EB-2011-0140

ONTARIO ENERGY BOARD

A PROCEEDING TO DESIGNATE A TRANSMITTER TO CARRY OUT DEVELOPMENT WORK FOR THE EAST-WEST TIE LINE

INTERROGATORIES OF THE INDEPENDENT ELECTRICITY SYSTEM OPERATOR ("IESO")

1. All Applicants:

Increase in Transfer Capability of the *Reference Case*

Preamble

For the *Reference Case,* Diagram 7 of the IESO's report shows a flow of approximately 335MVA on each of the existing Wawa-to-Marathon circuits following a double-circuit contingency involving the new line over the same section of the East-West Tie. The post-contingency thermal rating of each of these circuits is approximately 420MVA. Since the transfer capability across the East-West Tie Interface has been shown to be limited by voltage stability rather than the thermal rating of the existing circuits, the transfer capability of the reinforced East-West Tie could be further enhanced beyond the target transfer of 650MW by increasing the rating of the proposed 200MVAr SVC at Marathon TS and/or installing series capacitors.

Questions

(a) Please confirm that your design for the *Reference Case* could be modified to include provision for the future installation of series capacitors at each terminal. This would reduce the extent of the work required to equip the circuits of the *Reference Case* with series capacitors to allow full use of the additional transfer capability that the *Reference Case* could provide.

(b) If your design can be suitably modified to include this provision, what additional costs would be expected to be incurred for the associated modifications?

2. All Applicants submitting a proposal based on single-circuit lines:

Preamble

The double-circuit line has several benefits over the single-circuit option. These include:

i. a higher thermal rating (up to about 800 MW) that can be exploited for future expansion by adding more voltage control or compensation equipment.

ii. a higher level of reliability because of its inherent redundancy (2 circuits to one, a lower exposer to common-mode failures, more flexibility to perform line and terminal maintenance).

iii. less reliance on voltage control and compensation equipment, special protection systems.

iv. fewer electrical equipment involved and less risk of equipment failure.

v. a higher level of operating security as described in section 16 of the IESO's August 2011 Feasibility Study.

Question

What additional attributes of the single-circuit option does the transmitter claim will off-set the benefits of the double-circuit option described above?

3. All Applicants submitting a proposal based on single-circuit lines with series compensation:

Preamble

In the IESO's Feasibility Study of August 2011 it was assumed that the series compensation would be installed at the approximate mid-point of the line.

This assumption is made in Figure 1 for the Alternative Case and is also shown in each of the diagrams that summarize the results from the load flow analysis for the Alternative Case.

Subsequent to issuing the Feasibility Study, Hydro One informed the IESO that any reinforcement of the East-West Tie that involved an 'enhanced' connection would require special protective relaying and would need to be separately switched. This switching would be independent of the switching provided within the Hydro One transformer stations.

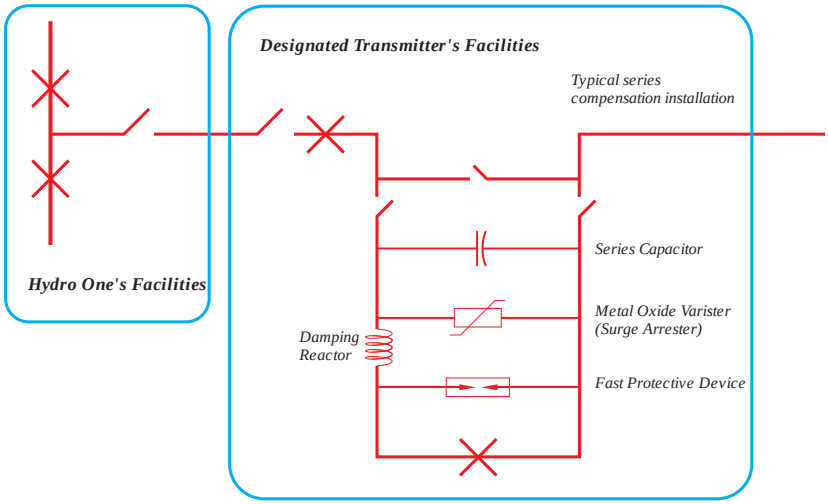
Therefore options that include the use of series compensation, or HVdc converters, would need to include separate breakers located in switchyards owned by the designated transmitter for the project.

Series compensated projects would need to include land acquisition and site preparation for the separate switchyards with breakers and isolating and bypass switches, surge arresters, the series capacitors and associated structures, protective relaying and in particular, protections and facilities to protect the series capacitors, and any other associated equipment. The diagrams below are examples of the series compensation arrangement.

Question

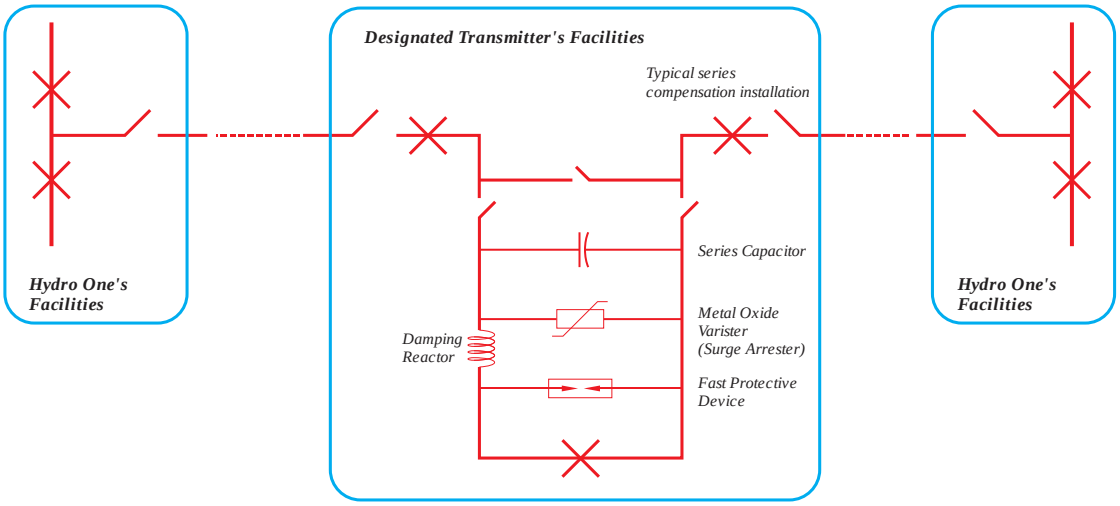
(a) Please identify the terminal arrangements and associated facilities for your proposed series compensated lines, and please confirm the total cost of procuring and installing the series compensation facilities, including the facilities described above for each series-compensated line.

1. With the Proposed Series Compensation Distributed Evenly between the Two Terminals of Each Line



Wawa TS, Marathon TS OR Lakehead TS

2. With the Proposed Series Compensation Concentrated at the Approximate Mid-Point of Each Line



The Approximate Mid-Point of the New Line

4. All Applicants:

Preamble

To assess whether a proposal will satisfy IESO reliability criteria at the required transfer level some characteristics for proposals must be available.

Question

What is the a.c. resistance (at 20°C), reactance and susceptance (i.e. R, X, B) for each circuit of the Wawa to Marathon and Marathon to Lakehead sections of the new line(s)?

5. RES Canada Transmission LP:

Preamble

Diagram 32 of the Feasibility Study in Exhibit I – Tab 2 of the RES Submission shows a voltage stability limit of **685MW** for transfers across the EW-Tie Interface following the most onerous contingency which would involve losing both circuits of the *existing* double-circuit line between Wawa TS and Marathon TS.

Diagram 8 of the IESO's Feasibility Study of August 2011 shows a voltage stability limit for the *Reference Case* of **686MW** for transfers across the EW-Tie Interface following the loss of both circuits of the *new* double-circuit line between Wawa TS and Marathon TS.

Question

(a) Please explain the claim made in Exhibit G of your submission that your Preferred Design 'has superior electrical performance attributes' when its EW-Tie transfer capability would be virtually identical to that of the Reference Case, but would require not only a higher-rated SVC at Marathon TS, but post-contingency switching of the tertiary-connected reactors at Marathon TS to achieve this transfer.

Preamble

Station layouts in IESO Feasibility Study REP-2 (Tab H-2-3 Figure 2, Figure 3, and Figure 4) had at least three diameters at Wawa, Marathon, and Lakehead. In the RES *Preferred Design*, ring-bus arrangements (i.e. two diameters) are presented for Wawa, Lakehead, and Marathon (Exhibit G Tab 3 Schedule 1, Exhibit H Tab 4 Schedule 4, and Exhibit H Tab 4 Schedule 5). These ring-bus layouts have weaker post-contingency configurations than those assessed by the IESO. In addition, the RES layouts do not cater for additional shunt elements at Marathon and Lakehead so post-contingency equipment configurations cannot be assessed. Without adopting the station layouts in IESO Feasibility Study REP-2, the corresponding transfer capabilities identified in this study have not been confirmed by the IESO.

Question

(b) Please confirm the ring bus layouts presented for the RES Reference and Alternatives will be equivalent or superior to either the Reference or Alternative Options in the IESO Feasibility Study of August 2011.

Preamble

In IESO Feasibility Study REP-2 conducted by the IESO for RES, the series compensation was modelled as split equally at both terminal stations. The 40% series compensation for the Wawa-Marathon circuit was modelled with 20% compensation at each of the Wawa and Marathon terminals. The 50% series compensation for the Marathon-Lakehead circuit was modelled with 25% compensation at each of the Marathon and Lakehead terminals. The RES *Preferred Design* puts all series compensation at Marathon.

Question

(c) Without using the series capacitor arrangement presented in the IESO Feasibility Study REP-2, what evidence supports the claim that the RES *Preferred Design* is equivalent or superior to either the Reference or Alternative Options in the IESO Feasibility Study of August 2011?

6. **All Applicants:**

Preamble

In the IESO Feasibility study of August 2011, the IESO assumed a route length of approximately 400 km, and used circuit electrical parameters representative of that length of route.

Question

(a) For transmitters proposing alternative paths that vary materially in length from the reference 400 km, please confirm that the change in length will not materially alter the electrical parameters of the line such that the targeted transfer capability can still be achieved.

Preamble

For transmitters proposing to use 230 kV class equipment, the preferred maximum continuous operating rating for some switchgear is 245 kV, and the maximum utilization voltage for other 230kV class equipment can be as low as 242 kV. The IESO's Market Rules require that equipment be capable of operating continuously up to 250 kV.

Question

(b) Will the design be capable of continuous operation up to 250 kV as required by the IESO's Market Rules?

7. All Applicants:

Are you aware of any differences between the inputs that went into the Feasibility Study on record and the details of the plans on record? If so, please explain such differences.

January 30, 2013