

Interrogatory # 3-ED-1

Reference: Exhibit 3, Tab 1, Schedule 4, Page 7

Preamble: “Alectra Utilities has identified 28 distinct projects that are required to address urgent and necessary cable renewal work in the Enersource and PowerStream RZs...The list of projects includes 13 cable injection projects and 15 projects for cable replacement.”

- a) In the case of projects involving cable replacement, how was the size of the replacement wire determined?**
- b) In the case of projects involving cable replacement, did Alectra consider using larger wires to accommodate increasing electrification resulting from the decarbonization of space heating and transportation? If yes, please provide the details.**
- c) If sizing up the wires used in the proposed cable replacement is not technically feasible, please explain.**
- d) If sizing up the wires used in the proposed cable replacement is technically feasible, please provide an estimate of the incremental increase in cost.**
- e) If larger wires were used, what would be the savings in transmission losses over the lifetime of the wires? Please provide the figures in both kWh/year and kWh at peak.**

Response:

- 1 a) In the case of projects involving cable replacement, the size of the wire was determined
- 2 according to system planning philosophy and using the latest Alectra approved standard for
- 3 the type of service. The primary residential loop is served by 1/0 Aluminum and the
- 4 industrial/commercial main feeder is served by 1000MCM Copper.
- 5
- 6 b) For cable replacement projects, Alectra Utilities has upgraded the wire to the latest Alectra
- 7 approved standard, wherever required. The 1000MCM Copper can carry the full feeder
- 8 loading of 600A. The residential loops are 1/0 and can carry 180A rating based on a typical
- 9 duct configuration. Please refer to 3-ED-4 a) for information on the use of larger wire to
- 10 accommodate increased electrification from space heating and transportation.

1 c) Alectra Utilities sized the wire according to its System Planning philosophy and Standards
2 based on loading for a residential and industrial/commercial subdivision.

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4 d) For the majority of cable replacement projects, Alectra Utilities is already increasing the wire
5 size along the main circuits to the latest Alectra-approved standard wire.

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7 e) Alectra Utilities has completed the analysis for one project where the cable is upsized to show
8 the distribution loss over the lifetime of the cable.

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10 For project 151895, with a section of 665m 750 AL cable with a peak of loading of 160A, the
11 line loss is 7.9kW at peak, and annual loss is 23,085kWh. When it is replaced with 1000 MCM
12 Cu cable, the line loss is 5.6kW at peak, and annual loss is 16,317kWh. The savings in
13 distribution loss over the lifetime of wire will be 338,400 kWh.

Interrogatory # 3-ED-2

Reference: Exhibit 3, Tab 1, Schedule 4, Page 7

- a) In general, what is Alectra's methodology for sizing equipment installations to ensure that future needs associated with the electrification of transportation and heating can be met?**
- b) Does Alectra assume that its wires should be able to handle 100% electrification of transportation and heating?**
- c) Please provide copies of any studies that Alectra has conducted on how electrification will impact capital planning and equipment sizing.**

Response:

- 1 a) and b)
2 Alectra Utilities uses system planning philosophy, its design and loading guidelines as per the
3 service type and the latest standards to size the equipment. Please refer to Alectra Utilities'
4 response to 3-ED-4 a) for a detailed explanation on cable sizes and future needs associated
5 with the electrification of transportation and heating.
6
7 c) Alectra Utilities has provided the response on ampacity of the cables that are being replaced
8 and injected in response to 3-ED-4 a), 3-ED-5 c) and 3-ED-6 c). Alectra Utilities' electrification
9 study is underway and has not been completed.

Interrogatory # 3-ED-3

Reference: Exhibit 3, Tab 1, Schedule 4, Page 7

Preamble: “With the completion of the proposed cable replacement projects, Alectra Utilities will replace the existing deteriorated and failing cable in 15 neighbourhoods with new cable installed in protective conduit that will provide reliable service for the next 55 years.”

- a) Approximately how many customers (residential, commercial and industrial) are served in the areas where cable replacement is proposed?**
- b) Please confirm the estimated lifetime of the new cable is 55 years.**
- c) What is the capacity of the wires (MW) that would be used in the cable replacement?**
- d) How has Alectra Utilities considered avoiding future costs of wire replacement related to decarbonisation through electrification in the project areas where cable would be replaced? Please explain.**
- e) What is the approximate current EV penetration in the areas in which the cable would be replaced?**
- f) If all residential customers in the areas where cable would be replaced were to adopt EVs during the lifetime of the new cable, what would the contribution be to peak demand for planning purposes in MW? Please provide caveats or a range of possible figures as we understand that a lot will depend on behaviours.**
- g) If all residential customers in the areas where the cable would be replaced were to replace gas furnaces with electric heat pumps during the lifetime of the new cable, what would be the contribution to peak demand in MWh for planning purposes? Please feel free to provide caveats or a range of possible figures as we understand that a lot will depend on behaviours.**

Response:

- 1 a) Approximately 3,300 customers are being served by the ICM projects where cable
- 2 replacement is being proposed, of which approximately 570 are commercial customers.

- 1 b) Alectra Utilities considers a Typical Useful Life (TUL) of 40 years and End of Useful Life (EUL)
2 of 55 years for new tree retardant/strand blocked in-duct cables (Reference: 2020 EDR
3 Application, EB-2019-0018 Appendix D page 58).
4
5 c) Please see Table 1 below for the capacity of the wires that would be used in cable replacement
6 projects.

7
8 **Table 1 – Capacity of wire by Project**

Project Code ICM	Project Name	Existing Cable Size	Replacement Cable Size
151912	Cable Replacement Project – (V51) – Ashbridge Traffic Circle area in Vaughan	2/0 AL	2/0 AL
151913	Cable Replacement Project - (M44) - Cochrane Dr (North) - Scolberg (South), Markham	1/0AL	1/0 AL
151914	Cable Replacement Project - (V36) - Aviva Park, Vaughan	1000 MCM AL	1000 MCM Cu
152379	Cable Replacement Project - (A10) - Batson Dr, Aurora	1/0 AL	1/0 AL
151329	Cable Replacement Project - (M21) - Raymerville Dr, Markham	1/0 AL	1/0 AL
151935	Cable Replacement Project - (M15) - Larkin Ave area of Markham	1/0 AL	1/0 AL
152373	Cable Replacement Project - (V26) - St. Joan of Arc area of Vaughan	2/0 AL	2/0 AL
152375	Cable Replacement Project - (A09) - Hammond Dr area of Aurora	1/0 AL	1/0 AL
151403	Cable Replacement - Montevideo & Battleford in Mississauga (Area 46)	1/0 AL	1/0 AL
151407	Cable Replacement - Glen Erin & Burnhamthorpe of Mississauga (Area 25)	1/0 AL	1/0 AL
151889	Cable Replacement - Tomken Trail in Mississauga (Area 36)	750 kcmil	1000 kcmil
151895	Cable Replacement - Main Feeder Cable on Cantay Road (Area 44)	750 kcmil	1000 kcmil
151901	Cable Replacement - Hemus Square in Mississauga (Area 16)	1/0 AL	1/0 AL
151902	Cable Replacement - Dixie Rd and Winding Trail (Area 19)	1/0 AL	1/0 AL
151903	Cable Replacement - South Millway Area in Mississauga (Area 25)	1/0 AL	1/0 AL

9
10 The ampacity of 1/0 Al cable is 180A, 2/0 Al is 220A and 1000Kcmil Cu is 600A based on
11 standard duct configuration.

- 1 d) Please see Alectra Utilities' response to 3-ED-4 a).
2
- 3 e) Alectra Utilities does not have information on the current EV penetration in the areas. Please
4 refer to DRC-3 for total electric vehicles in Alectra Utilities' service territory.
5
- 6 f) There are 2,750 residential customers in the areas where the cables are being replaced. The
7 additional demand of EV is based on type of vehicles (long range/short range), type of charger
8 installed (level 1 or level 2), time of use and/or ultra low rates, managed charging, commute
9 pattern. For planning purpose Alectra Utilities would consider 3.6MW as contribution to the
10 peak based on 2,750 vehicles.
11
- 12 g) The additional demand from electrification of space heating is based on type of heating
13 employed i.e., baseboard or heat pump or combination thereof, efficiency of heat pump, size
14 of the house and weather condition and diversity factor. With so many variables and without
15 a detailed inventory of the size of home, it is not possible to complete the analysis as required.

Interrogatory # 3-ED-4

Reference: Exhibit 3, Tab 1, Schedule 4, Page 7

- a) Please provide a table listing all the relevant projects and indicate whether equipment being installed would need to be replaced in the event of (i) 100% electrification of all vehicles, (ii) 100% electrification of space and water heating, and (iii) both (i) and (ii). Please make and state any assumptions as necessary. Please indicate any caveats.
- b) Will the spending have any impact on the ability of customers to install distributed energy resources? Would alternatives to the project have impacts on this? Please explain in details.

Response:

- 1 a) Table 1 below, provides a list of all ICM cable replacement projects, the existing cable size
- 2 and the replacement cable size for each project.

3 **Table 1 – PowerStream Rate Zone Project Existing and Replacement Wire Size**

Project Code ICM	Project Name	Existing Cable Size	Replacement Cable Size
151912	Cable Replacement Project – (V51) – Ashbridge Traffic Circle area in Vaughan	2/0 AL	2/0 AL
151913	Cable Replacement Project - (M44) - Cochrane Dr (North) - Scolberg (South), Markham	1/0AL	1/0 AL
151914	Cable Replacement Project - (V36) - Aviva Park, Vaughan	1000 MCM AL	1000 MCM Cu
152379	Cable Replacement Project - (A10) - Batson Dr, Aurora	1/0 AL	1/0 AL
151329	Cable Replacement Project - (M21) - Raymerville Dr, Markham	1/0 AL	1/0 AL
151935	Cable Replacement Project - (M15) - Larkin Ave area of Markham	1/0 AL	1/0 AL
152373	Cable Replacement Project - (V26) - St. Joan of Arc area of Vaughan	2/0 AL	2/0 AL
152375	Cable Replacement Project - (A09) - Hammond Dr area of Aurora	1/0 AL	1/0 AL

151403	Cable Replacement - Montevideo & Battleford in Mississauga (Area 46)	1/0 AL	1/0 AL
151407	Cable Replacement - Glen Erin & Burnhamthorpe of Mississauga (Area 25)	1/0 AL	1/0 AL
151889	Cable Replacement - Tomken Trail in Mississauga (Area 36)	750 kcmil	1000 kcmil
151895	Cable Replacement - Main Feeder Cable on Cantay Road (Area 44)	750 kcmil	1000 kcmil
151901	Cable Replacement - Hemus Square in Mississauga (Area 16)	1/0 AL	1/0 AL
151902	Cable Replacement - Dixie Rd and Winding Trail (Area 19)	1/0 AL	1/0 AL
151903	Cable Replacement - South Millway Area in Mississauga (Area 25)	1/0 AL	1/0 AL

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Alectra Utilities selected the cable sizes according to the loading guidelines as per the latest Alectra Utilities standard, and upsized, wherever required. There are several factors to consider in terms of electrification of vehicles and space and water heating. The additional demand from EVs is based on number of vehicles per household, type of vehicles (long range/short range), type of charger installed (level 1 or level 2), time of use and/or ultra low rates, managed charging, commute pattern. The additional demand from electrification is based on type of heating employed i.e., baseboard or heat pump or combination thereof, efficiency of heat pump, size of the house and weather condition. With so many variables and without a detailed inventory of the size and number of homes for each project, it is not possible to complete the analysis as required. However, at a high level, Alectra Utilities confirms that the existing loading on the residential subdivision 1/0 cable is within the 20% loading guideline of the cable and there is capacity available for future growth from electrification and space heating.

- b) The spending won't have any appreciable impact on capacity to connect additional DERs as the limitations for DER connections stem mainly from stations thermal and short circuit limits. Alectra Utilities' investment in the cables will ensure that the grid is in optimal condition so that the DER can be connected. The advantages that the DER offer in term of flexibility, capacity and reliability support cannot be realized if the underlying grid that they are connected is not reliable.

Interrogatory # 3-ED-5

Reference: Exhibit 3, Tab 1, Schedule 4, Page 7

Preamble: “The list of projects includes 13 cable injection projects and 15 projects for cable replacement. [...] With the completion of the proposed cable injection projects, Alectra Utilities will achieve two objectives: i) prevent further cable failure 19 outages; and ii) reduce the need for higher future costs to replace the cable.”

Questions:

- a) Approximately how many customers (residential, commercial and industrial) are served in the areas where cable injection projects are proposed?**
- b) Please confirm the estimated lifetime of cable that has been injected with silicone.**
- c) What is the capacity of the wires in MW that would be subject to cable injection?**
- d) How has Alectra Utilities considered avoiding future costs of wire replacement related to decarbonisation through electrification in the cable injection project areas? Please explain.**
- e) What would be the difference in cost if the cables in the cable injection project areas were replaced with larger wires are contemplated above in 3-ED-1(d)?**
- f) What is the approximate current EV penetration in the cable injection project areas?**
- g) If all residential customers in the cable injection project areas were to adopt EVs during the lifetime of the new cable, what would the contribution be to peak demand for planning purposes in MWh? Please feel free to provide caveats or a range of possible figures as we understand that a lot will depend on behaviours.**
- h) If all residential customers in the areas where the cable injection project areas were to replace gas furnaces with electric heat pumps during the lifetime of the new cable, what would be the contribution to peak demand in MWh for planning purposes? Please feel free to provide caveats or a range of possible figures as we understand that a lot will depend on behaviours.**

Response:

- 1 a) Approximately 13,800 customers are being served by the ICM projects where cable injection
- 2 is being proposed, of which approximately 1,090 are commercial customers.

1 b) As provided in Exhibit 1, Tab 1, Schedule 4, page 8 of 10, the injection of silicone gel reinforces
2 the weakened insulation and can extend the useful life of the cable up to 20 years without the
3 costly and disruptive need to excavate or to replace entire cables.

4
5 c) Please see Table 1 below for the capacity of the wires for the cable injection projects.

6 **Table 1 – Existing Wire Size in Cable Injection Projects**

Project Code ICM	Project Name	Existing Cable Size
151361	Cable Injection - Cairns Drive of Markham (M21)	1/0 AL
151367	Cable Injection -McNaughton Road Area of Vaughan (V26)	2/0 AL
151456	Cable Injection -Soveirgn Court Area in Vaughan (V50)	2/0 AL
151459	Cable Injection- CreditStobe Road Area in Vaughan (V24)	2/0 AL
151461	Cable Injection- Jacob Keffer Parkway Area in Vaughan (V17)	2/0 AL
151517	Cable Injection- 8th Line & Hwy 11 Area in Bradford (BR5)	1/0 CU
151520	Cable Injection - Willow Farm Lane of Aurora (A09)	1/0 AL
152386	Cable Injection- kersey Crescent Area in Richmond Hill (R23)	1/0 AL
152387	Cable Injection- Rainbridge Avenue (V51)	2/0 AL
151431	Cable Injection - Glen Erin Dr & Bell Harbour Dr in Mississauga (Area 39)	750 kcmil
151432	Cable Injection - Edwards Boulevard Area in Mississauga (Area 43 & 51)	750 kcmil/1000 kcmil
151435	Cable Injection - Derry Rd W & Ninth Linega (Area 56)	750 kcmil/1000 kcmil
151436	Cable Injection - Winston Churchill & The Collegeway (Area 58 & 59)	750 kcmil/1000 kcmil

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8 The ampacity of 1/0 Al cable is 180A, 2/0 Al is 220A, 750KCMIL is 460A and 1000KCMIL Cu
9 is 600A based on standard duct configuration.

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11 d) Please see Alectra Utilities' response to 3-ED-4 (a).

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13 e) Cable replacement with the recommended wire size per Alectra Utilities System Planning
14 guidelines would be six times the cost as provided in Exhibit 1, Tab 1, Schedule 4, page 8.

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16 f) Alectra Utilities does not have information on the current EV penetration in the areas. Please
17 see Alectra Utilities' response to DRC-3 for the total number of electric vehicles in Alectra
18 Utilities' service territory.

- 1 g) There are 13,800 residential customers in the areas where the cables are being injected. The
2 additional demand of EV is based on type of vehicles (long range/short range), type of charger
3 installed (level 1 or level 2), time of use and/or ultralow rates, managed charging, commute
4 pattern. Assuming one vehicle per residential customer, for planning purposes, Alectra
5 Utilities would consider 18.2MW as contribution to the peak.
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- 7 h) The additional demand from electrification of space heating is based on type of heating
8 employed i.e., baseboard or heat pump or combination thereof, efficiency of heat pump, size
9 of the house and weather condition and diversity factor. With so many variables and without
10 a detailed inventory of the size of home it is not possible to complete the analysis as required.