EB-2018-0165

Ontario Energy Board

IN THE MATTER OF the *Ontario Energy Board Act, 1998*, Schedule B to the *Energy Competition Act, 1998*, S.O. 1998, c.15;

AND IN THE MATTER OF the Application Toronto Hydro - Electric System Limited for an Order or Orders approving or fixing just and reasonable distribution rates and other charges, effective January 1,2020 to December 31, 2024.

.

Argument

of

Norman D. Hann P. Eng

August 28, 2019

1. Introduction

In the DECISION AND ORDER EB-2014-0116 TORONTO HYDRO-ELECTRIC SYSTEM LIMITED

The OEB has determined that it cannot fully rely on Toronto Hydro's approach to establishing its spending proposals in determining if the outcome of that spending is desirable for ratepayers. It is not clear that Toronto Hydro's proposals are necessarily aligned with the interests of its customers, as they are largely supported by an asset condition analysis rather than the impact of the proposed work on the reliability of the system. The approach used by Toronto Hydro does not give a clear indication of how the overall spending is related to customer experience such as reliability.

The Application lacks evidence of corporate policy guiding Toronto Hydro staff to focus on impacts on customers when developing spending proposals. The focus overall is on the need for work based on asset condition assessment without a clear understanding of the results expected to be achieved through the work. Continuous improvement measurements are lacking, as discussed in the section of the Decision dealing with reporting requirements.[1]

Through the evidence this argument is to assist the Board to understand that the

- Spending proposal still cannot be fully relied on
- Proposal are not aligned with the interests of the customers
- Asset condition is still largely based on age and lacking in closure to show that spending has made improvement

This is the Final Argument of Norman David Hann P. Eng. (N Hann)

Any issue not addressed or forecast cost, should not be construed as acceptance of Toronto Hydro's proposal.

2. General (Issue 1.0)

2.1 Has Toronto Hydro responded appropriately to all relevant OEB directions from previous proceedings (Issue 1.1)?

Underpinning the capital program and this proposal is the continuous assertion that key issues are defective/aging equipment/infrastructure and extreme weather

Design Standards

The foundation of any distribution system and the costs to develop and maintain the system are a function of standards, processes and procedures, etc. A key standard is the design of

[1] K4-6_VECC Compendium Panel 1 20190704

the Overhead Distribution System CSA C22.3 No. 1-10[2] which is referred throughout the evidence and hearings.

The CSA C22.3 No. 1-10 leads to the size and spacing of poles due to the design loads specified with load factors or overload factors or factors of safety. 2B-EP-43 Appendix D FILED: January 30, 2019 (13 pages) pg 9 and 10 Section 5 Overhead system refers to these tables and factors from the CSA standard.[3]

Appendix A – Design Loads with Load Factors, shows that the maximum **wind speed** wood poles under class 2 construction are built to withstand is 135 km/hr and the maximum ice load is 67.5 mm of **freezing rain**. Without the load factors the values are 90 km/hr and 25 mm of freezing rain respectively.

Toronto Hydro stated numerous times throughout the evidence and hearings that extreme weather was a major concern in the performance of the assets.

It is prudent for Toronto Hydro to show that the assets are experiencing weather loads beyond the capability of the asset to withstand.

<u>Customer Engagement</u>

In the customer engagement process Toronto Hydro referred to a textbook diagram for “end of economic life”[4]

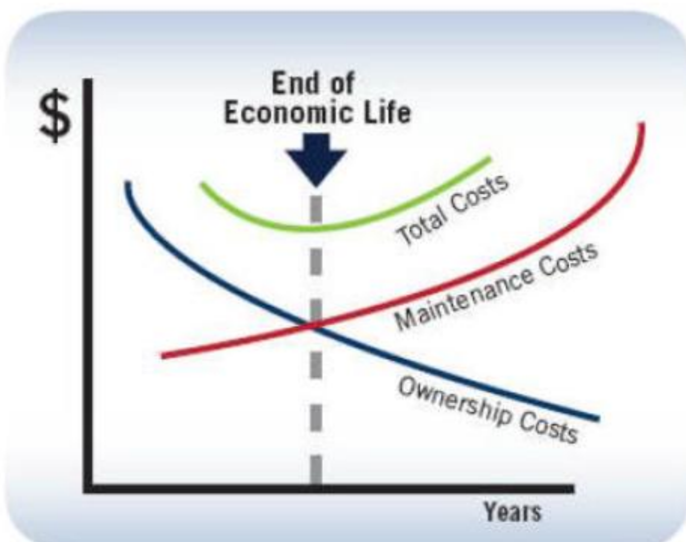

Figure 1: End of Economic Life Cost

Which has a very different shape and message to an actual chart for a sample wood pole.[5]

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[2] 2B-EP-43 Appendix D FILED: January 30, 2019 (13 pages) pg 9 and 10 Section 5 Overhead system

[3] Appendix A

[4] 2B section D4 pg 5

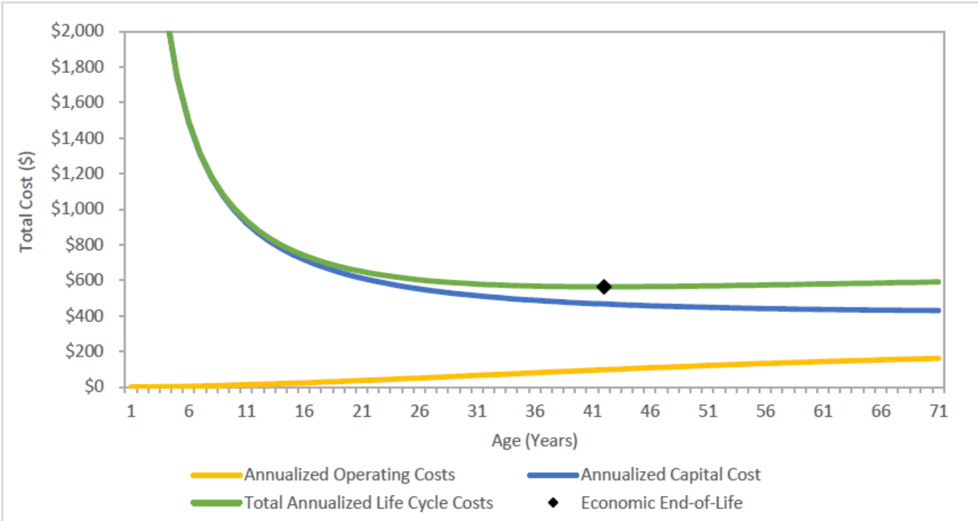

Figure 1: Total Annualized Life Cycle Cost of a Sample Wood Pole

A shape that is essentially flat and could have the Economic End of Life extend from 41 years to over 70 years with very little impact on OM&A

Customers were given the "text book" version not the "actual" version to make base there decisions on.

Customers were also told that aging equipment is the cause of 36%of the outages "However, the largest number of outages, roughly 36% of them, can be attributed to aging equipment." [6]

This did not refer to the number of outages to be restored or the correct cause[7] of the outage since "aging equipment" is a subset of "defective equipment" and used interchangeably by Toronto Hydro where in fact "end of life" is one of many "defective equipment" root causes and the 36%[8] [9] actually referred to the average number of customer interruptions divided by the customers served thus the impact on customers of the outages, NOT outages that required a restoration effort. Over the period 2013-2017 there were a total of 2922 defective equipment outages.[10] There is no benchmarking evidence to provide context as to whether this is large number or a small number, also some of the defective equipment may not have any impact on the supply of power to customers such as communication equipment.

These examples of misleading information will lead to very different thoughts and opinions by customers participating in the engagement process and thus a biased study.

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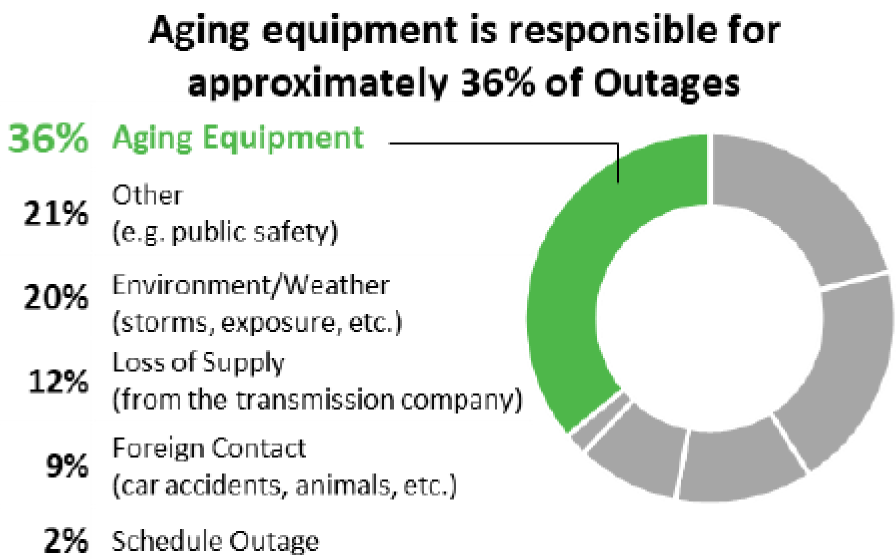
[5] JTC2.29
[6] Appendix 2.1 Toronto Hydro 2018 Customer Engagement Customer Feedback Portal Report pg 31
[7] 4B-HANN-128 – Table 1 and Table 2
[8] 2B Section E2 pg 14
[9] 1B-Hann-36
[10] 1B-HANN-22

Aging equipment is a so called “root cause”, therefore it cannot be used interchangeably unless it is the only root cause Therefore Toronto Hydro is saying to the customers in the presentations and the Board that since deterioration and defective equipment are the same there is no “incorrect maintenance, or imminent failures detected by maintenance”. Furthermore the cause could be tree brush contact or tree falling.



[11]

3.2 Are the rate and bill impacts resulting from Toronto Hydro’s application appropriate (Issue 1.3)?

Toronto Hydro was very careful to point out to Ms. Douglas[12] what she could do to reduce her electricity costs. She could “Upgrad[ed] [sic] insulation or windows,Heating and cooling factors such as gas or electric heating or air conditioning, systems, baseboard or portable heaters, thermostat settings, heated floors, heated driveways, pool pumps, etc.,Gas or electric water heating,Types and frequency of appliances in use, and their energy efficiency ratings”[13]. In other words, reduce her consumption. However, Toronto Hydro did not give any indication as to what it would do to reduce the most significant part of her bill, the delivery charge. Based on 8-SEC-94 since 2011 to 2024 Ms Douglas and all other customers can

[11] Appendix 2.1 Toronto Hydro 2018 Customer Engagement Customer Feedback Portal Report pg 31
[12] 1B-STAFF-17
[13]ibid

expect to pay at least a total of $2200 plus taxes extra in the delivery charge with no apparent change in performance or desire by Toronto Hydro to control the cost.[14]

3. Custom Incentive Rate-setting (Issue 2.0)

3.1 Are all elements of Toronto Hydro's Custom Incentive Rate-setting proposal for the determination of rates appropriate (Issue 2.1)?

In the UMS Benchmark Study comparators for vegetation management are not reasonable because they are based on elevation above sea level, not vegetation density.[15] (the comparator map is in meters which is a distance measure, not sq m or sq km which is an area measure)

Mr. Cummings stated vegetation management was not bench marked, yet this is a significant part of OM&A.

> "MR. HANN: These ones, too, I think, will need an undertaking. Where would Toronto Hydro fit in terms of quartile ranking in terms of its vegetation against whatever the number was there, and where would it fit in terms of its tree-caused outages.
>
> MR. CUMMINGS: That was not within the scope of our work. We were strictly looking at unit cost.
>
> MR. HANN: Okay. Would you agree that trees have an impact on unit costs?
>
> MR. CUMMINGS: For -- I don't think you can make a blanket statement like that in terms of replacing breakers or replacing transformers. I mean, you could create a scenario where trees are a factor, but I would view them as, if you will, separate and distinct.
>
> MR. HANN: So you are looking at unit costs of just capital, or capital and OM&A?
>
> MR. CUMMINGS: I am looking at the unit costs in this case, it is the unit cost of installing a breaker, which is primarily capital."[16]

Toronto Hydro has the ability to segregate its outage data into Former Toronto and Horseshoe[17] which would give a set of more appropriate comparators but chose not to benchmark in this fashion. Segregating Toronto Hydro's data would give a better comparison and shows its performance more accurately especially since there is an 8 to 12 times difference between the actual number of recorded interruptions/restorations between the 2 locations in the service territory

[14] Tr Volume 8 July 11, 2019 pg 51-53
[15] J8.12
[16] Tr Volume 8 July 11, 2019 pg 185
[17] 2B-Hann-52

The definition of KM in Table 1: 2020-2024 Custom Performance Scorecard Measures for Vegetation Management[18] needs to be clearly defined. The measure could be based on route or road km, primary circuit km or primary and secondary circuit km which are all different distances and would give a different result, yet the only vegetation management that should be used is with route or road km. This definition then makes a difference on any performance benchmarking that is undertaken.

Also the causes, especially "defective equipment" need to be clearly defined and understood by all involved in coding the outage and analyzing it so that the root cause will to lead to the appropriate business decision. [19] [20] [21]

4. Rate Base and Capital Plan (Issue 3.0)

5.1 Are the proposed 2020-2024 rate base amounts (including the working capital allowance amounts) reasonable (Issue 3.1)?

"Toronto Hydro will install taller poles with armless construction and tree-proof wire to reduce vegetation contact risks."[22]

This appears to be a very capital based vegetation management process that will lead to Toronto Hydro needing to "refresh the poles" every time the trees grow into the lines. At some point it will not be possible to purchase poles that are taller than the trees then a new strategy will need to be developed yet Toronto Hydro will have been reaping years of ROE on the increased value of the poles[23]. It may be that Toronto Hydro plans to reap the revenue from the increased asset base and then switch to OMA costs and actually manage the trees, so the asset replacement will stop and the costs switch to OMA.

The Area Conversions are tracked in an manner that is not comparable to internal Toronto Hydro performance or other utilities, the metric should be cost per KM, not cost per customer since the lots can be of varying sizes and configurations. Also, not replacing like for like – overhead to underground

[18] 2B Section C2 pg 5
[19] Tr Vol 4, July 4, 2019 pg 68, 69
[20] Tr Vol 6, July 8, 2019 pg 39, 40
[21] J6.8
[22] 2B Section D2 page 8
[23] Tr Vol 10, July 15, 2019 pg 107, 108

The evidence shows that that trunk feeders are the primary locations of outages for large numbers of customers are being interrupted per outage[24]

Note that Toronto Hydro states that " As shown by the Overhead Defective Equipment cause codes in Figures 21 and 22, below, the most significant SAIDI and SAIFI impacts since 2013 are attributable to pole and pole hardware failures as well as overhead switches. This is mainly due to the magnitude of these types of failures, which often disable large numbers of feeders."[25] This evidence confirms that the outages are occurring at or new the stations causing high impact to customers when one would expect them to randomly occurring across the system

Toronto Hydro states that "Capital replacements that harden the system against extreme weather will not eliminate interruptions due to tree contacts."[26] yet Toronto Hydro is installing taller poles to manage an OM&A expense with a capital expense. Furthermore, there has not been an extreme weather event that has exceeded the CSA C22.3 design loads with load factor[27] [28]

Toronto Hydro also states that "Tree Contacts can cause fuses to operate as part of the system's protection scheme. These outages are categorized as **Tree Contacts if there is sufficient evidence to show this was the cause**." [29] (bold added)

Since the outages appear to be at the station, there is not sufficient evidence to show it is trees that caused the outage, therefore it is recorded as equipment failure or unknown depending on the age of the equipment or the person doing the coding.

Mr. Lyberogiannis said that weather was available during the May 3rd presentation[30], AECON used weather data for its analysis[31], Mr Taki says the weather data is not available[32] to show how many times the assets have experienced loading that exceeds the CSA C22.3 No 1-10 loads with load factors[33], or over load factors or factors of safety even once. May it please the board to accept the non actual weather evidence exceeding design loads with load factors provided by Toronto Hydro as proof that Toronto Hydro has not to this point experienced any weather loading that exceeds the CSA C22.3 No 1-10 loads with load factors, or over load factors or factors of safety and thus the assets should have been able to withstand the weather conditions experienced. (though Toronto Hydro has experienced wind gust over 85 km/hr, a load without load factor a total of 12 times from 2009 to 2018). A load that according to the International recognized Beaufort Wind Scale - EXHIBIT NO. K4.3 - is

24 1B-Hann-31
25 1B Tab 2 Sch 4 pg 19
26 1B-Hann-39
27 Appendix A
28 2B section 4A pg 14 - adjusted
29 1B-Hann-39
30 Evidence Overview Presentation May 3, 2019 pg 43
31 2B Section D Appendix D - Climate Change Vulnerability Assessment
32 Tr Vol 4 July 4, 2019 pg 42
33 Appendix A

strong enough that "roofing shingles may become loose or blow off. This is a key piece of evidence since the premise of the application is that "extreme storms" are getting "more frequent" and something must be done to deal with this so called unprecedented weather condition. Weather is a condition; it is something that structural engineers design for every day, whether a power line, bridge or skyscraper. Standards are in place to ensure that minimum requirements are met to ensure the safety of the public and the economic function of the asset. Toronto Hydro needs to refocus its efforts instead of increasing the value of assets year over year from zero book value to "x" value for a larger ROE. Trees are getting taller and increasing in circumference each year,

EB-2018-0165 Presented to the Meeting at North York Central Library November 22,2018

<u>Changing Urban Environment</u>

Please note the change in the urban environment from some simple photos.

Blue spruce – photo taken in 1969 Blue Spruce photo taken Nov 2018

Please note that these 2 trees are on the same property separated by 49 years. This is one small example of how the urban vegetation environment has changed.

[34]

Trees represent a continuous challenge to the performance of the distribution system since they continue to grow, break and die in various types of conditions, motor vehicles hitting a pole are a random event therefore Mr Lyberogiannis statement is not reasonable in terms of managing the risks to the pole assets.[35] Also it is not likely that on an area conversion or

[34] K4.1 N. Hann Compendium – Panel 1 pg 159
[35] Tr Vol 4 July 4, 2019 pg 58 and 59

capital replacement that more ground clearance is required since the voltage will remain in the same range of the standards and not cross the threshold (below 22 kV) to require increased height unless it has become a trunk feeder.

Increasing the height of the poles gives temporary relief from interruptions (and a larger ROE) due to vegetation issues (According to the Beaufort Scale at 39-49 km/hr large branches are in motion. twigs break off trees at 62-74 km/hr, at 50-61 km/hr whole trees are in motion) Therefore, trees may be an issue at 39 km/hr if they are in proximity to the power lines and effective vegetation management is required.

Smart meter replacement,

Detailed analysis needs to be provided regarding the need for replacing electronic smart meters with no moving parts that are deemed to last for only 5 to 15 years compared to the previous mechanical meters which lasted 45 plus years. There are no documented benefits for this change for customers, maybe some for Toronto Hydro, some of which may just need a software change since smart meters still do not tell Toronto Hydro what customers are without power and when.

Storms – Appenix C

Table ES-1 Climate Parameters and Probability of Occurrence provides the following probabilities of occurrence[36]

15mm if freezing rain = 7.5 mm of radial ice – 0.11 days per year

25mm if freezing rain = 12.5 mm of radial ice – 0.06 days per year

70 km/hr wind – tree branch impact – 21 days per year

90 km/hr – design wind without factor of safety or load factor – 2 days per year

120 km/hr – not likely – therefore design load not exceeded.

The 2 probabilities like to do the most damage are freezing rain on trees and 70 km/hr winds, yet Toronto Hydro's focus of this application has been to replace assets and very little on looking at vegetation management including benchmarking against other utilities.

The question needs to be addressed as to why is defective equipment is presented as the main issue when trees under various weather conditions may be a more severe problem, especially when it is easier to code "defective equipment" than to search out the cause on the feeder as stated in 2B-Hann-66 "tree branches breaking, and then coming into contact with

[36] Exhibit 2B Section D Appendix D Toronto Hydro-Electric System Limited Climate Change Vulnerability Assessment Table ES-1 Climate Parameters and Probability of Occurrence

Overhead Feeders in Loop Configuration, as a result of freezing rain, rather than Toronto Hydro's design for ice loading"

Appendix B and Appendix C shows the freezing rain data and Large Event data available provided by Toronto Hydro, none of which exceeded the capacity of the system to resist the external load with load factors.

Regarding load carrying capacity, Toronto Hydro is not able to provide changes in load capacity due normal wear and tear which suggests that the ACA model is based on age rather than condition.[37] Though it is stated that "practitioners are explicitly directed to include assessment of the "change in capacity arising from aging and normal 1 wear and tear of the infrastructure". [38]

5. Load and Other Revenue Forecast (Issue 4.0)

6.1 Is Toronto Hydro's 2020-2024 load forecast reasonable (Issue 4.1)?

Given that Toronto Hydro expects load growth is likely to be immaterial (in consideration of other residential, commercial and institutional construction and growth also occurring in the City of Toronto)[39] replacement should be for the most part on a like for like basis

6. COSTS

Norman D Hann requests that he be awarded 100% of his reasonably incurred costs. Norman D Hann work with other intervenors throughout the process to limit duplication while ensuring that the record was complete

ALL OF WHICH IS RESPECTFULLY SUBMITTED

August 28, 2019

Norman D Hann P. Eng.

[37] TC 20190220 vol 2 pg 148
[38] 2B-Hann-63
[39] Tr Vol 8, July 11, 2019 pg 39

Appendix A – Design Loads with Load Factors

CSA 22.3 No.1-10 – Climatic Loads for Overhead Systems - Toronto area[40]

CSA 22.3 No.1-10 – Climatic Loads for Overhead Systems - Toronto area

Element	Value (notes)
Wind	400 Pa or ~25 m/s (Applied cables/conductors with radial ice cover, and support structures without ice cover)
Ice	12.5 mm radial ice thickness (assumes ice density 900 kg/m3)
Temperatures (ambient)	-20°C ambient temperature (assumed for calculating tensions)
Temperature (conductor)	Conductor temperatures for thermal loading/sag Conductors carrying <1/3 ampacity: 50°C Operating >1/3 ampacity: 100°C bare conductors, 80°C for covered or worst case scenario from ANSI/IEEE 738

- Minimum safety factor Grade 2 or above used for Toronto Hydro:

- Transverse load factors for wood poles (linear analysis; Table 32 in CSA 2006, Appendix E1 in CSA 2010) -> 1.5 for Grade 2 and 2.0 for Grade 1

- Transverse load factors for concrete poles (non-linear analysis) -> 1.2 Grade 2 and 1.5 Grade 1 construction

- Transverse load factors for steel poles (non-linear analysis) -> 1.2 and 1.5, respectively[41]

- according to the CSA C22.3 no.1-01 Overhead systems the vertical load factor for wood poles is 2.7 for Grade 2 and 4.0 for Grade 1 construction

Taking the above values into account provides a transverse wind speed with load factor of 1.5 of 135 km/hr with load factor for wood poles grade 2 construction (400 Pa = 25 m/s = 90 km/hr without the load factor or factor of safety for wood poles grade 2 construction and 67.5 mm of freezing rain with load factor (12.5 mm radial ice = 25 mm of freezing rain[42] times the load factor of 2.7)

[40] 2B-EP-43 Appendix D FILED: January 30, 2019 (13 pages) pg 9 and 10 Section 5 Overhead system
[41] ibid
[42] 2B Section D Appendix D - Climate Change Vulnerability Assessment

Table ES-1 Climate Parameters and Probability of Occurrence[43]

Climate Parameter		Annual Probability (Historical; **Projected 2030's and *2050's***)	Probability of Occurrence Study Period (2015-2050)
Daily Maximum Temperatures	25°C	66 per year; **84 per year**, ***106 per year***	100%
	30°C	16 per year; **26 per year**, ***47 per year***	100%
	35°C	0.75 per year; **3 per year**, ***8 per year***	100%
	40°C	~0.01 per year; **0.3 to 2 days per year**, ***1-7 days per year***	~100%
High Daily Avg. Temperature	30°C	0.07 per year; **N/A**, ***1.2 days per year***	~100%
Heat Wave	3 days max temp over 30°C	0.88 per year; **>1 for both**	100%
High Nighttime Temperatures	Nighttime low ≥23°C	0.70 per year; **7 per year**, ***16 per year***	~100%
Extreme Rainfall	100 mm in <1 day + antecedent	0.04 per year; ***extreme precipitation expected ↑, percentage unknown***	~75%-85%
Ice Storm/Freezing Rain	15 mm (tree branches)	0.11 per year; **>0.13 per year**, ***>0.16 per year***	>99%
	25 mm ≈ 12.5 mm radial	0.06 days per year; **>0.07 per year**, ***>0.09 per year***	>95%
	60 mm ≈ 30 mm radial	Upper bound of estimate: 0.007 events per year; **>0.008 per year**; ***>0.01 per year*** Lower bound of estimate: 0.002 events per year; **> 0.0023 per year**; ***0.003 per year***	High: ~25% Low: ~8%
High Winds	70 km/h+ (tree branches)	21 days per year; **N/A**, ***24 to 26 per year***	100%
	90 km/h	2 days per year; **N/A**, ***>2.5 per year***	100%
	120 km/h	~0.05 days per year; ***likely ↑, but % unknown***	~85% or higher
Tornado	EF1+	1-in-6,000; ***Unknown, no consensus***	~0.6%
	EF2+	1-in-12,000; ***Unknown, no consensus***	~0.3%
Lightning	Flash density per km km^2	1.12 to 2.24 per year per km^2; ***Expected increase, % change unknown***	~50-70%(Lg); ~10-20% (Sm)
Snowfall	Days w/ >10 cm	1.5 days per year; ***Trend decreasing but highly variable***	100%
	Days w/ > 5cm	5 days per year; ***Trend decreasing but highly variable***	100%
Frost		229 frost free days; **249 frost free days**, ***273 frost free days***	100%

[43] ibid

Appendix B Historic Freezing Rain

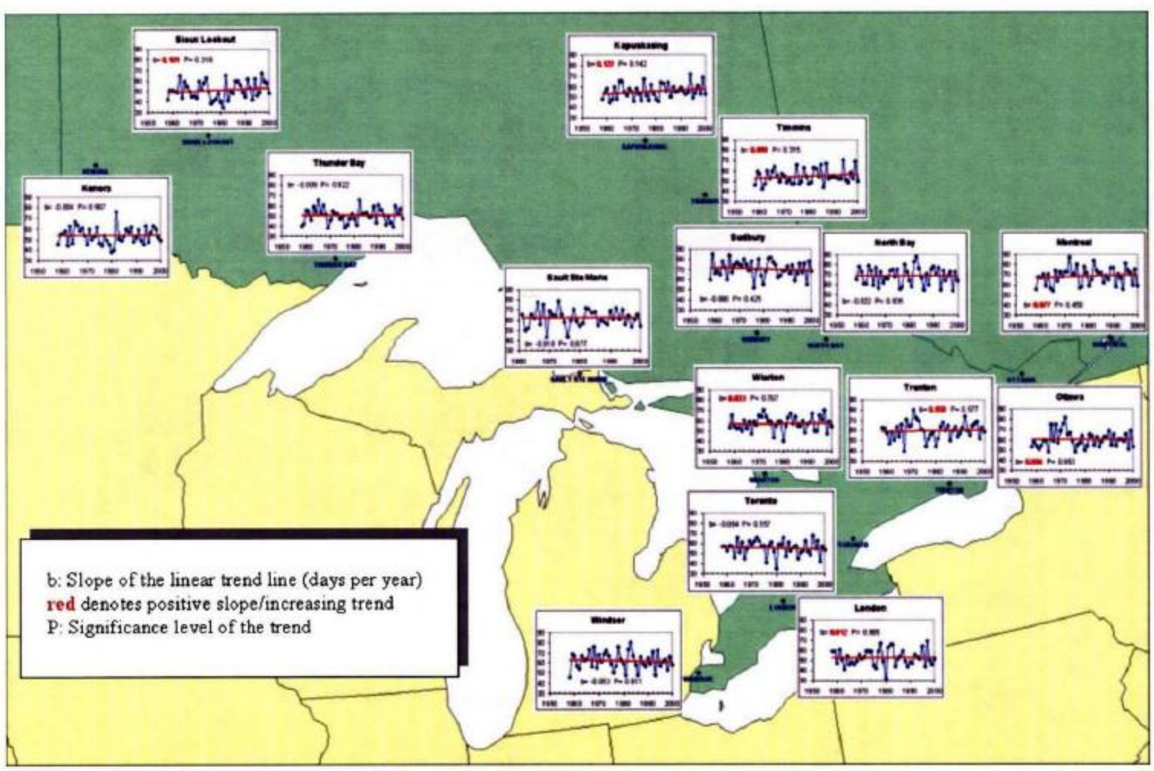
The Bibliography of Exhibit 2B Section D Appendix D Climate Change Vulnerability Assessment refers to work done by

Klaassen, J., Cheng, S., Auld, H., Li, Q., Ros, E., Geast, M., et al. (2003). Estimation of Severe Ice Storm Risk for South-Central Canada. Downsview (Toronto), Ontario: Meteorological Service of Canada – Ontario Region, Environment Canada.

The report *Estimation of Severe Ice Storm Risk for South-Central Canada* refers to

Figure 17

Figure 17 Annual time series of the total number of winter seasonal (November to April) days with freezing rain-related weather types for 15 stations in Canada.



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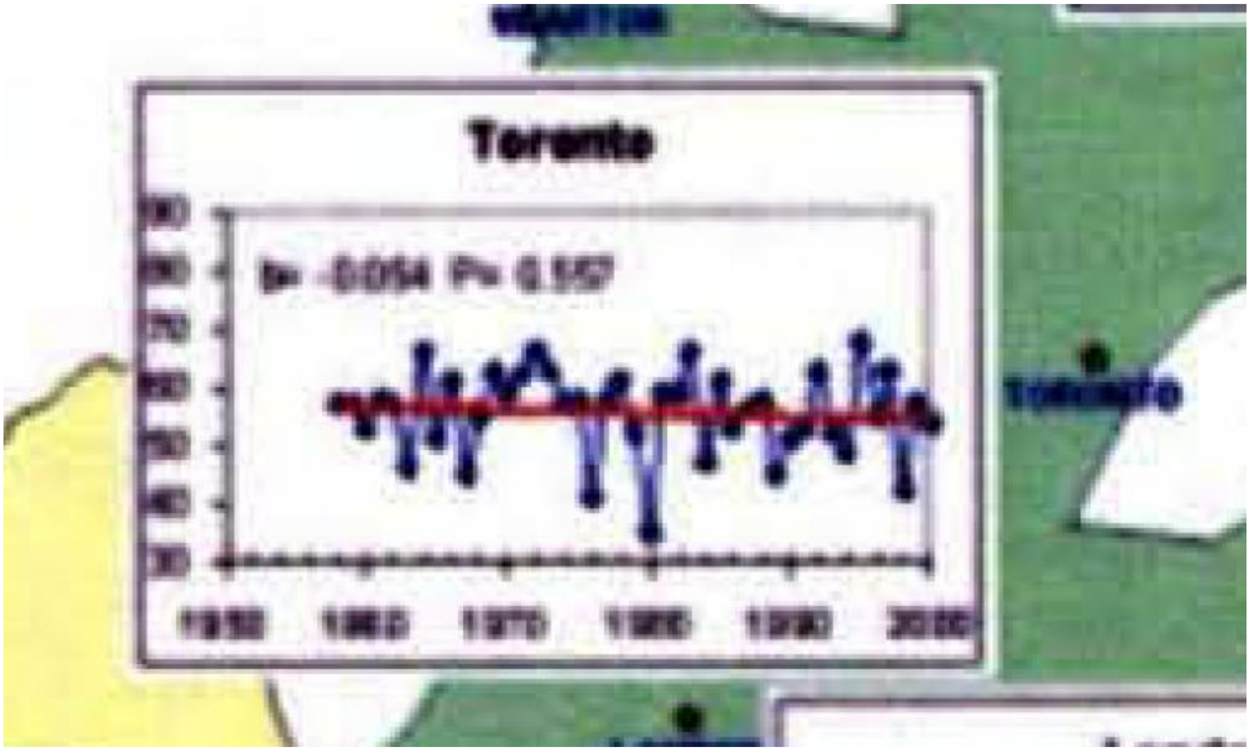
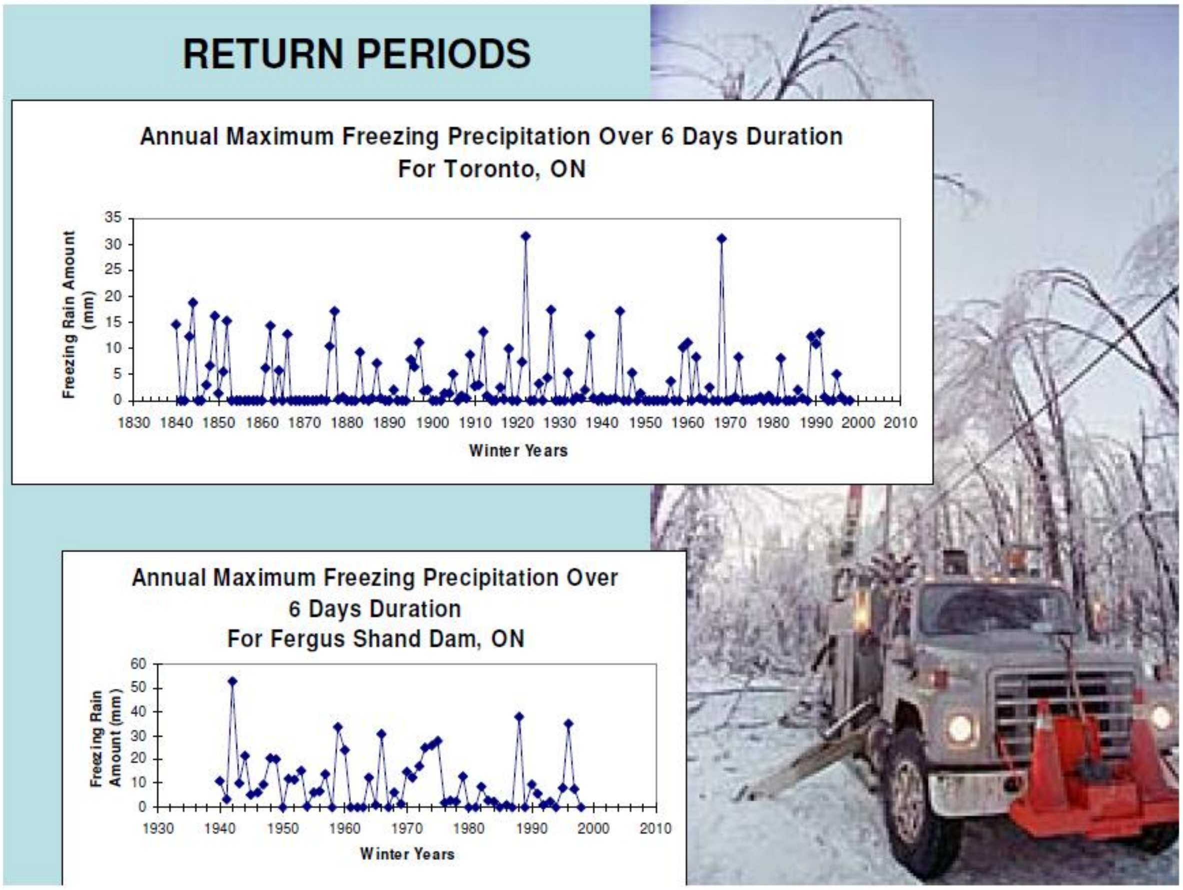
When the map and chart is expanded the report shows the Toronto Trend decreasing for Freezing rain.



In the <u>*Estimation of Severe Ice Storm Risk for South-Central Canada*</u> report is the reference listed on pg 24, <u>*Severe Ice Storm Risks in Ontario*</u> which is a summary presentation of Heather Auld Joan Klaassen, M Geast, S Cheng, E Ros, R Lee, Meteorological Service of Canada Environment Canada-Ontario Region and shows return period for freezing rain in Toronto from 1840 to 2000. The freezing rain has not exceeded 67.5 mm in that time period. Toronto Hydro did not provide more recent data for 2000 to 2018 for freezing rain.



[44]

[45]

[44] K4.1 N. Hann Compendium Panel 1 pg 157
[45] OEB STAFF SUMMARY OF COMMUNITY MEETING EB-2018-0165 pg 58 of pdf

Appendix C – Large Events

Table 1: Major Event Days

Dates	Description	Number of Outages	Total Customers Interrupted	Total Customer Hours Interrupted
July 8, 2013	Major Storm (Thunderstorm)	56	324,672	2,377,913
July 9, 2013	Major Storm (Thunderstorm)	44	41,502	91,646
December 21, 2013	Freezing Rain Ice Storm	42	175,928	3,204,481
December 22, 2013	Freezing Rain Ice Storm	208	441,547	8,295,093
December 23, 2013	Freezing Rain Ice Storm	25	29,530	196,633
December 24, 2013	Freezing Rain Ice Storm	23	13,983	149,337
December 25, 2013	Freezing Rain Ice Storm	18	20,225	92,924
December 26, 2013	Freezing Rain Ice Storm	20	19,147	91,458
April 15, 2014	Loss of Supply to Manby TS	27	113,035	129,479
June 17, 2014	Major Thunderstorm	38	55,442	88,496
November 24, 2014	Wind Storm	46	82,053	99,027
March 3, 2015	Freezing Rain	49	107,242	291,672
October 15, 2017	Wind Storm	31	43,175	107,846

[3] IEEE 1366-2012 – IEEE Guide for Electric Power Distribution Reliability Indices.
[4] Ontario Energy Board, Electricity Reporting & Record Keeping Requirements (March 15, 2018) at p. 10.

[46]

[46] 1B tab 2 sch 4 pg 5 table 1

Table 4: Extreme Weather Events since the Beginning of 2017 Event Description[47] [48]

Event	Description	
Freezing Rain (February 2017)	• Approximately 2-6 mm of freezing rain followed by additional heavy rain. • Estimated 9,200 customers out at peak; all customers restored within 24 hours • of the start of the freezing rain event	Did not exceed CSA C22.3 No 1-10 ice load with load factor
Highwater/ flooding (May - June 2017)	• Heavy rainfall in southern Ontario exceeded the yearly average for an entire summer. • Numerous incidents of high-water/flooding reported across Toronto. • **No customers were directly impacted during this 55-day incident due to the utility's proactive damage assessment and DPM mitigation measures, including flood mitigation efforts.**	No customers affected by storm
Wind Storm (October 2017)	• Strong wind gusts approaching 100 km/h in some areas and lasting approximately 3 hours. • Estimated 43,000 customers out at peak. • 90 percent of customers restored within 11 hours of event; all customers restored within 48 hours of the end of the event.	Did not exceed CSA C22.3 No 1-10 wind speed with load factor
Wind storm (April 2018)	• Sustained 65km/h winds, with gusts approaching 90km/h. • Estimated 24,000 customers out at peak; all customers restored within 48 hours of the end of the event.	Did not exceed CSA C22.3 No 1-10 wind speed with load factor
Ice Storm (April 2018)	• Approximately 10-20 mm of freezing rain, 20-25 mm rain, sustained winds of 70 km/h with gusts up to 110 km/h. • Estimated 51,000 customers out at peak. 99 percent of customers restored within first two days of response; all impacted customers restored within 5 days of the start of the event.	Did not exceed CSA C22.3 No 1-10 wind speed with load factor and did not exceed CSA C22.3 No 1-10 ice load with load factor
Wind Storm (May 2018)	• High winds reported throughout service territory with gusts reaching approximately 120 km/h. • Estimated 68,000 customers out at peak. • 96 percent of customers restored within 48 hours of the start of the event.	Did not exceed CSA C22.3 No 1-10 wind speed with load factor
Flash Storm (June	• High winds reported throughout service territory with gusts reaching approximately 90-100/h.	Did not exceed CSA C22.3 No 1-10 wind speed with load factor

[47] 2B section 4A pg 14 - adjusted
[48] Appendix A

2018)	• Estimated 16,500 customers out at peak. 86 percent of customers restored within the first 12 hours and 97 percent of customers restored within the first 24 hours of the event.	

COSTS

Energy Probe requests that it be awarded 100% of its reasonably incurred costs. Energy Probe worked

with other intervenors throughout the process to limit duplication while ensuring that the record was

complete

ALL OF WHICH IS RESPECTFULLY SUBMITTED

August 9, 2018

Brady Yauch, consultant to Energy Probe Research Foundation

7.2 *Costs*

7.2.1 SEC hereby requests that the Board order payment of our reasonably incurred costs in connection with our participation in this proceeding. It is submitted that SEC has participated responsibly in all aspects of the process, in a manner designed to assist the Board as efficiently as possible.

ALL OF WHICH IS RESPECFULLY SUBMITTED

Original signed by

____

Mark Rubenstein

Jay Shepherd

Counsel for the School Energy Coalition