EB-2015-0003

ONTARIO ENERGY BOARD

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

AND IN THE MATTER OF an Application by PowerStream Inc. for an Order approving rates and other service charges for the distribution of electricity for the years 2016 through 2020.

CROSS-EXAMINATION COMPENDIUM OF THE SCHOOL ENERGY COALITION
(Panel 2 – Capital)

November 23, 2015

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EB-2015-0003 PowerStream Inc.
Tabel 1: Appendix 2-AB

	Historical												Forecast (Planned)						Variance Analysis				
	2011			2012			2013			2014			2015	2016	2017	2018	2019	2020					
CATEGORY	Plan	Actual	Variance	Plan	Actual	Variance	Plan	Actual	Variance	Plan	Actual	Variance	Plan	Plan	Plan	Plan	Plan	Plan	2015 over 2014	2016 over 2015	2011-2014 Avg	2015-2020 Avg	% Increase (2015-20 over 2011-14)
Rate Base	$ '000		%	$ '000		%	$ '000		%	$ '000		%	$ '000	$ '000	$ '000	$ '000	$ '000	$ '000	$ '000	$ '000	$ '000	$ '000	$ '000
System Access	17,209	21,007	22%	18,891	19,888	5%	27,612	17,030	-38%	26,208	26,229	0%	24,145	28,232	28,470	29,561	28,726	31,867	- 2,084	4,087	21,039	28,500	35.5%
System Renewal	15,542	11,527	-26%	19,894	16,974	-15%	21,397	22,254	4%	38,857	39,186	1%	42,388	48,715	51,500	52,052	52,971	52,406	3,202	6,326	22,485	50,005	122.4%
System Service	26,073	22,885	-12%	14,846	13,770	-7%	31,847	34,780	9%	17,009	17,946	6%	27,322	38,322	32,072	29,920	26,963	23,022	9,376	11,000	22,346	29,604	32.5%
General Plant	10,906	7,877	-28%	23,055	24,200	5%	31,128	19,593	-37%	26,165	26,148	0%	24,545	17,631	19,558	13,967	16,841	18,206	- 1,603	- 6,913	19,454	18,458	-5.1%
Sub-Total	69,731	63,297	-9%	76,685	74,832	-2%	111,984	93,657	-16%	108,238	109,509	1%	118,400	132,900	131,600	125,500	125,501	125,500	8,891	14,500	85,324	126,567	48.3%
Non-Rate Base	2,167	2,278	5%	4,069	1,196	-71%	2,102	2,628	25%	1,648	1,364	-17%	2,489	-	-	-	-	-					
Grand Total	71,897	65,575	-9%	80,755	76,028	-6%	114,085	96,285	-16%	109,887	110,873	1%	120,889	132,900	131,600	125,500	125,501	125,500	10,016	132,900	87,190	126,982	45.6%
System O&M		2,055			2,438			2,523			2,627		3,290	3,825	4,365	4,909	5,459	6,015	663	3,825	2,411	4,644	92.6%

Notes to the Table:

1) All figures are Net amounts, i.e. reduced by contributed capital.

2) 2011 figures are CGAAP, all other years are MIFRS

3) For high-level explanations of the year-to-year variances, please refer to DSP Section 5.4.4

Source: Undertaking JTC1.5_App.2-AB_20150911

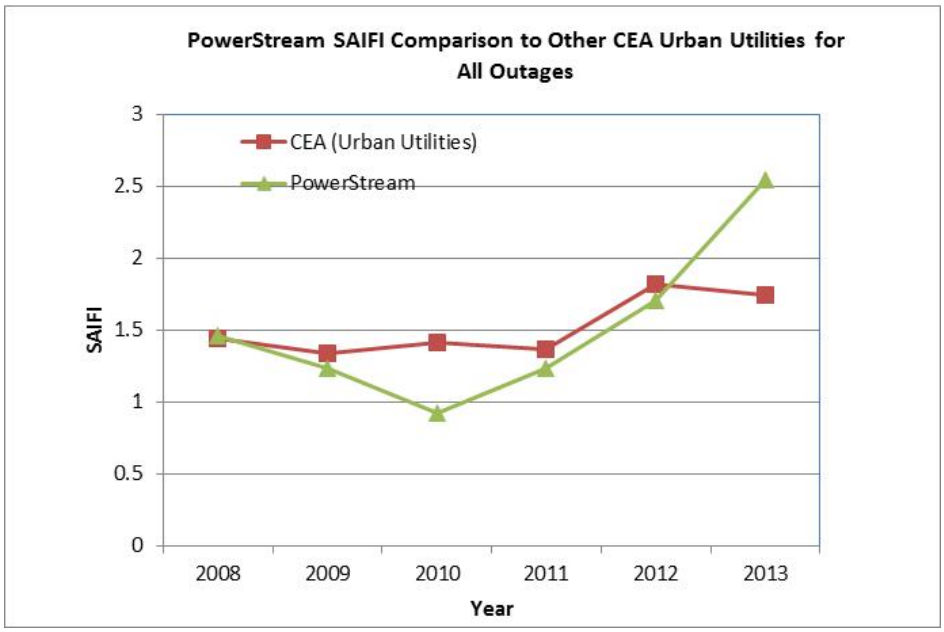


Figure 6: PowerStream compared to CEA Utilities; SAIFI

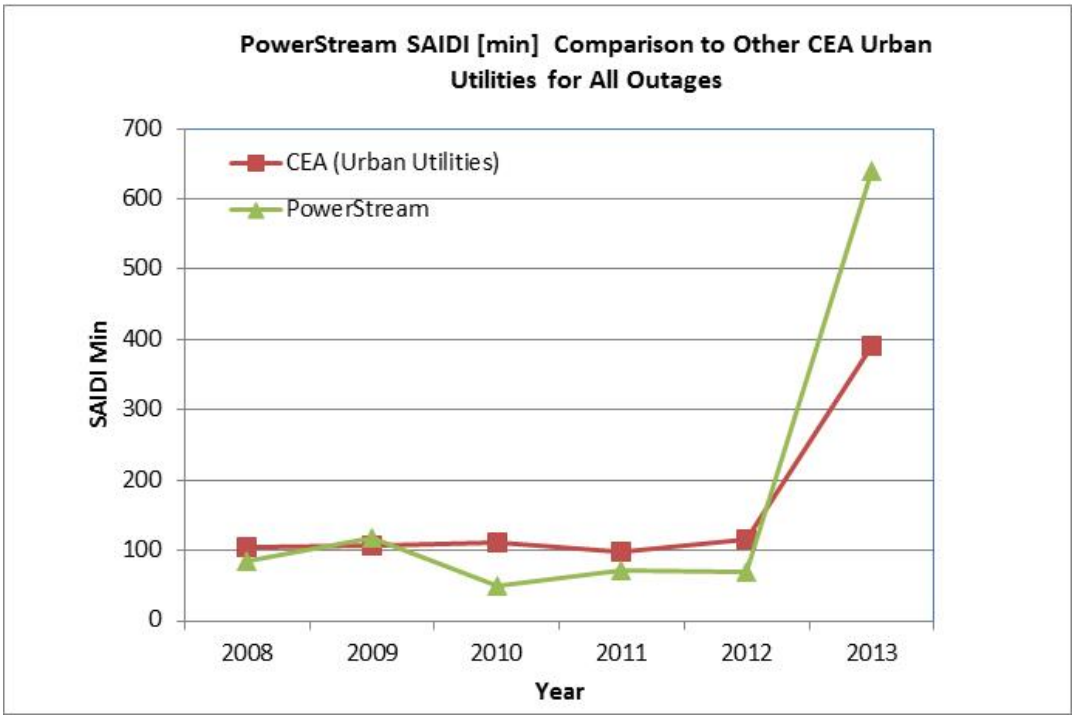


Figure 7: PowerStream compared to CEA Utilities; SAIDI

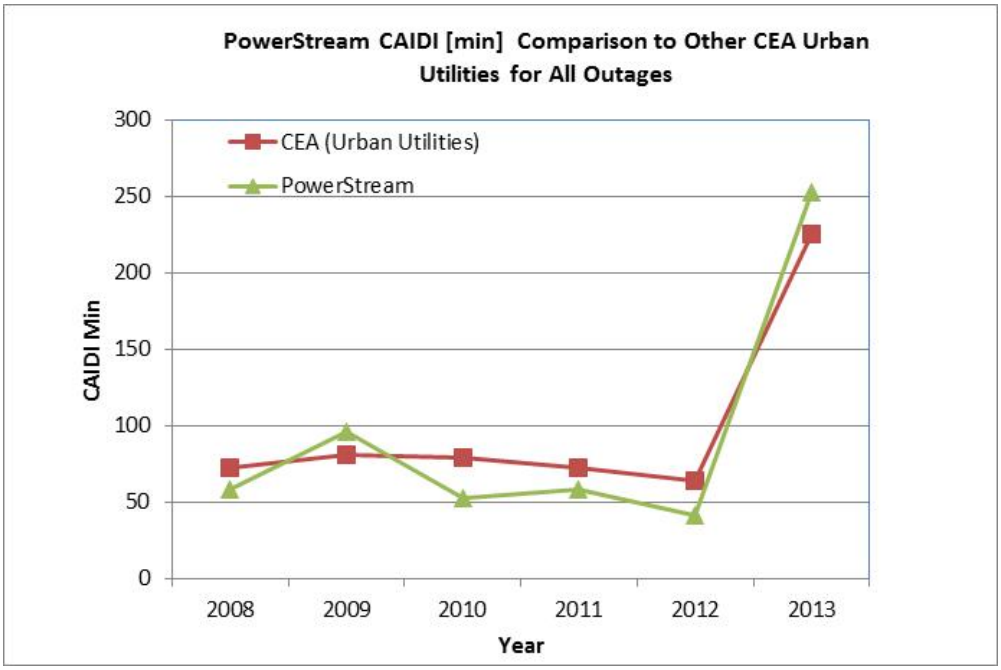


Figure 8: PowerStream compared to CEA Utilities; CAIDI

As seen in Figure 6 to Figure 8, PowerStream has been, with the exception of 2013, slightly better than the CEA average. The CEA numbers are all inclusive, in that it includes loss of supply and major events days. 2013 was a difficult year for weather related events for PowerStream, highlighted by the December ice storm.

Performance Focus

PowerStream categorizes outages in accordance with the cause codes designated by the Canadian Electricity Association (CEA). Within these codes, there are outages that can be considered “controllable” and others considered “uncontrollable”.

Although there is no accepted definitive classification within CEA, and there are events that could be debated as either controllable or uncontrollable, for practical purposes, PowerStream applies the distinction as shown in Table 1.

II-2-Staff-89

Ref: EB-2013-0166, 2014 IRM - Response to SEC IRs, Appendix B: PowerStream Inc. Corporate Ten Year Capital Plan 2014-2023 and E G/T2, 5.4.4 Capital Expenditure Summary, p. 11

OEB staff calculates the difference between forecasts in the DSP and the 10 year plan in the table below. Please provide the rationale for the total spend increase of $47M in the DSP.

	2015	2016	2017	2018	2019	2020	Total
Total DSP	$118,399,998	$132,900,017	$131,599,752	$125,499,835	$125,500,540	$125,500,071	$759,400,213
Total 10 Year Plan	$130,864,713	$123,495,236	$120,349,110	$98,999,672	$127,224,247	$111,151,594	$712,084,572
Difference	$12,464,715	-$9,404,781	-$11,250,642	-$26,500,163	$1,723,707	-$14,348,477	-$47,315,641

RESPONSE:

The Corporate Ten Year Capital Plan, which was provided in response to Interrogatory G-SEC-15, is the most recent Ten Year Capital Plan, created in June 2013, prior to being superseded by the 2015 DS Plan for the 2015-2020 Custom Rate Application. The difference in spending in the DS Plan compared to the Corporate Ten Year Capital Plan is due to updated, revised, and re-prioritized projects and programs and spending requirements that have resulted in the 18 months following the availability of the Corporate Ten Year Plan.

The material differences can be attributed to new storm hardening/increased rear lot remediation, CIS Systems, smart grid and metering.

Table 3: Historical Actual vs. Predicted Customer Counts/Connections

	Customer Counts			Connections		
Year	Actual	Predicted	Var %	Actual	Predicted	Var %
2011	335,935	335,809	-0.04%	80,969	81,080	0.14%
2012	343,344	343,361	0.00%	82,520	82,666	0.18%
2013	349,797	349,422	-0.11%	84,418	84,455	0.04%
2014	356,461	356,633	0.05%	85,990	85,867	-0.14%

Estimated rate class customer forecast models are statistically strong and generate predicted estimates that are extremely close to actual customer counts. Given rate-class customer model performance, PowerStream is confident and hence submits that the class-specific customer and connection regression models are robust and appropriate tools for forecasting future customer counts and connections.

Customer growth has been highly correlated with population growth. PowerStream has been experiencing a steady customer growth rate averaging 2% over the 2008 – 2014 periods. The 2015 – 2020 growth rates average 1.7% per year. This is consistent with the Conference Board population forecast. Table 4 and 5 illustrate the growth rates over the historical and forecast periods.

Table 4: Historic Customer Counts and Growth Rate (2008 – 2014)

	2008	2009	2010	2011	2012	2013	2014
Customer Counts	314,357	320,869	328,589	335,935	343,344	349,797	356,461
Growth Rates		2.07%	2.41%	2.24%	2.21%	1.88%	1.91%

Table 5: Forecast Customer Counts and Growth Rate (2015 – 2020)

	2015	2016	2017	2018	2019	2020
Customer Counts	362,543	368,663	374,990	381,372	387,845	394,508
Growth Rates	1.71%	1.69%	1.72%	1.70%	1.70%	1.72%

Rate class actual (2010 to 2014) and forecasted customer counts (2015 to 2020) are provided as supplementary information in electronic Appendix H-3-2.

EB-2015-0003 PowerStream Inc.

Table 2: 2011 to 2020 Costs for Material Investments

Material Investments	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2016-2020 Average	2011-2014 Average	% Variance
System Access													
New Connections and Subdivisions													
New Commercial Subdivision Development N&S	- 6,859	316,257	1,365,649	1,249,667	1,600,010	1,601,908	1,603,808	1,605,707	1,607,707	1,609,506	1,605,727.20	731,178.50	119.6%
New Residential Subdivision Development	473,519	10,593,928	3,799,355	3,956,902	7,895,964	8,633,109	9,392,346	9,759,944	10,135,066	10,517,394	9,687,572	4,705,926	105.9%
New Subdivision Development - Secondary Service Lateral	1,383,741	1,716,273	2,428,920	2,348,217	1,989,034	2,173,796	2,364,815	2,458,773	2,554,113	2,650,954	2,440,490	1,969,288	23.9%
O/H and U/G Residential Service Upgrades	900,744	730,652	762,179	925,892	928,921	984,657	1,043,737	1,106,360	1,172,741	1,243,109	1,110,121	829,867	33.8%
Road Authority													
Road Authority Expenditures	7,536,780	2,812,835	2,513,594	13,896,134	6,258,891	9,701,973	8,678,858	8,356,668	5,718,617	6,221,949	7,735,613	6,689,836	15.6%
Metering													
GS>50 MIST Meter Program Implementation					1,592,952	1,196,859	1,303,795	1,308,610	1,195,725	574,761	1,115,950		
Residential Meter "ICON F" Meter Replacement Program					411,051	494,361	494,746	872,435	2,280,384	4,517,454	1,731,876		
Other Customer Initiated Work													
Unforeseen Projects Initiated by the Customer	1,990,470	- 845,891	273,294	1,075,163	329,005	786,802	929,401	1,080,390	1,255,781	1,414,541	1,093,383	623,259	75.4%
Total Material Investments System Access	**12,278,395**	**15,324,054**	**11,142,991**	**23,451,975**	**21,005,828**	**25,573,465**	**25,811,506**	**26,548,887**	**25,920,134**	**28,749,668**	**26,520,732**	**15,549,354**	

Material Investments	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2016-2020 Average	2011-2014 Average	% Variance
System Renewal													
UG Lines - Planned Asset Replacement													
Cable Injection Program	349,694	771,664	4,141,808	5,913,763	4,024,219	4,138,312	4,255,465	4,375,771	4,499,323	4,626,219	4,379,018	2,794,232	56.7%
Cable Replacement Program	3,917,735	2,219,486	15,417,075	15,036,321	11,718,862	12,538,684	13,607,273	14,288,297	15,085,861	15,340,181	14,172,059	9,147,654	54.9%
Emerging Cable Replacement Projects	119,989	1,968,435	1,463,874	1,070,775	491,687	520,801	1,050,756	1,081,576	1,113,287	1,145,915	982,467	1,155,768	-15.0%
Submersible Transformer Replacement	6,451	508,952	1,168,202	856,776	1,040,300	620,000						635,095	
Switchgear Replacement Program	566,295	662,337	990,400	2,138,988	2,003,445	2,327,404	2,462,129	2,533,373	2,606,624	2,681,945	2,522,295	1,089,505	131.5%
Distribution Lines - Emergency/Reactive Replace													
Storm damage - Replacement of Distribution Equip due to Storms	428,418	482,911	767,149	1,160,050	999,785	1,000,232	1,005,603	1,005,624	1,010,352	1,010,159	1,006,394	709,632	41.8%
Switchgears - Unscheduled Replacement of Failed Switchgear		1,381,861	1,663,004	1,495,974	1,420,148	1,431,384	1,420,148	1,421,218	1,400,444	1,140,858	1,362,810	1,135,210	20.0%
Unscheduled Replacement of Other Failed Distribution Equip	6,525,087	4,878,957	4,791,479	4,890,357	4,904,357	5,107,035	5,206,156	5,358,281	5,455,354	5,305,986	5,286,562	5,271,470	0.3%
Overhead Lines - Planned Asset Replacement												-	
Pole Replacement Program 2012-2014 Avg = $4,676,592	1,638,822	4,111,507	5,045,992	4,872,277	4,645,383	4,933,143	5,570,700	5,870,246	6,241,483	6,244,377	5,771,990	3,917,150	47.4%
Unforeseen Projects Initiated by PowerStream	1,076,240	1,499,516	4,232,576	2,429,637	1,046,472	1,070,527	1,093,812	1,117,360	1,141,172	1,165,266	1,117,627	2,309,492	-51.6%
Storm Hardening													
Storm Hardening & Rear Lot Supply					3,499,998	7,900,017	7,999,752	7,499,834	6,900,540	7,200,070	7,500,043		
Stations/P&C - Planned & Emergency													
Planned Circuit Breaker Replacement Markham TS1&2, Lazenby TS1					747,766			1,087,788	1,119,281		441,414		
Station Switchgear Replacement (ACA) 8th Line MS323							412,339	1,106,666			303,801		
Station Switchgear Replacement (ACA) Patterson MS336								421,896	895,805		263,540		
Total Material Investments System Renewal	**14,628,731**	**18,485,626**	**39,681,559**	**39,864,918**	**36,542,422**	**41,587,539**	**44,084,133**	**47,167,930**	**47,469,526**	**45,860,976**	**45,234,021**	**28,165,209**	

Source: G-SEC-23

	A	B	C	D	E	F	G
3		**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
4	**System Access**	**($ 000)**	**($ 000)**	**($ 000)**	**($ 000)**	**($ 000)**	**($ 000)**
5	**New Connections and Subdivisions**	13,671	14,718	15,801	16,404	17,037	17,674
6	Locating for Capital Projects.	59,010	59,009	59,009	59,009	59,009	59,009
7	New Commercial Subdivision Development Place Holder (May not happen every year)	1,600,010	1,601,908	1,603,808	1,605,707	1,607,607	1,609,506
8	NEW OVER HEAD AND UNDERGROUND SECONDARY RESIDENTIAL SERVICE CONNECTION	371,774	394,081	417,725	442,789	469,356	497,518
9	New Residential Subdivision Development	7,895,964	8,633,109	9,392,346	9,759,944	10,135,066	10,517,394
10	New Services - new and upgrades - COMMERCIAL, INDUSTRIAL, INSTITUTIONAL (ICI) SERVICES	197,602	209,720	222,004	235,575	249,748	264,784
11	New Services (new and upgrades) - Commercial, Industrial and Institutional (ICI) Projects	74,323	78,616	83,372	88,331	93,600	99,306
12	New Subdivision Development - Secondary Service Lateral	1,989,034	2,173,796	2,364,815	2,458,773	2,554,113	2,650,954
13	O/H and U/G Residential Service Upgrades	928,921	984,657	1,043,737	1,106,360	1,172,741	1,243,109
14	Open work order for ICI meter installations.	395,939	419,695	444,877	471,570	513,960	544,574
15	SMALL NEW AND UPGRADE COMMERCIAL SERVICES	60,593	64,229	68,082	72,168	76,497	81,086
16	Subdivision - Underground Residential Distribution System Final Close out and Inspection.	97,520	99,467	101,414	103,362	105,309	107,257
17	**Road Authority**	6,259	9,702	8,679	8,357	5,719	6,222
18	Road Authority Expenditures	6,258,891	6,258,891	6,258,891	6,258,891	6,258,891	6,258,891
19	**Metering**	3,887	3,025	3,060	3,720	4,715	6,556
20	Advanced Metering Infrastructure (AMI) Security Audit	-	-	63,027	-	-	63,258
21	Buttonville Metering Upgrade	100,000	-	-	-	-	-
22	Commercial and Industrial Meter Re-Verification Program (Commercial meters - Non Smart)	486,225	350,000	350,000	506,243	512,915	519,588
23	Failed Meter Replacement	171,115	172,355	173,597	174,838	176,079	81,465
24	Feeder 63M2 Metering Unit Relocation	81,022	-	-	-	-	-
25	Firmware Upgrades in Smart Meters	30,752	20,886	21,271	16,242	16,531	33,641
26	GS>50 MIST Meter Program Implementation	1,592,952	1,196,859	1,303,795	1,308,610	1,195,725	574,761
27	Metering customer facing Interface Improvements - Planning	-	-	-	-	-	61,240
28	Obsolete Revenue Metering Removal from TSs	-	-	-	-	20,198	20,572
29	Open work order for ICI meter installations.	148,001	156,881	166,294	176,270	186,847	198,057
30	Residential Meter "ICON F" Meter Replacement Program	411,051	494,361	494,746	872,435	2,280,384	4,517,454
31	Smart Meter Network Expansion and Enhancements	100,000	265,546	100,000	250,000	100,000	266,016
32	Suite Meter Installation	379,625	-	-	-	-	-
33	Suite Meter Re-Verification Program	127,951	122,400	200,000	200,000	200,000	200,000
34	Upgrade 2.5 Element Services to 3 Element Services.	157,986	159,858	161,730	163,603	-	-
35	Smart Meter Test Facility	-	85,946	25,811	51,779	25,968	19,670
36	Wholesale Meter Replacement with TCP/IP	99,853	-	-	-	-	-
37	**Other Customer Initiated Work**	329	787	929	1,080	1,256	1,415
38	Unforeseen Projects Initiated by the customer Total	329,005	786,802	929,401	1,080,390	1,255,781	1,414,541
39	**RGEN FIT/microFIT (Net Rate Base)**	-	-	-	-	-	-
40	**Total System Access (Rate Base)**	24,145	28,232	28,470	29,561	28,726	31,867

PowerStream
Asset Condition Assessment
Technical Report

Distribution Assets
2014

Revision 1 - March 8, 2012
Revision 2 - November 27, 2012
Revision 3 - December 31, 2014

Notes:

- **The Original Report, dated April 05, 2009, was prepared by PowerStream Inc., Kinectrics Inc., and BIS Consulting, LLC**

- **The Revision versions of the report were prepared by PowerStream Inc.**

Table 16. Distribution switchgear parameter #3: field inspection/maintenance condition criteria.

Condition Factor	Factor	Condition Criteria Description
A	0	Corrective measures are required at the earliest possible time.
B	1	Corrective measures are required at the next available opportunity or shutdown.
C	4	Normal maintenance cycle can be followed.

Table 17. Distribution switchgear parameter #4: failure rate criteria.

Condition Factor	Multiplying Factor	Condition Criteria Description
A	1	M < 0.05
B	0.9	0.05 <= M < 0.1
C	0.8	0.1 <= M < 0.2
D	0.7	0.2 <= M < 0.4
E	0.6	M >= 0.4

**Where M = failure rate x age

Failure rate for distribution switchgear = 0.0048, calculated based on IEEE Gold book (IEEE Std 493-1997).

The Health Index of distribution switchgear units is shown in Figure 19.

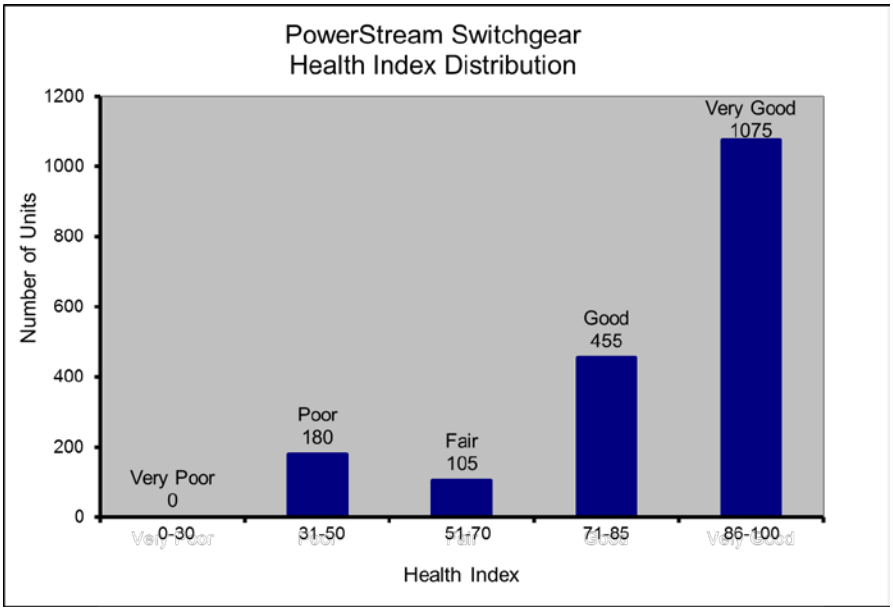


Figure 19. Distribution switchgear health index

3.5 Wood Poles

Summary of Asset Class

Wood poles are moderately complex assets with a low price per unit.

Wood pole failures are very rare due to PowerStream's comprehensive replacement programs. Contractors test the company's wooden poles, and make replacement recommendations based on test results and minimum physical life remaining. Program recommendations are based on the pole testing results and PowerStream's pole replacement prioritization indices. Health index formulation is based on industry best-practice.

Through an annual inspection and testing program, PowerStream monitors the condition of its poles to ensure that they meet minimum requirements for safety and reliability. Among other factors, PowerStream 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".*

Other considerations include pole condition information such as rot, decay, splitting, bending, leaning and insect infestation. PowerStream believes that the replacement of poles exhibiting poor (or worse) condition is non-discretionary in view of compliance with the CSA code, as well as considerations for safety of the public and for workers operating in, on, or around the poles and their associated equipment.

The pole replacement candidates are selected based on the combination of the following two categories:

Category 1: Poles that have less than 60% remaining strength which are needed to be addressed to meet the requirement of CSA standard Clause 8.3.1.3 of CSA.

Category 2: Poles that have more than 60% remaining strength but exhibit worsening conditions such as rot, decay, splitting, insect infestation, bending, and leaning and present a high probability of failure which present a safety risk to employees and public. These poles are determined based on the priority score developed based as explained in Prioritization Index formulation.

Data Sources Available

General demographic and condition data acquired during wood pole test program.

Demographics

Number of units: 38,070

Typical life expectancy (years): 35-75 as per Kinectrics Inc. Report No: K-418099-RA-001-R000 "Asset Amortization Study for the Ontario Energy Board"

results from contractors. It is the poles in this group that are usually targeted for replacement by PowerStream.

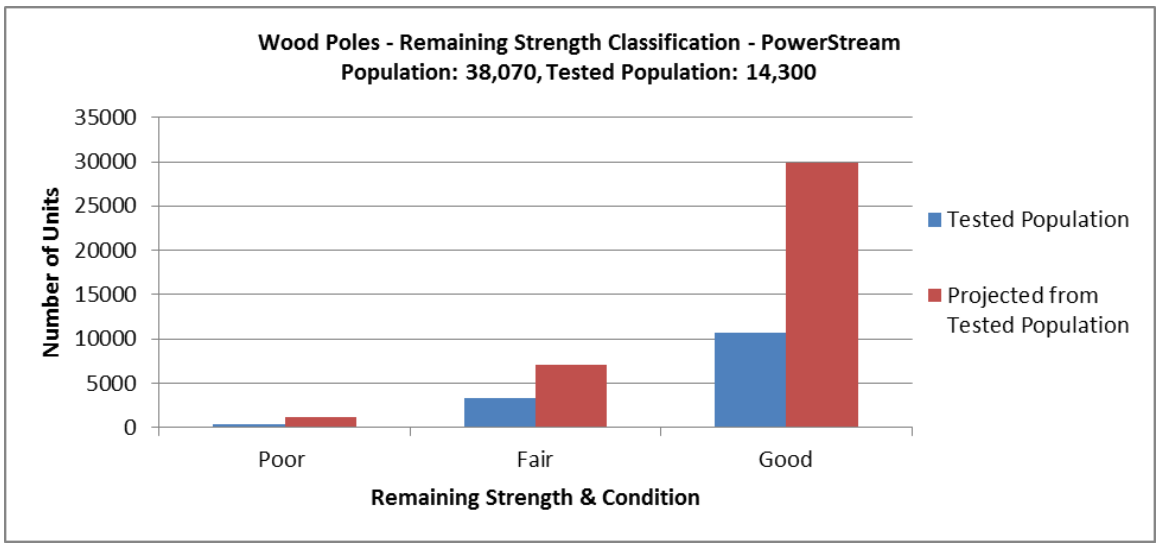


Figure 32. Wood poles Prioritization Index histogram (2013 information).

The long-range replacement and reinforcement program is based on pole inspection and testing recommendations. A total of 400 poles will be replaced or reinforced each year to maintain system reliability and public safety.

Conclusions

- Recommendations:
  - Replace and reinforce 400 poles per year.
  - Use the inspection and test results to select and prioritize candidates for replacement and reinforcement.
  - Continue collecting inspection and failure data and updated customized wood pole failure curves.
  - Continue capturing condition data per pole prioritization formulation and update the model.
- Gaps:
  - Inspection and testing data for remaining wood pole population. Pole testing is carried out on a 5-year cycle.
  - Reconcile discrepancies between GIS records and test data records.

Pressure: Aging Equipment

PowerStream's distribution system consists of various equipment (**poles, transformers, cables**, etc.) with different installation date profiles. While the majority of the distribution system was installed or rebuilt after 1980, a significant amount of distribution system equipment was installed in the 1970s, 1960s or even earlier, and is still in service today. While that old equipment continues to operate for the time being, it is well past its intended service life, and much of it will need to be replaced soon.

Equipment that is still operating beyond its intended service life is more likely to fail, and cause long power interruptions. As time goes on, more and more of the distribution system assets will be operating past end-of-life, unless replaced. This requires investment in system renewal projects and programs.

While PowerStream and its predecessor utilities have historically managed asset replacement programs efficiently with moderate levels of investment, the growing number of old assets needing replacement requires a higher level of investment than ever before.

PowerStream plans to proactively replace the oldest and worst condition equipment before it fails. Generally, proactive equipment replacement is less expensive than replacing equipment after an unexpected failure.

Some distribution assets such as pole mounted transformers and residential padmounted transformers, as well as secondary cables, are not proactively replaced. These assets are replaced once they fail. This "run to failure" approach is considered normal utility practice is the industry.

Asset Summary Chart – main assets by quantity

Asset Types	Asset Count (approx)	Average Life (approx)	Oldest Assets (approx)
Wood Poles	46,500	35-75	1940
Distribution Transformers	44,000	25-60	1956
Underground Primary Cable	7900 km	20-55	1965
Distribution Switchgear	1800	30-85	1978
Station Circuit Breakers	399	35-65	1958
Municipal Station Primary Switches	66	30-60	1956
Municipal Station Transformers	65	30-60	1958
Station Reactors	34	25-60	1986
Transformer Station Transformers	22	30-60	1986
Transformer Station 230kV High-Voltage Switches	22	30-60	1986
Station Capacitors	5	25-40	1990

Note: Above data and figures provided from PowerStream Asset Condition Assessment, Rev. 2, November 27, 2012.

13

Challenges	Solutions
The need to replace poles that are at or nearing end-of-life.	• Proactive replacement: PowerStream plans to replace or reinforce approximately 400 of the worst condition poles per year in order to minimize risk.
Underground primary cables that are at, or near, end-of-life, and the resulting high negative impact this has on reliability for affected customers.	• PowerStream proposes to replace approximately 52 km/year of the worst condition **underground cables**, and use silicon injection to extend the life of another estimated 47 km/year of underground cables. • PowerStream's approach for **cable** replacement is determined by prioritizing the cable sections that have the worst reliability and the highest customer impact.
Aging padmounted switchgear cubicles.	• Proactive replacement: PowerStream plans to replace approximately 31 of the poorest condition **switchgear** units in 2015, rising to 36 per year in 2016-2020.
The need to replace padmounted transformers, where concerns about condition have been reported.	• PowerStream commenced a proactive replacement program in 2013. • PowerStream proposes to proactively replace approximately 60 **padmounted transformers** per year.
Automated/remote-controlled switches, switches that are at, or near, end-of-life and therefore likely to fail compromising the ability to prevent feeder and station overloads during the summer peak.	• PowerStream proposes to replace five per year. • These are important for a number of reasons, including preventing station overloads during summer peaks, as well as improving reliability and restoration times.

Table 3: Comparison of Historical Unit Costs to Forecast Unit Costs	Actual				Forecast					
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Underground Lines - Planned Asset Replacement										
Cable Injection Program Cost	$349,694	$771,664	$4,141,808	$5,913,763	$4,024,219	$4,138,312	$4,255,465	$4,375,771	$4,499,323	$4,626,219
Kilometers of Cable Injection Completed	9.6	25.1	85.4	107.0	110	110	110	110	110	110
Unit Cost	$36,541	$30,744	$48,520	$55,281	$36,584	$37,621	$38,686	$39,780	$40,903	$42,057
Y/Y Unit Cost Change		-15.9%	57.8%	13.9%	-33.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Cable Replacement Program Cost	$3,917,735	$2,219,486	$15,417,075	$15,036,321	$11,718,862	$12,538,684	$13,607,273	$14,288,297	$15,085,861	$15,340,181
Kilometers of Cable Replacement Completed	10.33	9.06	49.539	54.999	27.5	27.5	27.5	27.5	27.5	27.5
Unit Cost	$379,258	$244,976	$311,211	$273,393	$426,140	$455,952	$494,810	$519,574	$548,577	$557,825
Y/Y Unit Cost Change		-35.4%	27.0%	-12.2%	55.9%	7.0%	8.5%	5.0%	5.6%	1.7%
Submersible Transformer Replacement Program Cost	$6,451	$772,357	$1,294,952	$857,249	$1,040,300	$620,000				
# of Submersible Transformer Replaced	20	32	24	10	8	4				
Unit Cost	$323	$24,136	$53,956	$85,725	$130,038	$155,000				
Y/Y Unit Cost Change		7382.9%	123.5%	58.9%	51.7%	19.2%				
Switchgear Replacement Program Cost	$566,295	$662,337	$990,400	$2,138,988	$2,003,445	$2,327,404	$2,462,129	$2,533,373	$2,606,624	$2,681,945
# of Switchgears Replaced	12	7	20	50	31	36	36	36	36	36
Unit Cost	$47,191	$94,620	$49,520	$42,780	$64,627	$64,650	$68,392	$70,371	$72,406	$74,498
Y/Y Unit Cost Change		100.5%	-47.7%	-13.6%	51.1%	0.0%	5.8%	2.9%	2.9%	2.9%
Distribution Lines - Emergency/Reactive Replace										
Unscheduled Replacement of Failed Switchgear Program Cost	$0	$1,381,861	$1,663,004	$2,138,988	$1,420,148	$1,431,384	$1,420,148	$1,421,218	$1,400,444	$1,140,858
# of Switchgears Replaced TCQ 23. G-SEC-24	0	36	42	34	31	31	30	29	27	22
Y/Y Unit Cost Change		$38,385	$39,595	$62,911	$45,811	$46,174	$47,338	$49,008	$51,868	$51,857
			3.15%	58.89%	-27.18%	0.79%	2.52%	3.53%	5.84%	-0.02%
Overhead Lines - Planned Asset Replacement										
Pole Replacement Program Cost	$1,638,822	$4,111,507	$5,045,992	$4,872,277	$4,645,383	$4,933,143	$5,570,700	$5,870,246	$6,241,483	$6,244,377
# of Poles Replaced	117	315	368	453	400	400	400	400	400	400
Unit Cost	$14,007	$13,052	$13,712	$10,756	$11,613	$12,333	$13,927	$14,676	$15,604	$15,611
Y/Y Unit Cost Change		-6.82%	5.1%	-21.6%	8.0%	6.2%	12.9%	5.4%	6.3%	0.0%

Note: Emerging Cable Replacemnet line excluded - quantities unclear in G-Sec-24

Source: G-SEC-24

II-1-Staff-18

Ref: E G/T2/ p. 3, l. 1-2, Distribution System Plan Summary, 5.3.1 Asset Management Process Overview, p. 12, 5.3.2 Overview of Assets Managed, Asset Inventory, p. 24 and EB-2013-0166, 2014 IRM - Response to SEC IRs, Appendix A: PowerStream Asset Condition Assessment Technical Report

On page 3 of the DSP Summary, PowerStream states "All asset information used for Asset Condition Assessment and reliability analysis in the DS Plan is as of December 31, 2014".

In section 5.3.1 (page 12) of the Asset Management Process Overview PowerStream states that:

> The ACA program includes the development of Health Indices, risk-based economic analyses (probability of failure and criticality), and recommended Asset Sustainability Plans (replacements).

It is also stated that "asset condition assessment data is maintained, within the various asset registries, on the following key electrical distribution and general plant assets" with 17 categories then being listed.

a) Please confirm that Health Indices, risk-based economic analyses and recommended Asset Sustainability plans are completed on a cyclical basis (yearly or bi-yearly) for all the aforementioned assets to determine investment levels in the capital plan.

b) Please confirm that all Asset Condition Assessment results presented in the section Asset Inventory (beginning on p.24) are based on the asset registry and inspection data as of December 31, 2014.

c) What is the inspection year of the data used for the asset condition assessment? If variable between asset classes please provide what data is from which year. If varied between the units within the asset class, please provide a range of the earliest and latest inspection data used for the asset condition assessment for this asset class.

d) Did PowerStream update Risk-based economic analysis and Econometric replacement results in accordance with the ACA report provided in EB-2013-0166? If yes, please provide the results. If no, please explain.

e) Please explain how PowerStream used the risk-based economic analysis results in development and prioritization of the capital projects.

f) Has PowerStream changed any of the formulations, methodologies, useful lives, or probability failure curves between the revisions of the Asset Condition Assessment report (in 2009, 2012 and the most recent update presented in Asset Inventory)?

g) Please state whether or not the Asset Condition Assessment results presented in the Asset Inventory were the basis for the identification and development of investments proposed in the 2015-2020 DSP.

RESPONSE:

a) Asset Condition Assessment (ACA) was conducted for the following asset categories listed in Table 18a.

Table 18a

	Health Indices (Yearly)	Risk-based Economic Analysis	Recommended Asset Sustainability Plan
Power Transformers (TS & MS)	Yes	Yes	Yes
Circuit Breakers (TS & MS)	Yes	Yes	Yes
Primary Switches (TS & MS)	Yes	Yes	Yes
230kV Primary Metering Units	Yes	No	Yes
Station Reactors (TS)	Yes	Yes	Yes
Capacitor Banks (TS)	Yes	Yes	Yes
Station Service Transformers (TS)	Yes	No	Yes
P&C Relays (TS, line transformer and bus)	Yes	No	Yes
Distribution transformers	Yes	Yes	Yes
Distribution Switchgear	Yes	Yes	Yes
Mini-Rupter switches	Yes	No	Yes
Automated switches	Yes	No	Yes
Wood Poles	Yes	No	Yes
Underground primary Cable	Yes	No	Yes

b) All Asset Condition Assessment results presented in the section Asset Inventory are based on the asset registry and inspection data as of December 31, 2014.

c) The inspection years of the data used for the asset condition assessment are shown in the Table 18c.

Table 18c

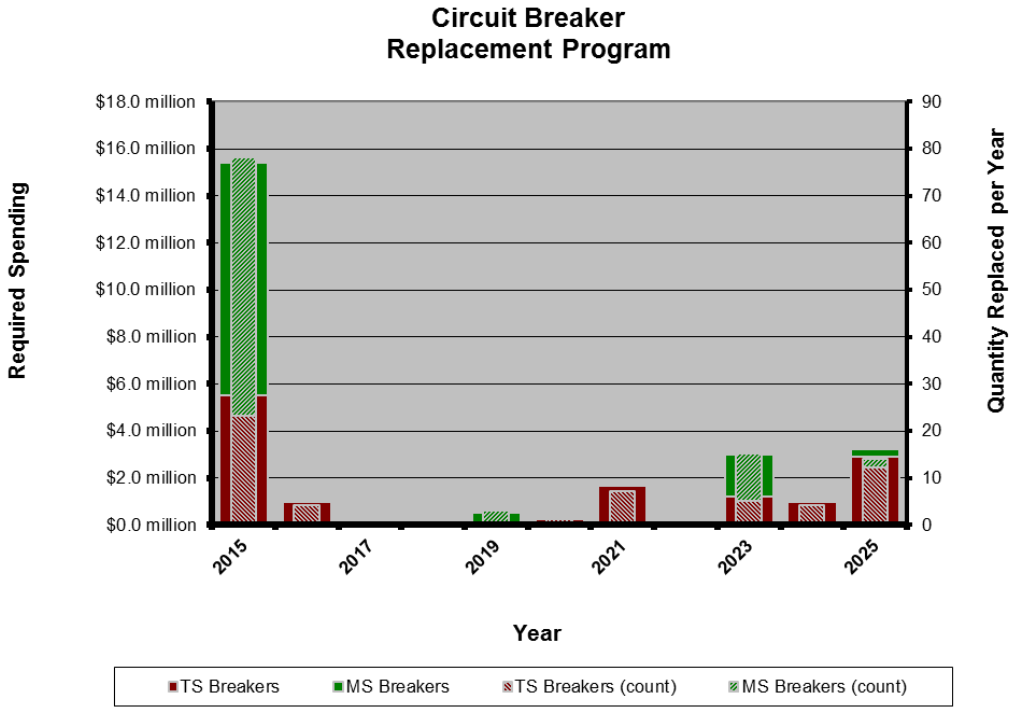
	Inspection Year	Inspection cycle
Power Transformers (TS & MS)	2014	Yearly
Circuit Breakers (TS & MS)	2014	Yearly
Primary Switches (TS & MS)	2014	Yearly
230kV Primary Metering Units	2014	Yearly
Station Reactors (TS)	2014	Yearly
Capacitor Banks (TS)	2014	Yearly

Station Service Transformers (TS)	2014	Yearly
P&C Relays (TS, line transformer and bus)	2014	Yearly
Distribution transformers	2012-2014	3 year cycle
Distribution Switchgear	2012-2014	3 year cycle
Mini-Rupter switches	2013-2014	3 year cycle
Automated switches	2013-2014	6 year cycle
Wood Poles	2010-2014	5 year cycle
Underground primary Cable	No inspection *Tested prior to cable prioritatization	No inspection

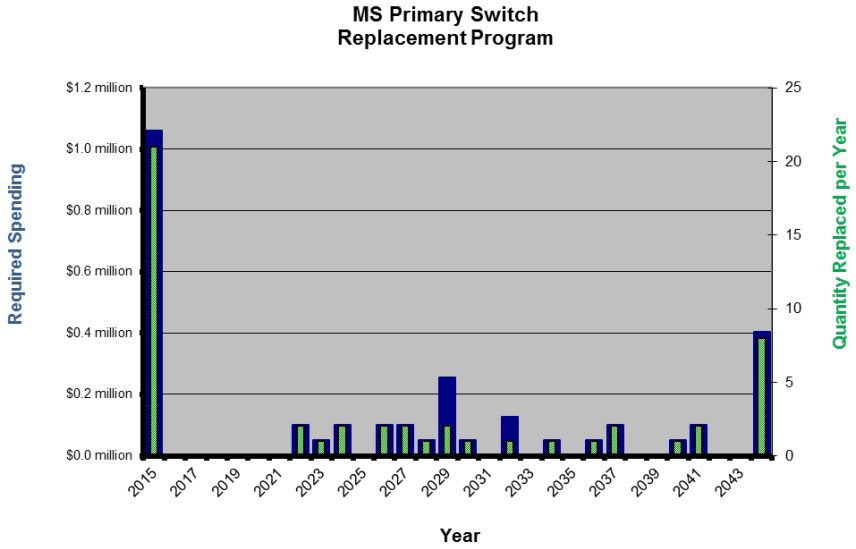
d) The updated Risk-based economic analysis and Econometric replacement results are summarized below.

Power Transformers, 230kV Primary Switches, and Station Reactors - The econometric model does not recommend any replacements within the next six years.

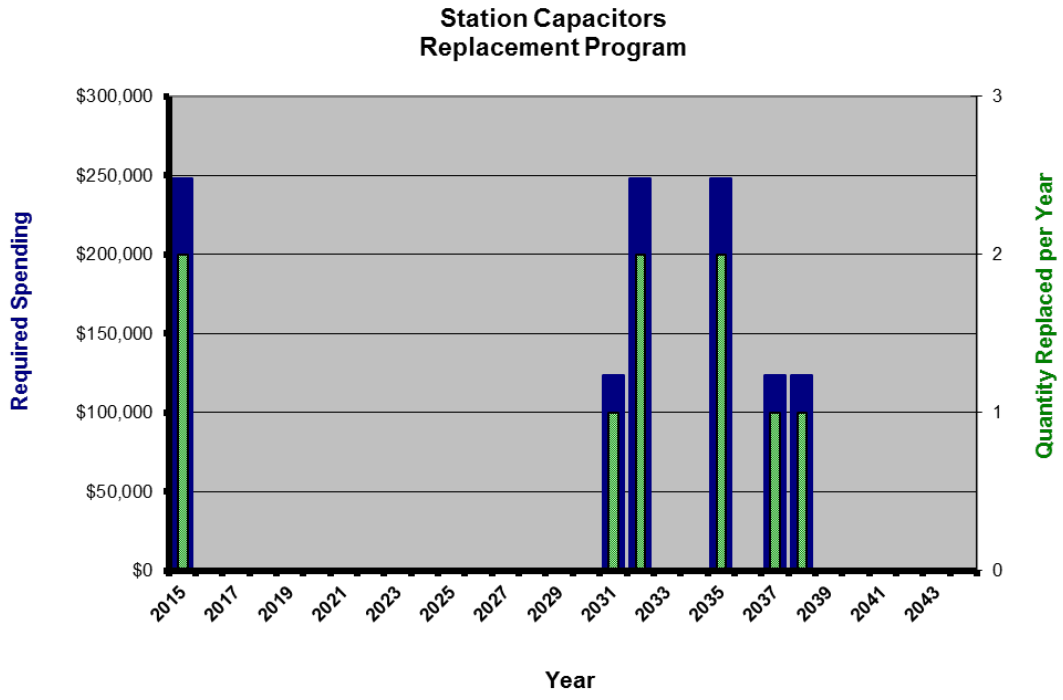
Circuit Breakers



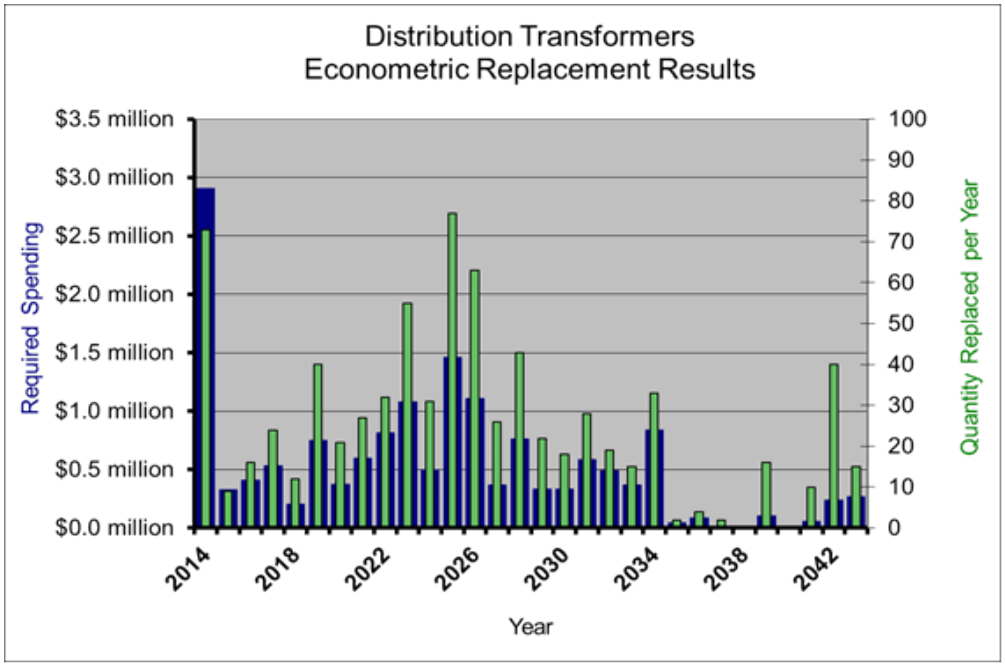
MS Primary Switches



Capacitor Banks

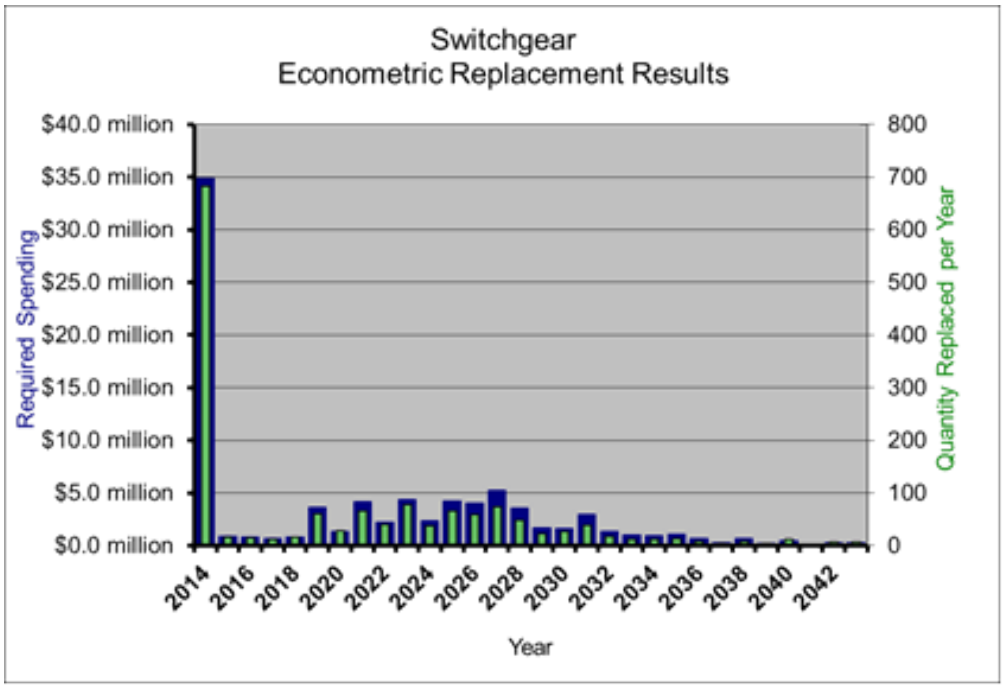


Distribution Transformers


Distribution Transformers
Econometric Replacement Results
Required Spending
$3.5 million
$3.0 million
$2.5 million
$2.0 million
$1.5 million
$1.0 million
$0.5 million
$0.0 million
Quantity Replaced per Year
100
90
80
70
60
50
40
30
20
10
0
2014
2018
2022
2026
2030
2034
2038
2042
Year

1

Distribution Switchgear



Mini-Rupter switches, Automated switches, Wood Poles and Underground primary Cable

For these assets the ACA models do not have Econometric Replacement Results.

d) In developing and prioritizing of the capital projects, PowerStream incorporates engineering judgment and operations input with the econometric model results to prudently spread out the replacement programs over a longer period of time. The intent of spreading the replacement requirement over a number of years is to smooth out the budget, resource and rate impacts while managing the incremental risk of asset failure.

As a result of this approach, the annual numbers of replacement units proposed in the annual budget may be different from those "Econometric Replacement" numbers generated by the ACA models.

e) Changes to formulations, methodologies, useful lives or probability failure between the revisions of the Asset Condition Assessment Report (in 2009, 2012 and the most recent update presented in Asset Inventory) are summarized below.

- Failure curves were originally based on a Normal Distribution. In 2011 PowerStream worked with BIS Consulting to convert the failure curves from Normal to Weibull Distribution.
- Shape and Scale factors were adjusted in the Wood Pole Model to reflect

PowerStream's experience with wood poles. The 2009 version has Shape = 1.94 and Scale = 32.57. The 2012 version has Shape = 2.88 and Scale = 45.54.

f) Asset Condition Assessment results were the basis for the identification and development of investments proposed. The other factors that are used are operations requirements, safety concerns, obsolescence, customer service, and coordination with other internal and external capital work.

II-2-Staff-55

Ref: E G/T2, 5.3.3 Asset Lifecycle Optimization Policies and Procedures, p. 32, Table 3

a) Please state the expected number of assets per each asset class that PowerStream has replaced in 2011-2014 and is planning to replace in 2015-2020 within the annual Emergency/Reactive Replacements.

b) Please confirm that these units are in addition to the units planned to be replaced within the other system renewal programs/projects.

RESPONSE:

a) Refer to Table 55a.

Table 55a

		Actuals				Proposed					
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Distrubution Lines - Emergency/Reactive Replace Capital											
a) LIS - Unsheduled Replacement of Failed (end of useful Life) Distrubution Equipment		0	3	1	5	3	3	3	3	3	3
b) Non Recoverable replacement of Distribution Equipment due to accident/vandalism		Not Available				Not Available					
c) Recoverable Replacement of distribution equipment due to Accidents/Vandalism		Not Available				Not Available					
d) Storm damage - Replacement of distribution equipment due to storm	# of Poles	Please refer to AMPCO 20 - AMPCO 24 for annual Emergency/Reactive Replacements for 2011 to 2014				30	30	30	30	30	30
	# of Transformers					18	18	18	18	18	18
e) Switchgears - unscheduled Replacement of Failed (end of useful Life) Distribution Equipment						37	37	37	37	37	37
f) Unscheduled Replacement of Failed (end of useful Life) poles, conductors & devices (S)	# of Poles					35	35	35	35	35	35
	# of Transformers					270	270	270	270	270	270
g) Unscheduled Replacement of Failed (end of useful Life) poles, conductors & devices (N)	# of Poles					7	7	7	7	7	7
	# of Transformers					87	87	87	87	87	87

b) The units shown in part (a) are in addition to the units planned to be replaced within the other system renewal programs/projects.

19. G-AMPCO-18 and G-AMPCO-26: Convert failure rates to number of units (show both).

RESPONSE:

Please refer to the updated tables below.

Submersible Transformer Failure Rate				
Year	**2011**	**2012**	**2013**	**2014**
Submersible TX Failed Units*	0.47%	1.91%	1.48%	2.75%
No of Failure	1	4	2	3
Total Count	212	209	135	109

*- Includes other submersible transformer

Annual failure rate for poles					
Year	**2010**	**2011**	**2012**	**2013**	**2014**
Annual failure rate for poles	0.005%	0.008%	0.008%	0.039%	0.063%
No of Failure	2	3	3	15	24
Total Count	38,070	38,070	38,070	38,070	38,070

II-2-Staff-71

Ref: E G/T2, 5.4.5 Justifying Capital Expenditures, p. 12, l. 1-6, Appendix A: Project Investment Summaries, Project Code: 100835 and 100851 and EB-2013-0166, 2014 IRM - Response to SEC IRs, Appendix A: PowerStream Asset Condition Assessment Technical Report, p. 112, 114 and 116

The Asset Condition Assessment Technical Report identified $288 per meter of cable replacement and $72 per meter of cable injection as average costs of the program.

Based on the numbers presented in the Project Investment Summary, OEB staff has calculated the following cost per meter numbers:

	2015	2016	2017	2018	2019	2020
Cable Replacement (25 km/year)	$11,718,862	$12,538,684	$13,607,273	$14,288,297	$15,085,861	$15,340,181
Cost per meter	$469	$502	$544	$572	$603	$614
Cable Injection (115 km/year)	$4,024,219	$4,138,312	$4,255,465	$4,375,771	$4,499,323	$4,626,219
Cost per meter	$35	$36	$37	$38	$39	$40

a) Please explain the higher number per meter of cable replacement and the lower number per meter of cable injection.

b) Please explain the 5%-7% increase in cost per meter of cable replacement in 2016-2019.

RESPONSE:

a) For Cable Replacement: The original unit cost of $288 per meter cited previously is no longer valid. Refer to Appendix Staff 71 - ACA Technical Report, for the updated

estimates.

It was recognized that the unit cost varies widely depending on the complexity and the actual design details at a specific location. At the beginning, PowerStream was hopeful that the unit cost would be low. $288 per meter was thought to be achievable. However, it turned out that the unit costs were higher than estimated. This is one of the reasons that PowerStream decided to replace less and to inject more quantity of cable within the same overall budget funds.

For Cable Injection: The original unit cost of $72 per meter cited previously is higher than the actual unit cost to date. It was recognized that the unit cost varies widely depending on the complexity at a specific location. Factors that affect the cost are:

- Number of splices;
- Number of phases;
- Switching and isolation logistics;
- Cable segment length; and
- Weather.

For the short term, PowerStream anticipates that the unit cost will stay low.

The quantity of 115 km per year is the higher end of the range that PowerStream anticipates achieving if the unit cost would be the lowest extreme of the cost spectrum. In reality, it may turn out that the unit cost will become higher and therefore PowerStream will complete less than 115 km per year.

b) The 5%-7% increase in the proposed budget is not the increase in unit cost. This increase was the result of PowerStream's budget optimization process. The increase is applicable to the whole work program for the year (not unit cost in that year). In the optimization process, the submitted funding may be reduced in one year and deferred (increase) in subsequent years

Cable Injection

PowerStream uses two rehabilitation options to rehabilitate cable segments that are aged and are in deteriorated condition. The options are cable replacement and cable injection. PowerStream's initial cable injection program (pre 2015) excluded the older cable population (31 years and older). In 2014, in an effort to find methods of improving reliability while working within a constrained budget, PowerStream consulted with cable injection service providers and other utilities to obtain broader information. PowerStream also completed additional research by determining the effectiveness of cable injection on older cables and deteriorated cables which previously would have been replacement candidates. This work, combined with the past success of PowerStream's cable injection program, led PowerStream to make the decision to expand the cable age group for cable injection.

Beginning in 2015, PowerStream will be injecting cables in the range of 31 to 39 years and thus deferring the high cost of cable replacement, for this new range of cables, by 20 years. This new approach allows PowerStream to rehabilitate more cable segments with the same amount of capital funding. As well, the new approach is more expedient as it makes it possible to address potential reliability problems faster. PowerStream is one of the few utilities in Canada that have fully embraced a new and innovative way to rehabilitate cable segments that are aged and in deteriorated condition. This new program demonstrates PowerStream's success in developing innovative solutions to improve reliability while working within a constrained budget.

In House Cable Testing

PowerStream is one of the few (if not only) electricity utilities in Canada to have its own in-house Cable Testing Program. This program ensures replacement decisions are made in the most cost effective and efficient manner. Operating cost savings occur because it is less costly for PowerStream to do its own in-house testing than it would be to have external contractors do cable testing for PowerStream.

II-1-Staff-16

Ref: E G/T 2, Distribution System Plan Summary

Please provide the following information for each of the DSP investment categories and project/material sub-projects, if available, for each of the years 2011 – 2020, in sufficient detail to calculate the investment amounts in the DSP:

a) Number of asset units installed and to be installed.

b) Number of asset units removed and to be removed.

c) Capitalized cost per asset units.

d) Please discuss any trends in capitalized cost per asset over the period, with specific reference to a) inflation trends and b) productivity measures.

If any of the requested information is not available, please provide an explanation.

RESPONSE:

a) A significant portion of the DS Plan is based on specific projects. PowerStream does not track, as a whole, installed units or per unit cost for these projects. Table 16a below provides asset units installed and to be installed for the asset condition assessment programs. For similar emergency asset replacements refer to G-AMPCO-24 and G-AMPCO-25, Sec III, Tab 1, Schedule 1, Pgs. 161 and 162.

Table 16a

Assets		Actual				Planned					
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Transformer Station Power Transformers (ACA)	# of Units	0	0	0	0	0	0	0	0	0	0
	$	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$/Unit	-	-	-	-	-	-	-	-	-	-
Municipal Station Power Transformers (ACA)	# of Units	0	0	0	0	0	0	0	0	0	0
	$	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$/Unit	-	-	-	-	-	-	-	-	-	-
Transformer and Municipal Station Circuit Breakers	# of Units	8	9	5	4	7	12	12	10	8	6
	$	$1,286,493	$1,314,020	$840,463	$375,395	$1,219,194	$2,223,194	$2,215,878	$2,616,350	$2,403,406	$1,367,315
	$/Unit	$160,812	$146,002	$168,093	$93,849	$174,171	$185,266	$184,657	$261,635	$300,426	$227,886
Transformer Station 230 kV Primary Switches (ACA)	# of Units	0	1	0	0	0	0	0	0	0	0
	$	$0	$61,541	$0	$0	$0	$0	$0	$0	$0	$0
	$/Unit	-	$61,541	-	-	-	-	-	-	-	-
Municipal Station Primary Switches (ACA)	# of Units	0	0	0	0	0	0	0	0	0	0
	$	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$/Unit	-	-	-	-	-	-	-	-	-	-
Transformer Station Capacitor Banks (ACA)	# of Units	0	0	0	0	0	0	0	0	0	0
	$	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$/Unit	-	-	-	-	-	-	-	-	-	-
Transformer Station Reactors (ACA)	# of Units	0	0	0	0	0	0	0	0	0	0
	$	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$/Unit	-	-	-	-	-	-	-	-	-	-
TS Station Service Transformers (ACA)	# of Units	0	0	0	0	0	0	0	0	0	0
	$	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$/Unit	-	-	-	-	-	-	-	-	-	-
TS 230 kV Primary Metering Units (ACA)	# of Units	0	0	0	0	0	0	0	0	0	0
	$	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$/Unit	-	-	-	-	-	-	-	-	-	-
Protection and Control Relays	# of Units	(1)				(1)					
	$										
	$/Unit										
Protection and Control RTUs	# of Units										
	$										
	$/Unit										
Spare Breakers and Switchgear Cells	# of Units										
	$										
	$/Unit										
Miscellaneous Spare Parts	# of Units	(1)				-	multi	multi	multi	multi	multi
	$					-	$48,631	$48,632	$48,632	$48,631	$48,632
	$/Unit					-	N/A	N/A	N/A	N/A	N/A

Note (1) not available

Assets		Actual				Planned					
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Underground Cable (Injection)	length (m)	9,570	25,100	85,363	106,976	102,000	80 - 100 km	80 - 100 km	80 - 100 km	80 - 100 km	80 - 100 km
	$	$315,776	$810,310	$4,319,470	$6,006,747	$4,024,219	$4,138,312	$4,255,465	$4,375,771	$4,499,323	$4,626,219
	$/m	$33	$32	$51	$56	$39	$41 - $52	$43 - $53	$44 - $55	$45 - $56	$46 - $58
Underground Cable (Replacement)	length (m)	10,330	9,060	49,539	54,499	25 - 30 km	25 - 30 km	25 - 30 km	25 - 30 km	25 - 30 km	25 - 30 km
	$	$2,829,932	$1,931,017	$14,722,080	$14,982,276	$11,718,862	$12,538,684	$13,607,273	$14,288,297	$15,085,861	$15,340,181
	$/m	$274	$213	$297	$275	$391 - $469	$418 - $502	$454 - $544	$476 - $572	$503 - $603	$511 - $614
Fault Indicator Replacement Program	# of Units	779	1,171	1,940	1,547	1650	1650	1650	1650	1650	1650
	$	$46,173	$326,565	$527,405	$484,511	$500,000	$500,000	$500,000	$500,000	$500,000	$500,000
	$/Unit	$59	$279	$272	$313	$303	$303	$303	$303	$303	$303
Porcelain Insulators	# of Units	-	-	-	-	275	275	275	275	275	275
	$	-	-	-	-	$66,000	$68,000	$69,000	$71,000	$71,000	$71,000
	$/Unit	-	-	-	-	$240	$247	$251	$258	$258	$258
Submersible Transformers	# of Units	20	32	24	10	8	4	-	-	-	-
	$	$479,131	$812,985	$1,263,913	$870,247	$1,040,300	$620,000	-	-	-	-
	$/Unit	$23,957	$25,406	$52,663	$87,025	$130,038	$155,000	-	-	-	-
Distribution Transformers	# of Units	-	-	54	67	60	60	60	60	60	60
	$	-	-	$314,706	$384,696	$494,105	$507,763	$521,766	$536,122	$550,844	$565,941
	$/Unit	-	-	$5,828	$5,742	$8,235	$8,463	$8,696	$8,935	$9,181	$9,432
Switchgear Replacement Program	# of Units	12	7	20	50	31	36	36	36	36	36
	$	$532,697	$697,178	$1,005,979	$2,172,620	$2,003,445	$2,327,404	$2,462,129	$2,533,373	$2,606,624	$2,681,945
	$/Unit	$44,391	$99,597	$50,299	$43,452	$64,627	$64,650	$68,392	$70,371	$72,406	$74,498
Mini-Rupter Switches	# of Units	-	-	-	21	15	15	15	15	15	15
	$	-	-	-	$482,622	$577,736	$592,267	$607,090	$622,214	$637,649	$653,406
	$/Unit	-	-	-	$22,982	$38,516	$39,484	$40,473	$41,481	$42,510	$43,560
Automated Switches	# of Units	-	-	5	5	5	5	5	5	5	5
	$	-	-	$392,480	$380,627	$435,912	$447,130	$458,595	$470,301	$482,308	$494,628
	$/Unit	-	-	$78,496	$76,125	$87,182	$89,426	$91,719	$94,060	$96,462	$98,926
Pole Replacement Program	# of Units	117	315	368	453	400	400	400	400	400	400
	$	$1,200,000	$4,320,000	$5,341,485	$4,948,885	$4,645,383	$4,933,143	$5,570,700	$5,870,246	$6,241,483	$6,244,377
	$/Unit	$10,256	$13,714	$14,515	$10,925	$11,613	$12,333	$13,927	$14,676	$15,604	$15,611

b) The number of asset units removed and to be removed will be the same as the number of units installed and to be installed in part (a).

c) Capitalized cost per asset units is shown in the table provided in part (a).

d) Transformer and Municipal Station Circuit Breakers:
Replacements are done over two years, with spending in the first year for engineering and long-lead materials. Cost per unit varies considerably due to diversity of equipment types, installation environment and scope of work.

Underground Cable:

The unit cost at each location is affected by the complexity of the location (residential, commercial, industrial, cable segment length, number of splices, drive way crossings, road crossing, number of Mini-Rupter switches, switching logistics, weather, etc.).This accounts for variances in unit cost for cable.

Submersible Transformers:

Unit cost at each location is affected by the complexity of the location (primary and secondary cable work required, new location to build new foundation for Padmount Transformer, drive way crossing, road crossing, turning curve, riser, weather, etc.). Project in 2015 and 2016 is a “Rocket ship” transformer replacement project in Barrie, which also includes the replacement of associated primary and secondary cables, which will make the unit cost to be higher.

Distribution Transformer:

The unit cost at each location is affected by the complexity of the location (primary and secondary cable work required, new location to build new foundation for the padmount transformer, etc.).

Switchgear:

Unit cost varies depending on equipment type and the complexity of the work at specific location.

PowerStream
Asset Condition Assessment
Technical Report
Phases 1, 2, and 3

Distribution Primary Cable – Asset Class Details and Results

Summary of Asset Class
Distribution primary cable are a moderately complex asset with a moderate price per meter.

There is no health index formulation calculated for underground cable.

Data Sources Available
Cable installation by drawing number, length, year, cable type, installation method (i.e., conduit, direct bury).

Demographics
Number of units: 3,400 km
Typical life expectancy (years): 35
Estimated replacement cost: $188 - $400/m (cable only), $340 - $660/m (in conduit)

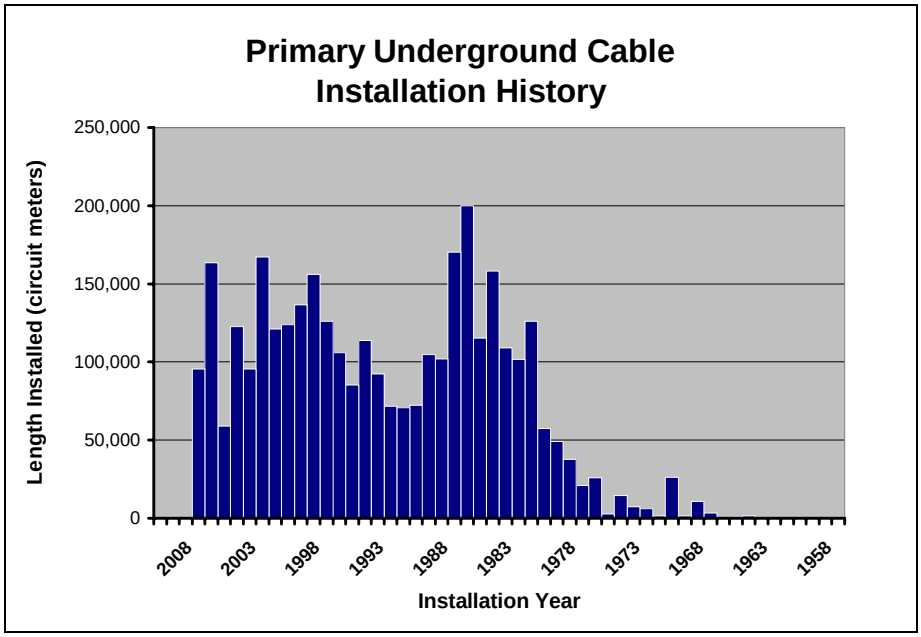


Figure 35. Distribution primary cable installation history.

Health Index Formulation and Results

There is no health index formulation calculated for underground cable.

Failure Probability Curves

The underground cable failure probability (hazard rate) curves are based on failure histories from other utilities with similar cable:

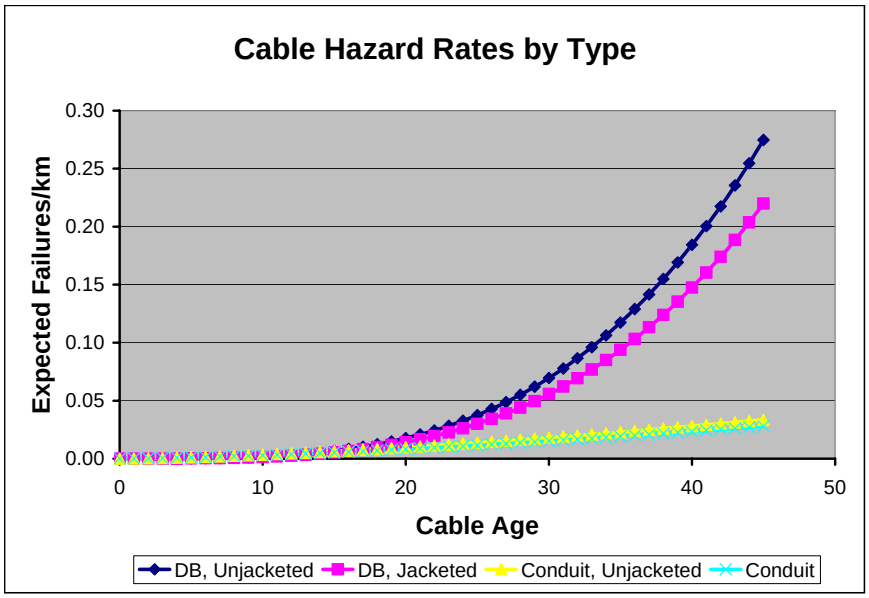


Figure 36. Distribution primary cable hazard rate curve.

Failure Effects

It is assumed that a cable fault on a 1-phase residential looped subdivision will impact 800 kVA (half the loop, 50 amps). For a 3-phase industrial/commercial subdivision, it is assumed that 3,350 kVA will be impacted (half the loop, 70 amps).

Intervention Mode

The intervention modes modeled for underground cable are injection and replacement. Cable injection is assumed to rejuvenate the cable by 20 years. The replacement and injection costs were provided by PowerStream.

Replacement Program Results

The economic model projects the optimal intervention timing for each asset analyzed. The program charts are generated by combining the optimal intervention timings and the associated capital costs.

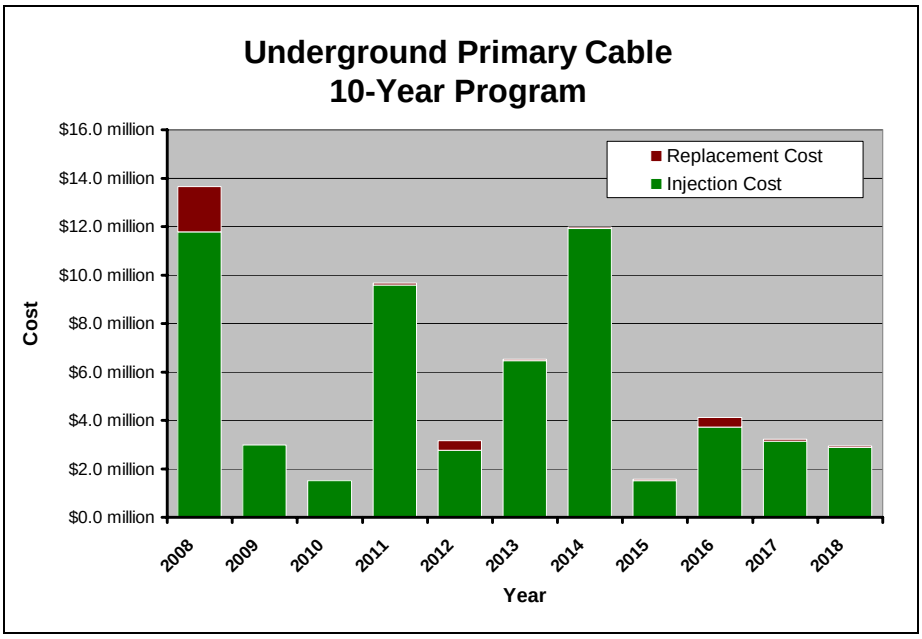


Figure 37. Underground cable 10-year spending program.

Conclusions

- Recommendations:
  - There is a backlog of cable injections. The backlog will likely require smoothing based on the B/C ratio of the sections involved and implementation considerations (workload, geography, etc).
  - Assumed failure rates should be compared with PowerStream's experience for verification or calibration.
- Gaps:
  - Actual spending programs should be based on more precise information about the loading of the sections, as well as verification of their age, type, and installation method.

B-CCC-15

REF: Ex. B/T1/p. 1

Please provide the business case for the new customer care and billing system. Please provide a schedule setting the annual expenditures (Historical and Forecast) for the new billing system, capital and OM&A.

RESPONSE:

The business case for the new customer care and billing system is attached as B-CCC-15 Appendix A. This is the evidence filed by PowerStream in its Cost of Service application EB-2012-0161 at Exhibit B1, Tab 1, Schedule 5.

Annual capital expenditures and a comparison to the initial budget from EB-2012-0161 are summarized in Table 1.

Table 1: Annual Capital Expenditures for New Billing System ($000s)

	Budget per	Actual				Forecast		Variance from
	EB-2012-0161	2011	2012	2013	2014	2015	Total	EB-2012-0161
Expenditure								
Internal Labour	4,167	20	1,143	2,055	2,584	2,060	7,862	3,695
Hardware	1,155	-	470	-	-	-	470	(685)
Software	3,978	-	2,891	231	125	11	3,258	(720)
Consulting	1,680	60	594	977	4,345	4,223	10,198	8,518
System Integrator	20,000	-	1,214	5,955	8,507	6,554	22,230	2,230
Legal	338	143	128	263	-	-	534	196
Miscellaneous	613	-	3	9	17	94	122	(491)
Capital lease	564	-	180	311	432	277	1,199	635
Contingency	2,000					-	-	(2,000)
Total	**34,495**	**223**	**6,624**	**9,801**	**16,008**	**13,218**	**45,874**	**11,379**

Total project costs of $45.9 Million are $11.4 million higher than the initial plan primarily due to the original project plan being aggressive and only able to absorb a limited number of change requests and schedule slippages. The project took longer than expected to complete due to challenges and complexities associated with system interfaces and testing. The variances are further explained below.

It should be noted that the current approved capital budget for this project is $45.9 million. The rate proposal contains capital costs of $42.8 million. PowerStream proposes to include this change in the first update.

Internal Labour ($3,695K above plan): Costs higher than plan due to additional scope of work and system complexities beyond what was originally anticipated. This complexity resulted in project delays and the associated additional staff resource time increased project costs.

Consulting ($8,518K above plan): Costs are higher than plan primarily due to additional system complexities and the associated consulting support required. Consulting included support from Oracle (interface design and testing), InfoTech and Util-Assist (system testing), Kaihen (project management and support) and E&Y (training and review). Consulting costs are also higher due to a $3.0M shift in the scope of work initially within the responsibility of the System Integrator (CGI) to PowerStream. This shift included the transfer of responsibility for certain activities such as report development, Organizational Change Management, Middleware and change requests. In addition, the initial project budget did not include $1.1M of overhead burdens associated with the project.

Systems Integrator ($2,230K above plan): Costs are higher than planned primarily due to extension of timeline to handle the additional complexities related to system interfaces, change requests and data conversion and testing activities

The primary reason for a later in-service date than initially planned (Q2 2014 to Q2 2015) is system testing that led to the identification of missing or incomplete requirements resulting in Change Requests to all 20 interfaces. It was not possible to fully identify at the "Discovery" phase of a project all of the issues associated with converting from a 30-year old system

The annual OM&A costs for the new billing system are set out in Table B-CCC-15- 2 below.

Table B-CCC-15-2: Annual OM&A Expenditures for New Billing System ($000s)

Expenditure	2012	2013	2014	2015	2016	2017	2018	2019	2020
Information Services:									
Application Managed Services Fee (AMS)				$2,016	$2,000	$2,000	$2,000	$2,000	$2,000
Oracle CC&B Software Maintenance Fee	$577	$535	$535	$530	$535	$541	$546	$551	$557
Training				$11	$15				
Other Software Purchase				$47	$64	$66	$67	$68	$69
Additional Consulting				$30	$40	$40			
Website Hosting Services				$35	$47	$12			
Customer Service:									
Training			$1,350	$19	$30	$7			
Outsourced Call Centre				$375	$200	$125			
Miscellaneous				$124	$141	$130	$130	$130	$130

Total	**$577**	**$535**	**$1,885**	**$3,187**	**$3,072**	**$2,921**	**$2,743**	**$2,749**	**$2,756**

B-CCC.15

Appendix 1

CUSTOMER INFORMATION SYSTEM PROJECT

SUMMARY

PowerStream will implement a new Oracle based Customer Information System ("CIS") to replace the existing T&W Info-Systems Ltd. CIS system ("T&W") that dates back to the 1970s. In November of 2011 PowerStream's Board of Directors approved a purchase agreement for the Oracle Customer Care and Billing CIS ("CC&B") solution. In February of 2012 PowerStream purchased Oracle's CIS Custom Components for the Ontario Market ("CCOM"). PowerStream is currently conducting a Request for Proposal ("RFP") process for selection of a system integrator.

PROJECT OVERVIEW

The new CIS is one element of PowerStream's documented five year Information System ("IS") Strategy which is aligned with its corporate strategy and supports PowerStream's objectives particularly in the areas of growth and integration with new and emerging technologies. PowerStream's overall IS Strategy is key to achieving the IS mission which states:

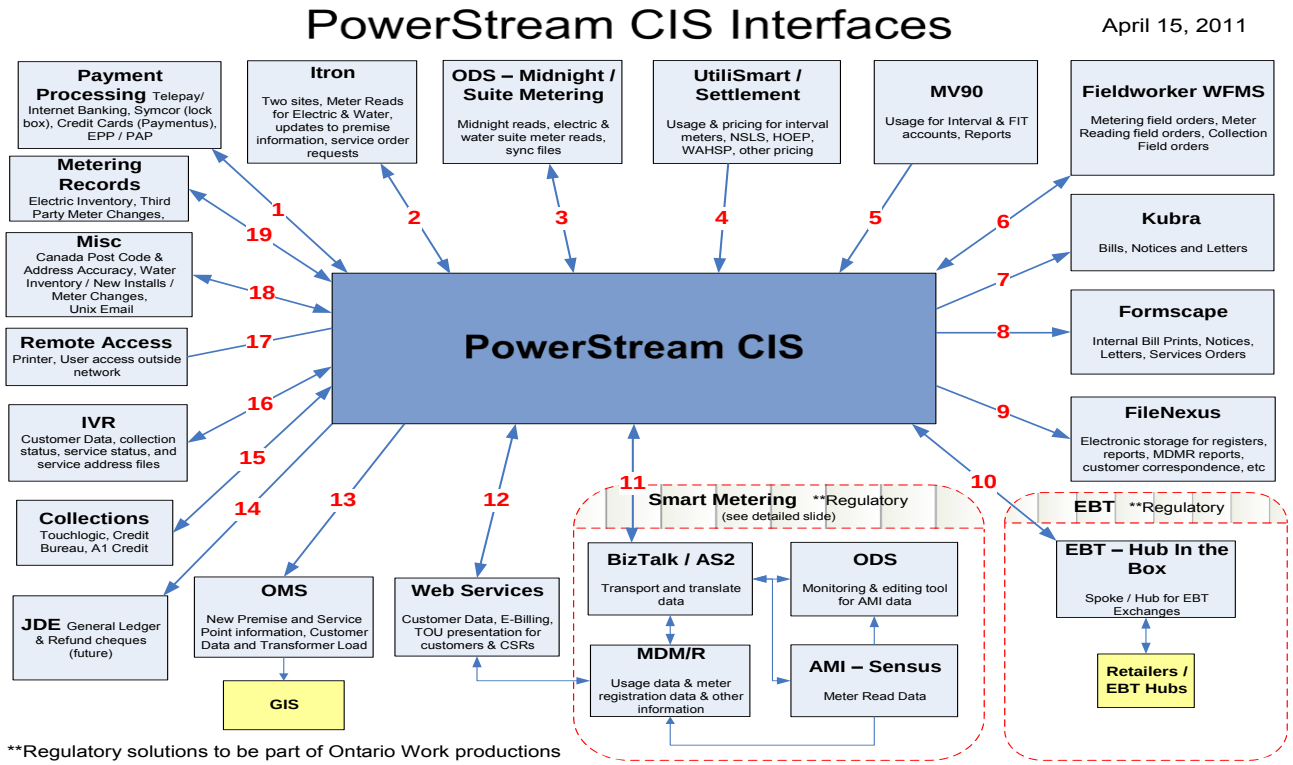
> "PowerStream will use information technology as an enterprise asset to enable and automate our business. Through the use of technology, PowerStream will sustain its leadership position in the industry by providing the best value and service to our customers, shareholders, and employees."

The CIS is a critical and comprehensive business system for PowerStream. The CIS provides the full meter-to-cash applications required to meet one of the core business mandates of providing account management, billing, collections, payments, and meter management/meter reading functionality for over 330,000 electricity customers within PowerStream's service territory. It also is a hub system providing inbound and outbound information to approximately twenty other interface systems both internal and external to PowerStream.

The new CIS will satisfy all of the functions of the existing T&W system, increase productivity and provide PowerStream with a platform to meet the needs of its customers and the changing industry. Oracle's CC&B solution will allow PowerStream to transform its current business by standardizing and integrating processes across the enterprise to help increase automation and productivity, improve customer service, and reduce operational risk. The CC&B system will provide customers with the ability to more easily access information and tools necessary to self-manage relationships and enable better energy decisions, thereby achieving two of the CIS project's key objectives: to 1) reduce cost to serve by lowering the number of calls to the customer care center; and 2) supply customers with the information and ability to better manage electricity usage and enroll in energy efficiency programs. The CC&B system will deliver more up-to-date customer information, a more user-friendly interface, and better workflow automation capabilities for improving customer interactions.

The major cost components of the new CIS system are the system hardware and software, internal resources, consulting and legal costs and the cost for integration of the CIS with PowerStream's existing processes and systems. Approximately two-thirds of the costs are for system integration. As noted earlier, the selection of a system integrator is taking place through a full RFP process. The system integrator plays a key role in integrating the twenty interfaces noted in Figure 1, below, with the Oracle CC&B solution by providing expertise in areas that include data conversion, business process requirements and design, testing training, organizational change management, cutover and transition and business continuity.

Figure 1: CIS Interfaces



The new CIS system is planned to be in service in by the end of Q2, 2014. The capital and OM&A cash costs associated with this project are outlined in Table 1 below.

Table 1: CIS Cost

CIS Replacement Project - Cost Breakdown							
(Taxes and Staff Overhead Burdens NOT Included)							
			Capital			OM&A	
Software License& Hardware			2012	2013	2014	2012	2013
		$5,133,160	$4,253,160	$605,000	$275,000	$578,844	$578,844
Internal Staff & Resource Costs							
		$4,166,934	$1,491,588	$1,726,192	$949,155		
Legal - Consulting - Other Misc.							
		$3,194,605	$1,399,464	$1,208,644	$586,497		
Integration							
		$22,000,000	$5,500,000	$12,100,000	$4,400,000		
TOTAL PROJECT COST		$34,494,699	$12,644,212	$15,639,836	$6,210,652		

The following sections of this evidence outline the CIS project need, alternatives considered, an assessment of the alternatives, an outline of the alternative selected, benefits of the new system and information on next steps in PowerStream's CIS implementation.

PROJECT NEED

PowerStream's current CIS is a legacy system that was created by T&W Info-Systems Ltd. in the 1970s. Prior to the creation of PowerStream each of the three initial predecessor utilities (Markham Hydro, Hydro Vaughan, and Richmond Hill Hydro) utilized different versions of this system to perform their billing and collection services. Upon creation of PowerStream in 2004, the systems were merged to one system. In 2006, further modifications were made to accommodate the acquisition of Aurora Hydro. The merger with Barrie Hydro in 2009 resulted in further changes. The implementation of smart meters and time of use ("TOU") rates also necessitated changes.

The CIS software is owned by PowerStream and supported by its Information Systems Division ("IS") which manages the T&W vendor that is onsite at the head office. T&W provides programming and software support to the CIS system and has provided significant support services in order to meet the ever changing needs of PowerStream's customers, demands of the Ontario electricity market and utility growth.

There are, however three significant risks associated with the current system that have caused the need to explore a more modern, robust and technically advanced system. The existing T&W CIS system has reached its limitations and cannot be kept running; integration with new and emerging technologies is restrictive; and the detailed knowledge base for this system is limited.

The risks mentioned above and the realization that eventually a new CIS System would be needed to facilitate future objectives has been known for some time. In 2007, PowerStream participated (as an observer) in a joint large municipal utility discovery process involving Toronto Hydro, Enersource, Hydro Ottawa, Horizon Utilities and London Hydro, so as to become familiar with CIS products available that may be suitable for PowerStream's future needs. This exercise ultimately resulted in both Toronto Hydro and Enersource pursuing a new CIS based on Oracle platforms which are both currently

in production. Horizon implemented an Oracle System. Hydro Ottawa is implementing an Oracle system. London Hydro selected an SAP system. Participation in this joint discovery group provided PowerStream with insight with regard to evaluating CIS solutions, developing an associated business case, preparing and conducting the Request for Proposal ("RFP") and solution implementation.

PROJECT TIMING

PowerStream had been involved in growth activities since its inception in 2004 initially and subsequently with further expansion involving Aurora Hydro, Barrie Hydro and most recently a partnership with Collus (pending regulatory approval). In addition to this growth activity PowerStream was actively involved in efforts regarding smart meter deployment, CIS system connectivity with the Provincial Meter Data Management and Repository ("MDM/R") and implementation of TOU rates during the 2008 to 2011 period. Therefore contemplating a new CIS during this heightened period of activity was not practical and it was decided to keep the T&W system operating as long as possible.

In 2010 as part of PowerStream's planning process it was identified that there would be a period of stability leading into 2011 and that a window of opportunity and period of relative stability would present itself in 2012 to late 2013 allowing a practical period of time in which a new CIS could be installed. Coupled with this was the awareness that a number of key personnel that would be instrumental in a new CIS implementation would become eligible for retirement, with some eligible as early as 2012. Therefore it was prudent to proceed with this initiative while PowerStream still had the highly specialized knowledge under its employ.

ALTERNATIVES CONSIDERED

Introduction

In 2007, a discovery process was initiated by PowerStream to become familiar with CIS products that may be suitable for its needs. PowerStream participated as an observer in a joint large municipal utility discovery process involving Toronto Hydro, Enersource, Hydro Ottawa, Horizon Utilities, and London Hydro. This resulted in a joint venture between Toronto Hydro and Enersource to pursue a new CIS. Enersource and Toronto Hydro are "live" with their systems based on an Oracle platform. Learnings were gained

by PowerStream related to evaluating CIS solutions, development of an IT business case, preparation for the RFP, and implementation of the solution.

The discovery process that was undertaken determined that there are only two suitable system solutions available to enable PowerStream to meet its business objectives. The two systems are Oracle's CC&B and SAP. Both systems are widely used throughout North America and are equally capable of producing similar performance. The primary differentiator between the two solutions is their ability to provide the functionality necessary to meet the regulatory requirements unique to the Ontario electricity market. Other considerations are the ability to meet business requirements, ability to integrate to existing business systems and interfaces, ease of integration, functionality, and ease of use.

PowerStream also participated in discussions with Hydro Ottawa in 2010 and 2011 to review the feasibility of partnering in a joint CIS venture and explore potential cost sharing and synergy opportunities. It was determined that differences in processes and interfaces would not permit a joint implementation. However, the two utilities plan to maintain close relationships to assist each other during an almost parallel implementation period. As an example of this relationship Ottawa Hydro provided information on their RFP process that proved to be valuable to PowerStream in setting up their RFP process for selection of a system integrator.

In the third quarter of 2011, following PowerStream's discussions and feasibility review with Hydro Ottawa, PowerStream made the decision to pursue a CIS replacement on its own. It has included this initiative as one of four primary objectives in its corporate strategy, and this is the primary focus of its formalized IS strategy. To date PowerStream has assigned two Project Co-Sponsors and a Core Implementation Team to head up this initiative.

As part of its due diligence, PowerStream participated in a hands-on demonstration of London Hydro's SAP system which represents the other main alternative to Oracle offered in the marketplace supporting utilities the same size as (or larger than) PowerStream. In addition, PowerStream had hosted presentations from both Oracle and SAP to allow them an opportunity to demonstrate their respective products and provide approximate costs. Finally, PowerStream has remained abreast of the trends

and developments amongst the largest Local Distribution Companies ("LDC"s) in Ontario, all of whom are either contemplating, proceeding with or have already implemented state of the art CIS's.

As a result of PowerStream's learning process there were three main alternatives for the replacement of PowerStream's CIS identified. These were;

Continuation of the status quo;

Implementing an Oracle based CIS; and

Implementing a SAP based CIS.

DESCRIPTION OF ALTERNATIVES

Alternative 1 – Status Quo

The core of PowerStream's CIS is the T&W system that has been in place since the 1980's (originally designed in the 1970's) with customized modifications to meet growth and regulatory/business requirements. Continuing with this system is an alternative for PowerStream. The CIS is owned by PowerStream and supported by both its in-house IS division and the remaining eight staff of the T&W vendor who are managed through the IS division. PowerStream is the only remaining significant client of T&W. T&W provides programming and system support of the CIS system and has provided support to meet growth and regulatory requirements.

PowerStream has identified several risks associated that make the current system not viable. These include the lack of documentation by T&W; significant customization of the system over the years primarily to accommodate growth through mergers with others and regulatory requirements; its inability to efficiently accommodate future changes as a result of past customization; changing business processes; and integration of emerging technologies. Compounding this matter is the fact that with the lack of documentation, there is no easy way of fixing this system without pulling key knowledgeable staff off of normal duties. Another key risk associated with the current system is the age of T&W's

principal, Dr. Yu Tu, who is past normal retirement age but continues to lead the support of the system and retains the knowledge of the core programming.

PowerStream's customer satisfaction can be expected to remain stable but will be at risk of deterioration when compared to other large LDCs that have implemented more comprehensive up-to-date systems that contain more customer care and self-serve abilities than exists with the T&W system. PowerStream's annual maintenance and capital costs can be expected to increase as new modifications are required to be made to an already highly customized system.

Alternative 2: Oracle Based CIS

This alternative results in the replacement of the existing T&W system with Oracle's Customer Care and Billing ("CC&B") solution. Oracle is one of the market leaders (the other being SAP) in the provision of CIS software to utilities of a size and scope of operation similar to and larger than PowerStream. They have an extensive client base in North America. Locally, Oracle's CC&B product is installed at Enersource and at Toronto Hydro. Hydro Ottawa is currently in the process of upgrading to the Oracle CC&B solution.

Oracle offers modern functions with new service features available to customers. It is designed to operate with easily updatable templates which are configurable to meet the specific requirements of a given client. It will be easy to install, modify, and support compared to older CIS offerings such as T&W. The software reflects best practices at the process level so process improvements will also be a benefit of implementation. In addition, there will be reduced time and cost benefit if "process templates" that have already been developed by Enersource and Toronto Hydro in their implementations are usable by PowerStream.

Oracle has Custom Components for the Ontario Marketplace, known as CCOM, which has been purchased by PowerStream, that is embedded in its CC&B product to provide the ability to perform transactions according to meet the needs of the Ontario regulatory requirements.

PowerStream's financial systems operate on a JD Edwards platform which is an Oracle based and supported system. Using Oracle's CC&B CIS solution makes integration to

PowerStream's financial system less complicated compared to integration to an SAP based CIS system.

Alternative 3: SAP Based CIS

This alternative results in the replacement of the existing T&W system with SAP's CIS solution. SAP is one of the market leaders (the other being Oracle) in the provision of CIS software to utilities of a size and scope of operation similar to and larger than PowerStream. They have an extensive client base in North America. Locally, SAP's product is installed at London Hydro and is being implemented at Hydro One. Hydro One recently completed an RFP and is planning to implement an SAP CIS solution which is consistent with its previous implementation of SAP products for its work management and finance systems.

SAP has some similar features to the Oracle offering but the SAP product does not have specific components to allow operation in the Ontario market. In addition, information was not readily available from SAP on potential process improvement benefits or details on the cost of the product.

ASSESSMENT OF ALTERNATIVES

Alternative 1 – Status Quo

Key risks to continuing with the T&W system were identified in the description of the Status Quo alternative and include the age of the system, the lack of documentation, inability to expand much beyond current capabilities, and the age of T&W's principal, Dr. Yu Tu, who leads the support of the system and retains the knowledge of the core programming.

In addition, PowerStream needs custom reports and the ability to make ad hoc requests in the CIS system. Currently this type of analysis requires custom programming by T&W which is often a lengthy and expensive process.

The T&W system is no longer viable.

Alternative 2: Oracle based CIS

The Oracle solution has several key advantages over the Status Quo and the SAP alternative. One of the key advantages to this alternative is that the Oracle CIS system includes established CCOM modules as part of its CC&B system.

In addition, in a review of CIS systems used in the industry it was found that Oracle is the same system currently used by Toronto Hydro and Enersource with plans underway by Hydro Ottawa to implement a system upgrade to the same Oracle platform. If PowerStream moved to the Oracle platform the opportunity arises to create a joint users group with the other three large LDCs which will provide a more efficient way to implement future system enhancements and changes as directed by the OEB. This user group would represent over 1.5 million customers in Ontario and will allow PowerStream to more effectively work with its peers to understand and implement regulatory changes. An additional benefit of working as a group utilizing CCOM is that costs associated with modifying the product due to regulatory changes could be shared.

As a result of PowerStream and Hydro Ottawa proceeding with an implementation in an almost parallel time frame, PowerStream was able to receive a significant price reduction on the CC&B product from Oracle. The savings on the capital cost of the Oracle CC&B and related support over the first 5 years of ownership is approximately $1 million.

This new system will allow PowerStream to take advantage of, and more easily integrate with, new and emerging technologies associated with customer self serve options and smart grid related initiatives some of which have already been explored by other Oracle users mentioned above.

PowerStream staff have explored both the Oracle and SAP systems in actual working situations and have concluded that Oracle provides a more streamlined and user friendly environment compared to SAP from both an implementation and an operational perspective.

Alternative 3: SAP Based CIS

SAP does not, at this time have the comparable custom modules for the Ontario marketplace similar to Oracle nor were they able to provide an order of magnitude in

terms of cost. Capital and annual maintenance costs were not available from SAP at the information session hosted by PowerStream or upon further discussions. Oracle has provided significant discounts on its software license while SAP could not provide a pricing range or order of magnitude to PowerStream unless they were first engaged to conduct a "Value Engineering" exercise of the PowerStream organization. As an alternative, SAP referred PowerStream to a consultant that had extensive experience in SAP implementation work. PowerStream met with the consultant to discuss potential risks, integration experiences and seek an order of magnitude in terms of expected costs. The outcome of the meeting confirmed that while SAP might be equivalent in terms of cost of the CIS product, integration would be more complex, and the system lack pre-developed functions to deal with the Ontario market.

The SAP alternative has a higher risk due to more complex interface requirements in relation to other PowerStream systems (e.g. PowerStream's JD Edwards Financial System is an Oracle based system) and the requirement to fully build out custom components for the Ontario marketplace similar to what is already available for Oracle's CIS.

Also, as mentioned above, PowerStream staff has explored both the Oracle and SAP systems in actual working situations. PowerStream met with London Hydro to discuss their recent implementation of an SAP CIS and to view the active system. A similar discovery meeting was held with Hydro One staff who were, at the time, at the front end of an SAP implementation. These discovery meetings concluded that Oracle provides a more streamlined and user friendly environment compared to SAP from both an implementation and operational perspective.

SELECTED ALTERNATIVE

A decision has been made to base PowerStream's new CIS System on the Oracle CC&B platform accompanied by Oracle's Custom CCOM (Alternative 2). The proposed Oracle -based CIS alternative is the best solution for PowerStream.

Identified Benefits

In addition to the issues previously identified, the Oracle product has the following key benefits / advantages.

The Oracle solution would allow PowerStream to participate in a joint users group allowing for more effective and efficient implementation of future enhancements to meet operational needs as well as regulatory changes. In addition, this user group will represent over 1.5 million customers in Ontario and will allow PowerStream to more effectively work with its peers to understand and implement regulatory changes.

This new up-to-date solution will increase employee satisfaction through a much improved user interface and ease of use within a windows based environment and much improved system abilities compared to the existing CIS. Processes within the new system are more efficient and automated thereby reducing the number of manual processes which lead to user frustration, thus improving overall efficiency and satisfaction.

The new Oracle based CIS will be more easily integrated with new and emerging technologies especially related to web based and mobile customer self-serve offerings which will have a direct and positive impact on customer satisfaction. The system also offers more cross functional ability which will enable more effective and efficient access to data that can be utilized by staff when dealing with complex escalated inquiries or through customer self-serve applications. This will lend itself towards providing customers with shorter turnaround times on inquiries and resolving billing exceptions thus improving service quality.

The Oracle product offers a number of predefined reports and the ability to conduct more effective ad hoc reports compared to the existing system. This will allow for the ability to drill deeper into processes in order to conduct custom analytics that will be used as part of PowerStream's efforts towards continuous improvement and cost savings.

The Oracle CC&B CIS will position PowerStream to migrate existing customers on to a platform which offers functionality that enables enhanced customer contact preferences and enhanced customer contact channels, something that is not available in T&W today.

The new system will reduce the need to increase future staff resources due to the inherent efficiencies and improved functionality built into the system. The CC&B system provides a platform where PowerStream can optimize core business processes and thereby supports the implementation of process improvement methodologies that drive efficiency and effectiveness of core CIS processes. The CC&B platform also positions PowerStream to accommodate potential future customer growth.

The affects to the environment are minimal and potentially positive. Initially there may be an increase in the use of paper during the implementation and stabilization phase. However, over time, the use of paper, especially in regard to exception reports, could be reduced. Future paper usage will also be reduced as a result of the system being more adaptable to emerging technologies therefore allowing PowerStream to leverage electronic communication technologies especially as they relate to service orders and collections notices. This will reduce dependency on high speed printers and therefore reduce the environmental impacts inherent with this type of equipment.

NEXT STEPS

The PowerStream Board of Directors approved a “Special Resolution”, dated November 21, 2011, for the amount of $3.3 million (plus applicable sales tax) to purchase the ORACLE Customer Care and Billing (CC&B) Software License and Associate Program Components and related one year support. This approval was requested in order to take advantage of significant cost savings that can be achieved by completing a purchase agreement between PowerStream and Oracle by November 30, 2011. Subsequently, as part of the approved 2012 Capital budget for the CIS Replacement project, Oracle’s CCOM was purchased in February of 2012.

An RFP was developed and released for bids in late 2011 in order to secure the services of a Systems Integrator to assist PowerStream in implementing the CC&B product. A recommendation for a vendor is scheduled to be prepared by the end of April, 2012 and finalization of the terms and conditions with the successful candidate completed by the end of May 2012. The targeted implementation or “Go Live” date of the new system is scheduled by the end of Q2 2014

At the present time efforts are underway to complete the development of an appropriate project governance structure. The organizational configuration of the internal implementation team has been completed and recruitment of staff to backfill those identified to participate on the project is underway.

September 16, 2015

Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
2300 Yonge Street
26th Floor, Box 2319
Toronto, ON M4P 1E4

Dear Ms. Walli

Re: PowerStream Inc. 2016 -2020 Electricity Distribution Rate Adjustment Application EB-2015-0003 – Response to IR, I-SEC-4, Internal Audit

In its August 21, 2015 response to interrogatory I-SEC-4, PowerStream provided information on its internal audit process. The response also contained an offer to discuss the internal audit function further with SEC to ensure that SEC received the needed information.

This dialogue occurred following the September 9, 2015 Technical Conference and resulted in the following documents being provided to SEC:

- The status of internal audit recommendations;
- A KPMG recommendation to create a risk register for the CIS project; and
- The risk register for the CIS project that was created during a workshop

These documents are attached to this letter and are being shared with OEB staff and the Parties. The information will be filed on RESS.

Yours truly,

Original signed by Colin Macdonald

Colin Macdonald
SVP, Regulatory Affairs & Customer Service

KPMG

cutting through complexity

PowerStream

Review of CIS Project Implementation

CONFIDENTIAL

Milestones 1 and 2

Phase I

February 24, 2013

Key Findings and Recommendations

#	Sub Section	Finding	Risk / Impact	Recommendation	Project Team's Response with Action Plan
4	Risk Register Update Process	Our review of the project risks identified in the risk register noted the following: • A formal risk assessment has not been performed to identify and assess the risks impacting the project. Currently, the risk register is being populated once a risk is identified by a member of the CIS project team. • The determination of risk ratings (high/medium/low) for the risks identified is based on a subjective assessment, and has not been prepared based on an established criteria or framework. We noted that the CIS project team is using a risk methodology that differs from the PowerStream Enterprise Risk Management ("ERM") framework by not separating the impact and probability of the risk occurring. **Priority: Medium**	Without a formal risk assessment, there is a likelihood that key risks may not be identified. Further, not using the organization's standard ERM framework and risk definition could result in inconsistencies in ratings and could result in resources not being optimally allocated to key project risk areas.	The CIS project team should complete a formalized risk assessment of the project before the start of the implementation phase. Further, rating decision rationale should be integrated into the risk register via the addition of impact and probability ratings, or via the retention of minutes from meetings where these ranks were discussed.	Agreed. Action: Adopted the PowerStream ERM model and modified our risk log accordingly.

PROJECT DESTINY
RISK ANALYSIS – NOVEMBER 2013

THREAT	RANKING	MITIGATION STRATEGY
1. In Service Date – November 24th 2014	High	o This is our highest risk – approach like Disaster Recovery Planning o Commence immediate assessment of alternatives for deferral of the I-S date: ▪ Develop impact assessments for two alternative IS dates - December 2014 & February/March 2015 o Need to identify functionality that could be deferred or eliminated e.g. Macro Biz Talk solution, Bill Print o Assessment of alternatives should also support messaging – i.e. develop an Advocacy Strategy and Communications Plan for the Board of Directors – create awareness of limited options for deferral
2. Critical Resource Availability	High	o Develop a specific plan for critical PowerStream staff where there is no backup capability. Develop an associated "key staff strategy" to ensure commitment to the Project - availability and productive time are concerns – may require incremental resources o Ensure that the "team culture" attracts new resources o Monitor CGI to ensure their key sub-contract resources are fully engaged o Initiate a discussion with regards to PowerStream's capability to simultaneously implement and support multiple core system replacements and enhancements o Key overall mitigation strategy is the Weekly Governance Meeting
3. Interface Dependencies	High	o Vendor engagement/management strategy in development – vendor feedback will help identify risks o This exercise will also identify critical interdependencies and communication needs of our vendors o Need to mitigate legal risks and assess how "deep" to go with each vendor

PROJECT DESTINY
RISK ANALYSIS – NOVEMBER 2013

4. New Business Processes	High	o Greatest need is relative to Change Management – build project awareness and the desire to change – sell "what's in it for me?" o A complimentary exercise to identify new businesses processes has also commenced o The Internal Communications Plan is the key mitigation strategy. It must succeed in engaging all Stakeholders in a timely manner, emphasising both functional and cultural change requirements, identifying "Business Champions" and leveraging their influence to effect change throughout the organisation.
5. Testing Resources	High	o Testing has commenced and already there have been PS resource shortfalls o Greater familiarity with the system will help alleviate the problem as will the development of a more team-oriented and committed culture o However, this will continue to require tight management and escalation by the PMO o May require the use of "trade-offs" as appropriate and greater leveraging of CGI resources
6. Corporate Agreement on a Quiet/Freeze Period	Medium/High	o Develop a PowerStream internal communications plan to "sell" the need for an Implementation "Quiet Period" – need to identify "Business Champions" o Key audience for this messaging is Mid-Level Supervisory staff where an understanding of and support for the strategic importance of this requirements is essential o Immediate need is for tight Change Management with Key Stakeholders to ensure consensus and buy-in at all Corporate levels
7. Project Budget	Medium	o Current Project Budget is not achievable even with an I-S date of November 2014 o Corporate Finance have costed the financial impacts of I-S date delays o Impact is "lumpy" because of one-time taxation effect o Regulatory cost recovery does not appear to be a critical issue

PROJECT DESTINY
RISK ANALYSIS – NOVEMBER 2013

8. Change Requests/Contract Revisions	Medium	o Will require strong management to ensure changes have universal alignment and appropriate prioritisation o An immediate need is for the cities of Markham & Vaughan to complete their assessment of the Storm Water Fee implementation Completing negotiation of the Managed Service Agreement and the Statement of Work prior to Phase 2 Project commencement should help address this risk
9. Oracle Product & Management Issues	Medium	o Mitigate this risk through monthly "touch points" with the Oracle Representative o Implementation of the same software by other Ontario LDCs should provide considerable mitigation
10. Discovery Process Scope	Medium	o In spite of the extensive effort devoted to the Discovery Phase it is possible new issues will be identified during the Testing Phase. With the planned overlap in "Testing Waves" there is little ability to accommodate remedial work o Risk is mitigated through the comprehensive approach to the Discovery Phase, identifying and closing gaps at that stage, and building on our current business process knowledge and the expertise of CGI o Risk is also mitigated by PMO structure and oversight function o Finally, risk mitigation will be provided by the I-S date Scenario exercise, which will better define the nature and scope of the associated risks
11. New Bill Print Implementation	Low	o Bulk of the associated work is resourced by a 3rd Party o Change management for Customers is key deliverable – Corporate Communications has agreed to provide a dedicated resource
12. Master Project Plan Adequacy	Low	o Risk is being assessed and managed on a weekly basis o Information Services currently reviewing their Plan – limited buffer

	A	B	C	D	E	F	G
3		2015	2016	2017	2018	2019	2020
4	**General Plant**	**($ 000)**	**($ 000)**	**($ 000)**	**($ 000)**	**($ 000)**	**($ 000)**
5	**Customer Information System (CIS)**	11,703	3,991	6,816	2,996	2,996	3,103
6	CIS Modifications	1,403,400	3,884,100	6,708,900	2,996,000	2,996,000	2,996,000
7	CIS Replacement Project	10,300,000	-	-	-	-	-
8	CS integration services with Outage Contact Centre	-	107,000	107,000	-	-	107,000
9	**IT & Info/Communication Systems**	5,302	7,560	7,016	4,587	7,244	8,318
10	All Out Security Upgrade	-	10,807	-	-	10,807	-
11	Application Review	-	96,300	-	-	-	-
12	Asset Analytic in C55	-	-	243,158	-	-	-
13	BizTalk Upgrade	-	-	-	-	252,500	-
14	Business Intelligence - Dashboards	-	-	-	-	-	123,704
15	C55 Phase 2 (Performance Management)	-	146,348	-	-	-	-
16	C55 Phase 2 (Replacement of CBMS)	398,810	-	-	-	-	-
17	Client Computing	411,950	400,000	425,000	425,000	441,667	454,167
18	Complete Sonet Loop at YorkTech/Addiscott	-	34,633	-	-	-	-
19	Control Room Map Cabinet Panel upgrade	80,250	-	-	-	-	-
20	Customer Experience Plan Outcomes	26,750	-	-	-	-	-
21	Customer Web Portal, Integrated Self-Serve & Mobile Applications	-	267,500	374,500	-	-	107,000
22	Cyber Security Audit & Upgrades	-	-	-	52,244	63,441	65,265
23	Data Loss Prevention - Phase 1	90,950	-	-	-	-	-
24	Disaster Recovery	-	50,290	50,290	50,290	50,290	50,290
25	Electronic MMR (Material Movement Record)	-	-	-	-	55,672	167,017
26	Enterprise Content Management	-	-	-	-	-	624,309
27	Expansion of Link between Addiscott & Cityview	96,300	-	-	-	-	-
28	Fieldworker System Changes & Equipment Replacement	80,250	-	-	64,200	80,250	-
29	File Share POC - Mobility file share	-	54,035	-	-	-	-
30	Finance Emerging Projects	135,000	219,000	241,000	266,000	293,000	323,000
31	GIS Emerging Projects	150,000	158,000	166,000	175,000	184,000	194,000
32	GIS Landbase Data (Parcels, Streets & Points of Interest. (Year 5 of a 5 year contract).	54,125	56,047	56,047	56,047	56,047	56,047
33	GIS StreetScape Images (Year 4 of 4)	112,350	112,350	112,350	112,350	-	-
34	Global Positioning System (GPS)for As Built Data Collection	-	-	-	-	35,278	-
35	Identity and Access Management	96,300	-	-	-	-	-
36	Implementation of a new ADMS Platform for Operations - Phase 1	-	-	-	-	-	121,365
37	Implementation Of GE PulseNET Network Management System for Scada Licensed Radio - Phase One.	-	25,269	-	-	-	-
38	Intergrate GPS technology with Responder OMS	-	-	-	-	-	74,452
39	IT Management System (Phase III)	-	-	-	-	-	197,715
40	IVR Corporate Directory replacement	53,500	-	-	-	-	-
41	IVR Replacement	-	-	-	-	-	540,350
42	IVR/OMS changes Customer Call Back Solution and Regional Granularity	80,250	-	-	-	-	-
43	JD Edwards Application Upgrade	-	-	-	-	2,396,800	-
44	JD Edwards High Availability Design Planning	-	214,000	-	10,700	-	-
45	JD Edwards System Hardware Upgrade (2019)	-	-	-	-	-	605,733
46	JD Edwards version Upgrade Design Planning	-	-	-	-	162,105	-
47	JDE Workload Automation	-	97,263	-	-	-	-
48	JDEdwards Enhancements	53,500	133,750	101,650	133,750	100,045	200,090
49	Legacy Easement Transactions for Capital	13,921	13,995	14,071	14,145	14,220	14,295
50	Major Upgrade to Ent. System	-	-	-	49,969	-	100,045
51	Migration of Operations WAN to a PowerStream Owned Solution - Phase 1	134,101	-	-	-	-	-
52	Misc Software Upgrades (FormScape, AutoCAD, etc.)	-	-	-	-	20,606	51,515
53	MSBPI	-	10,000	60,000	899,999	50,000	10,000
54	Netmotion	53,500	-	-	-	-	-
55	OM&A Budget Development (database & optimization process)	-	86,456	510,090	-	-	-
56	Phone System enhancement Upgrade	-	-	-	-	50,500	908,999
57	PowerStream Website Planning/Development and Enhancement to existing Site.	-	-	-	-	-	33,403
58	PowerStream Website Upgrade Project	214,000	-	-	-	-	-
59	Printer & Copier Fleet Replacement	42,800	200,000	250,000	40,000	40,000	40,000
60	RFGen Upgrade	10,700	-	-	10,700	-	-
61	Security - Additions & Enhancements	-	200,090	200,090	200,090	200,090	200,090
62	Server Refresh	267,500	319,999	340,000	360,000	380,000	400,000
63	SIP POC (Voice SIP Trunking)	-	96,300	-	-	-	-
64	Softphone Technology	-	-	-	-	-	108,070
65	SQL Expansion	90,950	100,000	-	50,000	-	100,000
66	CASCADE System Interface to New Operations Work Management System	-	-	86,456	-	-	-
67	CMMS Mobile Application Upgrade (Tablet solution)	-	85,171	-	-	-	-
68	PI System Hardware and System Upgrade	-	-	-	82,682	-	-
69	Purchase PI Enterprise Agreement	-	-	-	-	-	457,505
70	Storage Expansion (Data)	321,000	300,000	300,000	300,000	1,000,000	400,000
71	Talent Management System	-	25,000	-	-	-	-
72	Technology changes in Control Room.	-	-	-	-	-	272,877
73	Technology Upgrades Improving the System Control Room Environment	52,601	52,986	53,371	53,757	54,142	54,527
74	Third Party Contact Centre Systems Integration- Day to Day	-	-	432,280	-	-	-
75	Upgrade of the Electronic Visual Display Wall (EVDW) to LED Light Engines - Phase 1	-	-	-	-	175,546	175,789
76	Upgrade of the Radio over Internet Protocol (RoIP) Environment of the Operations Voice Radio System	-	-	197,008	-	-	-
77	Upgrade OMS to Advanced Distribution Management System (ADMS)	-	-	-	-	-	223,925
78	Upgrade Responder to 11.X	-	133,673	-	-	-	-
79	Upgrade Server O/S	-	300,000	-	50,000	-	-
80	Upgrade to IVR and Outage Communications Systems.	-	-	151,298	-	-	-
81	Upgrade to PowerStream's Operations Network CyberSecurity Posture - Phase 1	257,502	258,118	258,735	-	-	-
82	Upgrade/Expand Tape Library (DR and PROD)	-	-	600,000	-	-	200,000
83	UPK Upgrade	-	10,807	-	-	10,807	-
84	VDI Project – Phase 4 XenApp & Virtual Desktops Expansion	96,300	50,000	50,000	-	300,000	50,000
85	Contact Centre Workforce Management	-	214,000	321,000	-	-	-
86	Lines Mobile Equipment	119,840	150,870	120,910	77,818	77,818	77,818
87	Metering WFM - Enhancements	-	-	53,500	-	53,500	-
88	Metering WFM - Planning	58,850	-	-	-	-	-

	A	B	C	D	E	F	G
89	Mobile Workforce	42,800	202,016	445,120	250,059	100,259	-
90	Work Force Management / Mobile Dispatch	1,605,000	2,675,000	802,500	802,500	535,000	535,000
91	**Buildings & Emerging Operations**	3,696	655	713	779	899	1,208
92	Barrie Building Renovation Project 2015	3,149,489	-	-	-	-	-
93	Emergency Capital work as required for facilities	390,037	398,168	402,555	406,942	411,543	417,027
94	Lazenby Storage Facility	-	-	-	-	68,985	244,116
95	Markham TS#4 Heating Improvements	-	-	-	7,727	-	-
96	Connect Lazenby 1 to City Water and Sewer	-	-	-	-	-	75,330
97	Upgrade to Station Facilities (Building / Civil work) MultiYear	103,251	49,982	50,213	50,444	50,675	50,906
98	Emerging Issues - Operations Capital	53,500	207,000	260,500	314,000	367,500	421,000
99	**Fleet**	2,274	2,600	2,161	2,386	2,573	2,424
100	Backhoe/Loader	-	-	123,050	-	-	-
101	Bucket Truck	-	428,000	-	-	-	-
102	Bucket Truck	481,500	-	-	-	-	-
103	Bucket Truck	-	428,000	-	-	-	-
104	Bucket Truck	-	428,000	-	-	-	-
105	Bucket Truck	-	428,000	-	-	-	-
106	Bucket Truck	-	428,000	-	-	-	-
107	Bucket Truck	-	-	374,500	-	-	-
108	Bucket Truck	-	-	428,000	-	-	-
109	Bucket Truck	481,500	-	-	-	-	-
110	Bucket Truck	379,850	-	-	-	-	-
111	Bucket Trucks	-	-	-	-	-	1,391,000
112	Bucket Trucks	-	-	-	2,193,500	-	-
113	Bucket Trucks	-	-	-	-	1,605,000	-
114	Car/SUV	-	-	48,150	-	-	-
115	Cargo Van	-	-	48,150	-	-	-
116	Cargo Van	-	-	48,150	-	-	-
117	Emergency Fleet Breakdown Repairs	128,400	128,400	128,400	128,400	128,400	133,750
118	Flatbed with crane	321,000	-	-	-	-	-
119	Install Cargo Area Protectors	48,150	-	-	-	-	-
120	Pickup	53,500	-	-	-	-	-
121	Pickup	-	-	58,850	-	-	-
122	Pickup	-	58,850	-	-	-	-
123	Pickup	-	58,850	-	-	-	-
124	Pickup	-	58,850	-	-	-	-
125	Pickup	-	-	58,850	-	-	-
126	Pickup	-	-	58,850	-	-	-
127	Pickup	-	-	58,850	-	-	-
128	Pickup	-	58,850	-	-	-	-
129	Pickup	-	-	58,850	-	-	-
130	Pickups	149,800	-	-	-	-	-
131	Pickups	-	-	117,700	-	-	-
132	Pickups	-	-	107,000	-	-	-
133	Pickups and misc light duty vehicles	-	-	-	-	-	888,100
134	Pickups and misc light duty vehicles	-	-	-	-	829,250	-
135	SUV	-	-	48,150	-	-	-
136	SUV	-	-	48,150	-	-	-
137	SUV	-	-	48,150	-	-	-
138	SUV	-	-	48,150	-	-	-
139	SUV	-	-	48,150	-	-	-
140	SUV	-	-	48,150	-	-	-
141	SUV	-	-	48,150	-	-	-
142	SUV	-	-	42,800	-	-	-
143	Tools	10,700	10,700	10,700	10,700	10,700	10,700
144	Van	37,450	-	-	-	-	-
145	Van	37,450	-	-	-	-	-
146	Van	-	37,450	-	-	-	-
147	Van Pool Van	48,150	48,150	53,500	53,500	-	-
148	Van Pool Vans	96,300	-	-	-	-	-
149	**Tools**	570	467	473	820	709	711
150	Go Pro Video Cameras and accessories	3,210	-	-	-	-	-
151	Load Limiters	-	-	-	26,750	-	-
152	Metering Tools and Equipment	77,040	77,040	77,040	77,040	77,040	77,040
153	Mobile Office Equipment Enhancements	2,140	-	2,354	-	2,589	-
154	Mobile Tablets for Design Techs	3,638	-	-	-	-	-
155	P&C Specific Tools and Testing Equipment	10,700	10,700	10,700	10,700	10,700	10,700
156	Purchase Cable Locate Equipment	-	7,062	-	7,490	-	-
157	Purchase ground grid resistance meter	4,280	-	-	-	-	4,708
158	Purchase of Major Tools	362,691	362,691	362,691	362,691	362,691	362,691
159	Purchase of Remote Disconnection Meters	-	-	-	300,164	245,589	245,589
160	Purchase of the EnoServe Protective Relay Asset Management System	95,932	-	-	-	-	-
161	Purchase Plotter for Addiscott Office	-	-	10,700	-	-	-
162	Purchase Protective Equipment for Inspectors	-	-	-	2,269	-	-
163	Purchase Scanner for Addiscott Office	-	-	-	21,614	-	-
164	Purchase of Major Tools	10,000	10,000	10,000	10,000	10,000	10,000
165	Voltmeters - Cat4	-	-	-	1,177	-	-
166	**Interest Capitalization**	1,000	1,020	1,040	1,061	1,082	1,104
167	Interest Capitalization	1,000,000	1,020,000	1,040,000	1,061,000	1,082,000	1,104,000
168	**Smart Grid - Other**		1,338	1,338	1,338	1,338	1,338
169	Data Analytics	-	267,500	267,500	267,500	267,500	267,500
170	Electrical Vehicle Technologies	-	535,000	535,000	535,000	535,000	535,000
171	Home Technologies	-	535,000	535,000	535,000	535,000	535,000
172	**Total General Plant**	24,545	17,631	19,558	13,967	16,841	18,206

B-CCC-16

REF: Ex. B/T1/p. 1

System hardening has been identified as a significant cost driver for 2016 and 2017. Please provide a detailed explanation of this program and a schedule setting out all capital and OM&A expenditures for each year of the plan term related to this program. In addition, please identify all expenditures related to this program each year prior to 2016.

RESPONSE:

A detailed explanation of the Storm Hardening & Rear Lot Conversions program is included in the Consolidated Distribution System Plan, Section 5.4.5, page 19 of 36 as noted below

> *Storm Hardening & Rear Lot Conversion*
> Included in the study report was a series of recommendations. This category covers the capital work that PowerStream must complete to harden (strengthen) the overhead distribution system to withstand the frequency and severity of storms (wind, rain, ice) that have been experienced the last few years and, according to meteorologists, is expected to become more common in the future.
>
> The vast majority of PowerStream's overhead distribution system has been designed and constructed to legacy standards for the typical wind and ice loadings commonly experienced at that time. Over the past 15 years, the increased frequency and severity of extreme weather events has led to improvements to construction standards for all new distribution system construction, however, parts of the existing distribution system needs remedial work to bring it up to the latest standards.
>
> PowerStream has a number of pockets of customers (mainly residential) being supplied by rear lot construction. In accordance with the consultant's report, PowerStream will adopt full conversion for rear lots and recommend completion over 15 years. The projects will be prioritized based on age, asset condition, customer needs and reliability.
>
> PowerStream's proposed rear lot conversion investment expenditures for 2016 to 2020 is based on historical expenditures of similar type construction work. The proposed investments are based on estimated construction costs of approximately $12,400 per customer.

Initiatives included in the Storm Hardening program include:

a) *Grade 1/Composite Poles for Strategic Locations:*
PowerStream will continue development of composite pole standards and consider use of composite poles and Grade 1 construction in future construction of poles with 3 or more circuits or critical poles as defined.

b) *Periodic in-line Anchoring :*
PowerStream will review existing lines and determine additional anchoring needs, both in-line anchors and storm-guying. PowerStream plans to reinforce all poles that carry 4 circuits, 1500 poles in all.

c) *Flood Avoidance:*
Relocate all existing flood sensitive equipment (switches, breakers, relays, etc) located in existing transformer stations to be above grade. PowerStream plans to complete this work over four years.

d) *Rear Lot Remediation*:
Convert to full front lot current standard over 15 years.

PowerStream's proposed investment expenditures for 2016 to 2020 is based on combination of available resources and affordability.

From an OM&A perspective, vegetation management is the main focus for system hardening. This includes such activities as increasing the tree clearance cutback around lines, complete removal of any limbs overhanging lines (referred to as "blue-skying"), removal of hazard trees located close to a power line where failures of the tree could pose a hazard to the line, and implementing vegetation management around secondary wires on customer properties.

The capital and OM&A expenditures for each year of the plan term related to this program are shown below.

(000's)	**2016**	**2017**	**2018**	**2019**	**2020**
Capital	$ 7,900	$ 7,999	$ 7,499	$ 6,900	$ 7,200
OM&A	$ 614	$ 525	$ 531	$ 536	$ 541

There are no expenditures for this program prior to 2016.

	Actuals				Proposed					
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Distribution Lines - Emergency/Reactive Replace Capital	***$7,194,378***	***$7,918,155***	***$8,219,497***	***$8,697,396***	***$8,416,283***	***$8,636,001***	***$8,729,603***	***$8,888,091***	***$8,924,606***	***$8,504,138***
a) LIS - Unscheduled Replacement of Failed (end of useful Life) Distribution Equipment		$334,123.00	$51,210.00	$125,384.00	$350,776.00	$346,168.00	$331,291.00	$321,119.00	$276,190.00	$275,612.00
b) Non Recoverable replacement of Distribution Equipment due to accident/vandalism	$103,434.00	$126,031.00	$138,680.00	$208,789.00	$210,774.58	$220,581.01	$220,972.56	$220,972.47	$211,280.95	$191,499.23
c) Recoverable Replacement of distribution equipment due to Accidents/Vandalism	$137,439.00	$714,253.00	$807,981.00	$816,842.00	$530,442.20	$530,600.67	$545,432.33	$560,875.95	$570,984.37	$580,023.22
d) Storm damage - Replacement of distribution equipment due to storm.	$428,418.00	$482,911.00	$767,149.00	$1,160,050.00	$999,784.75	$1,000,232.43	$1,005,602.71	$1,005,624.45	$1,010,352.34	$1,010,159.38
e) Switchgears - Unscheduled Replacement of Failed (end of useful Life) Distribution Equipment		$1,381,861.00	$1,663,004.00	$1,495,974.00	$1,420,148.09	$1,431,383.51	$1,420,147.96	$1,421,218.32	$1,400,444.11	$1,140,858.02
f) Unscheduled Replacement of Failed (end of useful Life) poles, conductors & devices (S)	$5,472,537.00	$3,771,553.00	$4,051,060.00	$4,157,571.00	$4,004,267.00	$4,136,745.00	$4,195,526.00	$4,298,340.00	$4,349,171.00	$4,266,252.00
g) Unscheduled Replacement of Failed (end of useful Life) Distribution Equipment - Poles, conductors & devices (N)	$1,052,550.00	$1,107,423.00	$740,413.00	$732,786.00	$900,090.00	$970,290.00	$1,010,630.00	$1,059,941.00	$1,106,183.00	$1,039,734.00
Distribution Lines -Reactive O & M	***$5,400,663.80***	***$5,107,963.06***	***$6,862,122.52***	***$5,857,601.24***	***$5,888,034.00***	***$6,028,513.00***	***$6,172,551.00***	***$6,307,553.00***	***$6,440,120.00***	***$6,572,121.00***
h) Inspections, Patrol, Testing	$478,946.45	$558,421.79	$501,527.00	$434,200.74	$728,443.00	$739,101.00	$749,929.00	$759,915.00	$769,619.00	$778,996.00
i) Accidents & Vandalism	$530,023.70	$348,177.74	$355,100.84	$528,236.75	$408,551.00	$417,861.00	$427,351.00	$435,491.00	$443,139.00	$450,133.00
j) Poles and Lines Hardware	$686,710.96	$630,138.29	$524,338.75	$683,144.97	$577,254.00	$589,761.00	$602,520.00	$613,512.00	$623,834.00	$633,461.00
k) Storm Damage	$522,403.45	$337,871.22	$2,130,447.97	$265,277.83	$369,686.00	$377,037.00	$384,538.00	$391,068.00	$397,211.00	$403,090.00
l) Cable Faults - Primary	$1,488,438.22	$1,608,997.25	$1,725,815.28	$1,949,015.66	$2,201,209.00	$2,258,403.00	$2,317,214.00	$2,374,693.00	$2,432,340.00	$2,491,112.00
m) Cable Faults - Secondary	$1,042,341.74	$1,013,225.11	$968,755.14	$1,392,126.37	$1,030,677.00	$1,059,857.00	$1,089,858.00	$1,119,514.00	$1,149,470.00	$1,179,856.00
n) Customer Premises	$368,158.01	$335,833.91	$323,042.73	$312,657.00	$304,889.00	$312,771.00	$320,873.00	$327,565.00	$333,602.00	$339,707.00
o) Switching for Control Room	$102,177.94	$138,348.30	$160,101.14	$120,907.91	$101,848.00	$104,271.00	$106,746.00	$108,849.00	$110,808.00	$112,626.00
p) Permanent Removals	$181,463.33	$136,949.45	$172,993.67	$172,034.01	$165,477.00	$169,451.00	$173,522.00	$176,946.00	$180,097.00	$183,140.00

Table 3: Annual Emergency/Reactive Replacements (Capital and O&M)

On an overall annual basis, the total *for Distribution Lines – Emergency/Reactive Replacements* (capital) increases between 2015 to 2019, and commencing in 2020, the overall cost is expected to commence decreasing. The *Distribution Lines – Reactive O&M,* increases annually. Each individual line element has its own trending, as described below.

Item a) LIS - Unscheduled Replacement of Failed (end of useful Life) Distribution Equipment: This subcategory is trending downwards from 2015 to 2020 as a result of improved inspection and maintenance procedures and activities.

Performance Methodology and Metrics

This section of the filing requirements requests that distributors identify and define the methods and measures that will be used to monitor the quality of their planning process, the efficiency with which their plans are implemented, and/or the extent to which their planning objectives are met.

PowerStream has developed a set of measures to monitor quality and drive continuous improvement in its distribution system planning and implementation work over the 2015-2020 planning horizon. The measures cover several distinct dimensions of PowerStream's capital planning and implementation processes and/or address directly the outcomes of such processes, motivated by customer needs, regulatory compliance obligations, or efficiency objectives. Figure 1 outlines the DS Plan ongoing performance metrics.

1	**System Average Interruption Duration Index (SAIDI)**	$SAIDI = \frac{\sum \text{Customer Minutes of Interruption}}{\text{Total Number of Customers Served}}$		
2	**System Average Interruption Frequency Index (SAIFI)**	$SAIFI = \frac{\sum \text{Total Number of Customers Interrupted}}{\text{Total Number of Customers Served}}$		
3	**Customer Average Interruption Duration Index (CAIDI)**	$CAIDI = \frac{\sum \text{Customer Minutes of Interruption}}{\text{Total Number of Customers Interrupted}}$		
4	**Momentary Average Interruption Frequency Index (MAIFI)**	$MAIFI = \frac{\sum \text{Total Number of Customer Momentary Interruptions}}{\text{Total Number of Customers Served}}$		
5	**DS Plan Spending Progress Report**	$\frac{\text{\$ spent in a year}}{\text{budget in a year}}$	plus	$\frac{\text{\$ spent cumulative over n years (n=1 to 5)}}{\text{\$ cumulative budget over n years (n=1 to 5)}}$
6	**Work Order Closing Variances**	percentage of WOs that close within prescribed policy limits		
7	**Cable Failure Rates**	comparison pre-remediation vs post remediation for cable projects		

Figure 1: Performance Metrics

Reliability Indices: SAIDI, SAIFI, CAIDI, MAIFI

SAIDI – System Average Interruption Duration Index

SAIDI is an indicator of system reliability that expresses the average length of sustained interruptions that each customer experiences in a year. All planned and unplanned sustained interruptions are used to calculate this index. Loss of supply and major event days are excluded.

SAIFI – System Average Interruption Frequency Index

SAIFI is an indicator of system reliability that expresses the average number of sustained interruptions that each customer experiences in a year. All planned and unplanned sustained interruptions are used to calculate this index. Loss of supply and major event days are excluded.

CAIDI – Customer Average Interruption Duration Index

CAIDI is an indicator of the speed at which power is restored. All planned and unplanned sustained interruptions are used to calculate this index. Loss of supply and major event days are excluded.

MAIFI – Momentary Average Interruption Frequency Index

MAIFI is an indicator of system reliability that expresses the average number of momentary interruptions that each customer experiences in a year. All unplanned momentary interruptions are used to calculate this index. Loss of supply and major event days are excluded.

PowerStream will continue to conform with the expectations reliability performance (SAIDI, SAIFI, CAIDI) by remaining, as a minimum, within the range of its historical previous 3 year average performance.

Refer to Figure 1 to Figure 6 on pages 13 and 14 for historical information.

DS Plan Spending Progress Report

PowerStream will be monitoring its execution of the projects and programs included in the DS Plan.

On an annual basis, PowerStream's will calculate for that year, and on a cumulative basis for the five years of the DS Plan, its actual capital spending compared to the approved capital budget.

As this is the first DS Plan filing, there are no historical statistics.

Work Order Closing Variances

PowerStream will be monitoring its execution of the projects and programs included in the DS Plan. Variances, which are defined as a comparison of the actual dollars spent compared to the approved budget estimate, are reviewed are categorized within prescribed limits.

On an annual basis, PowerStream's will calculate for that year, how successful the variances on individual work orders were. PowerStream will review the variance reports and determine if incremental improvements have transpired, and based on the results, take corrective actions as are deemed necessary.

Figure 2 details the overall percentage of work orders for 2014 that were closed where the variances were within the prescribed limits.

G-SEC-16

REF: Ex. G-2-5.2.3, p.4-5

With respect to the Work Order Closing Variance Metric:

a. What level of variance requires management approval? i.e. the "prescribed limits"?

b. It would appear from Figure 2 that in 2014 only 42% of work orders were completed within the variance (not requiring management approval). Please explain the reasons for this low number and any corrective actions that PowerStream is undertaking.

c. For 2014, please provide for all work orders that are part of Figure 2, the total actual dollars spent and the total approved budgeted amounts.

d. Please provide similar information as set out in Figure 2, for 2012 and 2013.

e. Please provide similar information as requested in part (c) for 2012 and 2013.

RESPONSE:

a) The level of variance that would require management approval is as follows:

- for Projects with Gross Actual Totals of $100k or more, variances of +/-10%, or more, require management approval;
- for Projects with Gross Actual Totals of $25k-$100k, variances of +/-15% or more, require management approval; and
- for Projects with Gross Actual Totals of less than $25k, variances of +/-25% or more, require management approval.

b) As shown in Figure 2, the 42% represents 235 out of 553 work orders reviewed in 2014 that did not require management approval. Analysis of the causes for the 58% of work orders that did require management approval shows that the largest cause was labour-related, primarily less labour required than originally estimated. PowerStream is using findings from the Work Order Review and Closing Variance Metric to improve processes, and is investigating changes to improve work order estimating.

c) For 2014, for all work orders that are part of Figure 2, the total actual dollars spent and the total approved budgeted amounts are shown in the table below:

Category and # of Work Orders	2014 Sum of WO Gross Budget $	2014 Sum of WO Actual $
Capital (167)	$ 32,765,315	$ 28,262,639
ICI (58)	$ 2,124,799	$ 2,438,106
Subdivision (32)	$ 7,210,501	$ 6,293,873
Non-Paper Trail (61)	$ 9,810,060	$ 10,262,967
Total (318)	**$ 51,910,676**	**$ 47,257,586**

d) The Table as set out in Evidence Figure 2 for Year 2013 is shown below. The Work Order Review and Closing Process, in its current form, did not exist in 2012.

Work Order Review	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2013
# of Reviews Issued Requiring Management Approval													
Capital	-	12	-	10	-	8	8	4	-	-	15	11	68
ICI	-	-	-	3	-	7	4	2	-	-	1	13	30
Subdivision	1	-	-	3	-	5	4	2	-	-	-	9	24
Non Paper Trail	-	-	-	-	-	-	-	-	-	-	-	-	0
TOTAL	1	12	0	16	0	20	16	8	0	0	16	33	122
# of Reviews Not Requiring Management Approval													
Capital	-	9	3	-	1	-	-	1	-	-	15	-	29
ICI	-	-	-	-	2	3	6	1	-	-	5	-	17
Subdivision	-	2	1	-	-	1	-	2	-	-	-	-	6
Non Paper Trail	-	-	-	-	-	-	-	-	-	-	-	-	0
TOTAL	0	11	4	0	3	4	6	4	0	0	20	0	52
Percent of Work Orders Completed Within Variance (Not Requiring Management Approval)													
%	0	48	100	0	100	17	27	33	N/A	N/A	56	0	30

e) For 2013, for all work orders that are part of table above, the total actual dollars spent and the total approved budgeted amounts are shown in the table below. The Work Order Review and Closing Process, in its current form, did not exist in 2012.

Category and # of Work Orders	2013 Sum of WO Gross Budget $	2013 Sum of WO Actual $
Capital (68)	$ 7,116,319	$ 6,355,446
ICI (30)	$ 942,576	$ 916,823
Subdivision (24)	$ 7,069,032	$ 5,576,371
Non-Paper Trail (0)	N/A	N/A
Total (122)	**$ 15,127,927**	**$ 12,848,640**

II-1-Staff-13

Ref: E F/T1/pp.6-7

At the above reference the productivity changes arising from PowerStream's plans to rehabilitate 140 kilometres of end-of-life or beyond underground cable in 2015 and each year during the 2016 to 2020 IR plan term.

a) Please confirm that this is the only capital program that PowerStream is including in determining its estimated productivity savings from capital or if not please explain.

b) Please state the criteria used by PowerStream to determine that a particular capital program produced productivity savings versus those programs which did not produce such savings.

RESPONSE:

a) PowerStream confirms that cable injection is the only program that was included in the calculation of productivity savings from capital. The pole reinforcement program was discussed but the savings from this program were not calculated nor included in the estimated productivity savings.

b) PowerStream is continually working to improve its processes to be more effective and efficient as evidenced by its Organization Effectiveness department, Journey to Excellence and Innovation initiatives.

PowerStream has not attempted to measure the productivity of all capital programs. This is a very difficult task as no two capital projects are the same – there are always many different factors. For example pole line replacement projects will have differing pole heights, number of circuits and differences in terrain and other work conditions that significantly impact the cost of the project and any resulting metric such as cost per pole or cost per kilometre of line.

PowerStream selected the cable injection program to demonstrate the work PowerStream has been doing in productivity improvements as the program has significant costs with substantial productivity savings. By the use of this innovative program PowerStream has managed to extend the life of underground cables at a fraction of the cost of replacement. Other capital projects may also contain productivity savings but PowerStream has not attempted to measure these.

Project Summary Report	Project Code	Report Start Year	Number of Years	Scale
	102009	2015	6	Dollars
	Project Name	Storage Expansion (Data)		

4. Evaluation Criteria (OEB)	Project Summary	Every component of PowerStream's Corporate Infrastructure has at least one touch point to the SAN (Storage Area Network - a centralized system of Storage devices, i.e. Hard Drives). Each System is allocated storage space on the SAN, either for the "data" only, or as well as including the Server Operating System (OS) files and the data. Every user within PowerStream is allocated and uses storage space on the SAN. Any data that is entered in any system, emails that are sent and received, as well as logs generated by intelligent devices are stored in the SAN. From an Information Technology perspective corporate data is our most valuable and irreplaceable asset, systems can change but customer data, meter data, grid data, once collected must be safeguarded and saved for future use. Every component of PowerStream's Corporate Infrastructure has at least one touch point to the SAN (Storage Area Network - a centralized system of Storage devices, i.e. Hard Drives). Each System is allocated storage space on the SAN, either for the "data" only, or as well as including the Server Operating System (OS) files and the data. Every user within PowerStream (including contractors, summer students etc.) are allocated storage space on the SAN, primarily for business files and communication data (email, voicemail). Organic growth coupled with planned growth and the trending of SAN storage space is an increasing curve. The industry average for data growth is listed at 50% year on year; This translates into a large volume of data with no "plateau" in the foreseeable future. PowerStream data metrics show that they are following in line with the industry average. Other factors, such as new initiatives or mergers could increase this requirement significantly. PowerStream purchased and implemented a new state-of-the-art SAN in 2013 robust SAN solution in 2013. This SAN has been designed to be scalable to serve PowerStream for 5 years based upon current organic growth rates of the business and the past associated data growth rate. When purchasing the SAN in 2013 it was initially sized to successfully meet business growth through 2014, to have the scalability to meet business growth through 2018 based upon IS adding the necessary capacity to meet growth each year. The goal is to purchase data storage space as required to meet (and stay slightly ahead of) business requirements.
	1a. Main Driver	Capital Investment Support.
	1b. Priority and Reasons for Priority	Not Applicable.
	1c. Qualitative and Quantitative Analysis of Project and Project Alternatives	Not Applicable.
	2. Safety	Not Applicable.
	3. Cyber-Security, Privacy	Not Available.
	4. Coordination, Interoperability	Not Applicable.
	5. Economic Development	Not Applicable.
	6. Environmental Benefits	Not Applicable
5. Category-Specific Requirements for Each Project/Activity (OEB)	Impact of Deferral/"Do Nothing" Option	If this project does not proceed, a new initiative that included saving or utilizing electronic data would be hampered. As well, PowerStream could be in conflict with regulatory compliance with the OEB or Ministry of Energy if we are unable to store certain customer, meter or financial data.
	Net Benefits of Project in Monetary Terms (where practicable)	Cost savings by maintaining PowerStream's ability to store required data and meet its regulatory obligations as well as maintain or improve its customer data and customer satisfaction ratings. Operating - Soft Financial Benefits 2015 - $820,000 2016 - $828,200 2017 - $836,482 2018 - $844,847 2019 - $853,295 Soft Financial Benefits are calculated by employees saving/effectively utilizing 40 hours each per year due to having sufficient access to system data due to Storage Expansion. Every employee at Powerstream accesses and created business data ever working day. Many of the systems that require this data are critical to the daily operation of the business, and the above estimate is that for each employee utilizing technology to help perform their daily job function as opposed to performing in manually saves 40 hours per employee per year.

Project Summary Report

Project Code	Report Start Year	Number of Years	Scale
102009	2015	6	Dollars

Project Name: Storage Expansion (Data)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Expenditures Historical/Planned	$ -	$ -	$ -	$ -	$ 321,000	$ 300,000	$ 300,000	$ 300,000	$ 1,000,000	$ 400,000