MANA-1

Reference

Page 1 of Exhibit 1, Tab 3, Schedule 1 states that the population in its seventeen communities is forecast to grow from 3.5 million in 2016 to approximately 4.1 million by 2026.

[1-MANA-1] What information is this population forecast derived from? Please provide all source data.

[1-MANA-2] The Ministry of Finance's reference rate for population growth in the Province of Ontario is 1.8% slowing to approximately 1.0% during the same period. Does Alectra Utilities agree that growth in its communities approximates the provincial average?

[1-MANA-3] If Alectra Utilities asserts that growth in its communities is above the provincial average, to what extent?

Response:

1-MANA-1

Alectra Utilities has derived the information for the population forecast from the various sources including the Greater Golden Horseshoe Forecast to 2041, Regional Forecast as well as Statistics Canada Forecast. The source information is included in Table 2 in Section 5.3.2 of the DSP (Exhibit 4, Tab 01, Schedule 1, Page 176 and Page 177).

1-MANA-2

The Ministry of Finance's growth forecast for Province of Ontario is 0.9% for the low growth, 1.3% for the reference and 1.7% for the high growth forecast. Alectra Utilities has used the local population and housing information from the regions and municipalities it serves. Alectra Utilities' service territory includes several regions and municipalities which have higher growth than provincial average.

1-MANA-3

Alectra Utilities population growth, based on the data sources indicated in 1-MANA-1, is 1.7%.

MANA-2

Reference

Page 1 of Exhibit 1, Tab 3, Schedule 1 states that the investments contemplated in the DSP are not based on the historical expenditures of the utilities that have together formed Alectra Utilities.

[2-MANA-4] Is Alectra Utilities' position that rates should increase because of the amalgamation leading to Alectra Utilities?

[2-MANA-5] Is Alectra Utilities aware of any other amalgamation providing the basis for an increase in charges to ratepayers within the first five years of amalgamation?

Response:

2-MANA-4

In its Application, Alectra Utilities is seeking its annual inflationary adjustment to distribution rates, similar to all other distributors in Ontario. It is also seeking capital funding based on a rate-adjustment mechanism that reconciles the capital needs set out in its 2020-2024 Distribution System Plan ("DSP") with the capital-related revenue in rates, and associated 2020 to 2024 capital riders for each rate zone ("RZ"). Alectra Utilities is not seeking an increase in rates as a result of its consolidation. Please see Alectra Utilities' response to SEC-56.

2-MANA-5

Alectra Utilities does not accept the assumption that is made by MANA in this question, namely that the consolidation through which Alectra Utilities was formed has provided the basis for an increase in charges to ratepayers within the first five years of such transaction. Moreover, Alectra Utilities is not in a position to comment on the outcomes of other consolidation transactions in Ontario. Alectra Utilities identifies that the bill impacts of the M-Factor are modest relative to the need identified in the DSP. The bill impacts of the M-factor are set out, by rate zone, in Exhibit 2, Tab 1, Schedule 3, Tables 12 to 16. For example, as shown in Table 14, a Large Use customer in the Horizon Utilities Rate Zone would experience an average monthly % increase in their total bill annually, as a result of the M-Factor, of 0.01% if they have dedicated assets or 0.06% if they do not have dedicated assets. These bill impacts result not from the consolidation transaction, but because of the underlying capital investment needs of

the system. Those investment needs would have arisen regardless of the consolidation transaction, as discussed in response to Staff-11 b) and c).

MANA-3

Reference

Page 2 of Exhibit 2, Tab 1, Schedule 1 states that Alectra Utilities expects that during its rebasing deferral period, its rates will continue to be set on the basis of the individual RZs corresponding to each of its predecessor utilities.

[3-MANA-6] How is retention of the historic rate zones reconciled with Alectra Utilities "ground up" approach to rate determination?

Response:

Alectra Utilities' application does not state that it used a "ground up approach to rate determination". Rather, it is the investment plan that has been developed "from the ground up". In particular, at Exhibit 1, Tab 3, Schedule 1, p. 1 at lines 23 -27, the Application states:

> *The DSP is not a simple amalgamation of five distinct investment plans. Rather, it is a single, unified capital investment plan, built "from the ground up" to address the needs of the system as a whole in consideration of the identified priorities and preferences of Alectra Utilities' customers and a range of other planning considerations.*

With respect to the need to set rates on the basis of the individual rate zones, please see Alectra Utilities' response to BOMA-3 e). The manner in which Alectra Utilities has calculated the M-factor capital revenue requirement and resulting riders on a rate zone-specific basis is provided in Exhibit 2, Tab 1, Schedule 3, pp. 16-19.

MANA-4

Reference

Page 2 of Exhibit 1, Tab 3, Schedule 1 refers to the impact of adverse weather events on Alectra Utilities' distribution.

[4-MANA-7] What analysis has Alectra Utilities performed to compare adverse weather events in its jurisdiction with those in other jurisdictions?

[4-MANA-8] Did Alectra Utilities (or its predecessor utilities) review adverse weather events in its communities prior to amalgamation, and can Alectra provide those reviews?

[4-MANA-9] Did the historical expenditures of the utilities that have formed Alectra Utilities take adverse weather events into consideration? If so, how did they do so? If not, why not?

Response:

4-MANA-7

Alectra Utilities has not performed any analysis to compare adverse weather events with other jurisdictions. Alectra Utilities examined the weather events relevant to the service area in which it operates. Please refer to Appendix N of the DSP (Exhibit 4, Tab 1, Schedule 1, and Appendix N) for a summary of climate and trends in Alectra Utilities' service area.

4-MANA-8

Alectra Utilities' predecessor, PowerStream conducted a review, prior to the merger, on the impact of adverse weather on the distribution system. The report and findings guided Alectra Utilities understanding and system planning in the development of the DSP. Alectra Utilities has provided that review report as Appendix K of the Distribution System Plan (Exhibit 4, Tab 1, Schedule 1, and Appendix K).

4-MANA-9

Alectra Utilities' predecessor, PowerStream and Horizon Utilities had planned specific investments dedicated to storm hardening which included reinforcing four circuit poles (PowerStream) and rear lot renewals (PowerStream and Horizon Utilities). However, any investment in renewal or distribution automation on an overhead system has a direct impact on

storm resiliency due to improved restorations capability. Since all predecessor utilities had investments in overhead renewal, and some additionally had expenditures on automation, there is a direct impact on the distribution system resiliency for adverse weather.

MANA-5

Reference

Page 1 of Exhibit 2, Tab 1, Schedule 2 refers the priorities and preferences of all Alectra Utilities customers.

[5-MANA-10] How were the priorities and preferences of all Alectra Utilities customers measured?

Response:

5-MANA-10

Please refer to the detailed methodology in the 2020-2024 Customer Engagement Overview (pp. 6-11), provided at Exhibit 4, Tab 1, Schedule 1, Appendix C02.

MANA-6

Reference

Page 3 of Exhibit 2, Tab 1, Schedule 2 refers to the investment of 25% of Alectra Utilities' planning for expenditures during the 2020-2024 period into renewal of deteriorated underground systems.

Page 3 of Exhibit 4, Tab 1, Schedule 1 refers to underground asset investment.

[6-MANA-11] What is the expected impact on the duration and frequency of outages from this work?

[6-MANA-12] How are these duration and frequency of outages estimated?

[6-MANA-13] What percentage of this underground asset investment is occurring in the former Horizon rate zone?

[6-MANA-14] What is the expected impact on the duration and frequency of outages specifically in the Horizon rate zone from this work?

[6-MANA-15] Quantitatively, how does Alectra Utilities' usage of underground distribution assets compare with that of other utilities?

[6-MANA-16] Quantitatively, how does Alectra Utilities' frequency and duration of outages compare with that of other utilities?

[6-MANA-17] What percentage of expenditures do other Ontario utilities dedicate to repair of their underground systems, and how do these percentages compare to those included in the Alectra Utilities application?

Response:

[6-MANA-11] The investment of 25% of Alectra Utilities' planning for expenditures during the 2020-2024 period into renewal of deteriorated underground systems targets underground XLPE cable and cable accessories, switchgears, and civil structures (Reference: *Exhibit 04, Tab 01, Schedule 01, Appendix A10 – Underground Asset Renewal, Page 1*). The expected impact on the duration and frequency of outages resulting from the theses renewal programs are expected to be 1,384 hours and 601 outages avoided respectively during the 2020-2024 period. To put this in perspective, this equates to approximately 35,212,684 customer minutes of interruption that will be avoided as a result.

[6-MANA-12] The duration and frequency of outages are estimated utilizing a harmonized approach, whereby historical outage data is analyzed to measure the average outage duration

per failure and frequency of outages within a given area. In cases where the frequency of failure is not used, Alectra Utilities selects a generic failure rate since the underground assets for renewal are between the TUL and EUL and therefore have a higher probability of failure.

[6-MANA-13] The capital expenditure on underground asset renewal in the former Horizon Utilities operational area is approximately 11% of the total capital expenditure for underground asset renewal across Alectra Utilities' entire service territory (3% of the total investments).

[6-MANA-14] The expected impact on the duration and frequency of outages resulting from theses renewal programs in the West (legacy Horizon Utilities') operational area are expected to be 177 hours and 77 outages avoided respectively during the 2020-2024 period. To put this in perspective, this equates to approximately 12,834,761 customer minutes of interruption that will be avoided as a result.

[6-MANA-15] Alectra Utilities does not possess usage information from other utilities on underground cables in order to quantitatively compare the usage of underground distribution assets with that of other utilities.

[6-MANA-16] Alectra Utilities does not possess reliability information from other utilities on underground cables in order to quantitatively compare the frequency and duration of underground related outages with that of other utilities.

[6-MANA-17] Alectra Utilities does not possess renewal information from other utilities on underground cables in order to have data available on the percentage of expenditures other Ontario utilities dedicate to repair of their underground systems.

MANA-7

Reference

Pages 3 and 4 of Exhibit 2, Tab 1, Schedule 2 refers to an investment in "Enhancing the resilience of its overhead system to adverse weather events".

[7-MANA-18] What is the expected impact on the duration and frequency of outages from this work?

[7-MANA-19] How are these duration and frequency of outages estimated?

[7-MANA-20] What is the expected impact on the duration and frequency of outages specifically in the Horizon RZ from this work?

Response:

7-MANA-18

Alectra Utilities plans to invest in renewing overhead assets that enhance the resilience of its overhead system to adverse weather events. The expected impact on the duration and frequency of outages resulting from these investments are expected to be 227 hours and 141 outages avoided respectively during the 2020-2024 period. To put this in perspective, this equates to approximately 3,007,519 customer minutes of interruption that will be avoided as a result.

7-MANA-19

Alectra Utilities determines the duration and frequency of outages by applying historical outage data to determine the average outage duration and the frequency of outages within a given area. In cases where the frequency of failure is not reasonable, Alectra Utilities applies a system outage rate. Please refer to G-Staff-60 a) for additional information.

7-MANA-20

The expected impact on the duration and frequency of outages resulting from these investments in legacy Horizon Utilities' operational area is 112 hours and 80 outages avoided respectively during the 2020-2024 period. To put this in perspective, this equates to approximately 2,033,203 customer minutes of interruption that will be avoided as a result.

MANA-8

Reference

Page 4 in Exhibit 2, Tab 1, Schedule 2 refers to a "population of wood poles in circumstances where they carry four circuits".

Page 7 of Exhibit 4, Tab 1, Schedule 1 states that "Reinforced and replacement poles are more resilient to ice and wind loading. Alectra Utilities will specifically target a particular population of wood poles in circumstances where they are carrying four circuits"

[8-MANA-21] How is this population of wood poles divided as between rate zones?

[8-MANA-22] How does the number of four-circuit wood poles in Alectra Utilities' rate zones compare with the per-capita number in the jurisdiction of other Ontario utilities?

[8-MANA-23] What percentage of this population of wood poles is located in the former Horizon RZ?

Response:

8-MANA-21

Table 1, below provides the number of wood poles conveying 4-circuits, by operational area.

Table 1- Population of wood poles carrying 4 circuits divided between operating areas

Operating Area	# of Four-circuit Poles
East (former Powerstream)	1,888
Central-south (former Enersource)	822
Central-north (former Brampton)	170
West (former Horizon)	17
South-west (former Guelph)	40

8-MANA-22

Alectra Utilities does not have access to information on the number of four circuit poles from other Ontario utilities.

8-MANA-23

The percentage of wood poles carrying 4 circuits in the former Horizon RZ is 0.6% of the total population of 4 circuit poles across Alectra Utilities.

MANA-9

Reference

Page 7 of Exhibit 2, Tab 1, Schedule 2 refers to "ongoing customer engagement activities carried out by the company".

[9-MANA-24] What are the "ongoing customer engagement activities" referred to here?

Response:

Please see Exhibit 4, Tab 1, Schedule 1 of the pre-filed evidence, which is Alectra Utilities' Distribution System Plan. In particular, see the detailed description of Alectra Utilities' Customer Engagement efforts in Section 5.2.1.5. Part E of Section 5.2.1.5, which starts on p. 41 of 438, is focused on Ongoing Customer Engagement.

MANA-10

Reference

Page 7 of Exhibit 2, Tab 1, Schedule 2 refers to customers completing an "online workbook."

Page 38 of Exhibit 4, Tab 1, Schedule 1 also refers to a "comprehensive workbook".

[10-MANA-25] If the questions that customers were asked as part of the online workbook have not been produced, please produce them.

[10-MANA-26] If the questions that customers were asked have been produced, please advise where they are found in the Application.

Response:

10-MANA-25

The Customer Engagement Report and online workbook is provided in Exhibit 4, Tab 1, Schedule 1, Appendix C – Customer Engagement.

10-MANA-26

Please see Alectra Utilities' response to 10-MANA-25.

MANA-11

Reference

Page 7 of Exhibit 2, Tab 1, Schedule 2 refers to a final addendum with the additional GS over 50kW completes in Brampton.

[11-MANA-27] Please describe all impacts this final addendum had on the results of the consultation?

Response:

11-MANA-27

The GS>50kW customer engagement workbook in the Brampton RZ was extended to May 22, 2019 to allow more customers the opportunity to participate. This extension allowed seven additional GS>50kW customers in the Brampton RZ an opportunity to complete the workbook. While the new numbers allowed for further depth of analysis, they did not result in any substantive changes in the results.

MANA-12

Reference

Page 10 of Exhibit 2, Tab 1, Schedule 2 refers to customer preferences in relation to specific capital investment areas.

[12-MANA-28] Was information provided to customers to assist them in understanding these capital investment areas? If so, please produce it.

[12-MANA-29] Please produce any information Alectra Utilities has regarding its customers' understanding of the capital investment areas.

Response:

12-MANA-28

Yes, information was provided to customers to assist them in understanding these capital investment areas in the customer engagement workbooks. Details are produced in Exhibit 4, Tab 1, Schedule 1, Appendix C, Appendix 1.0, Representative Customer Engagement Report and Appendix 2.0, Voluntary Customer Engagement Report.

12-MANA-29

Alectra Utilities' customers received an online engagement workbook that was customized to their rate zone and customer class. Customers provided their feedback on between seven and thirteen capital investment areas. For each choice, Alectra Utilities identified an option to stay within existing rates under the Price Cap Formula. It also identified options to increase investments.

Where practical, options were offered to reduce investments to enable lower rates or make room for increased investments in more pressing areas. A summary of these findings are found in the 2020-2024 DSP Customer Engagement Overview, as well as in the detailed findings produced in Appendix 1.0, Representative Customer Engagement Report and Appendix 2.0, Voluntary Customer Engagement Report.

The diagnostic questions, included to assess the performance of the workbook ,indicate that customers felt comfortable with the content. For instance, page 33 of Appendix 1.0, Representative Customer Engagement Report shows that over 95% of residential customers in

all rate zones felt the purpose of the consultation was at least somewhat clear. Page 84 of the same report shows that at least 80% of residential customers in all rate zones had a favourable impression of the workbook. Finally, page 85 of the above-mentioned report shows that 80% of residential customers felt the workbook had just the right amount of information.

MANA-13

Reference

Page 10 of Exhibit 2, Tab 1, Schedule 2 states that the incorporation of customer preferences into the DSP involved the adjusting of pace of investments and the deferring of certain projects.

[13-MANA-30] Are these adjustments and deferrals completely described on pages 40-41 of Exhibit 4, Tab 1, Schedule 1? If not, what other adjustments and deferrals were made?

Response:

[13-MANA-30]

The adjustments to the capital investment plan are fully described on pages 39, 40 and 41 of Exhibit 4, Tab1 Schedule 1.

MANA-14

Reference

Page 2, lines 19-20 of Exhibit 4, Tab 1, Schedule 1 state that "When presented with investment options, Alectra Utilities customers indicated preference to fund the level of investment recommended by Alectra Utilities".

Page 12 of Exhibit 4, Tab 1, Schedule 1 states that "When presented with investment options, Alectra Utilities customers indicated preference to fund the level of investment recommended by Alectra Utilities."

Exhibit 4, Appendix C02 contains the notation "Small sample size, interpret with caution" under a number of the consultation results.

Exhibit 4, Appendix C02, Customer Engagement prepared by Innovative Reseach Group.

[14-MANA-31] Which investment options are referred to in these sentences?

[14-MANA-32] What methodology was used when asking customers about the level of investment recommended by Alectra Utilities?

[14-MANA-33] What were the exact questions asked of customers related to the statement that "customers indicated preference to fund the level of investment recommended by Alectra Utilities"? Please indicate which questions cited in Exhibit 4, Appendix C02 are relied upon for this conclusion, if any.

[14-MANA-34] Please produce the raw data relied upon to support the statement that "customers indicated preference to fund the level of investment recommended by Alectra Utilities".

[14-MANA-35] In asking about customers' investment preferences, were customers advised of the specific impact such investment options would have on their own electricity costs? What is the precise amount of "bill impact" that was disclosed to customers who indicated such preferences? Were customers asked to explicitly state whether, and to what extent, they preferred to increase their own electricity costs in order to fund the referenced investment levels? Were customers given an explicit option in the consultation to select a preference for decreased electricity costs and lower investments?

[14-MANA-36] What is meant by the notation "Small sample size, interpret with caution"?

[14-MANA-37] Please provide each of the results set out in the various Online Workbook Results by percentage of total Alectra customers (or where applicable, percentage of total Alectra customers in the specified RZ or in the specified class). For example, Page 152 of the IRG Report states that 31 customers in the GS > 50 kW – 4,999 kW preferred "recommended pace" and 31 customers in that class preferred "base pace"; what percentage of GS > 50 kW – 4,999 kW customers is represented by 31 customers?

Similarly, Page 200 of the IRG Report states that 0 Large Use customers preferred "recommended pace" and 1 Large Use customer preferred "base pace"; what percentage of Large Use customers is represented by that 1 customer? Please provide such percentages of total customer base (or RZ or class customer base) for each other Question in the IRG Report.

[14-MANA-38] What incentives, if any, were offered to customers in relation to providing the information resulting in the raw data?

[14-MANA-39] Please provide copies of the engagement letter and instruction provided to Innovative Research Group.

[14-MANA-40] What involvement did Alectra Utilities have in drafting the questions asked by Innovative Research Group as part of this consultation/workbook? Please provide all correspondence between Alectra Utilities and Innovative Research Group in relation to the consultation/workbook and the Report.

Response:

14-MANA-31

A summary of key findings related to investment options can be found from page 3 to page 5 of the DSP Customer Engagement Overview, provided at Exhibit 4, Tab 1, Schedule 1, Appendix C02.

14-MANA-32

The methodology is documented from page 6 to page 12 of the DSP Customer Engagement Overview as well as in the individual engagement reports, provided at Exhibit 4, Tab 1, Schedule 1, Appendix C.

14-MANA-33

Please refer to Exhibit 4, Tab 1, Schedule 1, Appendix C02, Appendix 1.0, Representative Customer Engagement Report, pages 79-80, 132-133, 180-181 and 227-229.

14-MANA-34

INNOVATIVE makes a commitment to all respondents to protect their privacy when collecting their responses. Consistent with that commitment, it is not common practice to make raw data available. The details of population characteristics, sample characteristics and weighting proceeds are documented in the sample validation section of the Representative Report,

provided at Exhibit 4, Tab 1, Schedule 1, Appendix C02, Appendix 1.0, Representative Customer Engagement Report, pages 3-9.

14-MANA-35

Customers were provided with rate impacts three ways. First, for each investment option, customers were provided with both the average bill impact per month annually and the total impact over the application period. These costs were customized by rate zone and rate class. The detailed grid providing the costs share with customers can be found in Appendix 1.0, Representative Customer Engagement Report, Pages 233 to 240. Second, customers were shown the cumulative rate impact of their personal choices and given the opportunity to change their responses until they were satisfied with the total rate impact. Those responses can be found in Appendix 1.0, Representative Customer Engagement Report. Third, customers were also asked their view on an overall rate increase sufficient to fund planners recommended options across all projects. Again, those responses can be found in Appendix 1.0, Representative Customer Engagement Report

14-MANA-36

“Small sample size, interpret with caution” is noted where an individual sample group does not meet or exceed n=50.

14-MANA-37

Because the decisions informed by this engagement are tied to specific rates for specific rate classes in specific rate zones, the data has not been complied for Alectra Utilities as a whole. Tables such as the Table on the bottom of page 3 in Appendix C02 show the responses for key questions across all rate zones so readers can assess whether there is a consensus across rate zones and classes or, if there are differences, whether those differences seem to be regionally based or rate class based.

14-MANA-38

As provided in Appendix 1.0, Representative Customer Engagement Report, customers were invited to enter a draw to win one of ten $500 prepaid credit cards.

14-MANA-39

There is no written instruction. INNOVATIVE and Alectra Utilities have conducted previous customer engagements and the understanding of both parties is that current engagement would build on previous engagements informed by new directions from the OEB as well as being responsive to the changing public environment. The redacted Letters of Agreement between INNOVATIVE and Alectra Utilities is provided as MANA-14_Attach 1_LOA Placemat, MANA-14_Attach 2_LOA Phase 1 and 2, and MANA-14-Attach 3_LOA Phase 3.

14-MANA-40

Alectra Utilities and INNOVATIVE worked together to develop the workbook. The beginning of the workbook that ensures all participants have a basic understanding of Alectra Utilities and where Alectra Utilities fits within the electricity system is based on INNOVATIVE's previous experience with Alectra Utilities and other electricity engagements. The specific investment options and the costs for each option were identified by Alectra Utilities. The design of the questions dealing with investment options was proposed by INNOVATIVE. The analysis and report were prepared by INNOVATIVE.

MANA-14

ATTACH 1- LOA Placemat

Innovative Research Group Inc.
56 The Esplanade, Suite 310
Toronto, Ontario M5E 1A7
(416) 642-6340 phone
(416) 640-5988 fax

July 26, 2018

Indy Butany-DeSouza
Alectra Utilities
2185 Derry Road W.
Mississauga, ON L5N 7A6

RE: LETTER OF AGREEMENT: ALEC. 04 *Alectra Utilities Corp. (2020 Consolidated DSP Consultation)*

Dear Indy,

On behalf of Innovative Research Group Inc. (INNOVATIVE), I would like to thank you for the opportunity to work with Alectra Utilities Corp. (Alectra Utilities) to complete Phase 1 of the 2020 Consolidated DSP Consultation.

This letter is to confirm the contractual arrangement between the Alectra Utilities and INNOVATIVE to design and execute the research services outlined in this *Letter of Agreement.*

As per our discussions, INNOVATIVE is being engaged to conduct research as per the Terms of Project and Appendices on the following pages.

We are looking forward to working with you. If you have any questions, please feel free to contact me directly at 416-640-4133.

Sincerely,

Julian Garas
Senior Consultant, Innovative Research Group Inc.
jgaras@innovativeresearch.ca
(416) 640-4133

TERMS OF PROJECT	
CLIENT:	Alectra Utilities Corp.
DESCRIPTION OF PROJECT:	Alectra Utilities Corp. 2020 Consolidated DSP Consultation – Phase 1
OWNERSHIP:	Alectra Utilities Corp.
TYPE OF PROJECT:	Residential, small business and mid-market telephone surveys and large use online surveys in the Brampton and Horizon rate zone & "Placemat" planning tool. See ***Appendix A*** for project details.
Deliverables :	• project management • Re-purposing existing survey instrument designed for PowerStream and Enersource RZs • Telephone and online surveys in Horizon and Brampton RZs with residential, small business, mid-market and large use customer • data tabulation • open-ended coding • data analysis • Final report • **"Placemat" Planning Tool:** Overview table summarizing needs and preferences of various rate classes in each rate zone based on customer research.
TIMING:	To commence immediately following project initiation meeting.
COST:	[redacted] Breakdown provided under ***Appendix B.***
BILLING TERMS:	**First Invoice**: 50% of total project cost upon commencement of project **Second Invoice**: 50% of total project cost upon completion of project
Please note that the cost of this study includes the deliverables as stated above, as well as all professional costs. This price excludes applicable taxes.	
Net due in 30 days *Interest will be charged at 1.5% per month on all overdue accounts.* *Please make payments payable to Innovative Research Group Inc.*	
Cancellation Fee *If the project is cancelled prior to field a cancellation fee of 1/3 the total project fee will be charged.*	

Confidentiality

(a) Innovative Research Group Inc. (INNOVATIVE) acknowledges that the Confidential Material of Alectra Utilities is a valuable and unique asset of Alectra Utilities and has and will be disclosed by Alectra Utilities to INNOVATIVE on a strictly confidential basis, INNOVATIVE shall not disclose or use the Confidential Material of Alectra Utilities other than to its employees, contractors and consultants for purposes directly related to the provision of services by INNOVATIVE to Alectra Utilities. INNOVATIVE shall cause its employees and contractors to execute confidentiality agreements in favour of Alectra Utilities regarding the Confidential Material of Alectra Utilities, in a form satisfactory to Alectra Utilities. INNOVATIVE acknowledges that the disclosure of the Confidential Material of Alectra Utilities to a third party may cause serious and irreparable harm to Alectra Utilities and, accordingly, INNOVATIVE shall take all reasonable precautions to prevent disclosure or use of any Confidential Information, except as provided herein. Use of the Confidential Material of Alectra Utilities by anyone other than INNOVATIVE, its employees and contractors shall constitute infringement of Alectra Utilities rights. In the event of a theft or piracy of trade secrets or other intangible elements of Confidential Material of Alectra Utilities, INNOVATIVE shall promptly notify Alectra Utilities in writing of such loss, theft or piracy.

(b) All of the undertakings and obligations relating to confidentiality and non-disclosure, whether contained in this paragraph or elsewhere in this Agreement, and whether of INNOVATIVE or Alectra Utilities shall survive the termination of this Agreement for whichever reason.

Privacy

The parties agree that this contract shall be performed in accordance with all applicable laws of Ontario and Canada, which both parties agree, is deemed to include the Personal Information Protection and Electronic Documents Act ("PIPEDA").

Termination of Agreement

Without prejudice to any other remedies to which Alectra Utilities may be entitled to under this Agreement, at law, or otherwise, Alectra Utilities may terminate this Agreement, upon the following:

(a) **Termination for Breach**: Except as expressly stated otherwise in this Section, if there shall be a breach or failure by any of the parties in the performance of such party's obligations under this Agreement or pursuant to any other agreement between INNOVATIVE and Alectra Utilities, the other party may give the non-breaching party written notice to cure such breach or non-performance. If the cause of such breach or non-performance is not corrected promptly having regard to the nature thereof, and in any event within twenty-one (21) days from the date of the notice to cure unless otherwise stated in this Section, the other party may terminate the Term of the Agreement by giving the non-performing party ten (10) days written notice.

(b) **Termination for Deemed Defaults**: Without in any way limiting or restricting the generality of above section, the respective parties shall conclusively be deemed to have committed a material breach or material failure in the performance of their obligations under this Agreement on the happening of any one of the following events:

   a. Such party becomes insolvent;
   b. Such party makes an assignment for the general benefit of creditors or becomes bankrupt; or
   c. Any proceedings shall be commenced by or against such party under any bankruptcy or insolvency laws, or for the appointment of a custodian, receiver or receiver-manager or any other official with similar powers over such party and such proceedings are not defended diligently and in good faith by such party.

(c) **Termination for Specific Events of Default:** On the happening of any of the following events, the Term of this Agreement may be immediately terminated by Alectra Utilities, without prior notice and without affording a cure period, unless a notice and/or cure period is specifically otherwise provided for herein:

a. If INNOVATIVE ceases to carry on its business in the ordinary course;
b. If INNOVATIVE shall fail to perform its obligations hereunder in a professional, worker-like and competent manner in form and substance satisfactory to Alectra Utilities;
c. If Alectra Utilities becomes entitled to terminate this Agreement or the Term of this Agreement under any provision of this Agreement which permits termination of this Agreement; and
d. If INNOVATIVE breaches any of the covenants set out in above sections.

(d) **Survival of Obligations:** In the event of expiration of the Term or termination of the Agreement, INNOVATIVE shall not be relieved of such party's obligations hereunder which specifically survive and any other obligations which have theretofore accrued and not yet been satisfied.

(e) **Preservation of Rights on Termination of Term:** Any termination of this Agreement by Alectra Utilities as provided herein shall not in any way operate to deny any of Alectra Utilities other rights or remedies, either at law or in equity or to relieve INNOVATIVE of any obligation accrued prior to the effective date of termination. No failure or delay on the part of Alectra Utilities to exercise a right of termination of the Term of this Agreement or the Agreement hereunder nor any default by INNOVATIVE shall be construed to prejudice Alectra Utilities right of termination of Term of this Agreement or the Agreement or cancellation for such default or for any other subsequent defaults.

By execution of this document, the undersigned retains and authorizes Innovative Research Group Inc. and binds Alectra Utilities with respect to the terms listed above.

DATED this 1st **day of** Aug., **2018**

Company name: Alectra Utilities Corp.

Per: _____

Authorized signing officer (I have authority to bind the organization)

Appendix A: Project Details

	Deliverables/Milestones	Rate Zone(s)	Timelines
Phase I	Complete remaining customer engagement surveys in Brampton and Horizon RZ's	Brampton, Horizon	*As soon as possible*
	Develop customer needs and preferences "placemat" to be used as a planning tool	All	*As soon as possible*
Phase II	Alectra to develop draft DSP with identified customer choices	All	Fall 2018
	Present DSP choices to customers and collect feedback on options	All	Fall 2018
	Alectra to incorporate customer feedback into DSP, finalize and submit Application	All	April 2019
	Potential ICM application(s)	*TBD*	*TBD*

Deliverables/Milestones	Rate Zone(s)	Timelines
Complete remaining customer engagement surveys in Brampton and Horizon RZ's	Brampton, Horizon	*As soon as possible*

Brampton & Horizon RZ Consultations

Building on the 2019 ICM Application customer engagement in the Enersource and PowerStream rate zone's – re-purpose existing survey instrument to gather feedback to feed into planning process in the Brampton and Horizon rate RZ's.

- **Residential, small business and mid-market telephone surveys in both rate zones.**
- **Large Use online surveys in both rate zones.**
- Exclude ICM-specific questions, including rate impacts from Enersource and PowerStream RZ surveys.
- Feedback to be used as input for drafting consolidated DSP and "placemat" planning tool.

Develop "Placemat" Planning Tool

Using existing customer feedback, develop a customer "placemat" to be used as a planning tool in preparing the draft consolidated DSP.

- Overview table summarizing needs and preferences of various rate classes in each rate zone based on customer research.
- To be circulated among Alectra Utilities business and technical teams to assist them in the development of the utility's draft consolidated DSP.

Appendix B: Budget

The following table provides the estimated costs for Phase 1 of the 2020 Consolidated DSP Consultation:

Rate Zone	Rate Class	Methodology	n-size	Estimated Cost*
Brampton	Residential	Telephone	n=500	[redacted]
Brampton	Small Business	Telephone	n=200	
Brampton	Mid-Market	Telephone	n=200	
Brampton	Large Use	Online	*Best effort*	
Horizon RZ	Residential	Telephone	n=500	
Horizon RZ	Small Business	Telephone	n=200	
Horizon RZ	Mid-Market	Telephone	n=200	
Horizon RZ	Large Use	Online	*Best effort*	

Total Project Cost: [redacted]

Budgetary Notes and Assumptions:

- *Estimated Costs are based on survey instrument developed as part of PowerStream and Enersource RZ ICM Consultation. Includes a 20% discount on project fees. Pricing based on a 25-question survey with 6 open-ended questions. Questionnaire length will impact the final pricing.
- Applicable taxes not included.

MANA-14

ATTACH 2- LOA Phase 1 and 2

March 14, 2019

Indy Butany-DeSouza
Alectra Utilities
2185 Derry Road West
Mississauga, Ontario L5N 7A6

RE: Letter of Agreement (ALEC.05) Consolidated DSP Customer Engagement (Workbook Development and Testing Phases)

Dear Indy,

On behalf of Innovative Research Group Inc. (INNOVATIVE), I would like to thank you for the opportunity to work with Alectra Utilities to design a comprehensive customer engagement in support of the utility's 2020-2024 Rate Application.

The plan is to conduct the customer engagement in three stages this year: (1) the planning and workbook development phase, (2) the testing phase, and (3) the customer engagement phase.

This letter is to confirm our agreement about the contractual arrangement between Alectra Utilities and INNOVATIVE to complete the study as per the Terms of Project on the following page. Please note that this letter covers only the planning and workbook development phase (Phase 1) and the testing phase (Phase 2). There will be an additional LOA for the customer engagement phase (Phase 3).

Once you have reviewed this letter, please sign below and fax back to my attention at (416) 640-5988, or scan and return via email. If you have any questions, please feel free to contact me at (416) 642-6429.

Yours truly,

BY EMAIL

Greg Lyle
President
Innovative Research Group Inc.

TERMS OF PROJECT

CLIENT:	Alectra Utilities	
DESCRIPTION OF PROJECT:	Consolidated DSP Customer Engagement (2020-2024)	
METHODOLOGY:	**Planning, Workbook Development and Testing Phases (Phases I and 2)**	
OWNERSHIP:	Results are property of Alectra Utilities	
TYPE OF PROJECT:	Customer consultation program designed to satisfy OEB requirements for successful customer engagement.	
PROJECT DELIVERABLES	**Project management and Customer Engagement Briefing Meetings*:** [redacted]	[redacted]
	Workbook development*: [redacted]	[redacted]
	Expenses for Customer Engagement Briefing Meetings, including travel and meals* (*estimate*)	[redacted]
	Workbook testing focus groups: [redacted]	[redacted]
	[redacted]	[redacted]
TIMING:	**November 2018 to March 2019**	
COST*	[redacted] * **Note:** Costs above are based on project estimates. Final invoice will reflect actual number of hours spent on project, as well as final expenses.	
BILLING TERMS:	***First invoice:*** 1/2 of total project cost upon commencement of project ***Second/final invoice:*** 1/2 of total project cost upon delivery of report ***Expenses:*** Hotel facility rental, AV, accommodation and printing to be billed back to client at cost	

Please note that the cost of this study includes the deliverables as stated above, as well as all professional costs. This price excludes applicable taxes, client approved travel and accommodation expenses.

Net due in 30 days *Interest will be charged at 1.5% per month on all overdue accounts.* *Please make payments payable to Innovative Research Group Inc.*
Cancellation Fee *If the project is cancelled prior to field a cancellation fee of 1/3 the total project fee will be charged.*
** Actual expenses will be billed separately at direct cost*

By execution of this document, the undersigned retains and authorizes **Innovative Research Group Inc**. and binds **Alectra Utilities** with respect to the terms listed above.

DATED this _____ day of _____, 2019.

Company name: Alectra Utilities

Per: _____
Authorized signing officer (I have authority to bind the organization)

MANA-14

ATTACH 3- LOA Phase 3

Innovative Research Group Inc.
56 The Esplanade, Suite 310
Toronto, Ontario M5E 1A7
(416) 642-6340 phone
(416) 640-5988 fax

March 10, 2019

Indy Butany-DeSouza
Alectra Utilities
2185 Derry Road W.
Mississauga, ON L5N 7A6

RE: LETTER OF AGREEMENT: ALEC05 *Alectra Utilities Corp. (Customer Engagement Phase III)*

Dear Indy,

On behalf of Innovative Research Group Inc. (INNOVATIVE), I would like to thank you for the opportunity to work with Alectra Utilities to design a comprehensive customer engagement in support of the utility's 2020-2024 Rate Application.

The plan is to conduct the customer engagement in three stages this year: (1) the planning and workbook development phase, (2) the testing phase, and (3) the customer engagement phase.

This letter is to confirm our agreement about the contractual arrangement between Alectra Utilities and INNOVATIVE to complete the study as per the Terms of Project on the following page. **Please note that this letter covers only the customer engagement phase (Phase 3)**

Once you have reviewed this letter, please sign below and fax back to my attention at (416) 640-5988, or scan and return via email. If you have any questions, please feel free to contact me at (416) 642-6429.

Sincerely,

Julian Garas
Senior Consultant, Innovative Research Group Inc.
jgaras@innovativeresearch.ca
(416) 640-4133

TERMS OF PROJECT		
CLIENT:	Alectra Utilities	
DESCRIPTIOM OF PROJECT:	Consolidated DSP Customer Engagement (2020-2024)	
METHODOLOGY:	**Customer Engagement Phase (Phase 3)**	
OWNERSHIP:	Results are property of Alectra Utilities	
TYPE OF PROJECT:	Customer consultation program designed to satisfy OEB requirements for successful customer engagement.	
PROJECT DELIVERABLES	**Project management and coordination:** [redacted]	[redacted]
	Telephone Reference Surveys: Residential and Small Business telephone surveys in each (5) rate zone. Target n=500 residential; n=200 small business in each rate zone.	[redacted]
	Low-Volume Online Workbook: Online customer engagement workbook distributed through both a unique and generic URL to all residential and GS<50 kW customers with an email address.	[redacted]
	GS>50 kW and Large Use Workbooks: Online customer engagement workbook distributed through a unique URL to all GS 50 kW – 4,999 kW and Large Use customers with an email address.	[redacted]
	Business Call-Backs: Complete telephone calls amongst business customers in order to encourage participation in the online workbook.	[redacted]

	Final Report: [redacted]	[redacted]
	Total	[redacted]
TIMING:	**March 2018 to May 2019**	
COST*	[redacted]	
BILLING TERMS:	***First/final invoice:*** 100% of total project cost upon delivery of report ***Expenses:*** Any expenses to be billed back to client at cost	
Please note that the cost of this study includes the deliverables as stated above, as well as all professional costs. This price excludes applicable taxes, client approved travel and accommodation expenses.		
Net due in 30 days *Interest will be charged at 1.5% per month on all overdue accounts.* *Please make payments payable to Innovative Research Group Inc.*		
Cancellation Fee *If the project is cancelled prior to field a cancellation fee of 1/3 the total project fee will be charged.*		
**** Actual expenses will be billed separately at direct cost***		

Confidentiality

(a) Innovative Research Group Inc. (INNOVATIVE) acknowledges that the Confidential Material of Alectra Utilities is a valuable and unique asset of Alectra Utilities and has and will be disclosed by Alectra Utilities to INNOVATIVE on a strictly confidential basis, INNOVATIVE shall not disclose or use the Confidential Material of Alectra Utilities other than to its employees, contractors and consultants for purposes directly related to the provision of services by INNOVATIVE to Alectra Utilities. INNOVATIVE shall cause its employees and contractors to execute confidentiality agreements in favour of Alectra Utilities regarding the Confidential Material of Alectra Utilities, in a form satisfactory to Alectra Utilities. INNOVATIVE acknowledges that the disclosure of the Confidential Material of Alectra Utilities to a third party may cause serious and irreparable harm to Alectra Utilities and, accordingly, INNOVATIVE shall take all reasonable precautions to prevent disclosure or use of any Confidential Information, except as provided herein. Use of the Confidential Material of Alectra Utilities by anyone other than INNOVATIVE, its employees and contractors shall constitute infringement of Alectra Utilities rights. In the event of a theft or piracy of trade secrets or other intangible elements of Confidential Material of Alectra Utilities, INNOVATIVE shall promptly notify Alectra Utilities in writing of such loss, theft or piracy.

(b) All of the undertakings and obligations relating to confidentiality and non-disclosure, whether contained in this paragraph or elsewhere in this Agreement, and whether of INNOVATIVE or Alectra Utilities shall survive the termination of this Agreement for whichever reason.

Privacy

The parties agree that this contract shall be performed in accordance with all applicable laws of Ontario and Canada, which both parties agree, is deemed to include the Personal Information Protection and Electronic Documents Act ("PIPEDA").

Termination of Agreement

Without prejudice to any other remedies to which Alectra Utilities may be entitled to under this Agreement, at law, or otherwise, Alectra Utilities may terminate this Agreement, upon the following:

(a) **Termination for Breach**: Except as expressly stated otherwise in this Section, if there shall be a breach or failure by any of the parties in the performance of such party's obligations under this Agreement or pursuant to any other agreement between INNOVATIVE and Alectra Utilities, the other party may give the non-breaching party written notice to cure such breach or non-performance. If the cause of such breach or non-performance is not corrected promptly having regard to the nature thereof, and in any event within twenty-one (21) days from the date of the notice to cure unless otherwise stated in this Section, the other party may terminate the Term of the Agreement by giving the non-performing party ten (10) days written notice.

(b) **Termination for Deemed Defaults**: Without in any way limiting or restricting the generality of above section, the respective parties shall conclusively be deemed to have committed a material breach or material failure in the performance of their obligations under this Agreement on the happening of any one of the following events:

   a. Such party becomes insolvent;
   b. Such party makes an assignment for the general benefit of creditors or becomes bankrupt; or
   c. Any proceedings shall be commenced by or against such party under any bankruptcy or insolvency laws, or for the appointment of a custodian, receiver or receiver-manager or any other official with similar powers over such party and such proceedings are not defended diligently and in good faith by such party.

(c) **Termination for Specific Events of Default**: On the happening of any of the following events, the Term of this Agreement may be immediately terminated by Alectra Utilities, without prior notice and without affording a cure period, unless a notice and/or cure period is specifically otherwise provided for herein:

a. If INNOVATIVE ceases to carry on its business in the ordinary course;
b. If INNOVATIVE shall fail to perform its obligations hereunder in a professional, worker-like and competent manner in form and substance satisfactory to Alectra Utilities;
c. If Alectra Utilities becomes entitled to terminate this Agreement or the Term of this Agreement under any provision of this Agreement which permits termination of this Agreement; and
d. If INNOVATIVE breaches any of the covenants set out in above sections.

(d) **Survival of Obligations**: In the event of expiration of the Term or termination of the Agreement, INNOVATIVE shall not be relieved of such party's obligations hereunder which specifically survive and any other obligations which have theretofore accrued and not yet been satisfied.

(e) **Preservation of Rights on Termination of Term**: Any termination of this Agreement by Alectra Utilities as provided herein shall not in any way operate to deny any of Alectra Utilities other rights or remedies, either at law or in equity or to relieve INNOVATIVE of any obligation accrued prior to the effective date of termination. No failure or delay on the part of Alectra Utilities to exercise a right of termination of the Term of this Agreement or the Agreement hereunder nor any default by INNOVATIVE shall be construed to prejudice Alectra Utilities right of termination of Term of this Agreement or the Agreement or cancellation for such default or for any other subsequent defaults.

By execution of this document, the undersigned retains and authorizes Innovative Research Group Inc. and binds Alectra Utilities with respect to the terms listed above.

DATED this 13 **day of** March **, 2019**

Company name: Alectra Utilities Corp.

Per: _____

Authorized signing officer (I have authority to bind the organization)

MANA-15

Reference

Page 2 of Exhibit 4, Tab 1, Schedule 1 refers to engagement of Kinectrics Inc. and Vanry and Associates.

Pages 52-53 of Exhibit 4, Tab 1, Schedule 1 refer to the reviews by Kinectrics Inc. and Vanry & Associates.

[15-MANA-42] Please provide any Kinectrics Inc. opinion and other work product not enclosed as Appendix E to the DSP.

[15-MANA-43] Please provide any Vanry & Associates opinion and other work product not enclosed as Appendix G to the DSP.

[15-MANA-44] Please provide copies of the engagement letters and instructions provided to Kinectrics Inc. and Vanry and Associates.

[15-MANA-45] Please provide all correspondence between Alectra Utilities and these parties in furtherance of them reaching their conclusions.

[15-MANA-46] Please describe the amounts of remuneration received by Kinectrics Inc. and Vanry and Associates.

[15-MANA-47] Please advise whether any of the remuneration received by Kinectrics Inc. or Vanry and Associates is contingent upon the outcome of their review or the outcome of this rate application.

[15-MANA-48] Were any consultants or experts retained in relation to development of the 2020 EDR Application that is not disclosed in the application? If so, which consults and experts were retained and why was their work not used?

Response:

15-MANA-42

Alectra Utilities has provided all Kinectrics Inc. opinions and work produced in Appendix E of the DSP. The opinions and work produced meets the requirements of the 2018 ACA Assurance Review as required by Alectra Utilities.

15-MANA-43

Alectra Utilities has provided all Vanry & Associates' opinions and work produced in Appendix G of the DSP. The opinions and work produced meets the requirements of the Alectra Utilities 2020-2024 DSP Assurance Review as required by Alectra Utilities.

15-MANA-44

Alectra Utilities provides as Attachment 1, the redacted version of the 2018 Assurance Review Kinectrics Consulting Service Agreement, which outlines the requirements and scope of the services required to complete the 2018 ACA Assurance Review.

Alectra Utilities provides as Attachment 2, the redacted version of the 2018 DSP Assurance Review Vanry Consulting Service Agreement, which outlines the requirements and scope of the services required to complete the 2020-2024 DSP Assurance Review.

15-MANA-45

Kinectrics Inc. was provided documentation on the methodology and outcomes of Alectra Utilities' 2018 Asset Condition Assessment. The documents include the Legacy Data Translation Report, the Health Index Methodology – Distribution Assets Report, the Health Index Methodology – Station Assets Report, and the 2018 Asset Condition Assessment Report.

The Legacy Data Translation Report is provided as Attachment 3; the Health Index Methodology – Distribution Assets Report is provided as Attachment 4; and the Health Index Methodology – Station Assets Report is provided as Attachment 5. The 2018 Asset Condition Assessment Report is provided as Appendix D of the DSP (Exhibit 4, Tab 1, Schedule 1, Appendix D).

Vanry & Associates was provided the complete Alectra Utilities 2020-2024 Distribution System Plan as provided in Exhibit 4, Tab 1, Schedule 1.

15-MANA-46

Please see response to 15-MANA-44.

15-MANA-47

The remuneration was not contingent on the expert opinion nor the outcome of rate applications.

15-MANA-48

Alectra Utilities retained Planview Utility Services Limited, METSCO and Singer & Watts to assist with the development of the Distribution System Plan ("DSP"). Their work was in the form of assisting with technical writing and review in completing the Distribution System Plan. As the scope of the work involved support in documentation and review, their work is reflected in the Distribution System Plan narrative.

MANA-15

ATTACHMENT 1

CONSULTING SERVICES AGREEMENT

THIS CONSULTING SERVICES AGREEMENT is agreed to by and between Alectra Utilities Corporation a corporation incorporated under the laws of the Province of Ontario (**"Alectra"**), and Vanry & Associates Inc. a corporation incorporated under the laws of British Columbia (**"Consultant"**) and is effective as of the 8th day of April, 2019 (the **"Effective Date"**).

A. Alectra wishes to engage the Consultant to perform the Services in accordance with this Agreement.

B. The Consultant agrees to supply and perform the Services described in accordance with the terms and conditions of this Agreement.

For good and valuable consideration, the Parties agree as follows:

1. INTERPRETATION

1.1 Definitions

Capitalized terms used in this Agreement have the meaning set out below:

"Applicable Law" means any domestic law, rule, statute, legislation, regulation, by-law, order, code, notice or direction issued by any Federal, Provincial or Municipal government or regulatory authority which is or becomes in force during the Term.

"Claims" means any actual, threatened or potential civil, criminal, administrative, regulatory, arbitral or investigative demand, allegation, claim, action, charge, suit, investigation or proceeding, or any other claim or demand.

"Indemnitees" means Alectra, its affiliates, agents, trustees, partners, officers, directors, shareholders, employees, subcontractors, consultants, successors and assigns.

"Losses" means in respect of any matter, all Claims, losses, damages, liabilities, deficiencies, charges, costs and expenses (including, without limitation, all legal and other professional fees, disbursements, interest, penalties and amounts) arising directly or indirectly as a consequence of such matter.

1.2 Schedules

The following are the Schedules to this Agreement as of the Effective Date:

Schedule 2.1(1) - Services
Schedule 2.1(4) – Key Personnel
Schedule 4.1 - Fees

The terms of the Schedules set out above will prevail over the terms and conditions set out in this Agreement to the extent the relevant Schedule expressly refers to the applicable section in this Agreement over which it prevails.

2. SERVICES

2.1 Scope

(1) The Consultant will perform Assess Management Review services for as Alectra set out in Schedule 2.1 and such other services as may be agreed to between the parties in writing from time to time (the **"Services"**). The Services include all services, functions and responsibilities that are inherent, necessary or required for the proper performance of the Services, as the same may be modified in accordance with this Agreement.

(2) The Consultant understands, acknowledges and agrees that:

a. execution of this Agreement is not a guarantee of any compensation or volume of Services;

b. Alectra has made no representation, warranty, covenant, promise or agreement of any kind with regard to the compensation or volume of Services;

c. Consultant's execution of this Agreement is based upon its own assessment of the Services and not on any reliance on anticipated or projected results; and,

d. the Consultant does not have an exclusive right to provide the Services during the Term.

(3) The Consultant will not delegate or subcontract all or any part of the Services to any person or company without the prior written consent of Alectra, which may be unreasonably withheld.

(4) The Consultant will make available during the Term the Consultant personnel identified to be "Key Personnel" in Schedule 2.1(4), as and to the extent specified in Schedule 2.1(4).

Key Personnel will have all the sufficient qualifications, seniority, expertise, and knowledge to perform the Services.

(1) The Consultant will ensure each Key Personnel is made available as required and will not remove any Key Personnel from the performance of his or her obligations under this Agreement without Alectra's prior written consent, except:

(a) for reasons of illness, resignation, termination for cause or other causes outside the reasonable control of the Consultant; or,

(b) if Alectra requests that Consultant do so in which case Consultant will immediately and upon Alectra's approval, replace such Key Personnel with successor Consultant personnel who has sufficient qualifications, seniority, expertise, and knowledge of Consultant's obligations under this Agreement and is promptly available to act as a successor for the assigned Key Personnel that will be replaced. If a candidate that is both acceptable and available to Alectra is not provided within 10 business days, Alectra will have the option to terminate this Agreement.

2.2 Term and Termination

(1) The term of this Agreement will begin on the Effective Date and shall continue until May 31, 2019 unless terminated in accordance with this Agreement (**"Term"**). Sixty (60) days prior to the expiry of this Agreement the parties may agree to extend the Term of this Agreement on mutually agreeable terms and conditions.

(2) Alectra may terminate this Agreement at any time for any or no reason. In such event, Alectra shall pay for all work performed by the Consultant up to the effective date of termination excluding for the avoidance of doubt, all consequential, indirect or special damages, and all Claims for lost opportunity. Alectra shall not be liable to the Consultant for any other Claims, costs, damages or Losses whatsoever arising from such termination.

(3) At any time prior to the end of Term, either party may terminate this Agreement with twenty (20) days notice to the other party in writing if: (a) the other party materially breaches this Agreement and such breach is not cured within five (5) business days or within such other period of time as may be agreed to between the parties after the other party receives written notice of such material breach; or, (b) the other party abandons or otherwise plainly demonstrates the intention not to continue performance of its obligations under this Agreement.

2.3 Changes in Services

Alectra may from time to time request a change in the scope of the Services by providing Consultant with a written notice setting out the requested change, and Consultant will respond to such requested change within five (5) business days of receipt indicating whether or not it is able to comply with such change request, and advising of any change in Fees.

3. ALECTRA POLICIES

3.1 Compliance with Alectra Policies

Consultant will comply with the policies and procedures of Alectra made known to Consultant from time to time (the **"Alectra Policies"**). Alectra may amend any of the Alectra Policies or add new policies and procedures in its sole discretion. If Alectra amends any Alectra Policies or adds any new ones, Alectra will advise Consultant as soon as reasonably possible.

4. FEES AND TAXES

Alectra will pay only the amounts specified in this Agreement.

4.1 Fees

(1) Alectra will pay the fixed fees (the **"Fees"**) set out in Schedule 4.1.

(2) Consultant will be paid in accordance with Schedule 4.1.

4.2 Travel and Out-of-Pocket Expenses

Unless set out otherwise in Schedule 4.1, Alectra will not pay any travel and out-of-pocket expenses unless any such reasonable travel and out of-pocket expenses relate to the performance of the Services and are pre-approved prior to such expenses being incurred. In the event Alectra approves Consultant incurring any travel and out-of-pocket expenses, such approval must be in writing and any such travel and out-of-pocket expenses must be documented by receipts incurred by Consultant.

4.3 Taxes

Alectra will pay any applicable taxes on the Fees. On request, Consultant will provide reasonable assistance to Alectra if Alectra has reasonable grounds to challenge the validity of any tax imposed on it under this Agreement. If it is determined that Alectra paid Consultant an amount for tax that was not due, Consultant will refund the amount (plus any interest earned on it) to Alectra.

5. CONFIDENTIAL INFORMATION

1. Consultant agrees that it shall not disclose, either during the Term or after the expiration or termination of this Agreement, to any third party any proprietary information of Alectra or it's affiliates including, without limitation, information concerning trade secrets, methods, processes or procedures or any other business or technical information or any information relating to past or present customer of Alectra or its affiliates, including for the avoidance of doubt, such customers' personal information ("**Confidential Information**"), which it receives during the course of its performance of this Agreement, without the prior written consent of Alectra, except to the extent that such Confidential Information: (i) is in the public domain; (ii) is independently developed by Consultant; (iii) is already in the possession of Consultant prior to disclosure by Alectra; (iv) is rightfully received from a third party not under a confidentiality obligation to Alectra; or (v) is legally required to be disclosed by Consultant.

2. Alectra shall retain control over and use of all Alectra Confidential Information which at all times shall remain the property of Alectra. The Consultant agrees that Alectra Confidential Information will only be used by the Consultant for the purposes of providing the Services. The Consultant shall not collect, create, handle, use, copy, disclose, dispose of or destroy any Alectra Confidential Information except as necessary to perform its obligations under this Agreement. The Consultant shall return to Alectra all Alectra Confidential Information in whatever form (or at Alectra's request, destroy such Alectra Confidential Information) which has been made or obtained in relation to this Agreement, upon the expiration or termination of this Agreement, or such other period of time as may be agreed upon by the parties.

3. Consultant acknowledges that any violation of the provisions of this Article 5 (Confidential Information) may cause irreparable damage or injury to Alectra, the exact amount of which may be impossible to ascertain, and that, for such reason, in addition to any other remedies available to Alectra, Alectra is entitled to proceed immediately to court in order to obtain, and Consultant will consent to, interim, interlocutory, and final injunctive relief restraining Consultant from breaching, and requiring Consultant to comply with, its obligations under this Article 5 (Confidential Information), without a requirement that a finding of irreparable harm or other criteria for the awarding of injunctive relief be made.

6. REPRESENTATIONS AND WARRANTIES

(1) Consultant represents and warrants to and covenants with Alectra as follows and acknowledges that Alectra is relying on the following representations, warranties and covenants in entering into this Agreement:

(a) Consultant will perform, or cause to be performed the Services and otherwise fulfill its obligations hereunder in accordance with Applicable Law, honestly and in good faith, exercising reasonable skill, care and diligence, in accordance with recognized professional, ethical and industry standards, in a timely manner and in accordance with the terms and conditions of this Agreement;

(b) Consultant possesses the knowledge, skill and experience necessary for the provision and completion of the Services in accordance with this Agreement;

(c) No Applicable Laws or agreements with third parties prohibit Consultant from complying with this Agreement or impose any restriction on Consultant's ability to provide the Services to Alectra; and,

(d) Consultant will advise Alectra immediately of any potential or actual conflict of interest issues which may arise during or prior to the performance of the Services.

(2) The failure of any of the above representations, warranties and covenants to be accurate at any time during the Term shall constitute a material breach of this Agreement, and, in addition to all other rights and remedies available to Alectra under this Agreement and at law or in equity, Alectra shall have the right to immediately terminate without penalty this Agreement.

7. LIABILITY, INDEMNIFICATION AND INSURANCE

7.1 Liability

(1) Subject to section 7.1(2), neither party shall be liable for any special, indirect, incidental, consequential or punitive damages.

(2) Section 7.1(1) will not apply to limit: (a) the liability of the Consultant for a breach of Article 5 (Confidential Information); or; (b) the Consultant's liability or obligations under Section 7.2 (Indemnification) or; (c) any other obligations of Consultant to indemnify set out elsewhere in this Agreement.

7.2 Indemnification

The Consultant shall defend, indemnify and hold harmless the Indemnitees prior to, during, and after the Term, from and against all Claims and Losses by whomsoever made, brought or prosecuted in any manner, arising out of, resulting from or attributable, directly or indirectly, to the Consultant's performance or non-performance of this Agreement

7.3 Insurance

(a) Commercial General Liability insurance shall be effected by the Consultant and maintained in force throughout the duration of this Agreement in an amount usual for a project of this nature, but, in any case, for a limit of liability not less than three million dollars ($3,000,000.00) per accident or occurrence. Notwithstanding the foregoing, the parties agree that subcontractors shall also maintain in force Commercial General Liability Insurance in the amount not less than five million dollars ($5,000,000.00) per accidence or occurrence. Alectra shall be named as an additional insured by added endorsement on the Consultant's and subcontractor's respective Commercial General Liability Insurance policies.

(b) The Consultant shall carry Errors and Omissions Insurance Policy liability not less than one hundred thousand dollars ($100,000.00) per occurrence.

(c) The Consultant shall provide to Alectra certificates evidencing the current status of the insurance policies required in Subsections 7.3(a) and (b), which describe the coverage and any material exclusions from or limitations on the coverage.

(d) In the event that the insurance policies required in Subsections 7.3(a) and (b) are cancelled or is changed by the insurer in a manner that would adversely affect Alectra, the Consultant shall provide Alectra with thirty (30) days prior written notice by mail or facsimile transmission of such cancellation or change.

8. DISPUTE RESOLUTION

If any dispute shall arise between the parties concerning this Agreement that cannot be mutually resolved between the parties within thirty (30) business days of the dispute being identified, or such other period of time agreed to between the parties, then such dispute shall be referred to an arbitrator, chosen unanimously by the parties. In the event the parties cannot unanimously agree on a person to act as an arbitrator, an arbitrator shall be appointed in accordance with the *Arbitration Act, 1991* (Ontario). The determination made by the arbitrator shall be binding upon the parties and their administrators, successors and assigns, as the case may be. The costs of the arbitrator and the arbitration venue shall, unless otherwise ordered by the arbitrator, be borne equally by the parties. Each party shall be responsible for its own legal fees, disbursements and all other expenses relating to the arbitration.

9. MISCELLANEOUS

(1) Alectra may assign this Agreement without consent to any affiliate or as a result of any merger, amalgamation or reorganization. **(2)** Any term that is void, illegal, or unenforceable, is ineffective or severable from this Agreement will not invalidate the remaining terms of this Agreement. **(3)** Time is of the essence in any matters relating to the performance of this Agreement. **(4)** This Agreement will be governed by and construed and enforced in accordance with the laws of the Province of Ontario. The courts of the Province of Ontario will have exclusive jurisdiction to determine any action arising under this Agreement. **(5)** Sections 4 (Fees and Taxes), 5 (Confidential Information), 7 (Liability, Indemnification and Insurance) and this Section 9(5) will survive the expiration or termination of this Agreement. **(6)** No relationship of principal and agent or partnership will exist between Alectra and Consultant. The parties will remain at all times independent contractor. In no event will Consultant be

considered an employee of Alectra. The Consultant acknowledges and agrees that as an independent contractor: (a) Consultant will not receive any payment from Alectra other than as specified herein; and, (b) Consultant is not entitled to any benefits, statutory benefits or protection's normally granted to employees of Alectra. Consultant acknowledges and agrees that it will comply with all Applicable Laws with respect to reporting required by Revenue Canada pursuant to the Income Tax Act (Canada). **(7)** This Agreement constitutes the entire agreement between the parties with respect to the subject matter hereof and cancels and supersedes any other understandings and agreements between the parties with respect to such subject matter, whether written or oral, and whether made prior to or during the Term. **(8)** This Agreement may be executed in counterparts, each of which shall constitute an original and all of which taken together shall constitute one and the same instrument. To evidence the fact that it has executed this Agreement, a party may send a copy of its executed counterpart to the other party by facsimile or other electronic transmission and the signature so transmitted shall be deemed to be its original signature for all purposes.

IN WITNESS WHEREOF, the parties have executed this Agreement as of the Effective Date.

ALECTRA UTILITIES CORPORATION

Per: _____

Name: Tom Wasik
Title: VP Asset Management, Network Services

I have authority to bind the corporation

VANRY & ASSOCIATES INC.

Per: _____

Name: Stewart Ramsay
Title: Vice President

I have authority to bind the corporation

SCHEDULE 2.1(1)

SERVICES

In addition to what else is set out in this Agreement, Consultant agrees to perform the following Services for Alectra from time to time as agreed to between the parties.

The consultant's scope of work shall include the following items:

1. Review of Alectra Utilities capital planning and budgeting input process
2. Review of methodology and assumptions that form Alectra Utilities Corporation capital investment evaluation including risk and benefit determination as well as financial budget determination
3. Review of capital investment risk mitigation thresholds, optimization process, incorporation of customer preferences and methodology of strategic adjustments made to the pacing of investments
4. Review of Alectra Utilities "Asset Lifecycle Optimization Policies and Practices"
5. Review of Alectra Utilities 2020-2024 Capital Expenditure Plan to evaluate appropriateness and pacing
6. A written report documenting the consultant's expert opinion on Alectra's reasonableness of the process inputs and assumptions used to develop the proposed 5 year investment plan including appropriateness of the level of investment
7. Comparison of Alectra's budgeting process to industry best practices in distribution utilities
8. Review of Customer Engagement results and evaluate compliance to such results

The consultant will be provided/have access to:

- Proprietary Asset Management reports;
- The opportunity to conduct interviews with the Network Services - Asset Management Subject Matter Experts ("SME's") in the areas listed below:
  - Engineering – Distribution System Planning
  - Engineering – Asset Condition Assessment
  - Engineering – Maintenance & Reliability
  - Asset Management policy, process, and strategy
  - Distribution Design groups
  - Capital Reporting
- The ability to request clarifications on evidence provided from SME's.

Materials may be provided in stages to the consultant to insure the proper allocation of resources. Alectra acknowledges that delays in providing the requested materials could have a negative impact on the consultant's ability to meet the required completion date.

The sequence of investigation will be discussed in detail with the consultant in the kick-off meeting.

Deliverables

1. The consultant will inform Alectra of critical findings as soon as they are discovered.

2. Ongoing progress status and analysis findings including a preliminary report, draft report and final report

3. Written report documenting the consultant's expert opinion for the items set out in the scope. The report shall include comments on the process, models, inputs, and reasonableness of assumptions made throughout the budgeting process.

4. Written documentation of the gap-analysis conducted including findings, possible mitigation and the consultant's recommendation to each of the findings. It is the responsibility of the consultant to bring identified gaps to Alectra's attention at the weekly update meetings.

5. Attend weekly In-person or teleconference (consultant's discretion) update meetings. The dates and times of meetings shall be determined by agreement between Alectra and the consultant.

   Teleconferencing is acceptable for select meetings upon agreement with Alectra. Alectra Utilizes Skype for Business as its means for teleconferencing.

   In-person meetings will be conducted at one of Alectra's following offices:
   - Alectra-Mavis 3240 Mavis Rd, Mississauga, ON L5C 3K1
   - Alectra-Derry 2185 Derry Rd W, Mississauga, ON L5N 7A6
   - Alectra-John Street 55 John St N, Hamilton, ON L8R 3M8
   - Alectra-Nebo Road 450 Nebo Rd, Hamilton, ON L8W 3P5
   - Alectra-Cityview* 161 Cityview Blvd, Woodbridge, ON L4H 0A9

   **(primary meeting location)*

Schedule/ Milestones*:

Step	Description	Deadline/ Period
1	Kick-off meeting	April 10 2019
2	Consultant conducts review and analysis	April 24, 2019
3	Consultant concludes research and analysis (milestone)	April 30, 2019
4	Consultant presents all findings to Alectra during the weekly meeting	April 17 – May 9, 2019
5	Consultant to provide (preliminary) feedback on Project list, DSP narrative and Financial tables for incorporation in to DSP	May 3, 2019
6	Consultant (Draft) Report and (Draft) Gap-Analysis documentation including comparison of alignment with Customer Engagement results	May 9, 2019
7	Consultant submits final report and final gap-analysis documentation	May 2019
8	Alectra accepts final report	May 31, 2019

**Schedule/Milestone dates are estimates, Alectra understands that delays in meeting with consultant and in providing data/information reasonably requested by the consultant will impede consultant's ability to meet the May 9 2019 deadline for a final draft report.*

SCHEDULE 2.1(4)

KEY PERSONNEL

- Stewart Ramsay - Executive Consultant, Vanry & Associates Inc.
- Julius Pataky Executive Consultant, Vanry & Associates Inc.
- Darin Johnson President, BIS Consulting LLC
- Neil Reid Vice President, BIS Consulting LLC

SCHEDULE 4.1

FEES

Fees:

Alectra shall pay the Consultant [redacted] (plus applicable taxes) (the "**Fees**"). The Fees

[redacted]

Invoicing:

For Lump Sum Fees

Consultant shall include the following details on each monthly invoice:

- Agreement# 2018-230
- Invoice period - milestone
- Description of the Services performed for this milestone;
- For each Pre-approved expense listed in the Invoice the pre-approved expense request and receipt in a form acceptable to Alectra;
- Total HST applicable to the Services during the invoice period, as well as the Consultant's HST registration number;
- Total amount billed for the invoice period
- Total amount of Fees and pre-approved expenses billed for the Project including those contained in that invoice

Should Alectra request and approve additional consulting services, these will be billed at [redacted]. Alectra will be billed monthly for any pre-approved Additional Services Fees plus applicable taxes and/or pre-approved expenses.

Consultant shall include the following details on each monthly invoice for pre-approved Additional Services:

- Agreement# 2018-230
- Invoice period
- Detailed description of the Services performed during the invoice period;
- Total number of hours worked performing the Services and who performed the Services during the invoice period;
- For each Pre-approved expense listed in the Invoice the pre-approved expense request and receipt in a form acceptable to Alectra;
- Total HST applicable to the Services during the invoice period, as well as the Consultant's HST registration number;
- Total amount billed for the invoice period
- Total amount of Fees and pre-approved expenses billed for the Project including those contained in that invoice

Alectra shall pay all acceptable invoices within thirty (30) days of receipt of the invoice. For purposes of this provision "acceptable" means that Alectra has reviewed the invoices for the Services performed during the invoice period and has, in its reasonable discretion, determined that the Services and Deliverables were satisfactorily completed, the Fees properly calculated and the expenses properly approved, incurred and documented.

MANA-15

ATTACHMENT 2

CONSULTING SERVICES AGREEMENT

THIS CONSULTING SERVICES AGREEMENT is agreed to by and between Alectra Utilities Corporation a corporation incorporated under the laws of the Province of Ontario (**"Alectra"**), and Kinectrics Inc. a corporation incorporated under the laws of Ontario (**"Consultant"**) and is effective as of the 3rd day of October, 2018 (the **"Effective Date"**).

A. Alectra wishes to engage the Consultant to perform the Services in accordance with this Agreement.

B. The Consultant agrees to supply and perform the Services described in accordance with the terms and conditions of this Agreement.

For good and valuable consideration, the Parties agree as follows:

1. INTERPRETATION

1.1 Definitions

Capitalized terms used in this Agreement have the meaning set out below:

"Applicable Law" means any domestic law, rule, statute, legislation, regulation, by-law, order, code, notice or direction issued by any Federal, Provincial or Municipal government or regulatory authority which is or becomes in force during the Term.

"Claims" means any actual, threatened or potential civil, criminal, administrative, regulatory, arbitral or investigative demand, allegation, claim, action, charge, suit, investigation or proceeding, or any other claim or demand.

"Indemnitees" means Alectra, its affiliates, agents, trustees, partners, officers, directors, shareholders, employees, subcontractors, consultants, successors and assigns.

"Losses" means in respect of any matter, all Claims, losses, damages, liabilities, deficiencies, charges, costs and expenses (including, without limitation, all legal and other professional fees, disbursements, interest, penalties and amounts) arising directly or indirectly as a consequence of such matter.

1.2 Schedules

The following are the Schedules to this Agreement as of the Effective Date:

Schedule 2.1(1) - Services
Schedule 2.1(4) – Key Personnel
Schedule 4.1 - Fees

The terms of the Schedules set out above will prevail over the terms and conditions set out in this Agreement to the extent the relevant Schedule expressly refers to the applicable section in this Agreement over which it prevails.

2. SERVICES

2.1 Scope

(1) The Consultant will perform Technical Writing services for as Alectra set out in Schedule 2.1 and such other services as may be agreed to between the parties in writing from time to time (the **"Services"**). The Services include all services, functions and responsibilities that are inherent, necessary or required for the proper performance of the Services, as the same may be modified in accordance with this Agreement.

(2) The Consultant understands, acknowledges and agrees that:

a. execution of this Agreement is not a guarantee of any compensation or volume of Services;

b. Alectra has made no representation, warranty, covenant, promise or agreement of any kind with regard to the compensation or volume of Services;

c. Consultant's execution of this Agreement is based upon its own assessment of the Services and not on any reliance on anticipated or projected results; and,

d. the Consultant does not have an exclusive right to provide the Services during the Term.

(3) The Consultant will not delegate or subcontract all or any part of the Services to any person or company without the prior written consent of Alectra, which may be unreasonably withheld.

(4) The Consultant will make available during the Term the Consultant personnel identified to be "Key Personnel" in Schedule 2.1(4), as and to the extent specified in Schedule 2.1(4).

And, Key Personnel will have all the sufficient qualifications, seniority, expertise, and knowledge to perform the Services.

(1) The Consultant will ensure each Key Personnel is made available as required and will not remove any Key Personnel from the performance of his or her obligations under this Agreement without Alectra's prior written consent, except:

(a) for reasons of illness, resignation, termination for cause or other causes outside the reasonable control of the Consultant; or,

(b) if Alectra requests that Consultant do so in which case Consultant will immediately and upon Alectra's approval, replace such Key Personnel with successor Consultant personnel who has sufficient qualifications, seniority, expertise, and knowledge of Consultant's obligations under this Agreement and is promptly available to act as a successor for the assigned Key Personnel that will be replaced. If a candidate that is both acceptable and available to Alectra is not provided within 10 business days, Alectra will have the option to terminate this Agreement.

2.2 Term and Termination

(1) The term of this Agreement will begin on the Effective Date and shall continue until December 14th 2018 unless terminated in accordance with this Agreement (**"Term"**). Ten (10) days prior to the expiry of this Agreement the parties may agree to extend the Term of this Agreement on mutually agreeable terms and conditions.

(2) Alectra may terminate this Agreement at any time for any or no reason. In such event, Alectra shall pay for all work performed by the Consultant up to the effective date of termination excluding for the avoidance of doubt, all consequential, indirect or special damages, and all Claims for lost opportunity. Alectra shall not be liable to the Consultant for any other Claims, costs, damages or Losses whatsoever arising from such termination.

(3) At any time prior to the end of Term, either party may terminate this Agreement with twenty (20) days notice to the other party in writing if: (a) the other party materially breaches this Agreement and such breach is not cured within five (5) business days or within such other period of time as may be agreed to between the parties after the other party receives written notice of such material breach; or, (b) the other party abandons or otherwise plainly demonstrates the intention not to continue performance of its obligations under this Agreement.

2.3 Changes in Services

Alectra may from time to time request a change in the scope of the Services by providing Consultant with a written notice setting out the requested change, and Consultant will respond to such requested change within five (5) business days of receipt indicating whether or not it is able to comply with such change request, and advising of any change in Fees.

3. ALECTRA POLICIES

3.1 Compliance with Alectra Policies

Consultant will comply with the policies and procedures of Alectra made known to Consultant from time to time (the **"Alectra Policies"**). Alectra may amend any of the Alectra Policies or add new policies and procedures in its sole discretion. If Alectra amends any Alectra Policies or adds any new ones, Alectra will advise Consultant as soon as reasonably possible.

4. FEES AND TAXES

Alectra will pay only the amounts specified in this Agreement.

4.1 Fees

(1) Alectra will pay the fixed fees (the **"Fees"**) set out in Schedule 4.1.

(2) Consultant will be paid in accordance with Schedule 4.1.

4.2 Travel and Out-of-Pocket Expenses

Unless set out otherwise in Schedule 4.1, Alectra will not pay any travel and out-of-pocket expenses unless any such reasonable travel and out of-pocket expenses relate to the performance of the Services and are pre-approved prior to such expenses being incurred. In the event Alectra approves Consultant incurring any travel and out-of-pocket expenses, such approval must be in writing and any such travel and out-of-pocket expenses must be documented by receipts incurred by Consultant.

4.3 Taxes

Alectra will pay any applicable taxes on the Fees. On request, Consultant will provide reasonable assistance to Alectra if Alectra has reasonable grounds to challenge the validity of any tax imposed on it under this Agreement. If it is determined that Alectra paid Consultant an amount for tax that was not due, Consultant will refund the amount (plus any interest earned on it) to Alectra.

5. CONFIDENTIAL INFORMATION

1. Consultant agrees that it shall not disclose, either during the Term or after the expiration or termination of this Agreement, to any third party any proprietary information of Alectra or it's affiliates including, without limitation, information concerning trade secrets, methods, processes or procedures or any other business or technical information or any information relating to past or present customer of Alectra or its affiliates, including for the avoidance of doubt, such customers' personal information ("**Confidential Information**"), which it receives during the course of its performance of this Agreement, without the prior written consent of Alectra, except to the extent that such Confidential Information: (i) is in the public domain; (ii) is independently developed by Consultant; (iii) is already in the possession of Consultant prior to disclosure by Alectra; (iv) is rightfully received from a third party not under a confidentiality obligation to Alectra; or (v) is legally required to be disclosed by Consultant.

2. Alectra shall retain control over and use of all Alectra Confidential Information which at all times shall remain the property of Alectra. The Consultant agrees that Alectra Confidential Information will only be used by the Consultant for the purposes of providing the Services. The Consultant shall not collect, create, handle, use, copy, disclose, dispose of or destroy any Alectra Confidential Information except as necessary to perform its obligations under this Agreement. The Consultant shall return to Alectra all Alectra Confidential Information in whatever form (or at Alectra's request, destroy such Alectra Confidential Information) which has been made or obtained in relation to this Agreement, upon the expiration or termination of this Agreement, or such other period of time as may be agreed upon by the parties.

3. Consultant acknowledges that any violation of the provisions of this Article 5 (Confidential Information) may cause irreparable damage or injury to Alectra, the exact amount of which may be impossible to ascertain, and that, for such reason, in addition to any other remedies available to Alectra, Alectra is entitled to proceed immediately to court in order to obtain, and Consultant will consent to, interim, interlocutory, and final injunctive relief restraining Consultant from breaching, and requiring Consultant to comply with, its obligations under this Article 5 (Confidential Information), without a requirement that a finding of irreparable harm or other criteria for the awarding of injunctive relief be made.

6. REPRESENTATIONS AND WARRANTIES

(1) Consultant represents and warrants to and covenants with Alectra as follows and acknowledges that Alectra is relying on the following representations, warranties and covenants in entering into this Agreement:

(a) Consultant will perform, or cause to be performed the Services and otherwise fulfill its obligations hereunder in accordance with Applicable Law, honestly and in good faith, exercising reasonable skill, care and diligence, in accordance with recognized professional, ethical and industry standards, in a timely manner and in accordance with the terms and conditions of this Agreement;

(b) Consultant possesses the knowledge, skill and experience necessary for the provision and completion of the Services in accordance with this Agreement;

(c) No Applicable Laws or agreements with third parties prohibit Consultant from complying with this Agreement or impose any restriction on Consultant's ability to provide the Services to Alectra; and,

(d) Consultant will advise Alectra immediately of any potential or actual conflict of interest issues which may arise during or prior to the performance of the Services.

(2) The failure of any of the above representations, warranties and covenants to be accurate at any time during the Term shall constitute a material breach of this Agreement, and, in addition to all other rights and remedies available to Alectra under this Agreement and at law or in equity, Alectra shall have the right to immediately terminate without penalty this Agreement.

7. LIABILITY, INDEMNIFICATION AND INSURANCE

7.1 Liability

(1) Subject to section 7.1(3), neither party shall be liable for any special, indirect, incidental, consequential or punitive damages.

(2) Subject to Section 7.1(3), the total aggregate liability for each party for damages arising from any cause or action whatsoever shall not exceed the total Fees and other amounts payable under the Agreement.

(3) Sections 7.1(1) and 7.1(2) will not apply to limit: (a) the liability of the Consultant for a breach of Article 5 (Confidential Information); or (b) any other obligations of Consultant to indemnify set out elsewhere in this Agreement.

7.2 Indemnification

The Consultant shall defend, indemnify and hold harmless the Indemnitees prior to, during, and after the Term, from and against all Claims and Losses by whomsoever made, brought or prosecuted in any manner, arising out of, resulting from or attributable, directly or indirectly, to the Consultant's performance or non-performance of this Agreement

7.3 Insurance

(a) Commercial General Liability insurance shall be effected by the Consultant and maintained in force throughout the duration of this Agreement in an amount usual for a project of this nature, but, in any case, for a limit of liability not less than five million dollars ($5,000,000.00) per accident or occurrence. Notwithstanding the foregoing, the parties agree that subcontractors shall also maintain in force Commercial General Liability Insurance in the amount not less than five million dollars ($5,000,000.00) per accidence or occurrence. Alectra shall be named as an additional insured by added endorsement on the Consultant's and subcontractor's respective Commercial General Liability Insurance policies.

(b) The Consultant shall carry Errors and Omissions Insurance Policy liability not less than one hundred thousand dollars ($100,000.00) per occurrence.

(c) The Consultant shall provide to Alectra certificates evidencing the current status of the insurance policies required in Subsections 7.3(a) and (b), which describe the coverage and any material exclusions from or limitations on the coverage.

(d) In the event that the insurance policies required in Subsections 7.3(a) and (b) are cancelled or is changed by the insurer in a manner that would adversely affect Alectra, the Consultant shall provide Alectra with thirty (30) days prior written notice by mail or facsimile transmission of such cancellation or change.

8. DISPUTE RESOLUTION

If any dispute shall arise between the parties concerning this Agreement that cannot be mutually resolved between the parties within thirty (30) business days of the dispute being identified, or such other period of time agreed to between the parties, then such dispute shall be referred to an arbitrator, chosen unanimously by the parties. In the event the parties cannot unanimously agree on a person to act as an arbitrator, an arbitrator shall be appointed in accordance with the *Arbitration Act, 1991* (Ontario). The determination made by the arbitrator shall be binding upon the parties and their administrators, successors and assigns, as the case may be. The costs of the arbitrator and the arbitration venue shall, unless otherwise ordered by the arbitrator, be borne equally by the parties. Each party shall be responsible for its own legal fees, disbursements and all other expenses relating to the arbitration.

9. MISCELLANEOUS

(1) Alectra may assign this Agreement without consent to any affiliate or as a result of any merger, amalgamation or reorganization. **(2)** Any term that is void, illegal, or unenforceable, is ineffective or severable from this Agreement will not invalidate the remaining terms of this Agreement. **(3)** Time is of the essence in any matters relating to the performance of this Agreement. **(4)** This Agreement will be governed by and construed and enforced in accordance with the laws of the Province of Ontario. The courts of the Province of Ontario will have exclusive jurisdiction to determine any action arising under this Agreement. **(5)** Sections 4 (Fees and Taxes), 5 (Confidential Information), 7 (Liability, Indemnification and Insurance) and this Section 9(5) will survive the expiration or termination of this Agreement. **(6)** No relationship of principal and agent or partnership will exist between Alectra and Consultant. The parties will remain at all times independent contractor. In no event will Consultant be

considered an employee of Alectra. The Consultant acknowledges and agrees that as an independent contractor: (a) Consultant will not receive any payment from Alectra other than as specified herein; and, (b) Consultant is not entitled to any benefits, statutory benefits or protection's normally granted to employees of Alectra. Consultant acknowledges and agrees that it will comply with all Applicable Laws with respect to reporting required by Revenue Canada pursuant to the Income Tax Act (Canada). **(7)** This Agreement constitutes the entire agreement between the parties with respect to the subject matter hereof and cancels and supersedes any other understandings and agreements between the parties with respect to such subject matter, whether written or oral, and whether made prior to or during the Term. **(8)** This Agreement may be executed in counterparts, each of which shall constitute an original and all of which taken together shall constitute one and the same instrument. To evidence the fact that it has executed this Agreement, a party may send a copy of its executed counterpart to the other party by facsimile or other electronic transmission and the signature so transmitted shall be deemed to be its original signature for all purposes.

IN WITNESS WHEREOF, the parties have executed this Agreement as of the Effective Date.

ALECTRA UTILITIES CORPORATION

Signature: _____

Name: Tom Wesik

KINECTRICS INC.

Signature: _____

Name: YURY TSIMBERI

SCHEDULE 2.1(1)

SERVICES

In addition to what else is set out in this Agreement, Consultant agrees to perform the following Services for Alectra from time to time as agreed to between the parties.

The consultant's scope of work shall include the following items:

1. Review of Alectra's ACA Framework;
2. Review of data harmonization methodology and assumptions for legacy utilities that form Alectra Utilities Corporation;
3. Review of Health Index models, assumptions, and results for distribution and station assets;
4. Review of Flagged-For-Actions selection methodology, assumptions and results;
5. Review of the proposed paced investment plan derived from the ACA framework;
6. Review of assumptions made throughout the ACA framework in terms of completeness and accuracy;
7. Review of Alectra's final ACA report 2018 which will be filed with the OEB as part of the Distribution System Plan;
8. Comparison of Alectra's in-house ACA and industry best practices in distribution utilities Asset Management in terms of alignment;
9. A documented gap-analysis encompassing the full ACA process and recommendations on addressing the findings prior to filing with the OEB;
10. A written report documenting the consultant's expert opinion on Alectra's in-house ACA; in addition to any computation or analysis required for the consultant to provide an expert opinion on the process, accuracy, and quality.

The successful proponent will be provided/have access to:

- Proprietary Asset Management reports;
- The opportunity to conduct interviews with the Asset Condition Subject Matter Experts ("SME's") in the areas listed below:
  - Engineering - Overhead Distribution Assets
  - Engineering - Underground Distribution Assets
  - Engineering - Station Assets
  - Data Management & Information Systems
- The ability to request clarifications on evidence provided from SME's.

Materials may be provided in stages to the proponent to insure the proper allocation of resources.

The sequence of investigation will be discussed in details with the successful proponent in the kick-off meeting.

Meetings

Attend weekly In-person or teleconference update meetings. The dates and times of meetings shall be determined by agreement between Alectra and the successful proponent.
It is the responsibility of the successful proponent to bring to any gaps to Alectra's attention at the weekly update meetings.

Teleconferencing is acceptable for select meetings upon agreement with Alectra. Alectra Utilizes Skype for Business as its means for teleconferencing.

In-person meetings will be conducted at one of Alectra's following offices:

- Alectra-Mavis 3240 Mavis Rd, Mississauga, ON L5C 3K1 *(primary meeting location)*
- Alectra-Derry 2185 Derry Rd W, Mississauga, ON L5N 7A6
- Alectra-John Street 55 John St N, Hamilton, ON L8R 3M8
- Alectra-Nebo Road 450 Nebo Rd, Hamilton, ON L8W 3P5
- Alectra-Cityview161 Cityview Blvd, Woodbridge, ON L4H 0A9

Deliverables

1. Consultant Report: A written report documenting the consultant's expert opinion for the items set out in the scope. The report shall include comments on the process, models, inputs, and reasonableness of assumptions made throughout the ACA framework.

2. Gap-Analysis: A written documentation of the gap-analysis conducted including findings, possible mitigation and the consultant's recommendation to each of the findings.

3. The consultant shall inform Alectra of critical findings as soon as they are discovered.

Schedule/ Milestones*

Description	Deadline/ Period
Kick-off meeting	To Be Determined
Proponent conducts review and analysis	October 1 to 26
Proponent concludes research and analysis (milestone)	October 29
Meetings	October 29-November 2
Consultant Report and Gap-Analysis documentation (Draft)	November 9
Alectra review period and consultation with proponent on report and gap-analysis documentation	November 9-16
Proponent submits final report and final gap-analysis documentation incorporating	November 23
Alectra accepts final report	November 30

**Schedule/Milestone dates are estimates, Alectra reserves the right to alter, shift, or modify the project timelines at its sole discretion.*

SCHEDULE 4.1

FEES

Fees:

Consultant shall be paid [redacted] for the performance of the Services (the "**Fees**").

Alectra will be billed monthly for the Fees plus applicable taxes and/or pre-approved expenses. Consultant will ensure that reasonable expenses are approved in writing prior to being incurred and provide approved expense reimbursement requests, together with receipts supporting all expenses claimed.

Invoice:

Consultant shall include the following details on each monthly invoice:

- Agreement# 2018-218
- Date/Service Period
- Names of key personnel with rate/s
- Total amount billed for the month
- Running Total of Project to date

SCHEDULE 2.1(4)

KEY PERSONNEL

Kinectrics Project Leader	Yury Tsimberg, Director - Asset Management
Kinectrics Project Team	Katrina Lotho, Senior Engineer - Asset Management Dr. Fan Wang, Senior Engineer - Asset Management

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ATTACHMENT 3

2018

Legacy Data Translation

ASSET CONDITION ASSESSMENT

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1 Introduction

In 2018, Alectra conducted an in-house Asset Condition Assessment (ACA) and the computation of a Health Index (HI) for active assets across Alectra using newly harmonized models. Since the data collection standards have not been standardized, existing data sources from the legacy utilities are utilized. In order to include the data in the new harmonized models, data translation tables were used to conduct the ACA.

The purpose of this report is to document the data translations executed on the source data in order to produce the results according to the new models with the documentation of assumptions made regarding the legacy data.

The report is organized in sections that discuss matters applicable to all rate zones or all assets within a rate zone, followed by data translation made for each asset class from each legacy utility. The scope of the report is distribution assets.

Within each asset class section, the details specific to each rate zone (Brampton Hydro (BH), Enersource (EH), Horizon (HR) and Powerstream (PS)) will be discussed.

With the addition of Guelph Hydro (GH) to Alectra, the data of GH has also been included in the harmonized model. GH was provided with the data translations applied to the legacy utilities' data, and a similar translation was applied. The data translation used for GH is provided for each asset class that was assessed.

2 Health Index (HI)

The HI model is asset class specific and is made of conditions and their corresponding weights.

Where that data for a specific factor is missing in the computation of an HI, only the remaining factors are considered, and the HI is measured as a percent of the total weightings of the available data. The missing data is reflected in the Data Availability Index (DAI) provided alongside the calculated HI for each asset.

The generic equation below shows the calculation of the Health Index:

$$\boldsymbol{Health\ Index} = \frac{\sum_{i=1}^{n}(Input\ Weight_i \times\ Input\ Score_i)}{\sum_{i=1}^{n}(Input\ Weight_i)} * Condition\ Multiplier \qquad (\mathbf{1}),\ \ where$$

$$\boldsymbol{n}: number\ of\ available\ inputs\ for\ an\ asset\ class,$$

$$\boldsymbol{Input\ Score}: percentage\ (0 - 100\%),$$

$$\boldsymbol{Health\ Index}: percentage\ (0 - 100\%),$$

$$\boldsymbol{Input\ Weight}: percentage, where \sum_{i=1}^{n} Input\ Weight_i = 100\%$$

$$\boldsymbol{Condition\ Multiplier}: maximum\ allowable\ HI\ given\ asset\ specific\ metrics$$

3 Data Availability Index

Data Availability Index ("DAI") is calculated for each asset to reflect the completeness of data that went in the computation of a given Health Index.

$$DAI = \sum_{i=1}^{m} (Input\ Weight_{\,i} \times\ Input\ Data\ Available_{\,i}) \qquad (\mathbf{2})$$

$$,where$$

$$\boldsymbol{m}: number\ of\ inputs\ required\ in\ the\ Health\ Index\ model\ of an\ asset\ class$$

$$\boldsymbol{Input\ Weight}: percentage, where \sum_{i=1}^{n} Input\ Weight_{\,i} = 100\%$$

$$\boldsymbol{Input\ Data\ Available}:\ True = 1\ or\ False = 0$$

$$\boldsymbol{DAI}: percentage\ (0 - 100\%)$$

4 Age

The age of an asset is to be computed using the installation date coming from the GIS system for an asset. If the installation date is not available or if directed by the SMEs to consider other dates, for example, manufacturing date is used to provide.

Computation of age is asset specific for a given legacy utility. The data used to compute age for each asset class within each rate zone will be explicitly indicated in each relevant section to follow.

Where there is no available installation or manufacture date information, an age place holder of "1000" is assigned for the purpose of compilation and computation in SQL views, functions, and scripts. The place holder of "1000" is used in the computational model to reflect a null value and is not considered in the HI calculation. It is only used to facilitate the programming only.

5 Powerstream Inspection Practices

The Powerstream rate zone does not capture detailed inspection information electronically as the other rate zones do. Inspection information is aggregated into an inspection code, which is stored into the GIS system. Powerstream has only captured information related to issues observed during visual inspections using the following inspection codes:

A – immediate follow up required, as a severe issue was noted during visual inspection

B – another inspection is required within 12 months, as an issue was noted that requires monitoring

C – regular inspection cycle to be followed, as no issues were noted

6 Use of a Default Value

In some cases, an inspection record indicates an inspection date, with no comments. As some legacy rate zones employed an inspection practice that only reported issues, a means to assign a field inspection score based on these records was required. A value/score of 3 out of a max score of 5 (i.e. 60%) was used to handle these cases. For programming purposes and to identify these scenarios, the condition score for these assets is flagged as a negative number.

An exception to this was noted for the Brampton rate zone, where certain asset inspection fields with blanks can be interpreted to be the same as an explicit recording of "good" criteria. These exceptions will be explicitly mentioned in the sections to follow.

7 Wood Poles

The Health Index of a wood pole is defaulted to “zero”, meaning that it requires immediate replacement if:

- The remaining strength (i.e. resistograph measurement) is equal to zero, or
- Pole condition is scored as zero.

7.1 BH

In the Brampton rate zone, wood pole testing and inspections are done using a Polux/Trimble device. Where there is a testing/inspection record, the information recorded by the Trimble, and stored in a spreadsheet(s) external to the GIS system.

The remaining pole strength, capped at 100%, is utilized from the inspection data source only if both strength readings are provided.

Pole inspection data is joined with GIS data. Only the most recent inspection record is used.

Age is computed using “install date” and “year of pole installation” information from inspection records.

The following outlines the score assigned (out of a maximum of 5) for physical condition for wood poles at BH:

<Pole Condition>	Score
Danger Pole	0
Fire Damage	1
Butt Rot	1
Loose Hardware	1
Lightning dam.	1
insect	2
woodpecker	2
top decay	2
split top	3
checking	3
bent pole	3

If the field <Visual> is "Fail" then score = 1

If the field <Sound> is "Fail" then score = 1

if the fields <Sound> & <Visual> are "Fail" then score = 0

The minimum score triggered is used as the physical condition score for the pole.

Poles with an inspection date but insufficient data to meet the scoring rules above are assigned a default score of 3, as discussed in section 6.

7.2 EH

In the Enersource rate zone, all assets have an installation date specified in the GIS system.

The remaining pole strength provided is being utilized, but it is capped at 100% where values are greater than 100%.

Pole inspection data is extracted as part of the GIS data extract, and only the most recent inspection record is used.

Age is computed using the install date information extracted from the GIS record.

The following outlines the score assigned (out of a maximum of 5) for physical condition for wood poles at EH:

Pole Cracks	Normal	4
	Minor	3
	Moderate	2
	Major	1
Overall Pole Condition	Good	5
	Fair	3
	Poor	1
Mechanical Damage	Fire	1
	Vehicle	1
	Dry rot	2
	Woodpecker	2

	Insect	2
Pole Top Feathering	Major	1
	Moderate	2
	Minor	3
	None	5
Sound Test Result	Solid Pole	5
	Partially Hollow	2
	Completely Hollow	1

The minimum score triggered is used as the physical condition score for the pole.

Poles with an inspection date but insufficient data to meet the scoring rules above are assigned a default score of 3, as discussed in section 6.

7.3 HR

In the Horizon rate zone, the installation date from GIS is utilized for computing age.

The remaining pole strength provided is being utilized, but it is capped at 100% where values are computed as greater than 100%.

Pole inspection data is extracted as part of the GIS data extract, and only the most recent inspection record is used.

The following outlines the score assigned (out of a maximum of 5) for physical condition for wood poles at HR:

Cracked	YES	
And		
		Score
Action Required	Standard	3
	Timely	2
	Urgent	1

The minimum score triggered is used as the physical condition score for the pole.

Poles with an inspection date but insufficient data to meet the scoring rules above are assigned a default score of 3, as discussed in section 6.

7.4 PS

In the PowerStream rate zone, the installation date from GIS is utilized for computing age.

The remaining pole strength provided is being utilized, but it is capped at 100% where values are computed as greater than 100%.

The inspection information contained within the GIS system is used. The only information available is the inspection date, and the inspection code.

The following outlines the score assigned (out of a maximum of 5) for physical condition for wood poles at PS:

<Inspection code>	Score
C	5
B	3
A	1

Poles with an inspection date but insufficient data to meet the scoring rules above are assigned a default score of 3, as discussed in section 6.

7.5 GH

The asset inspection data is collected by Guelph Hydro and stored in separate files outside the GIS system.

Age is computed using install year information from GIS.

Pole strength is calculated using the following table of Industrial Fiber Stress for different Wood Species. The measured pole strength value, measured in PSI, is divided by the recorded industrial fiber stress to determine the remaining strength of the pole. If the number is larger than 1 (or 100% remaining strength), the assumption is fixed that the pole has 100% remaining strength.

Wood Species Type	Industrial Fiber Stress
WESTERN CEDAR	5600
JACK PINE	6400
DOUGLAS FIR	8000
RED PINE	6000
LODGEPOLE PINE	6600
SOUTHERN PINE	7800

If the recorded pole strength is “0” and is recorded to be a “TRUE” for the criteria ‘Rejected_Pole’, HI is computed to be ‘0’ and that it requires immediate replacement. If the recorded pole strength is “0” and is recorded to be a “FALSE” for the criteria ‘Rejected_Pole’, HI is computed as is with the industrial fiber stress.

Poles with values of “0” could be understood as a “NULL” and the pole was only visually inspected; or the pole had actually a recorded a true “0”. With the criteria ‘Rejected_Pole’ incorporated, this addresses the “0” recorded values.

The following outlines the translation of the physical condition results to a score assigned (out of a maximum of 5). Lowest score is taken for Physical Condition – Overall Condition.

Header	Finding	Score
Pole_Leaning	None	5
	Mild	3
	Medium	2
	TRUE	1
Fire_Damage	None	5
	Mild	3
	Medium	2
Lightning_Damage	None	5
	Medium	2
PoleTop_Feathering	None	5
	Mild	3
	Medium	2
	Severe	0
PoleTop_Rot	None	5
	Mild	3
	Medium	2
	Severe	0
Woodpecker_Damage	None	5
	Mild	3
	Medium	2
	Severe	0
Cracks above GL	None	5
	Mild	3
	Medium	2
	Severe	0
Hollow_Sound	TRUE	1
	FALSE	5
External_Decay	None	5
	Mild	3
	Medium	2
	Severe	0
Internal_Decay	None	5
	Mild	3
	Medium	2
	Severe	0
Loose_Shell	TRUE	1

	FALSE	5
Carpenter_Ants	TRUE	1
	FALSE	5
	Mild	3
	Severe	0
Insect_Damage	None	5
	Mild	3
	Medium	2
	Severe	0
Decay_Below_GL	None	5
	Mild	3
	Medium	2
	Severe	0
Cracks_at_or_Below_GL	None	5
	Mild	3
	Medium	2
	Severe	0

8 Concrete Poles

8.1 BH

Concrete poles at BH have no record of conditions. As a result, these poles will not have a condition contribution to the HI value, and are exclusively using age information.

Age is calculated using the install date as provided by GIS.

8.2 EH

Pole inspection data is extracted as part of the GIS data extract, and only the most recent inspection record is used.

Age is calculated using the install date as provided by GIS.

The following outlines the score assigned (out of a maximum of 5) for physical condition for concrete poles at EH:

Pole Cracks/Splitting	Normal	4
	Minor	3
	Moderate	2
	Major	1
Concrete condition	Good	5
	Surface Cracks	3
	Rust Stains	2
	Re-bar exposed	1
Overall Pole Condition	Good	5
	Fair	3
	Poor	1

The minimum score triggered is used as the physical condition score for the pole.

Poles with an inspection date but insufficient data to meet the scoring rules above are assigned a default score of 3, as discussed in section 6.

8.3 HR

In the Horizon rate zone, the installation date from GIS is utilized for computing age.

Pole inspection data is extracted as part of the GIS data extract, and only the most recent inspection record is used.

The following outlines the score assigned (out of a maximum of 5) for physical condition for wood poles at HR:

Cracked	YES	
And		
		Score
Action Required	Standard	3
	Timely	2
	Urgent	1

The minimum score triggered is used as the physical condition score for the pole.

Poles with an inspection date but insufficient data to meet the scoring rules above are assigned a default score of 3, as discussed in section 6.

8.4 PS

In the PowerStream rate zone, the installation date from GIS is utilized for computing age. Manufacturing date was used if the installation date was not available.

The inspection information contained within the GIS system is used. The only information available is the inspection date, and the inspection code.

The following outlines the score assigned (out of a maximum of 5) for physical condition for wood poles at PS:

<Inspection code>	Score
C	5
B	3
A	1

Poles with an inspection date but insufficient data to meet the scoring rules above are assigned a default score of 3, as discussed in section 6.

8.5 GH

The asset inspection data is collected by Guelph Hydro and stored in separate files outside the GIS system. The field 'LOC_NUMBER' is used as the common field to match the GIS data and the inspection data. The 'INSTALL_YEAR' from GIS is used for computing age. Where 'INSTALL_YEAR' is blank, 'INSTALL_YEAR' is considered blank and the age will be blank.

The following outlines the translation of the physical condition results to a score assigned (out of a maximum of 5). Lowest score is taken for Physical Condition – Overall Condition.

Header	**Finding**	**Score**
Pole_Leaning	None	5
	Mild	3
	Medium	2
Fire_Damage	None	5
	Mild	3
	Medium	2
Lightning_Damage	None	5
	Medium	2
Cracks above GL	None	5
	Mild	3
	Medium	2
Cracks_at_or_Below_GL	None	5
	Mild	3
	Medium	2
	Severe	0

9 Underground Cables

A Gompertz-Makeham function is used to compute an age score for UG cables and is dependent on the type of cable that is being examined. In all rate zones, the cable material is determined. For XLPE cables, the following criteria is used to classify the installation types:

- **Non Tree Retardant cables (NON TR)**:
  Vintage 1988 or older; TUL 30 years; EUL 40 years
- **Tree Retardant Direct Buried cables (TR-DB)**:
  Vintage 1989-1993; TUL 35 years; EUL 45 years
- **Tree Retardant or Strand Blocked In-Duct cables(TR-ID):**
  Vintage 1994 or newer; TUL 40 years; EUL 55 years

9.1 BH

The install date as provided by GIS is used for HI calculations.

There is cable injection information available at BH. This information is tied to the same unique identifier utilized in GIS for cables. Where there is a match found, the effective age information provided in the cable injection data source is used instead of the computed age based on installation date from GIS.

A listing of cables that were subject to cable injection was provided. This listing included a new effective age for the cable. Where there was a match for these cables with cables in GIS, the new effective age was used rather than the age computed using GIS installation date. Based on the expected 20-year life extension for injected cables and EUL at 40, the effective age of injected cable at the time of injection is reset to 20 years old (40 - 20 = 20). Therefore, a cable injected in 2010 will have a new effective age of 28 in year 2018.

9.2 EH

The install date as provided by GIS is used for age calculations. EH does not use cable injection.

9.3 HR

The install date as provided by GIS is used for HI calculations. HR does not use cable injection.

9.4 PS

The install date as provided by GIS is used for age calculations.

There is cable injection information available at PS. This information is tied to the same unique identifier utilized in GIS for cables. Where there is a match found, the effective age information provided in the cable injection data source is used instead of the computed age based on installation date from GIS.

A listing of cables that were subject to cable injection was provided. This listing included a new effective age for the cable. Where there was a match for these cables with cables in GIS, the new effective age was used rather than the age computed using GIS installation date. Based on the expected 20-year life extension for injected cables and EUL at 40, the effective age of injected cable at the time of injection is reset to 20 years old (40 - 20 = 20). Therefore, a cable injected in 2010 will have a new effective age of 28 in year 2018.

9.5 GH

The install date as provided by GIS is used for HI calculations. GH does not use cable injection.

10 Switchgears

Switchgears (SG) can be of four different types: air insulated, solid dielectric, SF6, and oil.

Whenever the corrosion, component failure, insulation, or oil leak component of the Health Index is computed to be zero, HI will be set to zero. The asset will be included in list of assets for immediate replacement.

10.1 BH

BH contains all four types of SGs. The installation date from GIS is utilized for computing age.

SG inspection data is extracted as part of the GIS data extract, and only the most recent inspection record is used.

The following table outlines the score assigned (out of a maximum of 5) for corrosion for all SGs at BH:

CORROSION SCORE		
Header	**Finding**	**Score**
CORROSION	None	5
	Surface Rust	3
	Layers of Rust	1
	Rusted Through	0

The corrosion score will only be assigned a 5 if the 5 condition is explicitly found in the inspection data.

The following table outlines the score assigned (out of a maximum of 5) for component failure for all SGs at BH:

DAMAGE SCORE (Component failure)		
Header	**Finding**	**Score**
DAMAGE	None	5

	Painting Required	3

The component failure score will only be assigned a 5 if the 5 condition is explicitly found in the inspection data.

The following table outlines the score assigned (out of a maximum of 5) for insulation for all SGs at BH:

INSULATION SCORE		
Other than 'YES', score 5 else take lowest score. If >1 compartment, score 1.		
Header	**Finding**	**Score**
A_TRACKING	YES	2
A_TRACKING_BARRIER	YES	3
A_TRACKING_FUSE	YES	2
A_TRACKING_INSULATOR	YES	2
A_TRACKING_SWITCH	YES	2
A_TRACKING_TERMINATION	YES	2
B_TRACKING	YES	2
B_TRACKING_BARRIER	YES	3
B_TRACKING_FUSE	YES	2
B_TRACKING_INSULATOR	YES	2
B_TRACKING_SWITCH	YES	2
B_TRACKING_TERMINATION	YES	2
C_TRACKING	YES	2
C_TRACKING_BARRIER	YES	3
C_TRACKING_FUSE	YES	2
C_TRACKING_INSULATOR	YES	2
C_TRACKING_SWITCH	YES	2
C_TRACKING_TERMINATION	YES	2

D_TRACKING	YES	2
D_TRACKING_BARRIER	YES	3
D_TRACKING_FUSE	YES	2
D_TRACKING_INSULATOR	YES	2
D_TRACKING_SWITCH	YES	2
D_TRACKING_TERMINATION	YES	2

The insulation score will be assigned a 5 if the 5 condition is explicitly found in the inspection data, or a blank value. Note that all 4 compartments need to be in this condition in order to score a 5.

The following table outlines the score assigned (out of a maximum of 5) for oil leak for all oil type SGs at BH:

OIL LEAK SCORE		
Take lowest score		
Header	**Finding**	**Score**
A_LEAKING	None or NO	5
	YES	1
B_LEAKING	None or NO	5
	YES	1
C_LEAKING	None or NO	5
	YES	1
D_LEAKING	None or NO	5
	YES	1

The oil leak score will only be assigned a 5 if the 5 condition is explicitly found in the inspection data.

SGs with an inspection date but insufficient data to meet the scoring rules above are assigned a default score of 3, as discussed in section 6.

10.2 **EH**

EH contains only three types of SGs: air insulated, solid dielectric, and SF6. In the Enersource rate zone, all assets have an installation date specified in the GIS system.

SG inspection data is extracted as part of the GIS data extract, and only the most recent inspection record is used.

The following table outlines the score assigned (out of a maximum of 5) for corrosion for all SGs at EH:

CORROSION SCORE		
Take lowest score		
Header	**Finding**	**Score**
RUST	None	5
	Minor	3
	Major	0
HOLES	No or 0	5
	Yes or 1	0

The corrosion score will only be assigned a 5 if the 5 condition is explicitly found in the inspection data.

The following table outlines the score assigned (out of a maximum of 5) for component failure for all SGs at EH:

DAMAGE SCORE (Component failure)		
Take lowest score		
Header	**Finding**	**Score**
ARC_SUPPRESSORS	None	5
	Good	5
	Bad	1
	Foam Present	1
	Replace	0
PAINT_CONDITION	Good	5
	Graffiti	3
	Poor	1

The component failure score will only be assigned a 5 if the 5 condition is explicitly found in the inspection data.

The following table outlines the score assigned (out of a maximum of 5) for insulation for all SGs at EH:

INSULATION SCORE		
Take lowest score		
Header	**Finding**	**Score**
FIBER_BOARD_CONDITION	Good	5
	Bad	1
	Replace	1
TERMINATION_ARCING_MARKS_PRESENT	No	5
	0	5
	1	1

INSULATOR_CONDITION	Good	5
	Bad	1
	Arcing Marks Present	1
PITTING_FLASH_MARKS	None	5
	Present	1
CONNECTIONS	Good	5
	Bad	2
CLEANLINESS	Good	5
	Tracking	1
	Dirty & Tracking	1
	Dirty	1
TRACKING	None	5
	Minor	3
	Major	1

The insulation score will only be assigned a 5 if the 5 condition is explicitly found in the inspection data.

SGs with an inspection date but insufficient data to meet the scoring rules above are assigned a default score of 3, as discussed in section 6.

10.3 HR

In the Horizon rate zone, the installation date from GIS is utilized for computing age.

SG inspection data is extracted as part of the GIS data extract, and only the most recent inspection record is used.

The following outlines the score assigned (out of a maximum of 5) for physical condition for all SGs at HR:

CONDITION SCORE		
Header	**Finding**	**Score**
INSPECTION_STATUS	PASS	5
	FAIL	1
	NULL	NO SCORE

The condition score will only be assigned a 5 if the 5 condition is explicitly found in the inspection data.

SGs with an inspection date but insufficient data to meet the scoring rules above are assigned a default score of 3, as discussed in section 6.

10.4 PS

In the PowerStream rate zone, the installation date from GIS is utilized for computing age. Where this is blank, the manufacture date is used.

The inspection information contained within the GIS system is used. The only information available is the inspection date, and the inspection code.

The following outlines the score assigned (out of a maximum of 5) for physical condition for all SGs at PS:

<Inspection code>	Score
C	5
B	3
A	1

The condition score will only be assigned a 5 if the 5 condition is explicitly found in the inspection data.

SGs with an inspection date but insufficient data to meet the scoring rules above are assigned a default score of 3, as discussed in section 6.

10.5 GH

Switchgears (SG) in Guelph Hydro can be assumed to be either air insulated, solid dielectric or SF6. The assumption can be made there are no oil SGs since there is no indication in the files oil SGs exist. The HI models for air insulated, solid dielectric, and SF6 are the same.

'INSTALL_YEAR' is used to determine the age of the SGs.

The following table outlines the translation of the physical condition results to a score assigned (out of a maximum of 5) for all SGs at Guelph Hydro. It is assumed a score of '1' given by the inspector is translated to a condition score of 0.

Header	Finding	Score
Corrosion	5	5
	4	4
	3	3
	2	2
	1	0
Damage	5	5
	4	4
	3	3
	2	2
	1	0
Insulation	5	5

	4	4
	3	3
	2	2
	1	1

Guelph Hydro's 'Damage' field inspection is assumed to be translatable to the HI models' criteria 'Component Failure'.

11 Transformers – Pad Mount

Whenever the corrosion or oil leak component is determined to be scored zero, HI will be set to zero. The asset will be included in list of assets for immediate replacement.

11.1 BH

The transformer types considered as pad mount transformers at BH are: SINGLE PHASE PADMOUNT-DUAL VOLTAGE, SINGLE PHASE PADMOUNT, THREE PHASE PADMOUNT, THREE PHASE PADMOUNT-DUAL VOLTAGE, THREE PHASE PADMOUNT POWER, SINGLE PHASE SUBMERSIBLE, SINGLE PHASE SUBMERSIBLE OIL TYPE, SINGLE PHASE SUBMERSIBLE DRY TYPE.

The installation date from GIS is utilized for computing age.

Pad mount TX inspection data is extracted as part of the GIS data extract, and only the most recent inspection record is used.

The following table outlines the score assigned (out of a maximum of 5) for corrosion for all SGs at BH:

CORROSION SCORE		
Take lowest score		
For this inspection attribute, if NULL, score is 5 because there was an understanding with the inspector that NULL means no corrosion.		
Header	**Finding**	**Score**
CORROSION	None or 0 or NULL	5
	Surface Rust	3
	Surface Rust (Cosmetic)	3
	Surface Rust (bushing)	3
	Rusting at weld/seam but secure and intact	1
	Layers of Rust	1
	Rust Through	0
	Rust Through / Layers of Rust	0

The corrosion score can be assigned a 5 if the 5 condition is explicitly found in the inspection data, or a blank.

The following table outlines the score assigned (out of a maximum of 5) for oil leak for all pad mount TXs at BH:

OIL LEAK SCORE		
If LEAK_TXREQ is YES or 1, score is 0. For the other leak attributes, if only one type of leak is YES or 1, score is 3; for multiple findings, score is 1.		
For this inspection attribute, if NULL, score is 5 because there was an understanding with the inspector that NULL means no leak.		
Header	**Finding**	**Score**
LEAK_BUSHING	NO or 0 or NULL	5
	YES or 1	3
LEAK_NONE	NO or 0 or NULL	5
	YES or 1	3
LEAK_OTHER	NO or 0 or NULL	5
	YES or 1	3
LEAK_PLUG	NO or 0 or NULL	5
	YES or 1	3
LEAK_SEAM	NO or 0 or NULL	5
	YES or 1	3
LEAK_TAP_CHANGER	NO or 0 or NULL	5
	YES or 1	3
LEAK_TXREQ	NO or 0 or NULL	5
	YES or 1	0

The oil leak score can be assigned a 5 if the 5 condition is explicitly found in the inspection data, or a blank.

Pad mount TXs with an inspection date but insufficient data to meet the scoring rules above are assigned a default score of 3, as discussed in section 6.

11.2 EH

The transformer types considered as pad mount transformers at EH are: PADMOUNT, PADMOUNT-3PH

The installation date from GIS is used to compute age.

Pad mount TX inspection data is extracted as part of the GIS data extract, and only the most recent inspection record is used.

The following table outlines the score assigned (out of a maximum of 5) for corrosion for all pad mount TXs at EH:

CORROSION SCORE		
Header	**Finding**	**Score**
RUSTED_LID_SKIRT_TANK	None or No	5
	Minor	3
	Moderate	1
	Major	0

The corrosion score will only be assigned a 5 if the 5 condition is explicitly found in the inspection data.

The following table outlines the score assigned (out of a maximum of 5) for oil leak for all pad mount TXs at EH:

OIL LEAK SCORE		
Take lowest score		
Header	**Finding**	**Score**
OIL_LEAK_EXTERNAL	None or No	5
	Minor	3

	Moderate	1
	Major	0
OIL_LEAK_IN_FOUNDATION	None	5
	Minor	3
	Moderate	1
	Major	0

The oil leak score will only be assigned a 5 if the 5 condition is explicitly found in the inspection data.

Pad mount TXs with an inspection date but insufficient data to meet the scoring rules above are assigned a default score of 3, as discussed in section 6.

11.3 HR

The transformer types considered as pad mount transformers at HR are: STANDARD, PADMOUNT.

In the Horizon rate zone, the installation date from GIS is utilized for computing age.

Pad mount TX inspection data is extracted as part of the GIS data extract, and only the most recent inspection record is used.

The following outlines the score assigned (out of a maximum of 5) for corrosion for all pad mount TXs at HR:

CORROSION SCORE		
Take lowest score.		
Header	**Finding**	**Score**
RUST_1	NO	5
	YES	1
RUST_2	NO	5
	YES	1
RUST_3	NO	5
	YES	1
look for following in comments: rust, "rotten door", "door is broken"		
treat as a 'YES' and take lowest score		

The corrosion score will only be assigned a 5 if the 5 condition is explicitly found in the inspection data.

The following table outlines the score assigned (out of a maximum of 5) for oil leak for all pad mount TXs at HR:

OIL LEAK SCORE		
Take lowest score.		
Header	**Finding**	**Score**
LEAKING_OIL_1	NO	5
	YES	1
LEAKING_OIL_2	NO	5
	YES	1
LEAKING_OIL_3	NO	5

	YES	1

The oil leak score will only be assigned a 5 if the 5 condition is explicitly found in the inspection data.

Pad mount TXs with an inspection date but insufficient data to meet the scoring rules above are assigned a default score of 3, as discussed in section 6.

11.4 PS

The transformer types considered as pad mount transformers at PS are: 3 Phase Padmount, 1 Phase Padmount.

In the PowerStream rate zone, the installation date from GIS is utilized for computing age. Where this is blank, the manufacture date is not being used.

The inspection information contained within the GIS system is used. The only information available is the inspection date, and the inspection code.

The following outlines the score assigned (out of a maximum of 5) for physical condition for all SGs at PS:

<Inspection code>	Score
C	5
B	3
A	1

The condition score will only be assigned a 5 if the 5 condition is explicitly found in the inspection data.

Pad mount TXs with an inspection date but insufficient data to meet the scoring rules above are assigned a default score of 3, as discussed in section 6.

11.5 GH

The transformer types considered as pad mount transformers at Guelph Hydro are: PADMOUNT 1-3PH, PADMOUNT-3PH.

The asset inspection data is collected by Guelph Hydro and stored in separate files outside the GIS system. The field 'BankNum' and '#ELN' is used as the common field to match the GIS data and the inspection data. The 'INSTALL_YEAR' from GIS is used for computing age. Where 'INSTALL_YEAR' is blank, 'INSTALL_YEAR' is considered blank and age will be blank.

The following outlines the translation of the physical condition results to a score (out of a maximum of 5) for corrosion for all pad mount transformers at Guelph Hydro:

Header	Finding	Score
AppearanceProb	NONE	5
	PROBLEM	
AND		
AppearanceComm	"RUST"	1
BushingProb	NONE	5
	PROBLEM	
AND		
BushingComm	"RUST"	1
EnclosureProb	NONE	5
	PROBLEM	
AND		
EnclosureComm	"RUST"	1
Comments	"RUST"	1

If 'PROBLEM' is noted by the inspector and the keyword "RUST" is present in the respective comments headings, a score of 1 is assigned. If 'NONE' is filled by the inspector, a score of 5 is assigned. If the keyword is not present, a score of 5 is assigned regardless if the inspector noted 'PROBLEM' since the condition defect may be associated with other factors. Lowest score is taken for Physical Condition – Corrosion.

The following table outlines the translation of the physical condition results to a score assigned (out of a maximum of 5) for oil leak for all pad mount Transformers at Guelph:

Header	Finding	Score
AppearanceProb	NONE	5
	PROBLEM	
AND		
AppearanceComm	"LEAK"	1
BushingProb	NONE	5
	PROBLEM	
AND		
BushingComm	"LEAK"	1
OilProb	NONE	5
	PROBLEM	1
Comments	"LEAK"	1

If 'PROBLEM' is noted by the inspector and the keyword "LEAK" is present in the respective comments headings, a score of 1 is assigned. If 'NONE' is filled by the inspector, a score of 5 is assigned. However, since there is a separate identified header for 'OilProb', if the inspector has identified there is a 'PROBLEM' the resulting assigned score is 1. The assumption is the inspector has identified a severe enough oil problem that has marked the field as a problem and should be addressed in the near term. Since there is no evaluation field for severity of oil, a score of 1 is assigned to flag the asset. If the keywords are not present, a score of 5 is assigned regardless if the inspector noted 'PROBLEM' since the condition defect may be associated with other factors. Lowest score is taken for Physical Condition – Oil Leak.

12 Transformers – Pole Mount

Pole mount transformer locations at all of the legacy utilities can consist of anywhere from 1 to 3 individual transformer units. HI calculations for pole mount transformers are provided by the location.

Whenever the corrosion or oil leak component is determined to be scored zero, HI will set to zero. The asset will be included in list of assets for immediate replacement.

12.1 BH

The transformer types considered as pole mount transformers at BH are: SINGLE PHASE OVERHEAD-DUAL VOLTAGE, SINGLE PHASE OVERHEAD, THREE PHASE OVERHEAD BANK-DUAL VOLTAGE, THREE PHASE OVERHEAD BANK, THREE PHASE OVERHEAD, THREE PHASE STEP-DOWN, SINGLE PHASE STEP-DOWN, SINGLE PHASE BACK TO BACK.

The installation date from GIS is used. If the installation date is not available, the manufacture dates of the individual units at each location. The earliest date amongst available installation and manufacture dates at each location is utilized for computing age.

Pole mount TX inspection data is extracted as part of the GIS data extract, and only the most recent inspection record is used.

The following table outlines the score assigned (out of a maximum of 5) for corrosion for all pole mount TXs at BH:

Corrosion: Pick the minimum of all units at the location		
	None	5
	Surface Rust	3
	Layers of Rust	1
	Rust Through	0

The corrosion score can be assigned a 5 if the 5 condition is explicitly found in the inspection data, or a blank.

The following table outlines the score assigned (out of a maximum of 5) for oil leak for all single phase pole mount TXs at BH:

Oil Leak:		
	Yes	1
	No	5

For single phase pad mount TXs, the oil leak score can be assigned a 5 if the 5 condition is explicitly found in the inspection data, or a blank.

The following table outlines the score assigned (out of a maximum of 5) for oil leak for all three phase pole mount TXs at BH:

Oil Leak: Pick the minimum of all units at the location		
Tank Oil Leak (W)	No or 0	5
	Yes or 1	1
Tank Oil Leak (B)	No or 0	5
	Yes or 1	1
Tank Oil Leak (R)	No or 0	5
	Yes or 1	1

The oil leak score can be assigned a 5 if the 5 condition is explicitly found in the inspection data, or a blank. For three phase locations however, all three units must indicate the 5 condition or a blank for the location to score a 5.

12.2 **EH**

The transformer types considered as pole mount transformers at EH are: POLEMOUNT.

In the Enersource rate zone, all assets have an installation date specified in the GIS system.

Pole mount TX inspection data is extracted as part of the GIS data extract, and only the most recent inspection record is used.

The following table outlines the score assigned (out of a maximum of 5) for corrosion for all pole mount TXs at EH:

Transformer rust	yes	1
	no	5

The corrosion score will only be assigned a 5 if the 5 condition is explicitly found in the inspection data.

In order to determine a score for oil leaks at EH, the oil leak severity field has to be considered where the oil leak field indicates signs of oil leaking. The following table outlines the score assigned (out of a maximum of 5) for oil leak for all pole mount TXs at EH:

Sign of oil leak		
	no	5
	yes	check Oil Leak Severity
Oil Leak Severity		
	None	4
	Minor	3
	Moderate	1
	Major	0

The oil leak score will only be assigned a 5 if the 5 condition is explicitly found in the inspection data.

Pole mount TXs with an inspection date but insufficient data to meet the scoring rules above are assigned a default score of 3, as discussed in section 6.

12.3 HR

The earliest date amongst available installation and estimated installation dates at each pole mount TX location is utilized for computing age.

Pole mount TX inspection data is extracted as part of the GIS data extract, and only the most recent inspection record is used.

The following outlines the score assigned (out of a maximum of 5) for corrosion for all pole mount TXs at HR:

Pick the lowest		
Rust_1	Yes	1
	No	5
Rust_2	Yes	1
	No	5
Rust_3	Yes	1
	No	5

The corrosion score will only be assigned a 5 if the 5 condition is explicitly found in the inspection data.

The following table outlines the score assigned (out of a maximum of 5) for oil leak for all pole mount TXs at HR:

Pick the lowest		
Leaking_Oil_1	yes	1
	no	5
Leaking_Oil_2	yes	1
	no	5

Leaking_Oil_3	yes	1
	no	5

The oil leak score will only be assigned a 5 if the 5 condition is explicitly found in the inspection data.

Pole mount TXs with an inspection date but insufficient data to meet the scoring rules above are assigned a default score of 3, as discussed in section 6.

12.4 PS

At PS, the following transformer types are considered pole mount: 3 Phase Aerial, 3 Phase Step Down Transformer (Rabbit), 1 Phase Step Down Transformer (Rabbit), 2 Phase OH Bank, 3 Phase OH Bank.

The installation date from GIS is utilized for computing age.

The inspection information contained within the GIS system is used. The only information available is the inspection date, and the inspection code.

The following outlines the score assigned (out of a maximum of 5) for physical condition for all SGs at PS:

<Inspection code>	Score
C	5
B	3
A	1

The condition score will only be assigned a 5 if the 5 condition is explicitly found in the inspection data.

Pole mount TXs with an inspection date but insufficient data to meet the scoring rules above are assigned a default score of 3, as discussed in section 6.

12.5 GH

The transformer types considered as pole mount transformers at Guelph Hydro are: POLEMOUNT 1-3PH, POLEMOUNT-3PH

The asset inspection data is collected by Guelph Hydro and stored in separate files outside the GIS system. The field 'Bank#' and 'Local#' is used as the common field to match the GIS data and the inspection data. The 'INSTALL_YEAR' from GIS is used for computing age. Where 'INSTALL_YEAR' is blank, 'INSTALL_YEAR' is considered blank and age will be blank.

The following outlines the translation of the physical condition results to a score (out of a maximum of 5) for corrosion for all pole mount transformers at Guelph.

Header	Finding	Score
Tank Corrosion(Bottom)	None	5
	Low	4
	Mild	3
	Medium	2
	Major	1
	Severe	0
Tank Corrosion (Side)	None	5
	Low	4
	Mild	3
	Medium	2
	Major	1
	Severe	0

The corrosion score is assigned according to the level of severity marked by the inspector; with 'SEVERE' having the lowest score and with 'NONE', being the highest score of 5. Lowest score is taken for Physical Condition – Corrosion.

The following table outlines the translation of the physical condition results to a score assigned (out of a maximum of 5) for oil leak for all pole mount Transformers at Guelph:

Header	Finding	Score
Oil Leak	TRUE	1
	FALSE	5

Any oil leak marked by inspector, a score of 1 is assigned. Whereas, the lack of an oil leak, a score of 5 is assigned assuming good condition.

13 Transformers - Vault

Vault transformer locations at all of the legacy utilities can consist of anywhere from 1 to 3 individual transformer units. HI calculations for pole mount transformers are provided by the location.

Whenever the corrosion or oil leak component is determined to be scored zero, HI will be set to zero. The asset will be included in list of assets for immediate replacement.

13.1 BH

The transformer types considered as vault transformers at BH are: THREE PHASE SUBMERSIBLE VAULT, THREE PHASE ABOVE GRADE VAULT, LOW VOLTAGE NETWORK.

The installation date from GIS is used. If not available, the manufacture dates of the individual units at each location. The earliest date amongst available installation and manufacture dates at each location is utilized for computing age.

Vault TX inspection data is extracted as part of the GIS data extract, and only the most recent inspection record is used.

The following table outlines the score assigned (out of a maximum of 5) for corrosion for all vault TXs at BH:

Corrosion:		
	None	5
	Surface Rust	3
	Layers of Rust	1
	Rust Through	0

The corrosion score can be assigned a 5 if the 5 condition is explicitly found in the inspection data, or a blank.

The following table outlines the score assigned (out of a maximum of 5) for oil leak for all vault TXs at BH:

OIL LEAK SCORE

If LEAK_TXREQ is YES or 1, score is 0. For the other leak attributes, if only one type of leak is YES or 1, score is 3; for multiple findings, score is 1.

For this inspection attribute, if NULL, score is 5 because there was had an understanding with the inspector that NULL means no leak.

Header	Finding	Score
LEAK_BUSHING	NO or 0 or NULL	5
	YES or 1	3
LEAK_NONE	NO or 0 or NULL	5
	YES or 1	3
LEAK_OTHER	NO or 0 or NULL	5
	YES or 1	3
LEAK_PLUG	NO or 0 or NULL	5
	YES or 1	3
LEAK_SEAM	NO or 0 or NULL	5
	YES or 1	3
LEAK_TAP_CHANGER	NO or 0 or NULL	5
	YES or 1	3
LEAK_TXREQ	NO or 0 or NULL	5
	YES or 1	0

The oil leak score can be assigned a 5 if the 5 condition is explicitly found in the inspection data, or a blank

Vault TXs with an inspection date but insufficient data to meet the scoring rules above are assigned a default score of 3, as discussed in section 6.

13.2 EH

The transformer types considered as vault transformers at EH are: VAULT.

In the Enersource rate zone, all assets have an installation date specified in the GIS system. The installation date is used to compute age, and it is available at the location level, and it is already set to be the earliest installation date of the units at that location.

Vault TX inspection data is extracted as part of the GIS data extract, and only the most recent inspection record is used.

The following table outlines the score assigned (out of a maximum of 5) for corrosion for all vault TXs at EH:

Transformer rust	yes	1
	no	5

The corrosion score will only be assigned a 5 if the 5 condition is explicitly found in the inspection data.

In order to determine a score for oil leaks at EH, the oil leak severity field has to be considered where the oil leak field indicates signs of oil leaking. The following table outlines the score assigned (out of a maximum of 5) for oil leak for all vault TXs at EH:

Sign of oil leak		
	no	5
	yes	check Oil Leak Severity
Oil Leak Severity		
	None or null	4
	Minor	3
	Moderate	1
	Major	0

The oil leak score will only be assigned a 5 if the 5 condition is explicitly found in the inspection data.

Vault TXs with an inspection date but insufficient data to meet the scoring rules above are assigned a default score of 3, as discussed in section 6.

13.3 HR

The earliest date amongst available installation and estimated installation dates at each vault TX location is utilized for computing age.

Vault TX inspection data is extracted as part of the GIS data extract, and only the most recent inspection record is used.

The following outlines the score assigned (out of a maximum of 5) for corrosion for all vault TXs at HR:

Pick the lowest		
Rust_1	Yes	1
	No	5
Rust_2	Yes	1
	No	5
Rust_3	Yes	1
	No	5

The corrosion score will only be assigned a 5 if the 5 condition is explicitly found in the inspection data.

The following table outlines the score assigned (out of a maximum of 5) for oil leak for all vault TXs at HR:

Pick the lowest		
Leaking_Oil_1	yes	1
	no	5
Leaking_Oil_2	yes	1
	no	5
Leaking_Oil_3	yes	1
	no	5

The oil leak score will only be assigned a 5 if the 5 condition is explicitly found in the inspection data.

Vault TXs with an inspection date but insufficient data to meet the scoring rules above are assigned a default score of 3, as discussed in section 6.

13.4 PS

The transformers types considered as vault transformers at PS are: 3 Phase Vault, 1 Phase Submersible, 3 Phase Submersible.

In the PowerStream rate zone, the installation date from GIS is utilized for computing age.

The inspection information contained within the GIS system is used. The only information available is the inspection date, and the inspection code.

The following outlines the score assigned (out of a maximum of 5) for physical condition for all SGs at PS:

<Inspection code>	Score
C	5
B	3
A	1

The condition score will only be assigned a 5 if the 5 condition is explicitly found in the inspection data.

Vault TXs with an inspection date but insufficient data to meet the scoring rules above are assigned a default score of 3, as discussed in section 6.

13.5 GH

The transformer types considered as vault transformers at Guelph Hydro are: Vault 1-3PH, Vault-3PH.

The asset inspection data is collected by Guelph Hydro and stored in separate files outside the GIS system. The field 'BankNum' and '#ELN' is used as the common field to match the GIS data and the inspection data. The 'INSTALL_YEAR' from GIS is used for computing age. Where 'INSTALL_YEAR' is blank, 'INSTALL_YEAR' is considered blank and the age will be blank.

The following outlines the translation of the physical condition results to a score (out of a maximum of 5) for corrosion for all vault transformers at Guelph Hydro:

Header	Finding	Score
BushingProb	NONE	5
	PROBLEM	
AND		
BushingComm	"RUST"	1
GroundsProb	NONE	5
	PROBLEM	
AND		
	"RUST"	1
Comments	"RUST"	1

If 'PROBLEM' is noted by the inspector and the keyword "RUST" is present in the respective comments headings, a score of 1 is assigned. If the keyword is not present, a score of 5 is assigned regardless if the inspector noted 'PROBLEM' since the condition defect may be associated with other factors. If 'NONE' is filled by the inspector, a score of 5 is assigned. Lowest score is taken for Physical Condition – Corrosion.

The following table outlines the translation of the physical condition results to a score assigned (out of a maximum of 5) for oil leak for all vault transformers at Guelph Hydro:

Header	**Finding**	**Score**
BushingProb	NONE	5
	PROBLEM	
AND		
BushingComm	"LEAK"	1
OilLeakProb	NONE	5
	PROBLEM	1
Comments	"LEAK"	1

If 'PROBLEM' is noted by the inspector and the keyword "LEAK" is present in the respective comments headings, a score of 1 is assigned. If 'NONE' is filled by the inspector, a score of 5 is assigned. If the keywords are not present, a score of 5 is assigned regardless if the inspector noted 'PROBLEM' since the condition defect may be associated with other factors. Lowest score is taken for Physical Condition – Oil Leak.

14 Overhead Load Break Switches

No translation required since the asset HI is dependent on age only.

For all rate zones, the installation date is used to compute the age.

15 Overhead Conductors

No translation required since the asset HI is dependent on age only.

For all rate zones, the installation date is used to compute the age.

MANA-15

ATTACHMENT 4

2018

Distribution Assets Health Index Computational Methodology

ASSET CONDITION ASSESSMENT

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1 Health Index Model

The Health Index model is a weighted condition-based analytical model. The number and type of conditions are dependent on the asset class, consequences of failure, and existing data.

The generic equation below shows the calculation of the Health Index:

$$\boldsymbol{Health\ Index} = \frac{\sum_{i=1}^{n}(Input\ Weight_i \times\ Input\ Score_i)}{\sum_{i=1}^{n}(Input\ Weight_i)} * Condition\ Multiplier \qquad (\mathbf{1}),\ where$$

$$\boldsymbol{n}: number\ of\ available\ inputs\ for\ an\ asset\ class,$$

$$\boldsymbol{Input\ Score}: percentage\ (0-100\%),$$

$$\boldsymbol{Health\ Index}: percentage\ (0-100\%),$$

$$\boldsymbol{Input\ Weight}: percentage, where \sum_{i=1}^{n} Input\ Weight_i = 100\%$$

$$\boldsymbol{Condition\ Multiplier}: maximum\ allowable\ HI\ given\ asset\ specific\ metrics$$

1.1 Input Types

Inputs to the HI can be classified in two types: physical condition and service record data.

Physical conditions are conditions from the field that represent the state of the asset using measurements or visual inspections. Visual inspections are uniform surveys conducted in the field. Uniform surveys reduce subjectivity of the inspector; for example, visual inspection of corrosion on a transformer. Physical conditions can be measurement based; for example, pole residual strength measurement using resistograph.

Service record data is fact-based without any subjectivity; for example, age of an asset. It is indisputable and not prone to field errors. Service record conditions are dependent on the accuracy of the record keeping and quality controls in place.

1.2 Input Score

Inputs to the HI are scored in one of two ways: a step score and percentage score. Each input that makes up the Health Index is scored accordingly.

1.2.1 Step score

Step score is a points based scoring method used for inputs of the HI that are non-continuous; for example, field inspections. Step scoring is reserved for inputs with distinct levels measured against defined criteria.

The following is a general criteria for step scoring:

Table 1 Distribution Assets Step Scoring

Inspection Score	Criteria	HI Input Score
5	Excellent condition	100%
4	Relatively good condition	80%
3	Fair condition	60%
2	Moderate degradation	40%
1	Major degradation/not fit for service	20%
0	Imminent failure	0%

1.2.2 Percentage score

Percentage scoring is the continuous (i.e. gradual) scoring of an input. Percentage scoring is used when more granular data are available and step scoring is not accurately representative of an input's impact. This representation is used for measurements (e.g. pole residual remaining strength) and data (e.g. age).

For example, age is represented as a percentage score based on a continuous function given by the Gompertz-Makeham Model described by the following set of equations:

$$Age\ score = e^{\frac{-(f(t)-e^{-\alpha\beta})}{\beta}} \qquad (\mathbf{2}) \quad ,where$$

$$f(t) = e^{\beta(t-\alpha)}, where$$

$$t\text{: } age\ (years)$$

$$\alpha, \beta\text{: constants}$$

The constants α, β are calculated to yield an age score of 80% at the Typical Useful Life (TUL) and 1% at the End of Useful Life (EUL) of an asset.

Asset TUL is based on the "Asset Depreciation Study for the Ontario Energy Board Kinectrics Inc. Report No: K-418033-RA-001-R000 July 8, 2010" report. Similarly, asset EUL is based on the Max UL from the same report.

1.3 Condition Multiplier

In order to adequately represent the health of an asset using the HI, conditions that determine major degradation or imminent failure of an asset is accounted for by limiting the HI to a maximum value, using the condition multiplier. Once certain conditions are triggered the HI of an asset is limited to a maximum score, regardless of the status of other inputs.

Condition multipliers are based on dominant inputs to the HI that significantly impact the asset's health. For example, pole residual strength is a dominant input and indicator of a wood pole's health.

Examples of Condition multipliers are as follows:

- **Field inspection multiplier** is applied to assets that exhibit major degradation or imminent failure as determined by field inspection.
- **Measurement multiplier** is applied to assets that exhibit major degradation or imminent failure as determined by a measurement.
- **Safety hazard multiplier** is applied to assets that pose a safety hazard or in a condition that is below the acceptable safety industry standards, guidelines and practices.
- **Obsolescence multiplier** is applied to assets that are no longer serviceable or supported by vendors. This is largely driven by specification changes, compatibility, and/or manufacturer/supplier.

Where two or more condition multipliers are applicable, the smallest multiplier (by value) is applied.

1.4 Health Index Categorization

The HI of assets is expressed as a percentage. Categorization based on percentage ranges enables the identification of groups within an asset class that exhibit similar characteristics from an overall condition perspective. The HI is classified into one of the following five categories as shown in Table 2.

Table 2 Health Index Categories

Category	Criteria	Range
Very Good	Asset is in excellent condition.	$HI \geq 85\%$
Good	Asset is still relatively in excellent condition.	$70\% \leq HI < 85\%$
Fair	Asset is functional but showing signs of deterioration.	$50\% \leq HI < 70\%$
Poor	Asset is exhibiting degraded condition.	$25\% \leq HI < 50\%$
Very Poor	Asset is showing major degradation / imminent failure.	$HI < 25\%$

Figure 1 shows the five HI categories that an asset can be classified into, ranging from very good all the way down to very poor in Alectra's system.

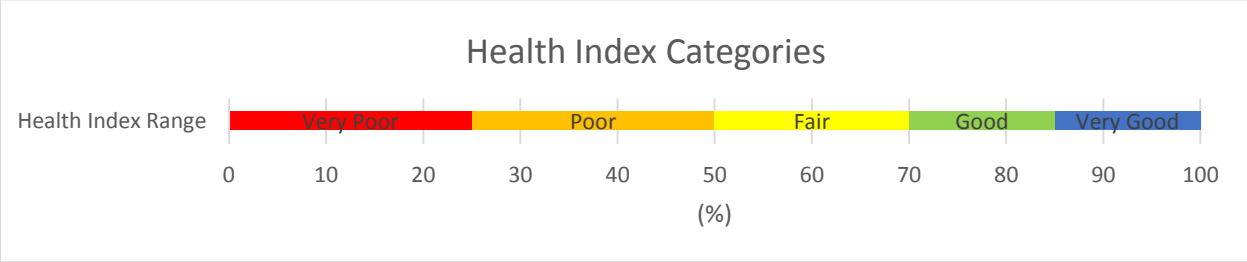

Figure 1 Health Index Categories

2 Pad Mounted Transformers

Table 3 Useful Life of Pad Mounted Transformers

Useful Life	Years
Minimum	25
Typical	40
Maximum	45

Table 4 Pad-mounted Transformers Health Index Parameters and Weights

#	Input	Input Weight for Pad-mounted Transformer	Scoring Method
1	Corrosion	44%	Step Score
2	Oil Leak	44%	Step Score
3	Age	12%	Percentage Score

Field inspection multiplier

If a distribution transformer exhibits major degradation or imminent failure as determined by field inspection, it is considered to be of very poor health. The physical conditions considered in this criterion are major corrosion or major oil leak.

$$field\ inspection\ multiplier = 25\%$$

Table 5 Alpha and Beta Values of Pad Mounted Transformers

Alpha	43.306
Beta	0.6054

3 Pole Mounted Transformers

Table 6 Useful Life of Pole Mounted Transformers

Useful Life	Years
Minimum	30
Typical	40
Maximum	60

Table 7 Pole-mounted Transformers Health Index Parameters and Weights

#	Input	Input Weight for Pole-mounted Transformer	Scoring Method
1	Corrosion	35%	Step Score
2	Oil Leak	35%	Step Score
3	Age	30%	Percentage Score

Field inspection multiplier

If a distribution transformer exhibits major degradation or imminent failure as determined by field inspection, it is considered to be of very poor health. The physical conditions considered in this criterion are major corrosion or major oil leak.

$$field\ inspection\ multiplier = 25\%$$

Table 8 Alpha and Beta Values of Pole Mounted Transformers

Alpha	61.1
Beta	0.159

4 Vault Transformers

Table 9 Useful Life of Vault Transformers

Useful Life	Years
Minimum	25
Typical	35
Maximum	45

Table 10 Vault Transformers Health Index Parameters and Weights

#	Input	Input Weight for Vault Transformer	Scoring Method
1	Corrosion	25%	Step Score
2	Oil Leak	61%	Step Score
3	Age	14%	Percentage Score

Field inspection multiplier

If a distribution transformer exhibits major degradation or imminent failure as determined by field inspection, it is considered to be of very poor health. The physical conditions considered in this criterion are major corrosion or major oil leak.

$$field\ inspection\ multiplier = 25\%$$

Table 11 Alpha and Beta Values of Vault Transformers

Alpha	43.4
Beta	0.3135

5 Switchgear

Table 12 Useful Life of Switchgear

Useful Life	Years (28kV Air)	Years (other types)
Minimum	10	20
Typical	20	30
Maximum	35	45

Table 13 Pad-mounted Air, Solid Dielectric and SF6 Switchgears Health Index Parameters and Weights

#	Input	Input Weight (AIR, SF6, SD)	Scoring Method
1	Corrosion	21%	Step Score
2	Component Failure	21%	Step Score
3	Insulation	43%	Step Score
4	Age	15%	Percentage Score

Table 14 Pad-mounted Oil-type Switchgears Health Index Parameters and Weights

#	Input	Input Weight (OIL)	Scoring Method
1	Corrosion	15%	Step Score
2	Component Failure	15%	Step Score
3	Insulation	40%	Step Score
4	Oil Leak	15%	Step Score
5	Age	15%	Percentage Score

Field inspection multiplier

If a pad-mounted switchgear exhibits major degradation or imminent failure as determined by field inspection, it is considered to be of very poor health. The physical conditions considered in this criterion are major corrosion, major oil leak, major component failure, major insulation failure.

$$field\ inspection\ multiplier = 25\%$$

Accelerated Degradation Multiplier

Air insulated switchgear are highly susceptible to flashover due to contamination from dust particles that breach the enclosure. Their continuous nominal operating voltage rating is 25kV with a maximum operating rating of 29.2 kV. These units function relatively well when new; however, during their normal duty they are exposed to multiple voltage stresses, which reduce their insulating performance, particularly when installed on the 27.6 kV distribution system. The 25kV nominal voltage rating has been an inherent flaw in the equipment since it was first introduced to the Ontario market. This lower nominal voltage contributes to the reduced life of the switchgear and reduces the ability of the switchgear to perform under abnormal conditions, leading to premature failures.

$$Aceelerated\ degradation\ multiplier = 50\%$$

Table 15 Alpha and Beta Values of Switchgear

Constants	Years (28kV Air)	Years (all other types)
Alpha	35.3893	45.366
Beta	0.2007	0.2017

6 Overhead Switches

Table 16 Useful Life of Overhead Switches

Useful Life	Years
Minimum	30
Typical	40
Maximum	55

Table 17 Overhead Switches Health Index Parameters and Weights

Input	Input Weight	Scoring Method
Age	100%	Percentage Score

Table 18 Alpha and Beta Values of Overhead Switches

Alpha	54.5
Beta	0.21

7 Overhead Conductors

Table 19 Useful Life of Overhead Conductors

Useful Life	Years
Minimum	50
Typical	60
Maximum	75

Table 20 Overhead Conductors Health Index Parameters and Weights

Input	Input Weight	Scoring Method
Age	100%	Percentage Score

Table 21 Alpha and Beta Values of Overhead Conductors

Alpha	76
Beta	0.195

Restricted Conductors Multiplier

Certain conductor sizes fall below the acceptable conductor sizes for the safe and reliable operation of the system. Any conductor below wires AWG (American Wire Gauge) size #6 is considered restricted and undersized according to current utility practices. Such conductors represent a major safety risk.

$$Restricted\ conductor\ multiplier = 25\%$$

8 Wood Poles

Table 22 Useful Life of Wood Poles

Useful Life	Years
Minimum	35
Typical	45
Maximum	75

Table 23 Wood Poles Health Index Parameters and Weights

#	Input	Input Weight	Scoring Method
1	Pole Strength	49%	Percentage Score
2	Field Inspection	36%	Step Score
3	Age	15%	Percentage Score

Pole Residual Strength Multiplier

If a wood pole is measured to have 60% or less in remaining strength, it is considered to be of very poor health.

The Canadian Safety Association (CSA) defines the standards for overhead distribution system construction and the use of wood poles. Among other factors, Alectra is guided in its pole assessment process by Clause 8.3.1.3 of CSA Standard C22.3 No. 1-10, which states that:

> *"when the strength of a structure has deteriorated to 60% of the required capacity, the structure shall be reinforced or replaced".*

$$Pole\ residual\ multiplier = 25\%$$

Field inspection multiplier

If a wood pole was scored 1 out of 5 on condition based on field inspection, it is considered to be of very poor health.

If a wood pole exhibits major degradation or imminent failure as determined by field inspection, it is considered to be of very poor health. The physical conditions considered in this criterion are major rotting, decay, splitting, insect infestation, bending and leaning.

$$field\ inspection\ multiplier = 25\%$$

Table 24 Alpha and Beta Values of Wood Poles

Alpha	80.5
Beta	0.106

9 Concrete Poles

Table 25 Useful Life of Concrete Poles

Useful Life	Years
Minimum	50
Typical	60
Maximum	80

Table 26 Concrete Poles Health Index Parameters and Weights

#	Input	Input Weight	Scoring Method
1	Field Inspection	69%	Step Score
2	Age	31%	Percentage Score

Field inspection multiplier

If a concrete pole exhibits major degradation or imminent failure as determined by field inspection, it is considered to be of very poor health. The physical conditions considered in this criterion are major cracking, exposed rebar or rusted rebar.

$$field\ inspection\ multiplier = 25\%$$

Table 27 Alpha and Beta Values of Concrete Poles

Alpha	81.1
Beta	0.159

10 Underground Primary Cables

10.1 XLPE

Table 28 Useful Life of UG Primary Cables XLPE

Useful Life	Non TR-DB Years	TR-DB Years	TR-ID Years
Typical	30	35	40
Maximum	40	45	55

Table 29 XLPE Cable Health Index Parameters and Weights

Input	Input Weight	Scoring Method
Age	100%	Percentage Score

Table 30 Alpha and Beta Values of UG Primary Cables XLPE

	Non TR-DB Years	TR-DB Years	TR-ID Years
Alpha	38.9026	43.9026	55.3635
Beta	0.3027	0.3027	0.2018

10.2 PILC

Table 31 Useful Life of UG Primary Cables PILC

Useful Life	Years
Typical	60
Maximum	70

Table 32 PILC Health Index Parameters and Weights

Input	Input Weight	Scoring Method
Age	100%	Percentage Score

Table 33 Alpha and Beta Values of UG Primary Cables PILC

Alpha	68.9026
Beta	0.3027

10.3 EPR

Table 34 Useful Life of UG Primary Cables EPR

Useful Life	Years
Typical	25
Maximum	45

Table 35 EPR Cables Health Index Parameters and Weights

Input	Input Weight	Scoring Method
Age	100%	Percentage Score

Table 36 Alpha and Beta Values of UG Primary Cables EPR

Alpha	47.4445
Beta	0.1502

MANA-15

ATTACHMENT 5

2018

Station Assets Health Index Computation Methodology

ASSET CONDITION ASSESSMENT

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1. Health Index Scoring Methodology

Below is a set of generic equations for calculating asset Health Index based on scores associated with multiple input parameters.

$$\text{Health Index} = \frac{\sum_{n=1}^{x}\left(\frac{(\text{Input Score})_n}{(\text{Maximum Input Score})_n}\ \text{x}\ (\text{Input Weight})_n\right)}{\sum_{n=1}^{x}((\text{Input Weight})_n)}\ \text{x Condition Multiplier}$$

Equation 1

Where "x" is the number of inputs. If data is not available for an input, that input is removed from the Health Index calculation entirely. Where applicable, Health Index is multiplied by a **condition multiplier**.

Where there are secondary inputs, overall the input score is calculated as follows:

$$\text{Input Score}_n = \frac{\sum_{m=1}^{y}\left(\frac{(\text{Secondary Input Score})_m}{(\text{Maximum Secondary Input Score})_m}\ \text{x}\ (\text{Secondary Input Weight})_m\right)}{\sum_{m=1}^{y}((\text{Secondary Input Weight})_m)}$$

Equation 2

Where "y" is the number of secondary input associated with input "n. If data is not available for a secondary input, that input is removed from the Health Index calculation entirely.

If a secondary input in turn has additional inputs, then a similar expression to that in Equation 2 is to be applied for determining overall score for that secondary input.

Inputs for computing Health Indices are scored in two ways; a step score and a percentage score.

Step Score

Step scores are applied to inputs obtained through field inspection or by means of test results. Table 1 shows the station asset step scoring criteria and equivalent percentage score.

Table 1 Station Assets step Scoring

Inspection Score	Criteria	HI Input Score
4	Excellent - Like new	100%
3	Good - Within operating context	75%
2	Fair - Not failed but watching	50%
1	Poor - Not within operating context	25%
0	Very Poor - Imminent failure	0%

Percentage Score

Percentage scoring is the continuous (i.e. gradual) scoring of an input. Percentage scoring is used when more granular data are available and step scoring is not accurately representative of an input's impact. This representation is used for measurements (e.g. pole residual remaining strength) and data (e.g. age).

For example, age is represented as a percentage score based on a continuous function given by the Gompertz-Makeham Model described by the following set of equations:

$$Age\ score = e^{\frac{-(f(t)-e^{-\alpha\beta})}{\beta}} \quad ,where$$

$$f(t) = e^{\beta(t-\alpha)}, where$$

$$t: age\ (years)$$

$$\alpha, \beta: \text{constants}$$

Equation 3

The constants α, β are calculated to yield an age score of 80% at the Typical Useful Life (TUL) and 1% at the End of Useful Life (EUL) of an asset.

Asset TUL is based on the “Asset Depreciation Study for the Ontario Energy Board Kinectrics Inc. Report No: K-418033-RA-001-R000 July 8, 2010” report. Similarly, asset EUL is based on the Max UL from the same report.

A sample scoring chart to be applied in the calculation of Health Index is shown in Table 2. Note that in this and in subsequent tables, the term Condition Parameter relates to Input and the term Sub-Condition Parameter relates to Secondary Input.

Table 2 Sample Health Index Scoring Chart

Condition Parameter		Sub-Condition Parameter		Sub-Condition Parameter Breakdown		Maximum Score	Possible Scores	Score Source
Number	Weight	Number	Weight	Number	Weight			
#1.0	30	#1.1	6	#1.1.1	4	4	1,2,3,4	Table a
				#1.1.2	3	4	1,2,3,4	
				#1.1.3	3	4	1,2,3,4	
				#1.1.z	2	4	1,2,3,4	
				Overall Subcondition #1.1	12	4	0,1,2,3,4	Table b
		#1.2	8	#1.2.1	2	6	1,2,3,4,5,6	Table c
				#1.2.2	3	6	1,2,3,4,5,6	
				#1.2.3	3	6	1,2,3,4,5,6	
				#1.2.z	3	6	1,2,3,4,5,6	
				Overall Subcondition #1.2	11	4	0,1,2,3,4	Table d
		#1.y	5	-	-	4	0,1,2,3,4	Table e
		Overall Condition #1	19	-	-	-	-	-
#2.0	15	#2.1	1	-	-	4	0,1,2,3,4	Survey
#3.0	10	#3.1	2	-	-	4	0,1,2,3,4	Survey
		#3.2	1	-	-	4	0,1,2,3,4	
		#3.3	1	-	-	4	0,1,2,3,4	
		#3.y	4	-	-	4	0,1,2,3,4	
		Overall Condition #3	8	-	-	-	-	-
#x.0	5	#x.1	2	-	-	4	0 - 4	Equation a
All Parameters	60	-	-	-	-	-	-	-

2. Power Transformers (TS and MS)

The Health Index for power transformers is computed by adding the weighted components of overall condition and age as summarized in Table 3.

Table 3 Power Transformers Health Index Parameters and Weights

#	Input	Input Weight	Scoring Method
1	Insulation	70%	Step Score
2	Cooling	5%	Step Score
3	Sealing and Connection	15%	Step Score
4	Age	10%	Percentage Score

Scoring details are as outlined in Table 4 through Table 10. Age score constants are provided in Table 12. Note that the term Condition Parameter refers to Input and the term Sub-Condition Parameter refers to Secondary Input.

Scores for Condition Parameters are gathered through surveys that are completed by Subject Matter Experts in each rate zone. A sample from a completed power transformer condition survey is provided in Appendix 1. Most of the input for the parameters within the insulation category is provided by third-party vendors who perform oil analysis of samples extracted from the transformers.

Table 4 Transformer Condition Parameters Scoring Chart

MS Transformer Condition Parameter	Weight	Sub-Condition Parameter	Weight	Sub-Condition Parameter Breakdown	Weight	Maximum Score	Possible Scores	Score Source
Insulation	70	Oil Analysis/Quality	3	Water (Moisture) Content	4	4	1,2,3,4	Table 5
				Dielectric Strength	3	4	1,2,3,4	
				IFT	3	4	1,2,3,4	
				Colour	2	4	1,2,3,4	
				Acid Number	2	4	1,2,3,4	
				Overall Oil Quality	14	4	0,1,2,3,4	Table 6
		Oil DGA	4	Hydrogen (H_2)	2	6	1,2,3,4,5,6	Table 7
				Methane (CH_4)	3	6	1,2,3,4,5,6	
				Ethane (C_2H_6)	3	6	1,2,3,4,5,6	
				Ethylene (C_2H_4)	3	6	1,2,3,4,5,6	
				Acetylene (C_2H_2)	5	6	1,2,3,4,5,6	
				Carbon Monoxide (CO)	1	6	1,2,3,4,5,6	
				Carbon Dioxide (CO_2)	1	6	1,2,3,4,5,6	
				CO_2/CO*	4	6	1,2,3,4,5,6	
				Overall DGA	22	4	0,1,2,3,4	Table 8
		Winding Doble (Power Factor Dissipation)	3	-	-	4	0,1,2,3,4	Table 9
		Furan Oil Analysis	3	-	-	4	0,1,2,3,4	Table 10
		Bushing Condition	1	-	-	4	0,1,2,3,4	Survey
		Overall Insulation	14	-		-	-	-
Cooling	5	Radiators/Cooling System Condition	1	-	-	4	0,1,2,3,4	Survey
		Overall Cooling	1	-		-	-	-
Sealing and Connection	15	Oil Leaks	2	-	-	4	0,1,2,3,4	Survey
		Main Tank/Cabinets and Control	1	-	-	4	0,1,2,3,4	
		Conservator/Oil Preservation System	1	-	-	4	0,1,2,3,4	
		Overall Power Transformer Condition	4	-	-	4	0,1,2,3,4	
		Overall Seals & Connection	8	-	-			-
Transformer Foundation/Support Steel/Grounding Condition	0	-	0	-	-	-	-	N/A
Service Record	10	Age	2	-	-	4	0 - 4	Equation 3
		Performance Record	0	-	-	-	-	N/A
		Loading	0	-	-	-	-	N/A
		Overall Service Record	2	-	-	-	-	-
All Parameters	100	-	-	-	-			-

* CO_2/CO ratio is considered only when CO_2 concentration exceeds 5000 ppm and CO concentration exceeds 500 ppm.

Table 5 Oil Quality Test Parameter Scoring Criteria

Oil Quality Test	Voltage Class [kV]	Scores				
		1	2	3	4	Weight
Water Content (D1533) [ppm]	V ≤ 69	n ≤ 30	30 < n ≤ 35	35 < n ≤ 40	n > 40	4
	69 < V < 230	n ≤ 20	20 < n ≤ 25	25 < n ≤ 30	n > 30	
	V ≥ 230	n ≤ 15	15 < n ≤ 20	20 < n ≤ 25	n > 25	
Dielectric Strength (D1816 - 2 mm gap)	V ≤ 69	n ≥ 40	35 ≤ n < 40	30 ≤ n < 35	n < 30	3
	V ≥ 230	n ≥ 50	45 ≤ n < 50	40 ≤ n < 45	n < 40	
Dielectric Strength (D1816 - 1 mm gap)	V ≤ 69	n ≥ 23	20 ≤ n < 23	18 ≤ n < 23	n < 18	
	V ≥ 230	n ≥ 30	28 ≤ n < 30	25 ≤ n < 28	n < 25	
Dielectric Strength (D877) [kV]	All	n ≥ 40	30 ≤ n < 40	20 ≤ n < 30	n < 20	
IFT (D971) [dynes/cm]	V ≤ 69	n ≥ 25	20 ≤ n < 25	15 ≤ n < 20	n < 15	3
	69 < V < 230	n ≥ 30	23 ≤ n < 30	18 ≤ n < 23	n < 18	
	V ≥ 230	n ≥ 32	25 ≤ n < 32	20 ≤ n < 25	n < 20	
Color (D1500)	All	n ≤ 1.5	1.5 < n ≤ 2.0	2.0 < n ≤ 2.5	n > 2.5	2
Acid Number (D974) [mg KOH/g]	V ≤ 69	n ≤ 0.05	0.05 < n ≤ 0.1	0.1 < n ≤ 0.2	n > 0.2	2
	69 < V < 230	n ≤ 0.04	0.04 < n ≤ 0.1	0.1 < n ≤ 0.15	n > 0.15	
	V ≥ 230	n ≤ 0.03	0.03 < n ≤ 0.07	0.07 < n ≤ 0.1	n > 0.1	

$$\text{Overall Factor} = \frac{\sum Score_i \times Weight_i}{\sum Weight}$$

Table 6 Oil Quality Test Overall Scoring Criteria

Score	Condition Criteria Description
4	Overall factor ≤ 1.2
3	1.2 < Overall factor ≤ 1.5
2	1.5 < Overall factor ≤ 2.0
1	2.0 < Overall factor ≤ 3.0
0	Overall factor > 3.0

Table 7 Oil DGA Scoring Criteria

Dissolved Gas	Scores						Weight
	1	2	3	4	5	6	
H_2	≤ 100	≤ 200	≤ 300	≤ 500	≤ 700	> 700	2
CH_4(Methane)	≤ 120	≤ 150	≤ 200	≤ 400	≤ 600	> 600	3
C_2H_6(Ethane)	≤ 65	≤ 100	≤ 150	≤ 250	≤ 500	> 500	3
C_2H_4(Ethylene)	≤ 50	≤ 80	≤ 150	≤ 250	≤ 500	> 500	3
C_2H_2(Acetylene)	≤ 3	≤ 7	≤ 35	≤ 50	≤ 80	> 80	5
CO	≤ 350	≤ 700	≤ 900	≤ 1100	≤ 1300	> 1300	1
CO_2	≤ 2500	≤ 3000	≤ 4000	≤ 4500	≤ 5000	> 5000	1
CO_2/CO	≤ 3 to < 8	≤ 8 to < 10	≤ 10 to < 13 or <0 to < 3	≤ 13 to < 14	≤ 14 to < 15	≥ 15	4
Total							22

*CO_2/CO ratio is considered only when the CO_2 concentration exceeds 5000 ppm and the CO concentration exceeds 500 ppm. Otherwise, the total weight value for dissolved gases is 18 rather than 22 as shown in the above table.

$$\text{Overall Factor} = \frac{\sum Score_i \times Weight_i}{\sum Weight}$$

Table 8 Oil DGA Overall Scoring Criteria

Score	Condition Criteria Description
4	Oil DGA overall factor ≤ 1.2
3	1.2 < Oil DGA overall factor ≤ 1.5
2	1.5 < Oil DGA overall factor ≤ 2.0
1	2.0 < Oil DGA overall factor ≤ 3.0
0	Oil DGA overall factor > 3.0

Table 9 Winding Doble Test Scoring Criteria

Score	Condition Criteria Description
4	power factor reading ≤ 0.5%
3	0.5% < power factor reading ≤ 0.7%
2	0.7% < power factor reading ≤ 1.0%
1	1.0% < power factor reading ≤ 2.0%
0	power factor reading > 2.0%

Table 10 Transformer Furan Oil Analysis Scoring Criteria

Score	Condition Criteria Description
4	≤ 100 PPB of 2-furaldehyde and no significant change from last test
3	2-furaldehyde > 100 and ≤ 250 PPB and no significant change from last test
2	2-furaldehyde > 250 and ≤ 500 PPB or significant change from last test
1	2-furaldehyde > 500 and ≤ 1000 PPB and significant change from last test
0	Greater than 1000 PPB of 2-furaldehyde

Table 11 Useful Life of Transformer

Useful Life	Years
Typical	45
Maximum	60

Table 12 Transformer Age Score Constants

Age Score Constants	
Constant	**Value**
α	60.0
β	0.206

DGA Multiplier

If a power transformer's oil sample results indicate a low overall oil DGA score (2 or lower), it will have a maximum Health Index of 50%.

$$DGA\ multiplier = 50\%$$

Explosive Gas Multiplier

A high concentration (Score is equal to 6.) of one or more explosive gases, specifically hydrogen, acetylene or methane, in a power transformer's oil sample results, indicates that there is a potential for an explosive failure and that the transformer should be removed from service for further diagnostics. A transformer with high concentration of explosive gases will be considered as a candidate for replacement and will have a maximum Health Index of 10%. This multiplier applies to transformer rated at 5 MVA and above.

$$Explosive\ Gas\ multiplier = 10\%$$

The calculated Health Index is to be multiplied by the lower of the DGA Multiplier or the Explosive Gas Multiplier, wherever applicable.

3. Circuit Breakers and Reclosers

The Health Index for circuit breakers is computed by adding the weighted components of overall condition and age as shown in Table 13.

Table 13 Circuit Breakers Health Index Parameters and Weights

#	Input	Input Weight (OIL)	Input Weight (AIR)	Input Weight (Vacuum)	Input Weight (SF6)	Scoring Method
1	Insulation	4.8%	5.6%	7.4%	6.1%	Step Score
2	Operating Mechanism	33.3%	38.9%	25.9%	33.3%	Step Score
3	Contact Performance	16.7%	19.4%	26.0%	21.2%	Step Score
4	Arc Extinction	21.4%	16.7%	14.8%	18.2%	Step Score
5	Oil Leaks	7.1%	0.0%	0.0%	0.0%	Step Score
6	Overall Performance	12.5%	14.6%	19.4%	15.9%	Step Score
7	Age	4.2%	4.8%	6.5%	5.3%	Percentage Score

Scoring details are as outlined in Table 14. Age score constants are provided in Table 16. Note that the term Condition Parameter refers to Input and the term Sub-Condition Parameter refers to Secondary Input.

Scores for Condition Parameters are gathered through surveys that are completed by Subject Matter Experts in each rate zone. A sample from a completed circuit breaker condition survey is provided in Appendix 2.

Table 14 Circuit Breaker and Recloser Condition Parameter Scoring Chart

Oil Circuit Breaker Condition Parameter	Parameter Weight					Sub-Condition Parameter	Sub-Condition Parameter Weight					Maximum Score	Possible Scores	Scoring Method
	Oil	Air	Vacuum	SF6	Switch & Fuse		Oil	Air	Vacuum	SF6	Switch & Fuse			
Insulation	2	2	2	2	2	Bushings/Insulators	2	2	2	2	2	4	0,1,2,3,4	Survey
Operating Mechanism	14	14	7	11	14	Control and Mechanism Box	3	3	3	3	3	4	0,1,2,3,4	Survey
						Control and Mechanism Box Components	7	7	4	5	7	4	0,1,2,3,4	Survey
						Overall Operating Mechanism	10	10	7	8	10	-	-	-
Contact Performance	7	7	7	7	7	Contact Resistance	3	3	3	3	3	4		Survey
						Contact Condition	3	3	3	3	3	4	0,1,2,3,4	Survey
						Travel Time	7	7	7	7	0	4	0,1,2,3,4	Survey
						Overall Contact Performance	13	13	13	13	6	-	-	-
Arc Extinction	9	6	4	6	0	Arc Interrupter/Arc Chute	2	2	0	2	0	4	0,1,2,3,4	Survey
						Tank	1	1	1	1	0	4	0,1,2,3,4	Surey
						Overall Arc Extinction	3	3	1	3	0	-	-	-
Oil Leaks	3	0	0	0	0	Oil Leaks	3	0	0	0	0	4	0,1,2,3,4	Survey
Service Record	7	7	7	7	7	CB Performance Record	6	6	6	6	6	4	0,1,2,3,4	Survey
						Age	2	2	2	2	2	4	0 - 4	Equation 3
						Overall Service Record	8	8	8	8	8	-	-	-
All Parameters	42	36	27	33	30	-	-	-	-	-	-	-	-	-

Table 15 Useful Life of Circuit Breaker

Breaker Installation	Useful Life	Years
Independent	Typical	45
	Maximum	65
In Switchgear	Typical	40
	Maximum	60

Table 16 Circuit Breaker Age Score Constants

Breaker Installation	Age Score Constants	
	Constant	Value
Independent	α	67.0
	β	0.154
In Switchgear	α	62.0
	β	0.154

Note that the demographics details contained in the circuit breaker condition surveys did not contain information as to whether circuit breakers are in switchgear or are independent units. Since the installation type was not recorded, the useful life and associated age score constants for units in switchgear have been applied for all circuit breakers because the majority of circuit breakers are in switchgear.

Obsolescence Multiplier

If a circuit breaker is deemed to be obsolescent in that it is no longer supported by the manufacturer and parts are no longer readily available, it will have a maximum Health Index of 50%. Calculated Health Index is to be multiplied by 0.5 where the Obsolescence Multiplier applies.

$$Obsolescence\ multiplier = 50\%$$

4. Station Switchgear

The Health Index for station switchgear is computed by adding the weighted components of overall condition and age as shown in Table 17.

Table 17 Station Switchgear Health Index Parameters and Weights

#	Input	Input Weight	Scoring Method
1	Enclosure Condition	25%	Step Score
2	Bus & Cable Compartment	37.5%	Step Score
3	Low Voltage Compartment	12.5%	Step Score
4	Overall Performance	18.75%	Step Score
5	Age	6.25%	Percentage Score

Scoring details are as outlined in Table 18. Age score constants are provided in Table 20. Note that the term Condition Parameter refers to Input and the term Sub-Condition Parameter refers to Secondary Input.

Scores for Condition Parameters are gathered through surveys that are completed by Subject Matter Experts in each rate zone. A sample from a completed station switchgear survey is provided in Appendix 3.

Table 18 Station Switchgear Condition Parameter Scoring Chart

Switchgear Condition Parameter	Condition Parameter Weight	Sub-Condition	Sub-Conditoin Parameter Weight	Maximum Score	Possible Scores	Scoring Method
Enclosure Condition	4	Metal Clad	1	4	0,1,2,3,4	Survey
		Partial Discharge	2	4	0,1,2,3,4	Survey
		Overall Enclosure	3	-	-	-
Bus & Cable Compartment	6	Cable Terminations	1	4	0,1,2,3,4	Survey
		Instrument Transformers	1	4	0,1,2,3,4	Survey
		Bus & Insulator	2	4	0,1,2,3,4	Survey
		Overall Bus & Cable	4	-	-	-
Low Voltage Compartment	2	Relays	2	4	0,1.2,3,4	Survey
		RTU	1	4	0,1,2,3,4	Survey
		Battieries	1	4	0,1,2,3,4	Survey
		Charger	1	4	0,1,2,3,4	Survey
		Overall LV Compartment	5		-	-
Service Record	4	Switchgear Performance	3	4	0,1,2,3,4	Survey
		Age	1	4	0 - 4	Equation 3
		Overall Service Record	4	-	-	-
All Parameters	16	All Parameters	16	-	-	-

Table 19 Useful Life of Station Switchgear

Useful Life	Years
Typical	40
Maximum	60

Table 20 Station Switchgear Age Score Constants

Age Score Constants	
Constant	**Value**
α	62.0
β	0.154

5. High-Voltage Primary Switches – Future Model

The Health Index for high-voltage (HV) primary switches is computed by adding the weighted components of overall condition and age as shown in Table 21.

Table 21 HV Primary Switches Health Index Parameters and Weights

#	Condition	Condition Weight	Scoring Method
1	Expert Feedback/Performance	27.1%	Step Score (0-4)
2	Insulators	8.1%	Step Score (0-4)
3	Switch Contact Resistance	13.5%	Step Score (0-4)
4	Operating Components	29.7%	Step Score (0-4)
5	Arc Break	13.5%	Step Score (0-4)
6	Age	8.1%	Percentage Score (0-100%)

Scoring details are as outlined in Table 22 through Table 23. Age score constants are provided in Table 25. Note that the term Condition Parameter refers to Input.

Scores for Condition Parameters are gathered through surveys that are completed by Subject Matter Experts in each rate zone.

Table 22 High-Voltage Primary Switch Condition Parameter Scoring Chart

HV Primary Switch Condition Parameter	Condition Parameter Weight	Maximum Score	Possible Scores	Scoring Method
Expert Feedback/Performance	10	4	0,1,2,3,4	Survey
Insulators	3	4	0,1,2,3,4	Survey
Switch Contact Resistance	5	4	0,1,3,4	Table 17
Blade/Arm	5	4	0,1,2,3,4	Survey
Operating Mechanism and Linkage	5	4	0,1,2,3,4	
Arc Break	5	4	0,1,2,3,4	
Lock/Handle	1	4	0,1,2,3,4	
Age	3	4	0 - 4	Equation 3
All Parameters	37	-	-	-

Table 23 High-Voltage Primary Switch Contact Resistance Scoring Criteria

Score	Condition Criteria Description
4	[0,200) uΩ
3	[200, 250) uΩ
1	[250, 300) uΩ
0	[300, ∞) uΩ

Table 24 Useful Life of High-Voltage Primary Switch

Useful Life	Years
Typical	40
Maximum	60

Table 25 High-Voltage Primary Switch Age Score Constants

Age Score Constants	
Constant	**Value**
α	62.0
β	0.154

6. Station Capacitors – Future Model

The Health Index for station capacitors is computed by adding the weighted components of overall condition and age as outlined in Table 26. Age score constants are provided in Table 28.

Scores for Condition Parameters are gathered through surveys that are completed by Subject Matter Experts in each rate zone.

Table 26 Station Capacitor Condition Parameter Scoring Chart

Station Capacitor Condition Parameter	Condition Parameter Weight	Maximun Score	Possible Scores	Scoring Method
Age	10	4	0 - 4	Equation 3
Expert Feedback	15	4	0,1,2,3,4	Survey
Field Inspection	5	4	0,1,2.3.4	
Insulators	1	4	0,1,2,3,4	
All Paramters	31	-		-

Table 27 Useful Life of Station Capacitors

Useful Life	Years
Typical	30
Maximum	40

Table 28 Station Capacitor Age Score Constants

Age Score Constants	
Constant	**Value**
α	39.0
β	0.3

7. TS Station Service Transformers – Future Model

The Health Index for TS station service (SS) transformers is computed by adding the weighted components of overall condition and age as outlined in Table 29. Age score constants are provided in Table 31.

Scores for Condition Parameters are gathered through surveys that are completed by Subject Matter Experts in each rate zone.

Table 29 TS Station Service Transformer Condition Parameter Scoring Chart

SS Transformer Condition Parameter	Condition Parameter Weight	Maximun Score	Possible Scores	Scoring Method
Age	2	4	0 - 4	Equation 3
Field Inspection	4	4	0,1,2,3,4	Survey
Expert Feedback	4	4	0,12,3,4	Survey
All Parameters	10	-	-	-

Table 30 Useful Life of Station TS SS Transformer

Useful Life	Years
Typical	45
Maximum	55

Table 31 TS SS Transformer Age Score Constants

Age Score Constants	
Constant	**Value**
α	54.0
β	0.3

8. High Voltage Revenue Metering Instrument Transformers – Future Model

The Health Index for high-voltage revenue metering instrument transformers (HV PMU ITs) is computed by adding the weighted components of overall condition and age as outlined in Table 32. Age score constants are provided in Table 34.

Scores for Condition Parameters are gathered through surveys that are completed by Subject Matter Experts in each rate zone.

Table 32 High Voltage Revenue Metering IT Condition Parameter Scoring Chart

HV PMU IT Condition Parameter	Condition Parameter Weight	Maximum Score	Possible Scores	Scoring Method
Age	2	4	0 - 4	Equation 3
Field Inspection	5	4	0,1,2,3,4	Survey
Expert Feedback	3	4	0,1,2,3,4	Survey
All Parameters	10	-	-	-

Table 33 Useful Life of HV Revenue Metering IT

Useful Life	Years
Typical	30
Maximum	40

Table 34 HV Revenue Metering IT Age Score Constants

Age Score Constants	
Constant	**Value**
α	39.0
β	0.3

9. Protection and Control Relays – Future Model

The Health Index for protection and control (P&C) relays is computed by adding the weighted components of overall condition and age as shown in Table 35.

Scores for Condition Parameters are gathered through surveys that are completed by Subject Matter Experts in each rate zone.

Table 35 P&C Relay Health Index Parameters and Weights

#	Condition	Condition Weight	Scoring Method
1	Value Assessment	50%	Percentage Score (0-100%)
2	Field Inspection	40%	Step Score (0-4)
3	Age	10%	Percentage Score (0-100%)

Scoring details are as outlined in Table 36. Age score constants are provided in Table 38. Note that the term Condition Parameter refers to Input and the term Sub-Condition Parameter refers to Secondary Input.

Table 36 Protection & Control Relay Condition Parameter Scoring Chart

P&C Relay Condition Parameter	Condition Parameter Weight	Sub-Condition	Sub-Condition Parameter Weight	Possible Scores	Scoring Method
Age	1	-	-	0 - 4	Equation 3
Field Inspection	4	-	-	1,1,2,3,4	Survey
Value Assessment	5	Functionality	5	0 - 50	Survey
		Communications Capability	2	0 - 20	Survey
		Fault Recording Capability	3	0 - 30	Survey
		Overall Value Assessment	10	-	-
All Parameters	10	-		-	-

Table 37 Useful Life of P&C Relay

Type of Relay	Useful Life	
	Typical	Maximum
Electromechanical	35	50
Solid State	30	45
Microprocessor (Digital)	20	20

Table 38 Protection & Control Relay Age Score Constants

Relay Type	Age Score Constants	
	Constant	Value
Electromechanical	α	50.0
	β	0.206
Solid State	α	45.0
	β	0.206
Microprocessor (Digital)	α	19.0
	β	0.2965

10. TS Transformer ULTC – Future Model

The TS transformer ULTCs had previously been included as part of PowerStream's TS Transformer model. The ULTC are now to be considered as an independent asset category.

The Health Index for ULTCs is computed by adding the weighted components of overall condition as summarized in Table 39.

Scores for Condition Parameters are gathered through surveys that are completed by Subject Matter Experts in each rate zone.

Table 39 Transformer ULTC Condition Parameter Scoring Chart

TS Transformer LTC Condition Parameter	Sub-Condition Parameter	Weight	Sub-Condition Parameter Breakdown	Weight	Maximum Score	Possible Scores	Score Source
Insulation	Oil Quality	6	Water (Moisture) Content	4	4	1,2,3,4	Table 3
			Dielectric Strength	3	4	1,2,3,4	
			IFT	3	4	1,2,3,4	
			Colour	2	4	1,2,3,4	
			Acid Number	2	4	1,2,3,4	
			Overall Oil Quality	14	4	0,1,2,3,4	Table 4
	Oil DGA	8	Hydrogen (H_2)	2	6	1,2,3,4,5,6	Table 5
			Methane (CH_4)	3	6	1,2,3,4,5,6	
			Ethane (C_2H_6)	3	6	1,2,3,4,5,6	
			Ethylene (C_2H_4)	3	6	1,2,3,4,5,6	
			Acetylene (C_2H_2)	5	6	1,2,3,4,5,6	
			Carbon Monoxide (CO)	1	6	1,2,3,4,5,6	
			Carbon Dioxide (CO_2)	1	6	1,2,3,4,5,6	
			CO_2/CO*	4	6	1,2,3,4,5,6	
			Overall DGA	22	4	0,1,2,3,4	Table 6
	Overall Insulation	14	-	-	-	-	-
All Other Condition Parameters	Tank Conditon	1	-	-	4	0,1,2,3,4	Survey
	Tank Leaks	2	-	-	4	0,1,2,3,4	
	Gaskets, Seals and Pressure Relief	1	-	-	4	0,1,2,3,4	
	LTC Control and Mechanism Cabinet	1	-	-	4	0,1,2,3,4	
	Control and Mechanism Cabinet Component and Operation	1	-	-	4	0,1,2,3,4	
	Overall Tap Changer Condition	4	-	-	4	0,1,2,3,4	
	All Other Parameters	10	-	-	-	-	-
All Parameters	-	24	-	-	-	-	-

* CO_2/CO ratio is considered only when CO_2 concentration exceeds 5000 ppm and CO concentration exceeds 500 ppm.

Table 40 Useful Life of TS Transformer ULTC

Useful Life	Years
Typical	40
Maximum	60

Appendix 1 Sample Completed Survey for Power Transformers

Asset Demographics															Asset Condition Scores						
Asset Nomenclature	Serial Number	Station Name	Station Designation	Transformer Position	Station Type (MS or TS)	Municipality	Rate Zone	Manufacturer	Nameplate MVA	Nameplate HV Voltage (kV)	Low Voltage (kV)	Year Manufactured	Year Rebuilt	Status	Oil Leaks	Main Tank, Cabinet and Controls	Conservator/ Oil Preservation System (Airbag Integrity)	Radiators/ Cooling System	Overall Power Transformer	Bushing Condition	Comments
8122-T1	46412	Markham TS#1 (J.V. Fry)	NAR8122	T1	TS	Markham	East (South)	Ferranti Packard	50/67/83	230	27.6	1986		I/S	3	3	3	3	3	4	
8122-T2	46411	Markham TS#1 (J.V. Fry)	NAR8122	T2	TS	Markham	East (South)	Ferranti Packard	50/67/83	230	27.6	1986		I/S	3	3	3	3	3	4	
8124-T1	A3S5876	Markham TS#2 (A.M. Walker)	NAR8124	T1	TS	Markham	East (South)	TTI	50/67/83	230	27.6	1988		I/S	3	3	3	3	3	4	
8124-T2	A3S5875	Markham TS#2 (A.M. Walker)	NAR8124	T2	TS	Markham	East (South)	TTI	50/67/83	230	27.6	1988		I/S	3	3	3	3	3	4	
8126-T1	289910	Markham TS#3 (D.H. Cockburn)	NAR8126	T1	TS	Markham	East (South)	ABB	50/67/83	230	27.6	1991		I/S	3	4	4	3	3	3	
8126-T2	289909	Markham TS#3 (D.H. Cockburn)	NAR8126	T2	TS	Markham	East (South)	ABB	50/67/83	230	27.6	1991		I/S	3	4	4	3	3	3	
8126-T3	97032723	Markham TS#3E (D.H. Cockburn Expansion)	NAR8126	T3	TS	Markham	East (South)	Pauwels	50/67/83	230	27.6	2004		I/S	3	3	3	3	3	4	
8126-T4	97032722	Markham TS#3E (D.H. Cockburn Expansion)	NAR8126	T4	TS	Markham	East (South)	Pauwels	50/67/83	230	27.6	2004		I/S	3	3	3	3	3	4	
7110-T1	LLL973001	Markham TS#4 (R.M. Fabro)	NA7110	T1	TS	Markham	East (South)	ABB	75/100/125	230	27.6	2008		I/S	3	3	3	4	4	4	
7110-T2	LLL973003	Markham TS#4 (R.M. Fabro)	NA7110	T2	TS	Markham	East (South)	ABB	75/100/125	230	27.6	2008		I/S	3	3	3	4	4	4	
8127-T1	T922002	Richmond Hill TS#1 (Lazenby 1)	NAR8127	T1	TS	Richmond Hill	East (South)	Hyundai	75/100/125	230	27.6	1991		I/S	4	2	3	4	3	4	
8127-T2	T922001	Richmond Hill TS#1 (Lazenby 1)	NAR8127	T2	TS	Richmond Hill	East (South)	Hyundai	75/100/125	230	27.6	1991		I/S	3	2	3	3	3	4	
8136-T3	97001484	Richmond Hill TS#2 (Lazenby 2)	NA8136	T3	TS	Richmond Hill	East (South)	Pauwels	50/67/83	230	27.6	2001		I/S	3	2	3	3	3	4	
8136-T4	97001483	Richmond Hill TS#2 (Lazenby 2)	NA8136	T4	TS	Richmond Hill	East (South)	Pauwels	50/67/83	230	27.6	2001		I/S	3	2	3	2	3	4	
5120-T1	289786	Vaughan TS#1 (Greenwood)	NAR5120	T1	TS	Vaughan	East (South)	TTI	75/100/125	230	27.6	1989		I/S	3	3	3	3	3	4	
5120-T2	289787	Vaughan TS#1 (Greenwood)	NAR5120	T2	TS	Vaughan	East (South)	TTI	75/100/125	230	27.6	1989		I/S	3	3	3	3	3	4	
5120-T3	289911	Vaughan TS#1E (Greenwood Expansion)	NAR5120	T3	TS	Vaughan	East (South)	ABB	75/100/125	230	27.6	1992		I/S	3	3	3	3	3	4	
5120-T4	862001	Vaughan TS#1E (Greenwood Expansion)	NAR5120	T4	TS	Vaughan	East (South)	ABB	75/100/125	230	27.6	2005		I/S	3	2	3	2	3	4	
5121-T1	289904	Vaughan TS#2 (Torstar)	NAR5121	T1	TS	Vaughan	East (South)	ABB	75/100/125	230	27.6	1991		I/S	2	4	4	3	3	4	
5121-T2	289903	Vaughan TS#2 (Torstar)	NAR5121	T2	TS	Vaughan	East (South)	ABB	75/100/125	230	27.6	1991		I/S	2	4	4	3	3	4	

Appendix 2 Sample Completed Survey for Circuit Breakers and Reclosers

Asset Demographics																		Asset Condition Scores											
Asset Nomenclature	Serial Number	Station Name	Station Designation	Circuit, Bus or Transformer Designation	Station Type (MS of TS)	Municipality	Rate Zone	Manufacturer	Model	Breaker Type	Interrupting Medium	Obsolescence (Y/N)	Number of Phases	Operating Voltage (kV)	Transformer Side (High or Low)	Continuous Current Rating (Amperes)	Year Manufactured	Status	Bushings/ Insulators	Control and Mechanism Box	Control and Mechanism Components	Contact Condition	Contact Resistance	Travel Time	Arc Interrupter/ Arc Chute	Tank	Oil Leaks (oil CB only)	Number of Operations	Performance Record	Comments
301-F1	S3H5500060911	Anne North MS301	MS301	MS301-F1	MS	Barrie	East (North)	Siemens	3AH5523-2MZ90-0ZN0-Z	Gas Insulated Vacuum	Vacuum	N	3	13.8	Low	1200	2016	IS	4	X	4	4	4	4	X	X	X	4	4	
301-F2	S3H5500060906	Anne North MS301	MS301	MS301-F2	MS	Barrie	East (North)	Siemens	3AH5523-2MZ90-0ZN0-Z	Gas Insulated Vacuum	Vacuum	N	3	13.8	Low	1200	2016	IS	4	X	4	4	4	4	X	X	X	4	4	
301-F3	S3H5500060905	Anne North MS301	MS301	MS301-F3	MS	Barrie	East (North)	Siemens	3AH5523-2MZ90-0ZN0-Z	Gas Insulated Vacuum	Vacuum	N	3	13.8	Low	1200	2016	IS	4	X	4	4	4	4	X	X	X	4	4	
301-F4	S3H5500060909	Anne North MS301	MS301	MS301-F4	MS	Barrie	East (North)	Siemens	3AH5523-2MZ90-0ZN0-Z	Gas Insulated Vacuum	Vacuum	N	3	13.8	Low	1200	2016	IS	4	X	4	4	4	4	X	X	X	4	4	
301-T1	S3H5500060913	Anne North MS301	MS301	MS301-T1	MS	Barrie	East (North)	Siemens	3AH5523-2MZ90-0ZN0-Z	Gas Insulated Vacuum	Vacuum	N	3	13.8	Low	1200	2016	IS	4	X	4	4	4	4	X	X	X	4	4	
CS301	90-10056T-L	Anne North MS301	MS301	MS301-CS	MS	Barrie	East (North)	S&C	2010	SF6	SF6		3	44	High	1200	1989	IS	4	4	4	3	4	3	X	X	X	4	2	
302-F1	S3H5500060910	Saunders MS302	MS302	MS302-F1	MS	Barrie	East (North)	Siemens	3AH5523-2MZ90-0ZN0-Z	Gas Insulated Vacuum	Vacuum	N	3	13.8	Low	1200	2016	IS	4	X	4	4	4	4	X	X	X	4	4	
302-F2	S3H5500060912	Saunders MS302	MS302	MS302-F2	MS	Barrie	East (North)	Siemens	3AH5523-2MZ90-0ZN0-Z	Gas Insulated Vacuum	Vacuum	N	3	13.8	Low	1200	2016	IS	4	X	4	4	4	4	X	X	X	4	4	
302-F3	S3H5500060908	Saunders MS302	MS302	MS302-F3	MS	Barrie	East (North)	Siemens	3AH5523-2MZ90-0ZN0-Z	Gas Insulated Vacuum	Vacuum	N	3	13.8	Low	1200	2016	IS	4	X	4	4	4	4	X	X	X	4	4	
302-F4	S3H5500060907	Saunders MS302	MS302	MS302-F4	MS	Barrie	East (North)	Siemens	3AH5523-2MZ90-0ZN0-Z	Gas Insulated Vacuum	Vacuum	N	3	13.8	Low	1200	2016	IS	4	X	4	4	4	4	X	X	X	4	4	
302-T1	S3H5500060914	Saunders MS302	MS202	MS302-T1	MS	Barrie	East (North)	Siemens	3AH5523-2MZ90-0ZN0-Z	Gas Insulated Vacuum	Vacuum	N	3	13.8	Low	1200	2016	IS	4	X	4	4	4	4	X	X	X	4	4	
CS302		Saunders MS302	MS302	MS302-CS	MS	Barrie	East (North)	S&C	2010	SF6	SF6		3	44	High	1200	1989	IS	4	4	4	3	4	3	X	X	X	4	2	
303-F1	59517C101	Ferndale South MS303	MS303	MS303-F1	MS	Barrie	East (North)	FEP	SFA17	SF6	SF6	Y	3	13.8	Low	1200	1990	IS	1	X	1	2	3	3	X	X	X	4	1	
303-F2	59517C102	Ferndale South MS303	MS303	MS303-F2	MS	Barrie	East (North)	FEP	SFA17	SF6	SF6	Y	3	13.8	Low	1200	1990	IS	1	X	1	2	3	3	X	X	X	4	1	
303-F3	59517C103	Ferndale South MS303	MS303	MS303-F3	MS	Barrie	East (North)	FEP	SFA17	SF6	SF6	Y	3	13.8	Low	1200	1990	IS	1	X	1	2	3	3	X	X	X	4	1	
303-F4	59517C104	Ferndale South MS303	MS303	MS303-F4	MS	Barrie	East (North)	FEP	SFA17	SF6	SF6	Y	3	13.8	Low	1200	1990	IS	1	X	1	2	3	3	X	X	X	4	1	
CS303	8810025TL	Ferndale South MS303	MS303	MS303-CS	MS	Barrie	East (North)	S&C	2010	SF6	SF6		3	44	High	1200	1990	IS	4	4	4	3	3	3	X	X	X	4	2	
304-F1	59579C101	Big Bay Point MS304	MS304	MS304-F1	MS	Barrie	East (North)	FEP	SFA17	SF6	SF6	Y	3	13.8	Low	1200	1994	IS	1	X	1	2	3	3	X	X	X	4	1	
304-F2	59579C102	Big Bay Point MS304	MS304	MS304-F2	MS	Barrie	East (North)	FEP	SFA17	SF6	SF6	Y	3	13.8	Low	1200	1994	IS	1	X	1	2	3	3	X	X	X	4	1	
304-F3	59579C103	Big Bay Point MS304	MS304	MS304-F3	MS	Barrie	East (North)	FEP	SFA17	SF6	SF6	Y	3	13.8	Low	1200	1994	IS	1	X	1	2	3	3	X	X	X	4	1	

Appendix 3 Sample Completed Survey for Station Switchgear

Asset Demographics																		Asset Condition Scores										
Asset Nomenclature	Serial Number	Station Name	Station Designation	Station Type (MS of TS)	Municipality	Rate Zone	Manufacturer	Model/ Type	Arc Resistant?	Location in Station	Enclosure Type	Bus Configuration	Rated Voltage (kV)	Operating Voltage (kV)	Current Rating (Amperes)	Year Manufactured	Year Rebuilt	Status	Enclosure Condition	Partial Discharge	Cable Terminations	Instrument Transformers	Bus and Insulators	Relays	RTU	Batteries	Charger	Overall Switchgear Performance	Comments
MS1-HV1 SWGR		Mineola MS	MS1	MS	Mississauga	Central (Mississauga)	S&C Electric	Vista	Yes	Outdoor		Single Bus		27.6		2010		I/S	3		3	2	3	2	3	3	3	0	LM4 Way1 motor controller not functioning
MS1-HV2 SWGR		Mineola MS	MS1	MS	Mississauga	Central (Mississauga)	S&C Electric	Vista	Yes	Outdoor		Single Bus		27.6		2010		I/S	3		3	2	3	2	3	3	3	3	
MS1-HV3 SWGR		Mineola MS	MS1	MS	Mississauga	Central (Mississauga)	S&C Electric	Vista	Yes	Outdoor		Single Bus		27.6		2010		I/S	3		3	0	3	2	3	3	3	3	LM6 Way1 R Phase Voltage sensor has failed
MS2-HV1 SWGR		Dixie MS	MS2	MS	Mississauga	Central (Mississauga)	S&C Electric	Vista	Yes	Outdoor		Single Bus		27.6		2009		I/S	3		3	2	3	2	3	3	3	3	
MS3-HV1 SWGR		Melton MS	MS3	MS	Mississauga	Central (Mississauga)	S&C Electric	Vista	Yes	Outdoor		Single Bus		27.6		2011		I/S	3		3	2	3	2	3	3	3	3	
MS3-HV2 SWGR		Melton MS	MS3	MS	Mississauga	Central (Mississauga)	S&C Electric	Vista	Yes	Outdoor		Single Bus		27.6		2011		I/S	3		3	2	3	2	3	3	3	3	
MS3-HV3 SWGR		Melton MS	MS3	MS	Mississauga	Central (Mississauga)	S&C Electric	Vista	Yes	Outdoor		Single Bus		27.6		2011		I/S	3		3	2	3	2	3	3	3	3	
MS4-HV1 SWGR		Rifle Range MS	MS4	MS	Mississauga	Central (Mississauga)	ABB	VD4	Yes	Indoor		Single Bus		27.6		2016		I/S	3		3	3	3	3	3	3	3	3	
MS4-HV2 SWGR		Rifle Range MS	MS4	MS	Mississauga	Central (Mississauga)	ABB	VD4	Yes	Indoor		Single Bus		27.6		2016		I/S	3		3	3	3	3	3	3	3	3	
MS5-HV1 SWGR		Birchview MS	MS5	MS	Mississauga	Central (Mississauga)	S&C Electric	Vista	Yes	Outdoor		Single Bus		27.6		2009		I/S	3		3	2	3	2	3	3	3	3	
MS5-HV2 SWGR		Birchview MS	MS5	MS	Mississauga	Central (Mississauga)	S&C Electric	Vista	Yes	Outdoor		Single Bus		27.6		2009		I/S	3		3	2	3	2	3	3	3	3	
MS7-HV1 SWGR		Orchard Heights MS	MS7	MS	Mississauga	Central (Mississauga)	S&C Electric	Vista	Yes	Outdoor		Single Bus		27.6		2010		I/S	3		3	0	3	2	3	3	3	3	LM4 Way1 R Phase Voltage sensor is failing
MS7-HV2 SWGR		Orchard Heights MS	MS7	MS	Mississauga	Central (Mississauga)	S&C Electric	Vista	Yes	Outdoor		Single Bus		27.6		2010		I/S	3		3	0	3	2	3	3	3	3	LM5 Way1 R Phase Voltage sensor has failed
MS8-HV1 SWGR		Clarkson MS	MS8	MS	Mississauga	Central (Mississauga)	S&C Electric	Vista	Yes	Outdoor		Single Bus		27.6		2007		I/S	3		3	2	3	2	3	3	3	3	
MS8-HV2 SWGR		Clarkson MS	MS8	MS	Mississauga	Central (Mississauga)	S&C Electric	Vista	Yes	Outdoor		Single Bus		27.6		2007		I/S	3		3	2	3	2	3	3	3	3	
MS8-HV3 SWGR		Clarkson MS	MS8	MS	Mississauga	Central (Mississauga)	S&C Electric	Vista	Yes	Outdoor		Single Bus		27.6		2007		I/S	3		3	2	3	2	3	3	3	3	
MS9-HV1 SWGR		Cawthra MS	MS9	MS	Mississauga	Central (Mississauga)	ABB	VD4	Yes	Outdoor		Single Bus		27.6		2016		I/S	3		3	3	3	3	3	3	3	3	
MS9-HV2 SWGR		Cawthra MS	MS9	MS	Mississauga	Central (Mississauga)	S&C Electric	All Duty	No	Outdoor		Single Bus		27.6				I/S	2		2	2	2	X	X	X	X	2	
MS11-HV1 SWGR		Hensall MS	MS11	MS	Mississauga	Central (Mississauga)	ABB	VD4	Yes	Outdoor		Single Bus		27.6		2015		I/S	3		3	3	3	3	3	3	3	3	

MANA-16

Reference

Page 5 of Exhibit 4, Tab 1, Schedule 1 states that "The required replacement of these underground cables, now 40 to 60 years old, is far and above anything that would have been contemplated in Alectra Utilities' base rates."

[16-MANA-49] Why did Alectra Utilities fail to previously contemplate the need to replace underground cables in its rate zones?

[16-MANA-50] What led Alectra Utilities to contemplate the existence of these 40 to 60 year old cables?

[16-MANA-51] Were Alectra Utilities' predecessor utilities aware of the need to replace these underground cables? Why or why not?

[16-MANA-52] Was the age or condition of these underground cables known to Alectra or any of its predecessor utilities at the time it submitted its MAADs Application [EB-2016-0025]?

Response:

16-MANA-49, 16-MANA-50, 16-MANA-51, 16-MANA-52

Please see Alectra Utilities' response to G-Staff-14.

MANA-17

Reference

Page 6 of Exhibit 4, Tab 1, Schedule 1 states that "Reliability is worsening. That is a fact."

[17-MANA-53] Please provide all underlying data showing the worsening of reliability in Alectra Utilities' jurisdiction and all facts showing that the worsening results from underground cables.

Response:

[17-MANA-53]

As provided in Section C.1.2.1, the main contributors to the worsening of reliability include increasing number of interruption due to defective equipment and increasing severity of outage durations due to adverse weather event. The leading cause of this trend is defective equipment; specifically, failures of underground direct-buried cable and cable accessories which contributes to 37% of all events and 44% of the total duration when an outage due to defective equipment occurs. Please see Section C.1.3 of the DSP (Exhibit 4, Tab1, Schedule 1, Page 118 to Page 122) for a detailed explanation and data which explains the increasing impact of underground cable failures on system reliability. Please see Page 12 of Appendix A10 for additional information on the increasing outages of XLPE cable on system reliability (Exhibit 4, Tab 1, Schedule1, appendix A10, Page 12).

MANA-18

Reference

Page 6 of Exhibit 4, Tab 1, Schedule 1 states that "More work is being carried out on an emergency basis. That is a fact."

[18-MANA-54] Please provide the volume of work performed by Alectra Utilities and its predecessors on an emergency basis over the last five years.

[18-MANA-55] Please provide any facts known regarding the volume of emergency work performed by other utilities in the province of Ontario.

Response:

[18-MANA-54]

Please see Table A06-1 in Appendix A06 in the DSP (Exhibit 4, Tab 1, Schedule 1, Appendix A06, Page 2) for the historical capital expenditure due to reactive replacement which illustrates that Alectra Utilities has experienced increasing volume of reactive work as result of failures and other emergencies.

[18-MANA-55]

Alectra Utilities does not have any information regarding the volume of emergency work performed by other utilities in the province of Ontario.

MANA-19

Reference

Page 6 of Exhibit 4, Tab 1, Schedule 1 states that "Customers are not receiving the service that they expect and are willing to pay for. That is also a fact."

[19-MANA-56] What is the service that customers expect and are not receiving?

[19-MANA-57] What is the basis for the alleged fact that customers are willing to pay for this service?

Response:

[19-MANA-56]

Since its creation in 2017, Alectra Utilities has engaged with its customers on capital planning issues at least once per year. Alectra Utilities' customers have consistently said that they want to the utility to maintain a reliable distribution system, even if that means some increase in their distribution rates. Alectra Utilities' 2020-2024 DSP is based on addressing customer expectations that the utility maintain reliability, but do so in a way that is prudent and delivers the best long-term value. In the development of the DSP, Alectra Utilities deployed a two phased customer engagement approach. Before planning started, Alectra Utilities engaged customers to attain customer priorities and needs. Innovative Research Group, the independent third party which conducted the customer engagement reported that, despite price concerns, customers are generally willing to consider paying more to maintain a reliable system. Alectra developed potential investments and went back to the customer in the second phase to assess their preferences amongst various investment options. In this second phase, Innovative Research reported that customers strongly preferred investments in infrastructure that most directly impacted their service, specifically investments in system renewal and system service.

Based on the feedback received from customers, Alectra Utilities has set reliability targets for the DSP based on the most recent five year historical performance result of 0.98 hours of system average interruption duration index and 1.34 interruptions of system average interruption frequency index per year. Alectra Utilities' DSP has plans to target the worst performing areas in the system. For example, the customers within the Rathburn rebuild area

(2019-2020) over the last five years (2014-2018) have experienced cable failures that has resulted in seven outages in one year; the cumulative duration of outages in that year was six hours, well above the system average. Alectra Utilities has established necessary and urgent plans to renew the deteriorating assets in such areas and provide customers the reliability that customers told Alectra Utilities they need.

[19-MANA-57]

Refer to Section 5.2.1.5 of the DSP (Exhibit 1, Tab 1, Schedule 1, Page 31 to Page 41 for a detailed explanation of the customer engagement work completed in the development of the DSP.

MANA-20

Reference

Page 7 of Exhibit 4, Tab 1, Schedule 1 refers to Alectra Utilities' connection of new customers.

[20-MANA-58] When Alectra Utilities was consulting with customers, were customers advised that any portion of their proposed rate increase would be devoted to the connection of new customers?

[20-MANA-59] If so, who was advised of this and at what stage?

[20-MANA-60] What percentage of the proposed rate increase is being devoted to Alectra Utilities' connection of new customers?

Response:

Please note, Page 7 of Exhibit 4 Tab1 Schedule 1 refers to Alectra Utilities' distribution system capacity to connect new customers based on forecasted needs and to alleviate capacity constraints.

20-MANA-58 and 20-MANA-59

In the first phase of customer engagement, which was conducted in 2018, Alectra Utilities engaged customers to attain customer priorities and needs. In the second phase of customer engagement, which was conducted in 2019, Alectra Utilities customers were presented with different investment options, including expansion of the system with feeders and stations to address development, intensification and provide back-up capacity. Please refer to Appendix C01- Customer Engagement Page 21, 23 and 24 for details.

20-MANA-60

System Access investments necessary to connect new customers are not included in M-Factor projects. Please see Appendix A02 – Customer Connections in the DSP (Exhibit 4, Tab 1, Schedule 1, Appendix A02) for a detailed explanation of all Customer Connection investments.

MANA-21

Reference

Page 8 of Exhibit 1, Tab 1, Schedule 1 refers to establishing additional linkages.

[21-MANA-61] When Alectra Utilities was consulting with customers, were customers advised that any portion of their proposed rate increase would be devoted to establishing additional linkages?

[21-MANA-62] If so, who was advised of this and at what stage?

[21-MANA-63] What percentage of the proposed rate increase is being devoted to Alectra Utilities' establishing of additional linkages?

Response:

21-MANA-61

As described on page 8, 388 of Exhibit 04, Tab1 Schedule 1 Alectra Utilities investments in establishing additional connections between adjacent legacy systems is to assist it in balancing loads more effectively, thereby enabling it to defer the need for costly system expansions.

Alectra Utilities did not include projects related to linkages as part of the M-factor.

21-MANA-62

Please refer to response to 21-MANA-61.

21-MANA-63

Please refer to response to 21-MANA-61.

MANA-22

Reference

Page 9 of Exhibit 1, Tab 1, Schedule 1 refers to enhancing the use of monitoring technologies, investing in environmental protection measures and managing inventory.

[22-MANA-64] When Alectra Utilities was consulting with customers, were customers advised that any portion of their proposed rate increase would be devoted to enhancing the use of monitoring technologies, investing in environmental protection measures and managing inventory?

[22-MANA-65] If so, who was advised of this and at what stage?

[22-MANA-66] What percentage of the proposed rate increase is being devoted to Alectra Utilities' enhancing the use of monitoring technologies, investing in environmental protection measures and managing inventory?

Response:

22-MANA-64

Customers were asked to provide specific feedback with regard to investments in monitoring and control equipment (see Appendix 1.0, Representative Customer Engagement Report, Pages 47-48, 112-113, 161-162 and 209-210, provided in Exhibit 4, Tab 1, Schedule 1, Appendix C).

22-MANA-65

All customers who participated in the online workbook were asked to provide specific feedback with regard to investments in monitoring and control equipment in Phase 2 of the 2020-2024 customer engagement.

22-MANA-66

As provided in Appendix 1.0, Representative Customer Engagement Report, Page 31, for each choice, Alectra Utilities identified an option to stay within existing rates under the Price Cap formula. It also identified options to increase investments, and in some areas, where practical, options to reduce investments to make room for increased investments in more pressing areas. As identified on page 48, the majority of customers (67%) preferred the recommended pace for

this type of investment, which corresponds with the option to stay within existing rates. Therefore, none of the proposed M-factor rate riders is being devoted to Alectra Utilities' enhancing the use of monitoring technologies, investing in environmental protection measures and managing inventory.

MANA-23

Reference

Page 12 of Exhibit 4, Tab 1, Schedule 1 refers to a "snowplow" of capital costs for future consumers.

[23-MANA-67] Please provide all assumptions on which the "snowplow" conclusion and funding shown in Figure 5.0 – 8 is based.

Response:

The long-term system renewal trends assessment as provided in Exhibit 4, Tab 1, Schedule 1, Page 12, Figure 5-8 was completed over a twenty-year outlook (2019-2038) and is based on the most recent available asset condition assessment and renewal cost projections.

The long-term system renewal assessment was completed for major distribution assets including underground cable, station equipment, poles, and distribution transformers. Alectra Utilities has provided the assets included in the analysis and the per-unit costs assumed in Table 1, below. The per-unit costs are adjusted for inflation in the analysis (2.15% per annum).

Table 1 – Cost Assumptions Utilized in the Long-Term System Renewal Assessment

Assets	Per-unit cost (2019 $)
Poles	$ 13,891
Cables: PILC (replacement)	$ 330,890
Cables: XLPE (replacement)	$ 350,000
Cables: XLPE (injection)	$ 65,000
Switchgear	$ 102,224
Distribution Transformer	$ 12,243
Station Transformer	$ 500,000
Station Switchgear	$ 1,000,000
Station Circuit Breaker	$ 80,000

The analysis is based on the projection of system renewal investment needs, which is represented in the analysis by the variable "Condition-based Required – Planned SR".

Annual system renewal needs were determined from the number of units reaching end-of-life multiplied by the per-unit cost (corrected by inflation). The number of units expected to reach end-of-life is based the asset demographics and the ACA's mortality projection (please see 2018 ACA Report included as Appendix D in the DSP for a full explanation of the mortality projection methodology). Alectra Utilities paced the backlog of existing assets in the early years of the outlook.

Once the condition-based system renewal requirements were set for the twenty year outlook period, Alectra Utilities overlaid the outlook with a projected planned renewal scenario based on the planned system renewal pacing as outlined in the DSP (represented by the variable DSP-Planned SR). The assumption underpinning the DSP-Planned system renewal is that the DSP will be sufficiently funded so that Alectra Utilities would not need to defer or delay investments in the early years of the outlook. As the planned renewal investments in the DSP span five years, Alectra Utilities paced the system renewal for the remaining 15 years of the outlook based on the strategy of maintaining overall reliability, in line with the first five years of the 20 year period.

Alectra Utilities considered a partial funding scenario by overlaying the variable "Partial Funding – Planned SR", where system renewals remain consistent with current levels of renewal in the period 2020-2024 and are paced accordingly, in order to reflect system renewal requirements to match the DSP planned system renewal rate by 2030. This scenario informs Alectra Utilities of the significant increases that will be required in the mid-point of the analysis, in order to maintain the system over the long term period. The scenario considered in the long term system renewal does not consider the impact of increases on reactive replacement needs, which are anticipated to be higher under the partial funding scenario.

MANA-24

Reference

Page 17 of Exhibit 4, Tab 1, Schedule 1 refers to customers consistently saying that "they want the utility to maintain a reliable distribution system, even if that means some increase in their distribution rates."

[24-MANA-68] These consultations are said to have occurred at least once per year since 2017. Does this mean that customers were consulted twice or some other number of instances?

[24-MANA-69] What is the amount of "some increase" in distribution rates that customers were informed of when expressing this "want"? Please break down the answer by RZ and customer class, where applicable.

[24-MANA-70] What were the exact questions asked of customers when they provided these responses?

Response:

24-MANA-68

All Alectra Utilities customers, in each rate zone and class, with an email address were invited to participate in the Phase 2 online workbook. Participants were not removed based on their participation in past customer engagements performed by Alectra Utilities since 2017. It is not possible to identify customers who participated in more than one engagement as information that would identify individual respondents is not collected.

24-MANA-69

Please refer to Appendix 1.0, Representative Customer Engagement Report, Pages 79-80, 132-133, 180-181 and 227-229 and Appendix C, Customer Engagement, Customer Engagement Planning Placemat, provided in Exhibit 4, Tab 1, Schedule 1.

24-MANA-70

Please refer to Appendix 1.0, Representative Customer Engagement Report, Pages 79-80, 132-133, 180-181 and 227-229 and Appendix C, Customer Engagement, Customer Engagement Planning Placemat.

MANA-25

Reference

Page 24 of Exhibit 4, Tab 1, Schedule 1 refers to customers identifying a "strong preference for the company to invest in system renewal…"

[25-MANA-71] Please provide all facts relied upon for this assertion of a strong preference.

[25-MANA-72] How is this statement reconciled with the fact that fact that when asked how Alectra Utilities can improve service, top responses were either "nothing" or "lower rates" (Appendix C)?

Response:

25-MANA-71

A strong majority of Alectra Utilities customers across all rate classes and in all rate zones support additional investments in infrastructure that most directly serve customers. These investments include; overhead renewal, underground renewal, transformer replacement, monitoring and control equipment and converting rear lot services. Detailed findings to support this assertion are included in Appendix 1.0, Representative Customer Engagement Report.

25-MANA-72

The engagement provided several opportunities for customers to express their needs. In order to understand customer needs, it is important to review all these opportunities. The open-ended question referred to in 30-MANA-89 was intended to identify needs – i.e., ways in which Alectra Utilities needs to do better to meet expected outcomes. By design, the answers do NOT identify outcomes where customers are generally satisfied so it is NOT intended to identify the broad range of important outcomes. Once presented with a list of potential outcomes that Alectra Utilities could focus on, delivering reasonable distribution rates and ensuring reliable electrical service are identified as top priorities for all customer classes in each rate zone (see Appendix C, Customer Engagement, Customer Engagement Planning Placemat).

After discussing specific proposed investments and their expected outcomes, customers were asked for their views on the cost of implementing all the investments recommended by Alectra

Utilities. A majority of customers in all rate classes in all rate zones either supported the increase outright or said they did not like it but felt that it is necessary (2020-2024 Customer Engagement Overviews, page 5).

MANA-26

Reference

Appendix C lists engagement sample sizes.

[26-MANA-73] How many customers does Alectra Utilities have within each category for which sample sizes are listed?

Response:

26-MANA-73

Please refer to the tables on pages 5-9 in Appendix 1.0, Representative Customer Engagement Report (Exhibit 4, Tab 1, Schedule 1) which provide this information.

MANA-27

Reference

Appendix C says to "consult complete Customer Engagement Reports"

[27-MANA-74] Please provide the Customer Engagement Reports.

Response:

27-MANA-74

The Customer Engagement Reports are provided in Exhibit 4, Tab 1, Schedule 1, Appendix C – Customer Engagement.

MANA-28

Reference

Page 27 of Exhibit 4, Tab 1, Schedule 1 states that "the company has faced a growing need for system access investments, over which Alectra Utilities has little control".

[28-MANA-75] When did Alectra Utilities become aware of the necessity of the system access investments now subject of its rate application?

[28-MANA-76] What is the cause of the growth of the need?

Response:

[28-MANA-75]

System Access investments are modifications to the distribution system necessary for Alectra Utilities to perform customer connections and comply with mandated service obligations. Such investments are intrinsic to Alectra Utilities and continue to be a necessary element of the investment portfolio.

Please see Section 5.3.1.3 of the DSP (Exhibit 4, Tab 1, Schedule 1, Page 140 to Page 145).

[28-MANA-76]

Please refer to Alectra Utilities' response to G-Staff-95, G-Staff-96, as well as Exhibit 4, Tab1, Schedule 1, Appendix A02 Tables 9 and 10.

MANA-29

Reference

Page 35 of Exhibit 4, Tab 1, Schedule 1 refers to telephone surveys, online surveys and focus groups.

[29-MANA-77] Please provide the instructions given to Innovate Research to perform these surveys and the focus group.

[29-MANA-78] Please provide the questions asked in the telephone surveys.

[29-MANA-79] Please provide the raw data arising from the telephone surveys.

[29-MANA-80] Please provide the instructions given to Innovative Research to perform the telephone surveys.

[29-MANA-81] Please provide the questions asked in the online surveys.

[29-MANA-82] Please provide the raw data arising from the online surveys.

[29-MANA-83] Please provide the instructions given to Innovative Research to perform the online surveys.

[29-MANA-84] Please provide the questions asked in the telephone surveys.

[29-MANA-85] Please provide the raw data arising from the focus groups.

[29-MANA-86] Please provide any video retained from Innovative Research's meeting with the focus groups.

[29-MANA-87] Please provide the instructions given to Innovative Research to administer the focus groups.

Response:

29-MANA-77

Please see Alectra Utilities' response to 14-MANA-39.

29-MANA-78

Please refer to Exhibit 4, Tab 1, Schedule 1, Appendix 3.0, Reference Survey Questionnaires.

29-MANA-79

Innovative Research Group makes a commitment to all respondents to protect their privacy when collecting their responses. Consistent with that commitment, it is not common practice to make raw data available. The details of population characteristics, sample characteristics and

weighting proceeds are documented in the sample validation section of the Representative Report, provided at Exhibit 4, Tab 1, Schedule 1, Appendix C02, Appendix 1.0, Representative Customer Engagement Report, pages 3-9.

29-MANA-80
Please see Alectra Utilities' response to 14-MANA-39.

29-MANA-81
Please refer to Appendix 1.0, Representative Customer Engagement Report.

29-MANA-82
Please see Alectra Utilities' response to 29-MANA-79.

29-MANA-83
Please see Alectra Utilities' response to 14-MANA-39.

29-MANA-84
Please refer to Appendix 3.0, Reference Survey Questionnaires.

29-MANA-85
There is no available raw data. In order to protect participant confidentiality, focus groups recordings are destroyed once the final report is accepted.

29-MANA-86
In order to protect participant confidentiality, focus groups recordings are destroyed once the final report is accepted.

29-MANA-87
Please see Alectra Utilities' response to 14-MANA-39.

MANA-30

Reference

Page 35 of Exhibit 4, Tab 1, Schedule 1 asserts that "maintaining reliability, while being sensitive to price" was a "stated need and priority" of customers.

[30-MANA-88] Which customers stated this need and priority?

[30-MANA-89] How is this comment reconciled with the fact that fact that when asked how Alectra Utilities can improve service, top responses were either "nothing" or "lower rates" (Appendix C)?

Response:

30-MANA-88

In the first phase of the 2020-2045 DSP Customer Engagement which took place over the spring and summer of 2018, residential, GS<50kW and GS>50kW customers identified delivering reasonable distribution rates and ensuring reliable electrical service as their top two priorities. Large Use customers have the same two priorities. However, Large Use customers ranked reliability over price (see Appendix C, Customer Engagement, Customer Engagement Planning Placemat).

30-MANA-89

Please see Alectra Utilities' response to 25-MANA-72.

MANA-31

Reference

Page 8 of Exhibit 2, Tab 1, Schedule 2 refers to an Innovative Research report prior to identifying investments based on customer needs & priorities.

Page 8 of Exhibit 2, Tab 1, Schedule 2 refers to an Innovative Research report on customer preferences.

Page 38 of Exhibit 4, Tab 1, Schedule 1 refers to Innovative Research presenting customer investment options and opportunity to present investment preferences

[31-MANA-90] If any of these reports have not been produced, please produce them.

[31-MANA-91] If these investment options have not already been produced, please produce them and information about how they were presented to customers.

[31-MANA-92] If these investment options have already been produced, please advise where they are found in the Application.

[31-MANA-93] Please provide all information delivered by customers in response to these requests.

Response:

31-MANA-90

All reports referred to in the pre-filed evidence have been included in Exhibit 4, Tab 1, Schedule 1, Appendix C.

31-MANA-91

All investment options have been produced. Please refer to Appendix 1.0, Representative Customer Engagement Report.

31-MANA-92

All investment options have been produced. Please refer to Alectra Utilities' response to 31-MANA-91, above.

31-MANA-93

Please refer to Appendix 1.0, Representative Customer Engagement Report.

MANA-32

Reference

Pages 38-39 of Exhibit 4, Tab 1, Schedule 1 refers to a reference study.

[32-MANA-94] Please provide the reference study/survey.

[32-MANA-95] Please advise whether any study or survey results were rejected as a result of Alectra Utilities' "validation". If so, please provide the information excluded.

Response:

32-MANA-94

Please refer to Exhibit 4, Tab 1, Schedule 1, Appendix 3.0, Reference Survey Questionnaires.

32-MANA-95

As explained on page 5 of Appendix 1.0, Representative Customer Engagement Report, validation refers to the process of reviewing the actual sample against known population characteristics to ensure the sample is representative of the broader public. This is used to determine whether weights are required to ensure the sample is representative of the population. Accepting or rejecting studies or surveys is not a part of this procedure.

MANA-33

Reference

Page 39 of Exhibit 4, Tab 1, Schedule 1 refers to customers being shown the rate impact of their choices.

[33-MANA-96] Is the rate impact shown to customers identical to the rate impact that will result from the rates sought in the 2020 EDR Application? If not, how do they differ?.

[33-MANA-97] The rate impacts shown in the IRG Workbook appears to be disclosed in dollars and cents, but without any description of whether these amounts are per kW, or per kWh, or per month, or per year, etc. Please provide a complete explanation of what the Bill Impact Analysis amounts are intended to represent. For example, on page 111 of Exhibit 4, Appendix C02, the "Average $ Initial" Bill Impact for HRZ is described as "$0.40". IS this 40¢/kW, or 40¢/kWh, or 40¢/month, or 40¢/year, or some other measurement? Please provide all supporting materials to demonstrate exactly how this amount was displayed, conveyed or disclosed to, and understood by, the customer.

[33-MANA-98] Please identify what rate impacts were shown to GS> 50 kW and to Large User customers, and where this disclosure can be found in Exhibit 4, Appendix C02.

Response:

33-MANA-96

The rate impacts shown to customers were based on the proposed level of M-factor capital expenditures. Alectra Utilities then incorporated customer preferences into the DSP by adjusting the pace of investments and deferring certain projects. The overall impact of the adjustment based on customer preferences from the second round of customer engagement on the 2020-2024 Capital Investment Plan, as well as other adjustments, was a net reduction of $17.5MM. The bill impacts presented in Tables 12 to 16 of Exhibit 2, Tab 1, Schedule 3, are lower than the bill impacts presented to customers as they reflect the reductions incorporated due to customer preferences.

33-MANA-97

The bill impacts presented are the average monthly bill impacts. The detailed calculation of the bill impacts are provided in the M-factor Revenue Requirement Model provided in response to G-Staff-8.

33-MANA-98

The rate impacts are provided in Exhibit 4, Tab 1, Schedule 1, Appendix 1.0 - 2020-2024 DSP Customer Engagement - Representative Report, pp. 179-180 and pp. 227-228.

MANA-34

Reference

Page 143 of Exhibit 4, Tab 1, Schedule 1 refers to Alectra Utilities' understanding that, despite price concerns, customers are generally willing to consider paying more to maintain a reliable system.

[34-MANA-99] What facts is this understanding based on?

Response:

34-MANA-99

In the first phase of the 2020-2024 Distribution System Plan ("DSP") Customer Engagement which took place over the spring and summer of 2018, the majority of residential, GS<50kW and GS>50kW customers expressed that they believe that *"Alectra Utilities should invest what it takes to replace the system's aging infrastructure to maintain system reliability; even if that increases my monthly electricity bill by a few dollars over the next few years."* (see Exhibit 4, Tab 1, Schedule 1, Appendix C, Customer Engagement, Customer Engagement Planning Placemat).

This is in addition to the fact that the top expressed priorities of Alectra Utilities' customers are delivering reasonable distribution rates and ensuring reliable electrical service. (see Appendix C, Customer Engagement, Customer Engagement Planning Placemat).

These general attitudes were reiterated by respondents' choices on investment options in Phase 2 of the Customer Engagement. Please see the 2020-2024 Distribution System Plan Customer Engagement, Key Findings section, in Exhibit 4, Tab 1, Schedule 1, Appendix C, Customer Engagement – 2020-2024 Distribution System Plan.

MANA-35

Reference

Exhibit 3, Tab 1, Schedule 12 is a Summary of Bill Impacts.

[35-MANA-100] Based on the data set out in this Schedule, what would be the financial impact of the rates requested by Alectra to a Large User in the Horizon Utilities RZ with the following monthly consumption statistics:

Adjusted Usage	**1,500,000 kWh**
Peak kW7-7	**4,850**
Demand kW	**4,850**
Demand kVA	**5,000**
Demand kVA7-7	**5,000**
Power Factor	**0.965**

- **on an annual basis in each of years 2020, 2021, 2022, 2023 and 2024, as compared to 2019 (current rates)?**
- **on an annual basis in each of years 2020, 2021, 2022, 2023 and 2024, as compared to the last full year in which such a customer was billed by Horizon Utilities (prior to the Alectra amalgamation)?**

[35-MANA-101] How many Large Use customers does Alectra have in each RZ? To the best of Alectra's ability, please estimate how this figure compares to the number of Large Use electricity customers (customers with similar peak capacities and volume) located within Alectra's jurisdiction which are transmission-connected (and therefore are not Alectra customers)?

[35-MANA-102] To the best of Alectra's ability, please estimate how many or what proportion of Alectra's Large Use customers are "Emissions-Intensive Trade-Exposed" customers (being those eligible for the Output Based Pricing System under the federal Greenhouse Gas Pollution Pricing Act, or such other definition as Alectra considers more appropriate or easier to assess for the purpose of responding to these Interrogatories).

[35-MANA-103] To the best of Alectra's ability, please estimate how many or what proportion of all "Emissions-Intensive Trade-Exposed" electricity customers (as described above) located in Alectra's jurisdiction and/or located in the Horizon RZ, are Alectra customers (versus transmission-connected and therefore not Alectra customers).

Response:

35-MANA-100

Based on existing 2019 rates and using the M-Factor rate riders as filed in Attachment 3 of Alectra Utilities' evidence, the estimated annual total bill and associated dollar and percentage impacts for a customer in the Large Use with Dedicated Assets service class with demand of 4,850 kW are provided in Table 1, below. As Alectra Utilities' rates are not harmonized across the rate zones, the alternative bill impact scenario identified in 35-MANA-100 will result in the same impacts presented in Table 1, below.

Table 1 – M-Factor Bill Impacts

Year	Annual Bill Total	Increase ($)	Increase (%)
2019	$2,805,051.12		
2020	$2,805,881.53	$830.41	0.03%
2021	$2,806,470.58	$589.05	0.02%
2022	$2,807,161.80	$691.22	0.02%
2023	$2,807,700.81	$539.01	0.02%
2024	$2,808,535.97	$835.16	0.03%

35-MANA-101

There are currently 32 Large Use customers in Alectra' Utilities jurisdiction

Table 2 – Number of Large Use Customers by RZ

Brampton RZ	Enersource RZ	Guelph RZ	Horizon RZ	PowerStream RZ	Alectra
6	9	4	11	2	32

Alectra Utilities is unable to estimate the number of Large Use transmission-connected electricity customers. These customers settle directly with the Independent Electricity System Operator ("IESO") as a registered Market Participant (MP) using wholesale revenue metering. Since they are not Alectra Utilities customers nor connected to our distribution system, Alectra Utilities has no visibility on their load profile and their peak capacities without a retail utility meter in place.

35-MANA-102

Alectra is unable to estimate how many or what proportion of Alectra Utilities' Large Use customers are "Emissions-Intensive Trade-Exposed" customers.

35-MANA-103

Please refer to response 35-MANA-102.

MANA-36

Reference

Figure 1, Exhibit 1, Tab 3, Schedule 1, Page 2 is a photograph of a wood pole failure dated October 15, 2017.

[36-MANA-104] How many of Alectra Utilities' wood poles (or those of its predecessor utilities) fell onto vehicles in the manner depicted in this photograph in 2017? In 2018? In 2019?

Response:

[36-MANA-104]

Alectra Utilities has experienced three incidents of wood poles falling perilously and impaling vehicles. There were two such incidents in 2017 and one incident in 2018.

MANA-37

Reference

Section 5.2.2.2 of the DSP states that Alectra Utilities has no historical surveys because it is new.

Did Horizon have any historical survey information with respect to customer preferences? If so:

[37-MANA-1] Please provide it.

[37-MANA-2] Did Alectra Utilities consider how Horizon's historical survey information aligned with its new survey information? How did it perform this consideration? What were the results of this consideration?

Response:

37-MANA-1

As part of this Application, Alectra Utilities began collecting the needs and preferences of customers in the Horizon RZ starting in the summer of 2018. A summary of this research can be found in the Customer Engagement Planning Placement, Appendix C01 – Placement – First Phase of Customer Engagement.

Additionally, in both 2014 and 2015, Alectra Utilities collected survey information in the Horizon RZ through customer engagement and customer satisfaction research.

In 2014, Horizon Utilities commissioned Innovative Research Group Inc. ("Innovative"), an independent consultant, for customer engagement activities for its DSP. Documentation of Horizon's Utilities' customer feedback and preferences includes:

i) Innovative's final report on the outcome of Horizon Utilities' online Distribution System Plan Review Workbook;

ii) Innovative's final report on the outcome of Horizon Utilities' residential customer survey;

iii) Innovative's final report on the outcome of Horizon Utilities' commercial stakeholder and community stakeholder consultations; and,

iv) Innovative's final report on the outcomes of Horizon Utilities' Large Use customer consultations.

All of the above reports can be found in Horizon Utilities' 2015 Custom IR Application (EB-2014-0002), Appendix D in Exhibit 2, Appendix 2-4 Horizon Utilities Distribution System Plan.

Finally, Horizon Utilities has engaged UtilityPULSE to complete Customer Satisfaction surveys. The most recent survey was completed in 2015 as provided in MANA-37_Attach 1 2015 Horizon UtilityPULSE Survey Report.

37-MANA-2

The focus of the analysis in Innovative's reports was on customer preferences as they relate to this current Application. There is no trend analysis comparing past preferences to current preferences.

MANA-37

ATTACH 1

2015 Horizon UtilityPULSE Survey Report

Horizon Utilities

horizon UTILITIES Looking beyond...

17th Annual Electric Utility Customer Satisfaction Survey

UtilityPULSE

The purpose of this report is to profile the connection between Horizon Utilities and its customers.

The primary objective of the Electric Utility Customer Satisfaction Survey is to provide information that will support discussions about improving customer care at every level in your utility.

The UtilityPULSE Report Card® and survey analysis contained in this report do not merely capture state of mind or perceptions about your customers' needs and wants - the information contained in this survey provides actionable and measurable feedback from your customers.

All comments and questions should be addressed to:

Sid Ridgley, UtilityPULSE division, Simul Corporation

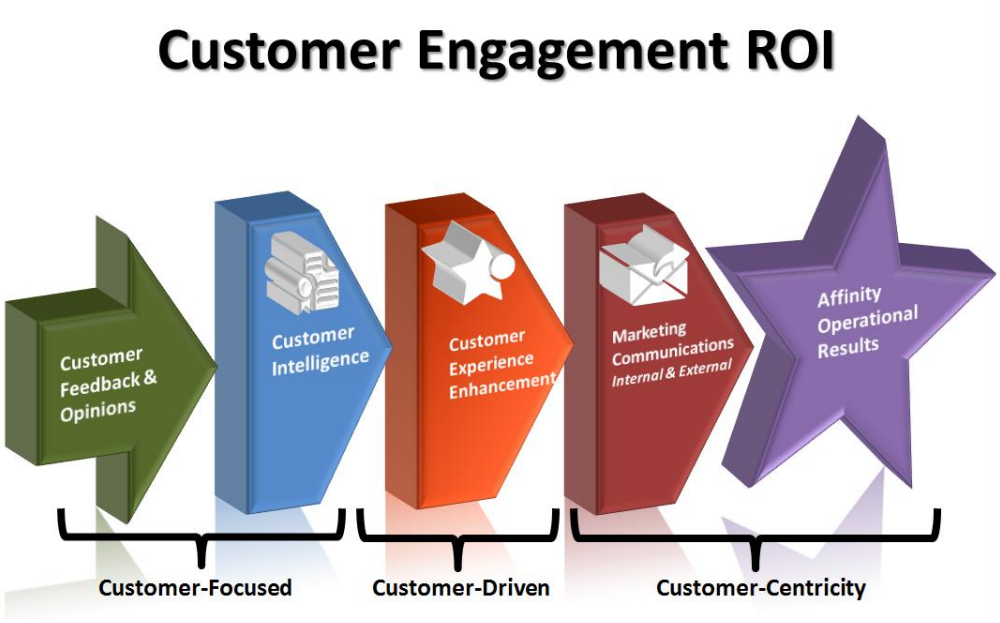
Toll free: 1-888-291-7892 or Local: 905-895-7900

Email: sidridgley@utilitypulse.com or sridgley@simulcorp.com

Executive summary

Customer engagement is a key driver for the success of energy efficiency, demand response, adoption of smart energy technologies and other programs the LDC manages. The key to effective engagement lies in understanding customers' attitudes, want, needs, motivations, and in recognizing that customers are smart people. Customer engagement is crucial for the longer term success of the LDC.

Chapter 5 of the Ontario Energy Board publication *"Filing Requirement's for Electricity Transmission and Distribution Applications"* (March 28, 2013) set out the requirements for performance outcomes in a number of areas. One of those areas, Customer Focus is defined as "*services are provided in a manner that responds to identified customer preferences".* Another area is Operational Effectiveness: *"continuous improvement in productivity and cost performance is achieved; and utilities deliver on system reliability and quality objectives."*



Customer Centric Engagement Index (CCEI)

It is important to note there are 2 sides of engagement. One side is getting customer participation in various activities while the other is about getting higher levels of emotional connection (affinity). Conducting surveys (like this one), holding town hall meetings, focus groups, etc. are examples of engaging your customers that is, getting your customers to participate in something. This survey also provides you with an emotional look at engagement. The CCEI index is a gauge of the amount of goodwill that has been generated. High numbers in CCEI suggest there is a high level of goodwill amongst your customers. Goodwill helps when things go awry for the utility and goodwill encourages active participation.

Utility Customer Centric Engagement Index (CCEI)			
	Horizon Utilities	**National**	**Ontario**
CCEI	84%	83%	80%

Base: total respondents

Engagement is how customers think, feel and act towards the organization. Ensuring that customers respond in a positive way requires that they are rationally satisfied with the services provided AND emotionally connected to your LDC and its brand. Connecting both rationally and emotionally strengthens and intensifies the degree to which the customer becomes engaged with the organization.

Customer engagement is not about making customers “happy” with the costs or the service that is being provided by their LDC. Nor is customer engagement about making the industry regulator “happy”. The purpose of engaging customers is to gather usable information that will help Horizon Utilities be more effective and efficient with higher levels of customer affinity.

Why bother with making investments in Customer Engagement activities? (Partial list)

1. Better understanding of expectations
2. Clarify interests
3. Strategy alignment
4. Enhanced reputation/risk management
5. Improved efficiency of operations
6. Proof stakeholder input is valuable
7. Efficient use of resources
8. More effective communications
9. Improved issues management
10. Better openness in decision making
11. Increased accountability
12. Better information/intelligence

Comparability

Your 2015 report contains data comparisons to:

- An Ontario-wide LDC benchmark
- A National LDC benchmark
- Previous year’s ratings (where available)
- Ontario LDCs participating in the 2015 survey
- UtilityPULSE database

Customer Focus - Customer Satisfaction - Satisfaction Survey Results

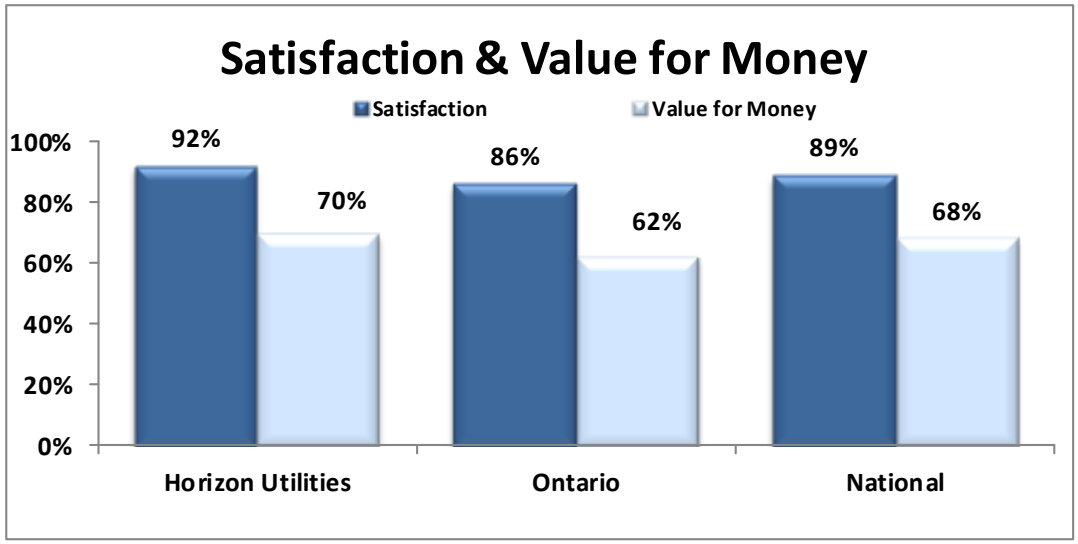
The Ontario Energy Board's consumer centric regulatory framework includes a customer satisfaction measure. Scoring well in this measure would indicate that many aspects of the LDC's operations are running well i.e., power reliability, restoring outages quickly, professional customer care, etc. Customer satisfaction is known as an effectiveness measure.

Horizon Utilities' SATISFACTION SCORES – Electricity customers' satisfaction					
Top 2 Boxes: 'very + fairly satisfied'	**2015**	**2014**	**2013**	**2012**	**2011**
PRE: Initial Satisfaction Scores	92%	87%	92%	90%	83%
POST: End of Interview	92%	87%	95%	93%	90%

Base: total respondents

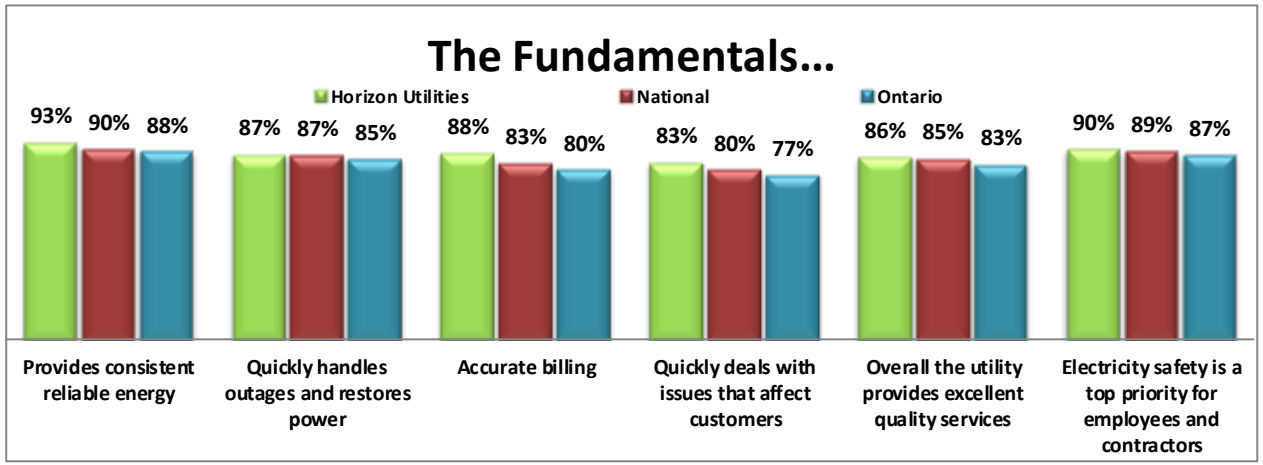
- ***Satisfaction*** *happens when utility core services meet or exceed customer's needs, wants, or expectations.*
- ***Loyalty*** *(Affinity) occurs when a customer makes an emotional connection with their electric utility on a diverse range of expectations beyond core services.*

Customer satisfaction is a priority for LDCs. Rigorous measurement of this measure is an essential first step to ensuring services are delivered consistently at the expected time, money and quality levels customers desire. We remind readers that a satisfied customer is not necessarily a customer with a high affinity level i.e., emotional engagement. The satisfaction measure focuses attention on the product or service of the LDC. Customers have a more multi-faceted view about their LDC, something that is captured in the UtilityPULSE report card.



Base: total respondents

There is an inelastic relationship between ratings for 'Satisfaction' and 'Value for money'. For years, 'Value for money' has been rated much lower than 'Satisfaction' which implies that the current LDC 'Satisfaction' scores are the result of other things. Getting the **"fundamentals"** right is the first responsibility of the LDC.



Base: total respondents

The Killer B's (Bills and Blackouts)

There will always be issues. To the customer the expectations from the physical world i.e., call-centre and the virtual world i.e., website, are the same: Solving the problem is the first priority. In terms of Billing Accuracy, Horizon Utilities rating was 88%, the Ontario benchmark was 80%.

Percentage of Respondents indicating that they had a Billing problem in the last 12 months			
	Horizon Utilities	**National**	**Ontario**
2015	9%	9%	15%
2014	13%	16%	25%
2013	8%	8%	10%
2012	8%	12%	13%
2011	12%	10%	16%

Base: total respondents

Customers understandably expect accurate bills and timely resolution of any billing issues. Billing is a frequent touch point with customers and presents an opportunity to create a positive experience and forge stronger relationships. Some the typical billing problems still encountered are:

- 71% : the amount owed was too high
- 8% : complaints about rates or charges
- 4% : the bill was difficult to understand
- 2% : the payment made was recorded incorrectly.

Outage Management

The ice-storm of December 2013 put more emphasis on what LDCs should be doing to communicate with customers when there is an outage – both planned and unplanned. Since then much has been written about outage management thereby heightening customers' awareness about the issue. None-the-less every LDC has made changes and/or enhancements to their outage management practices.

Percentage of Respondents indicating that they had a Blackout or Outage problem in the last 12 months			
	Horizon Utilities	National	Ontario
2015	38%	53%	53%
2014	43%	47%	49%
2013	17%	41%	35%
2012	19%	44%	46%
2011	18%	43%	43%

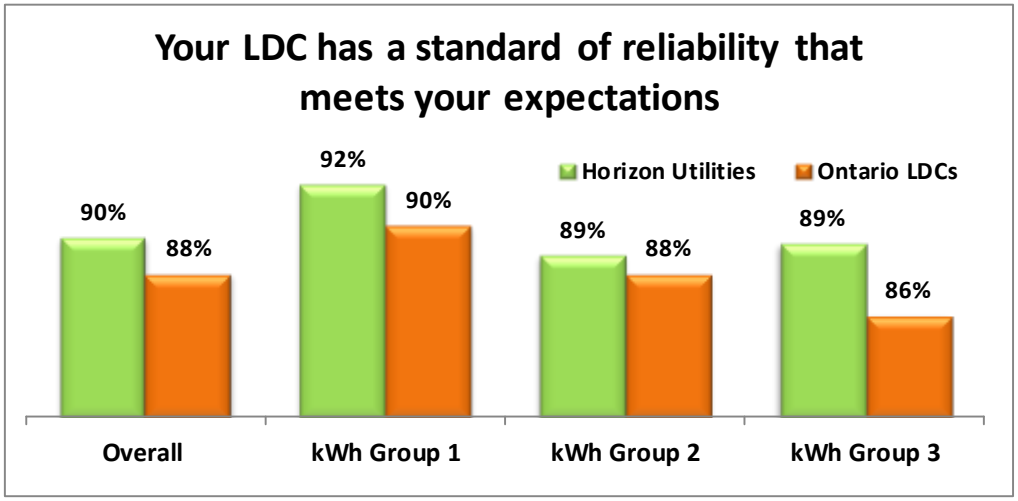
Base: total respondents

The perception of competency and value are certainly linked to the frequency and duration of power outages. 87% of respondents with an opinion agree (top 2 boxes) Horizon Utilities "quickly handles outages and restores power."

Customers have increased their expectations as it relates to getting information about outages. What makes the dissemination of information challenging for the LDC is the need to provide the information via multiple media channels and in a timely manner whilst trying to get the power restored.

Recognizing the importance of this topic to customers, a question about LDC reliability standards has been added to the core survey.

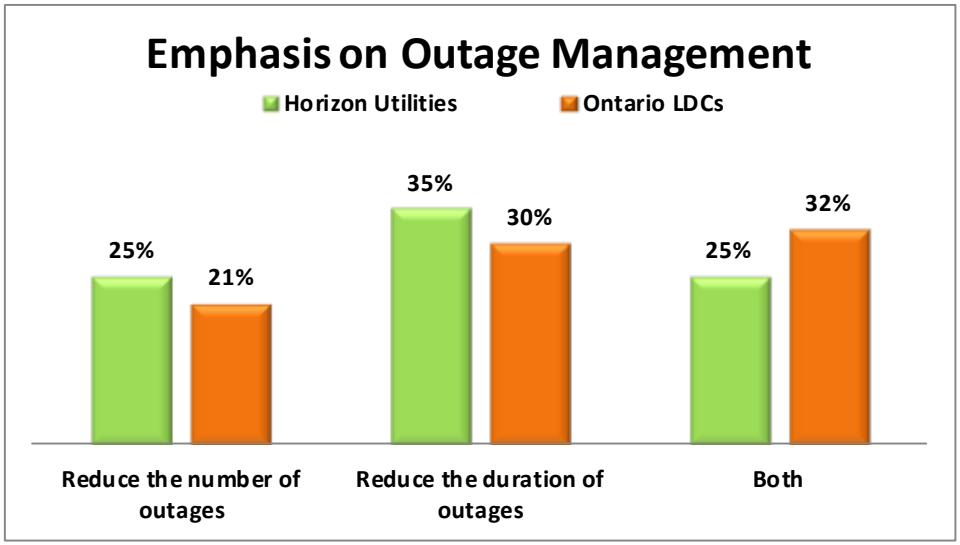
Customers who responded to the survey offer a paradox. On the one hand, when asked about "your LDC has a standard of reliability that meets your expectations", scores are very high – no doubt somewhat comforting to the LDC. On the other hand, when asked "Should your LDC improve its reliability standards" the majority certainly said "yes".



Base: An aggregate of respondents from the 2015 participating LDCs / 90% of total respondents from the local utility

How many outages are acceptable over 12 months? Horizon Utilities respondents who said "none" was 28%; "one" was 18%. Clearly expectations are very high.

Respondents were asked about emphasis on outage management: reduce the number; reduce the duration; or both with an understanding a rate increase would be required.



Base: An aggregate of respondents from the 2015 participating LDCs / total respondents from the local utility

LDC effectiveness responding to outages		
	Ontario LDCs	Horizon Utilities
Responding to the power outage	85%	88%
Restoring power quickly	86%	90%
Using media channels for updates	54%	60%
Providing information about the outage	61%	68%

Base: An aggregate of respondents from the 2015 participating LDCs / 90% of total respondents from the local utility

Preferred methods for LDC to contact you		
	Ontario LDCs	Horizon Utilities
Recorded telephone message	53%	80%
Email notice	29%	47%
Posted on utility's website	24%	41%
Social media - such as Twitter, facebook	17%	31%
Text message	28%	42%
Local radio	31%	69%
Local TV	23%	54%
Don't Know	3%	4%

Base: An aggregate of respondents from the 2015 participating LDCs / 90% of total respondents from the local utility

Being effective during an outage situation from the point of view of a customer requires that:

- timely information on outages is provided
- utilities understand that even a short outage in duration is impactful
- in large scale events, utilities should proactively provide tips on how to prepare for extended outages
- being kept informed about what is going on during an outage makes customers feel valued and that they matter.

Customer Focus – Customer Satisfaction – First Contact Resolution

Satisfaction with the contact experience

While employees can't control everything, they can control the quality of the experience. How a problem is handled can validate or invalidate a customer's perception about the utility's competency in providing excellent quality services. Customers, who contacted your LDC, rated their one-on-one transaction as follows:

Satisfaction with Customer Service			
Top 2 Boxes: 'very + fairly satisfied'	**Horizon Utilities**	**National**	**Ontario**
The time it took to contact someone	79%	76%	69%
The time it took someone to deal with your problem	80%	74%	64%
The helpfulness of the staff who dealt with you	77%	73%	67%
The knowledge of the staff who dealt with you	76%	73%	68%
The level of courtesy of the staff who dealt with you	84%	79%	79%
The quality of information provided by the staff who dealt with you	76%	72%	66%

Base: total respondents who contacted the utility

Given today's technology, many customers use more than one service channel. This gives the LDC a great opportunity to connect to both digital and physical service, providing customers a true omni-channel experience.

Overall satisfaction with most recent experience			
	Horizon Utilities	National	Ontario
Top 2 Boxes: 'very + fairly satisfied'	80%	79%	67%

Base: total respondents who contacted the utility

Problem solved rating

Respondents who said that they contacted the utility were also asked "Do you consider the problem solved or not solved?" 78% of your LDC's respondents said the problem was solved. The Ontario benchmark rating is 61%.

Customer Experience Performance rating (CEPr)

Some of the factors which contribute to the overall customer experience:

- Delivering accessible and consistent customer service (multi-channel)
- Understanding customer expectations
- Maintaining timely resolution timelines
- Providing effective communication(s) according to customer needs
- Demonstrating responsiveness
- Speeding up problem resolution
- Conducting problem analysis to prevent recurring issues
- Easy to do business with
- Seeking customer feedback and following through on recommendations

Customer Experience Performance rating (CEPr)			
	Horizon Utilities	**National**	**Ontario**
CEPr: all respondents	86%	83%	81%

Base: total respondents

The CEPr rating suggests that a very large majority of customers have a belief that they will have a good to excellent experience dealing with Horizon Utilities professionals.

Operational Effectiveness

With the exception of the Public Safety measure, performance measures would typically take the form of a monitoring and measuring (quantitative) rating. The realities of hard numbers may not correlate to actual customer perception.

Management Operations			
Top 2 boxes, 'strongly + somewhat agree'	**Horizon Utilities**	**National**	**Ontario**
Provides consistent, reliable electricity	93%	90%	88%
Quickly handles outages and restores power	87%	87%	85%
Makes electricity safety a top priority for employees and contractors	90%	89%	87%
Operates a cost effective electricity distribution system	72%	72%	63%
Overall the utility provides excellent quality services	86%	85%	83%

Base: total respondents with an opinion

Customer Focus – Service Quality

Current measures in the LDC scorecard are: New Residential Services Connected on Time; Scheduled Appointments Met on Time; and, Telephone Calls Answered on Time. These are good examples of efficiency measures as all are time based. Showing up on time may not create satisfaction, not showing up on time will cause dissatisfaction. Other dimensions of Service Quality that customers value include:

Customer Service Quality			
Top 2 boxes, 'strongly + somewhat agree'	**Horizon Utilities**	**National**	**Ontario**
Deals professionally with customers' problems	86%	82%	80%
Pro-active in communicating changes and issues affecting Customers	81%	74%	74%
Quickly deals with issues that affect customers	83%	80%	77%
Customer-focused and treats customers as if they're valued	80%	74%	72%
Is a company that is 'easy to do business with'	86%	81%	78%
Cost of electricity is reasonable when compared to other utilities	59%	63%	56%
Provides good value for money	70%	68%	62%
Delivers on its service commitments to customers	87%	84%	83%

Base: total respondents with an opinion

Operating & Capital Expenses

Much has been written, and reported on, regarding the cost of electricity. A goal of customer engagement, in addition to understanding wants & needs, is to reduce the worry that customers have about the reliability and future costs of electricity. What readers may not know is, Horizon Utilities has to focus on day-to-day operations while it builds, re-builds, re-furbishes and prepares the organization for a changed future. In addition, LDCs need to think in terms of decades, not just today, this week, this month, or this quarter. They need to do so in a regulated environment that is a 5 year planning environment. Respondents were asked to identify the items they were willing to pay more for and, they were asked "how much" they would be willing to pay.

Which of the following items are you willing to pay more for per month …				
Ontario LDCs	**Yes**	**No**	**Not sure**	**Don't know**
A proactive outage management system	51%	39%	9%	1%
Increased self-service options on the website	34%	58%	7%	1%
Extended office hours	16%	79%	5%	1%
Increased tree trimming to improve reliability	58%	35%	6%	0%
Better use of social media	20%	53%	2%	1%
Educating customers about energy conservation	47%	48%	4%	0%
Educating customers and the public about electricity safety	43%	53%	5%	0%

Base: An aggregate of respondents from the 2015 participating LDCs

Not surprisingly lower income respondents identified lower amounts. For example, 13% of respondents <40K who were willing to pay for one operational item identified a number between .51 - 1.00, it was 23% for respondents 70K+. Ability to pay also has an impact on the numbers that respondents identified. When three or more operational items were involved, 32% of respondents who said that they did not worry about paying their bill identified a number of 25 cents or less. Respondents who said they worry often, identified a number 25 cents or less, 59% of the time.

Secure customers identified higher numbers more frequently than At Risk customers. When three or more operational items were involved, At Risk customers pick a number less than 25 cents, 59% of the time; Secure customers was 35%. This proves that price increase receptivity is linked to customer affinity. However, average kWh usage per month showed very little difference between customers in the lower quartile of kWh versus customers in the highest quartile.

51% of respondents chose the statement “Pro-active replacement, even though it may cost more…” as the statement that best describes their view about replacing equipment.

The above chart can certainly fuel debate between industry professionals, regulators, interveners and customers. Could an LDC ignore investing in self-service options on their website? Do the raw scores from the survey represent what the LDC needs to do? If the LDC didn’t invest in increased self-service options what might happen to operational costs? What might happen to the perceived brand of the LDC i.e., being seen as a modern enterprise?

For those who said they would pay more…

Willing to pay how much more per month for …			
Ontario LDCs	**1 item**	**2 items**	**3 or more items**
$0.25 or less	59%	47%	35%
$0.26 – $0.50	10%	13%	10%
$0.51 – $1.00	14%	15%	16%
$1.01 – $2.00	6%	8%	15%
$2.01 – $3.00	2%	3%	6%
$3.01 – $5.00	1%	4%	7%
$5.01+	0%	3%	5%
Don't know	8%	8%	5%

Base: An aggregate of respondents from the 2015 participating LDCs

Respondents were not guided by the interviewer providing various ranges of rates.

Respondents were simply asked to give an amount of $.

Their answers were categorized into one of the rate ranges shown in the table.

The amount customers are willing to pay for 1 item versus 3 items did not translate into a proportional increase. While customers recognize 3 items would necessitate more money than 1 item, fewer customers were willing to pay that much more for 3 items. They are more willing to pay for items that provide a direct benefit to themselves.

Customer Affinity

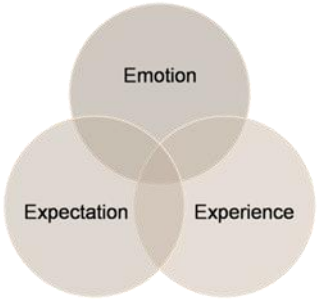
Customers continue to be more sophisticated, educated and demanding and with less money available. They expect value and quality services – not either/or but and/also. Recognizing that customers have a meaningful perspective can help the LDC drive out waste, reduce complaints, embrace new processes and new technologies that lead to greater efficiency and effectiveness.

There are many reasons why LDCs should put a premium on satisfying customers. Such as: there is an obligation to satisfy people; it makes sense economically; the industry has to prove that it is

valuable to its customers and, increased customer satisfaction can influence employee morale and retention. A big reason is, higher levels of customer affinity (Loyalty). Loyalty, for private industry, is a behaviourial metric. Loyalty, for natural monopolies (like LDCs) is an attitudinal metric.

Customer Loyalty Groups				
	Secure	**Favorable**	**Indifferent**	**At Risk**
Horizon Utilities				
2015	25%	10%	61%	4%
2014	21%	9%	59%	10%
2013	28%	17%	48%	7%
2012	27%	14%	51%	9%
2011	23%	9%	57%	11%

Base: total respondents



"Whether a customer is loyal and/or satisfied will be determined by an alignment of the emotion, experience and expectation of both the customer and the LDC."

Credibility and Trust

Higher levels of trust are the hallmarks of Secure customers and utilities benefit from a trusted relationship with their empowered customers. When people interact, either face-to-face, by telephone or on-line, if there is a lack of trust, the interaction is not going to be efficient. Trust improves the speed at which the interaction can be accomplished. At Risk customers recall experiencing more

outages and more billing problems than Secure customers. What makes matters worse is, At Risk customers are about 2X more likely to contact the utility to deal with it.

The attributes which help an LDC to be seen as trusted and highly credible are: knowledge, integrity, involvement and trust. Trust is not a thing, it is a feeling. On demonstrating Credibility and Trust, Horizon Utilities has done well.

Credibility and Trust Index			
	Horizon Utilities	**National**	**Ontario**
Knowledge	87%	84%	82%
The LDC is seen as being knowledgeable about the services it provides, about what is happening in the industry, and how customers can reduce costs or manage consumption.			
Integrity	85%	82%	79%
The LDC is seen as an organization that will act in the best interests of its customers and can be counted on to provide services and resolve problems in a professional manner.			
Involvement	81%	75%	73%
The LDC is actively involved in the industry, in the community and in things that affect the customer.			
Trust	85%	92%	87%
The LDC is an organization that can be trusted and is worthy of respect.			
Overall	**85%**	**83%**	**80%**

Base: total respondents

UtilityPULSE Report Card®

The purpose of the UtilityPULSE Report Card is to provide your utility with a snapshot of performance – it represents the sum total of respondents' ratings on 6 categories of attributes that research has shown are important to customers in influencing satisfaction and affinity levels with their utility.

Horizon Utilities' UtilityPULSE Report Card®

Performance

	CATEGORY	Horizon Utilities	National	Ontario
1	**Customer Care**	**A**	**B+**	**B+**
	Price and Value	B+	B+	B+
	Customer Service	A	B+	B+
2	**Company Image**	**A**	**A**	**B+**
	Company Leadership	A	B+	B+
	Corporate Stewardship	A	A	A
3	**Management Operations**	**A**	**A**	**A**
	Operational Effectiveness	A	A	B+
	Power Quality and Reliability	A+	A	A
	OVERALL	**A**	**A**	**B+**

Base: total respondents

Company Image

How customers think about their LDC has a direct influence on how customers act, react or engage with Horizon Utilities. For example, customers with a positive impression put less strain on the operations. In 2006, 10 years ago, our industry research showed Company Image had an 18% weighting as it relates to shaping perception about their LDC. Today, Company Image weighting for Horizon Utilities is 34%, Ontario is 33%, a significant change.

Attributes strongly linked to a hydro utility's image			
	Horizon Utilities	**National**	**Ontario**
Is a respected company in the community	86%	82%	79%
A leader in promoting energy conservation	82%	78%	75%
Keeps its promises to customers and the community	84%	79%	77%
Is a socially responsible company	84%	81%	77%
Is a trusted and trustworthy company	85%	81%	77%
Adapts well to changes in customer expectations	77%	71%	67%
Is 'easy to do business with'	86%	81%	78%
Provides good value for your money	70%	68%	62%
Overall the utility provides excellent quality services	86%	85%	83%
Operates a cost effective electricity distribution system	72%	72%	63%

Base: total respondents with an opinion

Marketing communications should capitalize on the strong image scores to reduce the worry that customers have about reliability, future costs and other concerns that they have. Technically performing the expected job well is one thing, but the LDC also has to be "seen" as performing well.

What do customers think about electricity costs?

For years electric utility customers have had a very real concern about high bills and the cost of electricity. We've constantly and consistently have told our clients "when a value proposition doesn't exist or is unclear, then people will focus on price." LDCs in Ontario certainly score low on "value for money." When a customer struggles to pay their electricity bill they also struggle to see the LDC providing good value for money.

The good news is, LDCs have been doing more to engage customers about the utilities' plans to spend money to improve operations and/or make capital investments. While this is seen as an important process, especially by the Ontario Energy Board, it doesn't deal with the basic issue at hand – the customer's own struggle to pay the bill. Our first year of research, 1999, showed us that there was a very high correlation between ability to pay and satisfaction – in 2015 the correlation is still high.

Is paying for electricity a worry or major problem …			
	Horizon Utilities	National	Ontario
Not really a worry	64%	70%	57%
Sometimes I worry	26%	20%	26%
Often it is a major problem	7%	7%	11%
Depends	2%	2%	2%

Base: total respondents

Additional Insights

As it relates to SMART Grid knowledge, customers polled in the Ontario survey show 37% *"have heard the term SMART Grid but know very little about it"* and 32% claimed they *"have not heard the term"*. This suggests that customers will not automatically understand and accept SMART Grid technology.

The Ontario survey shows that interest in purchasing an electric vehicle remains at 34% - unchanged since 2012. 75% of those that are "interested in purchasing" claim they wouldn't be acting on their interest in purchasing for 24 months or more. The adoption rate of EVs is still in its infancy.

UtilityPULSE asked 1,269 Residential customers, located throughout Ontario and who pay the electricity bill questions pertaining to the solicitation of customer feedback and opinions on different electricity industry matters. These questions were asked with the intent of gauging the customer's perception of requesting feedback and the importance thereof. Percentage of respondents who said it was important to solicit feedback [Top 2 Boxes: 'very + somewhat important']:

- 89% on "overall satisfaction with the utility"
- 83% on "how much money is being spent on repairing equipment"
- 86% on "how much money is being spent on keeping the system reliable"
- 84% on "extending the system to help economic development in the community".

The data on the importance of “feedback” tells us customers want their voice heard. We believe this is completely in sync with, what experts call, customer centricity. However asking for feedback, but not acting on that feedback or not using the feedback in a constructive way could have some adverse consequences for the LDC i.e., lower levels of trust, credibility and customer affinity.

Today’s consumers expect a ‘passion of service’ centered on quality and a proactive attitude toward the customer. LDCs are by no means excluded from this fundamental trend. Customers want respect, to feel they count, to be informed in case of power disruptions and to be reassured when unexpected large-scale outage events occur. To gain credibility as an LDC focused on the service it offers its customers, you need to empower staff at all levels of the organization with the tools and “know-how” so they will take initiative and responsibility in dealing with different situations as they arise.

We recommend having meaningful two-way dialogue with employees (and others) to leverage the results from your 2015 customer satisfaction survey derived from speaking with 603 Horizon Utilities' customers [March 4 - 14]. Ensuring customers are everyone’s priority in the LDC through words, behaviours, actions and interactions creates an improved organization that can better meet tomorrow’s challenges while keeping costs in check.

UtilityPULSE
Sid Ridgley
Simul/UtilityPULSE
Email: sidridgley@utilitypulse.com or sridgley@simulcorp.com
June, 2015

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Satisfaction (pre & post)

In Ontario, the Ontario Energy Board (OEB) has made it clear Customer Satisfaction measurement will be part of an Electricity Distributor's reporting. Of the many reasons why every LDC should place a premium on satisfying customers, here are some of the important ones:

1- Every enterprise has an obligation to satisfy its customers

2- Economically, high levels of satisfaction lead to less customer complaints and less scrutiny (hence less cost)

3- As an effectiveness measure it prompts discussion about policies, procedures, planning, use of technology, and more

4- When things go wrong (and they do), customers with high levels of satisfaction handle the problem far better than customer with very low levels of satisfaction

5- For employees there is a morale boost when working in an organization with a high level of customer satisfaction

6- Customers (as well as others) have growing levels of expectations which means the things that satisfy customers today may not tomorrow.

A focus on satisfaction prompts an organization to continue to evolve in ways that make sense to those that pay the bills. A focus on satisfaction is a focus on effectiveness in the delivery of service to the customer. Satisfied customers who trust their LDC may be more likely to seek advice i.e. energy efficiency methods, and may be more receptive to important messages i.e. safety, new capital projects, etc.

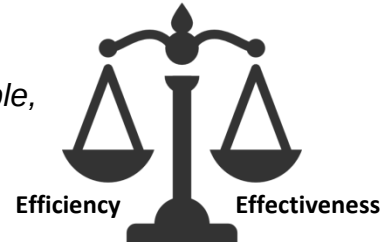
A word of caution to readers, please do not assume that great performance in an efficiency rating (such as answering the phone in 30 seconds) will lead to customer satisfaction. It will not. Answering the phone in 20 seconds but not solving the customer's problem is not going to ameliorate the customer's perception about the transaction.

Efficiency ratings won't lead to satisfaction but they can lead to dissatisfaction. Taking 90 seconds to answer the phone will create an agitated customer who, for the most part starts off being dissatisfied with the service – before you've even had a chance to deal with or solve their problem.

Customer expectations of their electricity LDC have evolved past the "provide electricity reliably, safely and billed both accurately with fair pricing". They do expect their LDC to be ethical, forward-thinking, competent and trustworthy.

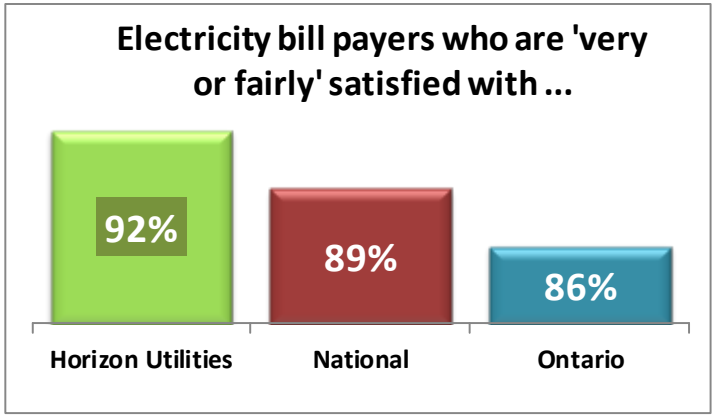
In a nutshell:

- Satisfaction is not a program, it is an outcome.
- ***Efficiency*** *is about achieving objectives with the minimum amount of people, time, money and other resources.*
- ***Effectiveness*** *ratings are measures that keep the organization and its people more future focused than efficiency ratings*
- Finding the right balance between efficiency and effectiveness measures is difficult.



- **Satisfaction** happens when utility core services meet or exceed customer's needs, wants, or expectations.

- **Loyalty** occurs when a customer makes an emotional connection with their electric utility on a diverse range of expectations beyond core services.



Base: total respondents

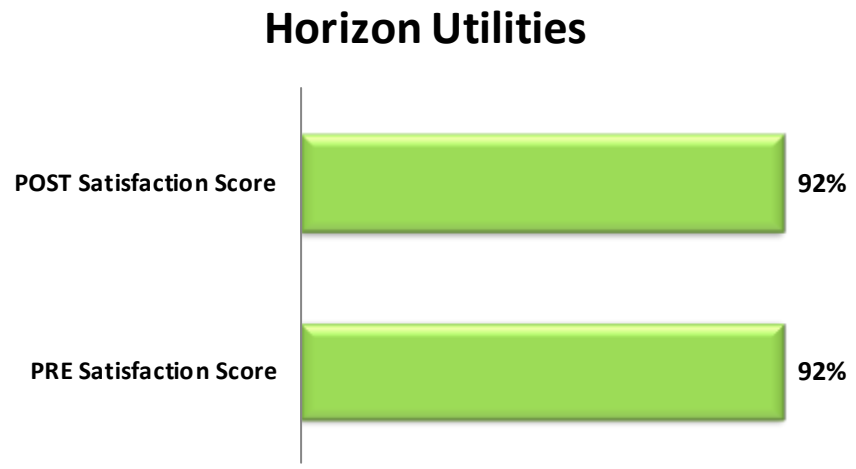
Satisfaction alone does not make a customer loyal; a willingness to commit and advocate for a company along with satisfaction identifies the three basic customer attitudes which underpin loyalty profiles. While satisfaction is an important component of loyalty, the loyalty definition needs to incorporate more attitudinal and emotive components.

Electricity bill payers who are 'very or fairly' satisfied with…					
	2015	2014	2013	2012	2011
Horizon Utilities	92%	87%	92%	90%	83%
National	89%	89%	90%	88%	89%
Ontario	86%	83%	90%	86%	84%

Base: total respondents

Every LDC we've worked with over the past 17 years conducting this survey can provide examples of employees who have certainly gone above and beyond the call of duty. Just listen to employees, at all levels, as they talk – with pride – about what their LDC is doing.

In the Simul/UtilityPULSE Customer Satisfaction survey, the overall satisfaction question is asked both at the beginning (PRE) and the end (POST). Asking the general satisfaction question at the start of the survey avoids bias and we obtain a spontaneous rating. This allows measurement of customers' overall impressions of the utility prior to prompting them to think of specific aspects of the relationship. After we have asked about specific aspects of the customer experience, we gain a more *considered* (or conditioned) response.



Base: total respondents

Satisfied and engaged employees who work in an organizational culture that promotes service excellence is key for completing the job both efficiently and effectively. After-all employees do more than deliver customer service – they personalize the relationship between customer and the utility

SATISFACTION SCORES – Electricity customers' satisfaction			
Top 2 Boxes: 'very + fairly satisfied'	**Horizon Utilities**	**National**	**Ontario**
PRE: Initial Satisfaction Scores	92%	89%	86%
POST: End of Interview	92%	88%	83%

Base: total respondents

SATISFACTION SCORES – Electricity customers' satisfaction					
Top 2 Boxes: 'very + fairly satisfied'	**2015**	**2014**	**2013**	**2012**	**2011**
PRE: Initial Satisfaction Scores	92%	87%	92%	90%	83%
POST: End of Interview	92%	87%	95%	93%	90%

Base: total respondents

Customers, as human beings, are both rational and emotional. The rational side of the customer holds the LDC accountable for doing its job. The emotional side of the customer is about fulfilling expectations. Not meeting rational needs – creates dissatisfaction. Meeting emotional needs, can move a customer from neutral to higher levels of satisfaction.

Attributes strongly linked to a hydro utility's image			
	Horizon Utilities	National	Ontario
RATIONAL NEEDS			
Provides consistent, reliable electricity	93%	90%	88%
Quickly handles outages	87%	87%	85%
Accurate billing	88%	83%	80%
Provides good value for money	70%	68%	62%
Is 'easy to do business' with	86%	81%	78%
Operates a cost effective electricity distribution system	72%	72%	63%
EMOTIONAL NEEDS			
Deals professionally with customers' problems	86%	82%	80%
Provides information to help customers reduce electricity costs	80%	76%	74%
Pro-active in communicating changes	81%	74%	74%
Quickly deals with issues that affect customers	83%	80%	77%
Adapts well to changes in customer expectations	77%	71%	67%
Overall the utility provides excellent quality services	86%	85%	83%

Base: total respondents with an opinion

Customer Service

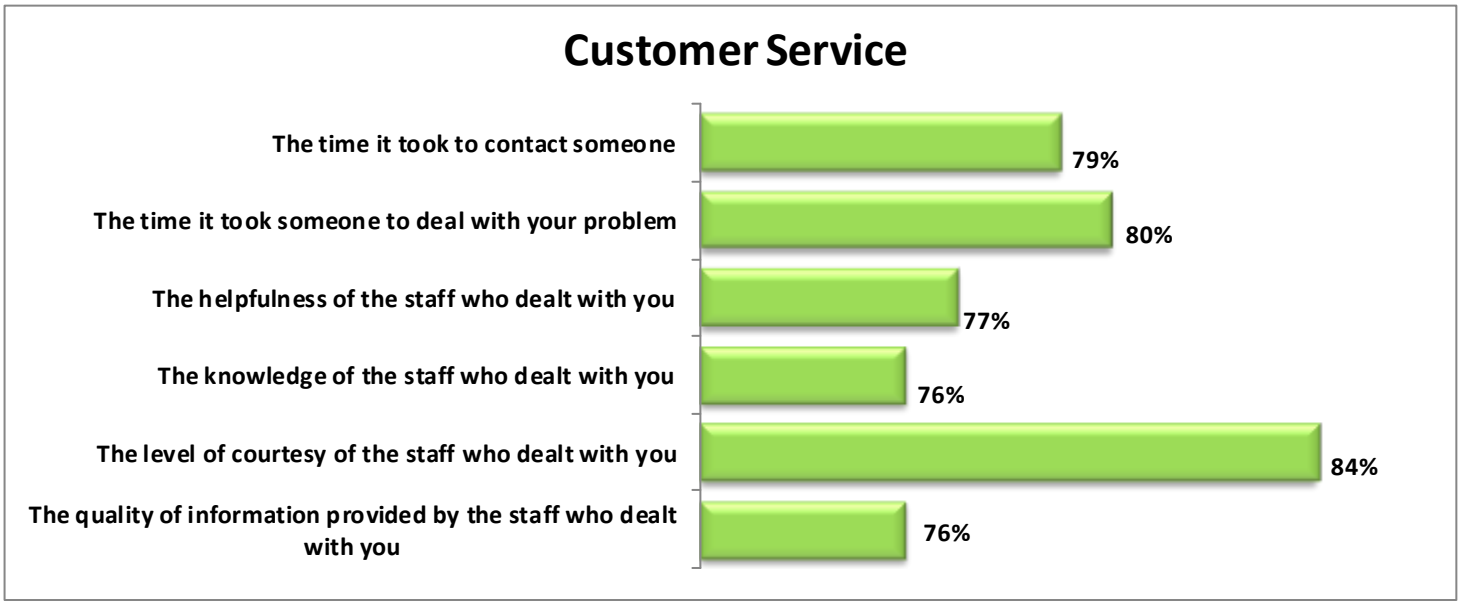
There is no way the quality of customer service can exceed the quality of the people delivering it. LDCs can have all the elements of customer service in place, but if customers are disappointed with the way their transaction was handled or its results, they will not be satisfied. There are lots of things the LDC and its people cannot control, but employees can control the quality of the experience.

Having well-trained employees is foundational. The keys to good customer service is listening to understand with real empathy and then responding in a professional, knowledgeable, and timely manner. After-all it is the customer who decides whether the interaction was worthwhile and/or valued.

Respondents, who contacted their utility via the telephone or in-person about a problem, were asked about six aspects of their most recent experience with a representative from Horizon Utilities.

- Information – quality of information provided
- Staff attitude – level of courtesy
- Professionalism – the knowledge of staff
- Delivery – helpfulness of staff
- Timeliness – the length of time it took to get what they needed
- Accessibility – how easy it was to contact someone

1. *Their problem solved quickly*
2. *To have personal interaction with a customer care representative*
3. *To speak with a knowledgeable and courteous customer care representative*



Base: total respondents who contacted the utility

Satisfaction with Customer Service			
Top 2 Boxes: 'very + fairly satisfied'	**Horizon Utilities**	**National**	**Ontario**
The time it took to contact someone	79%	76%	69%
The time it took someone to deal with your problem	80%	74%	64%
The helpfulness of the staff who dealt with you	77%	73%	67%
The knowledge of the staff who dealt with you	76%	73%	68%
The level of courtesy of the staff who dealt with you	84%	79%	79%
The quality of information provided by the staff who dealt with you	76%	72%	66%

Base: total respondents who contacted the utility

Respondents, who contacted their utility via an electronic means, e.g., email, website, social media, were asked about four aspects of their most recent experience with a representative.

Satisfaction with Customer Service via electronic means	
Top 2 Boxes: 'very + fairly satisfied'	**Overall**
The timeliness of response	60%
The quality of information provided	66%
The helpfulness of the information	66%
The level of professionalism	65%

Base: total respondents from the full 2015 database

Overall satisfaction with most recent experience			
	Horizon Utilities	**National**	**Ontario**
Top 2 Boxes: 'very + fairly satisfied'	80%	79%	67%

Base: total respondents who contacted the utility

The difference between overall service quality and service encounter quality (most recent experience), viewing the service encounter as a discrete event occurring over a defined period/moment of time (such as a call about their "July billing"). Customers hold expectations of the quality of each service encounter, just as they hold expectations about the overall service quality of an LDC. When the expectations are about individual service encounters, they are likely to be more specific and concrete (such as the number of minutes one waited for a CSR) than the expectations about overall service quality (like prompt service).

Interestingly when customers do have a problem, contact their LDC, and get the problem solved their satisfaction ratings are very similar to the overall level of satisfaction that exists. It is important that LDCs have an obsession with "first call resolution" as it is very beneficial and is more than a "nice idea".

SATISFACTION SCORES – Electricity customers' satisfaction			
	Overall	**Problems Solved**	**Problems Not Solved**
Top 2 Boxes: 'very + fairly satisfied'	89%	88%	60%
Bottom 2 Boxes: 'fairly + very dissatisfied'	7%	8%	37%

Base: total respondents from the full 2015 database

Satisfaction with Customer Service			
Top 2 Boxes: 'very + fairly satisfied'	**Overall**	**Paying for electricity:**	
		No worries	**Often worry**
The time it took to contact someone	74%	75%	64%
The time it took someone to deal with your problem	71%	72%	58%
The helpfulness of the staff who dealt with you	75%	78%	59%
The knowledge of the staff who dealt with you	75%	76%	65%
The level of courtesy of the staff who dealt with you	83%	83%	73%
The quality of information provided by the staff who dealt with you	73%	75%	62%

Base: total respondents from the full 2015 database

While there is more information about customer loyalty in this report, the following chart shows the difference in customer service ratings given by customers who are “secure” versus customers who are “at risk”. In addition, “at risk” customers seem to have more problems than other customers and are much more likely to contact their LDC to do something about it.

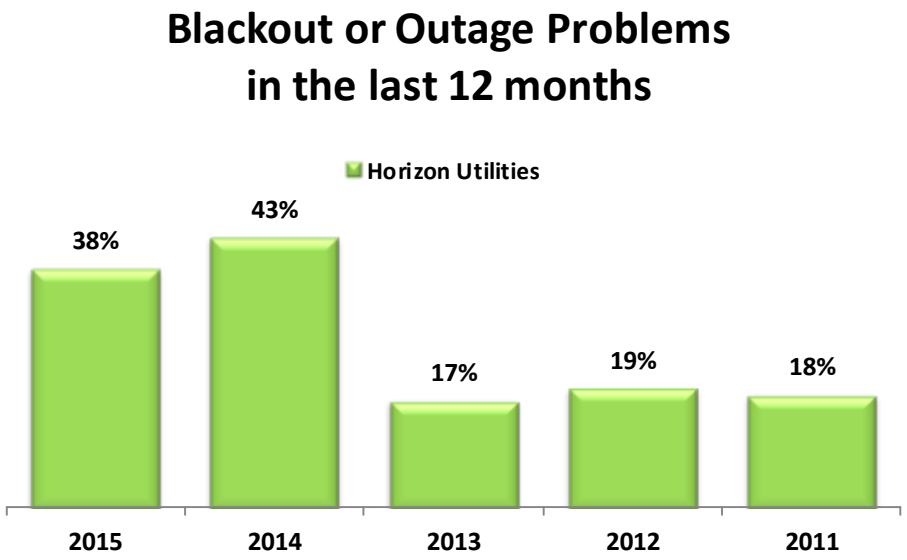
Base: total respondents from the full 2015 database

Important attributes which shape perceptions about service quality			
	Horizon Utilities	National	Ontario
Deals professionally with customers' problems	86%	82%	80%
Is pro-active in communicating changes and issues which may affect customers	81%	74%	74%
Quickly deals with issues that affect customers	83%	80%	77%
Customer-focused and treats customers as if they're valued	80%	74%	72%
Is a company that is 'easy to do business with'	86%	81%	78%
Cost of electricity is reasonable when compared to other utilities	59%	63%	56%
Provides good value for money	70%	68%	62%
Delivers on its service commitments to customers	87%	84%	83%
Trusted and trustworthy company	85%	81%	77%
Respected company in the community	86%	82%	79%
Provides information and tools to help manage electricity consumption	81%	77%	75%
Adapts well to changes in customer expectations	77%	71%	67%

Base: total respondents with an opinion

Bill payers' recent problems and problem resolution

Outages and billing problems, we call them the "Killer B's", the two issues that are most likely to cause grief to utility customers. Ensuring power reliability has and will continue to be the key operational priority for electric utilities.



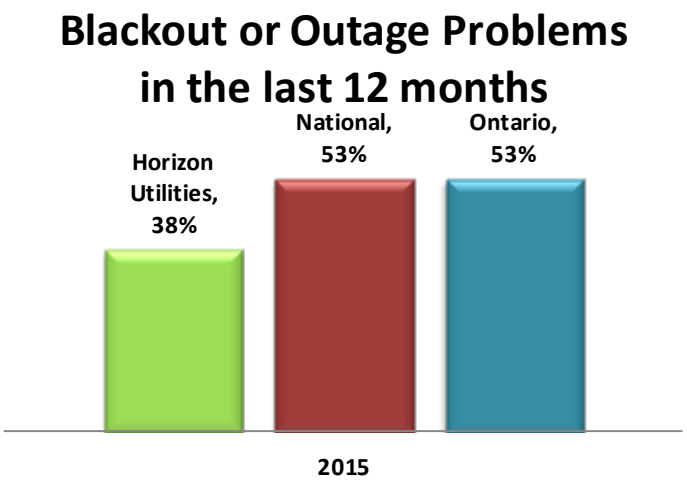
The perception of competency and value are certainly linked to the frequency and duration of power outages. 87% of respondents with an opinion agree (top 2 boxes) Horizon Utilities "quickly handles outages and restores power" and 90% agreed (top 2 boxes) that this LDC has a standard of reliability that meets expectations.

Base: total respondents

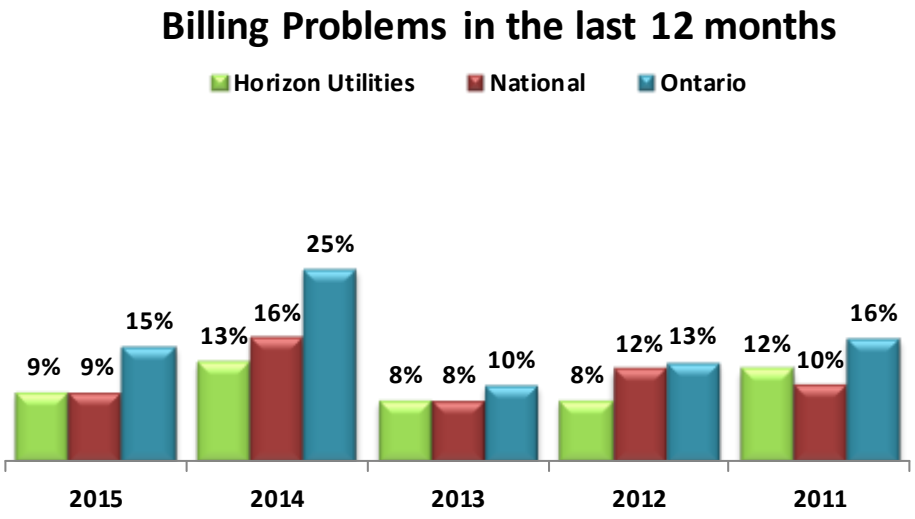
Like it or not, there will be times when the power goes off – and for reasons beyond the control of the LDC.

Percentage of Respondents indicating that they had a Blackout or Outage problem in the last 12 months			
	Horizon Utilities	National	Ontario
2015	38%	53%	53%
2014	43%	47%	49%
2013	17%	41%	35%
2012	19%	44%	46%
2011	18%	43%	43%

Base: total respondents



Base: total respondents



Base: total respondents

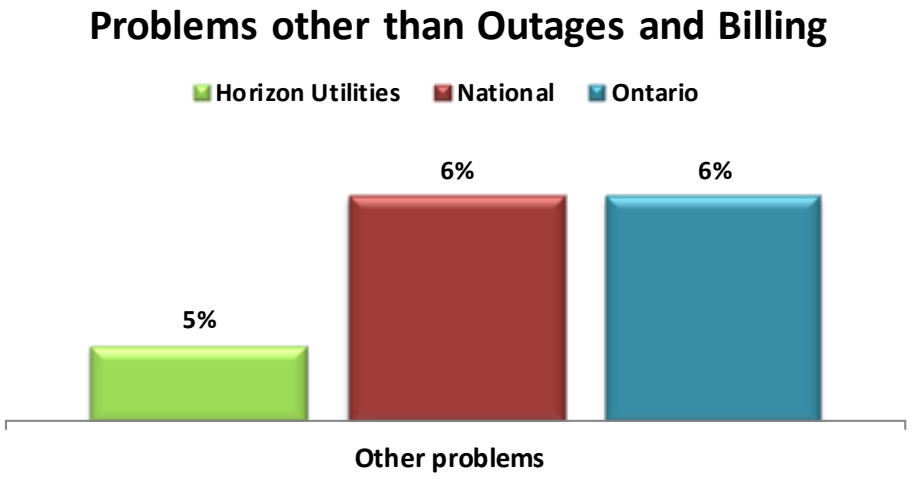
Percentage of Respondents indicating that they had a Billing problem in the last 12 months			
	Horizon Utilities	National	Ontario
2015	9%	9%	15%
2014	13%	16%	25%
2013	8%	8%	10%
2012	8%	12%	13%
2011	12%	10%	16%

Base: total respondents

Types of Billing Problems	
	Horizon Utilities
The amount owed was too high	71%
Complaint about rates or charges	8%
The bill was difficult to understand	4%
The payment made was recorded incorrectly	2%
The bill arrived late	2%

Base: total respondents with billing problems

As it relates to problems, the Killer B's – Bills and Blackouts still occupy top ranking – while moving/setting up a new account, maintenance repairs, high bills, information on pricing, ways to save energy, incentives on energy conservation are issues which also **contribute to customer contact levels through a call-centre or electronic media.**



Base: total respondents

Survey respondents were asked about how they contacted their utility when there was a problem. For utilities, customers continue to favour the telephone.

What method did you use to contact your electric utility when you had a problem?

Base: total respondents from the full 2015 database

Problems aggravate customers. It could be said that some problems can actually anger customers. As a minimum, a problem is an inconvenience to the customer – and they want it solved/resolved. When the problem is solved with the first interaction (often called first call resolution) overall customer satisfaction improves. When customer satisfaction improves the utility benefits.

Percentage of Respondents who contacted their utility and had their problem solved in the last 12 months			
	Horizon Utilities	National	Ontario
Yes	78%	81%	69%
No	18%	17%	26%

Base: total respondents

Attributes describing operational effectiveness			
	Overall Score	Problem Solved	Problem Not Solved
Provides consistent, reliable electricity	90%	88%	77%
Delivers on its service commitments to customers	86%	85%	68%
Accurate billing	86%	84%	64%
Quickly handles outages and restores power	87%	85%	73%
Makes electricity safety a top priority	88%	90%	79%
Has a standard of reliability that meets expectations	88%	87%	72%
Is efficient at managing the electricity system	82%	81%	63%
Is a company that is 'easy to do business with'	84%	82%	59%
Overall the utility provides excellent quality services	85%	84%	66%

Base: total respondents from the full 2015 database with an opinion

While an LDC is a natural monopoly i.e., customers can't go elsewhere and an LDC can't "fire" a customer, we recommend LDCs continue to build and strengthen their relationship with customers. UtilityPULSE categorizes respondents into 3 customer groups. Interestingly when the customer relationship is strong i.e., customers are Secure, they recall less outages and billing problems than customers who are At Risk.

Bill payers recalling a power failure or outage				
	Secure	**Favorable**	**Indifferent**	**At Risk**
Yes	31%	40%	46%	58%
No	68%	60%	53%	42%

Base: total respondents from the full 2015 database

Bill payers recalling a billing problem				
	Secure	**Favorable**	**Indifferent**	**At Risk**
Yes	3%	5%	10%	38%
No	97%	94%	89%	61%

Base: total respondents from the full 2015 database

Bill payers who said their problem was solved				
	Secure	**Favorable**	**Indifferent**	**At Risk**
Yes	94%	84%	73%	37%
No	5%	15%	23%	61%

Base: total respondents from the full 2015 database

Customer Experience Performance rating (CEPr)

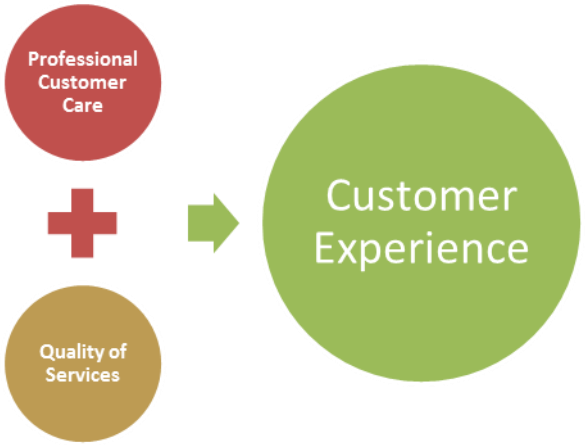
The CEPr score is an effectiveness rating and is affected by many dimensions of service. Every touch point with customers on the phone, website or in-person influences what customers think and feel about the organization. While an excellent transaction today creates a positive experience today, the perception created is that future transactions will be excellent too. Of course a negative transaction creates the perception that future transactions will be negative.

When the customer experience is strong, the opportunity to build loyalty is great. When the experience is a negative one, customers often conclude the organization doesn't care. When a customer believes the organization doesn't care, outrage and anger are a very real possibility.

Understanding your customer's expectations for service is the first step in providing an amazing customer experience. It is essential that customer care call centers develop a comprehensive understanding of

At the heart of the CEPr are 4 central questions:

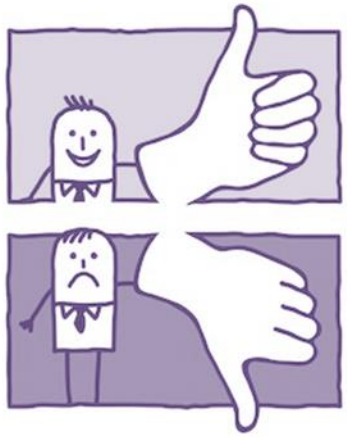
1. *Are interactions with the organization professional and productive?*
2. *Is the organization 'easy to deal with'?*
3. *Does the organization effectively meet your needs?*
4. *Does the organization provide high quality services?*



what customers expect from them, whether or not their needs are being met and how they can improve their service to meet their expectations.

Some of the factors which contribute to the overall customer experience:

- Delivering accessible and consistent customer service (multi-channel)
- Understanding customer expectations
- Maintaining timely resolution timelines
- Providing effective communication(s) according to customer needs
- Demonstrating responsiveness
- Speeding up problem resolution
- Conducting problem analysis to prevent recurring issues
- Easy to do business with
- Seeking customer feedback and following through on recommendations



Customer Experience Performance rating (CEPr)			
	Horizon Utilities	**National**	**Ontario**
CEPr: all respondents	86%	83%	81%

Base: total respondents

The CEPr for Horizon Utilities is 86%. This rating would suggest that a very large majority of customers have a belief that they will have a good to excellent experience dealing with Horizon Utilities professionals.

Customer Centric Engagement Index (CCEI)

Customer engagement is often thought of as a series of activities involving the customer such as conducting a survey, holding town hall type meetings, focus groups, etc. One could call these types of activities as the behaviour side of engagement. However there is an emotional side to engagement.

This survey also provides you with an emotional look at engagement. The UtilityPULSE CCEI is a gauge of the amount of goodwill that has been generated. High numbers in CCEI suggest that there is a high level of goodwill amongst your customers – this is important for two reasons. First when something goes awry for the utility, goodwill helps the utility to be resilient. Second, goodwill encourages active participation in requests to participate in engagement activities or program offerings from the utility.

The CCEI is a metric designed to get a more in-depth look at the attachment a customer has with your LDC and its brand. High levels of customer engagement (emotional) correlate strongly to high levels of Secure and Favourable customer numbers.

Engagement is how customers think, feel and act towards the organization. As such, ensuring that customers respond in a positive way requires that they are rationally satisfied with the services provided AND emotionally connected to your LDC and its brand. The more frequently and consistently an organization's products and services can connect with a customer, especially on an emotional level, the stronger and deeper the customer becomes engaged with the organization.

UtilityPULSE has identified the six key dimensions of what defines customer engagement. They are: empowered, valued, connected, inspired, future oriented and performance oriented.

Utility Customer Centric Engagement Index (CCEI)			
	Horizon Utilities	**National**	**Ontario**
CCEI	84%	83%	80%

Base: total respondents

Customer centric engagement is a measure of "goodwill" towards the utility. Customers who are less engaged, as measured by the CCEI are more likely to let costs and/or price impact their perceptions of their LDC. Customers who are highly engaged are more inclined to look past costs and money issues and use a rational approach to make values-based decisions. Highly engaged customers have a stronger emotional connection to your utility. It's this emotional connection that will drive commitment, loyalty and advocacy.

UtilityPULSE Report Card®

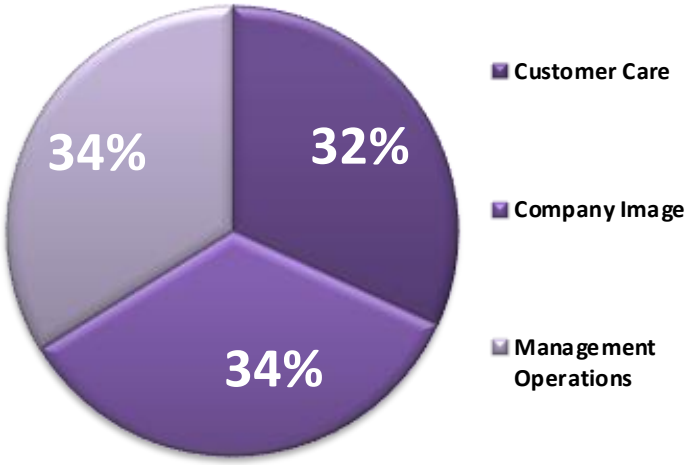
Simul's UtilityPULSE Report Card® is based on tens of thousands of customer interviews gathered over seventeen years. The purpose of the UtilityPULSE Report Card® is to provide electric utilities with a snapshot of performance – on the things that customers deem to be important. Research has identified over 20 attributes, sorted into six topic categories (we call these drivers), that customers have used to describe their utility when they have been satisfied or very satisfied with their utility. These attributes form the nucleus, or base, from which "scores" are assigned. Customer satisfaction and loyalty also play a major role in the calculations.

There are two main dimensions of the UtilityPULSE Report Card® the first is customer psyche and the other is customer perceptions about how the utility executes its business.

The Psyche of Customers

Every utility has virtually the same responsibility – provide safe and reliable electricity – yet not all customers are the same. The following chart shows the weight or significance of each category to the customer when forming their overall impression of the utility. Three major themes, each with two major categories make up the UtilityPULSE Report Card®. In effect the Report Card provides feedback about your customers' perception on the importance of each category and driver – as it relates to the benchmark.

UtilityPULSE Report Card® for Horizon Utilities



The UtilityPULSE Report Card is a zero sum game. As customer interest/concern in one area goes up, the others go down.

Base: total respondents

The UtilityPULSE Report Card® also provides customer perceptions about how your utility executes or performs its responsibilities. This is different, very different, from what a customer might say about a major concern or worry that they have about electricity. As our survey has shown since its inception the primary suggestion for improvement is “reduce prices”, which is also a major concern which your customers have about municipal taxes, gas for the vehicle, and other utilities.

Readers of this report should note that the categories and drivers are interdependent. Which means that, for example, failure to provide high levels of power quality and reliability will have a negative impact on customer perceptions as it relates to customer service. Customer care, when it doesn’t meet customer expectations has a negative impact on Company Image, etc.

Defining the categories and major drivers:

Category: Customer Care

Drivers: Price and Value; Customer Service

Just because everyone likes good customer care, that in and by itself, is not a reason to provide it – though it may be important to do so. In highly competitive industries good customer service may be a differentiating factor. The case for electric utilities is simple, high levels of customer care result in less work (hence cost) of responding to customer inquiries and higher levels of acceptance of the utility's actions.

Price and Value:

Customers have to purchase electricity because life and lifestyle depend on it. This driver measures customer perceptions as to whether the total costs of electricity represent good value and whether the utility is seen as working in the best interests of its customers as it relates to keeping costs affordable.

Customer Service:

Customers do have needs and every now and again have to interface with their utility. How the utility handles various customers' requests and concerns is what this driver is all about. Promptly answering inquiries, providing sound information, keeping customers informed and doing so in a professional manner are the major components of this driver.

Category: Company Image

Drivers: Company Leadership; Corporate Stewardship

Utilities have an image even if they do not undertake any activities to try to build it. A company's image is both a simple and complex concept. It is simple because companies do create images that are easily described and recognized by their target customers. It is complex because it takes many discrete elements to create an image which includes, but is not limited to: advertising, marketing communications, publicity, service offering and pricing.

An electric utility trying to manage its image has one more challenge to deal with, and that is the electric industry itself. There are so many players that residential customers (in particular) don't know who does what or who is responsible for what. So when there are political or regulatory announcements, the local utility is often swept up into the collective reaction of the population.

Company Leadership

This driver is comprised of customer perceptions as it relates to industry leadership, keeping promises and being a respected company in the community.

Corporate Stewardship

Customers rely on electricity and want to know that their utility is both a trusted and credible organization that is well managed, is accountable, is socially responsible and has its financial house in order.

Category: Management Operations

Drivers: Operational Effectiveness; Power Quality and Reliability

Electrical power is the primary product which utilities provide their customers and, they have very high expectations that the power will be there when they need it. Customers have little tolerance for outages. The reality is, every utility has to get this part right…no excuses. It is the utility's core business. This category and its drivers are clearly the most important for fulfilling the rational needs of a utility's customers.

Operational Effectiveness

This driver measures customers' perceptions as they relate to ensuring that their utility runs smoothly. Attributes such as: accurate billing and meter reading, completing service work in a professional and timely manner and maintaining equipment in good repair are deemed as important to customers.

Power Quality and Reliability

Power outages are a fact of life – and, customers know it. They expect their utility to provide consistent, reliable electricity, handle outages and restore power quickly and make using electricity safely an important priority.

Horizon Utilities' UtilityPULSE Report Card®

Performance

	CATEGORY	Horizon Utilities	National	Ontario
1	**Customer Care**	**A**	**B+**	**B**
	Price and Value	B+	B+	B+
	Customer Service	A	B+	B+
2	**Company Image**	**A**	**A**	**B+**
	Company Leadership	A	B+	B+
	Corporate Stewardship	A	A	A
3	**Management Operations**	**A**	**A**	**A**
	Operational Effectiveness	A	A	A
	Power Quality and Reliability	A+	A	A
	OVERALL	**A**	**A**	**B+**

Base: total respondents

As the UtilityPULSE Report Card® shows, the total customer experience with an electric utility is defined as more than “keeping the lights on”. Customers deal with your utility every day for a variety of reasons, most likely because they need someone to help them solve a problem, answer a question or take their order for service. All your employees, from customer service representatives to linemen, leave a lasting impression on the customers they interact with. In effect there are many moments of truth. Moments of truth are every customer touch point that a utility has with their customers. Therefore, managing these moments of truth creates higher levels of Secure customers while reducing the number of At Risk customers that exist.

It's the small things done consistently that matter: Things like greeting every customer, whether on the phone or in person, in a friendly and helpful manner. Things like listening to the customer's needs, providing solutions to their problems and showing appreciation to the customer for their business.

Utilities now recognize customer communications as a valuable aspect of their business. The better a utility communicates with customers in a manner that speaks to them, the more satisfied they are with their overall service. “Sending out information” is not the same as having a “conversation” with a customer. We believe that it is increasingly important to channel your communications to the various customer segments which exist.

Obviously employees – in every area – play a critical role in customer service success. Consequently how they feel about their job responsibilities and role in the company will be communicated indirectly through the level of

service which they actually provide customers with whom they interact. The reality is engaged employees are the key to excellent customer care.

Our survey work with employees shows that there are many elements of an organizational culture to support the people model needed to achieve high levels of engagement.

Our research has identified 6 main drivers that promote and support people giving their best:

- **Empowered**
- **Valued**
- **Connected**
- **Inspired**
- **Growing**
- **Performance oriented**

There are 12 key processes from “attracting employees” to “saying goodbye to employees” that are part of your people model to get the best performance from every employee.

We believe that taking the time to understand the difference between employee satisfaction and organizational culture is worthwhile from a resourcing perspective and from a people development perspective. Every organization has a culture – we believe that it is a leadership imperative to install and maintain a culture that ensures that you attain the achievements and successes of your utility’s many investments in people, technology and equipment. It is true, organization culture affects everyone and everyone affects organization culture.

The Loyalty Factor

If a customer is satisfied, it doesn't necessarily mean he or she is loyal. Satisfaction is about fulfilling promises/expectations; loyalty goes way beyond that by creating exceptional experiences and long-lasting relationships. There is a reason why marketing campaigns strive to build brand loyalty, not brand satisfaction. Measuring customer loyalty in an industry where many customers don't have a choice of providers doesn't make sense. Or does it?

The answer depends on how you define "customer loyalty."

Private industry often equates customer loyalty with basic customer retention. If a customer continues to do business with a company, that customer is, by definition, considered to be loyal. If this definition were applied to many companies in the utility industry, all customers would automatically be considered loyal. As such, measuring customer loyalty would appear to be unnecessary.

Natural monopolies (like LDCs) are not really different in what they should measure except that trying to determine which customers are "loyal" or "at risk" is not about their future behaviour but more about their "attitudinal" loyalty (are they advocates?).

Whether a customer is loyal and/or satisfied will be determined by an alignment of the emotion, experience and expectation of both the customer and the LDC.

Perhaps a better or more relevant way for utilities to approach the definition of customer loyalty is to further expand how they think about loyalty. Consider the following definition: Customer loyalty is an emotional disposition on the part of the customer that affects the way(s) in which the customer (consistently) interacts, responds or reacts towards the company – its products & services and its brand.

So what does it mean to respond favourably to a company? At a basic level, this can mean choosing to remain a customer. As previously mentioned however, this is essentially a non-issue for many utility companies. It then becomes necessary to think beyond just customer retention. One needs to consider other ways in which customers can respond favourably toward a company.

Other favourable responses or behaviours can be classified into one of three categories that reflect the concept of customer loyalty:

- Participation
- Compliance or Influence
- Advocacy

Some Tips to build loyalty:

- ✓ **Solve problems quickly**
- ✓ **Treat customers right**
- ✓ **Listen to complaints**
- ✓ **Be personal; create a great experience**
- ✓ **Friendly customer service**
- ✓ **Accessible information or help**
- ✓ **Good reputation**
- ✓ **Demonstrate you care**

Specific examples of potential participatory behaviour in the electric utility industry include:

- Signing up for programs that help the customer reduce or manage their energy consumption
- Using the utility as a consultant when selecting energy products and services from a third party
- Participating in pilot programs or research studies.

Specific examples of potential compliance or influence behaviours that utility customers might exhibit include:

- Seeking the utility's advice or expertise on an energy-related issue
- Voluntarily cutting back on electricity usage if the utility advised the customer to do so
- Accepting the utility's energy advice or referrals to energy contractors or equipment
- Being influenced by the utility's opinion regarding energy- management advice, equipment, or technologies
- Providing personal information that enables the utility to better serve the customer
- Paying bills online.

Creating customer advocates can be especially important for a company in a regulated industry. In the absence of customer advocates, or worse, in a situation where customers speak unfavourably about a company or actively work to support issues that are counter to those the company supports, companies can suffer a variety of negative consequences like increased business costs, lawsuits, fines and construction delays. For an electric utility, specific examples of potential advocacy behaviour include:

- Supporting the utility's positions or actions on energy-related public issues, including the environment
- Supporting the utility's position on the location and construction of facilities
- Providing testimonials about positive experiences with the utility.

In sum, loyal behaviour in the utility industry may not be as evident as it is in a more competitive environment. Measuring customer loyalty in a generally non-competitive industry requires one to think about loyalty in non-

traditional ways. Customer loyalty is an intangible asset that has positive consequences or outcomes associated with it no matter what the industry. Properly measuring loyalty among utility customers requires thoughtful probing to thoroughly identify the range of participation, compliance, and advocacy behaviours that will ultimately benefit the company in meaningful ways, and foster happier and more loyal customers.

The UtilityPULSE Customer Loyalty Performance Score segments customers into four groups: **Secure** – the most loyal - **Still Favorable**, **Indifferent**, and **At risk**.

Secure customers are "very satisfied" overall with their local electricity utility. They have a very high emotional connection with their utility and definitely would recommend their local utility.

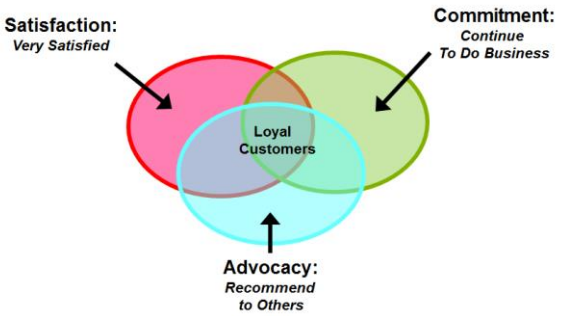
Still favorable customers are "very satisfied" overall, "definitely" or "probably" would recommend their local utility and not switch if they could.

Indifferent customers are less satisfied overall than secure and still-favorable customers and less inclined to recommend their local utility or say they would not switch.

At risk customers, who are "very dissatisfied" with their electricity utility, "definitely" would switch and "definitely" would not recommend it.

Loyalty is driven primarily by a company's interaction with its customers and how well it delivers on their wants and needs.

Customer Loyalty Model

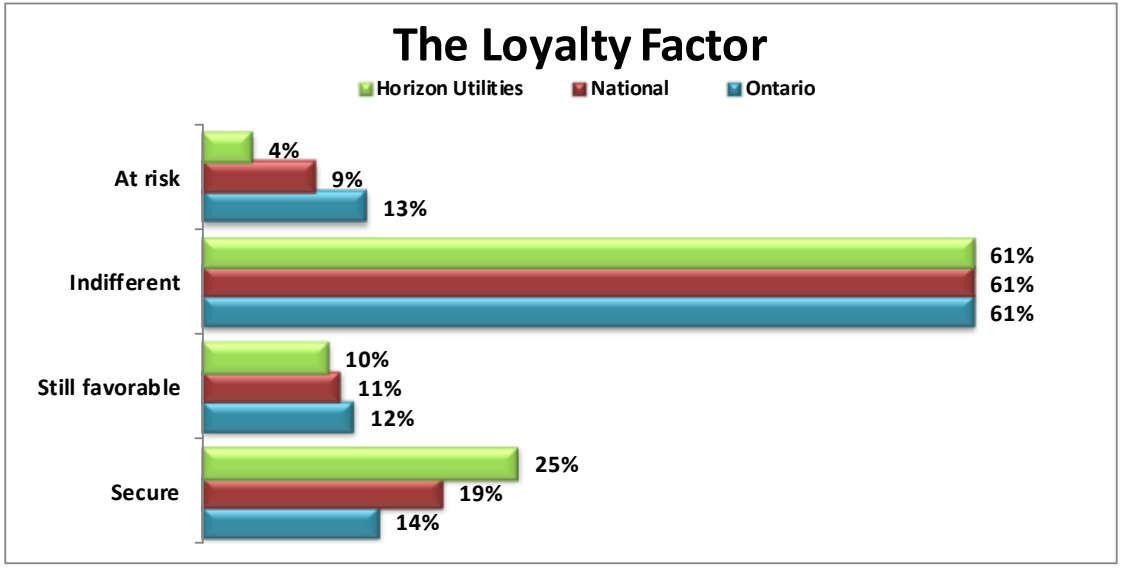


Loyalty is based on likelihood to:

- ***Satisfaction: overall satisfaction***
- ***Commitment: continue as a customer***
- ***Advocacy: willingness to recommend***

Customer Loyalty Groups				
	Secure	**Favorable**	**Indifferent**	**At Risk**
Horizon Utilities				
2015	25%	10%	61%	4%
2014	21%	9%	59%	10%
2013	28%	17%	48%	7%
2012	27%	14%	51%	9%
2011	23%	9%	57%	11%

Base: total respondents



Base: total respondents

Customer Loyalty Groups				
	Secure	**Favorable**	**Indifferent**	**At Risk**
		Ontario		
2015	14%	12%	61%	13%
2014	17%	10%	57%	17%
2013	24%	15%	51%	11%
2012	20%	13%	53%	14%
2011	17%	13%	54%	16%
		National		
2015	19%	11%	61%	9%
2014	20%	11%	56%	13%
2013	26%	17%	47%	10%
2012	30%	13%	46%	11%
2011	28%	14%	46%	12%

Base: total respondents

> Whether a customer is loyal and/or satisfied will be determined by an alignment of the emotion, experience and expectation of both the customer and the LDC.

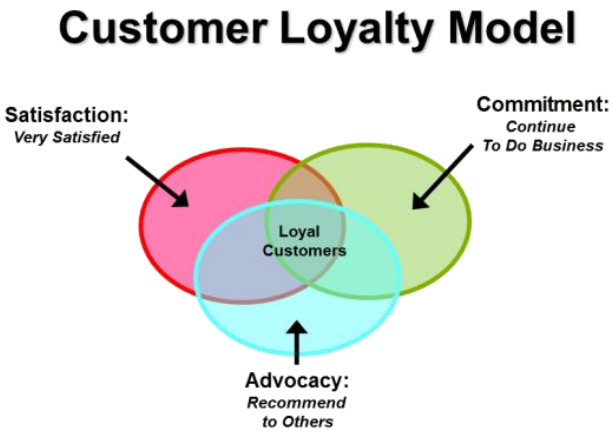
Secure customers' experiences and perceptions are distinct from those of Indifferent customers. There is yet an even greater gap between those identified as Secure versus At Risk.

- Problems are experienced and remain unresolved far more often by the Indifferent or At Risk segments in comparison to others. This is not an unusual finding.
- Other areas of interaction also revealed considerable differences among the segments. Consistently, Secure customers' perceptions are most positive.

Important attributes which shape perceptions about customer affinity			
	Overall	**Secure**	**At Risk**
Customer focused and treats customers as if they're valued	79%	94%	49%
Is pro-active in communicating changes and issues which may affect customers	79%	92%	5%
Deals professionally with customers' problems	85%	96%	60%
Provides information to help customers reduce their electricity costs	78%	91%	53%
Quickly deals with issues that affect customers	82%	96%	56%
Delivers on its service commitments to customers	86%	98%	65%
Provides information and tools to help manage electricity consumption	79%	92%	53%
Is 'easy to do business with'	84%	97%	55%
Adapts well to changes in customer expectations	75%	90%	45%
The cost of electricity is reasonable when compared to other utilities	60%	79%	34%
Provides good value for your money	69%	88%	36%
Provides consistent reliable electricity	90%	99%	76%
Operates a cost effective electricity distribution system	72%	91%	40%
Overall the utility provides excellent quality services	85%	98%	61%

Base:data from the full 2015 database from those respondents with an opinion

Customer commitment



Customer loyalty is a term that can be used to embrace a range of customer attitudes and behaviours. One of the metrics used to gauge loyalty is the measure of **retention,** or intention to buy again; this loyalty attitude is termed **commitment.** For LDCs commitment is not about behaviour it is about attitude i.e., do they want to remain your customer.

Customer commitment is a very important driver of customer loyalty in the electricity service industry. In a similar way to trust, commitment is considered an important ingredient in successful relationships. In simpler terms, commitment refers to the motivation to continue to do business with and maintain a relationship with a business partner i.e. the local utility.

For electric utilities, this measurement is about identifying the number of customers who feel that they "want to" vs "have to" do business with you. Potential benefits of commitment may include word of mouth communications - an important aspect of attitudinal loyalty. Committed customers have been known to demonstrate a number of beneficial behaviours, for example committed customers tend to:

- Come to you. One of the key benefits of establishing a good level of customer loyalty is that customers will come to you when they need a product or service

- Validate information received from 3rd parties with information and expertise that you have
- Try new products/initiatives
- Perhaps they will even trust you when recommendations are made
- Be more price tolerant
- More receptivity of utility viewpoints on various issues
- More tolerance of errors or issues that inevitably take a swipe at the utility
- Stronger levels of perception regarding how the utility is managed.

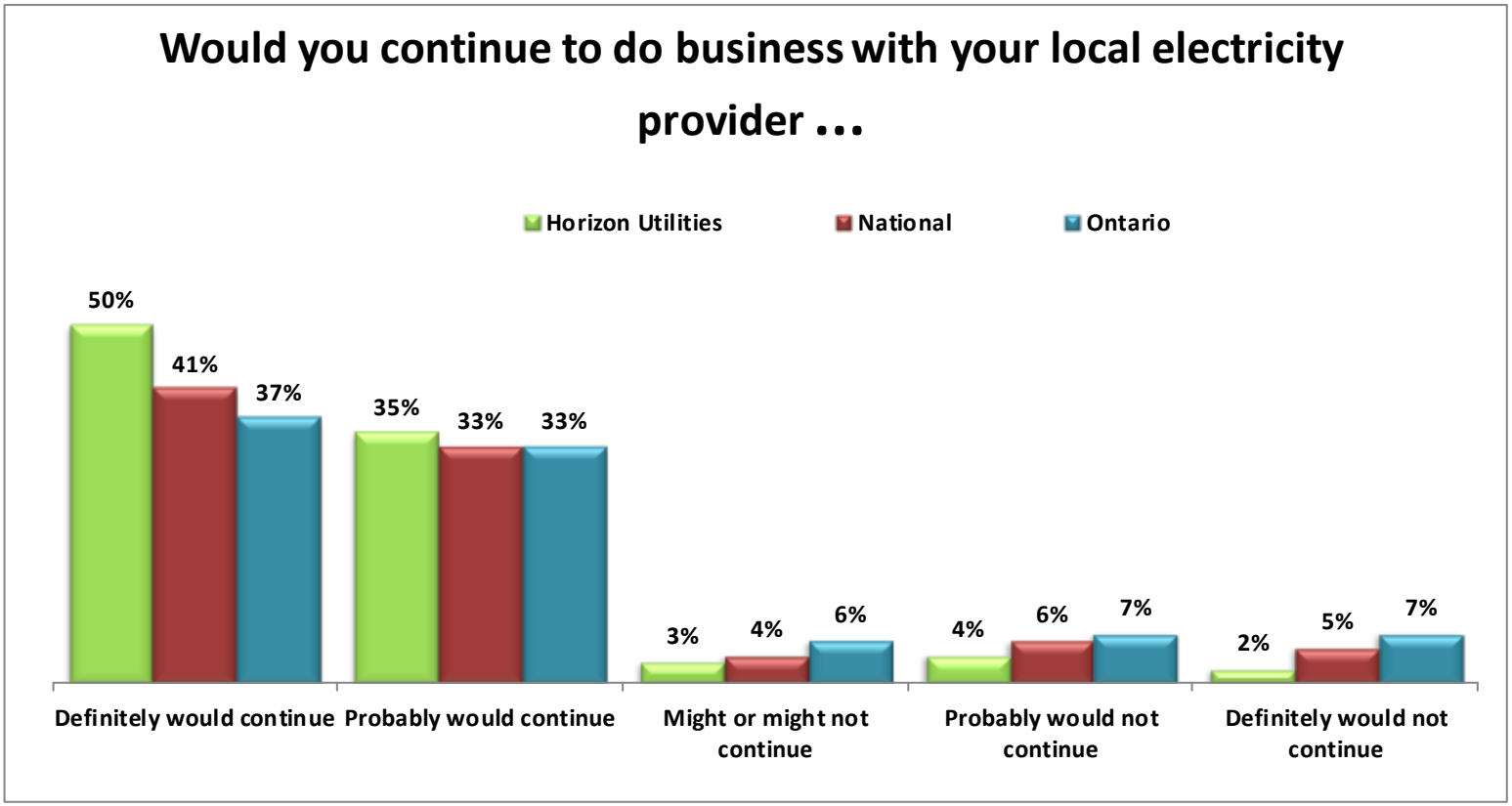
Though customers can not physically leave you, they can emotionally leave you and when they do, it becomes an extreme challenge to garner their participation or support for utility initiatives.

Electricity customers' loyalty – … Is a company that you would like to continue to do business with			
	Horizon Utilities	**National**	**Ontario**
Top 2 Boxes: 'Definitely + Probably' would continue	85%	74%	70%
Definitely would continue	50%	41%	37%
Probably would continue	35%	33%	33%
Might or might not continue	3%	4%	6%
Probably would not continue	4%	6%	7%
Definitely would not continue	2%	5%	7%

Base: total respondents

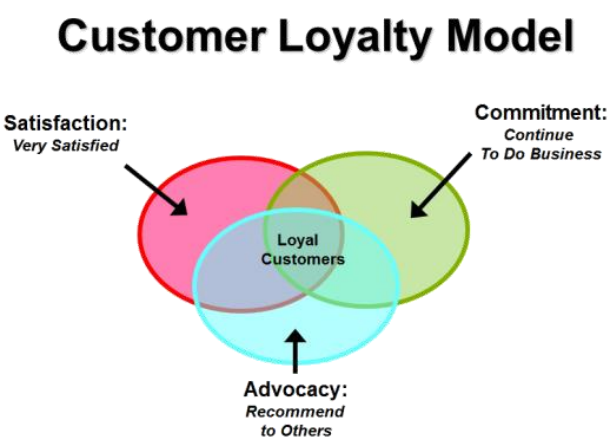
Electricity customers' loyalty – Is a company that you would like to continue to do business with					
Horizon Utilities	**2015**	**2014**	**2013**	**2012**	**2011**
Top 2 boxes: 'Definitely + Probably' would continue	85%	79%	85%	86%	78%

Base: total respondents



Base: total respondents

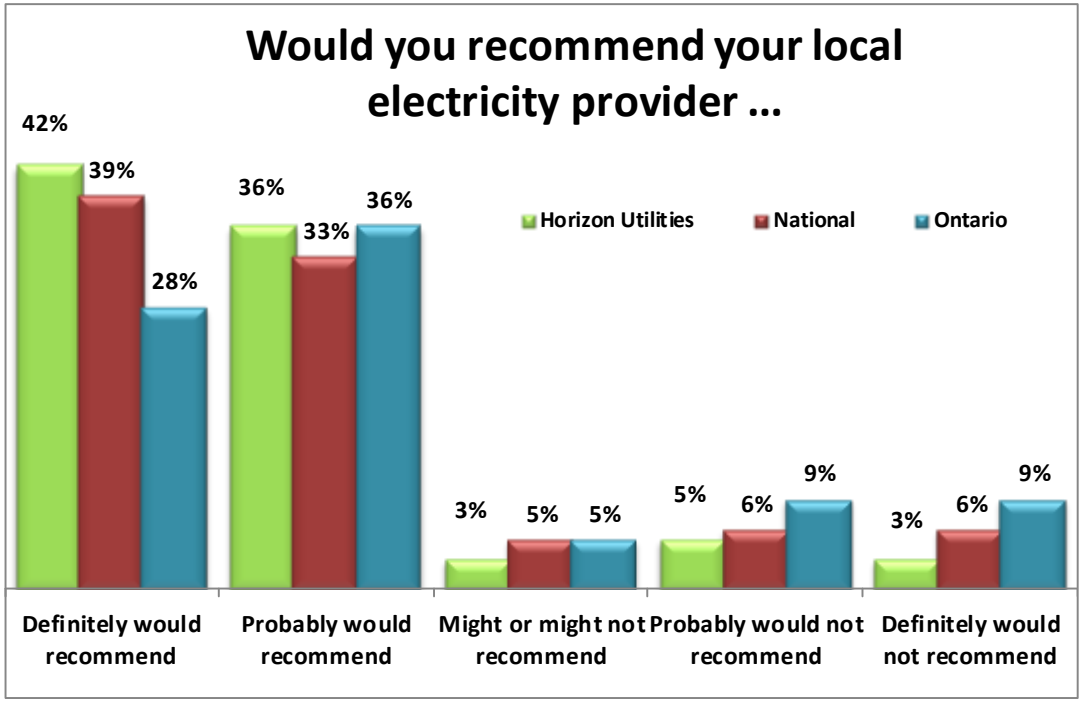
Word of mouth



Advocacy is one of the metrics measured in determining customer loyalty. Essentially, companies believe that a loyal customer is one that is spreading the value of the business to others, leading new people to the business and helping the company grow. Customer referrals, endorsements and spreading the word are extremely important forms of customer behaviour. For LDCs this is about generating positive referants about the LDC as a relevant and valuable enterprise.

When customers are loyal to a company, product or service, they not only are more likely to purchase from that company again, but they are more likely to recommend it to others – to openly share their positive feelings and experiences with others. In today's world, thanks to the Internet, they can tell and influence millions of people. That equates to new customers and revenue. The same holds true, if not more, when customers are disloyal. Disgruntled customers could share their negative experiences with an ever-widening audience, jeopardizing a company's reputation and resulting in fewer engaged customers and/or customers who are Favourable or Secure. Secure customers, typically are advocates and they are deeply connected and brand-involved.

Would you tell me if you agree or disagree with the following statement? Horizon Utilities is a company that you would recommend to a friend or colleague …



Base: total respondents

Word of mouth communication is a very powerful form of communication and influence. When customers are speaking to other customers (or their peers) it is more credible, goes through less perceptual filters and can enhance the view of services or products better than marketing communication.

There are two forms of word of mouth which utilities need to understand. The first is Experience-based word of mouth which is the most common and most powerful form. It results from a customer's direct experience with the utility or the re-statement of a direct experience from a trusted source.

The second is Relay-based word of mouth. This is when customers pass along important messages to others based on what they have learned through the more traditional forms of communications. For example, if the utility was communicating an offer for "free LED lights" chances are high that the offer will be "relayed" to others through word of mouth.

For an electric utility, specific examples of potential positive advocacy behaviour include:

- *Recommending that other customers specifically locate in the geographic area that is serviced by that utility*
- *Supporting the utility's positions or actions on energy-related public issues, including the environment*
- *Supporting the utility's position on the location and construction of facilities*
- *Providing testimonials about positive experiences with the utility*

Electricity customers' loyalty – … is a company that you would recommend to a friend or colleague			
	Horizon Utilities	National	Ontario
Top 2 boxes: 'Definitely + Probably' would recommend	78%	72%	64%
Definitely would recommend	42%	39%	28%
Probably would recommend	36%	33%	36%
Might or might not recommend	3%	5%	5%
Probably would not recommend	5%	6%	9%
Definitely would not recommend	3%	6%	9%

Base: total respondents

Electricity customers' loyalty – is a company that you would recommend to a friend or colleague					
Horizon Utilities	2015	2014	2013	2012	2011
Top 2 boxes: 'Definitely + Probably' would recommend	78%	72%	82%	81%	72%

Base: total respondents

Our survey research as well as theory backs up the fact that if your customers are willing to endorse you and put their reputation on the line to recommend you, they also trust you and are satisfied with the service you are providing.

Corporate image

Twenty years ago many LDCs didn't put too much effort into managing their corporate brand/image. One could argue customers cared less about image and more about operational items such as reliability, restoring power quickly and billing accuracy. In fact, our research from 2006 shows Company Image represented about an 18% weight in affecting the customer's perception about their utility.

But times and customer expectations have changed a lot since then. Customers expect their utility to do the core job exceptionally well AND be much more to customers and the community. They expect that you'll be socially responsible, have information they can use to reduce energy costs, be available to answer questions about the industry, etc. In 2015, Company Image represents about a 33% weight in affecting the customer's perception.

In a world where most customers feel time pressed and bombarded with information, a utility should put some real energy behind communicating its brand. The brand of a company is really its reputation. Just like a personal reputation, a brand reputation is formed based on the behaviors and actions of the company (or person), and how those behaviors and actions are perceived. After-all a positive brand image supports a positive perception of the organization. There will always be a brand/image, an LDC should actively manage its reputation, image and brand in order to have the brand/image it desires.

Every LDC has a brand and a brand image, while that image can be affected by events in the industry beyond the control of the LDC, the reality is there is a cost benefit to improving the customer experience, generating higher levels of customer engagement and growing the numbers of Favourable and Secure customers. Customers expect that your utility will conduct its business professionally ***AND*** be a proactive enterprise. How would they know, if you don't communicate with them?

Marketing – Communications			
	Horizon Utilities	**National**	**Ontario**
Topics that require more pro-active communication			
Cost of electricity is reasonable when compared to other utilities	59%	63%	56%
Adapts well to changes in customer expectations	77%	71%	67%
Provides good value for money	70%	68%	62%
Spends money prudently to keep the system reliable and up-to-date	78%	74%	69%
Operates a cost effective electricity distribution system	72%	72%	63%
Topics that your utility scores very well on			
Is a respected company in the community	86%	82%	79%
A company to "continue to do business with'	86%	82%	79%
Overall the utility provides excellent quality services	86%	85%	83%
Standard of reliability delivering electricity that meets expectations	90%	88%	86%
Provides consistent, reliable energy	93%	90%	88%

Base: total respondents with an opinion

Corporate Credibility & Trust

So, you have taken the time to listen to your customers and stakeholders. What next? Everyone will be looking at you to follow through on this feedback. You need to start establishing your credibility. You have to demonstrate that you can be trusted to get the job done and deliver on your promises. And, you need to do this in a way that builds your credibility and improves trust.

Creating credibility is a process, which advances only through honest, continuous communication between the utility, its regulators, and the public at large. Pro-active and credible communications from an LDC should do three things for its customers: 1- demonstrate competency 2- build confidence and 3- show a future orientation.

Attributes strongly linked to Credibility & Trust			
	Horizon Utilities	National	Ontario
Overall the utility provides excellent quality services	86%	85%	83%
Keeps its promises to customers and the community	84%	79%	77%
Customer-focused and treats customers as if they're valued	80%	74%	72%
Is a trusted and trustworthy company	85%	81%	77%

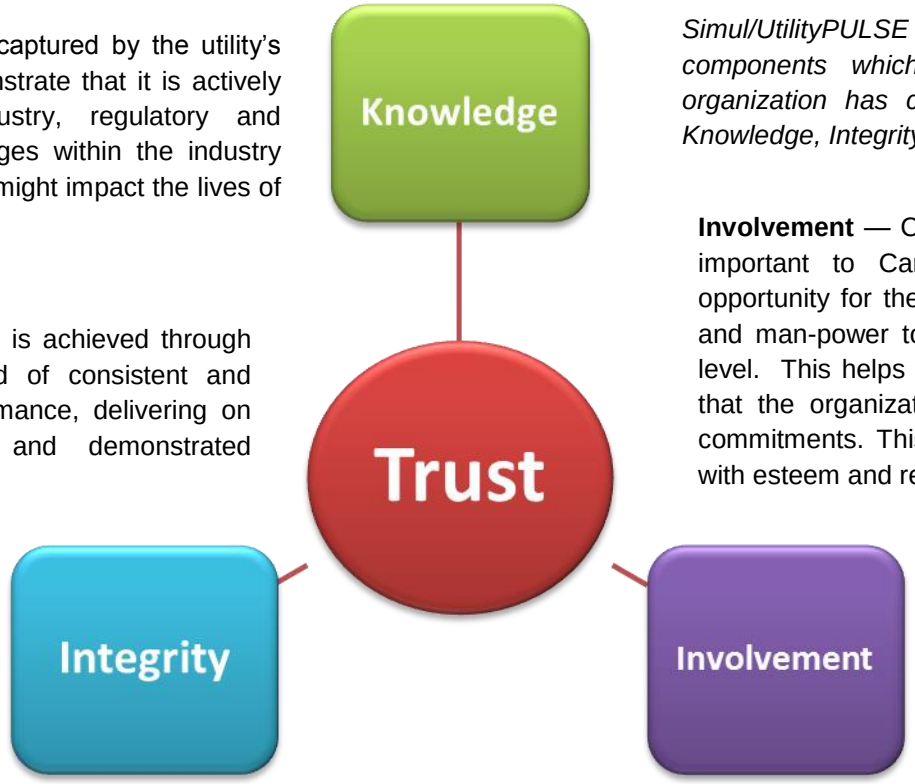
Base: total respondents with an opinion

Trust and credibility are indicators of the degree of confidence stakeholders have in your organization's ability to deliver on its commitments. Trust and credibility are outcomes based on what your utility actually does, not what it might be doing.

Knowledge is captured by the utility's ability to demonstrate that it is actively aware of industry, regulatory and economic changes within the industry and how these might impact the lives of customers.

Trust — Trust is achieved through a track record of consistent and reliable performance, delivering on commitments and demonstrated accountability.

Integrity is established by demonstrating adherence to a code of conduct. It requires consistently acting in accordance with the values and goals that have been communicated to customers.



Simul/UtilityPULSE research shows the under-pinning components which lead customers to believe an organization has credibility and can be trusted are: Knowledge, Integrity, Involvement and Trust.

Involvement — Corporate Involvement is increasingly important to Canadian communities as it is an opportunity for their local utility to use their resources and man-power to benefit people at the community level. This helps to build credibility as customers see that the organization is acting and delivering on its commitments. This helps customers regard the utility with esteem and respect.

Credibility and Trust Index

Horizon Utilities 85%

Ontario 80%

National 83%

How can service to customers be improved?

Every business, even natural monopolies, need to keep a focus on its customers, its standards of operations and in being responsive to problems. Insights into what isn't working or what can be done to improve often come from customers. Continuous improvement is the new normal.

Customers are more informed, more aware, more conscious of what's going on around them and in this age of internet and social media, they are better equipped to influence service quality and outcomes. They have learned to compare products and services, to document and monitor customer service and satisfaction, and to request or demand higher quality. And, when things go wrong, customers also know that they are "one click" away from the world knowing about it.

As a further way to identify pressure points and areas of concern, respondents were asked to give their top one or two priorities for improvement to their local utility's service.

For 2015 there is heightened awareness for the need to maintain equipment, keep things up to date, improve reliability, and communicate effectively, but true to historical form the number one suggestion remains "better prices/lower rates".

And we are interested in knowing what you think are the one or two most important things Horizon Utilities could do to improve service to their customers?

One or two most important things 'your local utility' could do to improve service	
Horizon Utilities	**% of all suggestions**
Better prices/lower rates	49%
Improve reliability of power	24%
Better communication with customers	17%
Eliminate SMART meters	10%
Be more efficient	9%
Extend service hours/availability of hydro representative	8%
Better maintenance	7%
Information & incentives on energy conservation	5%
Improve/simplify/clarify billing	5%
Remove hidden costs on bills	3%
Better online presence	2%
Staff related concerns	1%

Base: total respondents with suggestions

What do customers think about electricity costs?

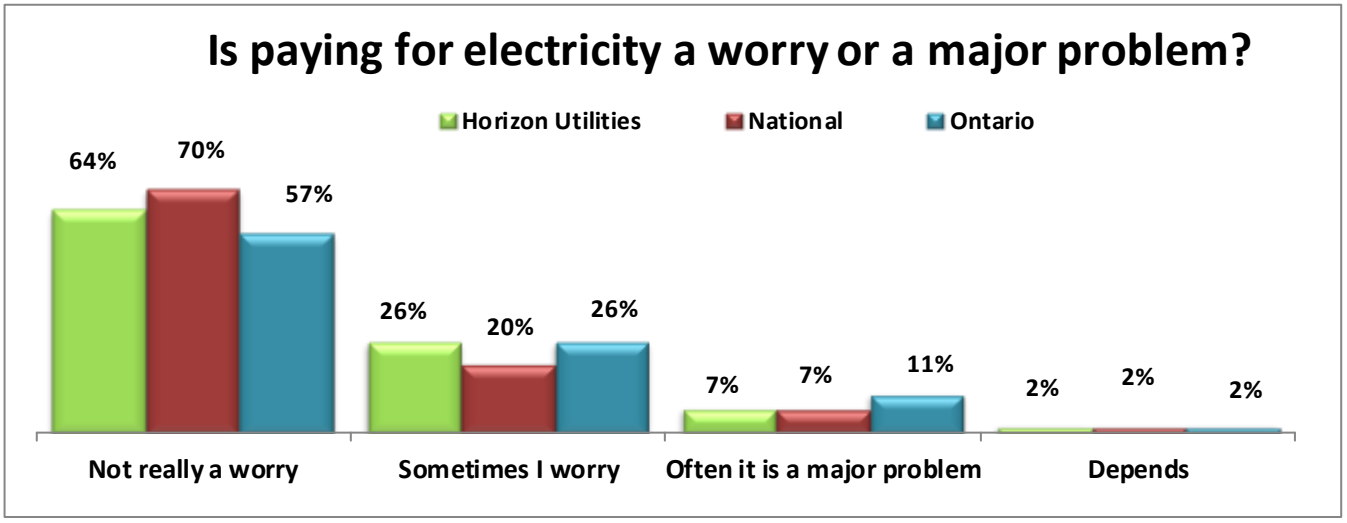
For years electric utility customers have had a very real concern about high bills and the cost of electricity. We've constantly and consistently have told our clients "when a value proposition doesn't exist or is unclear, then people will focus on price". LDCs in Ontario certainly score low on "value for money". The reality is, when a customer struggles to pay their electricity bill they struggle to see the LDC providing good value for money.

The good news is LDCs have been doing more to engage customers about the utilities' plans to spend money to improve operations and/or make capital investments. While this is seen as an important process, especially by the Ontario Energy Board, it doesn't deal with the basic issue at hand – the customer's own struggle to pay the bill. Our first year of research, 1999, showed us that there was a very high correlation between ability to pay and satisfaction – in 2015 the correlation is still very high.

Next I am going to read a number of statements people might use about paying for their electricity. Which one comes closest to your own feelings, even if none is exactly right? Paying for electricity is not really a worry, Sometimes I worry about finding the money to pay for electricity, or Paying for electricity is often a major problem?

Is paying for electricity a worry or a major problem?				
	Not a worry	Sometimes	Often	Depends
	Horizon Utilities			
2015	64%	26%	7%	2%
2014	61%	26%	7%	4%
2013	67%	20%	7%	3%
2012	66%	23%	8%	1%
2011	59%	26%	11%	2%

Base: total respondents



Base: total respondents

Is paying for electricity a worry or a major problem?				
	Not a worry	Sometimes	Often	Depends
Horizon Utilities				
<$40,000	48%	38%	11%	4%
$40<$70,000	60%	31%	6%	1%
$70,000+	75%	16%	4%	2%

Base: total respondents

For 2015, UtilityPULSE segmented respondents into 3 “average kWh groups”. Group 1 represents 25% of the customer base derived from segmenting the customer data file into the first quartile of kWh usage. Group 2 represents the middle 50% of the customer base; and Group 3 represents the top quartile of kWh customers. Group 1 uses the least amount of electricity on average, while Group 3 uses the most.

Is paying for electricity a worry or a major problem?			
	kWh Group 1	kWh Group 2	kWh Group 3
Not really a worry	74%	59%	62%
Sometimes I worry	20%	29%	25%
Often it is a major problem	3%	9%	8%
Depends	3%	2%	1%

Base: total respondents

Is paying for electricity a worry or a major problem?				
	Not a worry	**Sometimes**	**Often**	**Depends**
		Ontario		
2015	57%	26%	11%	2%
2014	59%	26%	11%	2%
2013	66%	21%	11%	1%
2012	59%	27%	11%	2%
2011	52%	31%	13%	3%
		National		
2015	70%	20%	7%	2%
2014	69%	20%	7%	3%
2013	70%	18%	8%	2%
2012	67%	22%	8%	2%
2011	63%	25%	8%	2%

Base: 2015 Ontario and National benchmark surveys

What do small commercial customers think?

Small commercial customers represent a significant amount of any LDC's customer base yet the amount of customer intelligence that a LDC has on this customer segment is extremely low. Beyond having a contact telephone number, name of company and address there often isn't much more information.

In an time when "targeted" communication is important, knowing the type of category of small commercial account would assist LDCs in delivering meaning messages in an effective way. This could be particularly important in the area of energy conservation i.e., pulling together messages and programs for specific types of businesses. After all, a small restaurant is different from a small accounting office.

Small commercial customers have, in many ways, very similar concerns with Residential customers but there are some differences. For example, small business customers are 1.5X more likely to contact their LDC when there is an outage or billing issue.

Small Commercial Customer (General Service < 50kW Demand)

A small commercial customer is defined by the OEB as a non-residential customer in a less than 50 kW demand rate class. These customers are similar to the residential customer in that their bill does not have a demand component to it and their charges are based upon KWH of consumption. Most of these customers would occupy small storefront locations or offices

Deposit requirements, monthly energy bills (and, therefore, energy usage), power quality, and reliability all directly impact a small business's financial situation. Unlike residential customers who tend to describe the cost of power interruptions in terms of a "inconvenience", commercial (and industrial) customers associate power interruptions with the cost of lost business, i.e., a loss in production is a loss in profits.

Likewise, based on the requirement of electricity to sustain business operations, there exists a difference in actual levels of demand response. For instance, small business and commercial users are unlikely to choose to decrease their electricity consumption if it is incompatible with efficient management of their business processes or threatens contracted deliveries to their primary product markets. In some cases, electricity consumption is a relatively small proportion of total input and operating costs, which substantially reduces the financial incentive for shutting down production during off peak pricing.

The tables associated with this report will contain Ontario LDC specific information as it relates to residential and commercial customers. Recognizing that smaller data samples are susceptible to greater data swings, for most LDCs there would be 60 or 90 responses from small commercial customers. We have compiled the following based on a group composite of all of our 2015 discussions with small commercial and residential customers.

Satisfaction: Pre & Post		
Satisfaction (Top 2 Boxes: 'very + somewhat satisfied')	**Residential**	**Commercial**
Initially	89%	90%
End of Interview	89%	90%

Base: total respondents from the full 2015 database

As it relates to the six attributes associated with customer service:

Very or fairly satisfied with…	Residential	Commercial
The time it took to contact someone	73%	78%
The time it took someone to deal with your problem	70%	75%
The helpfulness of the staff who dealt with your problem	74%	80%
The knowledge of the staff who dealt with your problem	73%	82%
The level of courtesy of the staff who dealt with your problem	81%	88%
The quality of information provided by the staff member	72%	76%

Base: total respondents from the full 2015 database

Residential respondents had lower satisfaction levels with customer service versus Commercial respondents.

Overall satisfaction with most recent experience		
	Residential	Commercial
Top 2 Boxes: 'very + somewhat satisfied'	72%	77%
Bottom 2 Boxes: 'somewhat + very dissatisfied'	26%	22%

Base: total respondents from the full 2015 database

Comparisons between Residential and Commercial		
Loyalty Groups	**Residential**	**Commercial**
Secure	23%	25%
Still Favourable	10%	10%
Indifferent	59%	57%
At risk	8%	8%

Base: total respondents from the full 2015 database

Loyalty Model Factors	Residential	Commercial
Very/somewhat satisfied	89%	90%
Definitely/probably would continue	81%	81%
Definitely/probably would recommend	75%	78%

Base: total respondents from the full 2015 database

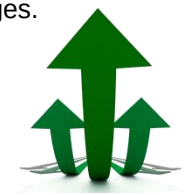
Outages & Bill problems	Residential	Commercial
Respondents with outage problems	44%	37%
Respondents with billing problems	10%	12%

Base: total respondents from the full 2015 database

Attempts to contact local utility…	Residential	Commercial
Respondents with outage problems	19%	30%
Respondents with billing problems	39%	63%

Base: total respondents from the full 2015 database

Residential respondents reported a considerably higher incidence of outages.



Commercial respondents were more likely to call in about billing and outage problems.

Important attributes which describe operational effectiveness		
	Residential	Commercial
Provides consistent, reliable electricity	90%	90%
Delivers on its service commitments to customers	86%	87%
Accurate billing	86%	85%
Quickly handles outages and restores power	87%	87%
Makes electrical safety a top priority	88%	90%
Uses responsible environmental practices when completing work	88%	89%
Is efficient at managing the electricity distribution system	82%	82%
Is a company that is 'easy to do business with'	84%	84%
Operates a cost effective electricity distribution system	72%	72%

Base: total respondents with an opinion from the full 2015 database

Important attributes which shape perceptions about corporate image		
	Residential	Commercial
Is a respected company in the community	85%	86%
A leader in promoting energy conservation	80%	81%
Keeps its promises to customers and the community	82%	83%
Is a socially responsible company	83%	84%
Is a trusted and trustworthy company	84%	85%
Adapts well to changes in customer expectations	74%	76%
Overall the utility provides excellent quality services	85%	86%

Base: total respondents with an opinion from the full 2015 database

Important attributes which shape perceptions about service quality and value		
	Residential	Commercial
Is pro-active in communicating changes and issues which may affect customers	79%	80%
Provides good value for money	68%	69%
Customer-focused and treats customers as if they're valued	79%	80%
Deals professionally with customers' problems	84%	87%
Spends money prudently	77%	77%
Quickly deals with issues that affect customers	82%	82%
Provides information and tools to help manage electricity consumption	79%	77%
Provides information to help customers reduce their electricity costs	78%	77%
The cost of electricity is reasonable when compared to other utilities	60%	59%

Base: total respondents with an opinion from the full 2015 database

Is paying for electricity a worry or a major problem?		
	Residential	**Commercial**
Not really a worry	63%	91%
Sometimes I worry	24%	27%
Often it is a major problem	8%	9%
Depends	3%	1%

Base: total respondents from the full 2015 database

When there is an outage, which of the following methods would you want your utility to use to give you information about the outage?

Preferred methods to give you information about the outage from your utility…		
	Residential	**Commercial**
Recorded telephone message	60%	58%
E-mail	32%	40%
Post on utility's website	25%	28%
Social media - Twitter	19%	20%
Text message	32%	35%
Local radio	41%	43%
Local TV	30%	30%

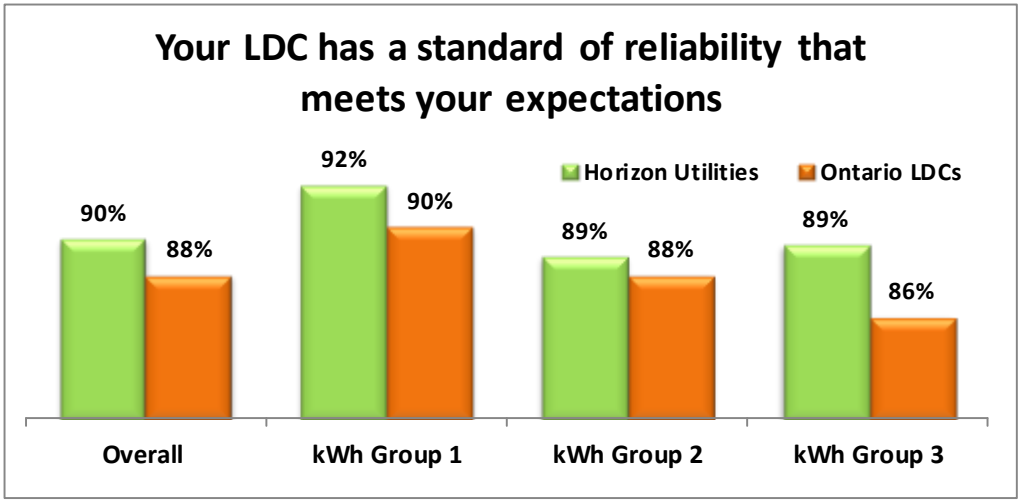
Base: total respondents from the full 2015 database

SUPPLEMENTAL QUESTIONS

Outage Management

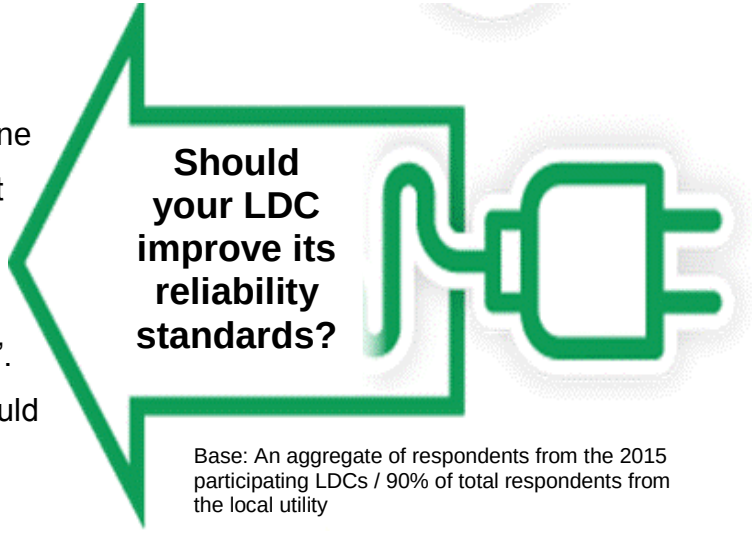
The ice-storm of December 2013 put more emphasis on how LDCs should be communicating with customers when there is an outage – both planned and unplanned outages. Since then much has been written about outage management thereby heightening customers' awareness about the issue. None-the-less every LDC has made changes and/or enhancements to their outage management practices.

Recognizing the importance of this topic to customers, a question about LDC reliability standards has been added to the core survey.



Base: An aggregate of respondents from the 2015 participating LDCs / 90% of total respondents from the local utility

Customers who responded to the survey offer a paradox. On the one hand, when asked about "your LDC has a standard of reliability that meets your expectations", scores are very high – no doubt somewhat comforting to the LDC. On the other hand, when asked "Should your LDC improve its reliability standards" the majority certainly said "yes". What we didn't do is tell the customer how much more money they would have to pay per month for higher standards.



Base: An aggregate of respondents from the 2015 participating LDCs / 90% of total respondents from the local utility

	Yes	No	Depends
Ontario LDCs	57%	35%	8%
Horizon Utilities	53%	39%	8%

An outage management system helps LDC employees to discover, locate and resolve power outages in a more informed, orderly, efficient and timely manner.

How many outages are acceptable over 12 months?

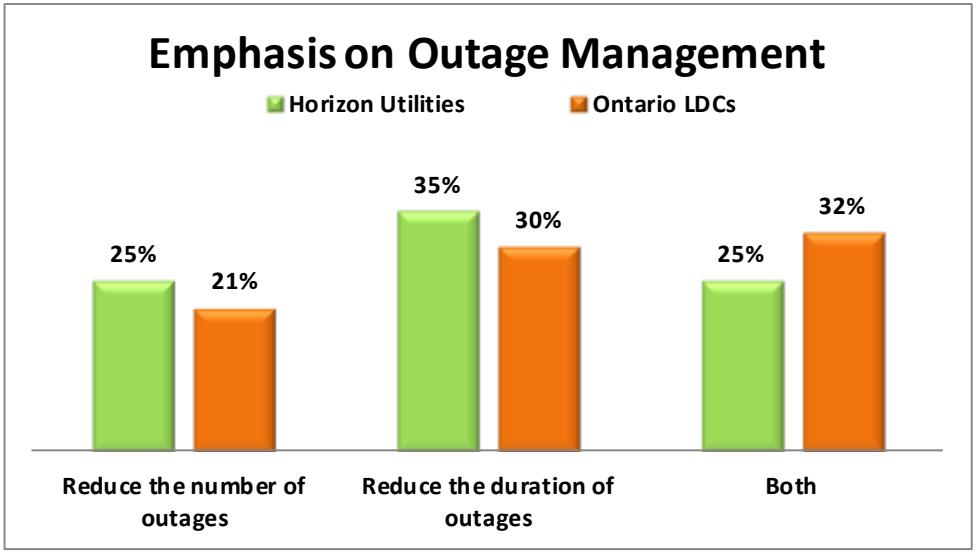
	Ontario LDCs	Horizon Utilities
None	23%	28%
One	15%	18%
Two	26%	26%
Three	13%	10%
Four	5%	5%
Five or more	7%	5%
Don't Know	9%	8%

Reasonable amount of time for an unplanned outage?

	Ontario LDCs	Horizon Utilities
Less than 15 minutes	14%	12%
16-30 minutes	15%	9%
31-60 minutes	13%	13%
1 to 2 hours	29%	33%
3 to 5 hours	13%	17%
6 to 12 hours	5%	6%
More than 12	3%	4%
Don't Know	8%	7%

Base: An aggregate of respondents from the 2015 participating LDCs / 90% of total respondents from the local utility

If the utility were to improve reliability should they put more emphasis on reducing the number of or unplanned outages or reducing the duration of the unplanned outage? Or both which requires an increase.



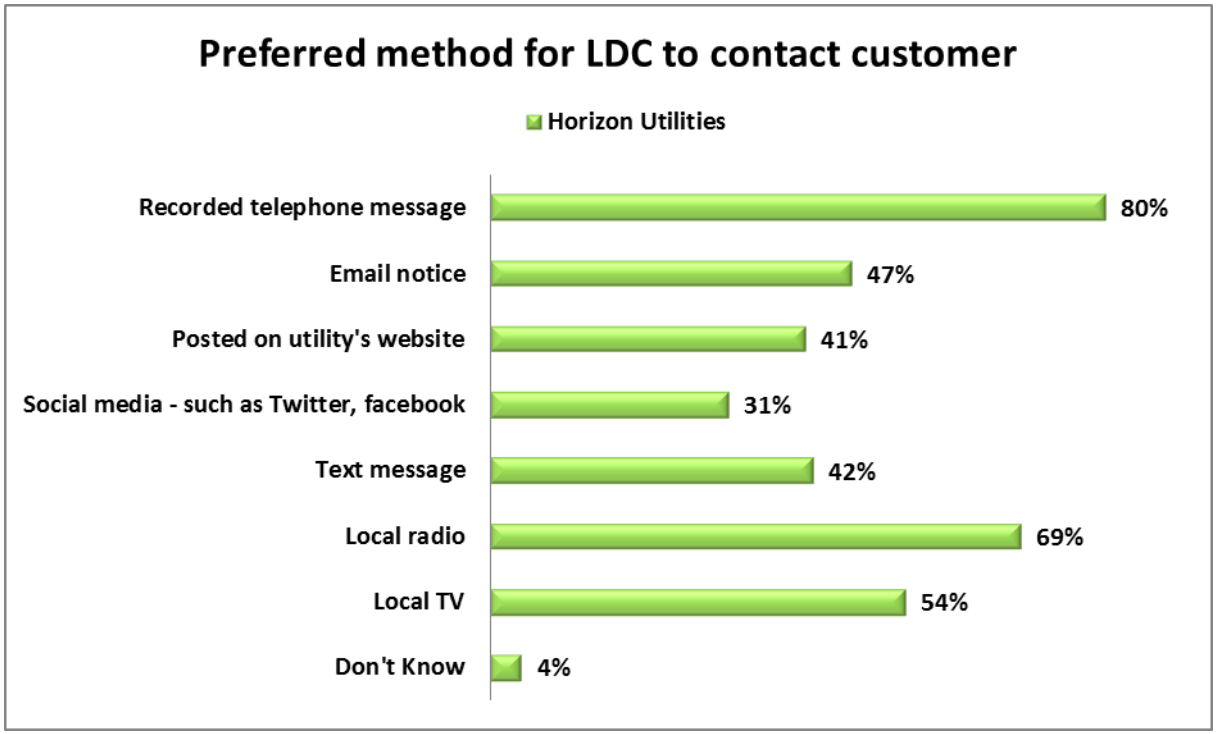
Base: An aggregate of respondents from the 2015 participating LDCs / 90% of total respondents from the local utility

Which communication channel do customers prefer to use? The telephone is the most used and preferred method to contact the LDC to communicate with customer care representatives.

	Telephone	Email	Utility Website	Social Media	Mail	In Person
Ontario LDCs	84%	5%	2%	1%	0%	0%
Horizon Utilities	85%	5%	3%	1%	0%	0%

Base: An aggregate of respondents from the 2015 participating LDCs / 90% of total respondents from the local utility

While the telephone is still the communication channel most would prefer to use to communicate with or to be communicated to, customers do have an expectation for the LDC to use varied methods to contact them. Communication channels other than the telephone received higher preference scores when asked about the utility contacting the customer versus the customer's use of such channels to contact the utility. This indicates that the onus is on the utility to find a way to contact a customer when necessary and that should use various means to ensure the message is communicated. Proactive communication channels which include recorded calls, emails and SMS (text messaging) are increasingly being used by utilities to reach customers affected by outages.



Base: 90% of total respondents from the local utility

Top 4 methods:

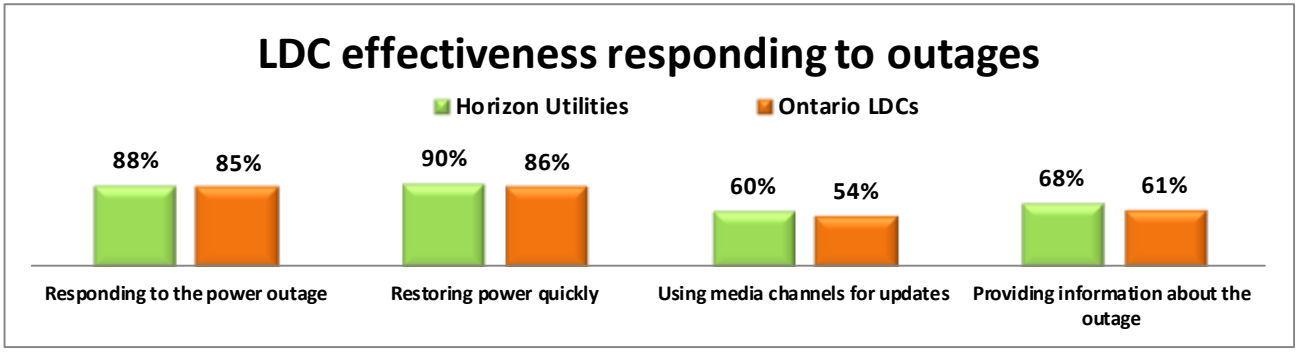
- Recorded Telephone Message
- Email notice
- Posted on website
- Text message

Responding to outages and making sure power is restored quickly is a priority item with customers as well as communications during outage events. Being effective during an outage situation from the point of view of a customer requires that:

- timely information on outages is provided
- utilities understand that even a short outage in duration is impactful
- in large scale events, utilities should proactively provide tips on how to prepare for extended outages
- being kept informed about what is going on during an outage makes customers feel valued.

LDC effectiveness responding to outages		
	Ontario LDCs	Horizon Utilities
Responding to the power outage	85%	88%
Restoring power quickly	86%	90%
Using media channels for updates	54%	60%
Providing information about the outage	61%	68%

Base: An aggregate of respondents from the 2015 participating LDCs / 90% of total respondents from the local utility



Base: An aggregate of respondents from the 2015 participating LDCs / 90% of total respondents from the local utility

The types of information that customers require during an outage include:

- *When will their power be restored?*
- *What areas are affected?*
- *How many customers are impacted?*
- *Have work crews been dispatched to the affected area and is the utility working to restore power?*
- *What was the cause of the power outage?*
- *What can customers do to cope during the outage?*

Operating & Capital Expenses

Much has been written, and reported on, regarding the cost of electricity. On the one hand many customers "want" lower prices, but they "need" reliability and responsiveness. UtilityPULSE has been conducting research in the LDC industry in Ontario for 17 years. However, members of UtilityPULSE have been doing customer research for much longer. It is true, customers (but not all) can tell you what they want, but they have a very difficult time telling you what they need. Hence it is up to the professionals in the LDC to use their experience and judgment to determine what needs to be done and when it should be done. No easy task.

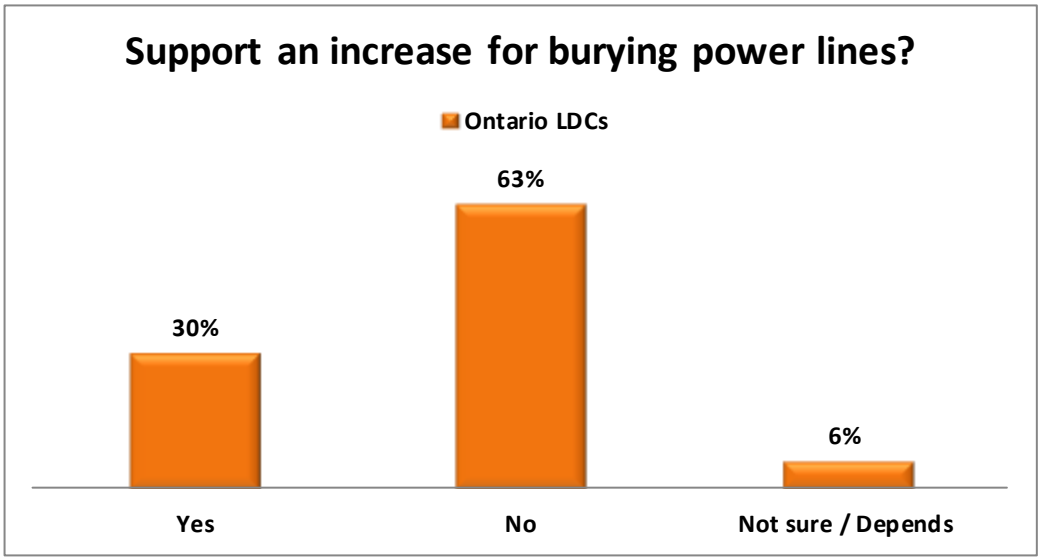
UtilityPULSE asked customers: *"As it relates to replacing equipment electric utilities typically follow 2 main practices which are: let equipment run-to-failure OR pro-actively replace equipment. Which of the following best represents your view on equipment replacement?":*

Strategy for replacing equipment	
	Ontario LDCs
Run-to-failure when there are limited customers affected ensures full-value is received from the equipment	27%
Pro-active replacement, even though it may cost more, should ensure reliable power	65%
Don't Know	8%

Base: An aggregate of respondents from the 2015 participating LDCs

Understanding customer expectations, concerns, worries, and desires does help an LDC to build their plan to take the LDC forward while ensuring that it remains relevant, viable, and valuable to customers, employees and other stakeholders.

To bury or not to bury is a debated topic by many. Survey respondents were asked: "*Buried power lines look better and are less affected by weather. However, they are more expensive to install and maintain, and it often takes longer to restore power when there is an outage. Would you support an increase in your bill for new programs to bury power lines?"*

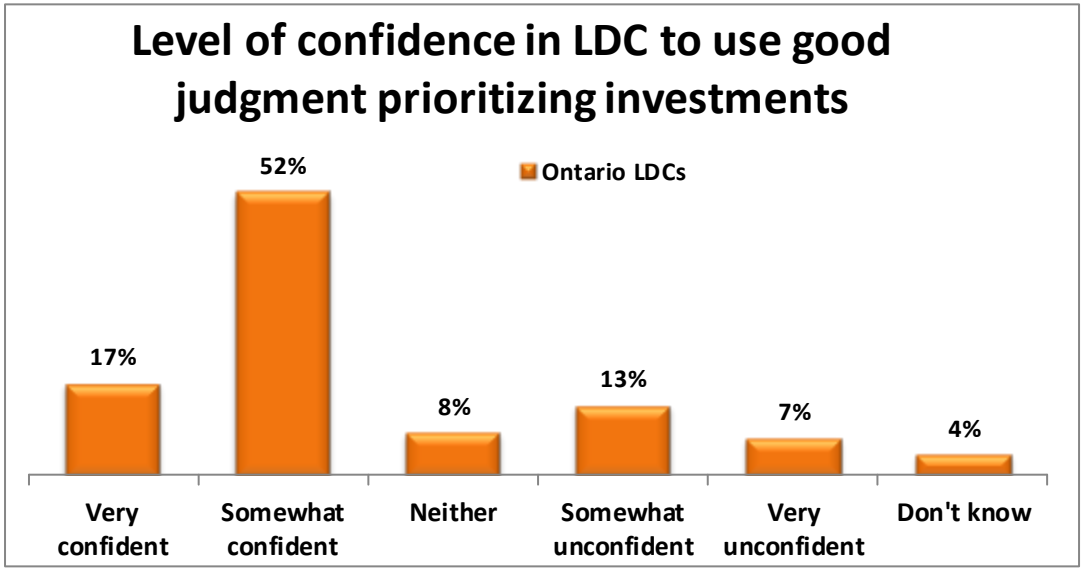


Base: An aggregate of respondents from the 2015 participating LDCs

For respondents that said they support new programs for burying power lines, they were asked whether the priority for new programs should be applied to residential streets, major streets or both.

Programs to bury power lines	
	Ontario LDCs
Residential only	14%
Major streets only	12%
Both	73%

Base: An aggregate of respondents from the 2015 participating LDCs



Responding customers really don't know how much things cost or even what it takes to complete various operational tasks or capital projects.

We have heard customers tell us "we expect those that are being paid will make good decisions."

Base: An aggregate of respondents from the 2015 participating LDCs

Which of the following items are you willing to pay more for per month …				
Ontario LDCs	**Yes**	**No**	**Not sure**	**Depends**
A proactive outage management system	51%	39%	9%	1%
Increased self-service options on the website	34%	58%	7%	1%
Extended office hours	16%	79%	5%	1%
Increased tree trimming to improve reliability	58%	35%	6%	0%
Better use of social media	20%	53%	2%	1%
Educating customers about energy conservation	47%	48%	4%	0%
Educating customers and the public about electricity safety	43%	53%	5%	0%

Base: An aggregate of respondents from the 2015 participating LDCs

Not surprisingly lower income respondents identified lower amounts. For example, 13% of respondents <40K who were willing to pay for one operational item identified a number between .51 -1.00, it was 23% for respondents 70K+. Ability to pay also has an impact on the numbers that respondents identified. When three or more operational items were involved, 32% of respondents who said that they did not worry about paying their bill identified a number of 25 cents or less. Respondents who said they worry often, identified a number 25 cents or less, 59% of the time.

Secure customers identified higher numbers more frequently than At Risk customers. When three or more operational items were involved, At Risk customers pick a number less than 25 cents, 59% of the time; Secure customers was 35%. This proves that price increase receptivity is linked to customer affinity. However, average kWh usage per month showed very little difference between customers in the lower quartile of kWh versus customers in the highest quartile.

The above chart can certainly fuel debate between industry professionals, regulators, interveners and customers. Could an LDC ignore investing in self-service options on their website? Do the raw scores from the survey represent what the LDC needs to do? If the LDC didn't invest in increased self-service options what might happen to operational costs? What might happen to the perceived brand of the LDC i.e., being seen as a modern enterprise? For those that said they would pay more…

Willing to pay how much more per month for …			
Ontario LDCs	**1 item**	**2 items**	**3 or more items**
$0.25 or less	59%	47%	35%
$0.26 – $0.50	10%	13%	10%
$0.51 – $1.00	14%	15%	16%
$1.01 – $2.00	6%	8%	15%
$2.01 – $3.00	2%	3%	6%
$3.01 – $5.00	1%	4%	7%
$5.01+	0%	3%	5%
Don't know	8%	8%	5%

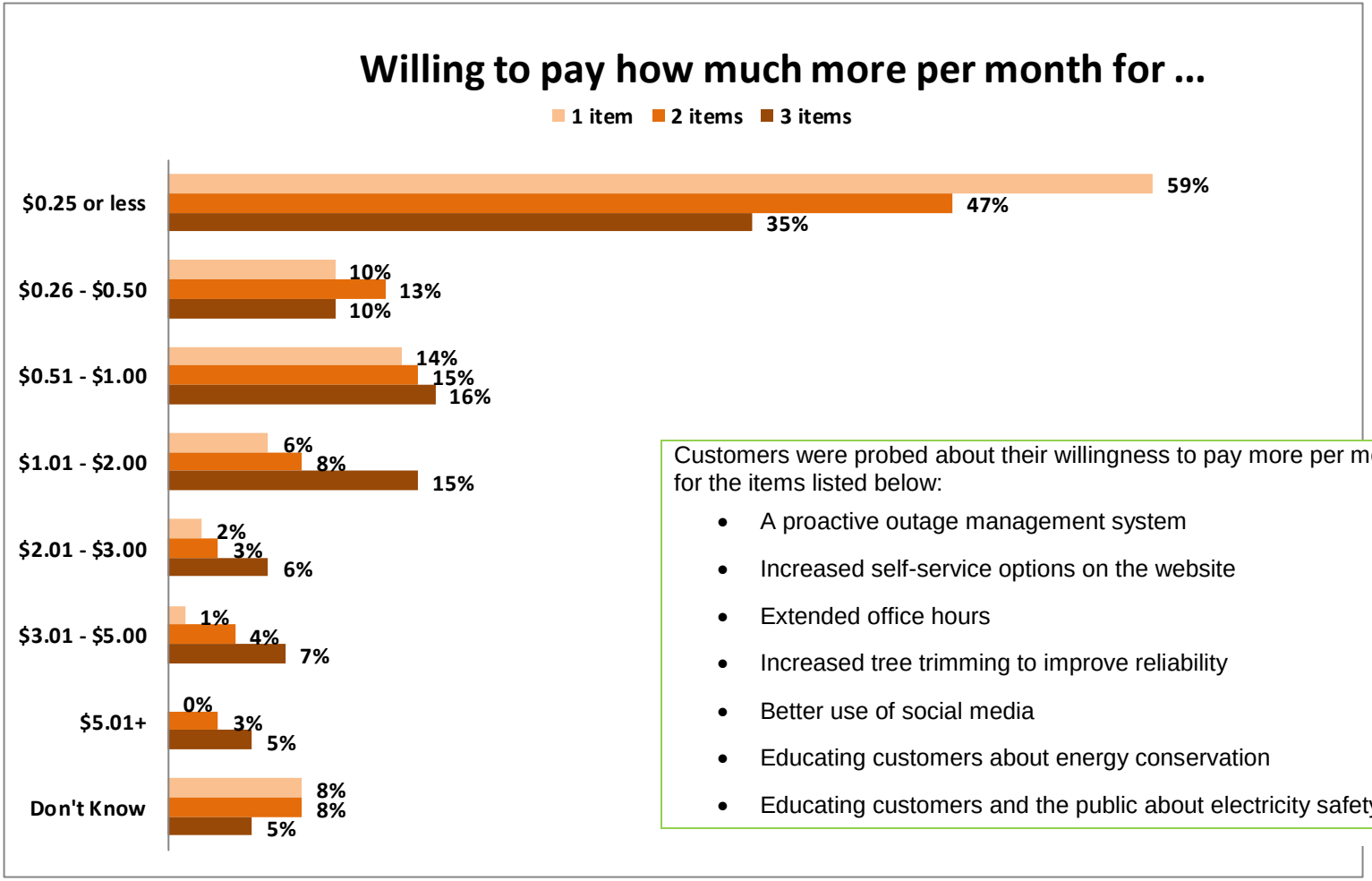
Base: An aggregate of respondents from the 2015 participating LDCs

Respondents were not guided by the interviewer providing various ranges of rates.

Respondents were simply asked to give an amount of $.

Their answers were categorized into one of the rate ranges shown in the table.

From the data we can see that some customers are willing to pay more when they have a personal interest in certain capital projects i.e., projects that have a direct impact. The amount customers are willing to pay for 1 item versus 3 items did not translate into a proportional increase. While customers recognize 3 items would necessitate more money than 1 item, fewer customers were willing to pay that much more for 3 items. It is evident that $2.00 was a threshold amount as fewer than 10% would be willing to pay over $2.00 for 1, 2 or 3 items.



Customers were probed about their willingness to pay more per month for the items listed below:

- A proactive outage management system
- Increased self-service options on the website
- Extended office hours
- Increased tree trimming to improve reliability
- Better use of social media
- Educating customers about energy conservation
- Educating customers and the public about electricity safety

Base: An aggregate of respondents from the 2015 participating LDCs

Soliciting Feedback

The Ontario Energy Board, in its publication: *"EB-2010-0379 Report of the Board Performance Measurement for Electricity Distributors: A Scorecard approach",* referenced staff recommendations that distributors would be required to survey customer satisfaction among other items in an effort to continually seek ways in which to improve performance and productivity while better understanding and engaging with their customers.

UtilityPULSE asked 1,269 Residential customers, located throughout Ontario and who pay the electricity bill questions pertaining to the solicitation of customer feedback and opinions on different electricity industry matters. These questions were asked with intent of gauging the customer's perception of requesting feedback and the importance thereof.

89%

89% of Ontario respondents feel it is 'very + somewhat' important for their LDC to solicit customer feedback on customers' overall satisfaction with the utility.

83%

83% of Ontario respondents feel it is 'very + somewhat' important for their LDC to solicit customer feedback on how much money is being spent on repairing equipment.

86%

86% of Ontario respondents feel it is 'very + somewhat' important for their LDC to solicit customer feedback on how much money is being spent on keeping the system reliable.

84%

84% of Ontario respondents feel it is 'very + somewhat' important for their LDC to solicit customer feedback on the utility's plans to spend money on extending the system to help economic development in the community.

Importance of soliciting customer opinions and feedback on ….				
	Top 2 boxes: 'very + somewhat' important	Bottom 2 boxes: 'somewhat + very' unimportant	Neither	Don't know
… customers' overall satisfaction with the utility …	89%	8%	1%	3%
… how much money is being spent on repairing equipment …	83%	9%	1%	6%
… how much money is being spent on keeping the system reliable …	86%	6%	2%	6%
… the utility's plans to spend money on extending the system to help economic development in the community …	84%	10%	2%	4%

Base: 1,269 Residential respondents from the 2015 Ontario Benchmark survey

The data reveals that customers do believe the LDC should be seeking their opinions on certain operational matters as well as their overall satisfaction. It could be the customer's view that by having their input counted especially where spending is concerned, they might play a part in controlling costs and stop any unnecessary spending.

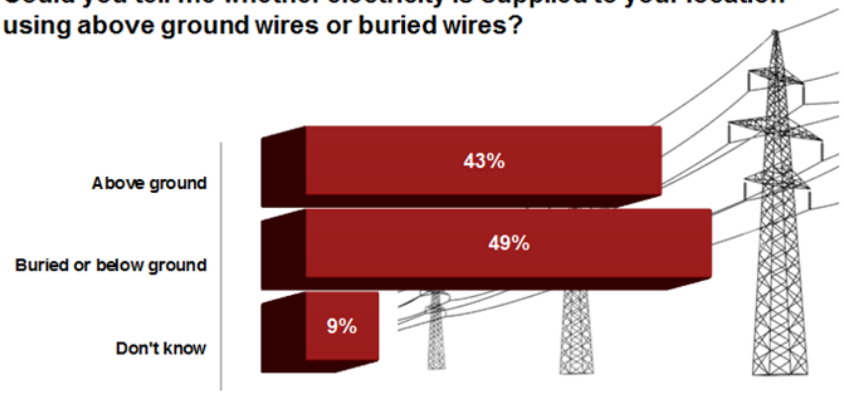
Public Electrical Safety Measure

The Ontario Energy Board when establishing the LDC Scorecard, included a safety measure. The Electrical Safety Authority took the lead and produced a document describing various facets of the consultative process. Due to the timing of the 2015 UtilityPULSE Ontario benchmark survey, we decided to use the questions from the public document: *http://www.esasafe.com/assets/files/esasafe/pdf/Public_Consultation/Public-Electrical-Safety-Measure_LDC-Scorecard-Consultation-Document.pdf.* The questions were early drafts and will (no doubt) undergo some refinement.

UtilityPULSE asked 400 Residential customers, who pay the electricity bill and located throughout Ontario, the questions which appeared in the document.

UtilityPULSE or any of its employees are not commenting on the purpose of the questions, question design or sequence. We believed we had the opportunity to "test" the questions and have done so as a "give back" to our clients and to industry decision makers. We believe the findings may be helpful for various stakeholders involved in determining the public safety measure(s) to be used in an LDC's report-card.

Could you tell me whether electricity is supplied to your location using above ground wires or buried wires?



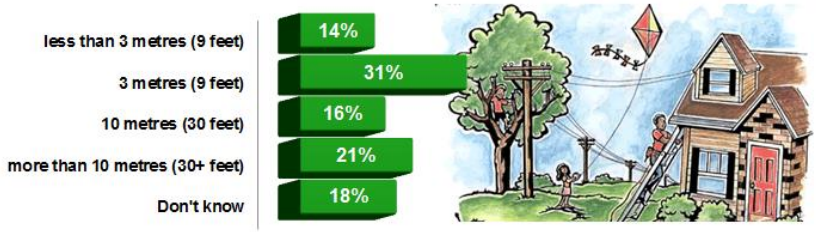
Base: 400 respondents from the 2015 Ontario Benchmark survey

How dangerous is it to touch (with your body or any object) an overhead powerline?

Very dangerous	Somewhat dangerous	Not very dangerous	Not at all dangerous	Don't know
70%	8%	5%	10%	7%

Base: 400 respondents from the 2015 Ontario Benchmark survey: Answer=very

How close can you safely come (such as when standing on a ladder, cleaning windows or eaves, climbing or trimming trees, etc.) to an overhead powerline that runs down the street or that connects a home or business to the line on the street?



Base: 400 respondents from the 2015 Ontario Benchmark survey: Answer=3 metres

Some electrical utility equipment is located on the ground such as locked steel cabinets that contain transformers or substation sites – which are clusters of electrical equipment typically behind a high fence.

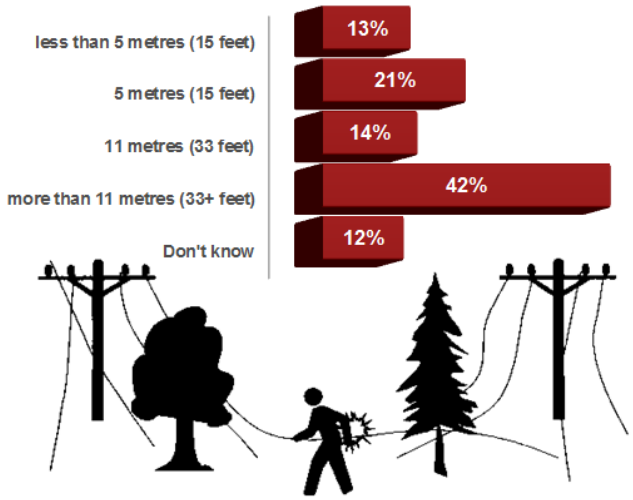
How dangerous is it to try to damage, open, remove contents or otherwise interfere with this equipment?	
79%	Very dangerous
5%	Somewhat dangerous
3%	Not very dangerous
6%	Not at all dangerous
7%	Don't know

Base: 400 respondents from the 2015 Ontario Benchmark survey: Answer=very

How likely are you to 'call before you dig' to locate electrical and other underground lines when undertaking work or home projects that involve digging?

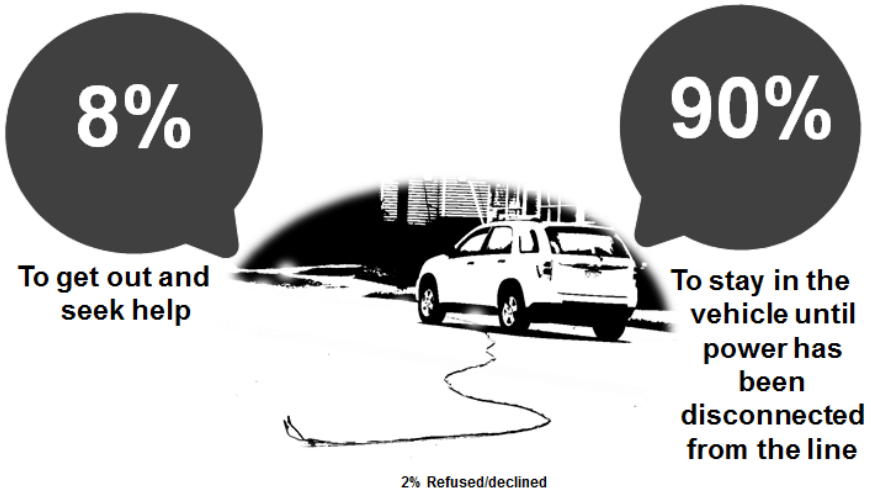
Base: 400 respondents from the 2015 Ontario Benchmark survey: Answer=very

How close can you safely come to a downed overhead powerline, such as caused by a storm or accident?



Base: 400 respondents from the 2015 Ontario Benchmark survey: Answer=11 metres

If you were in a vehicle (e.g. car, bus, truck) and an overhead powerline came down on top of it such as during a storm or accident which is generally safer?



Base: 400 respondents from the 2015 Ontario Benchmark survey: Answer= stay in

Do you work or undertake activities that regularly cause you to come close to energized powerlines such as construction work, roofing, window washing, tree trimming?

Base: 400 respondents from the 2015 Ontario Benchmark survey

SMART Grid

A number of functions will be available to electricity system stakeholders due to the advance of SMART Grid technologies. Providing tools to address peak demand, to improve system reliability, to manage distribution and energy storage are tools available to LDCs and system operators, SMART Grid technologies offer consumers possibilities as well. For the electricity customer, SMART grid technologies can provide the opportunity to manage electricity use, to control bills, and to sell power back the grid. How much of this is the average consumer aware of or "in the know"? While many industry insiders talk about the SMART Grid, i.e., its benefits and its challenges, the reality is, the average person is not very knowledgeable about it.

Level of knowledge about the SMART Grid		
	Ontario 2015	**Ontario 2014**
I have a fairly good understanding of what it is and how it might benefit homes and businesses	9%	9%
I have a basic understanding of what it is and how it might work	21%	25%
I've heard of the term, but don't know much about it	37%	36%
I have not heard of the term	32%	29%
Don't know	1%	1%

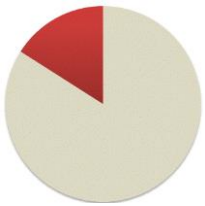
Base: total respondents from the 2015/2014 Ontario Benchmark survey

Once again, this year's survey probed around the concept of SMART Grid. While another year has passed, it is evident that the SMART Grid is still not a much talked about concept, only 30% [34%;2014] have a basic or good understanding of what it is, 69% have either not heard of the term or if they did, do not know much about it.

56%

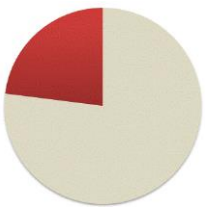
56% of Ontario respondents feel it is 'very + somewhat' important to pursue the implementation of SMART Grid technologies

16%



16% of Ontario respondents feel it is 'very + somewhat' unimportant to pursue the implementation of SMART Grid technologies

23%



23%, one in four Ontarians simply admitted they "do not know" if SMART grid technologies should be pursued.

Base: total respondents from the 2015 Ontario Benchmark survey

Support towards working with neighbouring utilities on SMART Grid initiatives		
	Ontario 2015	**Ontario 2014**
Very supportive	40%	41%
Somewhat supportive	39%	37%
Neither supportive or unsupportive	2%	4%
Somewhat unsupportive	5%	4%
Unsupportive	6%	4%
Don't know	8%	10%

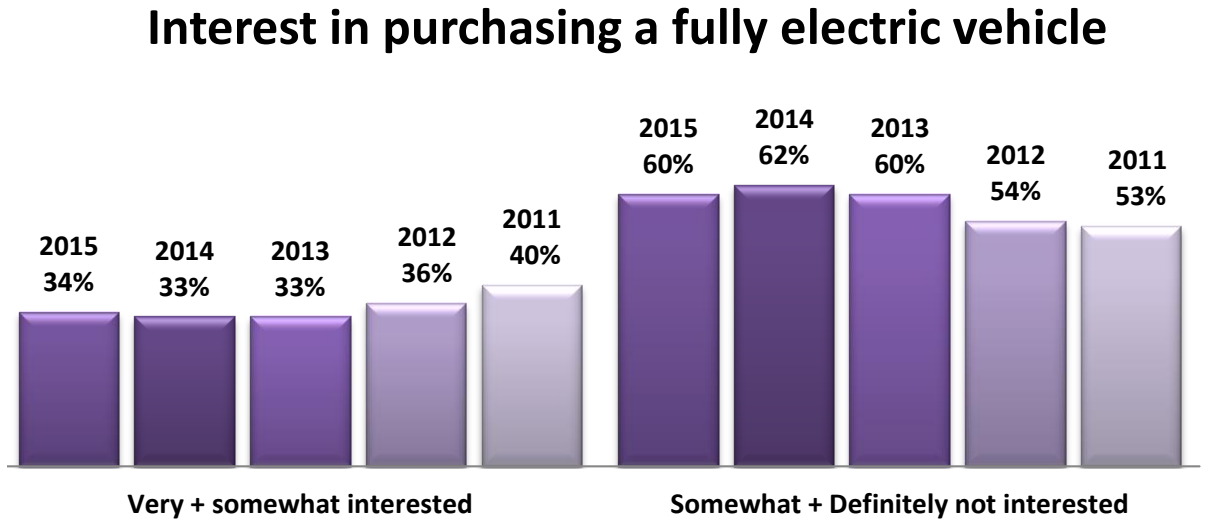
Base: total respondents from the 2015/2014 Ontario Benchmark survey

With inconsistencies between Ontario LDCs' about the definition of SMART Grid coupled with different levels of technical maturity --- collaboration amongst LDCs is very difficult.

Purchasing an Electric Vehicle

For 5 years UtilityPULSE has been collecting information and tracking electricity customers interest in purchasing an electric vehicle. In fact, we've asked the same questions in the same way for 5 years.

While the actual raw numbers are interesting e.g., 34% are very + somewhat interested in purchasing an electric vehicle, the 5 year trend is also interesting. Other than the first year when various manufacturers hit the airwaves about their EVs the interest level has remained in the 34% area. We can conclude that "interest" in purchasing doesn't actually translate to a customer acting on that interest and buying an electric vehicle. Perhaps it is because the EV industry has not done a good job in allaying fears about distances that can be travelled between charges, or time to charge from empty, or the higher depreciation costs associated with most EVs.



Base: total respondents from the 2015 Ontario Benchmark survey

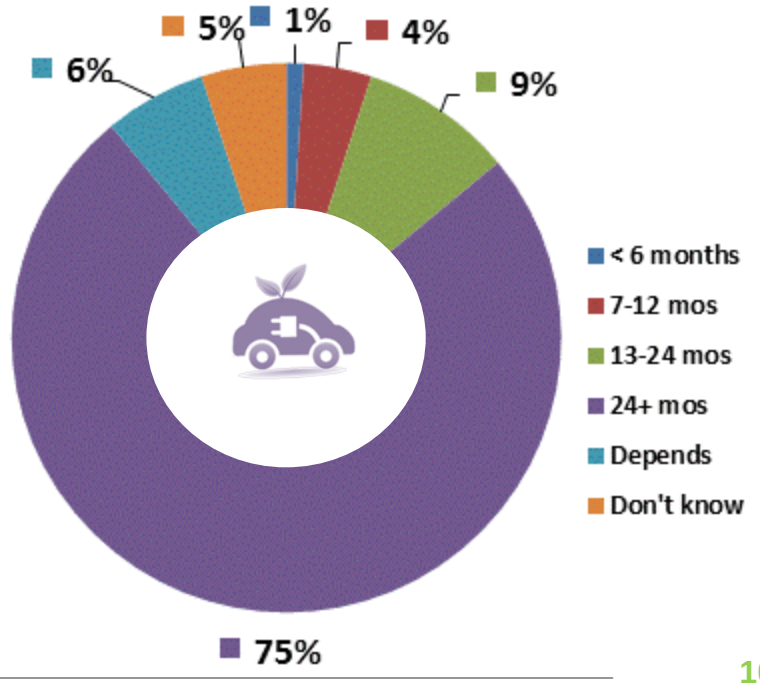
From a demographics perspective respondents in the 35-54 age group had the highest level of interest at 45% (39% in 2014). Data from the survey also tells us that there is very little variance in interest to purchase based on the respondents ability to pay for their electricity bills. Customers who said they have “No worries” or said they “Often worry” about paying their electricity bills were statistically equal in their level of interest.

Interest in purchasing a fully electric vehicle	Income <$40K	Income $40K<$70K	Income $70K +	Age 18-34	Age 35-54	Age 55+
Top 2 Boxes: 2015 ‘very + somewhat interested’	30%	28%	41%	29%	45%	29%
Top 2 Boxes: 2014 ‘very + somewhat interested’	30%	28%	42%	27%	39%	28%

Base: total respondents from the 2015 Ontario Benchmark survey

Length of time before purchasing a fully electric vehicle	Ontario 2015	Ontario 2014
Immediately to next 6 months	6%	2%
7 to 12 months	4%	2%
13 to 24 months	9%	9%
Over 24 months	75%	79%
Depends	6%	5%
Don’t know	5%	3%

Base: total respondents from the 2015/2014 Ontario Benchmark survey



Method

The findings in this report are based on telephone interviews conducted for Simul Corp. / UtilityPULSE by Greenwich Associates between March 4 - 14, 2015 with 603 respondents who pay or look after the electricity bills from a list of residential and small and medium-sized business customers supplied by Horizon Utilities.

The sample of phone numbers chosen was drawn randomly to insure that each business or residential phone number on the list had an equal chance of being included in the poll.

The sample was stratified so that 85% of the interviews were conducted with residential customers and 15% with commercial customers.

In sampling theory, in 19 cases out of 20 (95% of polls in other words), the results based on a random sample of 603 residential and commercial customers will differ by no more than ±3.99 percentage points where opinion is evenly split.

This means you can be 95% certain that the survey results do not vary by more than 3.99 percentage points in either direction from results that would have been obtained by interviewing all Horizon Utilities residential and small and medium-sized commercial customers if the ratio of residential to commercial customers is 85%:15%.

The margin of error for the sub samples is larger. To see the error margin for subgroups use the calculator at http://www.surveysystem.com/sscalc.htm.

Interviewers reached 2,351 households and businesses from the customer list supplied by Horizon Utilities. The 603 who completed the interview represent a 26% response rate.

The findings for the Simul/UtilityPULSE National Benchmark of Electric Utility Customers are based on telephone interviews conducted February 20 through February 27, 2015, with adults throughout the country who are responsible for paying electric utility bills. The ratio of 85% residential customers and 15% small and medium-sized business customers in the National study reflects the ratios used in the local community surveys. The margin of error in the National poll is ±2.7 percentage points at the 95% confidence level.

For the National study, the sample of phone numbers chosen was drawn by recognized probability sampling methods to insure that each region of the country was

represented in proportion to its population and by a method that gave all residential telephone numbers, both listed and unlisted, an equal chance of being included in the poll.

The data were weighted in each region of the country to match the regional shares of the population.

The margin of error refers only to sampling error; other non-random forms of error may be present. Even in true random samples, precision can be compromised by other factors, such as the wording of questions or the order in which questions were asked.

Random samples of any size have some degree of precision. A larger sample is not always better than a smaller sample. The important rule in sampling is not how many respondents are selected but how they are selected. A reliable sample selects poll respondents randomly or in a manner that insures that everyone in the population being surveyed has an equal chance of being selected.

How can a sample of only several hundred truly reflect the opinions of thousands or millions of electricity customers within a few percentage points?

Measures of sample reliability are derived from the science of statistics. At the root of statistical reliability is probability, the odds of obtaining a particular outcome by chance alone. For example, the chances of having a coin come up heads in a single toss are 50%. A head is one of only two possible outcomes.

The chance of getting two heads in two coin tosses is less because two heads are only one of four possible outcomes: a head/head, head/tail, tail/head and tail/tail.

But as the number of coin tosses increases, it becomes increasingly more likely to get outcomes that are either close to or exactly half heads and half tails because there are more ways to get such outcomes. Sample survey reliability works the same way but on a much larger scale.

As in coin tosses, the most likely sample outcome is the true percentage of whatever we are measuring across the total customer base or population surveyed. Next most likely are outcomes very close to this true percentage. A statement of potential margin of error or sample precision reflects this.

Some pages in the computer tables also show the standard deviation (S.D.) and the standard error of the estimate (S.E.) for the findings. The standard deviation embraces the range where 68% (or approximately two-thirds) of the respondents would fall if the distribution of answers were a normal bell-shaped curve. The spread of responses is a way of showing how much the result deviates from the "standard mean" or

average. In the Horizon Utilities data on corporate image, Simul converted the answers to a point scale with 4 meaning agree strongly, 3 meaning agree somewhat and so on (see in the computer tables).

For example, the mean score is 3.71 for providing consistent, reliable electricity. The average is 3.21 for providing information to help customers reduce their energy costs.

For reliable electricity the standard deviation is 0.50. For affordable energy the S.D. is 0.85. These findings mean there is a wider range of opinion – meaning less consensus – about whether Horizon Utilities provides information to help customers to reduce their energy costs than about whether Horizon Utilities energy supplies are reliable.

Beneath the S.D. in the tables is the standard error of the estimate. The S.E. is a measure of confidence or reliability, roughly equivalent to the error margin cited for sample sizes. The S.E. measures how far off the sample's results are from the standard deviation. The smaller the S.E., the greater the reliability of the data.

In other words, a low S.E. indicates that the answers given by respondents in a certain group (such as residential bill payers or women) do not differ much from the probable spread of the answers "predicted" in sampling and probability theory.

Certain questions pertaining to conservation and conservation efforts used an aggregate data approach whereby similar data sets were accumulated to form a larger sample size establishing a higher confidence interval, forecasting value and modeling data.

In these instances, all of the sub-datasets from the entire UtilityPULSE database for 2015 were concatenated in order to use the average of all the control samples for comparison. The cumulated population base for these questions was in excess of 8,000.

At a 95% confidence level the margin of error is ±1.1 and at a 99% confidence level the margin of error would be ±1.44. So the aggregate strategy has given a very good population sample size which better, or more accurately, reflects the true feelings and beliefs of the population as a whole.

Good things happen when work places work. You'll receive both strategic and pragmatic guidance about how to improve Customer satisfaction & Employee engagement with leaders that lead and a front-line that is inspired. We provide: training, consulting, surveys, diagnostic tools and keynotes. The electric utility industry is a market segment that we specialize in. Both large and small utilities have received actionable insights. For seventeen years we have been talking to 1000's of utility customers in Ontario and across Canada and we have expertise that is beneficial to every utility.

Culture, Leadership & Performance – Organizational Development	**Focus Groups, Surveys, Polls, Diagnostics**	**Customer Service Excellence**
Leadership development	Diagnostics ie. Change Readiness, Leadership Effectiveness, Managerial Competencies	Service Excellence Leadership
Strategic Planning	Surveys & Polls	Telephone Skills
Teambuilding	Customer Satisfaction and Loyalty Benchmarking Surveys	Customer Care
Organizational Culture Transformation	Organization Culture Surveys	Dealing with Difficult Customers

Benefit from our expertise in Customer Satisfaction, Leadership development, Strategy development or review, and Front-line & Top-line driven-change. We're experts in helping you assess and then transform your organization's culture to one where achieving goals while creating higher levels of customer satisfaction is important. Anyone can present data, or design programs – we believe having an understanding of the industry before doing so is cruicial. Call us when creating an organization where more employees satisfy more customers more often, is important.

Your personal contact is:

Sid Ridgley, CSP

Phone: (905) 895-7900 Fax: (905) 895-7970 E-mail: sidridgley@utilitypulse.com or sridgley@simulcorp.com

MANA-38

Reference

Page 4 of Exhibit 1, Tab 3, Schedule 1 states that without M-Factor funding, critical investments would need to be deferred beyond 2024, resulting in: an increasingly deteriorated distribution system; decreasing reliability; increasing reactive expenditures; and greater renewal costs in the long term.

[38-MANA-1] How were these impacts determined to exist?

[38-MANA-2] To what extent and by what measure will reliability be decreased if the M-factor funding is not granted? Please respond with precise metrics.

[38-MANA-3] To what extent and by what measure will reactive expenditures be increased if the M-factor funding is not granted? Please respond with precise metrics.

[38-MANA-4] To what extent and by what measure will renewal costs be increased if the M-Factor is not granted? Please respond with precise metrics.

[38-MANA-5] What studies, reports or other information support the aforementioned impacts and metrics?

Response:

38-MANA Parts 1 - 4

Alectra Utilities' investment plans are the outcome of its extensive business planning efforts, coordinated planning with third parties, multiple rounds of ongoing formal and informal customer engagement, and the implementation of a robust asset management process. The priorities of Alectra Utilities' customers are that the company should maintain overall reliability and mitigate the impacts of extreme weather on service reliability, while ensuring that distribution rates are reasonable. Please refer to Exhibit 4, Tab 1, Schedule 1, Section 5.2.1 Distribution System Plan Overview, and Exhibit 2, Tab 1, Schedule 2 for further details.

Alectra Utilities has analyzed the impacts on reliability due to reduced funding as discussed in Exhibit 4, Tab 1, Schedule 1, Page 13, Lines 6-8. Please also see Alectra Utilities' response to EP-1.

38-MANA-5

Alectra Utilities has provided a great deal of studies, reports, analysis and supporting information relating to the impacts resulting from the failure to obtain M-Factor funding in the Distribution System Plan. Alectra Utilities has provided a summary of the sections within the DSP and relevant areas of interest in Table 1.

Table 1 - Areas of Evidence in Exhibit 4, Tab 1, Schedule 1

Appendix	Page Number	Title	Relevance
	19	5.2.1 DISTRIBUTION SYSTEM PLAN OVERVIEW	Summary of objectives, Asset Management Framework, and details on customer engagement
	96	5.2.3 PERFORMANCE MEASUREMENT FOR CONTINUOUS IMPROVEMENT	Provides key performance indicators of DSP, reliability performance, and asset data
	130	5.3.1 ASSET MANAGEMENT OVERVIEW	Details on AM strategy and process
	173	5.3.2 OVERVIEW OF ASSETS MANAGED	Service area, climate trends, system configuration, asset capacity utilization
	227	5.3.3 ASSET LIFECYCLE OPTIMIZATION	Asset refurbish and replace practices, inspection and maintenance practices and asset lifecycle risk management
	232	5.4.1 CAPITAL INVESTMENT PLANNING PROCESS OVERVIEW	Provides details on the entire capital planning process including business cases
A05		Overhead Asset Renewal	Provides details on overhead asset renewal including details of assets prone to adverse weather
A07		Rear Lot Conversion	Provides details on the need for rear lot conversions
A10		Underground Asset Renewal	Provides details on the increasing issues with reliability and need for investment
B		Material Investment Business Cases	Provides details on all material investments Alectra Utilities has proposed
C		Customer Engagement	Details results of the customer engagement process

D		Asset Condition Assessment 2018	Provides the details of Alectra Utilities ACA
E		Kinectrics Inc. ACA Assurance Review	Independent third party review of Alectra Utilities ACA
F		Worst Performing Feeders Report	Provides details on worst performing feeder by operational area
G		DSP Assurance Review Report	Independent third party review of Alectra Utilities DSP
K		CIMA Report on Hardening the Distribution System against severe storms - Final Report	Independent third party review of options for storm hardening the distribution system
L		Alectra Value Framework Implementation Document	Provides how the values of projects are prepared
M		Major Event Days (2014-2018)	Provides details on major event days for the last 5 years
O		Station and Feeder Loading Tables	Provides station and feeder loading for capacity and contingency analysis

1

MANA-39

Reference

During the M-Factor Presentation, Mr. Bentz asserted at Page 4, Line 6 of the Presentation Day Transcript that M-Factor funds are necessary "to facilitate load growth". He repeated that "load growth" was a target for spending at Page 8, Line 7 of the Presentation Day Transcript. He stated for a third time that M-Factor funding would allow Alectra "to accommodate load growth", at Page 8, Line 21 of the Presentation Day Transcript. But when Board Member Anderson asked about load growth, Ms. Butany-DeSouza stated first, at Page 51, Line 8, that "load continues to decline"; and later claimed, at Page 51, Line 21, that "Load is pretty stable".

[39-MANA-1] Is Alectra's load growing, as Mr. Bentz claimed three times? Or is it declining, as Ms. Butany-DeSouza claimed? Or is it pretty stable, as Ms. Butany-DeSouza also claimed?

[39-MANA-2] Please provide total load volumes in each of the Alectra (and legacy utility) territories for the last 5 years.

Response:

39-MANA-1

In all references, Mr. Bentz was speaking to the stream of load growth from customer connections resulting largely from new residential and commercial developments. New customer connections put upward pressure on Alectra Utilities total system load and drive a large portion of Alectra Utilities capital funding needs, since Alectra Utilities is required to invest in system expansion, system capacity, and system access to ensure that it can support the load of new customer connections in greenfield areas, and, in regions of urban redevelopment and intensification.

Ms. Butany-DeSouza was in the first reference, speaking to the trend of declining load amongst existing customers. Existing customer load is generally declining across Alectra Utilities service territory, due to both policy related and natural conservation and demand management ("CDM"). Simply put, CDM is driving down average use per customer and putting downward pressure on total system load. This effect of CDM on average use per customer is not unique to Alectra Utilities.

In the second reference, Ms. Butany-DeSouza was addressing the total system load. Load growth resulting from new customer connections has been largely offset by the declining average use per customer, and as a result Alectra Utilities' total system load is stable. This is demonstrated Table 1, below, in response to 39-MANA-2.

39-MANA-2

Please see Table 1 for total load volumes in each of the Alectra Utilities (and legacy utility) rate zones for the last 5 years.

Table 1 – Annual Supply (GWh)[1] by Rate Zone

YEAR	BRZ	ERZ	GRZ	HRZ	PRZ	ALECTRA	ALECTRA Consolidated	Annual Change, %
2013	4,027	7,688	1,747	5,614	8,739		**27,815**	
2014	4,027	7,574	1,760	5,631	8,694		**27,686**	-0.5%
2015	4,062	7,439	1,785	5,549	8,754		**27,590**	-0.3%
2016	4,149	7,569	1,720	5,546	8,892		**27,876**	1.0%
2017			1,661			**25,245**	**26,906**	-3.5%
2018			1,721			**26,268**	**27,989**	3.9%
						5-year Average (2014-2018)		**0.1%**

[1] Data Source: RRR 2.1.5, Total Supply

MANA-40

Reference

Slide 28 of the Alectra M-Factor Presentation filed on August 7, 2019 states that there will be no project-specific materiality threshold.

[40-MANA-1] What ability will the OEB have to limit expenditures on specific projects, if any?

Response:

40-MANA-1

The materiality threshold establishes the level of capital funding that a utility should be expected to absorb within its funding from base rates outside of a rebasing application. Alectra Utilities identified projects that fit within the M-factor maximum eligible capital, which is calculated as the difference between the 2020 to 2024 capital forecast for Alectra Utilities to the Threshold Capital Expenditure. Further, subject to the OEB's approval of the M-Factor, Alectra Utilities proposes a symmetrical CIVA for the 2020-2024 term of the DSP. Alectra Utilities proposes to track variances between the actual and forecast M-factor capital related revenue requirement for the DSP term.

MANA-41

Reference

Page 6 of Exhibit 1, Tab 3, Schedule 1 refers to the M-factor as "an enhancement to the OEB's current rate making methodology, which is specific to the circumstances of a consolidated utility preparing and filing a consolidated utility preparing and filing a consolidated DSP".

[41-MANA-1] Does this mean that the rate increase related to the M-Factor would not have occurred but for the Alectra Utilities amalgamation?

[41-MANA-2] Which other utility consolidations have necessitated an M-Factor "enhancement"?

[41-MANA-3] Have any other consolidated utilities been able to satisfy their post-consolidation capital requirements without an M-Factor "enhancement"? Please list them.

Response:

The following is in response to 41-MANA-1, -2 and -3.

Absent the consolidation transaction through which Alectra Utilities was established, the overall rate increase that customers would have experienced would have been larger because there would have been multiple utilities filing individual Custom IR rebasing applications, based on individually prepared DSPs. Alectra Utilities is not in a position to speak to the capital needs of other utilities, it can only speak to its own circumstances.

However, unlike any other consolidation that Alectra Utilities is aware of, Alectra Utilities was required to prepare a DSP by 2019, during the 10 year rate rebasing deferral period. This DSP is consistent with the capital needs identified at the time of the approval of the MAADs application. The DSP is a 5-year capital plan that was built from the bottom up, on a system-wide basis. The M-factor, as proposed, will provide flexibility to permit Alectra Utilities to implement the DSP over 5 years, by providing the ability to fund capital investments on an envelope basis, allowing specific projects to be replaced, modified or shifted between years depending on system needs and priorities.

This flexibility is not provided under the Incremental Capital Module ("ICM"). Please see Exhibit 2, Tab 1, Schedule 3 at page 7 for the attributes of the M-factor that are enhancements to the current rate making methodology.

MANA-42

Reference

Page 3 of Exhibit 2, Tab 1, Schedule 1 acknowledges the OEB's view that Alectra Utilities would benefit from cost savings from the amalgamation.

[42-MANA-1] Has amalgamation resulted in additional cost rather than savings?

[42-MANA-2] What quantum of savings or loss did Alectra Utilities believe would be saved or lost by amalgamation prior to the occurrence of the amalgamation?

[42-MANA-3] What quantum of savings or loss does Alectra Utilities now believe is being saved or lost by amalgamation?

Response:

The response below applies to all parts of MANA-42.

Please see Alectra Utilities response to G-Staff-15.

MANA-43

Reference

During the M-Factor presentation, at Page 23, Line 11 of the Presentation Day Transcript, Mr. Cananzi stated that DSP funds must be spent on development and intensification in Alectra territory, which he later clarified at Page 51, Line 27 refers to growth.

[43-MANA-1] Regardless of the impact of such development and intensification on load volumes, does connecting new customers have any impact on Alectra's revenues, for example in the form of customer charges or other non-volumetric charges?

[43-MANA-2] Please describe the impact of new customers on revenues in detail, with specific figures to the number of expected new customers and the amount of expected new revenues from non-volumetric charges from such new customers.

[43-MANA-3] Where is the addition of customers and impact on total load usage reflected in Alectra's application?

[43-MANA-4] Why is this spending necessary from existing customers when it will result in Alectra obtaining new customers and therefore new sources of revenue?

Response:

43-MANA-1 to 43-MANA-4

Please see Alectra Utilities' response to G-Staff-94 and MANA-39.

MANA-44

Reference

During the M-Factor presentation, at Page 4, Line 9 of the Presentation Day Transcript Ms. Butany-DeSouza stated that the 5-year M-Factor provides 5-year rate certainty for customers.

[44-MANA-1] On what basis should customers believe that the M-Factor will provide them with rate certainty when the ICM and rate rebasing deferral were supposed to perform that function?

Response:

44-MANA-1

The basis for MANA's assumption that the ICM and rate rebasing deferral were supposed to perform the function of providing rate certainty is not evident from the OEB's policies on these items.

In the 2015 *Report of the Board – Rate Making Associated with Distributor Consolidations* (EB-2014-0138) (the "MAADs Report"), the OEB determined that consolidating distributors could file for incremental capital funding during the rebasing deferral period. It identified the purposes of providing an opportunity to seek incremental capital funding, including to encourage consolidation efforts, and stated that "*a distributor may now apply for an ICM that includes normal and expected capital investments. This clarification of policy should address the need of those distributors who may not consider entering into a MAADs transaction due to concerns over the ability to finance capital investments*.[1]"

In the subsequent *Handbook to Electricity Distributor and Transmitter Consolidations* (the "MAADs Handbook") released on January 21, 2016, the OEB stated that "*ICM is now available for any prudent discrete capital project that fits within an incremental capital budget envelope, not just expenditures that were unanticipated or unplanned*.[2]" Further the OEB stated that "*[t]o encourage consolidation, the 2015 Report extended the availability of the ICM for consolidating distributors that are on Annual IR Index, thereby providing consolidating*

[1] MAADs Report, March 25, 2015, p.9

[2] MAADs Handbook, January 21, 2016, p.17

distributors with the ability to finance capital investments during the deferral period without being required to rebase earlier than planned."

Similarly, regarding the rebasing deferral period and its extension to a maximum of ten years, the OEB identified the purpose of such in the MAADs Policy, stating that "*[it] has determined that providing an extension of the allowed deferral period to up to 10 years after the closing of the transaction, would address distributors' key concern about the 2007 policy; would reduce the risk of a MAADs transaction, which may encourage more consolidation; and would provide distributors with the flexibility to manage their own, unique circumstances*.[3]"

In the MAADs Handbook, the OEB stated the purpose of the extension of the rebasing deferral period. The OEB indicated that "*[t]o encourage consolidations, the OEB has introduced policies that provide consolidating distributors with an opportunity to offset transaction costs with any achieved savings. The 2015 Report permits consolidating distributors to defer rebasing for up to ten years from the closing of the transaction*.[4]"

Neither in the MAADs Report, nor in the MAADs Handbook, did the OEB state that the purpose of the ICM and rebasing deferral were supposed to provide rate certainty.

Rather, one of Alectra Utilities' concerns with the ICM framework is that it requires annual requests for incremental capital funding, which makes it difficult to plan and efficiently implement a 5-year DSP. During the M-Factor presentation, at Page 4, Line 9 of the Presentation Day Transcript, Mr. Bentz that indicated that one of the key benefits of the 5-year M-factor is that it would provide 5-years of rate certainty for customers.

As Alectra Utilities indicates in Exhibit 2, Tab 1, Schedule 4, page 1, the M-factor – and the resulting M-factor riders described in Exhibit 2, Tab 1, Schedule 3, pp. 17-19 - provide both customers and the utility with certainty and stability in respect of incremental capital funding over the full five-year term of the DSP.

[3] MAADs Policy, p. 6

[4] MAADs Handbook, p.11-12

MANA-45

Reference

During the M-Factor presentation, Mr. Cananzi advised, at Page 55, Line 1 of the Presentation Day Transcript, that Alectra had found "accelerating degradation".

[45-MANA-1] Why was this accelerating degradation not identified in legacy DSPs?

[45-MANA-2] Where was this identified in the MAAD application?

Response:

45-MANA-1

Please see response to G-Staff-14.

45-MANA-2

Please see response to G-Staff-14.

MANA-46

Reference

Exhibit 5, Attachment 1, indicates an actual Return on Equity for Alectra of 7.66% in 2018, and a deemed Return on Equity of 8.94%.

During the M-Factor Presentation, Mr. Bentz asserted, at Page 5, Line 19 of the Presentation Day Transcript, that the requested M-Factor funding was to support investment in "certain capital expenditure needs".

He also asserted an interest in "being sensitive to the impact that these investments have on customer bills" (Page 6, Line 11) and in keeping rates "as low as possible" (Page 7, Line 3).

[46-MANA-1] If the M-Factor is approved and the DSP is subsequently implemented using, in part, funds collected as M-Factor charges, will Alectra and its shareholders earn (or is the goal for Alectra and its shareholders to earn) a Return on Equity on the additional capital spending which is outlined in the proposed DSP and funded by M-Factor? For the purposes of this question, Alectra can assume that its total ROE does not exceed the 8.94% deemed ROE by more than 300 bps (ie does not exceed 11.94%).

[46-MANA-2] What is the rate of ROE that Alectra expects to earn on DSP capital spending funded by M-Factor? Is it between 7.66% and 8.94%? Is it between 7.66% and 11.94%?

[46-MANA-3] Using the ROE rate or range given in response to 47-MANA-2, what is the expected return, in dollars, that Alectra or its shareholders can expect to earn on DSP capital spending funded by M-Factor, over the 5 year term of the DSP?

[46-MANA-4] In its customer engagement process, did Alectra ask whether, and did customers respond that, Alectra's Return on Equity was one of their preferences or priorities? Please advise where on in the materials such customer preferences or priorities appear.

[46-MANA-5] Would Alectra classify its Return on Equity as a "capital expenditure need"?

[46-MANA-6] Is the sole impetus for Alectra's M-Factor proposal just the factors discussed in the M-Factor Presentation (e.g. improve reliability by renewing aging assets and preparing for severe weather, and reacting to community development and growth), or is the M-Factor proposal in any way – even in part – driven by an interest in increasing profits, returns or dividends for Alectra and its shareholders?

[46-MANA-7] If increasing their profits, returns or dividends is not in any way a factor in or reason behind Alectra's M-Factor proposal, in the interest of keeping rates "as low as possible", will Alectra consider voluntarily reducing the ROE on the M-Factor funded items to 0% (for example, by reducing the M-Factor amount collected by 7.66%, but without reducing the amount of spending under the DSP), so that an additional 7.66%

can be spent to improve reliability for customers rather than for shareholder dividends, executive compensation or other non-capital spending?

Response:

46-MANA-1

There are three main components to the revenue requirement calculation for M-factor capital investments, which is consistent with the revenue requirement calculation in the Ontario Energy Board's ("OEB") Incremental Capital Module: 1. Return on Rate Base; 2. Amortization expense; and 3. Grossed-Up Taxes/PILs.

The Return on rate base includes: i) recovery of interest costs to support utility borrowings to finance M-Factor investment, consistent with amounts deemed by the OEB in rate-making policy; and ii) a return to the Shareholder on its investment supporting the financing of M-Factor capital consistent with amounts deemed by the OEB in rate-making policy.

The latter amount is appropriate to compensate utility shareholders for their investment in utility capital commensurate with risks and risk premiums embedded in OEB policy underlying cost of capital deemed appropriate in distribution rates. MANA would understand that shareholder invested capital should bear an appropriate return. The detailed calculation of Alectra Utilities' M-factor revenue requirement is provided in Exhibit 5, Tab 1, Schedule 1, Attachment 3, M-factor Revenue Requirement.

As provided in Exhibit 2, Tab 1, Schedule 3, Table 6, the proposed M-factor revenue requirement for 2020 through 2024 is $21.8MM, of which $15.8MM is return of rate base; $11.2MM is amortization and ($5.2MM) is grossed-up PILs.

46-MANA-2

M-factor revenue requirement is calculated by rate zone; the Return on Equity ("ROE") used in the calculation is the OEB-approved ROE from each legacy's utility last rebasing application as provided in Attachment 3 of Exhibit 2, Tab 1, Schedule 3.

46-MANA-3

Please see Alectra Utilities' response to 46-MANA-1.

46-MANA-4

Please see Alectra Utilities' response to 46-MANA-1. The calculation of revenue requirement is prescriptive and aligned with the OEB's Incremental Capital Module. Customer preferences and priorities relate to the investment options included in the Customer Engagement Workbook provided in Exhibit 4, Tab 1, Schedule 1, Appendix C.

46-MANA-5

Please see Alectra Utilities' response to 46-MANA-1.

46-MANA-6

As provided in Exhibit 2, Tab 1, Schedule 3, the nature of the investments set out in the Distribution System Plan ("DSP") has informed Alectra Utilities' request for capital funding in this Application. Alectra Utilities consulted with customers in order to understand their needs and priorities. The five-year DSP was developed to be responsive to the views of Alectra Utilities' customers. Alectra Utilities assessed customers' preferences between specific capital investment options and incorporated that feedback into the final DSP.

46-MANA-7

Please see Alectra Utilities' response to 46-MANA-1. The ROE percentages used in the calculation of M-factor revenue requirement is the OEB-approved ROE for each of Alectra Utilities' predecessor utilities.