

October 26, 2012

Mr. Ted Lyberogiannis
Sustainment Manager - Transmission Stations Planning
Hydro One Networks Inc.
483 Bay Street
Toronto, Ontario
M5G 2P5

Dear Mr. Lyberogiannis:

***Replacement of T1 & T2 at Cobden TS
Notification of Conditional Approval of Connection Proposal
CAA ID Number: 2012-EX626***

Thank you for the information regarding the proposed replacement of T1 and T2 at Cobden TS. The IESO has concluded that the proposed changes will not result in a material adverse impact on the reliability of the integrated power system. The IESO is therefore pleased to grant **conditional** approval as detailed in the attached expedited System Impact Assessment report. Please note that any material changes to your proposal may require a re-assessment by the IESO and may nullify your conditional approval.

You may now initiate the IESO's **Facility Registration/Market Entry** process. To do so, please contact Registration & Compliance Support at market.entry@ieso.ca at least eight months prior to your expected energization date. The SIA report, attached hereto, details the requirements that your company must fulfill during this process, including demonstrating that the equipment *as installed* will not be materially different from the equipment *as approved* by the IESO. The document entitled [Market Entry: A Step-by-Step Guide](#) describes the key steps in the Market Entry process.

When your company has successfully completed the IESO's **Facility Registration/Market Entry** process, the IESO will provide you with a **final approval**, thereby confirming that the facility is fully authorized to connect to the IESO-controlled grid.

For further information, please contact me via connection.assessments@ieso.ca.

Yours truly,

Michael Falvo
Manager – Market Facilitation
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cc: IESO Records

Final Report - Expedited System Impact Assessment
Hydro One Networks Inc.

1.0 GENERAL DESCRIPTION & PROPOSED MODIFICATIONS

Hydro One is proposing to replace T1 and T2 at Cobden TS with new units due to end of life.

Cobden TS is a 110/44 kV DESN transformer station on the 115 kV circuits X2Y and X6 out of Chenaux GS.

The expected in-service date for the replacement T1 and T2 will be communicated to the IESO.

2.0 TECHNICAL SPECIFICATIONS

The technical specifications of the existing and replacement transformers are given in the following table.

Cobden TS			
All values for replacement equipment are specified at the time of order. Actual values to be provided prior to in-service dates.			
Transformer	Existing T1	Existing T2	Replacement T1 and T2
Configuration	Three phase	Three phase	Three phase
Transformation (kV)	110/44	110/44	115.5/44
Winding Configuration	Wye/Wye	Wye/Wye	Wye/Wye
Thermal Rating	11.25 MVA ONAN 15.0 MVA ONAF 19.0 MVA ONAF	11.25 MVA ONAN 15.0 MVA ONAF 22.8MVA ONAF	25.0 MVA ONAN 33.3 MVA ONAF 41.7 MVA ONAF
Continuous Thermal Rating (winter 10°C)	19.0 MVA	22.8 MVA	41.7 MVA
10-DAY Thermal Rating (winter 10°C)	28.8 MVA	32.6 MVA	58.4 MVA Assumed to be 140% of the continuous rating (1.4 x 41.7)
15-MIN Thermal Rating (winter 10°C)	38.1 MVA	46.7 MVA	To be provided
Positive Sequence Impedance (H-L)	R = 0.616% X = 8.92% on 15.0 MVA base	R = to be provided X = 8.99% on 15.0 MVA base	R = 0.26% X = 7.41% on 25.0 MVA base
Impedance to Ground	HV –ungrounded LV – solidly grounded	HV –ungrounded LV – solidly grounded	HV –ungrounded LV – solidly grounded
Under-load tap-changer	44 ± 4.4 kV 16 Steps	44 ± 4.4 kV 16 Steps	44 ± 8.8 kV 32 Steps
Off-load tap-changer	Tap 1: 121.0 Tap 2: 115.5 Tap 3: 110.0 Tap 4: 104.5	Tap 1: 115.5 Tap 2: 112.75 Tap 3: 110.0 Tap 4: 107.25 Tap 5: 104.5	Not applicable
In service off-load tap position	Tap 2: 115.5	Tap 1: 115.5	Not applicable

Table 1 – Comparison of Existing and Replacement T1 and T2 at Cobden TS

3.0 REQUIREMENTS

Hydro One must notify the IESO as soon as it becomes aware of any changes to the assumptions made in the connection assessment. The IESO will determine whether these changes require a re-assessment.

Reactive Power Requirements

The Market Rules require that Hydro One have the capability to maintain a power factor (pF) within the range of 0.9 lagging and 0.9 leading as measured at the defined metering points at Cobden TS.

Monitoring Requirements

The Market Rules (Chapter 4 section 7.4) require that the transmitter shall provide the IESO on a continual basis with on-line monitored quantities as specified in Appendix 4.16. For this proposed project, the IESO will continue to require the operating quantities associated with the new transformers.

Among other things, end to end telemetry testing must be completed by the applicant along with the IESO to ensure that standards are met and sign conventions are understood.

Provided that the TSC requirements are satisfied, the IESO does not have additional requirements.

4.0 ASSESSMENT & CONCLUSIONS

4.1 10-Day Winter Transfer Capabilities

The 10-DAY winter transfer capability for a DESN is determined by removing the transformer with the highest 10-DAY thermal rating from service.

The 10-DAY winter ratings of these two transformers at Cobden TS are listed in the table below.

10-DAY Winter Thermal Ratings (10°C) for Transformers T1/T2 DESN at Cobden TS		
Transformer	Existing T1 & T2	New T1 & T2
T1	28.8 MVA	58.4 MVA assumed
T2	O/S (32.6 MVA)	O/S (58.4 MVA) assumed
10-DAY Winter Transfer Capability (with highest rated transformer out of service)	28.8 MVA	58.4 MVA assumed

Table 2 – 10-DAY Winter Thermal Ratings for T1/T2 DESN at Cobden TS

For the T1/T2 DESN at Cobden TS, the existing 10-DAY winter transfer capability is 28.8 MVA. The 10-DAY winter transfer capability will increase to an assumed 58.4 MVA when the new T1 and T2 are put into service.

4.2 Peak Loads and Projections

Revenue meter information from June 21, 2011 through September 9, 2012 was used to evaluate the load on the T1/T2 DESN at Cobden TS. The peak load of 23.2 MVA on the T1/T2 DESN at Cobden TS occurred on January 3, 2012 at 18:00. The figure below shows the loading at the LV side of T1 and T2 during the daily on-peak hours, which are defined as 7 a.m. until 11 p.m.

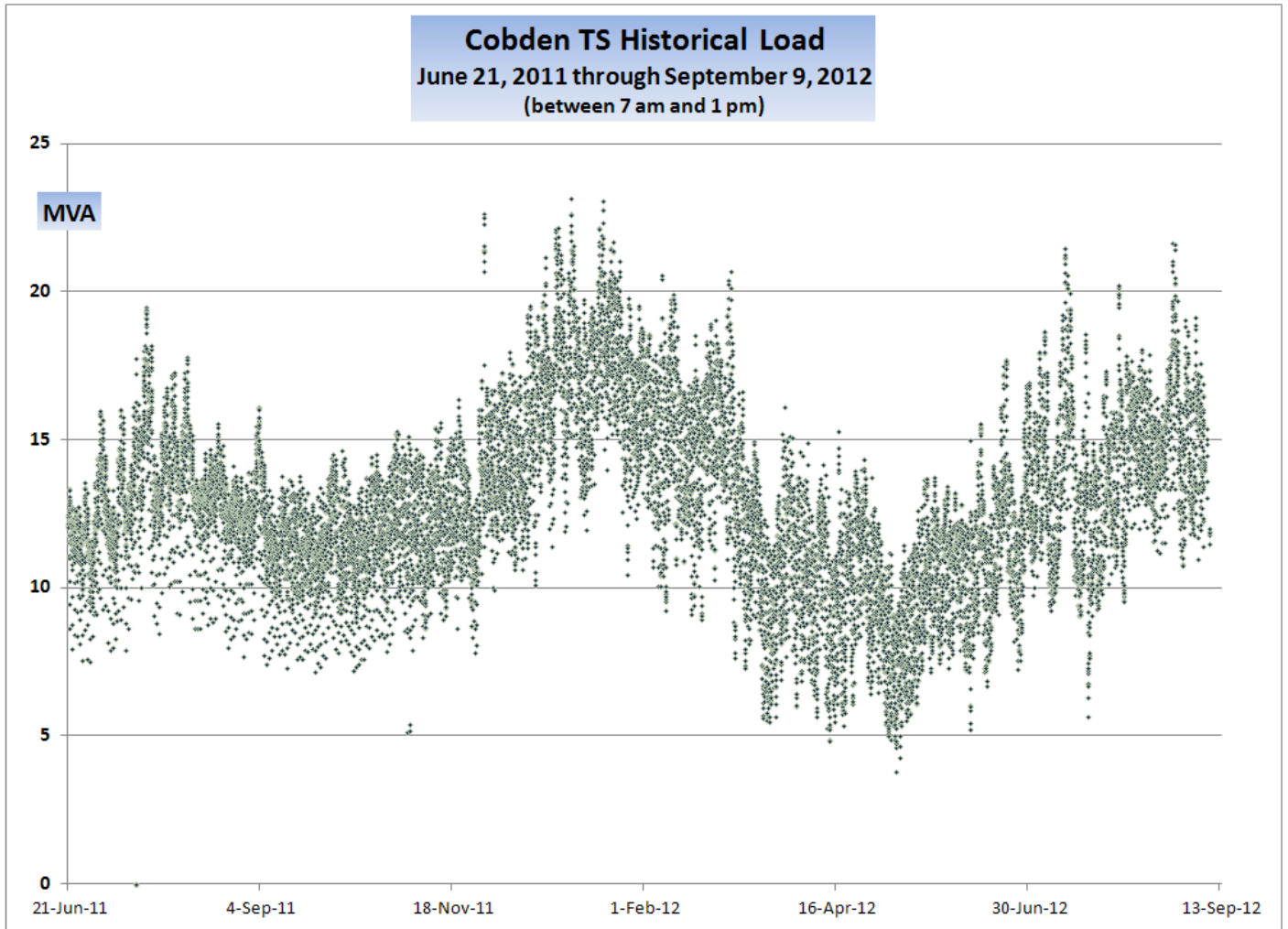


Figure 1 – T1/T2 DESN Load at Cobden TS

The peak load at Cobden TS is lower than the current 10-DAY winter capability of 28.8 MVA.

The load on T1 and T2 at Cobden TS is projected to increase by 1% annually as shown in the table below.

Cobden TS T1/T2 Projected Peak Load Growth		
Year	Projected Peak Load (MVA)	10-DAY Winter Capability (MVA)
2012	23.2	28.8
2013	23.4	
2014	23.7	
2015	23.9	58.4 assumed
2016	24.1	
2025	26.4	

Table 3 – T1/T2 Projected Load Growth at Cobden TS

The projected peak load will not exceed the new 10-DAY winter capability of 58.4 MVA (assumed) for the T1/T2 DESN at Cobden TS.

4.3 Load Angle & Power Factor

The Market Rules require that Hydro One have the capability to maintain a power factor (pF) within the range of 0.9 lagging and 0.9 leading as measured at the defined metering points at Cobden TS. This power factor range translates into a load angle range of ± 0.45 radians. All the points above 0.45 radians indicate a lagging power factor below 0.9. All points below -0.45 radians indicate a leading power factor below 0.9.

Revenue meter information from June 21, 2011 through September 9, 2012 was used to evaluate the load angle at Cobden TS. The figure below illustrates the load angle on the LV side of Cobden TS during the daily on-peak hours, which are defined as 7 a.m. until 11 p.m.

There is are no low voltage shunt capacitors at Cobden TS providing reactive support.

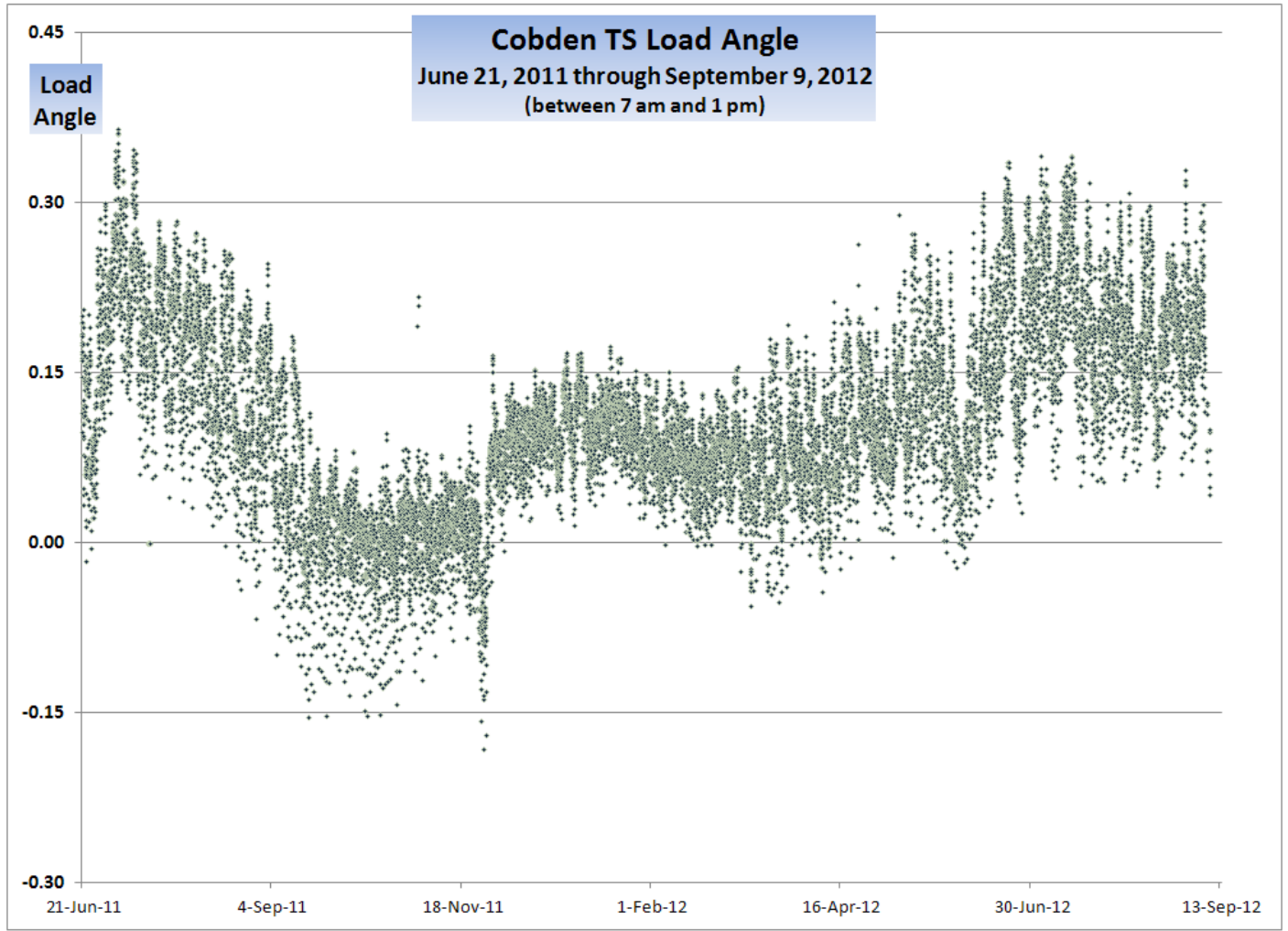


Figure 2 – Load Angle at Cobden TS

Between June 21, 2011 and September 9, 2012, the load angle at Cobden TS was within the IESO required limits.

4.4 Conclusions

It can be concluded that the replacement of T1 and T2 at Cobden TS with two new transformers will not result in a material adverse impact on the reliability of the IESO-controlled grid provided that all requirements in this report are met.