Hydro One's LAC & Threshold CIAs for LDCs

June 30, 2010

Agenda for Today

1. Overview of Hydro One's List of Allocated Capacity (LSC)
2. Threshold CIA Option for LDC's
3. Review of a CIA Template
4. Q & A Session

Today's Objectives

- Today we want to review the List of Station Capacity to ensure you understand the context and information provided.
- We also want to provide a specific update on the Threshold CIA Process for LDC's.
- We will review our CIA template to help you understand the output of a CIA study.

Hydro One LSC

- On May 1, 2010, HONI published a new format to better comply with regulatory requirements, and to provide more information to proponents.
- LAC is now composed of the List of Station Capacity and the List of Applications.
- No fundamental changes to station capacities as a result.

Hydro One LSC

- On June 1, 2010, legacy distribution generators (NUGs) were added to the List of Applications
  - Load displacement generators are not shown since their impact is included in metered load. Their SC impact has been included in the remaining SC capacity values.
- Proponents can now see existing generators and future generators on the same list.
- Proponents can determine the remaining capacity on a feeder by using the two lists together.

Hydro One LSC

- List of Station Capacity shows thermal capacity and Short Circuit capacity available, in separate columns.
- Minimum station loading is shown for information, but is also reflected in the thermal capacity number.
- Therefore the minimum station loading value is not required to determine remaining capacity.

Hydro One LSC

- The remaining SC capacity must accommodate both existing and queued generators.
- Without detailed knowledge of the existing or queued generators, we suggest:
  - Subtract the capacity listed on the List of Applications **(x5 assuming a classical synchronous machine)** from the associated TS from the LAC values. The result is remaining SC capacity.
- Must pass both thermal & Short Circuit capacity tests.
- NOTE: These calculations do not substitute for a CIA.

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

Dobbin TS

List of Applications

Project Number	Tx Station	Tx Feeder	Dx Station	Dx Feeder	Application Date	Name Plate Capacity (kW)
Existing	DOBBIN TS	20M7			N/A	**1100**
242	DOBBIN TS	M7			27-Nov-06	**8000**
1215	DOBBIN TS	M5			28-Sep-07	**10000**

List of Station Capacity

Station Name	Bus Name	Feeder Name	Voltage (kV)	Minimum Load (MW)	Short Circuit Capacity (MVA)	Thermal Capacity (MW)	Upstream TS	Upstream TS Feeder
DOBBIN TS	Total	M1 to M8	44.0	30.1	**447.2**	**90.1**		

Capacity : Example 1

- Dobbin TS
  - Station capacity is 90.1MW (thermal), and
  - Station capacity is 447.2 MVA (short circuit)
- Existing capacity allocated at Dobbin TS
  - Applications: 10 + 8 = 18 MW
  - Existing Generation: 1.1 MW
  - Total capacity allocated: 18 + 1.1 = 19.1 MW
- Remaining Capacity (there must be capacity in both tests)
  - Thermal: 90.1 – 19.1 = 71 MW
  - Short Circuit: 447.2 – (19.1 * **5)** = 351.7 MVA

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List of Station Capacity

Station Name	Bus Name	Feeder Name	Voltage (kV)	Minimum Load (MW)	Short Circuit Capacity (MVA)	Thermal Capacity (MW)	Upstream TS	Upstream TS feeder
BELLEVILLE TS	Total	M1, M2, M3, M4, M5, M6, M7, M8, M9	44.0	57.0	703.5	80.5		

Downstream DS Capacity

Station Name	Bus Name	Feeder Name	Voltage (kV)	Minimum Load (MW)	Short Circuit Capacity (MVA)	Thermal Capacity (MW)	Upstream TS	Upstream TS feeder
STIRLING DS	Total	F1,F2,F3	8.3	1.2	N/A	3.6	BELLEVILLE TS	M5

List of Applications

Project Number	Tx Station	Tx Feeder	Dx Station	Dx Feeder	Application Date	Name Plate Capacity (kW)
Existing	BELLEVILLE TS	M9			N/A	950
837	BELLEVILLE TS	M5	STIRLING DS	F3	22-Aug-07	498
11910	BELLEVILLE TS	M6			19-May-10	10000
11960	BELLEVILLE TS	M6			26-May-10	10000
12360	BELLEVILLE TS	M6			26-May-10	10000

Capacity : Example 2

- Belleville TS and Stirling DS
  - Station capacity is 80.5 MW (thermal), and
  - Station capacity is 703.5 MVA (short circuit)
- Existing capacity allocated at Belleville TS
  - Applications at Belleville TS: 10 + 10 + 10 = 30 MW
  - Applications at Stirling DS: 0.498 MW
  - Existing Generation: 0.95 MW
  - Total capacity allocated: 30 + 0.498 + 0.95 = 31.448 MW
- Remaining Capacity (there must be capacity in both tests)
  - Thermal: 80.5 – 31.448 = 49.052 MW
  - Short Circuit: 703.5 – (31.448 * **5)** = 546.26 MVA

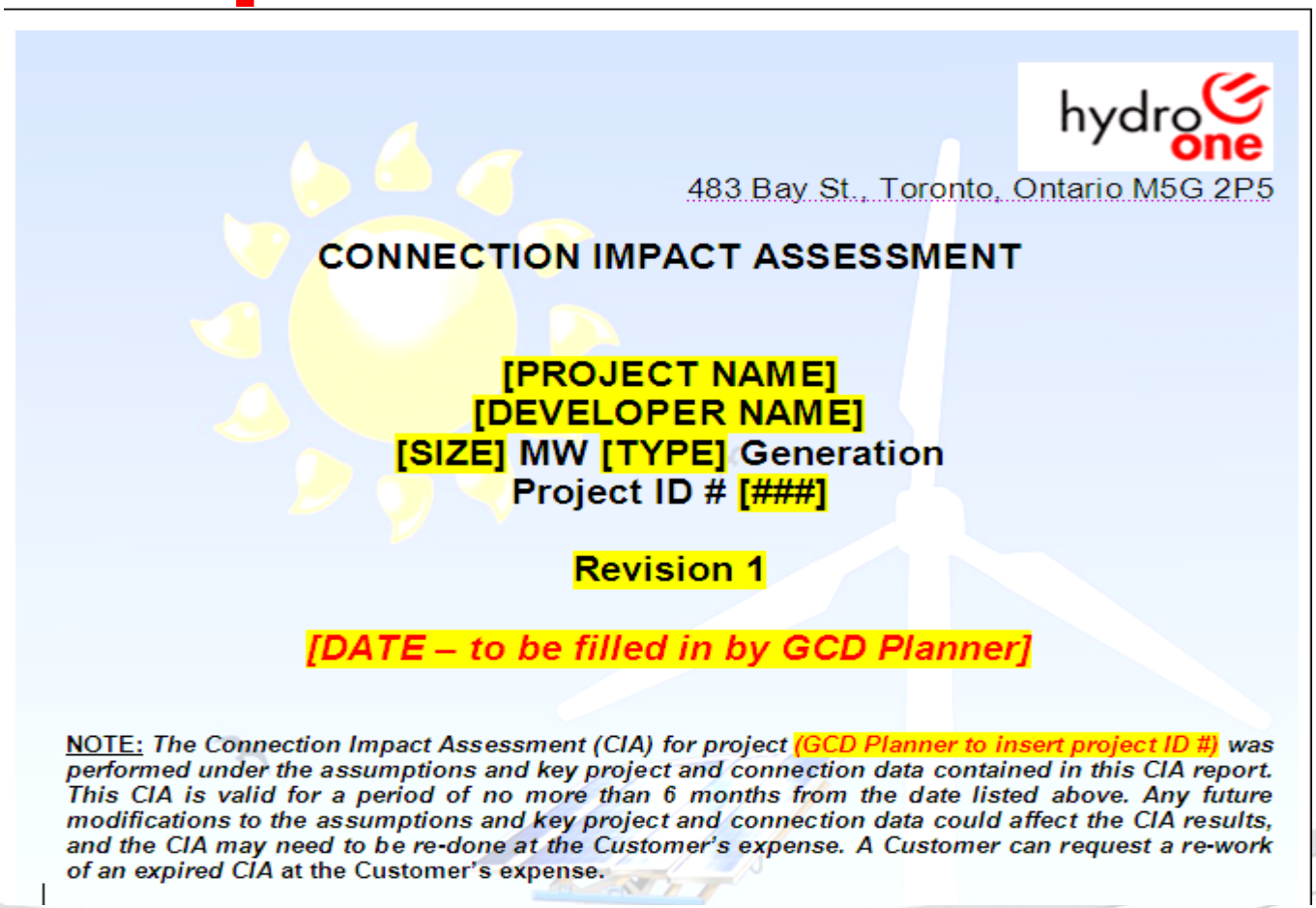
LDC Threshold CIA Option

- Available for LDC owned feeders & express feeders to one LDC subject to available Gx capacity at the TS.
- Only applies to inverter based CAE projects.
- Allocates1 MW of capacity per TS bus for inverter based Gx connections.
- LDC must have one CAE project application to apply for the Threshold CIA.

LDC Threshold CIA Option

- Valid for 6 months but extendable on receipt of CAE project connection status from the LDC.
- More than 1 MW available with appropriate rationale.
- Simplified application form for LDC's.
- Same application process - through BCC.

CIA Report



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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.

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CIA Template Example

- Executive Summary
- Assumptions
- Project Data Summary
- Tx Station Impacts
- Dx Feeder Impacts (Voltage, Equipment, etc.)
- Appendices

CIA: Background And Objective of the Impact Assessment

- Identifies the impact to the System(s).
- Refers the reader to Assumptions.
- Provides information about CIA revisions.
- Refers to the Distribution System Code.

CIA: Executive Summary

- Scope of CIA
- Highlights
- Issues

CIA Template Example

- Assumptions
- Key Connection Impact Assessment (CIA) Study Data
  - System Data
  - Project and Connection Data

CIA: Impacts to the Hydro One Distribution System

- Section 4 is where Hydro One normally identifies the Distribution feeder impacts. This section is left out of the Threshold CIA because the feeder belongs to the LDC and the feeder portion is studied by the LDC.
- It will be included in those CIAs where the feeder is shared by Hydro One and another Distributor(s).

CIA: Impacts to the Hydro One Supply Station

- Momentary Voltage Fluctuations at Station LV Bus.
- Power Flow at Station.
- Impact of DG Fault Contribution on Transmission System Code Limits and Station Equipment Rating.
- Feeder Relay Directioning at Supply Station (can be specified by the LDC).
- Direct Transfer Trip (T/T) Signal from Station Feeder Breaker/re-closer to the DG facility (can be specified by the LDC).
- Direct transfer trip from a radial Transmission line.
- Telecommunication, Telemetry and SCADA (omitted for projects < 250kW).

CIA: Other Requirements and Considerations

- Interconnection Requirements
- Power Quality
- Revenue Metering at DG Site [Omitted if the DG Facility is in LDC Service Territory]
- Protection Design Review
- System Impact Assessment (SIA) Requirement

CIA: Appendices

- A - Distribution Operating Map
- B - Single Line Diagram
- C - System Impedance Data
- D - Proponent Contact information

Summary

- Reviewed LSC & LOA listings.
- Reviewed the Threshold CIA option.
- Outlined the contents of the HONI CIA.
- We will now take questions. Please type them in.

Thank You

Please stay in touch with your Account Executive
and monitor www.HydroOne.com
for future developments.