Interrogatories of Environmental Defence

EB-2021-0041 – London Hydro – 2022 Cost of Service

1. Reference: Exhibit 2, Appendix 2-7 DSP

Preamble: Section 4.1 of the 2015 OEB CDM Guidelines states:

> "Distributors may apply to the Board for funding through distribution rates to pursue various activities such as CDM programs, demand response programs, energy storage programs and programs reducing distribution losses for the purpose of deferring the capital investment for specific distribution infrastructure. Any such application must include a consideration of the projected effects to the distribution system on a long-term basis.
>
> Applications can be filed at any time. The Board expects that as part of its long-term planning processes, a distributor will consider applications for CDM programs to defer distribution infrastructure. The distributor should explain the proposed program in the context of the distributor's five-year Distribution System Plan ("DSP") or explain any changes to its system plans that are pertinent to the program."

Questions:

(a) Please file any guidelines, standards, or processes that London Hydro uses to "consider applications for CDM programs to defer distribution infrastructure" as outlined in the above except from the OEB CDM guidelines.
(b) Why is London Hydro not proposing any CDM programs to defer distribution infrastructure in this application?
(c) Please describe the steps taken by London Hydro to consider CDM as an alternative to each of the projects listed in Exhibit 2, Appendix 2-7 DSP, pages 155-157. Please address each project and sub-project separately with a particular focus on system service.
(d) What is the main department responsible for considering non-wires-alternatives to system service projects?
(e) What steps will London Hydro take to revaluate its plans for 2023-2027 if the proposed changes to the CDM guidelines are implemented by the OEB?

2. Reference: Exhibit 1, Page 68

Questions:

(a) Please file a copy of any distribution line loss studies completed by or participated in by London Hydro since 2000, including those reports referenced on page 28 of Exhibit 1.

(b) In Table 1-7: Line Loss Reductions (Exhibit 1, page 68), the loss factor remains the same for the 2017 application and the 2022 application (i.e., 3.15%) despite line loss reductions in the previous four applications. Please explain why line losses have not decreased in the 2022 application.

(c) Does London Hydro quantify and consider the potential value of distribution loss reductions for different options when procuring equipment (e.g., transformers) and deciding on the details of demand-driven capital projects (e.g., the type and sizing of conductors)? If yes, please explain how and provide documentation detailing the methodology used.

(d) If London Hydro is considering the value to its customers of distribution loss reductions for planning purposes, how does it calculate the dollar value ($) of said loss reductions (kWh)? Is the value calculated based only on the HOEP or on all-in cost of electricity (e.g., including the GA)?

(e) Further to the above question, Hydro Ottawa and Burlington Hydro use the all-in cost of electricity. If London Hydro's practice differs, please explain whether there are aspects of its system that would justify this.

(f) Please complete the following table:

Value of London Hydro Distribution System Energy Losses –						
	2015 (historic)	…	2027 (forecast)	Historic annual average	Forecast annual average	Total
Electricity Purchases (MWh)						
Electricity Sales (MWh)						
Losses (MWh)						
Losses %						
All-In Cost of Electricity ($/MWh) – Annual Average						
Cost of Losses ($)						

(g) Please complete the following table:

GHG's from London Hydro's Forecast Distribution System Energy Losses						
	2023	2024	2025	2026	2027	Total
Forecast Losses (MWh)[1]						

[1] If no better numbers are available, the losses from 2019 or the average over 2015 to 2019 could be used for the purpose of this row of this response.

Carbon Intensity of Electricity[2] (CO2e/MWh)						
GHGs (CO2e)						

(h) In EB-2019-0261, Hydro Ottawa agreed to, and the Board approved, the following: "Between 2021 and 2025, Hydro Ottawa shall endeavour to maintain its five-year average total system losses below the target of 3.02% set by the OEB in EB-2005-0381 through cost-effective measures." Is London Hydro willing to agree to the same terms? If not, what commitments can London Hydro make to the Board in this regard? In particular, please indicate what target London Hydro is willing to meet.

(i) In EB-2019-0261, Hydro Ottawa agreed to, and the Board approved, the following: "In addition, over the course of 2020-2021, Hydro Ottawa shall prepare a plan to reduce distribution losses as much as possible through cost-effective measures. The utility shall file the plan with the OEB when complete. In 2022-2025, Hydro Ottawa shall implement as many of the cost-effective measures set out in its plan as possible (e.g. any changes to planning and procurement processes to better mitigate losses, investments that can be made within current budgets, operational measures, etc.). All other cost-effective measures will be incorporated into the utility's next rebasing application and DSP." Is London Hydro willing to agree to the same terms? If not, what commitments can London Hydro make to the Board in this regard?

(j) In EB-2019-0261, Hydro Ottawa agreed to, and the Board approved, the following: "Finally, as described in Hydro Ottawa's response to undertaking JT 3.10, a pilot of a Grid Edge Volt/VAr Control ("VVC") solution will be complete by the end of 2020. If this pilot is successful, Hydro Ottawa shall increase the deployment of these (or equivalent) units by conducting an analysis in 2021 to identify potential suitable locations and by deploying these units in a subset of locations which are deemed to be suitable and cost-effective, with an estimated investment of up to $1.0M over the five-year test period. The cost of these investments will be accommodated within the overall approved capital budget." Is London Hydro willing to agree to implement similar technology through an equivalent commitment? If not, what commitments can London Hydro make to the Board in this regard?

(k) Please complete the following table:

Distribution Losses – Correlated with Consumption and Peak Demand				
	2010	…	2020	Average
Annual distribution losses (MWh)				
Annual consumption (MWh)				

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[2] Please base this figure on the IESO's January 2020 Annual Planning Outlook - http://www.ieso.ca/-/media/Files/IESO/Document-Library/planning-forecasts/apo/Annual-Planning-Outlook-Jan2020.pdf?la=en; see also the data tables at http://www.ieso.ca/-/media/Files/IESO/Document-Library/planning-forecasts/apo/Annual-Planning-Outlook-Data-Tables-Jan2020.xlsx?la=en.

Losses as % of consumption (%)				
Peak demand (MW)				
Ratio of loss % to peak demand				

3. Reference: Exhibit 2, Appendix 2-7 Distribution System Plan, p. 29

Preamble:

> "The adoption of electric vehicles in residential areas has been moderate and so far, manageable. London Hydro uses smart meter data to determine if any transformers are experiencing loads exceeding their recommended capacity, and is able to take appropriate action to accommodate increased loads. To date, this has only been a couple of transformer upgrades in size each year. However, as electric vehicles become more common, and more customers opt for the higher capacity fast chargers, this trend could increase. The electrification of larger fleet vehicles such as transit, delivery vehicles and service vehicles could have an impact on the overall system loading. This may require upgrades to sections of the grid that historically serviced lightly loaded areas where fleet vehicles were simply parked overnight. London Hydro has joined the Canadian Urban Transit Research & Innovation Consortium (CUTRIC) to stay engaged with industry trends and utility best practices. There are no projects within this DSP that specifically address the impacts of transportation electrification, as these are unknown at this time but London Hydro will continue to monitor the industry trends."

Questions:

(a) Please file a copy of any reports in London Hydro's possession containing forecasts for the numbers of electric vehicles in London Hydro's service area.
(b) Please file a copy of any reports in London Hydro's possession on the impacts of electric vehicles on (i) utility revenue and (ii) utility costs.
(c) What is London Hydro's best estimates of the number of electric cars in its service area total and incremental between now and 2030?
(d) Please describe all steps that London Hydro is taking or considering to encourage customers to charge their cars at off-peak times.
(e) Please describe all steps that London Hydro is taking or considering to encourage customers to use their car batteries to off-set the peak load of their building via bi-directional chargers.
(f) Please estimate the impact on London Hydro's revenues and costs as a result of electric vehicles over 2023-2027. Please consider whether London Hydro will experience additional revenues than costs as described in the following Synapse energy study: https://www.synapse-energy.com/sites/default/files/EVs-Driving-Rates-Down-8-122.pdf. Please explain the response.

(g) Is London Hydro open to offering an optional EV rate structure to encourage EV owners to charge at off-peak times? What regulatory applications and approvals would be necessary to do so?

4. Reference: Exhibit 2, Appendix 2-7 Distribution System Plan

   For all of the below questions, please provide an answer on a best efforts basis and please make and state any assumptions and caveats as necessary.

   (a) Please provide any analysis that London Hydro has produced or reviewed to examine heat pumps as a way to reduce distribution costs (e.g. as part of an NWA).
   (b) Please complete the following table:

London Hydro Customers – Characteristics by Sector			
	2022	…	2027
Total Customers			
Residential			
Commercial			
Industrial			
Customers with Electrical Space Heating			
Residential			
Commercial			
Industrial			
Annual Consumption (kWh) for Resistance Space Heating for Average Customer			
Residential			
Commercial			
Industrial			
Peak Demand (kW) for Resistance Space Heating for Average Customer			
Residential			
Commercial			
Industrial			
Annual Consumption (kWh) for Resistance Water Heating for Average Customer			
Residential			
Commercial			
Industrial			

Peak Demand (kW) for Resistance Water Heating for Average Customer			
Residential			
Commercial			
Industrial			

(c) Please complete the following table:

Electricity Use – Typical Customer After Conversion to Heat Pumps									
	Average Annual Electricity Consumption – Resistance Heating (kWh)			Average Annual Electricity Consumption (ccASHP & HPWP, HSPF Region 5=10[3]) (kWh)			Average Annual Electricity Consumption (GSHP & HPWP, sCOP=5) (kWh)		
	Total – Space/ Water	Space Heating	Water Heating	Total – Space/ Water	Space Heating	Water Heating	Total – Space/ Water	Space Heating	Water Heating
Average or Typical Single-Family Residential Customer									

(d) Please complete the following table:

Winter Peak Demand – Typical Customer After Conversion to Heat Pumps									
	Average Peak Demand – Resistance Heating (kW)			Average Peak Winter Demand (ccASHP & HPWP, HSPF Region 5=10[4]) (kW)			Average Peak Winter Demand (GSHP & HPWP, sCOP=5) (kWh)		
	Total – Space/ Water	Space Heating	Water Heating	Total – Space/ Water	Space Heating	Water Heating	Total – Space/ Water	Space Heating	Water Heating
Average or Typical Single-Family Residential Customer									

[3] Equivalent to ~sCOP=2.9 (2.96516)
[4] Equivalent to ~sCOP=2.9 (2.96516)

(e) Please complete the following table:

Summer Peak Demand – Typical Customer After Conversion to Heat Pumps									
	Average Peak Demand – Traditional Central AC (kW)			Average Peak Winter Demand (ccASHP & HPWP, HSPF Region 5=10[5]) (kW)			Average Peak Winter Demand (GSHP & HPWP, sCOP=5) (kWh)		
	Total – Space/ Water	Space Cooling	Water Heating	Total – Space/ Water	Space Cooling	Water Heating	Total – Space/ Water	Space Cooling	Water Heating
Average or Typical Single-Family Residential Customer									

(f) Please complete this table of cooling efficiencies:

Cooling Efficiencies of Various Equipment Types			
		SEER	EER
Central air conditioners	Average of current stock (best estimate, London Hydro customers or Ontario average)		
	Standard unit		
	Energy Star rated		
	Energy Star – Most efficient of 2021		
Air source heat pumps	Standard unit		
	Energy Star rated		
	Energy Star – Most efficient of 2021		
Air source heat pumps in hybrid systems (if different)	Standard unit		
	Energy Star rated		
	Energy Star – Most efficient of 2021		
Ground source heat pumps – closed loop	Standard unit		
	Energy Star rated		
	Energy Star – Most efficient of 2021		
Ground source heat pumps – open loop	Standard unit		
	Energy Star rated		

[5] Equivalent to ~sCOP=2.9 (2.96516)

	Energy Star – Most efficient of 2021		
Cold climate heat pumps – variable speed	Standard unit		
	Energy Star rated		
	Energy Star – Most efficient of 2021		

5. Reference: Exhibit B & Exhibit G, Tab 1, Schedule 2, Page 35

Questions:

(a) What investments is London Hydro making over 2023-2027 to accommodate fuel switching over that period? Please describe these and provide the dollar total.
(b) Please confer with staff for the Canada Greener Homes Grant to obtain estimates of: (i) the number of customers in Ontario that will use the grant to switch from fossil fuel heating to an electric heat pump and (ii) the number of customers that will use the grant to switch from electric resistance heating to an electric heat pump.

6. Reference: DSP Appendix K – Asset Sustainment Plan 2021-2030, p. 107

Preamble: London Hydro states as follows:

> "With the advent of electric vehicles (EV), new potential loads from the EV chargers may increase the capacity utilization as higher loads will be drawn by some select customers."

Questions:

(a) What investments is London Hydro making over 2023-2027 to accommodate an expansion of electric vehicles? Please describe these and provide the dollar total.
(b) Does a residential customer need to notify or seek approval from London Hydro before installing a high-speed electric vehicle charger? Please explain and provide any relevant excerpts from the relevant document containing said requirement.
(c) Does a residential customer need to notify or seek approval from London Hydro before installing a high-speed bi-directional electric vehicle charger (under 10 kW) that does not export to the grid? Please explain and provide any relevant excerpts from the relevant document containing said requirement.
(d) How many applications to install bi-directional EV charges has London Hydro received?
(e) Can London Hydro require a residential customer to make a financial contribution toward distribution system upgrades necessary to allow the customer to install a high-speed one-directional EV charger? If yes, would London Hydro do so? Please explain.
(f) Can London Hydro require a residential customer to make a financial contribution toward distribution system upgrades necessary to allow the customer to install a high-speed bi-

directional EV charger (non-exporting)? If yes, would London Hydro do so? Please explain.

(g) Generally speaking, what protective devices would be needed for a residential customer to install a bi-directional EV charger that is not meant to export to the grid to ensure that there is no damage in the event of a grid outage?
(h) Is London Hydro obligated to undertake the upgrades necessary for residential customers to install EV chargers if they choose to do so?
(i) How many electric vehicles will London Hydro buy over 2023-2027?
(j) How many electric vehicle chargers will London Hydro buy over 2023-2027?

7. Reference: Exhibit 2, Appendix 2-7 Distribution System Plan

Questions:

(a) Does the installation of a bi-directional EV charger in a home that is used to off-set load at peak times contribute toward short circuit limits?
(b) Approximately how many customers are on a feeder with short circuit constraints that would prevent the customer from installing a parallel bi-directional EV charger? Please provide a breakdown between customer classes if possible.
(c) Approximately how many customers are on a feeder with short circuit constraints that would prevent the customer from installing a micro distributed energy resource of 10 kW? Please provide a breakdown between customer classes if possible.
(d) What is included in the basic connection services provided to residential customers and funded through rates? Does this include a maximum rating for a residential customer's electricity panel? Does it include a maximum contribution to the system's short circuit limits? Please explain.
(e) Please confirm that the DSC requires London Hydro's basic connection services for residential customers to at least include "supply and installation of overhead distribution transformation capacity or an equivalent credit for transformation equipment." Would this include the capacity necessary to install (i) a one-way fast EV charger and (ii) a fast bi-directional EV charger. If relevant, please provide a response for 5 kW and 10 kW chargers.
(f) Please provide a table showing the DER connections made over the past 5 years and forecast over the application term broken down by year, technology, and size range.
(g) What investments is London Hydro planning to increase the capacity for its customers to install DERs?
(h) Please provide a table and narrative description of the restricted feeders with little or no capacity to install DERs, the approximately number of customers connected to each, and the cost so resolve the constraints limiting the capacity to connect DERs.

8. Reference: Exhibit 7, Appendix – Cost Allocation Model

Questions:

(a) Please complete the following table for all non-residential metered customers. Please provide a copy in an excel spreadsheet

Fixed Charges – Actual and Estimated vs. OEB Maximum			
	2010 (actual)	…	2027 (estimated)
Fixed Charge			
Customer class 1			
…			
Customer class n			
Maximum Fixed Charge (minimum system with PLCC adjustment)			
Customer class 1			
…			
Customer class n			
Number of Customers			
Customer class 1			
…			
Customer class n			
Revenue from Fixed Charges			
Customer class 1			
…			
Customer class n			
Total			
Revenue if Fixed Charge Set at Maximum			
Customer class 1			
…			
Customer class n			
Total			

(b) Please reproduce the above table for 2023 to 2027 as if London Hydro were to set its fixed rates in accordance with the following ruling in Hydro Ottawa's rates case: "[T]he OEB finds that fixed charges should be set by comparing the fixed charge resulting from Hydro Ottawa's standard rate design approach with the previous year's level for the five year rate term. In years where maintaining the current fixed/variable revenue split results in a higher fixed charge than the previous year, Hydro Ottawa shall maintain the fixed charge at the previous year's level. In years where maintaining the current fixed/variable revenue split results in a lower fixed charge than the previous year, Hydro Ottawa shall maintain the fixed charge at the lower value."