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November 15, 2016

VIA RESS AND COURIER
Kirsten Walli
Board Secretary
Ontario Energy Board
P.O. Box 2319
2300 Yonge Street, 27th Floor
Toronto, Ontario M4P 1E4

Dear Ms. Walli:

RE: EB-2016-0160 Hydro One Networks Inc. ("Hydro One") Transmission Rates Application – Interrogatories to Environmental Defence Evidence

In accordance with Procedural Order No. 4, please find attached Hydro One's interrogatories in the above noted proceeding, in respect of the evidence filed by Environmental Defence on November 9, 2016.

Yours truly,

McCarthy Tétrault LLP
Per:

For: Gordon M. Nettleton
GMN

Hydro One Networks Inc. (HONI) Interrogatories
Evidence of Travis Lusney on Behalf of Environmental Defence
Filed November 9, 2016 in EB-2016-0160 ("ED Evidence")
November 15, 2016

HONI 1
Ref: ED Evidence, Page 5.

Preamble:

Inclusion of transmission system modeling of transmission losses can be used on a daily basis to optimize the configuration of the transmission system.

Interrogatory:

a) Please describe what daily reconfigurations of the transmission system would be informed from modeling the transmission losses on a daily basis and how would that materially reduce losses.

HONI 2
Ref: ED Evidence, Pages 6 to 7.

Preamble:

A second option to reduce transmission conductor losses is to replace the conductor with materials that have extremely low resistance, sometimes referred to as superconductors. Superconductors achieve low resistance by cooling the material below a specific threshold temperature, while achieving substantially higher power transfer capability at the same voltage level and size as conventional materials. The need to cool the superconductor means that the use is primarily restricted to underground applications where cooling capabilities are easier to apply compared to overhead transmission lines. The superconductor materials are expensive compared to conventional conductor materials limiting the application to specific circumstances.

Interrogatory:

a) What specific circumstances would superconductors be applicable for the purpose of reducing conductor losses?

b) Has there been an application of superconductors for the primary purpose of reducing losses in North America?

c) If so, please identify where and what jurisdiction this has been applied and what might be the approximate investment level for these projects?

d) What is the typical per km cost ratio of a superconductor compared to a conventional ACSR conductor to transfer the same power level?

HONI 3
Ref: ED Evidence, Page 7.

Preamble:

A third option for reducing transmission conductor losses is to reduce the flow of reactive power on the transmission conductor. Reactive power is the result of current and voltage not being in phase and leads to total current on a line being greater than what is required to deliver the required power to a load. Reactive power compensation can be used to remove reactive power and reduce the additional transmission system losses. Reactive power compensation can be provided by a Flexible Alternating Current Transmission System (FACTS). FACTS is defined by the IEEE as "a power electronic based system and other static equipment that provide control of one or more AC transmission system parameters to enhance controllability and increase power transfer capability". FACTS can provide Shunt Compensation or Series Compensation.

Interrogatory:

a) Is the primary purpose of most FACTS devices to improve power transfer capability, or to reduce conductor losses?

b) If the primary purpose is to improve power transfer capability, would that not result in higher current flows and higher losses?

c) If the primary purpose is to reduce conductor losses, please identify some examples of FACTS installations in North America for this purpose. Please also identify the type of FACTS device and an estimate of the facility cost and the forecasted level of loss savings.

HONI 4
Ref: ED Evidence, Page 12.

Preamble:

The first component of transmission efficiency regulation is allocation of responsibility for procurement of losses. In some countries (e.g., Norway), the transmitter/network operator is responsible for procurement of energy to replace losses and those transmission loss costs are included in allowed revenue. Where the transmitter/network operator is responsible for procuring transmission losses, the energy is typically secured through real-time energy markets, bi-lateral agreements or through auctions/tenders for generation of firm energy.

Interrogatory:

a) Please confirm that the Norwegian transmitter/network operator is Statnett, and please confirm whether ED's understanding of Statnett is consistent with the following statement taken from Statnett's website:

> Statnett is first of all responsible for all high voltage electricity transmission and distribution in Norway … Statnett is also appointed the role as Norway's Transmission System Operator (TSO) with an overall responsibility of coordinating the operation of the country's electric power system, maintaining correct balance between supply and demand at all times. In doing so Statnett also regulates all electric power exchange with other national grid systems abroad, primarily involving those of the other Nordic grid system operators.

HONI 5
Ref: ED Evidence, Page 12.

Preamble:

An example of transmission loss regulation is the transmission license of National Grid Electricity Transmission (NGET), a transmission company located in the United Kingdom (UK), which requires a report on transmission losses within its transmission system. NGET is required to publish an annual transmission losses report and to publish a strategy on how NGET will address the level of transmission losses on its transmission system.

Interrogatory:

a) Does NGET perform the integrated system operations function, including the balancing of generation and load, in addition to performing the functions of a transmission owner?

b) If so, how are these functions different from the integrated system operation functions performed by the IESO in Ontario?

c) Given the differences in the functions and operations of NGET and Statnett versus Hydro One, please explain why examples of where transmitter/network operator responsibility is shared is relevant to Ontario transmission owners.