EB-2022-0028
EPCOR Electricity Distribution Ontario Inc. – Cost of Service Application

Interrogatories of Environmental Defence

1. Reference: Exhibit 1, Tab 1, Schedule 1, Page 20

Preamble:

The planning assumptions and approaches used to develop both the strategic direction of EEDO and its DSP are the following:

a) EEDO's load service requirement will continue to grow at approximately 2% per annum.

[…]

c) Before EEDO builds new capacity, it will consider the impact of DER penetration as well as non-wires alternatives that are expected to be more available over the next 5 years.

d) EEDO's customers will continue to adopt DER technology including electric vehicles which will require a modernized and updated grid management system.

Questions:

(a) Please confirm whether the assumed 2% per annum anticipated growth of load service includes anticipated load growth due to increased electrification of transportation (i.e., electric vehicles) and space heating (i.e., high efficiency cold climate heat pumps) related to ongoing decarbonization efforts. If so, please provide any studies or reports that EEDO relied on to reach this assumption.
(b) Please explain how EEDO considers the impact of DER penetration and non-wires alternatives over the next 5-years in planning for new capacity building. Please file any guidelines, standards or processes that EEDO uses when considering the impact of DERs and NWAs for planning purposes.

2. Reference: Exhibit 2, Appendix A – Distribution System Plan, s. 5.4.3

Questions:

(a) Please describe how EEDO sizes new equipment to ensure it will be able to handle the future load from electrification.
(b) For the five largest capital spending items in the distribution system plan, please provide the following:

i. What is the approximate threshold of electric vehicle penetration (%) in the relevant area at which point an additional upgrade would be required to the proposed investment?
ii. What is the approximate threshold of the percentage of customers that electrify their fossil fuel heating with high-efficiency cold climate heat pumps in the relevant area at which point an additional upgrade would be required to the proposed investment?
iii. What is the approximate threshold of the percentage of customers that electrify both their vehicles and fossil fuel heating in the relevant area at which point an additional upgrade would be required to the proposed investment?

These questions 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. An order-of-magnitude answer on a best-efforts basis is sufficient.

3. Reference: Exhibit 2, Appendix A – Distribution System Plan, s. 5.4.3

Questions:

(a) What percent of EEDO's customers are on restricted feeders?
(b) Please elaborate on the following statement: "EEDO has had exploratory conversations with third parties about implementing CDM solutions to reduce feeder loading during peak."
(c) Please provide a list of investments in the DSP that EEDO considers as potential candidates for a non-wires alternative (NWA), including CDM.
(d) Will EEDO consider implementing any cost-effective NWAs prior to the expiry of its DSP in 2027?
(e) If EEDO implements an NWA in lieu of a currently-planned capital project, how would it account for the change in costs, including any migration of capital costs to operating costs?

4. Reference: Exhibit 2, Appendix A – Distribution System Plan, Page 51

Preamble:

> EEDO believes that our customer's want to continue to participate in the opportunities surrounding distributed energy resources such as electric vehicle integration and distributed renewable energy. To prepare for this grid evolution, EEDO has been implementing grid technology solutions such as a digital model of our system that permits for advanced analytics. This technology will be essential to maintain safety and reliability with the complexities introduced by EV charging behaviours and exported energy from batteries and solar PV. EEDO has developed a plan to continue to upgrade, modify and keep secure these grid technology solutions in order to maintain pace with the growing distributed energy resources.

Questions:

(a) Please describe and itemize all proposed spending to enable the implementation of DER's by EEDO's customers.
(b) The market for DERs is rapidly changing, as are the regulatory processes and technology for connecting them to the grid. If EEDO decides between now and 2027 that additional DER-enabling investments should be made before the end of the DSP, which are not part of the proposed DSP, how would EEDO cover those costs?

5. Reference: Exhibit 2, Appendix A – Distribution System Plan, Page 51

Preamble:

> EEDO believes that our customer's want to continue to participate in the opportunities surrounding distributed energy resources such as electric vehicle integration and distributed renewable energy. To prepare for this grid evolution, EEDO has been implementing grid technology solutions such as a digital model of our system that permits for advanced analytics. This technology will be essential to maintain safety and reliability with the complexities introduced by EV charging behaviours and exported energy from batteries and solar PV. EEDO has developed a plan to continue to upgrade, modify and keep secure these grid technology solutions in order to maintain pace with the growing distributed energy resources.

Questions:

(a) Please file a copy of any reports in EEDO's possession containing forecasts for the numbers of electric vehicles in EEDO's service area.
(b) Please file a copy of any reports in EEDO's possession on the impacts of electric vehicles on (i) utility revenue and (ii) utility costs.
(c) What is EEDO's best estimates of the number and percent of electric cars in its service area total and incremental between now and 2030?
(d) Please describe all steps that EEDO is taking or considering to encourage customers to charge their cars at off-peak times.
(e) Please describe all steps that EEDO 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 EEDO's revenues and costs as a result of electric vehicles over 2023-2027. Please consider whether EEDO 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) What investments is EEDO making over 2023-2027 to accommodate an expansion of electric vehicles? Please describe these and provide the dollar total.
(h) Does a residential customer need to notify or seek approval from EEDO before installing a high-speed electric vehicle charger? Please explain and provide any relevant excerpts from the relevant document containing said requirement.

(i) Does a residential customer need to notify or seek approval from EEDO 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.
(j) How many applications to install bi-directional EV charges has EEDO received?
(k) Can EEDO 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 EEDO do so? Please explain.
(l) Can EEDO 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 EEDO do so? Please explain.
(m) 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?
(n) Is EEDO obligated to undertake the upgrades necessary for residential customers to install EV chargers if they choose to do so?
(o) How many electric vehicles will EEDO buy over 2023-2027?
(p) How many electric vehicle chargers will EEDO buy over 2023-2027?

6. Reference: Exhibit 2, Appendix A – Distribution System Plan, Page 51

Preamble:

> EEDO believes that our customer's want to continue to participate in the opportunities surrounding distributed energy resources such as electric vehicle integration and distributed renewable energy. To prepare for this grid evolution, EEDO has been implementing grid technology solutions such as a digital model of our system that permits for advanced analytics. This technology will be essential to maintain safety and reliability with the complexities introduced by EV charging behaviours and exported energy from batteries and solar PV. EEDO has developed a plan to continue to upgrade, modify and keep secure these grid technology solutions in order to maintain pace with the growing distributed energy resources.

Question:

(a) Please provide further details about or point to the evidence in the application that describes EEDO's plan to "upgrade, modify and keep secure these grid technology solutions in order to maintain pace with the growing distributed energy resources."

7. Reference: Exhibit 2, Appendix A – Distribution System Plan, Page 18

Preamble:

EEDO system losses over the historical period are shown below:

2017	2018	2019	2020	2021

5.8%	2.6%	2.6%	3.6%	3.7%

Losses have trended in the 2.6 - 6.0% range over this historical period.

Questions:

(a) Please explain why system losses fell by 2.2% between 2017 and 2018.
(b) After two years of system losses of 2.6% in 2018 and 2019, why did losses increase in 2020 and 2021 to 3.6% and 3.7%, respectively?
(c) Does EEDO 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 EEDO 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 EEDO's practice differs, please explain whether there are aspects of its system that would justify this.

8. Reference: Exhibit 2, Appendix A – Distribution System Plan

Questions:

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 EEDO 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:

EEDO 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[1]) (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									

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

(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[2]) (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									

(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[3]) (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, EEDO customers or Ontario average)		
	Standard unit		

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

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