IN THE MATTER OF a cost of service application made by Hydro One Networks Inc. Transmission with the Ontario Energy Board on May 31, 2016 under section 78 of the *Ontario Energy Board Act,* 1998, S.O. 1998, c. 15, (Schedule B), seeking approval for changes to its transmission revenue requirement and to the Ontario Uniform Transmission Rates, to be effective January 1, 2017 and January 1, 2018.

AND IN THE MATTER OF the Notice of Motion filed with the Board on September 29, 2016 by Environmental Defence.

AND IN THE MATTER OF Hydro One Networks Inc. Submissions in response to the Notice of Motion filed by Environmental Defence, in accordance with Rule 8.03 of the Ontario Energy Board Rules of Practice and Procedure.

SUBMISSIONS OF HYDRO ONE NETWORKS INC.
IN RESPONSE TO ENVIRONMENTAL DEFENCE
October 21, 2016

A. INTRODUCTION

In accordance with Procedural Order No. 3 dated October 12, 2016, and Rule 8.03 of the *Rules of Practice and Procedure,* Hydro One Networks Inc. ("**Hydro One**") provides submissions in response to the Notice of Motion filed on September 29, 2016, by Environmental Defence (the "**ED Motion**") and to address submissions filed by Board Staff on October 18, 2016.

The ED Motion requests an order from the Board requiring Hydro One to provide further responses to specific interrogatories. Board Staff supports the ED Motion based on the belief that transmission losses are relevant to Hydro One's transmission planning exercise, and thus information respecting transmission losses is relevant to this rate proceeding. Board Staff submits that while some of the information may take considerable time to produce, Hydro One should use its best efforts to provide the requested information.

B. SUBMISSIONS

The ED Motion requests that Hydro One produce further and better responses to the following interrogatories:

	Interrogatory	Additional Information Requested
•	ED IR #1	The actual maximum capacity that can be imported to and

from Ontario's five adjoining jurisdictions (actual capacity after considering operational constraints, not installed capacity) ("**Maximum Import/Export Capacity**").

- ED IR #2 Hydro One's annual transmission energy losses as a percent of its total annual transmission throughput volumes and transmission energy losses during annual peak demand hour as a percent of the total demand of its customers during the peak hour, for the last 10 years ("**Annual Transmission Losses**").
- ED IR #3(c) Estimates of the average transmission energy losses for transmission companies in the United States and Canada ("**Average Third Party Transmission Losses**").
- ED IR #4(a)(c) Detailed description of the various sources of Hydro One's transmission energy losses, including a percentage breakdown by geographic region and type, and a list of steps Hydro One could be taking to reduce transmission losses that it is currently not taking ("**Transmission Loss Sources**").
- ED IR #5 Estimate of the annual cost of Hydro One transmission losses for the last ten years ("**Transmission Loss Costs**").

Hydro One opposes the ED Motion on the basis that it is not in possession and control of the information requested.

Theoretically, transmission investments to address system losses would be considered in Hydro One's transmission planning process if the IESO identified a specific system need and directed Hydro One to carry out a particular project intended to address this type of need. Overall system and regional planning are matters within the IESO's responsibilities. In the present circumstances, however, the IESO has not identified such needs, nor has it provided such direction to Hydro One. Under Ontario's market structure, the costs associated with energy losses are recovered as a component of the prevailing market price for electricity. The planning and recovery of costs associated with energy losses are within the purview of the IESO; therefore, Hydro One does not maintain information on energy losses, let alone use this type of information in its own transmission investment planning process.

As noted in ED's Motion, Hydro One and the IESO have advised ED of the level of information that each possesses in respect of energy losses on the transmission network. The IESO does not collect energy loss information specific to transmitters or other market participants, and as noted Hydro One does not maintain this information. These responses have not been

considered sufficient for ED's purposes, and thus what ED seeks is for Hydro One and/or the IESO to take positive steps to obtain and produce information that Hydro One does not possess.

Hydro One objects to this request. The effort required for Hydro One to create and produce the type of information requested by ED would require assessing a variety of dynamic factors that apply to the market demand for electricity in each hour of the year and correlating this to each circuit comprising the Hydro One transmission system, as well as interconnecting transmission systems.

From its correspondence dated October 19, 2016, ED seeks to address transmission losses further in this proceeding by engaging an expert to address the topic of transmission losses and how losses are addressed in other jurisdictions. Hydro One does not see this step as in any way being relevant to or justifying the ED Motion at hand, namely, production of information that Hydro One does not possess. If the Board effectively determines that transmission losses are a topic germane to this proceeding by approving ED's request to have expert testimony prepared on the topic of how the treatment of transmission losses in jurisdictions outside of Ontario has bearing on Hydro One's investment planning process, then Hydro One will have Mr. Bing Young available to address, to the extent possible, questions ED has with respect to why Hydro One does not use energy losses information in the manner requested by ED in its transmission planning process.

1. Maximum Import/Export Capacity

Hydro One does not have information on the actual maximum import/export capacity associated with each of Ontario's five adjoining jurisdictions. Available information respecting Ontario's export and import capacity was provided by the IESO in its September 16, 2016 letter to ED ("**IESO Letter #1**").[1] IESO Letter #1 included a link to the Ontario Transmission System report dated June 21, 2016, which provides Ontario's theoretical coincident import/export capacity. While the report does not specifically provide import/export capacity, it does provide the transfer capability of Ontario's interconnections.[2] In IESO Letter #1, the IESO notes that the amount of

[1] IESO Letter #1 has been filed in the record of EB-2016-0160 on September 16, 2016; IESO Letter #1 is also referred to in Environmental Defence Motion For Full and Adequate Interrogatory Responses: EB-2016-0160 Motion Record, Tab 9, pp. 1-2.

[2] Ontario Transmission System, IESO, June 21, 2016, at p 16, as referenced in Environmental Defence Motion For Full and Adequate Interrogatory Responses: EB-2016-0160 Motion Record, Tab 9, p 2.

power that can be transferred at Ontario's interconnections at any given time is affected by many dynamic factors in and outside Ontario, and the IESO's value used to calculate transfer capabilities incorporates various complex considerations.[3] These dynamic factors are not within Hydro One's control. In contrast, Hydro One's transmission system planning process is focused upon the investments that are needed for its own assets and operations during the test year period that are needed in order to ensure safe and reliable transmission service.

Following receipt of ED's Motion, Hydro One had follow-up conversations with the IESO concerning the additional information requested. On October 18, 2016, counsel to Hydro One received correspondence from the IESO in this regard ("**IESO Letter #2**"). IESO Letter #2 is attached as **Exhibit "1"**.

IESO Letter #2 details all of the information that the IESO possesses that may be helpful to ED, and addresses what appear to be misunderstandings underlying ED's requests for information on energy losses and intertie capacity. In brief, ED's stated goal in obtaining this information is to investigate potential investments to reduce customer bills by reducing energy losses, and the IESO has stated that these objectives cannot be properly considered in isolation in this proceeding.

ED has now been provided with as much information as both the IESO and Hydro One possess respecting import and export capacity. If additional inquiry is sought into the factors and issues that affect energy losses, then it would seem that a different process led by the IESO would be appropriate in order to consider those broader issues.

Inquiry within this proceeding, however, would not provide this broader perspective and would potentially cause significant delay to the Board's consideration of the relief sought in this application.

2. Annual Transmission Losses and Average Third Party Transmission Losses

Hydro One does not record or compute the total amount of electricity transmitted by Hydro One as a percentage of the total electricity transmitted in the province, nor does it compute its annual energy losses on the transmission network. This was discussed in Hydro One's response to

[3] Such as generation, customer demand and limits imposed on the transmission system due to thermal, voltage, and stability conditions during a particular time period: Environmental Defence Motion For Full and Adequate Interrogatory Responses: EB-2016-0160 Motion Record, Tab 9, p 2.

ED's interrogatory, as well as at the Technical Conference.[4] At the Technical Conference, ED requested that Hydro One provide an estimate of the transmission losses attributable to Hydro One, within a range and subject to provisos. The answer given was that Hydro One does not have the information to create such an estimate – among other difficulties, any such estimate would require computations involving 8,760 hours of the year since losses on the network vary throughout the year.[5] The estimate ED seeks would require an enormous amount of data and analysis (enough to understand what occurred in every part of the transmission network every single hour of the year).[6]

Neither the IESO nor Hydro One collects energy loss information specific to transmitters. As noted above, Hydro One has stated this, and the IESO has noted that it has not conducted any transmitter-specific transmission loss studies, or any studies on transmission companies in Canada and the United States. Hydro One submits that to require the IESO or Hydro One to conduct these studies would be an unreasonable amount of effort in the view of fulfilling one interrogatory response in this proceeding.

3. Transmission Loss Sources

ED seeks a breakdown of the various sources of transmission losses, including a percentage breakdown by geographic region and type. In Hydro One's response to ED's interrogatory, Hydro One stated that losses on the transmission network are primarily due to line losses and transformer losses; this was also discussed on Day 2 of the Technical Conference.[7] Hydro One also does not have information on the sources supplying electricity to the system compared to delivery points where electricity exits the system – this information resides with the IESO.[8] Estimating and calculating transmission losses is further complicated by the wide range of variables which must be considered: among others, transmission losses are a function of

[4] Hydro One Response to ED Interrogatory #002: EB-2016-0160, Exhibit I, Tab 5, Schedule 2, Page 1 of 1; 2016-0160, Technical Conference Transcript: Day 2, September 23, 2016, at pp 87-88.

[5] Technical Conference Transcript: Day 2: EB-2016-0160 (23 September 2016), Pages 90-91.

[6] *Ibid,* Pages 90-91, Lines 28-5.

[7] Hydro One Response to ED Interrogatory #004: EB-2016-0160, Exhibit I, Tab 5, Schedule 4, Page 1 of 1; Technical Conference Transcript: Day 2: EB-2016-0160 (23 September 2016), Pages 77-87.

[8] Hydro One Response to ED Interrogatory #002: EB-2016-0160, Exhibit I, Tab 5, Schedule 2, Page 1 of 1.

voltage, electrical distance, generation dispatch, and loading patterns.[9] Hydro One simply does not have enough information to break out the various sources of transmission losses.

There appears to be a misunderstanding with respect to Hydro One's transmission planning process as it relates to energy losses. Losses on the transmission network are significantly impacted by the dispatch of generation, loading patterns and the transactions that take place in the power system – both in and outside of Ontario. While Hydro One's transmission planning process includes direction from the IESO as it concerns projects for overall system requirements, the IESO has not directed Hydro One to proceed with any system project specifically intended to address losses on the transmission network. Indeed, it would be unprecedented for Hydro One to receive such direction because system losses are typically an ancillary aspect to IESO's system-directed planning and operations initiatives.

4. Transmission Loss Costs

In order to provide ED with the requested Transmission Loss Costs, Hydro One would at minimum require information on annual energy losses specific to Hydro One's transmission network. As noted above, Hydro One does not compute its annual transmission losses, and for the reasons noted above Hydro One submits that it would be unreasonable to require it to compile this information for the purpose of answering ED's interrogatory.

A. CONCLUSIONS

Hydro One and the IESO have collectively provided as much information as each currently possesses to facilitate ED's understanding of energy losses and Hydro One's transmission planning process.

As stated above, Hydro One will facilitate additional discussion of ED's concerns to the extent possible by ensuring that a witness is available to address the reasons why Hydro One does not consider energy losses in its transmission planning process. Considering the level of work effort required to produce the information sought by ED, Hydro One submits that cross examination of this issue will be the most useful way of addressing ED's concerns with energy losses as they relate to the transmission planning process.

[9] Technical Conference Transcript: Day 2: EB-2016-0160 (23 September 2016), Pages 78-79.

Hydro One agrees with the IESO that the discussion of potential investments for the purpose of reducing system energy losses or increasing Ontario's capacity to import power cannot be appropriately conducted in the context of this rates proceeding. Such discussions are more appropriately conducted in other planning processes and initiatives conducted by the IESO that looks at system needs in the context of a broader range of trade-offs and considerations. Hydro One would be willing to actively participate in IESO-led initiatives related to system energy losses and import/export capabilities.

Hydro One therefore submits that production of the information requested in the ED Motion should not be ordered by the Board.

All of which is respectfully submitted this 21st day of October, 2016.

Gordon M. Nettleton
Partner, McCarthy Tetrault LLP
Counsel to Hydro One Networks Inc.

Exhibit 1

October 20, 2016

Independent Electricity System Operator
1600-120 Adelaide Street West
Toronto, ON M5H 1T1
t 416.967.7474
www.ieso.ca

Mr. Gordon Nettleton, Partner
McCarthy Tétrault LLP
PO Box 48, Suite 5300
Toronto-Dominion Bank Tower
Toronto, ON
M5K 1E6

Dear Mr. Nettleton:

Re: Board File No.: EB-2016-0160
Hydro One Networks Inc. 2017-2018 Cost of Service Rate Application

The Independent Electricity System Operator (IESO) is writing to you with regards to Environmental Defence's (ED) September 29, 2016 notice of motion requesting that Hydro One provide "full and adequate" responses to ED's interrogatories 1 to 5, and the Board's recent Procedural Order No. 3.

The IESO, as you are aware, filed a letter with the Board dated September 16, 2016 responding to ED's counsel's request that the IESO expand on Hydro One's answers to certain interrogatories. The IESO also spoke directly with ED's counsel regarding the data available to answer ED's interrogatories.

Having reviewed ED's motion requesting additional information in response to interrogatories 1 to 5, some of which ED proposes be obtained from the IESO, this letter supplements the IESO's September 16, 2016 letter. The IESO also wishes to address what appear to be fundamental misunderstandings underlying ED's requests for information on transmission system energy losses and import and export capacity. Please feel free to file this letter as part of Hydro One's response to ED's motion.

Interrogatories 1 to 5

The IESO responses to interrogatories 1 to 5 are set out in the attached Appendix A. These answers reiterate and supplement the responses provided in the September 16, 2016 letter. The IESO is providing these responses to assist Hydro One in responding to those interrogatories for which ED proposes additional information be obtained from the IESO, and to assist the Board in deciding this matter.

ED's Request for Transmission Loss and Intertie Capacity Information

As stated in ED's motion, its goal in pursuing information from Hydro One and the IESO is to investigate whether "it may be possible to make investments that ultimately reduce customer bills by reducing costly energy losses or by increasing Ontario's capacity to import inexpensive clean power". ED's motion, however, presupposes that these objectives may be considered and addressed in isolation in the context of this proceeding. That is not the case. Both reducing transmission losses and increasing opportunities for clean imports are matters that have been and continue to be considered and addressed as part of other processes, including bulk system planning, regional planning, market evolution and government policy initiatives. Moreover, within these processes, the objectives of reducing transmission losses and increasing opportunities for clean imports are considered and weighed in light of other interrelated and competing priorities.

Transmission Losses

With respect to transmission planning, reducing losses is one of many considerations to be balanced in ensuring that new infrastructure investments or equipment upgrades are in the best interests of the province and ratepayers. Others include reliability, cost and related benefits such as increased capacity for new generation and/or load. For example, a new transmission line that has a voltage of 500 kV would typically mean that less energy would be lost to resistance as compared to a 230 kV line. On the other hand, the higher voltage may require more costly step-down equipment and may limit the amount and type of resources that could be connected to it due to reliability concerns. This is one example, but it illustrates the fact that making capital investments to reduce transmission line losses entails other economic, social and environmental policy trade-offs.

Transmission system planning issues, including the matter of transmission losses, are being considered and addressed through other processes including through the development of the Ministry of Energy's next Long-Term Energy Plan (LTEP), which is currently underway. There are also power system planning engagement activities conducted by the IESO. These processes and others offer opportunities for stakeholders to provide input at the early planning stages of major generation or transmission projects, prior to the associated costs of the transmission projects being reflected in transmitters' cost of service applications.

Intertie Capacity
With respect to electricity imports and exports, trade between jurisdictions is driven by many factors including economics, market/system conditions and policy objectives, not simply by physical intertie and/or transmission capability. For example, there may be sufficient capability for Ontario to accept an import, but the exporting jurisdiction may sell elsewhere if the price it is offered is higher. ED's suggestion that intertie capacity can be "unlocked" through transmission system upgrades in Ontario does not take into account the balancing of all these factors nor does it account for upgrades in transmission and/or generation that may be required in the neighbouring jurisdictions. As noted in the 2013 LTEP, "While clean energy imports offer potential benefits to Ontario, the value to Ontario depends on the willingness of those supplying imports to offer a product that matches Ontario needs and represents better value than the domestic alternatives."

Enhancing opportunities for Ontario through trade with other jurisdictions has been and continues to be the focus of several IESO-led, public initiatives. The Review of Ontario Interties report, which was released by the IESO in October 2014, provides thorough and relevant context. It can be found at http//www.ieso.ca/Documents/IntertieReport-20141014.pdf. Also, a stream of the IESO's current Market Renewal engagement that will be investigating capacity trading with neighbouring jurisdictions will include environmental considerations such as clean energy imports. All materials related to this and other public engagements, including feedback received to date, can be found on the IESO's website at http://www.ieso.ca/Pages/Participate/Stakeholder-Engagement.

The analysis that ED proposes to conduct with the information requested of Hydro One and the IESO, much of which is unavailable or would require substantial time and effort to develop, does not sufficiently take into account the complexity of the subject matter and the limited value of considering this information in the relative isolation of Hydro One's rate proceeding. Further, the concerns and opportunities ED is seeking to address through its IRs to Hydro One and the IESO are being considered and addressed in other public forums and processes.

Yours truly,

Adrian Pye
Acting Senior Manager, Regulatory Affairs

APPENDIX A: IESO RESPONSES TO ED INTERROGATORIES 1 - 5

1. Reference: Ex. B1, Tab 1, Sch. 2, Page 8

a) Please provide the theoretical maximum import and export capacity (MW) of each of Hydro One's 26 interconnections with adjoining jurisdictions (Manitoba, Quebec, Minnesota, Michigan and New York);

b) Please provide Hydro One's best estimate of the actual maximum amount of electricity (MWhs) that can be imported per year via each of these interconnections;

c) Please provide Hydro One's best estimate of the actual maximum amount of electricity (MWhs) that can be exported per year via each of these interconnections;

d) Please describe all the actions that Hydro One is taking to increase the amount of electricity (MWhs) that can be imported and/or exported via each of these interconnections. In each case where actions are being taken, please state the expected increase in annual imports and/or exports (MWhs) that these actions will allow.

e) Has Hydro One estimated the benefits and costs of upgrading its transmission system to permit increased imports and/or exports of electricity? If yes, please provide copies of these analyses.

a) As stated previously in the IESO's letter dated September 16, 2016, the theoretical maximum transfer capability limits for each major interface between Ontario and other jurisdictions can be found in the Ontario Transmission System reports available at the following link: http://www.ieso.ca/Documents/marketReports/OntTxSystem_2016jun.pdf.

(b) and (c) The IESO further clarified in its September 16 letter that the "amount of power that can be transferred at Ontario's interjurisdictional interfaces at any given time is affected by many dynamic factors in and outside Ontario" including such complex considerations as "generation, customer demand and limits imposed on the transmission system due to thermal, voltage, and stability conditions during a particular time period."

In practice, the IESO and its neighbouring balancing authorities coordinate hourly interjurisdictional trades on an economic basis within the flow limits (i.e. physical security limits) of the intertie and of their respective grids. Although flow limits for each intertie point are affected in real time by dynamic and

unpredictable factors, the IESO calculates estimates in its Ontario Transmission System reports to support analysis for the 18-Month Outlook reports. The estimates assume that all transmission elements expected to be in place during the assessment period are in service. Information on these reports was provided to ED by the IESO in the September 16, 2016 letter.

Market reports displaying the day-ahead, pre-dispatch and real-time intertie scheduling limits as well as intertie schedule and flows can be found on the IESO's public reports site at http://reports.ieso.ca/public/. General information on imports and exports can be found on the IESO's website at http://www.ieso.ca/Pages/Media/Imports-and-Exports.aspx.

d) and (e) The IESO cannot speak on behalf of Hydro One on the actions it is taking.

2. Reference: Ex. B2, Tab 1, Sch. 1

a) Please provide, for each of the last 10 years, Hydro One's annual transmission energy losses as a percent of its total annual transmission throughput volumes; and

b) Please provide, for each of the last 10 years, Hydro One's transmission energy losses during the annual peak demand hour as a percent of the total demand of its customers during the peak hour.

a) and (b) As noted in the September 16, 2016 letter, the IESO does not calculate and publish transmission system losses associated with Ontario-only demand or transmitter-specific losses.

The IESO calculates and publishes estimated transmission system losses associated with total market demand (Ontario demand plus exports) in 5-minute intervals in the Real-time Constrained Totals report available at the following link: http://reports.ieso.ca/public/RealtimeConstTotals/.

The IESO also noted in its September 16, 2016 letter that Ontario and market demand peak values back to market opening are publicly available on the IESO's website at http://www.ieso.ca/Pages/Power-Data/Data-Directory.aspx or upon requests to customer.relations@ieso.ca.

ED suggested in its motion that the IESO could make a "best efforts attempt" to calculate Hydro One-specific transmission losses, possibly by "multiplying the total system transmission losses by the percentage of the total system transmission volumes that are transmitted Hydro One" or by "subtracting the

MWhs provided to its customers (i.e. LDCs and transmission-connected customers) from the MWhs that generators transmit to Hydro One's system (Hydro One has confirmed that all of these figures are metered)". The IESO does not have the information to calculate losses associated with Hydro One's transmission system directly.

3. Reference: Ex. B2, Tab 1, Sch. 1

a) Has Hydro One undertaken benchmarking studies which compare its annual transmission energy losses as a percent of its total annual transmission throughput volumes to those of other electricity transmission companies? If yes, please provide these studies; and

b) Has Hydro One undertaken benchmarking studies which compare its transmission energy losses during the annual peak demand hour as a percent of the total demand of its customers during the peak hour to those of other electricity transmission companies? If yes, please provide these studies; and

c) What are the average transmission energy losses for transmission companies in (i) the United States and (ii) Canada? To the extent that they are available, please provide the figures for both the annual transmission energy losses as a percent of total annual transmission throughput volumes and the transmission energy losses during the annual peak demand hour as a percent of the total demand of its customers during the peak hour.

a) and (b) The IESO cannot speak on behalf of Hydro One on the actions it has taken.

c) It is not within the IESO's mandate, as reliability authority or system planner, to conduct analysis on *transmitter-specific* losses within or outside of Ontario. ED asserts that it would be more efficient and effective for Hydro One or the IESO to "seek out" information about average transmission energy losses for transmission companies in (i) the United States and (ii) Canada, rather than having ED obtain this information via an expert consultant. The IESO disagrees. In fact, it is the IESO's view that, if there were value in undertaking this analysis, an expert consultant with research experience in North American electricity markets would be much better equipped and suited to conduct a jurisdictional scan of transmission losses across North America and could perform that review more efficiently than Hydro One or the IESO. It is also the IESO's view that this sort of analysis could take substantial effort.

4. Reference: Ex. B2, Tab 1, Sch. 1

a) Please provide a detailed description of the various sources of Hydro One's transmission energy losses. Please include a percentage breakdown by geographic region and type (e.g. line losses versus losses from equipment such as transformers). Please also attach any internal documents, reports, presentations, etc. on this issue.

b) Please provide a detailed description of Hydro One's plans to reduce its transmission energy losses from the various sources of those losses. Please also attach any internal documents, reports, presentation, etc. on this issue.

c) Please describe and list all of the actions that Hydro One could take but will not be taking to reduce its transmission energy losses (e.g. due to cost, viability, priorities, etc.).

a) The IESO does not have the system visibility or data necessary to provide a description of the various sources of Hydro One's transmission energy losses.

b) and (c) The IESO cannot speak on behalf of Hydro One on the actions it has or could be taking.

5. Reference: Ex. B2, Tab 1, Sch. 1

a) Please make best efforts to estimate the gross cost of the energy lost in each of the last 10 years via transmission energy losses. Please make and state assumptions as necessary.

b) To the extent that the figure would be different than the one provided in response to (a) above, please estimate the cost of the transmission energy losses to Hydro One's customers.

c) Please estimate the cost of transmission energy losses to Hydro One itself.

a), (b) and (c) The IESO does not calculate and does not have loss data specific to Hydro One. It is also, as noted above, outside of the IESO's scope of responsibilities to calculate the cost associated with transmitter-specific energy losses.