

# Elson Advocacy

May 11, 2020

**BY RESS AND EMAIL**

**Ms. Christine Long**

Board Secretary

Ontario Energy Board

2300 Yonge Street, Suite 2700, P.O. Box 2319

Toronto, Ontario M4P 1E4

Dear Ms. Long:

**Re: EB-2019-0261 – Hydro Ottawa – 2021-2025 Distribution Rates**

Enclosed please find the interrogatories of Environmental Defence in the above matter.

Yours truly,



Kent Elson

cc: Parties in the above proceeding

## **Interrogatories of Environmental Defence**

### **EB-2019-0261 – Hydro Ottawa – 2021-2025 Distribution Rates**

#### **Transmission Losses**

1. Reference: Exhibit 8 ,Tab 9, Schedule 1, UPDATED, May 5, 2020

Preamble: Hydro Ottawa's Conservation and Demand Management Annual Reports for 2006 and 2007 describe a project relating to Distribution Loss Reduction as follows:

#### Description:

The Distribution Loss Reduction Program is a broad network based initiative to drive greater efficiencies within the distribution grid. This program will identify opportunities for system enhancements. Next steps will be to complete the engineering analysis and feasibility studies. Items to be addressed may include the following:

Power Factor Correction - A power factor assessment will be completed which will identify locations for the installation of power factor correction capacitor banks.

Voltage Conversion - Voltage upgrades can save up to 90% of the losses associated with a feeder as higher voltages and lower current results in lower losses. This study will ascertain the locations and value of voltage conversions.

Power System Load Balancing - This program is designed to ascertain where load shifting can occur to improve system efficiency. It is estimated that approximately 5% - 10% of system losses could be saved.

Voltage Profile Management - Changing voltage profiles at the distribution station level can result in a peak reduction at the controllable distribution stations.

Line Loss Reductions - Replacement of conductors can reduce line losses. An evaluation of where such opportunities exist may be undertaken.

#### Target users

The results of this program will positively impact all of Hydro Ottawa's customers.

#### Benefits

Reducing electricity distribution system delivery losses will have a number of positive impacts including reducing system demand, relieving network capacity to accommodate growth and reducing the requirement for new generating capacity in the Province. Costs associated with distribution system delivery losses are recovered through electricity distribution charges. Reductions in these costs will therefore benefit all customers

Question:

- a) Please provide the final cost and the expected savings in terms of distribution loss reductions (kWh) and the value of those reductions (\$) for the above project and each component.
- b) Please file the studies, evaluations, and reports completed in the above project.
- c) Has Hydro Ottawa undertaken other focused distribution loss reduction work since the project described above?
- d) Would Hydro Ottawa consider conducting a similar project seeing as considerable time has passed since 2006?
- e) Is Hydro Ottawa able to estimate the cost of doing so and the estimated value of loss reductions?
- f) Would regulatory approval for this be required in this proceeding?

2. Reference: Exhibit 8 ,Tab 9, Schedule 1, UPDATED, May 5, 2020

Question:

- a) How does Hydro Ottawa's rate of distribution system energy losses compare to other leading LDCs inside and outside of Ontario?
- b) How does Hydro Ottawa compare to other LDCs in terms of its efforts to reduce distribution system energy losses? In what ways is or isn't Hydro Ottawa a leader in this regard?

3. Reference: Exhibit 8 ,Tab 9, Schedule 1, UPDATED, May 5, 2020

Preamble: Hydro Ottawa's Conservation and Demand Management Annual Reports for 2006 and 2007 describe a project relating to Distribution Loss Reduction.

Question:

- a) What are the most important steps that Hydro Ottawa has taken in the past 20 years to reduce distribution system energy losses?
- b) Where does Hydro Ottawa believe the greatest opportunities are to make additional reductions in distribution losses in the next 20 years?
- c) Does Hydro Ottawa 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 Hydro Ottawa 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) Please list and describe the operational measures that Hydro Ottawa takes to cost-effectively reduce distribution losses.
- f) Please provide a table listing the technically available measures to cost-effectively reduce distribution losses and describe for each the respective responsibilities of Hydro Ottawa, the IESO, and Hydro One.

4. Reference: Exhibit 8, Tab 9, Schedule 1, UPDATED, May 5, 2020, p. 2

- a) Please complete the below table.

Value of Ottawa's Distribution System Energy Losses - Historic						
	2015	2016	2017	2018	2019	Total
Electricity Purchases (MWh)	7,622,794	7,600,820	7,410,784	7,612,656	7,466,403	
Electricity Sales (MWh)	7,374,808	7,374,415	7,190,875	7,367,818	7,240,881	
Losses (MWh)	247,987	226,405	219,909	244,838	225,521	
Losses %	3.25%	2.98%	2.97%	3.22%	3.02%	
All-In Cost of Electricity in Ottawa (\$/Mwh) – Annual Average						
Cost of Losses (\$)						

- b) Does Hydro Ottawa anticipate the value of losses on its system to be materially higher or lower over the next five years?
- c) Please complete the following table:

GHG's from Ottawa's Forecast Distribution System Energy Losses						
	2021	2022	2023	2024	2025	Total
Forecast Losses (MWh) <sup>1</sup>						
Carbon Intensity of Electricity <sup>2</sup> (CO <sub>2</sub> e/MWh)						

<sup>1</sup> 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.

<sup>2</sup> 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>.

GHGs (CO2e)							
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- d) Is Hydro Ottawa willing to review its operational measures, investment planning, and other practices to consider whether it could be taking additional measures to cost-effectively reduce the energy losses occurring in its distribution system?

### Fixed Versus Variable Charges

#### 5. Reference: Cost Allocation Model, Sheet O2 Monthly Fixed Charge Min & Max

Preamble: The above reference includes the following information:

Output sheet showing minimum and maximum level for Monthly Fixed Charge								
	1	2	3	4	6	7	8	9
<u>Summary</u>	Residential	GS <50	GS 50 to 1,499 kW	GS 1,500 to 4,999 kW	Large Use	Street Light	Sentinel	Unmetered Scattered Load
Customer Unit Cost per month - Avoided Cost	\$4.23	\$6.25	\$26.46	\$67.13	\$13.28	\$0.07	\$1.85	\$0.05
Customer Unit Cost per month - Directly Related	\$7.68	\$10.73	\$44.75	\$117.09	\$70.72	\$0.18	\$3.77	\$0.13
Customer Unit Cost per month - Minimum System with PLCC Adjustment	\$16.61	\$21.15	\$78.85	\$402.12	\$516.80	\$8.19	\$14.67	\$8.70
Existing Approved Fixed Charge	\$27.79	\$19.32	\$200.00	\$4,193.93	\$15,231.32	\$0.91	\$3.17	\$5.09

Question:

- Does Hydro Ottawa agree that shifting costs for commercial and industrial customers from fixed charges to variable charges would incentivize positive customer behaviour such as shifting load off the peak, installing distributed energy, and implementing energy efficiency? Please explain.
- Does Hydro Ottawa agree that setting the fixed monthly charges for commercial and industrial customers at the level of avoided cost would represent a shift of costs from fixed charges to variable charges?
- Does Hydro Ottawa agree with Board Staff that setting fixed monthly charges at the level of avoided costs has benefits, including that avoided costs “are easiest to determine, are subject to minimal judgment and thus more accurate”?<sup>3</sup>

<sup>3</sup> EB-2007-0667, Board Staff Discussion Paper: On the implications arising from a review of the electricity distributors’ cost allocation filings, June 28, 2007, pp. 26-27.

60 Ibid



2021-2025 (forecast)								
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### **Integrated Resource Planning**

6. Reference: Exhibit 1, Tab 1, Schedule 5, UPDATED, p. 8-14

Question:

- a) Please describe the processes at Hydro Ottawa to implement Integrated Resource Planning, with a particular focus on the consideration of non-wires solutions to system needs. Please file any internal documentation outlining said processes.
- b) How does Hydro Ottawa ensure that non-wires options are identified and considered early enough in the planning process to ensure that they can be implemented in lieu of supply-side solutions where cost effective?
- c) How does Hydro Ottawa calculate the net costs/benefits of non-wires solutions when comparing them to supply-side option? Please include all kinds of distributed energy resources in your answer, including energy efficiency, demand response, storage, and distributed generation. Please include a description of how avoided energy costs (e.g. the value of future energy savings from energy efficiency) are considered when comparing wires and non-wires solutions.
- d) Does Hydro Ottawa always study potential non-wires solutions to system needs in its capital planning processes? If not, please explain the screening criteria that Hydro Ottawa uses to determine whether an assessment of non-wires solutions is warranted.
- e) Does Hydro Ottawa agree that it is appropriate in certain circumstances for an LDC to procure or contract for distributed energy resources where doing so would be a more cost-effective alternative in comparison to a traditional supply-wide investment?
- f) Does Hydro Ottawa agree that it is appropriate for it to earn a return if it is able to avoid a capital investment in wires or transformers through distributed energy resources such as energy efficiency, demand response, or storage?
- g) Does Hydro Ottawa agree that it is important to give LDCs an incentive to adopt non-wires solutions to system needs where those solutions are more cost-effective?
- h) Does Hydro Ottawa agree that the difference between the financial returns from wires and non-wires solutions creates a disincentive to implement non-wires solutions?
- i) Has Hydro Ottawa sought approval to earn a return for avoiding a capital investment in wires or transformers through distributed energy resources such as energy efficiency, demand response, or storage?
- j) How does Hydro Ottawa believe a financial return should be calculated for avoiding a capital investment in traditional supply-side infrastructure through distributed energy resources such as energy efficiency, demand response, or storage?

7. Reference: Exhibit 1, Tab 1, Schedule 5, UPDATED, p. 8-14

Question:

- a) Of the capital spending identified in the application, please identify which items are candidates for considering whether the need could be addressed most cost-effectively with distribution energy resources or non-wires solutions? For each, please describe the need addressed by the project and the cost of the supply-side solution.
- b) Does Hydro Ottawa anticipate that the drop in electricity demand from COVID-19 will defer the need for some of the capital investments outlined in its application? If yes, would this potentially create a window to consider or reconsider non-wires solutions?
- c) If Hydro Ottawa determines before the end of 2025 that a certain capital investment could be addressed more cost effectively through a non-wires solution, what regulatory steps would be required to implement that non-wires solution instead? Please consider a scenario where the non-wires solution is less expensive up-front and a scenario where the non-wires solution is more expensive up-front but is more cost-effective overall (e.g. due to future avoided energy costs).
- d) Is Hydro Ottawa proposing to spend on any distributed energy resources (including energy efficiency, storage, etc.) to avoid more costly supply-side investments? If yes, please provide details and cite references to the evidence.

8. Reference: Exhibit 1, Tab 1, Schedule 5, UPDATED, p. 8-14

Preamble: These questions relate to the planned investments described in Exhibit 1, Tab 1, Schedule 5, UPDATED, p. 14, tables 6 and 7.

Question:

- a) For each investment, please quantify and describe the need to be addressed.
- b) For each investment, please discuss (i) the possibility that COVID-19 might reduce or defer the need and (ii) whether this may provide additional time to consider or implement non-wires solutions.
- c) For each investment, describe the efforts taken so far to consider distributed energy resources as a potentially more cost-effective alternative. Please expressly address (i) energy efficiency and (ii) a combination of options, such as energy efficiency coupled with storage. Please file any analysis or related documentation that Hydro Ottawa has prepared in this regard.
- d) For each investment to be made by HONI in relation to Ottawa, please describe whether and how HONI and Hydro Ottawa have or will be working together to consider non-wires alternatives.

9. Reference: Exhibit 1, Tab 1, Schedule 5, UPDATED, p. 8-14

Preamble: During the OEB's Distributed Energy Resources process, Mike Fletcher, Project Manager, Building Engineering and Energy Management for the City of Ottawa made these comments relating to integrated resource planning, and a lost opportunity to examine a non-wires alternative:



13 That was the case in south Nepean. Basically we ran  
 14 out of time to look at non-wire solutions. Nobody's fault,  
 15 really, but it would be nice not to have that reoccur in,  
 16 you know, in everybody's interest.<sup>4</sup>

Questions:

- a) Please describe the above-referenced situation in South Nepean and why the time ran out to look at non-wires solutions.
- b) Please describe what lessons have been learned from this situation and what, if anything, Hydro Ottawa commits to do differently in the future.
- c) Will Hydro Ottawa commit in its interrogatory response to review this situation further and determine what other changes are needed to avoid running out of time to look at non-wires solutions?

10. Reference: Exhibit 1, Tab 1, Schedule 5, UPDATED, p. 8-14

Preamble: During the OEB's Distributed Energy Resources process, Mike Fletcher, Project Manager, Building Engineering and Energy Management for the City of Ottawa made these comments relating to the possibility of decommissioning a 130 kV line.

11 So going into Orleans, one option would involve  
 12 decommissioning a 130 kV line, and again that's a  
 13 municipality that likes intensification, we put our hand up  
 14 for that option and when I made comments to the IESO, I  
 15 said, well, that is a big vote in favour of that. I don't  
 16 know how we are going to go on to weigh the factors, but  
 17 you know, as a municipality, costs of running a  
 18 municipality go do if we can intensify.

Questions:

- a) What role has Hydro Ottawa taken in support of the possibility of decommissioning this line?
- b) How would Hydro Ottawa and the IESO calculate the value of decommissioning this line such that the land can be used for other purposes?

### **Ottawa's Climate Change Action Plan**

11. Reference: Exhibit 1, Tab 1, Schedule 9, UPDATED, May 5, 2020, Page 19

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<sup>4</sup> EB-2018-0287/0288 Distributed Energy Resources and Remuneration, Transcript, Stakeholder Conference, September 19, 2019, p. 42.

## Questions:

- a) Please file a copy of Ottawa’s Climate Change Action Plan and its declaration regarding a climate crisis.
- b) Please confirm Ottawa’s GHG reduction targets.
- c) Please provide Ottawa’s planned reductions in GHGs from electricity to meet its overall GHG targets.
- d) What are Hydro Ottawa’s roles and responsibilities in relation to Ottawa’s Climate Change Action Plan and related climate change policies?
- e) Please provide the information used in the Climate Change Action Plan modelling of the “business as usual” scenario for electricity use, electricity carbon intensity, and GHG’s arising from electricity use.

Ottawa’s Electricity Demand and GHGs Per Climate Planning Documents					
	2020	2021	...	2049	2050
Annual Electricity Demand (kWh)					
Carbon Intensity of Electricity (CO <sub>2</sub> e/kWh)					
GHGs from Electricity Use (CO <sub>2</sub> e)					

- f) If it differs from the above, please provide the information used in Ottawa’s “Modelling Ottawa’s Greenhouse Gas Emissions to 2050”<sup>5</sup> for electricity use, electricity carbon intensity, and GHG’s arising from electricity use.

Ottawa’s Electricity Demand and GHGs Per Climate Planning Documents					
	2020	2021	...	2049	2050
Annual Electricity Demand (kWh)					
Carbon Intensity of Electricity (CO <sub>2</sub> e/kWh)					
GHGs from Electricity Use (CO <sub>2</sub> e)					

<sup>5</sup> <https://app05.ottawa.ca/sirepub/cache/2/ovrfoz1xumuuxu3z2a2wevdp/62802305082020123822766.PDF>

- g) According to the IESO's January 2020 Annual Planning Outlook<sup>6</sup>, the carbon intensity of electricity is forecast to increase significantly between now and 2040 under the reference case. Please calculate the impact of this increase on the GHG emissions arising from Ottawa's electricity usage in the following table:

Ottawa's Carbon Emissions from Electricity – Impact of Increased Carbon Intensity					
	2020	2021	...	2040	Total
Annual Electricity Demand – Ottawa (kWh)					
Scenario 1 – Carbon Intensity Remains at 2019 Levels					
Carbon Intensity of Electricity (CO <sub>2</sub> e/kWh) -					
GHGs from Electricity Use (CO <sub>2</sub> e)					
Scenario 2 – Carbon Intensity Increases per IESO Annual Planning Outlook Reference Case					
Carbon Intensity of Electricity (CO <sub>2</sub> e/kWh) -					
GHGs from Electricity Use (CO <sub>2</sub> e)					
Percent Difference in GHG Levels Between Scenario 1 and 2					

- h) Please confirm that the forecast increase in carbon intensity of electricity is due to forecast increases in gas-fired electricity generation.
- i) Has Hydro Ottawa provided the City of Ottawa with an updated forecast of GHG emissions arising from electricity use in the City as a result the forecast increases in gas-fired electricity generation? If yes, when was that provided?

For each of the above, please make assumptions as necessary and state all assumptions. If the calculations are a challenge, please answer the question on a best-efforts basis and with any caveats as necessary. If certain parts of the answer cannot be estimated, please explain why and complete as much of the answer as possible. If an answer cannot be provided for the complete period, please provide an answer for as far into the future as feasible. If Ottawa's electricity demand cannot be forecast beyond 2025, please assume that demand remains at 2025 levels.

### Energy Efficiency

12. Reference: Exhibit 1, Tab 1, Schedule 5, UPDATED, p. 8-14; Exhibit 1, Tab 1, Schedule 9, UPDATED, May 5, 2020, Page 19

Questions:

<sup>6</sup> <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>.

- a) What are the total avoided energy costs that have been achieved through Hydro Ottawa's CDM programs to date?
- b) What are the total net benefits (calculated per the TRC) that have been achieved through Hydro Ottawa's CDM programs to date?
- c) What was the TRC benefit-cost ratio for Hydro Ottawa's CDM programs for the latest year of data available for (i) residential customers and (ii) commercial / industrial customers. Please indicate the year of data provided.
- d) Is Hydro Ottawa prevented by the OEB rules or other rules to implement a non-wires alternative to a capital project that involves an energy efficiency program? If yes, please identify the rules and provide excerpts.
- e) Is Hydro Ottawa prevented by the OEB rules or other rules from filing an application with the OEB seeking approval of an energy efficiency program akin to the applications filed by gas utilities for their DSM programs? If yes, please identify the rules and provide excerpts.
- f) Could the City of Ottawa ask Hydro Ottawa through a unanimous shareholder resolution (or otherwise) to apply to the OEB for approval of an energy efficiency program to be funded via distribution rates (e.g. as part of its efforts to meet its GHG reduction targets)? If not, please explain why not.
- g) Aside from any regulatory questions, does Hydro Ottawa believe it could develop an energy efficiency program that would save more for consumers (via avoided future energy costs) than it cost (via administration and the incremental costs of the efficiency measures)?
- h) If Hydro Ottawa were to propose an energy efficiency program, what areas would it focus on?
- i) If Hydro Ottawa were to finance the cost of an energy efficiency program to ensure the benefits (avoided energy costs) match the costs over time, what, approximately, is the lowest interest it could obtain to do so?

## Heat Pumps

13. Reference: Exhibit 1, Tab 1, Schedule 9, UPDATED, May 5, 2020, Page 19

Preamble: An expert report filed in EB-2016-0004 by Dr. Stanley Reitsma, P. Eng., outlined significant benefits to the electricity system in reducing peak demand.<sup>7</sup> See page 5 to 13. For example, Dr. Reitsma concludes:

“Though geothermal relies on electricity as an input (to power the pump), geothermal system actually reduces electricity demand in the summer, and increases it in the winter, relative to traditional methods of heating and cooling (heating with fossil fuels and cooling with traditional AC systems). For Ontario, a summer peaking jurisdiction, a greater reliance on geothermal would reduce peaking power needs and also reduce surplus

<sup>7</sup> Dr. Stanley Reitsma, P. Eng., *Ontario's Low Carbon Future: Geothermal Heat Pumps*, March 21, 2016 (<http://www.rds.oeb.ca/HPECMWebDrawer/Record/521626/File/document>).

baseload generation. Coincidentally, the load profile of a geo system is similar to the production profiles of Ontario wind energy facilities.”<sup>8</sup>

“For the cooling of buildings, Geo HP’s use about half the electricity to operate compared to air source heat pumps and AC systems, and, geo’s electrical demand doesn’t spike as it gets hot outside, since the ground loop temperature remains relatively unchanged. They can reduce the “heat wave” electricity system demand spikes by up to 75%.”<sup>9</sup>

Questions:

- a) Does Hydro Ottawa agree with the comments in the above-referenced report regarding the benefits that geothermal systems can provide to the electricity system, including a reduction of peak demand? Please explain.
- b) Does Hydro Ottawa agree that the expansion of geothermal systems would reduce peak demand on Hydro Ottawa’s system, on which distribution system capacity is based?
- c) Does Hydro Ottawa agree that geothermal systems have the capacity to provide important benefits to the electricity distribution system, especially in comparison to traditional baseboard heating?
- d) Does Hydro Ottawa agree that the benefits of geothermal systems are not reflected in the distribution costs paid by residential consumers because those charges do not vary based on coincident peak demand?
- e) Does Hydro Ottawa agree that increases in heat pumps would assist the City of Ottawa in achieving its GHG reduction targets?
- f) Would Hydro Ottawa agree to study the possibility of offering customers with geothermal systems a reduction in their distribution charges that would approximately reflect the benefits those customers provide to the distribution system? Assume the overall rate structure would continue to make Hydro Ottawa whole for its revenue requirement.
- g) Could the City of Ottawa ask Hydro Ottawa through a unanimous shareholder resolution (or otherwise) to apply to the OEB for approval of a rate structure that provides a discount to customers with geothermal systems to reflect the benefits those customers provide to the distribution system? If not, please explain why not. Assume the rate structure would continue to make Hydro Ottawa whole for its revenue requirement.
- h) Please provide Hydro Ottawa’s best information on the number and proportion of its customers with (i) electrical, (ii) natural gas, (iii) propane, (iv) oil, (v) wood, and (vi) other kind of space heating.

14. Reference: Exhibit 1, Tab 1, Schedule 9, UPDATED, May 5, 2020, Page 19

Questions:

- a) Please confirm that 39% of Ottawa’s greenhouse gas emissions are from the consumption of natural gas (per Ottawa’s Climate Change Action Plan).

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<sup>8</sup> *Ibid.* p. 5.

<sup>9</sup> *Ibid.* p. 6.

- b) Please describe potential roles that Hydro Ottawa could play in relation to the implementation of electric heat pumps as an alternative to natural gas heating.
- c) How many new homes and businesses are forecast to be built in Hydro Ottawa's coverage area in the next 10 years? If available, please provide an annual breakdown.
- d) How many new customers does Hydro Ottawa expect to hook up in the next 10 years? If available, please provide an annual breakdown.
- e) What assistance could Hydro Ottawa provide to developers to promote the installation of electric heat pumps instead of natural gas furnaces in new construction?
- f) Would Hydro Ottawa benefit from regulatory changes in order to play a greater role in promoting the expansion of electric heat pumps in lieu of natural gas? If yes, what are those potential changes?
- g) Please comment on the report by Ralph Torrie estimating that electricity demand could decline if all heating was converted to electric heat pumps and energy retrofits were increased: <https://www.corporateknights.com/channels/built-environment/recovering-stronger-building-low-carbon-future-green-renovation-wave-15875463/>.

## Electric Vehicles

15. Reference: Exhibit 1, Tab 1, Schedule 9, UPDATED, May 5, 2020, Page 19

- a) How many electric vehicle charging stations are installed by Hydro Ottawa customers now and how many are forecast for each year from 2021 to 2025? Please provide a high-end and low-end estimate.
- b) Is Hydro Ottawa confident that it is making all the investments needed to facilitate increases in electric vehicles and electric vehicle charging stations even if its high-end forecasts come to fruition?
- c) Have any Hydro Ottawa customers been unable to install an electric vehicle charging station (e.g. a level 3 station) due to constraints on Hydro Ottawa's distribution system? If yes, how many customers each year?
- d) Have any Hydro Ottawa customers been *delayed* in installing an electric vehicle charging station (e.g. a level 3 station) due to constraints on Hydro Ottawa's distribution system? If yes, how many customers each year?
- e) Is it Hydro Ottawa's goal that all customers will be able to install and use electric vehicle charging stations if they wish to do so? If not, please detail Hydro Ottawa's targets in this regard.
- f) Is it Hydro Ottawa's goal that all customers will be able to install and use electric vehicle charging stations *without delay of more than one month* if they wish to do so? If not, please detail Hydro Ottawa's targets in this regard.
- g) Please list and describe the investments that Hydro Ottawa intends to make over 2021-2025 to ensure readiness for electric vehicles.
- h) Please list and describe the ways in which Hydro Ottawa is *currently* able to use the battery in electric vehicles as a distributed energy resource to provide a service that benefits the distribution system.
- i) Please list and describe the ways in which it is possible to use the battery in electric vehicles as a distributed energy resource to provide a service that benefits the distribution system, *focusing only on those which Hydro Ottawa is not yet capable of undertaking*.

- j) Is Hydro Ottawa able to capitalize on the storage capacity of electric vehicles to reduce distribution system costs by: (i) communicating directly with charging stations to reduce load during peak periods, (ii) communicating directly with charging stations to allow power to be drawn from batteries during peak periods, (iii) drawing energy from car batteries connected to charging stations during peak periods, and (iv) communicating directly with charging stations to ensure energy is drawn from the LDC's system at the optimal times? If not, please explain what additional steps Hydro Ottawa is willing to commit to take to explore and implement these things.
- k) Is Hydro Ottawa willing to offer customers special rates to encourage the expansion of electric vehicles?
- l) Is Hydro Ottawa willing to further explore steps it can take to speed up the implementation of charging stations in hard-to-service locations, such as for on-street parking in the City of Ottawa?
- m) Could the City of Ottawa ask Hydro Ottawa through a unanimous shareholder resolution (or otherwise) to apply to the OEB for approval of programs intended to encourage the expansion of electric vehicles? If not, please explain why not.