Hydro One Networks Inc.
EB-2022-0140
Leave to Construct Application:
Transmission Line between Chatham SS and Lakeshore TS

Interrogatories of Environmental Defence

Interrogatory # 5-ED-1

Reference: Exhibit B, Tab 3, Schedule 1, Attachment 2, Page 9

Preamble:

> As the southernmost portion of Ontario, the Windsor-Essex Region extends southwest from Chatham to Windsor. Although the region is home to approximately 400,000 people, its electricity demand is defined by its economic activity. The region's history of automotive manufacturing, particularly near the city of Windsor, is accompanied by entertainment tourism in the city's core and large food processing operations throughout Essex County.
>
> While the manufacturing sector in the Windsor-Essex Region continues on a downward trend in line with the recent automotive industry, economic diversification has triggered other changes to the region's electricity demand. The Kingsville-Leamington area within the Windsor-Essex Region includes North America's largest concentration of greenhouse vegetable production. With agricultural businesses in this local area expanding rapidly, interest in cannabis growth operations developing, and the adoption of artificial crop lighting becoming commonplace, electricity supply requirements to the Kingsville-Leamington area will continue increasing significantly. Due to the substantial growth in the area, any local supply needs have to be assessed along with the bulk system supply.

Question:

(a) In addition to increasing greenhouse operations, did Hydro One also consider future load growth related to the electrification of heating and transportation in the Kingsville-Leamington area as result of anticipated decarbonization efforts? If so, please provide any copies of any studies that Hydro One has conducted on how electrification will impact capital planning and equipment sizing in the Windsor-Essex region.

Interrogatory # 5-ED-2

Reference: Exhibit B, Tab 3, Schedule 1, Attachment 2, Page 9

Preamble:

The Kingsville-Leamington area within the Windsor-Essex Region includes North America's largest concentration of greenhouse vegetable production. With agricultural businesses in this local area expanding rapidly, interest in cannabis growth operations developing, and the adoption of artificial crop lighting becoming commonplace, electricity supply requirements to the Kingsville-Leamington area will continue increasing significantly. Due to the substantial growth in the area, any local supply needs have to be assessed along with the bulk system supply.

Questions:

(a) Approximately how many greenhouse customers are within the area to be served by the proposed transmission line?
(b) Of the greenhouse customers, approximately what percent are heated with fossil fuels and approximately what percent are heated with electricity?
(c) Please comment on the likelihood that a significant portion of the greenhouses that will be served by the proposed transmission line will electrify their heating by 2030, 2040, and 2050. In the answer, please expressly address the impact of carbon pricing, the impact of Canada's binding statutory carbon targets, Canada's 2030 Carbon Emissions Reduction Plan, and the changing cost-effectiveness of fossil fuel heating versus electric heating.
(d) Please provide an analysis of the cost-effectiveness of fossil-fuel-heated greenhouses converting to heating by high-efficiency electric heat pumps (air source or ground source) that accounts for forecast carbon price increases, recent efficiency improvements in heat pumps, and impacts on gas prices from the war in Ukraine. The purpose of this question relates to the likelihood that greenhouses will electrify as that will impact electricity demand and could impact the size of conductor that is chosen.
(e) If all the fossil-fuel-heated greenhouses in the area to be served by the proposed transmission line were to convert to electric heating, how much would peak demand (MW) increase? How much would the annual demand (MWh) increase? Based on current rates, how much would Hydro One earn in incremental revenue associated with this increased demand? Please make and state those assumptions as necessary. To address uncertainties, please state all caveats and/or provide a range of possible figures. An order-of-magnitude answer on a best efforts basis is sufficient.

Interrogatory # 5-ED-3

Reference: Exhibit B, Tab 3, Schedule 1, Attachment 2, Page 15

Preamble:

As noted above, the primary driver of load growth for the overall region is expansion of the agricultural industry in the Kingsville-Leamington area. Demand forecast scenarios were developed based on different outlooks for growth in the Kingsville-Leamington area. While historically summer peaking, the load in the Kingsville-Leamington area is forecast to transition to a winter peaking load, due to the use of artificial crop lighting in

winter months. As a result, the overall peak for the Windsor-Essex Region is also forecast to become a winter peak in the near-term.

Three scenarios were developed to represent the load growth forecast specific to the Kingsville-Leamington area.

Questions:

(a) Please confirm that Hydro One relied on the load forecasts provided in the IESO's report, "Need for Bulk Transmission Reinforcement in the Windsor-Essex Region" dated June 13, 2019 (filed as Exhibit B, Tab 3, Schedule 1, Attachment 2) at pages 14-17 in the development of this application.
(b) Do the load forecasts in Figures 4, 5 and 6 on pages 14-17 of Exhibit B, Tab 3, Schedule 1, Attachment 2 include data related to future electrification? If so, please explain.

Interrogatory # 5-ED-4

Reference: Exhibit B, Tab 3, Schedule 1, Attachment 2, Page 15

Preamble:

Most of the questions below will require a number of assumptions to be made to provide an answer. Please make and state those assumptions as necessary. To address uncertainties, please state all caveats and/or provide a range of possible figures. For all of these questions, an order-of-magnitude answer on a best efforts basis is sufficient.

Questions:

(a) Approximately how many customers are in the area that will be served by the proposed transmission line? Please provide a breakdown by residential, commercial, and industrial.
(b) What is the approximate current electric vehicle penetration in the Leamington-Kingsville area?
(c) Approximately how many residential customers heat their homes with electric heat pumps?
(d) If all residential customers in the Leamington-Kingsville area served by the proposed transmission line were to adopt electric vehicles, what would the contribution to peak demand be for planning purposes in MW? How much would the annual demand (MWh) increase? Based on current rates, how much would Hydro One earn in incremental revenue associated with this increased demand?
(e) If all residential customers in the Leamington-Kingsville area served by the proposed transmission line were to replace existing fossil fuel heating with high-efficiency electric heat pumps, what would the incremental contribution to peak demand be for planning purposes in MW? How much would the annual demand (MWh) increase? Based on current rates, how much would Hydro One earn in incremental revenue associated with this increased demand?

(f) What is the approximate threshold of electric vehicle penetration (%) at which point an additional upgrade would be required to the proposed transmission line?
(g) What is the approximate threshold of the percentage of customers that electrify their fossil fuel heating with high-efficiency cold climate heat pumps at which point an additional upgrade would be required to the proposed transmission line?
(h) What is the approximate threshold of the percentage of customers that electrify both their vehicles and fossil fuel heating at which point an additional upgrade would be required to the proposed transmission line?

Interrogatory # 5-ED-5

Reference: Exhibit B, Tab 3, Schedule 1, Attachment 2, Page 15

Questions:

(a) How much incremental peak capacity would be obtained by using a 1780 kcmil ACSR conductor versus the proposed conductor size?
(b) Please provide a rough desktop estimate of the cost (NPV to today) if Hydro One needs to upgrade these lines to a 1780 kcmil ACSR conductor in 15 years from now. We are not asking Hydro One to speak to the likelihood of this possibility and ask that the answer be provided even if Hydro One believes it is unlikely.
(c) What is the expected useful lifetime of the proposed transmission line (total years, and in-service date to end-date)?
(d) Please calculate the value of increasing the size of the line arising from the avoidance of the *possibility* that this size increase would be required in the before the end of the equipment's lifetime due to demand growth.

Interrogatory # 5-ED-6

Reference: Exhibit B, Tab 9, Schedule 1, s. 3.0

Preamble:

Conversely, when comparing Methods 2 and 3, Figure 2 below demonstrates that the incremental NPV result for Method 2 and 3 differs with the energy price used. If the energy price is $23.2[5], Method 2 is favourable. However if the energy price is valued at $120, Method 3 is favourable.

	Method 2: 1443 kcmil ACSR	Method 3: 1780 kcmil ACSR	Difference
Capital Cost ($M)	93.0	100.0	7.0
Annual Losses (MWHR)	16,024	13,178	-2,846
Net Present Value ($M)			
Energy Price ($/MWHR)	**Method 2: 1443 kcmil ACSR**	**Method 3: 1780 kcmil ACSR**	**Difference**
$23.2	-87.6	-91.8	-4.2
$75.0	-108.8	-109.2	-0.5
$120.0	-127.1	-124.3	2.8

Figure 2

Questions:

(a) Please provide all calculations underlying the applicant's analysis of transmission losses. Please attach the live excel spreadsheets to allow the analysis to be tested with varying assumptions.
(b) Please provide the latest draft of Hydro One transmission losses evaluation guidelines.
(c) Did Hydro One conduct its transmission losses evaluation in this case in accordance with its draft guidelines? If not, please describe any ways in which it deviated from the guidelines.
(d) Please confirm that the Hydro One transmission losses evaluation guideline remains a draft and Hydro One is still considering the input from stakeholders provided on the guideline (as was stated in responses to IRs in Hydro One's ongoing rates case).

Interrogatory # 5-ED-7

Reference: Exhibit B, Tab 9, Schedule 1, s. 3.0

Preamble: Per page 4:

> "Transmission line losses remain within the scope of the IESO's stakeholder engagement on transmission line losses. Hydro One does not have any basis to deviate from the HOEP value of $23.2/MWHR which is the only current settlement mechanism to recover transmission line loss costs."

Questions:

(a) A draft IESO transmission losses evaluation guideline is available from the IESO. The IESO's methodology accounts for, among other things, the capacity benefits of loss reductions in addition to the energy benefits, unlike the draft Hydro One guideline. Please obtain a copy of the IESO's draft guideline and conduct a transmission losses assessment in a method that is consistent with the IESO's guideline.

(b) As the IESO's guideline is new, please ask the IESO to comment on a draft of Hydro One's response to (a).
(c) Please provide all calculations underlying the response to (a). Please also provide the live excel spreadsheets to ensure a better understanding of what has been done and to allow stakeholders to consider the outcomes if certain variables are changed.
(d) Please confirm that Hydro One's detailed transmission losses assessment as between the 1443 kcmil ACSR and 1780 kcmil ACSR options accounted only for the energy benefits ($23.2/MWh) and not the capacity benefits?

Interrogatory # 5-ED-8

Reference: Exhibit B, Tab 9, Schedule 1, s. 3.0

Questions:

(a) Please provide an excel spreadsheet showing, for the lifetime of the proposed transmission line, the:
    i. Forecast annual demand on the proposed transmission line (MWh);
    ii. Forecast peak demand on the proposed transmission line (MW);
    iii. Forecast peak demand at the time of system peak (i.e. co-incident peak demand) in MW;
    iv. Forecast losses (MW) at the system peak hour for the 1443 kcmil ACSR and 1780 kcmil ACSR options; and
    v. Forecast annual losses (MWh) for the 1443 kcmil ACSR and 1780 kcmil ACSR options.
(b) Please provide the equation to calculate the losses as a function of demand (MW) for the 1443 kcmil ACSR and 1780 kcmil ACSR options.
(c) Please an excel spreadsheet with historical figures for the area to be served by the proposed transmission line, including:
    i. Hourly demand for the past five years (MW); and
    ii. Hourly demand for the past five years (MW) for the top ten system peak hours:

Interrogatory # 5-ED-9

Reference: Exhibit B, Tab 9, Schedule 1, s. 3.0

Questions:

(a) Has Hydro One taken any irreversible steps that would commit it to installing a 1443 kcmil ACSR line instead of a 1780 kcmil ACSR line? If yes, what are those steps and why were they taken?
(b) Has Hydro One taken any steps that would increase the cost of selecting the 1780 kcmil ACSR line (e.g. purchasing material only compatible with the 1443 kcmil option)? If yes, what are those steps and why were they taken?
(c) Would a decision by Hydro One and/or the OEB to pursue a 1780 kcmil ACSR line delay the in-service date? If yes, please provide a full explanation as to why.