0	10	0	10

ALMONTE TS Thermal Capacity (MW) = 24 Short Circuit Capacity (MVA) = N/A			
Thermal Bus Capacity (MW)	J = 17	Q = 29	
Short Circuit Bus Capacity (MVA)	J = 1116	Q = 1141	
	M25	M26	M28
Allocated Capacity (MW)	5	0	0

ARDOCH DS Thermal Capacity (MW) = 6 Short Circuit Capacity (MVA) = 75		
	F1	F2
Allocated Capacity (MW)	0	0

ARMITAGE TS DESN 1 Thermal Capacity (MW) = 116 Short Circuit Capacity (MVA) = 402								
	M11	M12	M13	M14	M21	M22	M23	M24
Allocated Capacity (MW)	0	0	0	0	0	0	0	0

Station may supply another LDC's territory. Refer to OPA FIT LDC locator tool to find LDC.

SAMPLE - LIST OF CAPACITY

Station Name	BUS Name	Dx Details Feeders	Tx - LV Level (kV)	Station Minumum Load	Station Thermal Capacity (MW)	Station Short Circuit Capacity (MVA)	Upstream TS	Upstream TS feeder
AGIMAK DS	Total	F1, F2	24.9	1.0	7.0	652		
AGINCOURT TS	B	M2,M4,M6,M8,M10,M12	27.6	14.4	10.8	124		
AGINCOURT TS	Y	M1,M3,M5,M7,M11	27.6	13.2	10.8	125		
AGINCOURT TS	Total	M2,M4,M6,M8,M10,M12,M1,M3,M5,M7,M11	27.6	27.4	Sum of Buses	0		
ALBION TS	Total	N/A	12.5	35.8	Sum of Buses	0		
ALBION TS	BQ	N/A	12.5	20.9	9.0	113		
ALBION TS	JY	N/A	12.5	14.3	9.0	112		
ALEXANDER DS	B1	F1,F3	27.6	4.5	12.5	N/A	SOUTH MARCH TS	M5
ALEXANDER DS	B2	F2,F4	27.6	2.3	10.3	N/A	SOUTH MARCH TS	M5
ALEXANDER DS	Total	F1,F2,F3,F4	27.6	6.9	14.9	N/A	SOUTH MARCH TS	M5
ALLANBURG TS	Total	M6, M7, M8	27.6	9.8	21.8	212		
ALLISTON TS	Total	M1, M2, M3, M4, M5, M6	44	21.6	61.5	467		
ALMONTE TS	J	M25	44	1.8	21.8	1142		
ALMONTE TS	Q	M26, M28	44	7.7	28.7	1148		
ALMONTE TS	Total	M25,M26,M28	44	10.6	29.1	0		
ARDOCH DS	Total	F1, F2	12.5	0.5	6.5	75		
ARMITAGE TS DESN 1	QJ	M11, M12, M13, M14, M21, M22, M23, M24	44	59.6	118.0	411		
ARMITAGE TS DESN 2	EY	M31, M32, M33, M34, M41, M42, M43, M44	44	60.4	85.2	300		
ARNPRIOR TS	Total	M1, M2	44	15.4	33.1	907		
AYLMER TS	Total	M1, M2	27.6	3.2	10.0	529		
BARRIE TS	Total	M1, M2, M3, M4, M5, M6, M7	44	24.5	68.5	644		
BASIN TS	A5A6	T3A5, T3A6, T5A5, T5A6	13.8	10.7	9.0	65		
BASIN TS	A7A8	T3A7,T3A8, T5A7, T5A8	13.8	9.5	8.1	65		
BASIN TS	Total	T3A5, T3A6, T5A5, T5A6,T3A7,T3A8, T5A7, T5A8	13.8	21.5	Sum of Buses	0		
BATHURST TS DESN 1	B	M10,M4,M5, M6, M8	27.6	14.9	39.9	94		
BATHURST TS DESN 1	Y	M1,M2,M3,M7,M9	27.6	11.8	41.8	108		
BATHURST TS DESN 1	Total	M1,M2,M3,M7,M9,M10,M4,M5, M6, M8	27.6	26.6	Sum of Buses	0		
BATHURST TS DESN 2	Total	M23,M25,M27,M31,M24,M26,M30,M32	27.6	24.0	Sum of Buses	0		
BATHURST TS DESN 2	J	M24,M26,M30, M32	27.6	11.7	27.8	97		
BATHURST TS DESN 2	Q	M23,M25,M27,M31	27.6	12.3	33.8	98		
BATTERSEA DS	T1	F1,F2	12.5	1.1	7.1	409		
BATTERSEA DS	T2	F3	12.5	1.0	7.7	396		
BATTERSEA DS	Total	F1,F2,F3	12.5	2.0	8.0	0		
BEACH TS - DESN1	B1B2	M11, M12, M13, M14, M21, M22, M23, M24	13.8	9.2	0.5	21		
BEACH TS - DESN1	Total	M11, M12, M13, M14, M21, M22, M23, M24,M51,M52,M53,M54,M61,M62,M63	13.8	17.4	Sum of Buses	34		
BEACH TS - DESN1	Y1Y2	M51,M52,M53,M54,M61,M62,M63,M64	13.8	8.2	5.4	41		
BEACH TS - DESN2	Total	M41,M42,M43, M44, M31,M32,M33,M34,M71,M72,M73,M74,M81,M82,M83,M8	13.8	0.4	Sum of Buses	21		
BEACH TS - DESN2	J1J2	M71,M72,M73,M74,M81,M82,M83,M84	13.8	7.1	2.8	34		
BEACH TS - DESN2	Q1Q2	M41,M42,M43, M44, M31,M32,M33,M34	13.8	6.7	5.8	20		

SAMPLE - LIST OF APPLICATIONS

Project Number	Station	Tx Feeder	Dx Station	Dx Feeder	CIA Initiated Date	Proposed Total Capacity (kW)
752	ALLANBURG TS	KM3			11/28/2006	1,056
2179	ALLISTON TS	M4			9/7/2007	10,000
1830	ALLISTON TS	M6			5/15/2008	10,000
63	ALMONTE TS	M25			3/7/2007	5,000
1076	ARMITAGE TS	M43			8/16/2007	1,500
1845	ARMITAGE TS	M32			5/15/2008	10,000
1846	ARMITAGE TS	M32			5/15/2008	10,000
1208	ARNPRIOR TS	M2			9/28/2007	10,000
1209	ARNPRIOR TS	M2			9/28/2007	10,000
561	AYLMER TS	M2			12/4/2006	848
2098	AYLMER TS	M2			7/17/2008	10,000
1266	BASIN TS	A17BN, A19BN, A25BN			2/5/2007	4,160
746	BATHURST TS	M7			10/1/2006	6,000
1054	BATTERSEA DS	F1			11/14/2007	498
2168	BEAMSVILLE TS	M1			2/12/2008	10,000
2167	BEAMSVILLE TS	M2			2/12/2008	10,000
2022	BEAMSVILLE TS	M2			6/20/2008	10,000
1946	BEARDMORE DS	F2			6/18/2008	700
1668	BEAVERTON TS	M27	PORT BOLSTER DS	F2	4/2/2008	100
10,110	BEAVERTON TS	M24			2/12/2009	2,000
10,140	BEAVERTON TS	M24			2/12/2009	2,500
8	BELLE RIVER TS	M2			2/29/2000	10,000
837	BELLEVILLE TS	M5	STIRLING DS	F3	8/22/2007	498
10,130	BELLEVILLE TS	M7			2/12/2009	6,800
1123	BRANTFORD TS	M26			8/15/2007	8,100
1402	BROCKVILLE TS	M3	BROCKVILLE SCHOFIELD DS	F41	1/7/2008	90
1932	BROWN HILL TS	M1			5/22/2008	10,000
1017	BUCHANAN TS	M21			7/18/2007	10,000
1018	BUCHANAN TS	M21			7/18/2007	10,000
1994	BUCHANAN TS	M22			6/9/2008	2,850
2125	BUCHANAN TS	M22			7/4/2008	10,000
2126	BUCHANAN TS	M22			7/4/2008	7,000
750	BUNTING TS	BUM55 (BUM61)			5/30/2006	2,000

Thank You

Please stay in touch with your account executive
and monitor www.HydroOne.com
for future developments