Hydro One Networks Inc.
EB-2021-0136
Leave to Construct Application – Richview TS
by Trafalgar TS Reconductoring Project – Application and Evidence

Interrogatories of Environmental Defence

Interrogatory 1

Reference: Exhibit B-3-1, p. 8

Preamble: The IESO project report dated July 12, 2021 states as follows:

> Several transmission alternatives were considered that can provide increases in the FETT capacity.
>
> Those options were narrowed down to two options that meet the following two criteria:
> - Can be in-service before the summer 2026.
> - Provide an increase in transfer capability of at least 2,250 MW in 2026 assuming all transmission elements in service.

Question:

(a) Please confirm that the two criteria are that the project: (i) can be in-service before the summer 2026; and (ii) provide an increase in transfer capability of at least 2,250 MW in 2026 assuming all transmission elements in service.

Interrogatory 2

Reference: Exhibit B-3-1, p. 8

Preamble:

> "At the development phase of the project, numerous conductors were considered for upgrading the Trafalgar TS x Richview TS lines. It was concluded that the use of 1433 kcmil ACSS would provide the required planning summer long term emergency (LTE) rating of 2000 A. It is a high-temperature compact conductor that allows the required rating without involving significant tower modifications. The existing line includes 795 kcmil ACSR and 1307 kcmil ACSR conductors. The reduction in the resistance, hence reduction in line losses, will be about 44% for the sections with 795 kcmil ACSR and about 8% for the sections with 1307 kcmil ACSR."

Questions:

(a) Does Hydro One take the position that it was unable to seek OEB approval for a larger conductor than 1433 kcmil ACSS even if this could cost-effectively avoid transmission losses (i.e., the net present value of the transmission loss reductions would be higher than the net present value of the incremental cost of the larger conductor)?
(b) Was Hydro One or the IESO responsible for determining whether a larger conductor would be more cost-effective due to the value of incremental transmission loss reductions (i.e., greater than 1433 kcmil ACSS)? Please provide Hydro One's view and ask for the IESO's view.
(c) Please provide the name and title of the primary Hydro One engineers that were involved in the development of this project.
(d) Please provide the name and title of the primary IESO engineers that were involved in the development of this project.
(e) Did Hydro One and the IESO discuss the possibility of upsizing the conductors to cost-effectively reduce transmission losses? If yes, please provide the approximate dates of any such discussions, a summary of what was concluded, and any correspondence on that topic.

Interrogatory 3

Reference: Exhibit B-3-1, p. 8

Preamble:

> "Several transmission alternatives were considered that can provide increases in the FETT capacity.
>
> Those options were narrowed down to two options that meet the following two criteria:
> - Can be in-service before the summer 2026.
> - Provide an increase in transfer capability of at least 2,250 MW in 2026 assuming all transmission elements in service.
>
> …
>
> At the development phase of the project, numerous conductors were considered for upgrading the Trafalgar TS x Richview TS lines. It was concluded that the use of 1433 kcmil ACSS would provide the required planning summer long term emergency (LTE) rating of 2000 A. It is a high-temperature compact conductor that allows the required rating without involving significant tower modifications. The existing line includes 795 kcmil ACSR and 1307 kcmil ACSR conductors. The reduction in the resistance, hence reduction in line losses, will be about 44% for the sections with 795 kcmil ACSR and about 8% for the sections with 1307 kcmil ACSR."

Questions:

(a) Please provide a list of the type and size of conductors that would also result in an increase in transfer capability of at least 2,250 MW in 2026 assuming all transmission elements in service (aside from 1433 kcmil ACSS). Presumably this will include a variety of larger conductors.

(b) Please estimate the cost of the project based on the various potential conductors that would meet the required transfer capability (at least 2,250 MW assuming all transmission elements in service) and include those estimates in the following table:

Conductor Alternatives – Capital Cost Comparison	
	Total Capital Cost
Conductor 1: 1433 kcmil ACSS	$56.3 million
Conductor 2	
…	
Conductor n	

(c) To assist us in determining whether a more detailed transmission loss analysis is unnecessary, please estimate annual transmission losses that would result from the various potential conductors that would meet the required transfer capability (at least 2,250 MW assuming all transmission elements in service) and include those estimates in the following table. Please estimate the losses as if the lines were fully loaded 24/7/365. Note that this request is intended to assist in screening and is not a forecast.

Conductor Alternatives – Annual Transmission Loss Comparison for Screening	
	Estimated Transmission Loss
Conductor 1: 1433 kcmil ACSS	X kwh
Conductor 2	Y kwh
…	…
Conductor n	

(d) To assist us in determining whether a more detailed transmission loss analysis is unnecessary, please calculate the cost of the transmission losses set out in part (c) above at $120/MWh and provide the results in the following table:

Conductor Alternatives – Annual Transmission Loss Value (for Screening Only)	
	Estimated Transmission Losses Value
Conductor 1: 1433 kcmil ACSS	$X
Conductor 2	$Y
…	…
Conductor n	

(e) Please estimate annual transmission losses that would result from the various potential conductors that would meet the required transfer capability (at least 2,250 MW assuming all transmission elements in service) and include those estimates in the following table. Please estimate the losses based on historic load data of Hydro One's choosing and make and state all necessary assumptions.

Conductor Alternatives – Annual Transmission Loss Comparison	
	Estimated Transmission Losses
Conductor 1: 1433 kcmil ACSS	X kwh
Conductor 2	Y kwh

…	…
Conductor n	

(f) Please estimate annual transmission losses assuming the load increases by 2% annually over 40 years starting from the amount listed in (e).

Conductor Alternatives – Transmission Loss Comparison – 40 Years			
	Estimated Annual Transmission Losses		
	Year 1	…	Year 40
Conductor 1: 1433 kcmil ACSS	X kwh		
Conductor 2	Y kwh		
…	…		
Conductor n			

(g) Please estimate the value of transmission losses listed in (f) based on the avoided cost figures published by the IESO as part of its latest Annual Planning Outlook and provide the results in the following table:

Conductor Alternatives – Transmission Loss Value – 40 Years			
	Estimated Annual Transmission Losses Value		
	Year 1	…	Year 40
Conductor 1: 1433 kcmil ACSS	$X	…	
Conductor 2	…		
…			
Conductor n			

(h) Please provide the equations necessary to determine the losses along the line in question based on the various conductor options that would meet the required transfer capability (at least 2,250 MW assuming all transmission elements in service). Please include a function to determine the losses based on the load (MW).

(i) For the most recent year with available data, please provide a live excel spreadsheet showing the load on the line (MW) and the transmission losses on the line (MW) for every hour in that year. For that same year, please also provide HOEP for every hour in the year.

Interrogatory 4

Reference: Exhibit B-3-1, p. 8

Preamble:

> "Several transmission alternatives were considered that can provide increases in the FETT capacity.
>
> Those options were narrowed down to two options that meet the following two criteria:
>
> - Can be in-service before the summer 2026.

- Provide an increase in transfer capability of at least 2,250 MW in 2026 assuming all transmission elements in service.

…

At the development phase of the project, numerous conductors were considered for upgrading the Trafalgar TS x Richview TS lines. It was concluded that the use of 1433 kcmil ACSS would provide the required planning summer long term emergency (LTE) rating of 2000 A. It is a high-temperature compact conductor that allows the required rating without involving significant tower modifications. The existing line includes 795 kcmil ACSR and 1307 kcmil ACSR conductors. The reduction in the resistance, hence reduction in line losses, will be about 44% for the sections with 795 kcmil ACSR and about 8% for the sections with 1307 kcmil ACSR."

Question:

(a) Please conduct an analysis assessing the cost-effectiveness of upsizing the conductor that compares the incremental costs to the incremental benefits (i.e., reduced transmission losses) over 40 years. Please express the result as an NPV figure. Please provide all the calculations, variables, and assumptions.

Interrogatory 5

Reference: Exhibit B-07-01, p. 10

Preamble: "[T]he RTR Project requires tower modifications to accommodate the new heavier conductor. This is expected to include tower reinforcement, including localized steel member replacement and foundational upgrades for increased loading conditions. Additionally, six towers along the route have been identified as needing full replacement."

Question:

(a) Please describe and estimate the cost of the tower modifications that would be required for the various potential conductors that would meet the required transfer capability (at least 2,250 MW assuming all transmission elements in service) and include those in the following table:

Conductor Alternatives – Tower Modification Comparisons		
	Description of Tower Modifications	Estimated Cost of Tower Modifications
Conductor 1: 1433 kcmil ACSS		
Conductor 2		
…		
Conductor n		

Interrogatory 6

Reference: Exhibit B-3-1, p. 8

Questions:

(a) Please provide the capacity the various potential conductors that would meet the required transfer capability (at least 2,250 MW assuming all transmission elements in service) and include those estimates in the following table:

Conductor Alternatives – Capacity Comparison	
	Capacity
Conductor 1: 1433 kcmil ACSS	X MW
Conductor 2	
…	
Conductor n	

(b) Please estimate the value of this additional capacity to the electricity system to the extent that it may allow for less costly energy and/or capacity.

Interrogatory 7

Reference: Exhibit B-07-1, p. 1

Question:

(a) Please provide a breakdown of the project cost table (Table 1 – Project Cost) divided into work relating to tower modification and other work.

Interrogatory 8

Reference: Exhibit B-03-01-03, p. 8

Preamble:

> "greater flexibility in where supply resources are located is expected to provide greater competition amongst those supply resources and ultimately lead to ratepayer savings."

Questions:

(a) Please provide an estimate of the value of the ratepayer savings described above. Please do so on a best-efforts basis. An order-of-magnitude estimate is sufficient. Please make and state any assumptions as necessary. If necessary, please ask the IESO for its estimate.
(b) Please provide a map or maps showing: (i) the approximate area in which supply resources would need to be procured if the project is not built; and (ii) the approximate area in which supply resources can be procured if the project is built. If necessary, please ask the IESO for this information.

(c) Please describe the kinds and magnitude of supply resources that this project will potentially enable. For example:
   a. Is this likely to enable more wind, storage, or solar assets from western Ontario, and if yes, how much of each?
   b. Is this likely to enable more imports, and if yes, how much from each neighbour?
   c. Is this likely to enable generation from gas fired generation, and if yes, how much?