



EXHIBIT 2 – RATE BASE & DSP

2018 Cost of Service

Westario Power Inc.
EB-2017-0084

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2.1 OVERVIEW OF RATE BASE

2.1.1 RATE BASE OVERVIEW

WPI transitioned to International Financial Reporting Standards (“MIFRS”) on January 1, 2015, and has prepared this application under MIFRS. WPI confirms that there were no other changes that would affect the utility’s net book value other than the implementation of new depreciation rates in 2013. In other words, there is no difference between the utility’s net book values in between its last Board Approved 2013 Cost of Service and the 2018 Proposed Cost of Service.

The net fixed assets used to determine the utility’s Rate Base include those distribution assets associated with activities that enable the conveyance of electricity for distribution purposes. WPI does not have non-distribution assets nor does it conduct non-distribution activities.

¹Controllable expenses include operations and maintenance, billing and collecting and administration expenses which are discussed in detail in Exhibit 4.

WPI has calculated its 2018 test year rate base to be \$51,531,560. This rate base is also used to determine the proposed revenue requirement found in Exhibit 6. Table 1 below presents WPI’s Rate Base calculations for the Test Year.

¹ MFR - Non-distribution activities - capital expenditures and reconciliation to total capital budget

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Table 1 - Test Year Rate Base

<i>Particulars</i>	GAAP	MIFRS
	Last Board Approved	2018
<i>Net Capital Assets in Service:</i>		
<i>Opening Balance</i>	33,959,796	45,329,857
<i>Ending Balance</i>	37,220,508	48,227,215
<i>Average Balance</i>	35,590,152	46,778,536
<i>Working Capital Allowance</i>	6,282,163	4,753,024
<i>Total Rate Base</i>	41,872,315	51,531,560
<i>Expenses for Working Capital</i>	Last Board Approved	2018
<i>Eligible Distribution Expenses:</i>		
3500-Distribution Expenses - Operation	440,000	580,760
3550-Distribution Expenses - Maintenance	2,298,000	1,386,773
3650-Billing and Collecting	1,191,000	1,202,000
3700-Community Relations	46,000	31,000
3800-Administrative and General Expenses	2,181,700	2,747,500
6105-Taxes other than Income Taxes	33,000	35,000
6205-Donations (LEAP)	12,500	13,000
Total Eligible Distribution Expenses	6,202,200	5,996,033
3350-Power Supply Expenses	46,149,156	57,377,618
Total Expenses for Working Capital	52,351,356	63,373,651
Working Capital factor	12.00%	7.50%
Total Working Capital	6,282,163	4,753,024

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2.1.2 RATE BASE TREND

Table 2 below presents WPI's Rate Base calculations for all required years including the 2018 Test Year. Year over year variance analysis follows in section 2.1.3

Table 2 - Rate Base Trend

	CGAAP	CGAAP	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS
<i>Particulars</i>	Last Board Approved	2013	2014	2015	2016	2017	2018
<i>Net Capital Assets in Service:</i>							
<i>Opening Balance</i>	33,959,796	30,238,882	35,097,117	37,772,006	39,652,327	42,890,084	45,329,857
<i>Ending Balance</i>	37,220,508	35,097,117	37,772,006	39,652,327	42,890,084	45,329,857	48,227,215
<i>Average Balance</i>	35,590,152	32,667,999	36,434,561	38,712,166	41,271,205	44,109,970	46,778,536
<i>Working Capital Allowance</i>	6,282,163	6,074,549	6,330,904	6,783,843	7,595,348	7,848,730	4,753,024
<i>Total Rate Base</i>	41,872,315	38,742,548	42,765,466	45,496,009	48,866,553	51,958,700	51,531,560
	CGAAP	CGAAP	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS
<i>Expenses for Working Capital</i>	Last Board Approved	2013	2014	2015	2016	2017	2018
<i>Eligible Distribution Expenses:</i>							
<i>3500-Distribution Expenses - Operation</i>	440,000	381,172	278,333	264,131	390,384	419,927	580,760
<i>3550-Distribution Expenses - Maintenance</i>	2,298,000	1,769,218	1,574,688	1,398,823	1,720,696	1,560,909	1,386,773
<i>3650-Billing and Collecting</i>	1,191,000	1,268,735	1,224,007	1,131,494	1,043,796	1,130,000	1,202,000
<i>3700-Community Relations</i>	46,000	11,983	15,351	34,398	29,681	30,000	31,000
<i>3800-Administrative and General Expenses</i>	2,181,700	2,266,129	2,119,773	2,367,840	2,522,440	2,548,000	2,747,500
<i>6105-Taxes other than Income Taxes</i>	33,000	36,453	35,704	34,605	34,097	35,000	35,000
<i>6205-Donations (LEAP)</i>	12,500	12,500	12,500	12,500	25,000	13,000	13,000
<i>Total Eligible Distribution Expenses</i>	6,202,200	5,746,190	5,260,356	5,243,790	5,766,094	5,736,836	5,996,033
<i>3350-Power Supply Expenses</i>	46,149,156	44,875,052	47,497,179	51,288,235	57,528,471	59,669,247	57,377,618
<i>Total Expenses for Working Capital</i>	52,351,356	50,621,242	52,757,535	56,532,025	63,294,565	65,406,083	63,373,651
<i>Working Capital factor</i>	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	7.50%
<i>Total Working Capital</i>	6,282,163	6,074,549	6,330,904	6,783,843	7,595,348	7,848,730	4,753,024

The Rate Base for the 2018 Test Year has decreased by \$427,140 from the Bridge Year due to a reduction in the working capital factor, and increased by \$9,659,245 over the last Board Approved Rate Base. The reason for the sizeable increase from the 2013 Cost of Service is attributed to investments made in capital assets over that period. The capital assets significantly increased each year from the 2013 Board Approved to 2018 Test due to extensive upgrades and replacements of WPI aging distribution substations which had reached the end of their life and were at risk of imminent failure. The total cost of substation upgrades from 2013 to 2018 Test year is \$6,842,352. Details of these additions to capital assets are discussed in length in the DSP section 5.4.4 and summarized in table below.

Major capital cost drivers 2014

System Renewal	Poletran Conversion	287,498
	Substation Upgrades	1,809,644
	#6 Copper Replacements	449,151
	Decrepit Pole Replacement	289,729
System Access	Capital Poles	113,970
	New Underground Service Connections	374,338
	Non-demarcation Customers	11,639
	3 Phase Customers	97,994
	Single Phase	1,585
	New Lots Developed	209,439
System Service	Metering	299,478
General Plant	Technology	118,480
	Vehicle Replacement	371,134
	Tools & Equipment	74,412
	Facilities Enhancements	39,429
	OfficeFurniture and Equipment	42,234
	Miscellaneous Equipment	17,556

Major capital cost drivers 2015

System Renewal	Poletran Conversion	344,055
	Substation Upgrades	815,176
	#6 Copper Replacements	773,415
	Decrepit Pole Replacement	475,884

System Access	Capital Poles	276,202
	New Underground Service Connections	287,736
	Non-demarcation Customers	14,487
	3 Phase Customers	105,763
	New Lots Developed	204,099

System Service	Smart Meter	235,882
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General Plant	Technology	388,702
	Vehicle Replacement	58,226
	Tools & Equipment	93,460
	Facilities Enhancements	40,949
	OfficeFurniture and Equipment	21,091
	Miscellaneous Equipment	17,800

Major capital cost drivers 2016

System Renewal	Substation Upgrades	1,457,532
	#6 Copper Replacements	281,923
	Decrepit Pole Replacement	985,871
	Distribution Transformer Replacement	335,460

System Access	Capital Poles	277,122
	New Underground Service Connections	99,313
	Non-demarcation Customers	32,139
	3 Phase Customers	173,013
	Single Phase	47,878
	New Lots Developed	106,223
	Relocates and Replacements	103,944

System Service	SCADA	55,932
	Metering	254,808
	Cyme and GIS integration	354,684
	Mobile Transformer Substation	688,929
	Station Upgrade	97,962

General Plant	Technology	210,994
	Vehicle Replacement	93,165
	Tools & Equipment	1,275
	Facilities Enhancements	7,906
	OfficeFurniture and Equipment	6,259
	Miscellaneous Equipment	100,662

Major capital cost drivers 2017

System Renewal	Poletran Conversion	285,118
	Substation Upgrades	1,450,000
	#6 Copper Replacements	652,215
	Decrepit Pole Replacement	772,820
	Distribution Transformer Replacement	306,200

System Access	Capital Poles	304,300
	New O/H Service Connections	166,129
	New Underground Service Connections	124,663
	Non-demarcation Customers	45,200

System Service	SCADA	70,000
	Metering	30,000

General Plant	Technology	52,800
	Vehicle Replacement	10,000
	Tools & Equipment	25,000
	OfficeFurniture and Equipment	15,000

Major capital cost drivers 2018

System Renewal	Poletran Conversion	463,286
	Substation Upgrades	1,310,000
	#6 Copper Replacements	370,772
	Decrepit Pole Replacement	780,146
	Distribution Transformer Replacement	307,305

System Access	Capital Poles	306,742
	New O/H Service Connections	166,129
	New Underground Service Connections	124,663
	Non-demarcation Customers	45,200

System Service	SCADA	282,000
	Metering	30,000
	Cyme and GIS integration	70,000

General Plant	Technology	30,000
	Vehicle Replacement	500,000
	Tools & Equipment	35,000
	Facilities Enhancements	35,000
	OfficeFurniture and Equipment	35,000

Increased Power Supply Expenses

- WPI has forecasted an increase in the 2018 Power Supply Expenses of approximately \$11.2M over its 2013 Cost of Service.

Increased Distribution Expenses

- The 2018 forecast for OM&A reflects an decrease of approximately \$200K from the 2013 Board Approved. The details of the decreases in OM&A are provided in Exhibit 4.
- The Working Capital Allowance has decreased by \$3.1M compared to the 2017 Bridge year and decreased by \$1.5M compared to the 2013 Board Approved Working Capital Allowance. The reason for the decrease from the 2017 Bridge Year to the 2018 Test Year is due to the change in Working Capital Allowance rate from 12% to 7.5%, in accordance with the letter issued by the OEB on June 2, 2015.
- Year over year variances are presented in the next section.

2.1.3 RATE BASE VARIANCE ANALYSIS

The following paragraphs and Tables 3 to Table 7 provide a narrative on the changes that have driven the increase in rate base since WPI's 2013 Board Approved Cost of Service Application.

WPI's materiality threshold is \$50,000.

WPI has provided the following variances on the change in Rate Base:

- ✓ 2018 Test Year (MIFRS) against 2017 Bridge Year (MIFRS)
- ✓ 2017 Bridge Year (MIFRS) against 2016 Actual (MIFRS)
- ✓ 2016 Actual (MIFRS) against 2015 Actual (MIFRS)
- ✓ 2015 Actual (MIFRS) against 2014 Actual (CGAAP)
- ✓ 2014 Actual (CGAAP) against 2013 Actual (CGAAP)
- ✓ 2013 Actual (CGAAP) against 2013 Board Approved (CGAAP)

2013 Board Approved vs. 2013 Actual:

Table 3 – 2013 BA to 2013 Actual Rate Base Variance

CGAAP				
<i>Particulars</i>	Last Board Approved	2013	Var	%
<i>Net Capital Assets in Service:</i>				
<i>Opening Balance</i>	33,959,796	30,238,882	(3,720,914)	-10.95%
<i>Ending Balance</i>	37,220,508	35,097,117	(2,123,391)	-5.70%
<i>Average Balance</i>	35,590,152	32,667,999	(2,922,153)	-8.21%
<i>Working Capital Allowance</i>	6,282,163	6,074,549	(207,614)	-3.30%
<i>Total Rate Base</i>	41,872,315	38,742,548	(3,129,766)	-7.47%
<i>Expenses for Working Capital</i>	CGAAP			
<i>Eligible Distribution Expenses:</i>	Last Board Approved	2013	Var	%
<i>3500-Distribution Expenses - Operation</i>	440,000	381,172	(58,828)	-13.37%
<i>3550-Distribution Expenses - Maintenance</i>	2,298,000	1,769,218	(528,782)	-23.01%
<i>3650-Billing and Collecting</i>	1,191,000	1,268,735	77,735	6.53%
<i>3700-Community Relations</i>	46,000	11,983	(34,017)	-73.95%
<i>3800-Administrative and General Expenses</i>	2,181,700	2,266,129	84,429	3.87%
<i>6105-Taxes other than Income Taxes</i>	33,000	36,453	3,453	10.46%
<i>6205-Sub-account LEAP Funding</i>	12,500	12,500	-	0.00%
<i>Total Eligible Distribution Expenses</i>	6,202,200	5,746,190	(456,010)	-7.35%
<i>3350-Power Supply Expenses</i>	46,149,156	44,875,052	(1,274,104)	-2.76%
<i>Total Expenses for Working Capital</i>	52,351,356	50,621,242	(1,730,114)	-3.30%
<i>Working Capital factor</i>	12%	12%	-	0.00%
<i>Total Working Capital</i>	6,282,163	6,074,549	- 207,614	-3.30%

The total actual Rate Base in 2013 of \$38.7M was \$3.1M or 7.47% less than the 2013 Board Approved Forecast. The main reasons for the variance are:

- A lower 2013 opening balance of Net Capital Assets in service due to lower capital expenditures in 2012 than anticipated by \$2.6M; however this was largely offset by the addition to gross assets in 2013 of \$6.85M, including \$241k spent on capital poles to allow system expansion to connect new customers. There were two new 3 phase customers that were larger jobs for \$111K, New Underground Connections for \$282k for 132 residential customers, and \$1.3M was spent on #6 Copper Wire replacement in Southampton - Southampton was next in the plan in 2013 to replace restricted #6 Copper distribution line

1 replacement that included replacement of all #6 conductors and aging
2 transformers plus poles- \$534k was spent on the replacement of 52 poles
3 identified for replacement by the pole audit, \$288k was spent on Poletran
4 conversion of approximately 20 Poletran in the Town of Port Elgin and, most
5 notably \$3.45M was added to rate base in relation to the conversion to Smart
6 Meters.

7
8 Note: Poletrons are an old style of transformer that is contained within a steel
9 streetlight pole. These were manufactured in the 60s/70s. Due to their design,
10 they introduce a safety hazard to the staff because of improper electrical
11 clearances inside the units and unreliable assets, and it is very difficult to operate
12 such a system during outages or/and during the servicing of the poletrons.

13 Therefore, Westario decided to replace all of its Poletran system across the
14 service territory in order mitigate safety risk and develop a more efficient system
15 to operate and maintain. This project was broken down into 10 phases, one
16 phase per year due to heavy labour and budget requirements. The typical
17 replacement of a Poletrons involves installing new ducts by directional drilling,
18 new Primary/ Secondary cables and new pad mount transformers. A Splice box
19 for the existing secondary services is installed, as well as, a new streetlight pole to
20 replace where the old Poletrons was removed. By completing a load analysis of
21 the area, usually 1 pad mount/pole mount transformer can be installed to replace
22 2-3 Poletrons.

2013 Actual vs. 2014 Actual:

Table 4 – 2013 Actual to 2014 Actual Rate Base Variance

CGAAP				
<i>Particulars</i>	2013	2014	Var	%
<i>Net Capital Assets in Service:</i>				
Opening Balance	30,238,882	35,097,117	4,858,235	16.07%
Ending Balance	35,097,117	37,772,006	2,674,889	7.62%
Average Balance	32,667,999	36,434,561	3,766,562	11.53%
Working Capital Allowance	6,074,549	6,330,904	256,355	4.22%
Total Rate Base	38,742,548	42,765,465	4,022,917	10.38%
<i>Expenses for Working Capital</i>	CGAAP			
<i>Eligible Distribution Expenses:</i>	2013	2014	Var	%
3500-Distribution Expenses - Operation	381,172	278,333	(102,839)	-26.98%
3550-Distribution Expenses - Maintenance	1,769,218	1,574,688	(194,530)	-11.00%
3650-Billing and Collecting	1,268,735	1,224,007	(44,728)	-3.53%
3700-Community Relations	11,983	15,351	3,368	28.11%
3800-Administrative and General Expenses	2,266,129	2,119,773	(146,356)	-6.46%
6105-Taxes other than Income Taxes	36,453	35,704	(749)	-2.05%
6205-Sub-account LEAP Funding	12,500	12,500	-	0.00%
Total Eligible Distribution Expenses	5,746,190	5,260,356	(485,834)	-8.45%
3350-Power Supply Expenses	44,875,052	47,497,179	2,622,127	5.84%
Total Expenses for Working Capital	50,621,242	52,757,535	2,136,293	4.22%
Working Capital factor	12%	12%	-	0.00%
Total Working Capital	6,074,549	6,330,904	256,355.00	4.22%

The total Rate Base in 2014 Actual of \$42.7M was \$4.0M or 10.4% more than the 2013 Actuals.

The main reasons for the variance are:

- \$4.3M in capital expenditures, including \$2.8M in System Renewal projects. \$449k was spent on #6 Copper replacements, Wingham station upgrade was \$592k, additionally \$534k spent on the Palmerston station and a new transformer, \$677k spent on installing the second transformer in Harriston to replace the aging 2MVA undersized transformer with a 5MVA transformer, \$289k was spent on replacing 55 decrepit poles to continue the work of replacing poles identified in the pole audit. As well \$299k was spent on the GS<50 interval metering upgrade and there were 4 new 3 phase customer connections costing \$99k, Harriston and Southampton Convenience Stores/Gas Station, and one in the Hanover industrial

park, there was an increase in new residential connections, 141 in total for 2014, costing \$376k and 5 New subdivisions were \$221k.

- The Power Supply Expenses shows an increase, the net difference of the power purchased and Global Adjustment between 2014 and 2013 is an increase of \$2.6M.

2015 Actual vs. 2014 Actual:

Table 5 - 2015-2014 Rate Base Variances

2014 CGAAP/ 2015 MIFRS				
<i>Particulars</i>	2014	2015	Var	%
<i>Net Capital Assets in Service:</i>				
Opening Balance	35,097,117	37,772,006	2,674,889	7.62%
Ending Balance	37,772,006	39,652,327	1,880,321	4.98%
Average Balance	36,434,561	38,712,166	2,277,605	6.25%
Working Capital Allowance	6,330,904	6,783,843	452,939	7.15%
Total Rate Base	42,765,465	45,496,009	2,730,544	6.38%
Expenses for Working Capital	2014 CGAAP/ 2015 MIFRS			
<i>Eligible Distribution Expenses:</i>	2014	2015	Var	%
3500-Distribution Expenses - Operation	278,333	264,131	(14,202)	-5.10%
3550-Distribution Expenses - Maintenance	1,574,688	1,398,823	(175,865)	-11.17%
3650-Billing and Collecting	1,224,007	1,131,494	(92,513)	-7.56%
3700-Community Relations	15,351	34,398	19,047	124.08%
3800-Administrative and General Expenses	2,119,773	2,367,840	248,067	11.70%
6105-Taxes other than Income Taxes	35,704	34,605	(1,099)	-3.08%
6205-Sub-account LEAP Funding	12,500	12,500	-	0.00%
Total Eligible Distribution Expenses	5,260,356	5,243,790	(16,566)	-0.31%
3350-Power Supply Expenses	47,497,179	51,288,235	3,791,056	7.98%
Total Expenses for Working Capital	52,757,535	56,532,025	3,774,490	7.15%
Working Capital factor	12%	12%	-	0.00%
Total Working Capital	6,330,904	6,783,843	452,939.00	7.15%

The total Rate Base in 2015 Actual of \$45.5M was \$2.7M or 6.4% greater than the 2014 Actual.

The main reason for the variance is:

- The average net capital assets in service were \$2.3M higher than the prior year's average.

- \$3.9M in capital expenditures, including \$2.4M in System Renewal projects, \$816k in Substation upgrades, \$773K in #6 Copper replacements and \$344K in Poletran conversion and \$476 in Decrepit Pole Replacement. Details can be found in the Distribution System Plan in Section 2.5.2 of this Exhibit. The nature, intent and basis of the projects is generally consistent with previous years and represent a consistent long term planning regime.
- The Power Supply Expense shows a significant increase, the net different of the Power Purchase and Global Adjustment between 2015 and 2014 is an increase of \$3.7M.

2016 Actual vs. 2015 Actual:

Table 6 - 2016-2015 Rate Base Variances

Particulars	MIFRS			
	2015	2016	Var	%
<i>Net Capital Assets in Service:</i>				
<i>Opening Balance</i>	37,772,006	39,652,327	2,330,209	4.98%
<i>Ending Balance</i>	39,652,327	42,890,084	2,816,588	8.17%
Average Balance	38,712,166	41,271,205	2,573,399	6.61%
<i>Working Capital Allowance</i>	6,783,843	7,595,348	811,505	11.96%
Total Rate Base	45,496,009	48,866,553	3,384,903	7.41%
Expenses for Working Capital	MIFRS			
<u><i>Eligible Distribution Expenses:</i></u>	2015	2016	Var	%
<i>3500-Distribution Expenses - Operation</i>	264,131	390,384	126,253	47.80%
<i>3550-Distribution Expenses - Maintenance</i>	1,398,823	1,720,696	321,873	23.01%
<i>3650-Billing and Collecting</i>	1,131,494	1,043,796	(87,698)	-7.75%
<i>3700-Community Relations</i>	34,398	29,681	(4,717)	-
				13.71%
<i>3800-Administrative and General Expenses</i>	2,367,840	2,522,440	154,600	6.53%
<i>6105-Taxes other than Income Taxes</i>	34,605	34,097	(508)	-1.47%
<i>6205-Sub-account LEAP Funding</i>	12,500	12,500	-	0.00%
Total Eligible Distribution Expenses	5,243,790	5,753,594	509,804	9.72%
<i>3350-Power Supply Expenses</i>	51,288,235	57,528,471	6,240,236	12.17%
Total Expenses for Working Capital	56,532,025	63,282,065	6,750,040	11.94%
<i>Working Capital factor</i>	12%	12%	-	0.00%
Total Working Capital	6,783,843	7,593,848	810,005.00	11.94%

The total Rate Base in 2016 Actual of \$48.9M is \$3.4M or 7.4% greater than 2015 Actual. The main reason for the variance is:

- The average net capital assets in service were \$2.5M higher than the prior year's average.
- \$5.4MM in capital expenditures, including \$3.1M in System Renewal projects, \$1.5M in Substation upgrades, \$282K in #6 Copper replacements and \$335K in Distribution Transformer Replacement and \$986 in Decrepit Pole Replacement. Details can be found in the Distribution System Plan in Section 2.5.2 of this Exhibit.
- The nature, intent and basis of the projects is generally consistent with previous years and represent a consistent long term planning regime.
- The rest of the increase can be attributed to regular maintenance of the distribution system required to keep the system running in a safe and reliable manner.
- Annual changes in the cost of power and increases in OM&A expenses. Details of the OM&A expenditures are presented in Exhibit 4.

2017 Bridge Year vs. 2016 Actual:

Table 7 - 2017-2016 Rate Base Variances

Particulars	MIFRS			
	2016	2017	Var	%
<i>Net Capital Assets in Service:</i>				
Opening Balance	39,652,327	42,890,084	3,237,757	8.17%
Ending Balance	42,890,084	45,329,857	2,439,773	5.69%
Average Balance	41,271,205	44,109,970	2,838,765	6.88%
Working Capital Allowance	7,595,348	7,848,730	253,382	3.34%
Total Rate Base	48,866,553	51,958,700	3,092,147	6.33%
Expenses for Working Capital	MIFRS			
<i>Eligible Distribution Expenses:</i>	2016	2017	Var	%
3500-Distribution Expenses - Operation	390,384	419,927	29,543	7.57%
3550-Distribution Expenses - Maintenance	1,720,696	1,560,909	-159,787	-9.29%
3650-Billing and Collecting	1,043,796	1,130,000	86,204	8.26%
3700-Community Relations	29,681	30,000	319	1.07%
3800-Administrative and General Expenses	2,522,440	2,548,000	25,560	1.01%
6105-Taxes other than Income Taxes	34,097	35,000	903	2.65%
6205-Sub-account LEAP Funding	12,500	13,000	-12,000	-48.00%
Total Eligible Distribution Expenses	5,766,094	5,736,836	-29,258	-0.51%
3350-Power Supply Expenses	57,528,471	59,669,247	2,140,776	3.72%
Total Expenses for Working Capital	63,294,565	65,406,083	2,111,518	3.34%

<i>Working Capital factor</i>	12%	12%	0	
Total Working Capital	7,595,348	7,848,730	253,382	3.34%

The total Rate Base in 2017 Bridge of \$52M is projected to be \$3.1M or 6.3% more than the 2016 Actual. The main reason for the variance is:

- The average net capital assets in service are projected to be approximately \$2.8M higher than the prior year's average.
- The \$4.3M in capital additions during 2017 can be attributed mainly to \$3.5M in System renewal; \$1.45M in Substation upgrades, \$652K in #6 Copper replacements and \$773K in Decrepit Pole replacement. Details can be found in the Distribution System Plan in Section 2.5.2 of this Exhibit.
- The nature, intent, and basis of the projects are generally consistent with previous years and represent a consistent long term planning regime.
- The rest of the increase can be attributed to regular maintenance of the distribution system required to keep the system running in a safe and reliable manner.
- Annual changes in the cost of power and increases in OM&A expenses. Details of the OM&A expenditures are presented in Exhibit 4.

2018 Test Year vs. 2017 Bridge Year:

Table 8- 2018-2017 Rate Base Variances

<i>Particulars</i>	MIFRS			
	2017	2018	Var.	%
<i>Net Capital Assets in Service:</i>				
<i>Opening Balance</i>	2,890,084	45,329,857	2,439,773	5.69%
<i>Ending Balance</i>	45,329,857	48,227,215	2,897,359	6.39%
Average Balance	44,109,970	46,778,536	2,668,566	6.05%
<i>Working Capital Allowance</i>	7,848,730	4,753,024	(3,095,706)	-39.44%
Total Rate Base	51,958,700	51,531,560	-427,140	-0.82%
Expenses for Working Capital	MIFRS			
<i>Eligible Distribution Expenses:</i>	2017	2018	Var.	%
<i>3500-Distribution Expenses - Operation</i>	419,927	580,760	160,833	38.30%
<i>3550-Distribution Expenses - Maintenance</i>	1,560,909	1,386,773	-174,136	-11.16%
<i>3650-Billing and Collecting</i>	1,130,000	1,202,000	72,000	6.37%
<i>3700-Community Relations</i>	30,000	31,000	1,000	3.33%
<i>3800-Administrative and General Expenses</i>	2,548,000	2,747,500	199,500	7.83%

<i>6105-Taxes other than Income Taxes</i>	35,000	35,000	0	0.00%
<i>6205-Sub-account LEAP Funding</i>	13,000	13,000	0	0.00%
<i>Total Eligible Distribution Expenses</i>	5,736,836	5,996,033	259,197	4.52%
<i>3350-Power Supply Expenses</i>	59,669,247	57,377,618	-2,291,629	-3.84%
<i>Total Expenses for Working Capital</i>	65,406,083	63,373,651	-2,032,432	-3.11%
<i>Working Capital factor</i>	12%	7.50%	0	
<i>Total Working Capital</i>	7,848,730	4,753,024	-3,095,706	-39.44%

- 1
- 2 The total Rate Base in 2018 Test Year of \$51.5M is \$0.5M or 0.8% lower than the 2017 Bridge
- 3 Year. The main reason for the variance is:
- 4 • The average net capital assets in service are projected to be approximately \$1.4M higher
 - 5 than the prior year's average.
 - 6 • In 2018, increased capital investment for \$4.9M is required to keep the system running
 - 7 safely and reliably.
 - 8 • The capital additions during 2018 can be attributed mainly to \$3.2M in System renewal
 - 9 and 382K in System Service; \$1.31M in Substation upgrades, \$371K in #6 Copper
 - 10 replacements and \$780K in Decrepit Pole replacement and 463K in Poletran conversions
 - 11 and \$382K in Enhanced Technology (SCADA for example). Details can be found in the
 - 12 Distribution System Plan in Section 2.5.2 of this Exhibit.
 - 13 • The nature, intent, and basis of the projects are generally consistent with previous years
 - 14 and represent a consistent long term planning regime.
 - 15 • A reduction in the cost of power and the working Capital factor from 12% to 8% resulted
 - 16 in a \$3.2M reduction in the Working Capital Allowance.
- 17

2.1.4 FIXED ASSET CONTINUITY SCHEDULE

This Schedule presents a continuity schedule of its investment in capital assets, the associated accumulated amortization and the net book value for each Capital USoA account for the 2013 to 2016 Actuals and 2017 Bridge Year and 2018 Test Year.

WPI attests that the OEB Appendices 2-BA continuity statements presented at the next page reconcile with the calculated depreciation expenses, under Exhibit 4 – Operating Costs², and are presented by asset account. The utility also attests that the net book value balances reported on Appendix 2-BA and balances reconcile with the rate base calculation.^{3 4 5} The Excel version of the OEB Appendices are filed in conjunction with this application.⁶ The utility notes that it has not applied for an ACM or ICM in the years between its 2014 Cost of Service and this application.⁷

Information on year-over-year variance and explanation where variances are greater than the materiality threshold are summarized in the previous section 2.1.3 and explained in detail in Appendix A of the Distribution System Plan.

The following asset retirements are reflected in the fixed assets continuity statements presented on the next page.⁸

² MFR - Continuity statements must reconcile to calculated depreciation expenses and presented by asset account

³ MFR - Opening and closing balances, average of opening and closing balances for gross assets and accumulated depreciation; working capital allowance (historical actuals, bridge and test year forecast)

⁴ MFR - Continuity statements (year end balance, including interest during construction and overheads).

Explanation for any restatement (e.g. due to change in accounting standards)

Year over year variance analysis; explanation where variance greater than materiality threshold

Hist. OEB-Approved vs Hist. Actual

Hist. Act. vs. preceding Hist. Act.

Hist. Act. vs. Bridge

Bridge vs. Test

⁵ MFR - Opening and closing balances of gross assets and accumulated depreciation must correspond to fixed asset continuity statements. If not, an explanation must be provided (e.g.. WIP, ARO). Reconciliation must be between net book value balances reported on Appendix 2-BA and balances included in rate base calculation

⁶ MFR - Completed Fixed Asset Continuity Schedule (Appendix 2-BA) - in Application and Excel format

⁷ Summary of approved and actual costs for any ICM(s) and/ or ACM approved in previous IRM applications

⁸ MFR - All asset disposals clearly identified in the Chapter 2 Appendices for all historical, bridge and test years and if any amounts related to gains or losses on disposals have been included in Account 1575 IFRS - CGAAP Transitional PP&E Amount

Fixed Asset Continuity Schedule - CGAAP/ASPE/USGAAP

Year	2013
------	------

CGAAP - with changes to policies

CCA Class	OEB	Description	Cost					Accumulated Depreciation						AVG Gross Bal	AVG AccDep
			Opening Balance	Additions	Disposals	Adjustments	Closing Balance	Opening Balance	Additions	Disposals	Adjust.	Closing Balance	Net Book Value		
12	1611	Computer Software (Formally known as Account 1925)	\$ 926,780	\$ 309,217	\$ -	\$ -	\$ 1,235,996	\$ 865,906	\$ 94,473	\$ -	\$ 51,488	\$ 1,011,866	\$ 224,130	\$ 1,081,388	\$ 938,886
CEC	1612	Land Rights (Formally known as Account 1906 and 1806)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
N/A	1805	Land	\$ 227,769	\$ -	\$ -	\$ -	\$ 227,769	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 227,769	\$ 227,769	\$ -
47	1808	Buildings	\$ 2,486,318	\$ 8,091	\$ -	\$ -	\$ 2,494,409	\$ 275,084	\$ 52,213	\$ -	-\$ 24,297	\$ 303,000	\$ 2,191,410	\$ 2,490,364	\$ 289,042
13	1810	Leasehold Improvements	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
47	1815	Transformer Station Equipment >50 kV	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
47	1820	Distribution Station Equipment <50 kV	\$ 4,179,819	\$ 30,940	\$ -	\$ -	\$ 4,210,759	\$ 1,697,942	\$ 290,619	\$ -	-\$ 67,860	\$ 1,920,701	\$ 2,290,058	\$ 4,195,289	\$ 1,809,322
47	1825	Storage Battery Equipment	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
47	1830	Poles, Towers & Fixtures	\$ 7,760,246	\$ 923,362	\$ -	-\$ 99,497	\$ 8,584,111	\$ 2,671,024	\$ 113,689	\$ -	-\$ 157,300	\$ 2,627,413	\$ 5,956,699	\$ 8,172,179	\$ 2,649,218
47	1835	Overhead Conductors & Devices	\$ 11,092,581	\$ 1,056,695	\$ -	-\$ 204,681	\$ 11,944,595	\$ 3,791,834	\$ 149,575	\$ -	-\$ 226,721	\$ 3,714,688	\$ 8,229,907	\$ 11,518,588	\$ 3,753,261
47	1840	Underground Conduit	\$ 3,072,707	\$ 151,445	\$ -	-\$ 4,269	\$ 3,219,883	\$ 1,091,094	\$ 28,225	\$ -	-\$ 64,065	\$ 1,055,254	\$ 2,164,629	\$ 3,146,295	\$ 1,073,174
47	1845	Underground Conductors & Devices	\$ 9,459,117	\$ 338,983	\$ -	-\$ 92,856	\$ 9,705,243	\$ 3,047,008	\$ 202,203	\$ -	-\$ 192,623	\$ 3,056,587	\$ 6,648,656	\$ 9,582,180	\$ 3,051,797
47	1850	Line Transformers	\$ 8,365,268	\$ 201,308	\$ -	-\$ 54,406	\$ 8,512,170	\$ 3,047,552	\$ 218,231	\$ -	-\$ 173,432	\$ 3,092,352	\$ 5,419,818	\$ 8,438,719	\$ 3,069,952
47	1855	Services (Overhead & Underground)	\$ 4,791,959	\$ 261,100	\$ -	-\$ 54,980	\$ 4,998,080	\$ 1,510,344	\$ 85,814	\$ -	-\$ 95,231	\$ 1,500,927	\$ 3,497,153	\$ 4,895,020	\$ 1,505,635
47	1860	Meters	\$ 1,679,831	\$ 77,975	-\$ 250,594	\$ 8,535	\$ 1,498,676	\$ 502,392	\$ 78,006	-\$ 102,654	-\$ 37,984	\$ 439,760	\$ 1,058,917	\$ 1,589,253	\$ 471,076
47	1860	Meters (Smart Meters)	\$ 150,793	\$ 3,849,692	\$ -	\$ -	\$ 4,000,485	\$ 12,069	\$ 250,125	\$ -	\$ 656,472	\$ 918,666	\$ 3,081,819	\$ 2,075,639	\$ 465,367
N/A	1905	Land	\$ 1,635	\$ -	\$ -	\$ -	\$ 1,635	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,635	\$ 1,635	\$ -
47	1908	Buildings & Fixtures	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
13	1910	Leasehold Improvements	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
8	1915	Office Furniture & Equipment (10 years)	\$ 265,118	\$ 12,647	-\$ 10,275	\$ -	\$ 267,490	\$ 200,995	\$ 16,205	-\$ 6,696	-\$ 7,289	\$ 203,214	\$ 64,276	\$ 266,304	\$ 202,105
8	1915	Office Furniture & Equipment (5 years)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
10	1920	Computer Equipment - Hardware	\$ 275,946	\$ -	\$ -	\$ -	\$ 275,946	\$ 275,946	\$ -	\$ -	\$ -	\$ 275,946	\$ -	\$ 275,946	\$ 275,946
45	1920	Computer Equip.-Hardware(Post Mar. 22/04)	\$ 52,212	\$ -	\$ -	\$ -	\$ 52,212	\$ 52,212	\$ -	\$ -	\$ -	\$ 52,212	\$ -	\$ 52,212	\$ 52,212
45.1	1920	Computer Equip.-Hardware(Post Mar. 19/07)	\$ 163,095	\$ 82,496	\$ -	\$ -	\$ 245,591	\$ 104,278	\$ 85,968	\$ -	-\$ 12,581	\$ 177,665	\$ 67,926	\$ 204,343	\$ 140,971
10	1930	Transportation Equipment	\$ 2,250,267	\$ -	\$ -	\$ -	\$ 2,250,267	\$ 1,288,731	\$ 104,558	\$ -	-\$ 110,224	\$ 1,283,064	\$ 967,203	\$ 2,250,267	\$ 1,285,898
8	1935	Stores Equipment	\$ 86,278	\$ -	\$ -	\$ -	\$ 86,278	\$ 34,524	\$ 9,753	\$ -	-\$ 4,071	\$ 40,206	\$ 46,071	\$ 86,278	\$ 37,365
8	1940	Tools, Shop & Garage Equipment	\$ 297,961	\$ 41,298	\$ -	\$ -	\$ 339,259	\$ 203,203	\$ 20,281	\$ -	-\$ 9,168	\$ 214,316	\$ 124,943	\$ 318,610	\$ 208,759
8	1945	Measurement & Testing Equipment	\$ 80,686	\$ -	\$ -	\$ -	\$ 80,686	\$ 42,291	\$ 9,184	\$ -	-\$ 3,556	\$ 47,919	\$ 32,767	\$ 80,686	\$ 45,105
8	1950	Power Operated Equipment	\$ 89,272	\$ -	\$ -	\$ -	\$ 89,272	\$ 45,364	\$ 9,509	\$ -	-\$ 3,895	\$ 50,978	\$ 38,294	\$ 89,272	\$ 48,171
8	1955	Communications Equipment	\$ 176,173	\$ -	\$ -	\$ -	\$ 176,173	\$ 126,373	\$ 8,565	\$ -	-\$ 9,927	\$ 125,010	\$ 51,163	\$ 176,173	\$ 125,692
8	1955	Communication Equipment (Smart Meters)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
8	1960	Miscellaneous Equipment	\$ 60,691	\$ 26,266	\$ -	\$ -	\$ 86,957	\$ 33,092	\$ 5,831	\$ -	-\$ 1,534	\$ 37,389	\$ 49,568	\$ 73,824	\$ 35,241
47	1970	Load Management Controls Customer Premises	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
47	1975	Load Management Controls Utility Premises	\$ 258,631	\$ -	\$ -	\$ -	\$ 258,631	\$ 258,631	\$ -	\$ -	\$ -	\$ 258,631	\$ -	\$ 258,631	\$ 258,631
47	1980	System Supervisor Equipment	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
47	1985	Miscellaneous Fixed Assets	\$ 1,427	\$ -	\$ -	\$ -	\$ 1,427	\$ 1,427	\$ -	\$ -	\$ -	\$ 1,427	\$ -	\$ 1,427	\$ 1,427
47	1990	Other Tangible Property	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
47	1995	Contributions & Grants	-\$ 8,896,788	-\$ 473,674	\$ -	\$ -	-\$ 9,370,462	-\$ 2,062,405	-\$ 153,728	\$ -	\$ 183,363	-\$ 2,032,770	-\$ 7,337,692	-\$ 9,133,625	-\$ 2,047,588
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
		Sub-Total	\$ 49,355,790	\$ 6,897,842	-\$ 260,869	-\$ 519,226	\$ 55,473,538	\$ 19,116,909	\$ 1,679,297	-\$ 109,349	-\$ 310,435	\$ 20,376,421	\$ 35,097,117	\$ 52,414,664	\$ 19,746,665
		Less Socialized Renewable Energy Generation Investments (input as negative)					\$ -					\$ -	\$ -		
		Less Other Non Rate-Regulated Utility Assets (input as negative)					\$ -					\$ -	\$ -		
		Total PP&E	\$ 49,355,790	\$ 6,897,842	-\$ 260,869		\$ 55,473,538	\$ 19,116,909	\$ 1,679,297	-\$ 109,349	-\$ 310,435	\$ 20,376,421	\$ 35,097,117		
		Depreciation Expense adj. from gain or loss on the retirement of assets (pool of like assets)													
		Total						\$ 1,679,297							
								-\$ 134,504	Net Adjustment to regulator account in year through amortization expense (IFRS Transition)						
								\$ 758,532	Net Adjustment to regulator account in year through misc amortization expense (Stranded meters, Hardware, Software)						
								\$ 2,303,325	Depreciation Expense						

10	Transportation
8	Stores Equipment
8	Tools, Shop
8	Meas/Testing
8	Communication

Less: Fully Allocated Depreciation

Transportation
Stores Equipment
Tools, Shop
Meas/Testing
Communication

Net Depreciation

		check	difference
\$	2,303,325	\$	2,270,482
		\$	32,843

Year2014Former CGAAP - without changes to the policies

			Cost					Accumulated Depreciation							
CCA Class	OEB	Description	Opening Balance	Additions	Disposals	Adjustments	Closing Balance	Opening Balance	Additions	Disposals	Adjust.	Closing Balance	Net Book Value	AVG Gross Bal	AVG AccDep
12	1611	Computer Software (Formally known as Account 1925)	\$ 1,235,996	\$ 115,489	\$ -	\$ -	\$ 1,351,485	\$ 1,011,866	\$ 114,869	\$ -		\$ 1,126,735	\$ 224,750	\$ 1,293,741	\$ 1,069,301
CEC	1612	Land Rights (Formally known as Account 1906 and 1806)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
N/A	1805	Land	\$ 227,769	\$ -	\$ -	\$ -	\$ 227,769	\$ -	\$ -	\$ -		\$ -	\$ 227,769	\$ 227,769	\$ -
47	1808	Buildings	\$ 2,494,409	\$ 39,429	\$ -	\$ -	\$ 2,533,838	\$ 303,000	\$ 53,025	\$ -		\$ 356,024	\$ 2,177,814	\$ 2,514,124	\$ 329,512
13	1810	Leasehold Improvements	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
47	1815	Transformer Station Equipment >50 kV	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
47	1820	Distribution Station Equipment <50 kV	\$ 4,210,759	\$ 1,810,684	\$ -	\$ -	\$ 6,021,444	\$ 1,920,701	\$ 259,437	\$ -		\$ 2,180,139	\$ 3,841,305	\$ 5,116,101	\$ 2,050,420
47	1825	Storage Battery Equipment	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
47	1830	Poles, Towers & Fixtures	\$ 8,584,111	\$ 412,618	\$ -	\$ -	\$ 8,996,729	\$ 2,627,413	\$ 126,964	\$ -		\$ 2,754,376	\$ 6,242,353	\$ 8,790,420	\$ 2,690,894
47	1835	Overhead Conductors & Devices	\$ 11,944,595	\$ 400,615	\$ -	\$ -	\$ 12,345,209	\$ 3,714,688	\$ 153,987	\$ -		\$ 3,868,675	\$ 8,476,534	\$ 12,144,902	\$ 3,791,681
47	1840	Underground Conduit	\$ 3,219,883	\$ 67,599	\$ -	\$ -	\$ 3,287,481	\$ 1,055,254	\$ 29,521	\$ -		\$ 1,084,775	\$ 2,202,706	\$ 3,253,682	\$ 1,070,015
47	1845	Underground Conductors & Devices	\$ 9,705,243	\$ 421,513	\$ -	\$ -	\$ 10,126,756	\$ 3,056,587	\$ 210,719	\$ -		\$ 3,267,306	\$ 6,859,451	\$ 9,916,000	\$ 3,161,947
47	1850	Line Transformers	\$ 8,512,170	\$ 351,725	\$ -	\$ -	\$ 8,863,895	\$ 3,092,352	\$ 225,166	\$ -		\$ 3,317,518	\$ 5,546,376	\$ 8,688,032	\$ 3,204,935
47	1855	Services (Overhead & Underground)	\$ 4,998,080	\$ 214,778	\$ -	\$ -	\$ 5,212,858	\$ 1,500,927	\$ 90,626	\$ -		\$ 1,591,553	\$ 3,621,305	\$ 5,105,469	\$ 1,546,240
47	1860	Meters	\$ 1,498,676	\$ 79,997	\$ -	\$ -	\$ 1,578,673	\$ 439,760	\$ 59,261	\$ -		\$ 499,021	\$ 1,079,652	\$ 1,538,675	\$ 469,390
47	1860	Meters (Smart Meters)	\$ 4,000,485	\$ 298,853	\$ -	\$ -	\$ 4,299,338	\$ 918,666	\$ 288,105	\$ -		\$ 1,206,771	\$ 3,092,567	\$ 4,149,912	\$ 1,062,718
N/A	1905	Land	\$ 1,635	\$ -	\$ -	\$ -	\$ 1,635	\$ -	\$ -	\$ -		\$ -	\$ 1,635	\$ 1,635	\$ -
47	1908	Buildings & Fixtures	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
13	1910	Leasehold Improvements	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
8	1915	Office Furniture & Equipment (10 years)	\$ 267,490	\$ 42,234	-\$ 37,368	\$ -	\$ 272,356	\$ 203,214	\$ 13,263	-\$ 24,794		\$ 191,683	\$ 80,673	\$ 269,923	\$ 197,449
8	1915	Office Furniture & Equipment (5 years)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
10	1920	Computer Equipment - Hardware	\$ 275,946	\$ -	\$ -	\$ -	\$ 275,946	\$ 275,946	\$ -	\$ -		\$ 275,946	\$ -	\$ 275,946	\$ 275,946
45	1920	Computer Equip.-Hardware(Post Mar. 22/04)	\$ 52,212	\$ -	\$ -	\$ -	\$ 52,212	\$ 52,212	\$ -	\$ -		\$ 52,212	\$ -	\$ 52,212	\$ 52,212
45.1	1920	Computer Equip.-Hardware(Post Mar. 19/07)	\$ 245,591	\$ 2,446	\$ -	\$ -	\$ 248,038	\$ 177,665	\$ 38,195	\$ -		\$ 215,860	\$ 32,177	\$ 246,815	\$ 196,763
10	1930	Transportation Equipment	\$ 2,250,267	\$ 371,134	\$ -	\$ -	\$ 2,621,401	\$ 1,283,064	\$ 117,351	\$ -		\$ 1,400,415	\$ 1,220,985	\$ 2,435,834	\$ 1,341,740
8	1935	Stores Equipment	\$ 86,278	\$ 580	\$ -	\$ -	\$ 86,858	\$ 40,206	\$ 9,782	\$ -		\$ 49,988	\$ 36,869	\$ 86,568	\$ 45,097
8	1940	Tools, Shop & Garage Equipment	\$ 339,259	\$ 73,832	\$ -	\$ -	\$ 413,091	\$ 214,316	\$ 26,899	\$ -		\$ 241,215	\$ 171,875	\$ 376,175	\$ 227,766
8	1945	Measurement & Testing Equipment	\$ 80,686	\$ -	\$ -	\$ -	\$ 80,686	\$ 47,919	\$ 9,184	\$ -		\$ 57,104	\$ 23,583	\$ 80,686	\$ 52,511
8	1950	Power Operated Equipment	\$ 89,272	\$ -	\$ -	\$ -	\$ 89,272	\$ 50,978	\$ 9,509	\$ -		\$ 60,487	\$ 28,785	\$ 89,272	\$ 55,733
8	1955	Communications Equipment	\$ 176,173	\$ 545	\$ -	\$ -	\$ 176,718	\$ 125,010	\$ 8,592	\$ -		\$ 133,603	\$ 43,116	\$ 176,446	\$ 129,307
8	1955	Communication Equipment (Smart Meters)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
8	1960	Miscellaneous Equipment	\$ 86,957	\$ 17,556	\$ -	\$ -	\$ 104,513	\$ 37,389	\$ 8,168	\$ -		\$ 45,557	\$ 58,955	\$ 95,735	\$ 41,473
47	1970	Load Management Controls Customer Premises	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
47	1975	Load Management Controls Utility Premises	\$ 258,631	\$ -	\$ -	\$ -	\$ 258,631	\$ 258,631	\$ -	\$ -		\$ 258,631	\$ -	\$ 258,631	\$ 258,631
47	1980	System Supervisor Equipment	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
47	1985	Miscellaneous Fixed Assets	\$ 1,427	\$ -	\$ -	\$ -	\$ 1,427	\$ 1,427	\$ -	\$ -		\$ 1,427	\$ -	\$ 1,427	\$ 1,427
47	1990	Other Tangible Property	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
47	1995	Contributions & Grants	-\$ 9,370,462	-\$ 394,426	\$ 37,008	\$ -	-\$ 9,727,880	-\$ 2,032,770	-\$ 175,880	\$ -		-\$ 2,208,650	-\$ 7,519,230	-\$ 9,549,171	-\$ 2,120,710
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
		Sub-Total	\$ 55,473,538	\$ 4,327,199	-\$ 360	\$ -	\$ 59,800,377	\$ 20,376,421	\$ 1,676,744	-\$ 24,794		\$ 22,028,371	\$ 37,772,006	\$ 57,636,957	\$ 21,202,396
		Less Socialized Renewable Energy Generation Investments (input as negative)Less Socialized Renewable Energy Generation Investments (input as negative)					\$ -					\$ -	\$ -	\$ 36,434,561	
		Less Other Non Rate-Regulated Utility Assets (input as negative)Less Other Non Rate-Regulated Utility Assets (input as negative)					\$ -					\$ -	\$ -	\$ 36,434,561	
		Total PP&E	\$ 55,473,538	\$ 4,327,199	-\$ 360	\$ -	\$ 59,800,377	\$ 20,376,421	\$ 1,676,744	-\$ 24,794		\$ 22,028,371	\$ 37,772,006	\$ 36,434,561	
		Depreciation Expense adj. from gain or loss on the retirement of assets (pool of like assets)													
		Total						\$ 1,676,744							

-\$ 134,504

\$ 1,542,240

Net Adjustment to regulator account in year through amortization expense (IFRS Transition)

Depreciation Expense

10		Transportation
8		Stores Equipment
8		Tools, Shop
8		Meas/Testing
8		Communication

Less: Fully Allocated Depreciation

Transportation
Stores Equipment
Tools, Shop
Meas/Testing
Communication
Net Depreciation

	check	difference
\$ 1,542,240	\$ 1,542,240	\$ 0

Year2015IFRS

			Cost					Accumulated Depreciation							
CCA Class	OEB	Description	Opening Balance	Additions	Disposals	Adjustments	Closing Balance	Opening Balance	Additions	Disposals	Adjust.	Closing Balance	Net Book Value	AVG Gross Bal	AVG AccDep

12	1611	Computer Software (Formally known as Account 1925)	\$ 1,351,485	\$ 187,990	\$ -	\$ -	\$ 1,539,475	\$ 1,126,735	\$ 124,746	\$ -		\$ 1,251,481	\$ 287,994	\$ 1,445,480	\$ 1,189,108
CEC	1612	Land Rights (Formally known as Account 1906 and 1806)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
N/A	1805	Land	\$ 227,769	\$ -	\$ -	\$ -	\$ 227,769	\$ -	\$ -	\$ -		\$ -	\$ 227,769	\$ 227,769	\$ -
47	1808	Buildings	\$ 2,533,838	\$ 40,949	\$ -	\$ -	\$ 2,574,787	\$ 356,024	\$ 53,470	\$ -		\$ 409,494	\$ 2,165,293	\$ 2,554,313	\$ 382,759
13	1810	Leasehold Improvements	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
47	1815	Transformer Station Equipment >50 kV	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
47	1820	Distribution Station Equipment <50 kV	\$ 6,021,444	\$ 866,731	\$ -	\$ -	\$ 6,888,174	\$ 2,180,139	\$ 300,047	\$ -		\$ 2,480,186	\$ 4,407,988	\$ 6,454,809	\$ 2,330,162
47	1825	Storage Battery Equipment	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
47	1830	Poles, Towers & Fixtures	\$ 8,996,729	\$ 563,724	-\$ 5,371	\$ -	\$ 9,555,081	\$ 2,754,376	\$ 142,399	\$ -		\$ 2,896,775	\$ 6,658,306	\$ 9,275,905	\$ 2,825,576
47	1835	Overhead Conductors & Devices	\$ 12,345,209	\$ 849,171	-\$ 21,928	\$ -	\$ 13,172,452	\$ 3,868,675	\$ 162,665	\$ -		\$ 4,031,340	\$ 9,141,112	\$ 12,758,831	\$ 3,950,008
47	1840	Underground Conduit	\$ 3,287,481	\$ 48,936	\$ -	\$ -	\$ 3,336,418	\$ 1,084,775	\$ 30,212	\$ -		\$ 1,114,987	\$ 2,221,431	\$ 3,311,950	\$ 1,099,881
47	1845	Underground Conductors & Devices	\$ 10,126,756	\$ 539,283	-\$ 38,518	\$ -	\$ 10,627,521	\$ 3,267,306	\$ 215,864	\$ -		\$ 3,483,170	\$ 7,144,351	\$ 10,377,139	\$ 3,375,238
47	1850	Line Transformers	\$ 8,863,895	\$ 309,609	-\$ 81,409	\$ -	\$ 9,092,095	\$ 3,317,518	\$ 226,572	\$ -		\$ 3,544,091	\$ 5,548,004	\$ 8,977,995	\$ 3,430,804
47	1855	Services (Overhead & Underground)	\$ 5,212,858	\$ 196,699	\$ -	\$ -	\$ 5,409,558	\$ 1,591,553	\$ 95,001	\$ -		\$ 1,686,553	\$ 3,723,004	\$ 5,311,208	\$ 1,639,053
47	1860	Meters	\$ 1,578,673	\$ 154,402	\$ -	\$ -	\$ 1,733,075	\$ 499,021	\$ 58,138	\$ -		\$ 557,159	\$ 1,175,916	\$ 1,655,874	\$ 528,090
47	1860	Meters (Smart Meters)	\$ 4,299,338	\$ 77,709	-\$ 57,254	\$ -	\$ 4,319,794	\$ 1,206,771	\$ 291,829	\$ -		\$ 1,498,599	\$ 2,821,194	\$ 4,309,566	\$ 1,352,685
N/A	1905	Land	\$ 1,635	\$ -	\$ -	\$ -	\$ 1,635	\$ -	\$ -	\$ -		\$ -	\$ 1,635	\$ -	\$ -
47	1908	Buildings & Fixtures	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
13	1910	Leasehold Improvements	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
8	1915	Office Furniture & Equipment (10 years)	\$ 272,356	\$ 21,091	\$ -	\$ -	\$ 293,447	\$ 191,683	\$ 16,663	\$ -		\$ 208,346	\$ 85,101	\$ 282,902	\$ 200,015
8	1915	Office Furniture & Equipment (5 years)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
10	1920	Computer Equipment - Hardware	\$ 275,946		\$ -	\$ -	\$ 275,946	\$ 275,946	\$ -	\$ -		\$ 275,946	\$ -	\$ 275,946	\$ 275,946
45	1920	Computer Equip.-Hardware(Post Mar. 22/04)	\$ 52,212		\$ -	\$ -	\$ 52,212	\$ 52,212	\$ -	\$ -		\$ 52,212	\$ -	\$ 52,212	\$ 52,212
45.1	1920	Computer Equip.-Hardware(Post Mar. 19/07)	\$ 248,038	\$ 179,867	\$ -	\$ -	\$ 427,905	\$ 215,860	\$ 37,487	\$ -		\$ 253,347	\$ 174,558	\$ 337,971	\$ 234,604
10	1930	Transportation Equipment	\$ 2,621,401	\$ 58,226	\$ -	\$ -	\$ 2,679,627	\$ 1,400,415	\$ 131,380	\$ -		\$ 1,531,796	\$ 1,147,831	\$ 2,650,514	\$ 1,466,106
8	1935	Stores Equipment	\$ 86,858		\$ -	\$ -	\$ 86,858	\$ 49,988	\$ 9,814	\$ -		\$ 59,803	\$ 27,055	\$ 86,858	\$ 54,896
8	1940	Tools, Shop & Garage Equipment	\$ 413,091	\$ 93,460	\$ -	\$ -	\$ 506,551	\$ 241,215	\$ 33,441	\$ -		\$ 274,656	\$ 231,895	\$ 459,821	\$ 257,936
8	1945	Measurement & Testing Equipment	\$ 80,686		\$ -	\$ -	\$ 80,686	\$ 57,104	\$ 8,049	\$ -		\$ 65,153	\$ 15,533	\$ 80,686	\$ 61,128
8	1950	Power Operated Equipment	\$ 89,272		\$ -	\$ -	\$ 89,272	\$ 60,487	\$ 8,302	\$ -		\$ 68,789	\$ 20,483	\$ 89,272	\$ 64,638
8	1955	Communications Equipment	\$ 176,718	\$ 20,845	\$ -	\$ -	\$ 197,563	\$ 133,603	\$ 9,665	\$ -		\$ 143,267	\$ 54,296	\$ 187,141	\$ 138,435
8	1955	Communication Equipment (Smart Meters)	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
8	1960	Miscellaneous Equipment	\$ 104,513	\$ 17,800	-\$ 788	\$ -	\$ 121,525	\$ 45,557	\$ 8,952	\$ -		\$ 54,509	\$ 67,016	\$ 113,019	\$ 50,033
47	1970	Load Management Controls Customer Premises	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
47	1975	Load Management Controls Utility Premises	\$ 258,631	\$ -	\$ -	\$ -	\$ 258,631	\$ 258,631	\$ -	\$ -		\$ 258,631	\$ -	\$ 258,631	\$ 258,631
47	1980	System Supervisor Equipment	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
47	1985	Miscellaneous Fixed Assets	\$ 1,427	\$ -	\$ -	\$ -	\$ 1,427	\$ 1,427	\$ -	\$ -		\$ 1,427	\$ -	\$ 1,427	\$ 1,427
47	1990	Other Tangible Property	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
47	1995	Contributions & Grants	-\$ 9,727,880	-\$ 360,794	\$ -	\$ -	-\$ 10,088,675	-\$ 2,208,650	-\$ 184,587	\$ -		-\$ 2,393,237	-\$ 7,695,438	-\$ 9,908,278	-\$ 2,300,944
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
			\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -
		Sub-Total	\$ 59,800,377	\$ 3,865,697	-\$ 205,268	\$ -	\$ 63,460,806	\$ 22,028,371	\$ 1,780,108	\$ -		\$ 23,808,479	\$ 39,652,327	\$ 61,630,592	\$ 22,918,425
		Less Socialized Renewable Energy Generation Investments (input as negative)Less Socialized Renewable Energy Generation Investments (input as negative)					\$ -					\$ -	\$ -	\$ 38,712,166	
		Less Other Non Rate-Regulated Utility Assets (input as negative)Less Other Non Rate-Regulated Utility Assets (input as negative)					\$ -					\$ -	\$ -		
		Total PP&E	\$ 59,800,377	\$ 3,865,697	-\$ 205,268	\$ -	\$ 63,460,806	\$ 22,028,371	\$ 1,780,108	\$ -		\$ 23,808,479	\$ 39,652,327	\$ 38,712,166	
		Depreciation Expense adj. from gain or loss on the retirement of assets (pool of like assets)													
		Total						\$ 1,780,108							
								-\$ 134,504							
								\$ 1,645,605							

Net Adjustment to regulator account in year through amortization expense

Depreciation Expense

10		Transportation
8		Stores Equipment
8		Tools, Shop
8		Meas/Testing
8		Communication

Less: Fully Allocated Depreciation

Transportation
Stores Equipment
Tools, Shop
Meas/Testing
Communication
Net Depreciation

check difference
\$ 1,645,605 \$ 1,653,966 -\$ 8,361

Year 2016

IFRS

CCA Class	OEB	Description	Cost					Accumulated Depreciation						AVG Gross Bal	AVG AccDep
			Opening Balance	Additions	Disposals	Adjustments	Closing Balance	Opening Balance	Additions	Disposals	Adjust.	Closing Balance	Net Book Value		
12	1611	Computer Software (Formally known as Account 1925)	\$ 1,539,475	\$ 406,812	-\$ 252,607	\$ -	\$ 1,693,680	\$ 1,251,481	\$ 51,311	-\$ 50,147		\$ 1,252,645	\$ 441,035	\$ 1,616,577	\$ 1,252,063
CEC	1612	Land Rights (Formally known as Account 1906 and 1806)	\$ -			\$ -	\$ -	\$ -		\$ -		\$ -	\$ -	\$ -	\$ -

10	Transportation
8	Stores Equipment
8	Tools, Shop
8	Meas/Testing
8	Communication

Transportation
Stores Equipment
Tools, Shop
Meas/Testing
Communication
Net Depreciation

	check	difference
\$ 1,663,500	\$ 1,638,686	\$ 24,814

\$ 41,271,205

\$ 41,271,205

IFRS

AVG Gross Bal	AVG AccDep
\$ 1,720,080	\$ 1,320,725
\$ -	\$ -
\$ 227,769	\$ -
\$ 2,581,931	\$ 489,290
\$ -	\$ -
\$ -	\$ -

47	1820	Distribution Station Equipment <50 kV	\$ 9,203,794	\$ 1,520,000		\$ 10,723,794	\$ 2,811,477	\$ 206,698.26	\$ -	\$ -	\$ 3,018,175	\$ 7,705,619	\$ 9,963,794	\$ 2,914,826	
47	1825	Storage Battery Equipment	\$ -			\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
47	1830	Poles, Towers & Fixtures	\$ 10,225,542	\$ 639,652		\$ 10,865,194	\$ 3,051,195	\$ 170,786.49	\$ -	\$ -	\$ 3,221,981	\$ 7,643,213	\$ 10,545,368	\$ 3,136,588	
47	1835	Overhead Conductors & Devices	\$ 14,024,766	\$ 815,191		\$ 14,839,957	\$ 4,206,769	\$ 225,185.28	\$ -	\$ -	\$ 4,431,954	\$ 10,408,003	\$ 14,432,362	\$ 4,319,362	
47	1840	Underground Conduit	\$ 3,393,124	\$ 79,020		\$ 3,472,144	\$ 1,145,823	\$ 40,434.16	\$ -	\$ -	\$ 1,186,257	\$ 2,285,887	\$ 3,432,634	\$ 1,166,040	
47	1845	Underground Conductors & Devices	\$ 10,882,438	\$ 438,283		\$ 11,320,721	\$ 3,706,649	\$ 186,573.94	\$ -	\$ -	\$ 3,893,223	\$ 7,427,498	\$ 11,101,580	\$ 3,799,936	
47	1850	Line Transformers	\$ 9,605,392	\$ 513,137		\$ 10,118,529	\$ 3,763,648	\$ 247,909.17	\$ -	\$ -	\$ 4,011,557	\$ 6,106,972	\$ 9,861,960	\$ 3,887,602	
47	1855	Services (Overhead & Underground)	\$ 5,664,034	\$ 483,924		\$ 6,147,958	\$ 1,786,152	\$ 112,646.46	\$ -	\$ -	\$ 1,898,799	\$ 4,249,159	\$ 5,905,996	\$ 1,842,476	
47	1860	Meters	\$ 1,963,881			\$ 1,963,881	\$ 903,732	\$ 65,057.71	\$ -	\$ -	\$ 968,790	\$ 995,091	\$ 1,963,881	\$ 936,261	
47	1860	Meters (Smart Meters)	\$ 4,319,794	\$ 57,976		\$ 4,377,770	\$ 1,498,599	\$ 289,919	\$ -	\$ -	\$ 1,788,518	\$ 2,589,252	\$ 4,348,782	\$ 1,643,559	
N/A	1905	Land	\$ 1,635			\$ 1,635	\$ -		\$ -	\$ -	\$ -	\$ 1,635	\$ 1,635	\$ -	
47	1908	Buildings & Fixtures	\$ -			\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
13	1910	Leasehold Improvements	\$ -			\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
8	1915	Office Furniture & Equipment (10 years)	\$ 299,706	\$ 15,000		\$ 314,706	\$ 225,829	\$ 12,779	\$ -	\$ -	\$ 238,608	\$ 76,097	\$ 307,206	\$ 232,219	
8	1915	Office Furniture & Equipment (5 years)	\$ -			\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
10	1920	Computer Equipment - Hardware	\$ 311,260			\$ 311,260	\$ 327,109	\$ 7,063	\$ -	\$ -	\$ 334,172	\$ 22,912	\$ 311,260	\$ 330,640	
45	1920	Computer Equip.-Hardware(Post Mar. 22/04)	\$ 52,212			\$ 52,212	\$ 52,212	\$ -	\$ -	\$ -	\$ 52,212	\$ -	\$ 52,212	\$ 52,212	
45.1	1920	Computer Equip.-Hardware(Post Mar. 19/07)	\$ 427,905			\$ 427,905	\$ 253,347	\$ 42,239	\$ -	\$ -	\$ 295,586	\$ 132,319	\$ 427,905	\$ 274,467	
10	1930	Transportation Equipment	\$ 2,764,478	\$ 10,000		\$ 2,774,478	\$ 1,653,067	\$ 191,129	\$ -	\$ -	\$ 1,844,196	\$ 930,282	\$ 2,769,478	\$ 1,748,631	
8	1935	Stores Equipment	\$ 86,858			\$ 86,858	\$ 69,617	\$ 7,292	\$ -	\$ -	\$ 76,908	\$ 9,949	\$ 86,858	\$ 73,262	
8	1940	Tools, Shop & Garage Equipment	\$ 507,826	\$ 25,000		\$ 532,826	\$ 312,584	\$ 33,591	\$ -	\$ -	\$ 346,175	\$ 186,651	\$ 520,326	\$ 329,380	
8	1945	Measurement & Testing Equipment	\$ 80,686			\$ 80,686	\$ 69,446	\$ 2,920	\$ -	\$ -	\$ 72,366	\$ 8,320	\$ 80,686	\$ 70,906	
8	1950	Power Operated Equipment	\$ 89,272			\$ 89,272	\$ 77,091	\$ 7,026	\$ -	\$ -	\$ 84,117	\$ 5,155	\$ 89,272	\$ 80,604	
8	1955	Communications Equipment	\$ 198,326			\$ 198,326	\$ 154,128	\$ 12,406	\$ -	\$ -	\$ 166,535	\$ 31,792	\$ 198,326	\$ 160,332	
8	1955	Communication Equipment (Smart Meters)	\$ -			\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
8	1960	Miscellaneous Equipment	\$ 222,187			\$ 222,187	\$ 69,485	\$ 19,422	\$ -	\$ -	\$ 88,907	\$ 133,280	\$ 222,187	\$ 79,196	
47	1970	Load Management Controls Customer Premises	\$ -			\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
47	1975	Load Management Controls Utility Premises	\$ 258,631			\$ 258,631	\$ 258,631		\$ -	\$ -	\$ 258,631	\$ -	\$ 258,631	\$ 258,631	
47	1980	System Supervisor Equipment	\$ -			\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
47	1985	Miscellaneous Fixed Assets	\$ 1,427			\$ 1,427	\$ 1,427		\$ -	\$ -	\$ 1,427	\$ -	\$ 1,427	\$ 1,427	
47	1990	Other Tangible Property	\$ -			\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
47	1995	Contributions & Grants	-\$ 10,673,899	-\$ 340,541		-\$ 11,014,440	-\$ 2,589,564	-\$ 199,206	\$ -	\$ -	-\$ 2,788,770	-\$ 8,225,670	-\$ 10,844,169	-\$ 2,689,167	
	etc.		\$ -			\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	etc.		\$ -			\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	etc.		\$ -			\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	etc.		\$ -			\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	etc.		\$ -			\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	etc.		\$ -			\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	etc.		\$ -			\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	etc.		\$ -			\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	etc.		\$ -			\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	etc.		\$ -			\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
		Sub-Total	\$ 68,414,652	\$ 4,309,442	\$ -	\$ -	\$ 72,724,094	\$ 25,524,568	\$ 1,869,669	\$ -	\$ -	\$ 27,394,238	\$ 45,329,857	\$ 70,569,373	\$ 26,459,403
		Less Socialized Renewable Energy Generation Investments (input as negative)Less Socialized Renewable Energy Generation Investments (input as negative)				\$ -					\$ -	\$ -	\$ 44,109,970		
		Less Other Non Rate-Regulated Utility Assets (input as negative)Less Other Non Rate-Regulated Utility Assets (input as negative)				\$ -					\$ -	\$ -	\$ 44,109,970		
		Total PP&E	\$ 68,414,652	\$ 4,309,442	\$ -	\$ -	\$ 72,724,094	\$ 25,524,568	\$ 1,869,669	\$ -	\$ -	\$ 27,394,238	\$ 45,329,857	\$ 44,109,970	
		Depreciation Expense adj. from gain or loss on the retirement of assets (pool of like assets)													
		Total						\$ 1,869,669							

10		Transportation
8		Stores Equipment
8		Tools, Shop
8		Meas/Testing
8		Communication

Less: Fully Allocated Depreciation

Transportation
Stores Equipment
Tools, Shop
Meas/Testing
Communication

Net Depreciation

\$ 1,869,669

Year 2018

IFRS

CCA Class	OEB	Description	Cost					Accumulated Depreciation						AVG Gross Bal	AVG AccDep
			Opening Balance	Additions	Disposals	Adjustments	Closing Balance	Opening Balance	Additions	Disposals	Adjust.	Closing Balance	Net Book Value		
12	1611	Computer Software (Formally known as Account 1925)	\$ 1,746,480	\$ 30,000	\$ -		\$ 1,776,480	\$ 1,388,804	\$ 149,959	\$ -	\$ -	\$ 1,538,764	\$ 237,716	\$ 1,761,480	\$ 1,463,784
CEC	1612	Land Rights (Formally known as Account 1906 and 1806)	\$ -		\$ -		\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
N/A	1805	Land	\$ 227,769		\$ -		\$ 227,769	\$ -		\$ -	\$ -	\$ -	\$ 227,769	\$ 227,769	\$ -
47	1808	Buildings	\$ 2,581,931	\$ 35,000	\$ -		\$ 2,616,931	\$ 515,110	\$ 51,989	\$ -	\$ -	\$ 567,098	\$ 2,049,832	\$ 2,599,431	\$ 541,104
13	1810	Leasehold Improvements	\$ -		\$ -		\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
47	1815	Transformer Station Equipment >50 kV	\$ -		\$ -		\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
47	1820	Distribution Station Equipment <50 kV	\$ 10,723,794	\$ 1,662,000	\$ -		\$ 12,385,794	\$ 3,018,175	\$ 242,053.82	\$ -	\$ -	\$ 3,260,229	\$ 9,125,565	\$ 11,554,794	\$ 3,139,202
47	1825	Storage Battery Equipment	\$ -		\$ -		\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
47	1830	Poles, Towers & Fixtures	\$ 10,865,194	\$ 554,157	\$ -		\$ 11,419,351	\$ 3,221,981	\$ 182,724.58	\$ -	\$ -	\$ 3,404,706	\$ 8,014,645	\$ 11,142,272	\$ 3,313,344
47	1835	Overhead Conductors & Devices	\$ 14,839,957	\$ 687,193	\$ -		\$ 15,527,150	\$ 4,431,954	\$ 236,742.08	\$ -	\$ -	\$ 4,668,696	\$ 10,858,454	\$ 15,183,554	\$ 4,550,325
47	1840	Underground Conduit	\$ 3,472,144	\$ 96,015	\$ -		\$ 3,568,159	\$ 1,186,257	\$ 41,463.77	\$ -	\$ -	\$ 1,227,721	\$ 2,340,438	\$ 3,520,151	\$ 1,206,989
47	1845	Underground Conductors & Devices	\$ 11,320,721	\$ 535,769	\$ -		\$ 11,856,490	\$ 3,893,223	\$ 194,691.04	\$ -	\$ -	\$ 4,087,914	\$ 7,768,576	\$ 11,588,606	\$ 3,990,568

47	1850	Line Transformers	\$ 10,118,529	\$ 525,026	\$ -	\$ 10,643,555	\$ 4,011,557	\$ 260,886.21	\$ -	\$ -	\$ 4,272,443	\$ 6,371,112	\$ 10,381,042	\$ 4,142,000
47	1855	Services (Overhead & Underground)	\$ 6,147,958	\$ 478,726	\$ -	\$ 6,626,684	\$ 1,898,799	\$ 120,051.46	\$ -	\$ -	\$ 2,018,850	\$ 4,607,833	\$ 6,387,321	\$ 1,958,825
47	1860	Meters	\$ 1,963,881		\$ -	\$ 1,963,881	\$ 968,790	\$ 65,057.71	\$ -	\$ -	\$ 1,033,847	\$ 930,034	\$ 1,963,881	\$ 1,001,318
47	1860	Meters (Smart Meters)	\$ 4,377,770	\$ 57,899	\$ -	\$ 4,435,669	\$ 1,788,518	\$ 293,781	\$ -	\$ -	\$ 2,082,299	\$ 2,353,369	\$ 4,406,719	\$ 1,935,409
N/A	1905	Land	\$ 1,635		\$ -	\$ 1,635	\$ -		\$ -	\$ -	\$ -	\$ 1,635	\$ 1,635	\$ -
47	1908	Buildings & Fixtures	\$ -		\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
13	1910	Leasehold Improvements	\$ -		\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
8	1915	Office Furniture & Equipment (10 years)	\$ 314,706	\$ 35,000	\$ -	\$ 349,706	\$ 238,608	\$ 15,279	\$ -	\$ -	\$ 253,888	\$ 95,818	\$ 332,206	\$ 246,248
8	1915	Office Furniture & Equipment (5 years)	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
10	1920	Computer Equipment - Hardware	\$ 311,260		\$ -	\$ 311,260	\$ 334,172	\$ 7,063	\$ -	\$ -	\$ 341,235	-\$ 29,975	\$ 311,260	\$ 337,703
45	1920	Computer Equip.-Hardware(Post Mar. 22/04)	\$ 52,212		\$ -	\$ 52,212	\$ 52,212	\$ -	\$ -	\$ -	\$ 52,212	\$ -	\$ 52,212	\$ 52,212
45.1	1920	Computer Equip.-Hardware(Post Mar. 19/07)	\$ 427,905		\$ -	\$ 427,905	\$ 295,586	\$ 42,239	\$ -	\$ -	\$ 337,825	\$ 90,080	\$ 427,905	\$ 316,706
10	1930	Transportation Equipment	\$ 2,774,478	\$ 500,000	\$ -	\$ 3,274,478	\$ 1,844,196	\$ 209,129	\$ -	\$ -	\$ 2,053,325	\$ 1,221,153	\$ 3,024,478	\$ 1,948,761
8	1935	Stores Equipment	\$ 86,858		\$ -	\$ 86,858	\$ 76,908	\$ 7,292	\$ -	\$ -	\$ 84,200	\$ 2,658	\$ 86,858	\$ 80,554
8	1940	Tools, Shop & Garage Equipment	\$ 532,826	\$ 35,000	\$ -	\$ 567,826	\$ 346,175	\$ 36,591	\$ -	\$ -	\$ 382,765	\$ 185,060	\$ 550,326	\$ 364,470
8	1945	Measurement & Testing Equipment	\$ 80,686		\$ -	\$ 80,686	\$ 72,366	\$ 2,920	\$ -	\$ -	\$ 75,287	\$ 5,399	\$ 80,686	\$ 73,827
8	1950	Power Operated Equipment	\$ 89,272		\$ -	\$ 89,272	\$ 84,117	\$ 7,026	\$ -	\$ -	\$ 91,143	-\$ 1,871	\$ 89,272	\$ 87,630
8	1955	Communications Equipment	\$ 198,326		\$ -	\$ 198,326	\$ 166,535	\$ 12,406	\$ -	\$ -	\$ 178,941	\$ 19,385	\$ 198,326	\$ 172,738
8	1955	Communication Equipment (Smart Meters)	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
8	1960	Miscellaneous Equipment	\$ 223,614		\$ -	\$ 223,614	\$ 90,333	\$ 19,422	\$ -	\$ -	\$ 109,755	\$ 113,858	\$ 223,614	\$ 100,044
47	1970	Load Management Controls Customer Premises	\$ -		\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
47	1975	Load Management Controls Utility Premises	\$ 258,631		\$ -	\$ 258,631	\$ 258,631	\$ -	\$ -	\$ -	\$ 258,631	\$ -	\$ 258,631	\$ 258,631
47	1980	System Supervisor Equipment	\$ -		\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
47	1985	Miscellaneous Fixed Assets	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
47	1990	Other Tangible Property	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
47	1995	Contributions & Grants	-\$ 11,014,440	-\$ 340,541	\$ -	-\$ 11,354,981	-\$ 2,788,770	-\$ 204,881	\$ -	\$ -	-\$ 2,993,651	-\$ 8,361,330	-\$ 11,184,710	-\$ 2,891,210
	etc.		\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	etc.		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
			\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
		Sub-Total	\$ 72,724,094	\$ 4,891,244	\$ -	\$ 77,615,338	\$ 27,394,238	\$ 1,993,885	\$ -	\$ -	\$ 29,388,123	\$ 48,227,215	\$ 75,169,716	\$ 28,391,180
		Less Socialized Renewable Energy Generation Investments (input as negative)												
		Less Socialized Renewable Energy Generation Investments (input as negative)				\$ -					\$ -	\$ -	\$ 46,778,536	
		Less Other Non Rate-Regulated Utility Assets (input as negative)												
		Less Other Non Rate-Regulated Utility Assets (input as negative)				\$ -					\$ -	\$ -	\$ 46,778,536	
		Total PP&E	\$ 72,724,094	\$ 4,891,244	\$ -	\$ 77,615,338	\$ 27,394,238	\$ 1,993,885	\$ -	\$ -	\$ 29,388,123	\$ 48,227,215		
		Depreciation Expense adj. from gain or loss on the retirement of assets (pool of like assets)												
		Total					\$ 1,993,885							

10		Transportation
8		Stores Equipment
8		Tools, Shop
8		Meas/Testing
8		Communication

Less: Fully Allocated Depreciation	
Transportation	
Stores Equipment	
Tools, Shop	
Meas/Testing	
Communication	
Net Depreciation	\$ 1,993,885

1

<i>Description</i>	2013 Disposals	2013 Accumulated Depreciation Disposals
<i>Meters</i>	-\$ 250,594	-\$ 102,654
<i>Office Furniture & Equipment (10 years)</i>	-\$ 10,275	-\$ 6,696
<i>Description</i>	2014 Disposals	2014 Accumulated Depreciation Disposals
<i>Office Furniture & Equipment (10 years)</i>	-\$ 37,368	-\$ 24,794
<i>Description</i>	2015 Disposals	2015 Accumulated Depreciation Disposals
<i>Poles, Towers & Fixtures</i>	-\$ 5,371	\$ -
<i>Overhead Conductors & Devices</i>	-\$ 21,928	\$ -
<i>Underground Conductors & Devices</i>	-\$ 38,518	\$ -
<i>Line Transformers</i>	-\$ 81,409	\$ -
<i>Meters (Smart Meters)</i>	-\$ 57,254	\$ -
<i>Miscellaneous Equipment</i>	-\$ 788	\$ -
<i>Description</i>	2016 Disposals	2016 Accumulated Depreciation Disposals
<i>Computer Software (Formally known as Account 1925)</i>	-\$ 252,607	-\$ 50,147
<i>Poles, Towers & Fixtures</i>	-\$ 6,864	-\$ 322
<i>Overhead Conductors & Devices</i>	-\$ 4,094	-\$ 311
<i>Underground Conductors & Devices</i>	-\$ 3,363	-\$ 973
<i>Line Transformers</i>	-\$ 94,685	-\$ 10,218
<i>Meters</i>	-\$ 60,941	-\$ 11,630
<i>Transportation Equipment</i>	-\$ 8,314	-\$ 8,314

2

2.2 GROSS ASSETS

2.2.1 GROSS ASSET VARIANCE ANALYSIS

WPI showed in Table 2 above, the calculation using the average net balances for capital and accumulated depreciation. Below is a table that shows the gross opening and closing balances of the assets and accumulated depreciation⁹. The opening and closing balances correspond to the fixed asset continuity statements, therefore no reconciliation is required¹⁰.

Table 9: Gross Assets and Accumulated Depreciation

Particulars	Last Board Approved	2013	2014	2015	2016	2017	2018
Gross Capital Assets in Service:							
Opening Balance		49355790.44	55473538	59800376.9	63460806.2	68414652.2	72724094.2
Ending Balance		55473538.02	59800376.9	63460806.2	68414652.2	72724094.2	77615338.2
Average Balance		52414664.23	57636957.5	61630591.6	65937729.2	70569373.2	75169716.2
Accumulated Depreciation							
Opening Balance		19116908.83	20376421.2	22028370.9	23808479.4	25524568.4	27394237.6
Ending Balance		20376421.15	22028370.9	23808479.4	25524568.4	27394237.6	29388122.9
Average Balance		19746664.99	21202396	22918425.1	24666523.9	26459403	28391180.3
Average Net Book Value	\$35,590,152	32667999.24	36434561.4	38712166.4	41271205.4	44109970.2	46778536

Table 2-AB is presented below as well as in the DSP. The section which follows Table 2-AB presents a breakdown of capital investments by RRFE functions; System Access (Table 10), System Renewal (Table 11), System Services (Table 12) and General Plant (13). That said, to

⁹MFR - Opening and closing balances, average of opening and closing balances for gross assets and accumulated depreciation; working capital allowance (historical actuals, bridge and test year forecast)

¹⁰MFR - Opening and closing balances, average of opening and closing balances for gross assets and accumulated depreciation; working capital allowance (historical actuals, bridge and test year forecast)

comply with the filing requirements, the utility is also presenting a Breakdown of the utility's
Gross Assets by function (distribution plant, general plant, etc.) at Table 2.13¹¹

Table 10 - OEB Appendix 2-AB Capital Expenditures¹²

	Historical (previous actual)							
	Test-5	Test-4	Test-4	Test-4	Test-3	Test-4	Test-2	Test-4
	2013	2013	2014	2014	2015	2015	2016	2016
CATEGORY	Actual	BA	Actual	Planned	Actual	Planned	Actual	Planned
	\$		\$		\$		\$	
System Access	715,705		808,965	877,948	888,287	819,981	839,632	816,000
System Renewal	2,148,446		2,841,278	2,625,575	2,409,929	2,507,578	3,116,718	4,097,000
System Service	3,508,123		408,138	723,780	308,049	1,653,530	1,362,195	433,000
General Plant	480,015		663,247	555,000	620,228	469,600	651,394	295,000
Total	6,852,289		4,721,628	4,782,304	4,226,493	5,450,689	5,969,938	5,641,000
Contributed Capital	(473,674)		(394,427)	(344,627)	(360,794)	(313,340)	(584,438)	(200,000)
Net Capital	6,378,616	4,739,040	4,327,200	4,437,677	3,865,698	5,137,349	5,385,500	5,441,000
System O&M	2,150,390		1,853,021		1,662,954		2,111,080	

	Forecast (planned)					
	Test-1	Test	Test+1	Test+2	Test+3	Test+4
	2017	2018	2019	2020	2021	2022
CATEGORY	Projected Y/E	Forecast	Forecast	Forecast	Forecast	Forecast
	\$	\$	\$	\$	\$	\$
System Access	\$980,834	\$983,276	1,005,176	1,011,547	1,018,022	1,027,434
System Renewal	3,466,354	3,231,509	2,963,562	3,158,679	3,449,520	3,466,927
System Service	100,000	382,000	66,750	69,690	69,690	69,690
General Plant	102,800	635,000	350,000	590,000	95,000	570,000
Total	4,649,987	5,231,784	4,385,488	4,829,916	4,632,232	5,134,051
Contributed Capital	(340,541)	(340,541)	(340,541)	(340,541)	(340,541)	(340,541)
Net Capital	4,309,446	4,891,243	4,044,947	4,489,375	4,291,691	4,793,510
System O&M	1,980,836	1,967,533	2,006,884	2,047,021	2,087,962	2,129,721

¹¹ MFR - Complete Appendix 2-AA along with: explanation for variances, including that of actuals v. OEB-approved amounts for last OEB-approved CoS application; for capital projects that have a project life cycle greater than one year, the proposed accounting treatment, including the treatment of the cost of funds for construction work-in-progress

¹² MFR - Complete Appendix 2-AB - historical years must be actuals, forecasts for the bridge and test

- 1 It should be noted that the nature, intent, and basis of projects 2013 and forward are generally
2 regular and represent a consistent long term planning regime with exceptions mostly due to
3 planned irregular expenditures related to things like scheduled vehicle replacement.

4

Investment Category	Project/Activity	Budget 2013 (\$)	Actual 2013 (\$)
System Renewal	Poletran	612,345	287,667
	Substation Upgrade	385,658	23,541
	# 6 Copper Replacement	1,326,425	1,303,085
	Decrepit Pole Replacement	571,220	534,153
	Distribution Transformer Replacement		
Total Expenditure		2,895,648	2,148,446
System Service	Scada		
	Metering	444,524	517,995
	Cyme and GIS Integration		
	Wholesale Metering (PME)	14,638	15,940
	ESRI ArcGIS		
	Mobile Transformer Substation		
	Hanover MS1 Reactor Installation	217,173	
	Station Grid Code Upgrade Non Compliant	288,371	
	Stranded and Smart Metering		3,452,097
	IFRS and 2013 COS entries		-519,226
	Annual OH Burden Adj		41,317
Total Expenditure		964,706	3,508,123
System Access	Capital Poles	173,790	241,160
	New O/H Service Connections		
	New U/G Service Connections	169,141	282,317
	Non-Demarcation Customers	40,000	6,613
	3 Phase Customers	229,970	111,353
	Single Phase Customers		11,998
	New Lots Develop	187,150	62,265
	Relocates and Replacements		
	Contributed Capital	-343,740	-473,674
Total Expenditure		456,311	242,032
General Plant	Technology	73,600	391,713
	Vehicle Replacement	445,000	
	Tools & Equipment	72,000	41,298
	Facilities Enhancements	9,000	8091
	Office Furniture and Equipment	2,000	12,647
	Miscellaneous Equipment		26,266
	Change in Major Spare parts Inventory		-75,974
Total Expenditure		601,600	404,041
Total Expenditure		4,918,265	6,302,642

6

7

2013 Capital Expenditures

System Access

- WPI spent \$241k on new pole installations to allow system expansion to connect new customers, this program includes all Westario's service territory based on customer demand for requiring pole replacement and new/upgrade services. During 2013 Westario determined that based off customer demand this program would require 50 poles per year.
- All the below services include new/upgrade assets based on customer request per calendar year across the Westario's service territory.
 - o New UG service Connections
 - o Non-demarcation customer
 - o 3 phase customers
 - o New lot development
- There were two new 3 phase customers that were larger jobs, \$111K, an underground line to the Teeswater Sewage station, and a new elementary school in Wingham.
- WPI spent \$ 282k for New Underground Connections to accommodate the connections of 132 new residential customers.
- There were five (5) new subdivision developments in 2013; WPI invested \$62k to allow for the energization and supply of power to these developments. Harbour Haven in Port Elgin was planned and deferred to 2014.

System Renewal

- #6 Copper Wire replacement, Capital Expenditure \$1.3M. In 2013 WPI completed a number of separate jobs to replace restricted #6 copper wire in the town of Southampton. The # 6 copper wire replacement was necessary to eliminate potential and significant safety risk the conductor poses to the public and safety of WPI workers. The #6 copper conductors in this town were very old and brittle and in the event of a storm or during maintenance activities the conductor can

break and fall to the ground. The plan to replace restricted #6 Copper conductor projects also included the replacement of all #6 copper conductors, old aging transformers and decrepit poles. This project included various locations in the town of Southampton.

- Decrepit Pole replacement, Capital Expenditure \$534k: WPI completed the replacement 52 decrepit poles identified as reaching their end of life, rotten and unsafe as per the Asset Condition Assessment (ACA) included in WPIs' Asset Management Plan (AMP) from previous pole audits. Based on Westario's older pole test results and pole aging analysis, various towns in Westario's service territory were selected to complete decrepit pole replacements including Port Elgin. Decrepit Pole replacement program includes replacement of decrepit wood poles, aging poles, conductors and devices.
- Poletran Conversion, Capital Expenditure \$288k: WPI completed the removal and replacement of 20 Poletran unit in Town of Port Elgin, This program was expected to be a 10-year project cycle to complete all Poletran conversion, one phase per year. In 2013 phase 5 of 10 was completed. As mentioned before the replacement of these units were necessary due to their design, and the safety hazard that our staff are exposed to because of the improper electrical clearances inside the units and the difficulty to operate and maintain the unit safely. An outage is required when maintaining the unit which causes unnecessary power outages to our customers supplied by the unit.
- All necessary civil construction, including underground boring, conduit installation are usually completed in the prior year in preparation for the actual electrical installation portion.

System Service

- Metering: WPI spent \$520k on metering, requirement to upgrade 3-phase to interval metering and on smart metering, 3 Phase smart meters installed, upgraded to 3 elements where possible, cross phase test completed. This work

1 was contracted to our MSP, Rodan Energy Solutions Inc. Below are the upgraded
2 meters per area.

3	KINCARDINE	44
4	PORT ELGIN	51
5	SOUTHAMPTON	14
6	LUCKNOW	10
7	Total	119

- 8 • Stranded and Smart Meter, Capital Expenditure \$3,508,123 were added to rate
9 base in 2013.

10 **General Plant**

- 11 • \$82k was spent on computer hardware; \$309k was spent on software, \$274k was
12 for Smart Meters (Computer Software for the Smart Meter Implementation from
13 2009 to 2012) and applied as per the approved 2013 COS.

Investment Category	Project/Activity	Budget 2014	Actual 2014
System Renewal	Poletran	354,467	287,498
	Substation Upgrade	1,641,605	1,809,644
	# 6 Copper Replacement	149,619	449,151
	Decrepit Pole Replacement	479,884	289,729
	Distribution Transformer Replacement		
Total Expenditure		2,625,575	2,836,022
System Service	Scada		
	Metering	435,123	299,478
	Cyme and GIS Integration		
	Wholesale Metering (PME)		
	ESRI ArcGIS		
	Mobile Transformer Substation		
	Hanover MS1 Reactor Installation		
	Station Grid Code Upgrade Non Compliant	288,657	
	Stranded and Smart Metering		
	IFRS and 2013 COS entries		
	Annual OH Burden Adj		113,916
Total Expenditure		723,780	413,394
System Access	Capital Poles	298,288	113,970
	New O/H Service Connections		
	New U/G Service Connections	187,853	374,338
	Non-Demarcation Customers	40,000	11,639
	3 Phase Customers	230,857	97,994
	Single Phase		1,585
	New Lots Develop	120,951	209,439
	Relocates and Replacements		
	Contributed Capital	-344,627	-394,428
Total Expenditure		533,322	414,537
General Plant	Technology	15,000	118,480
	Vehicle Replacement	400,000	371,134
	Tools & Equipment	70,000	74,412
	Facilities Enhancements	35,000	39,429
	Office Furniture and Equipment	5,000	42,234
	Miscellaneous Equipment	30,000	17,556
	Change in Major Spare parts Inventory		-28,543
Total Expenditure		555,000	634,702
1	Total Expenditure	4,437,677	4,298,655

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2014 Capital Expenditures

System Access

- WPI spent \$114k on new poles installation to allow system expansion to connect new customers, this program includes all Westario's service territory based on customer demand and new/upgrade services which may require a pole replacement. Additional projects which required new poles installed included one municipal road access job and one project to eliminate a load transfer customer.
- All the below services that includes new/upgraded assets based on customer request per calendar year across the Westario's service territory.
 - o New UG service Connections
 - o Non-demarcation customer
 - o 3 phase customers
 - o New lot development
- There were four (4) new 3 phase customer connections costing \$99k, Harriston and Southampton Convenience Stores/Gas Station, and one in the Hanover industrial park.
- There was an increase in new residential connections, 141 in total for 2014, costing \$376k.
- New subdivisions: there were seven (7) new subdivisions developments planned in 2014, however only 5 were constructed, WPI invested \$221k to accommodate for the energization and supply of power to these developments.

System Renewal

- #6 Copper Wire replacement, Capital Expenditure \$450Kk: in 2014 WPI completed three (3) major jobs to replace restricted #6 copper wire within the town of Kincardine. The # 6 copper wire replacement was necessary to eliminate potential and significant safety risk the conductor poses to the public and safety of the workers. The #6 copper conductors in this town were very old and brittle

and in the event of a storm or other maintenance activities the conductor can break and fall to the ground inadvertently. The plan to replace restricted #6 Copper conductor projects, also includes the replacement of all #6 copper conductors, old aging transformers and decrepit poles. As part of WPI annual restricted #6 copper wire replacement program Kincardine was next in the plan.

- Substation Upgrade, Capital Expenditure \$1.8k: in 2012 WPI, as part of its distribution asset management plan (DAMP), tested substation transformers insulation oil for all of its transformers, especially those greater than thirty (30) year old and reaching their Typical Useful Life (TUL) of 45 years. The data collected was used to determine which transformers would reach their end of life or fail imminently. A substation asset strategy was developed in 2012 by WPI for it 27 distribution stations based on these station assessments. In 2014, WPI started its substation asset replacement/upgrade strategy. WPI spent \$592k to upgrade MS1 Substation in Wingham as the transformer had reached its end of life and was leaking oil badly creating an environmental and safety concern in the community. WPI spent \$534k on the Palmerston substation to upgrade the transformer due to the transformer reaching end of life and the high risk of failure as indicated from the dissolve gas analysis results (DGA). A new transformer was added to the station to provide backup power supply for the town and to reduce the outage time during construction. WPI spent \$677 to install a second transformer in Harriston and to replace the aging and undersized 2MVA transformer which was causing unsafe operating conditions for our staff and an unreliable supply of power for the town of Harriston.
- Decrepit Pole replacement, Capital Expenditure \$289k: WPI completed the replacement 55 decrepit poles identified as reaching their end of life, rotten and unsafe as per our Asset Condition Assessment (ACA) of WPIs' Asset Management Plan (AMP) from previous pole audits. Based on Westario's older pole test results and pole aging analysis, various towns and municipality in WPI service territories were selected for decrepit pole replacements. The Decrepit Pole Replacement

program included replacement of decrepit wood poles, aging poles, conductors and devices.

- Poletran Conversion, Capital Expenditure \$288k: WPI completed the removal and replacement of 20 Poletran units in Town of Port Elgin and Southampton. This program was expected to be a 10-year project cycle to complete all Poletran conversion, one phase per year. In 2014 phase 6 of 10 was completed. As mentioned before the replacement of these units were necessary due to their design, and the safety hazard that our staff are exposed to because of the improper electrical clearances inside the units and the difficulty to operate and maintain the unit safely. An outage is required when maintaining the unit which causes unnecessary power outages to our customers supplied by the unit.
- All necessary civil construction, including underground boring, conduit installation are usually completed in the prior year in preparation for the actual electrical installation portion.

System Service

- Metering: WPI spent \$294k, on the end of GS<50 interval metering upgrades, 3 Phase smart meters installed, upgraded to 3 elements where possible, cross phase test completed. WPI also purchased new gatekeepers for \$100k.

WINGHAM	16
HANOVER	52
NEUSTADT	2
CLIFFORD	5
HARRISTON	11
PALMERSTON	10
Total	96

- All interval meters changed out due to seal expiry, cross phase tested Interval Meters changed 16.

General Plant

- 1 • WPI initially indicated that \$115k was spent on SAP software and other Microsoft
2 software licenses to complete upgrades to its financial software to better manage
3 our various financial transactions; however upon further analysis of the licenses
4 and agreements it was determined that the majority of these fees did not
5 represent capital assets and \$111K was reversed in 2016 to reclassify this as an
6 expense. The OM&A for 2018 represents the correct allocation of these annual
7 computer fees.
- 8 • \$74k was spent to purchase one tensioner and stringing machine. The new
9 tension and stringing machine was purchased to enable our lines staff to safely
10 string lines over existing live line during line construction. The use of a tensioner
11 and stringing machine requires a unit at each end of the line being strung. The
12 other tensioner and stringing machine was purchased in 2015.
- 13 • \$371k on transportation, – WPI purchased one pickup truck, one Digger truck, a
14 Reel trailer and a Cargo trailer to replace its retired trucks/trailers as part of the
15 vehicle replacement policy. The pickup truck and Digger truck had reached their
16 useful lives and the hydraulic system in the digger truck was constantly failing
17 due to wear and tear.

Investment Category	Project/Activity	Budget 2015	Actual 2015
System Renewal	Poletran	379,439	344,055
	Substation Upgrade	848,371	815,176
	# 6 Copper Replacement	851,195	773,415
	Decrepit Pole Replacement	428,573	475,884
	Distribution Transformer Replacement		1,328
Total Expenditure		2,507,578	2,409,858
System Service	Scada		
	Metering	105,705	235,882
	Cyme and GIS Integration		
	Wholesale Metering (PME)	10,000	10,308
	ESRI ArcGIS	361,825	
	Mobile Transformer Substation	978,000	
	Hanover MS1 Reactor Installation		
	Station Grid Code Upgrade Non Compliant	198,000	
	Stranded and Smart Metering		
	IFRS and 2013 COS entries		
	Annual OH Burden Adj		61,930
Total Expenditure		1,653,530	308,120
System Access	Capital Poles	228,091	276,202
	New O/H Service Connections		
	New U/G Service Connections	218,651	287,736
	Non-Demarcation Customers	42,000	14,487
	3 Phase Customers	215,840	105,763
	Single Phase		
	New Lots Develop	115,399	204,099
	Relocates and Replacements		
	Contributed Capital	-313,340	-360,794
Total Expenditure		506,641	527,493
General Plant	Technology	268,600	388,702
	Vehicle Replacement	35,000	58,226
	Tools & Equipment	85,000	93,460
	Facilities Enhancements	46,000	40,949
	Office Furniture and Equipment	5,000	21,091
	Miscellaneous Equipment	30,000	17,800
	Change in Major Spare parts Inventory		-113,560
Total Expenditure		469,600	506,668
1 Total Expenditure		5,137,349	3,752,139

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2015 Capital Expenditures

System Access

- WPI spent \$283k on new poles installation for new feeders coming out of the newly upgraded Kincardine MS1 Station, as well as the Hanover Industrial park line extension, the new pole installation program includes all Westario's service territory based on customer demand for requiring pole replacement and new/upgrade services. This program is estimated to have about 50 poles installed for the calendar year based on historical information.
- Below is a list of program which may require new pole installs, including new/upgrades based on customer request per calendar year across the Westario's service territory.
 - o New UG service Connections
 - o Non-demarcation customer
 - o 3 phase customers
 - o New lot development
- In 2015, WPI planned Ten (10) new 3 phase connections, with six (6) proceeding, with a spend of \$105k.
- New residential underground connections cost \$288k, with 132 new connections completed.
- New subdivisions cost \$204k, with four (4) proceeding, most notably the Hanover Industrial Park.

System Renewal

- #6 Copper Wire replacement, Capital Expenditure \$773k: In 2015 WPI completed a Seven (7) major jobs to replace restricted #6 copper wire within the town of Kincardine. The # 6 copper wire replacement was necessary to eliminate potential and significant safety risk the conductor poses to the public and safety of the

workers. As part of Westario's annual Capex the town of Kincardine was next in the plan to replace restricted #6 Copper distribution lines.

- Substation Upgrade, Capital Expenditure \$815k; In 2015 WPI spent \$848k to upgrade Kincardine MS1 Substation including installing a new 7.5MVA transformer. The Kincardine MS1 substation had reached its end of life, the transformer was smaller in size and had a different wiring configuration than that of the other three (3) substations which made it difficult and unsafe to parallel the substation with other station for maintenance purposes. The old transformer test result also proved high risk of failure as indicated from the dissolve gas analysis results (DGA).
- Decrepit Pole replacement, Capital Expenditure \$476k: WPI completed the replacement of 48 decrepit poles identified as reaching their end of life, rotten and unsafe as per our Asset Condition Assessment (ACA) of WPIs' Asset Management Plan (AMP) from previous pole audits. Based on Westario's older pole test results and pole aging analysis, various towns and municipality in WPI service territories were selected to complete decrepit pole replacements. The Decrepit Pole Replacement program included replacement of decrepit wood poles, aging poles, conductors and devices.
- Poletran Conversion, Capital Expenditure \$344k: WPI completed the removal and replacement of 23 Poletran units in Town of Port Elgin. In 2015 phase 7 of 10 was completed as per the poletran ten (10) year program. The replacement of these units were necessary due to their design, and the safety hazard that our staff are exposed to because of the improper electrical clearances inside the units and the difficulty to operate and maintain the unit safely. These Poletran units being replaced were built to meet electrical standards at the time of implementation but no longer meet current standards.

System Service

- \$236k spent on metering: WPI replaced 25 older version Gatekeepers to newer technology Gatekeepers to support the future AMI communication platform for new smart meter installations and communication network.

General Plant

Westario Power's General Plant capital spending for 2015 was \$43K under the 2014 amount.

- \$179k on computer hardware (servers, storage capacity, switches, desktops, laptops) related to a system upgrade and GIS implementation. The capital expenditure in this category was primarily due to the costs associated with a system upgrade to accommodate a network and capacity/security hardware upgrade to facilitate data management and the acquisition of the implementation of the Geographic Information System (GIS). This GIS was necessary to allow WPI to better manage and store relevance data pertinent to its asset management program, increasing functionality for the Engineering and Operations staff, and to integrate with our future SCADA system. This expenditure for WPI GIS implementation was mainly to install hardware as the first step in a four phase process.
- Records initially indicated that \$187k was spent on SAP software and other Microsoft software licenses to complete upgrades to its financial software to better manage our various financial transactions; however upon further analysis of the licenses and agreements it was determined that the majority of these fees did not represent capital assets and \$142K was reversed in 2016 to reclassify this as an expense. The OM&A for 2018 represents the correct allocation of these annual computer fees. The remaining \$45K was spent on various administrative management products such as MS office, SQL server, records management, and incident reporting.
- \$93k spent on a second tensioner and stringing machine. The new tension and stringing machine was purchased to enable our lines staff to safely string lines over existing live line during line construction. The use of a tensioner and stringing machine requires a unit at each end of the line being strung. The other tensioner and stringing machine was purchased in 2014.
- \$58k spent on Truck 66, a replacement supervisor pickup truck.

Investment Category	Project/Activity	Budget 2016	Actual 2016
System Renewal	Poletran	489,000	
	Substation Upgrade	1,824,000	1,457,532
	# 6 Copper Replacement	880,000	281,923
	Decrepit Pole Replacement	469,000	985,871
	Distribution Transformer Replacement	435,000	335,460
Total Expenditure		4,097,000	3,060,786
System Service	Scada	70,000	55,932
	Metering	53,000	254,808
	Cyme and GIS Integration		354,684
	Wholesale Metering (PME)		
	ESRI ArcGIS	210,000	
	Mobile Transformer Substation		688,929
	Hanover MS1 Reactor Installation		
	Station Grid Code Upgrade Non Compliant	100,000	97,962
	Stranded and Smart Metering		
	IFRS and 2013 COS entries		
	Annual OH Burden Adj		320,497
Total Expenditure		433,000	1,772,812
System Access	Capital Poles	199,000	277,122
	New O/H Service Connections	16,000	
	New U/G Service Connections	86,000	99,313
	Non-Demarcation Customers	13,000	32,139
	3 Phase Customers	223,000	173,013
	Single Phase		47,878
	New Lots Develop	79,000	106,223
	Relocates and Replacements		103,944
	Contributed Capital		-584,438
Total Expenditure		616,000	255,194
General Plant	Technology	55,000	210,994
	Vehicle Replacement	115,000	93,165
	Tools & Equipment	85,000	1,275
	Facilities Enhancements	20,000	7,906
	Office Furniture and Equipment	20,000	6,259
	Miscellaneous Equipment		100,662
	Change in Major Spare parts Inventory		
Total Expenditure		295,000	420,261
Total Expenditure		5,441,000	5,509,053

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2016 Capital Expenditures

System Access

WPI spent \$277k on new poles installation on customer demand driven jobs requiring pole replacement. Each year WPI estimates about 50 poles will be installed for the calendar year based on historical information. Below is a list of projects which may require new poles install, including new/upgrades customer service;

- o New UG service Connections
- o Non-demarcation customer
- o 3 phase customers
- o New lot development
- There were Six (6) new 3 phase customers with a spend of \$173k.
- New residential underground connections were \$99k.
- New overhead connections were \$106k.

System Renewal

- #6 Copper Wire replacement, Capital Expenditure \$282k: In 2016 WPI completed a three (3) separate jobs to replace restricted #6 copper wire in the town of Lucknow. The # 6 copper wire replacement was necessary to eliminate potential and significant safety risk the conductor poses to the public and safety of WPI workers. The #6 copper conductors in this town were very old and brittle and in the event of a storm or other maintenance activities the conductor can break and fall to the ground inadvertently. The plan to replace restricted #6 Copper conductor projects, also includes the replacement of all #6 copper conductors, old aging transformers and decrepit poles. This project included various locations in the town of Lucknow.
- Substation Upgrade, Capital Expenditure \$1.5k: the capital expenditure increase shows a continuation in the systematic substation asset replacement strategy

1 with the majority of the spend going toward the Upgrade of the Kincardine MS3
2 substation and Phase 1 of Lucknow MS1 substation. WPI. as a means of cost
3 savings, refurbished the existing 7.5MVA transformer in the Kincardine MS3. WPI
4 also completed phase 1 upgrades of Lucknow substation which was part of the
5 annual station upgrade and refurbishment plan. The Kincardine MS3 transformers
6 had reached its end of life and showed a high risk of failure as indicated from the
7 dissolve gas analysis results (DGA) in accordance to the transformer historical test
8 results. However, further assessments determined that refurbishment of the
9 Lucknow transformers could extend the life of the equipment. The Lucknow
10 station was the only station in the town and therefore it was necessary to
11 upgrade the station to mitigate the risk of loss of supply due to an imminent
12 failure of the transformer. WPI took additional steps to design/construction a
13 make ready mobile unit station (MUS) connection point for future supply
14 reliability for the town Lucknow.

- 15 • Decrepit Pole replacement, Capital Expenditure \$986k: WPI completed the
16 replacement of 145 decrepit poles identified as reaching their end of life, rotten
17 and unsafe as per our Asset Condition Assessment (ACA) of WPIs' Asset
18 Management Plan (AMP) from previous pole audits. Based on Westario's older
19 pole test results and pole aging analysis in various towns and municipalities WPI
20 service territories, Harriston and Southampton were selected to complete most of
21 the decrepit pole replacements for 2016. The Decrepit Pole Replacement
22 program included replacement of decrepit wood poles, aging poles, conductors
23 and devices.
- 24 • Distribution Transformer Replacement, Capital Expenditure \$335k: in 2016 WPI
25 completed the removal and replacement of 85 Pole top transformer and 10 Pad
26 transformers in Town of Kincardine, Southampton, Hanover, Clifford and
27 Harriston. These transformers had reached the end of life and in some cases were
28 leaking oil badly creating an environmental and safety concern in the community.
29 The Distribution Transformer Replacement program started in 2016 and is
30 expected to continue for the next five years. The program is expected to target

aging transformers that have either reached or exceeded the end of life and are impacting system reliability and safety during maintenance.

System Service

- Mobile Transformer Substation (MUS): The main driver for the increase in this category is a one-time expense for a new mobile unit substation; in 2016 WPI, as part of its Substation asset replacement strategy, WPI determined that it needed a MUS, a reliable supply of power for the towns with one substation during the upgrade or construction stage of the substation. This unit would help limit any outages and inconveniences to our customers, providing backup power for the duration of the project.
- Metering \$255K: WPI is showing an increase in metering spend due to the MIST Meters Installation program in many locations within our service territory.
- Station Grid code upgrade \$98K: as part of Westario's substation requirements for meeting regulatory standards. The ground grid in a number of substations was upgraded to ensure compliance with electrical standards and ensuring the safety of operators and maintenance personal within the substation perimeter.
- WPI started installing hardware and Remote Terminal Units (RTU) in Palmerston and Kincardine MS3 substation as part of the SCADA network system. The SCADA system was design to provide WPI with real-time substation operating conditions and also important load and voltage data for system planning.

General Plant

- EsriArcGIS software \$355K, GIS: the capital expenditure for the software was primarily associated to GIS implementation. Continued investment in the full implementation of GIS for engineering design, system reliability and Asset Management. WPI was able to transition from AutoCAD based maps to the more efficient GIS system as of 2016 due to the successful implementation of GIS.
- Transportation \$93K, purchased 2 pickup trucks and Van to replace its retired trucks as part of the vehicle replacement policy.

Investment Category	Project/Activity	Budget 2017	Actual 2017
System Renewal	Poletran	285,118	
	Substation Upgrade	1,450,000	
	# 6 Copper Replacement	652,215	
	Decrepit Pole Replacement	772,820	
	Distribution Transformer Replacement	306,200	
Total Expenditure		3,466,353	
System Service	Scada	70,000	
	Metering	30,000	
Total Expenditure		100,000	
System Access	Capital Poles	304,300	
	New O/H Service Connections	166,129	
	New U/G Service Connections	124,663	
	Non-Demarcation Customers	45,200	
Total Expenditure		640,292	
General Plant	Technology	52,800	
	Vehicle Replacement	10,000	
	Tools & Equipment	25,000	
	Facilities Enhancements		
	Office Furniture and Equipment	15,000	
	Miscellaneous Equipment		
	Change in Major Spare parts Inventory		
Total Expenditure		102,800	
Total Expenditure		4,309,445	

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2017 Capital Expenditures

System Access

WPI spent \$304k on new poles installation on customer demand driven jobs requiring pole replacement. Each year WPI estimates about 50 poles will be installed for the calendar year based on historical information. Below is a list of projects which may require new poles install, including new/upgrades customer service;

- o New UG service Connections
- o Non-demarcation customer
- o 3 phase customers
- o New lot development
- Non Demarcation and 3 Phase customers \$45K planned.
- New residential underground connections planned \$125k.
- New overhead connections planned \$166K.

System Renewal

- #6 Copper Wire replacement, Capital Expenditure \$652k: In 2017 WPI completed a total of twelve (12) separate jobs to replace restricted #6 copper wire within the town of Wingham and Hanover. The # 6 copper wire replacement was necessary to eliminate potential and significant safety risk the conductor poses to the public and safety of the workers. The #6 copper conductors in these town were very old and brittle and in the event of a storm or other maintenance activities the conductor can break and fall to the ground inadvertently.
- Substation Upgrade, Capital Expenditure \$1.45k: in 2017 WPI is continuing with the systematic substation asset replacement strategy with the majority of the spend on the Kincardine MS2, Palmerston MS1 and phase 2 of Lucknow MS1 station upgrades, \$1.45M planned - Westario completed Kincardine MS2 due to the transformer reaching its end of life and the high risk of failure as indicated from the dissolve gas analysis results (DGA). Lucknow MS1 substation upgrades

1 and transformer refurbishment are required due to the high risk of failure as
2 indicated from the dissolve gas analysis results (DGA). The Palmerston MS1
3 Station was completed in 2017 with the commissioning of the backup
4 transformer in the substation. The Lucknow station upgrade started in 2016 and
5 completed in 2017.

- 6 • Decrepit Pole replacement, Capital Expenditure \$773k: WPI completed the
7 replacement of 92 decrepit poles identified as reaching their end of life, rotten
8 and unsafe as per our Asset Condition Assessment (ACA) of WPIs' Asset
9 Management Plan (AMP) from previous pole audits. Based on Westario's older
10 pole test results and pole aging analysis, Southampton, Kincardine, and Port Elgin
11 and various towns were selected to complete decrepit pole replacements . The
12 Decrepit Pole Replacement program includes replacement of decrepit wood
13 poles, aging poles, conductors and devices.
- 14 • Poletran Conversion, Capital Expenditure \$285k: WPI completed the removal and
15 replacement of 16 Poletran unit in Town of Port Elgin. In 2017 phase 8 of 10 was
16 completed as per the poletran ten (10) year program. The replacement of these
17 units are necessary due to their design, and the safety hazard that our staff are
18 exposed to because of the improper electrical clearances inside the units and the
19 difficulty to operate and maintain the unit safely.
- 20 • Distribution Transformer Replacement, Capital Expenditure \$72k: In 2017 WPI
21 completed the removal and replacement of 30 Pole top transformers and 10 Pad
22 transformers in Town of Kincardine, Southampton, Hanover, Clifford and
23 Wingham and Palmerston. These transformers had reached the end of life and in
24 some cases are leaking oil badly creating an environmental and safety concern in
25 the community. The Distribution Transformer Replacement program started in
26 2016 and is expected to continue for the next five years. The program is expected
27 to target aging transformers that have either reached or exceeded the end of life
28 and are impacting system reliability and safety during maintenance.

1 **System Service**

- 2 • Metering - \$30K planned- (\$38K as of August), In 2017 WPI replaced and
3 resealed the primary metering equipment (PME) in Eight (8) in accordance with
4 Measurement Canada standards and to ensure full compliance with OEB
5 metering requirements.
- 6 • WPI started installing hardware and Remote Terminal Units (RTU) in Lucknow,
7 Kincardine MS1 and Kincardine MS2 substation as part of the SCADA network
8 system. The SCADA system was design to provide WPI with real-time substation
9 operating conditions and also important load and voltage data for system
10 planning.
- 11 •

12 **General Plant**

- 13 • The General Plant expenditures increased was primarily due to the need for a
14 higher level of computer software and hardware upgrades in the year.

Investment Category	Project/Activity	Budget 2018	Actual 2018
System Renewal	Poletran	463,286	
	Substation Upgrade	1,310,000	
	# 6 Copper Replacement	370,772	
	Decrepit Pole Replacement	780,146	
	Distribution Transformer Replacement	307,305	
Total Expenditure		3,231,509	
System Service	Scada	282,000	
	Metering	30,000	
	Cyme and GIS Integration	70,000	
Total Expenditure		382,000	
System Access	Capital Poles	306,742	
	New O/H Service Connections	166,129	
	New U/G Service Connections	124,663	
	Non-Demarcation Customers	45,200	
Total Expenditure		642,734	
General Plant	Technology	30,000	
	Vehicle Replacement	500,000	
	Tools & Equipment	35,000	
	Facilities Enhancements	35,000	
	Office Furniture and Equipment	35,000	
	Miscellaneous Equipment		
	Change in Major Spare parts Inventory		
Total Expenditure		635,000	
Total Expenditure		4,891,243	

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2018 Capital Expenditures

System Access

- Westario has forecasted \$307k in spending on capital poles in 2018: this program includes all of Westario's service territory on the basis of customer demand for requiring pole replacement and new/upgrade services. This program is based on 50 pole replacements per calendar year.
- All of the below services that includes new/upgrades based on customer request per calendar year across the Westario's service territory.
 - o New UG service Connections
 - o Non-demarcation customer
 - o 3 phase customers
 - o New lot development
- New 3 phase, subdivisions and Commercial customers budgeted for \$45k.
- New residential underground service connections budgeted for \$125k.
- New overhead connections budgeted for \$166k.

System Renewal

- WPI plans to upgrade and build Hanover MS5 station based on its station upgrade/rebuild plan in the town of Hanover. It is critical that the transformer be replaced due to the high running temperature as a result of the loading on the equipment and the high risk of failure as indicated from the dissolve gas analysis results (DGA). The transformer is 3 MVA in size and the growing industrial development warrants a larger size transformer as per the maintenance program. The budgeted cost is \$1.3M which includes property and the new substation required for this project.
- The Decrepit Poles Replacement project is budgeted for \$780K for 100 poles and pole mounted distribution transformers. These pole were selected as per WPI's new pole test program results and pole aging analysis, for the town of Southampton, Walkerton, Port Elgin, Hanover and other smaller towns. This

replacement program includes decrepit wood poles, aging pole mounted transformers and conductors in some of the areas.

- Distribution Transformer Replacement: WPI is planning to replace Ten (10) pad-mount transformers and overhead pole transformers in 2018, with \$307K budgeted for this program. The program will target aging transformers that have either reached or exceeded the end of life and are impacting system reliability and safety during maintenance.
- #6 restricted Copper replacement project has been budgeted at \$371K in 2018, as part of WPI annual capital expenditure for the town of Walkerton and Neustadt are next in the plan for restricted #6 copper replacement.
- PoleTran Conversion is projected to continue for Town of Port Elgin as per the 10 year project plan to complete all pole Tran conversion. In 2018 phase 9 of 10 is to be completed with a budget of \$463K.

System Service

- Metering \$30K budgeted for 2018 that includes Primary Meter Revenue (PME) replacement to reseal in accordance with Measurement Canada Standards.
- SCADA capital expenditure of \$282k is budgeted for 2018: WPI plans to install hardware and Remote Terminal Units (RTU) in Wingham MS1 and Hanover MS5 substation as a continuation of its SCADA system network. The SCADA system was designed to provide WPI real-time substation operating conditions and also important load and voltage data for system planning. WPI is planning to host its own SCADA system in the future as it is currently hosted by another utility.
- WPI is planning on investing in additional power system applications, which will be helpful for carrying out power system analysis, planning and design. Currently these analysis and studies are conducted by third parties. WPI believes it has the skills and technical talents to conduct these analysis and studies internally. These software applications include implementation of Cyme software to be integrated with existing GIS for planning, system analysis and design purposes. The budget for this system application is \$70K.

1 **General Plant**

- 2 • The General Plant spending is \$635K, WPI is expected to show an increase in
3 spending for this category in 2018 due to the plans to replace its 2005 single
4 bucket truck and 1999 dump truck and two (3) 2008 pick-up trucks. The large
5 trucks have reached the end of useful life, based on the mileage and the high
6 maintenance cost. The expenditure for this category will enhance the
7 effectiveness of Westario's facility for efficiency of operations, as we continue to
8 make strategic investments on tools, equipment, office furniture and
9 technologies.

Appendix 2-AA

2013 Board Approved Capital Projects Table vs 2013 Actual

Projects	2013 BA	2013 Actual	Difference	Explanation
Capital 6 Primary replacement	1,404,459	1,303,085	-101,374	Kincardine was planned but deferred to the following year
Capital Poles - Decrepit	567,155	534,153	-33,002	
Capital Poles	476,954	241,160	-235,794	allow system expansion to connect new customers – greater # of underground connections from existing assets
Emergency Transformer Refurb and Ready Stations	301,252		-301,252	substation upgrades were deferred to 2014 to accommodate greater effort needed for smart meters
Upgrade Station Metering	129,422		-129,422	substation upgrades were deferred to 2014 to accommodate greater effort needed for smart meters
Station Grid Upgrade	209,369		-209,369	substation upgrades were deferred to 2014 to accommodate greater effort needed for smart meters
Port Elgin 5KV Cable and Poletran replacement	741,355	287,667	-453,688	project costs were below budget
New Phase 3 Customers	303,893	111,353	-192,540	two new 3 phase customers that were larger jobs, an underground line to the Teeswater Sewage station, and a new elementary school in Wingham, fewer smaller scale additions than anticipated, overall growth in this area lower than anticipated
New Low Voltage services	259,832	282,317	22,485	
Non-Demarcation Customers	42,000	6,613	-35,387	See below
New Lots developed	248,142	62,265	-185,877	Harbour Haven in Port Elgin was planned and deferred to 2014
Metering	280,648	533,935	253,287	requirement to upgrade 3 phases to interval metering and on smart metering, 3 Phase smart meters installed, upgraded to 3 elements where possible, cross phase test completed
Building	9,000	8,091	-909	
Office Furniture and Equipment	2,000	12,647	10,647	
Computer Hardware	28,600	82,496	53,896	\$62,873.57 was for Stranded Meters (Computer Hardware for the Smart Meter Implementation from 2009 to 2012) and applied as per the approved 2013 COS
Computer Software	45,000	309,217	264,217	\$274,216.89 was for Smart Meters (Computer Software for the Smart Meter Implementation from 2009 to 2012) and applied as per the approved 2013 COS
Transportation Equipment	400,000		-400,000	deferral of a vehicle purchases to 2015
Tools, Shop and Garage Equipment	72,000	41,298	-30,702	
Miscellaneous Equipment	45,000	26,266	-18,734	
Substation Refurbishment	516,538	23,541	-492,997	substation upgrades

				were deferred to 2014 to accommodate greater effort needed for smart meters
Contributions and Grants	-457,663	-473,674	-16,011	
IFRS and Burden Adj		-477,909	-477,909	
Smart Meters		3,452,097	3,452,097	applied as per the approved 2013 COS

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2 There were less new developments and slightly less new services than expected. Both 3 phases
3 and single-phase upgrades decreased slightly. Capital poles projects values are based on actual
4 number of poles changed or installed, which were more than expected.

5 The Poletran project costs were below budget, and substation upgrades were deferred to
6 accommodate greater effort needed for smart meters.

7 Aside from 2013 taking most of the costs for new metering, that year also included the
8 approved recovery and cost transfer of the stranded meters.

9 Expenditures decreased due to the disposal of the stranded meters recovery and the deferral of
10 a vehicle purchase. However, there was an increase in software and hardware due to the
11 purchase of safety training software and new computers. Tools and miscellaneous equipment
12 increased due to the purchase of a trailer and replacement of line tools.

Table 11 – OEB Appendix 2-AA System Access Project Table

2013 – 2018 System Access investments are modifications or relocation a distributor is obligated to perform to provide a customer access to electricity services. There is steady load growth happening because of new subdivisions being built. This is causing investment in plant to service the new subdivisions.

Reporting Basis		CGAAP	CGAAP	CGAAP	CGAAP	MIFRS	MIFRS	MIFRS	MIFRS
Projects	USoA	2011	2012	2013	2014	2015	2016	2017	2018
System Access									
Capital Poles									
Distribution Station Equipment Nor	182000	0	0	0	0	0	0	0	0
Poles, Towers and Fixtures	183000	88,194	72,452	73,025	33,673	80,888	99,869	95,802	96,571
Overhead Conductors and Devices	183500	39,166	106,855	102,325	37,154	151,509	74,137	126,561	127,577
Underground Conduit	184000	510	2,807	3,066	12,214	10,654	3,333	8,401	8,468
Underground Conductors and Devices	184500	2,891	2,611	26,988	24,726	14,105	33,869	26,586	26,799
Line Transformers Overhead	185000	10,593	23,442	22,585	-3,725	9,979	52,649	28,168	28,394
Services Overhead	185500	8,465	23,682	11,705	1,110	9,068	9,255	15,085	15,206
Meters	186000	2,125	0	1,465	8,817	0	4,011	3,696	3,726
New 3 phase									
Distribution Station Equipment Nor	182000	0	0	0	0	0			
Poles, Towers and Fixtures	183000	17,990	32,836	11,846	16,908	4,668	9,847		
Overhead Conductors and Devices	183500	22,322	40,864	34,342	28,683	13,967	20,853		
Underground Conduit	184000	253	388	822	998	267	1,750		
Underground Conductors and Devices	184500	30,942	11,792	15,713	1,195	13,483	17,779		
Line Transformers Overhead	185000	95,438	46,450	38,225	35,071	56,612	101,645		
Services Overhead	185500	10,755	5,739	20	6,659	3,649	4,987		
Meters	186000	14,595	1,360	10,383	8,480	13,116	16,152		
New Single Phase									
Distribution Station Equipment Nor	182000	0	0	0	0		0		
Poles, Towers and Fixtures	183000	0	849	0	0		4,661		
Overhead Conductors and Devices	183500	0	2,224	766	160		6,479		
Underground Conduit	184000	0	6,430	0	0		305		
Underground Conductors and Devices	184500	0	7,958	479	0		2,516		
Line Transformers Overhead	185000	0	4,275	2,398	0		26,761		
Services Overhead	185500	0	15,354	7,964	1,424		3,819		
Meters	186000	0	1,379	390	0		3,338		
New UG Service									
Distribution Station Equipment Nor	182000	0	0	0	0	0	0	0	0
Poles, Towers and Fixtures	183000	3,405	21,580	21,343	8,766	9,061	4,560	12,960	12,960
Overhead Conductors and Devices	183500	6,735	18,560	24,068	10,062	24,475	3,073	15,764	15,764
Underground Conduit	184000	690	2,465	791	618	1,083	3,817	1,730	1,730
Underground Conductors and Devices	184500	31,773	25,750	37,071	48,297	50,137	26,494	36,484	36,484
Line Transformers Overhead	185000	-2,694	66,924	-13,624	140,062	54,406	57,041	59,870	59,870
Services Overhead	185500	180,662	134,538	112,954	80,502	71,634	0	129,441	142,011
Meters	186000	116,297	63,140	99,715	86,031	76,941	4,328	14,405	1,835
New Subdivisions (80 new lots)									
Distribution Station Equipment Nor	182000	0	0	0	0	0	0		
Poles, Towers and Fixtures	183000	24,561	13,085	5,768	16,365	39,537	4,480		
Overhead Conductors and Devices	183500	39,440	25,839	7,068	25,454	62,572	12,667		
Underground Conduit	184000	2,462	413	167	1,298	1,576	184		
Underground Conductors and Devices	184500	157,372	182,972	24,822	111,279	64,946	78,205		
Line Transformers Overhead	185000	55,612	53,462	23,046	44,725	34,027	10,688		
Services Overhead	185500	9,092	999	1,272	10,318	1,441	0		
Meters	186000	11,449	0	121	0	0	0		
CDM & Car Charging Station									
Distribution Station Equipment Nor	182000							0	0

Poles, Towers and Fixtures	183000							17,271	17,271
Overhead Conductors and Devices	183500							21,008	21,008
Underground Conduit	184000							2,305	2,305
Underground Conductors and Devices	184500							48,620	48,620
Line Transformers Overhead	185000							53,800	61,533
Services Overhead	185500							203,353	184,116
Meters	186000							14,325	25,828
Capital Poles									
Distribution Station Equipment	182000	0	0						
Poles, Towers and Fixtures	183000	169,152	176,460						
Overhead Conductors and Devices	183500	229,501	172,567						
Underground Conduit	184000	7,046	3,826						
Underground Conductors and Devices	184500	67,798	9,142						
Line Transformers Overhead	185000	123,021	16,396						
Services Overhead	185500	85,609	46,094						
Meters	186000	1,895	518						
Non-budged Work Orders									
Distribution Station Equipment Nor	182000						0		
Poles, Towers and Fixtures	183000						16,774		
Overhead Conductors and Devices	183500						30,137		
Underground Conduit	184000						11,117		
Underground Conductors and Devices	184500						23,346		
Line Transformers Overhead	185000						-71,890		
Services Overhead	185500						80,137		
Meters	186000						14,324		
Non-demarcation									
Distribution Station Equipment Nor	182000	0	0	0	0	0	0	0	0
Poles, Towers and Fixtures	183000	2,446	0	0	0	0	3,242	4,560	4,560
Overhead Conductors and Devices	183500	0	0	0	0	0	161	227	227
Underground Conduit	184000	17,852	0	0	11,536	3,568	8,465	11,905	11,905
Underground Conductors and Devices	184500	0	0	0	103	0	5,374	7,558	7,558
Line Transformers Overhead	185000	0	0	0	0	0	0	0	0
Services Overhead	185500	0	1,245	6,613	0	10,919	14,895	20,949	20,949
Total Projects		\$1,685,415	\$1,445,721	\$715,705	\$808,965	\$888,287	\$839,632	\$980,834	\$983,276
Contributed Capital		-626,691	-689,868	-473,674	-394,427	-360,794	-584,438	-340,541	-340,541
Sub-Total System Access		1,058,724	755,853	242,031	414,538	527,493	255,194	640,293	642,735

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Table 12 - OEB Appendix 2-AA System Renewal Variances

System Renewal	USoA	2011	2012	2013	2014	2015	2016	2017	2018
#6 Copper Primary Replacement									
Distribution Station Equipment	182000	0	0	0	0	0	0	0	
Poles, Towers and Fixtures	183000	188,289	191,308	550,670	176,655	245,523	89,049	215,474	122,493
Overhead Conductors and Devices	183500	272,671	737,605	562,982	147,104	401,943	145,336	328,658	186,836
Underground Conduit	184000	3,916	3,772	17,146	14,595	19,121	4,924	12,081	6,868
Underground Conductors and Devices	184500	59,654	7,621	50,158	20,315	57,392	13,417	27,022	15,362
Line Transformers Overhead	185000	119,629	44,646	54,644	48,024	22,162	14,942	36,258	20,612
Services Overhead	185500	145,735	18,205	67,484	42,456	27,274	13,316	32,533	18,495
Meters	186000	1,545	1,165	0	0	0	939	189	107
Port Elgin 5KV Cable & Poletrun Replacement									
Distribution Station Equipment	182000	0	0	0	0	0		0	0
Poles, Towers and Fixtures	183000	10,242	4,360	4,062	10,337	7,685		6,369	10,348
Overhead Conductors and Devices	183500	17,388	29,695	8,855	14,378	12,201		10,111	16,429
Underground Conduit	184000	249,446	3,066	121,218	16,609	1,070		887	1,441
Underground Conductors and Devices	184500	115,416	198,452	119,711	175,030	236,148		195,696	317,984
Line Transformers Overhead	185000	30,269	37,862	29,705	54,024	52,173		43,236	70,253
Services Overhead	185500	11,089	3,222	4,116	17,120	34,778		28,820	46,830
Meters	186000	0	0	0	0	0		0	0
Substation Refurbishment									
Distribution Station Equipment	182000	303,500	0	15,000	1,814,902	815,176	1,513,465	1,450,000	1,310,000
Poles, Towers and Fixtures	183000	28,317	0	0	0				
Overhead Conductors and Devices	183500	43,714	0	142	0				
Underground Conduit	184000	55,471	0	0	0				
Underground Conductors and Devices	184500	77,151	0	9,670	0				
Line Transformers Overhead	185000	37,393	0	13,744	0				
Services Overhead	185500	15,222	0	0	0				
Meters	186000	89,589	0	-15,015	0				
Distribution Transformer Replacements									
Distribution Station Equipment	182000	0	0			0	0	0	0
Poles, Towers and Fixtures	183000	0	0			910	13,118	11,974	12,017
Overhead Conductors and Devices	183500	0	0			0	8,276	7,554	7,581
Underground Conduit	184000	0	0			0	1,556	1,421	1,426
Underground Conductors and Devices	184500	0	0			111	9,093	8,300	8,330
Line Transformers Overhead	185000	0	0			0	299,713	273,571	274,558
Services Overhead	185500	0	0			378	2,319	3,380	2,124
Meters	186000	0	0			0	1,385	-0	1,269
Storm Damage									
Distribution Station Equipment	182000	0	0						
Poles, Towers and Fixtures	183000	0	0						
Overhead Conductors and Devices	183500	0	0						
Underground Conduit	184000	0	0						
Underground Conductors and Devices	184500	0	0						
Line Transformers Overhead	185000	0	0						
Services Overhead	185500	0	0						
Meters	186000	0	0						
Decrepit Poles									
Distribution Station Equipment	182000			0	0	0	2,858	0	0

Poles, Towers and Fixtures	183000			213,863	113,445	153,228	362,137	274,088	276,782
Overhead Conductors and Devices	183500			262,335	111,881	145,733	407,253	303,704	310,167
Underground Conduit	184000			4,432	6,458	10,049	20,059	40,233	61,815
Underground Conductors and Devices	184500			13,245	18,096	91,165	31,967	86,790	73,404
Line Transformers Overhead	185000			16,734	20,941	60,551	91,248	17,429	9,000
Services Overhead	185500			23,544	18,908	14,495	68,939	49,832	48,464
Meters	186000			0	0	663	1,408	744	514
Total Projects		\$1,875,646	\$1,280,979	\$2,148,446	\$2,841,278	\$2,409,929	\$3,116,718	\$3,466,353	\$3,231,509

- 1 **2013 – 2018 System Renewal** investments involve replacing and/or refurbishing system assets
- 2 to extend the original service life of the assets and thereby maintain the ability of the
- 3 distributor's distribution system to provide customers with electricity services. System renewal
- 4 has been proceeding at an appropriate pace based on the health index as detailed in the Asset
- 5 Condition Assessment Report included in the DSP. In 2018 the utility plans on replacing poles
- 6 and transformers that are defective as a result of inspections carried out and is on track with and
- 7 consistent with plans developed in 2016.

8 **Table 13 - OEB Appendix 2-AA System Service Variances**

System Service		2011	2012	2013	2014	2015	2016	2017	2018
Smart Meter, Collectors & Interval Metering Projects									
Distribution Station Equipment	182000	0	0	0	0	51,584	0	0	0
Poles, Towers and Fixtures	183000	8,516	28,167	29,900	10,003	5,188	3,055	1,154	1,154
Overhead Conductors and Devices	183500	917	25,068	42,029	3,681	19,389	1,783	1,603	1,603
Underground Conduit	184000	254	303	2,131	0	83	184	57	57
Underground Conductors and Devices	184500	323	17,018	37,481	4,843	8,632	266	1,228	1,228
Line Transformers Overhead	185000	4,304	13,943	12,432	973	18,710	1,495	806	806
Services Overhead	185500	1,781	1,282	16,194	735	1,198	3,993	530	530
Meters	186000	975	-14,734	377,828	273,986	131,098	244,032	24,621	24,621
SCADA									
Distribution Station Equipment	182000	0	0					70,000	282,000
Poles, Towers and Fixtures	183000	0	0						
Overhead Conductors and Devices	183500	0	0						
Underground Conduit	184000	0	0						
Underground Conductors and Devices	184500	0	0						
Line Transformers Overhead	185000	0	0						
Services Overhead	185500	0	0						
Meters	186000	0	0						
Service Upgrades (to 100, 200 or 400 Amp)									
Distribution Station Equipment Nor	182000	0	0				0		70,000
Poles, Towers and Fixtures	183000	0	0				0		
Overhead Conductors and Devices	183500	0	0				0		
Underground Conduit	184000	0	0				0		
Underground Conductors and Devices	184500	0	0				0		
Line Transformers Overhead	185000	0	0				0		
Services Overhead	185500	0	0				0		
Meters	186000	0	0				0		
Fit									

Distribution Station Equipment Nor	182000						688,929		
Substation Monitoring System(SCADA)									
Distribution Station Equipment	182000	0	0						
Poles, Towers and Fixtures	183000	1,559	0						
Overhead Conductors and Devices	183500	21,332	0						
Underground Conduit	184000	0	0						
Underground Conductors and Devices	184500	0	0						
Line Transformers Overhead	185000	0	0						
Services Overhead	185500	0	0						
Meters	186000	115,939	0						
Upgrade Station Metering, Transformers & Switchgear									
Distribution Station Equipment	182000	0	0	15,940		0			
Poles, Towers and Fixtures	183000	0	0	0		0			
Overhead Conductors and Devices	183500	0	0	0		0			
Underground Conduit	184000	0	0	0		0			
Underground Conductors and Devices	184500	0	0	0		0			
Line Transformers Overhead	185000	0	0	0		0			
Services Overhead	185500	0	0	0		0			
Meters	186000	0	0	0		10,308			
IFRS & COS Entries									
Distribution Station Equipment	182000	0	-89,310	0					
Poles, Towers and Fixtures	183000	0	113,067	-99,497					
Overhead Conductors and Devices	183500	0	186,447	-204,681					
Underground Conduit	184000	0	4,602	-4,269					
Underground Conductors and Devices	184500	0	147,190	-92,856					
Line Transformers Overhead	185000	0	50,310	-54,406					
Services Overhead	185500	0	111,117	-54,980					
Meters	186000	0	92,600	-8,535					
Station Grid Code Upgrade									
Distribution Station Equipment	182000	147,139	0				97,962		
Poles, Towers and Fixtures	183000	1,505	0						
Overhead Conductors and Devices	183500	3,277	0						
Underground Conduit	184000	450	0						
Underground Conductors and Devices	184500	7,743	0						
Line Transformers Overhead	185000	33,705	0						
Services Overhead	185500	5,034	0						
Meters	186000	4,118	0						
Stranded and Smart Metering									
Distribution Station Equipment	182000	0	0	0					
Poles, Towers and Fixtures	183000	0	0	0					
Overhead Conductors and Devices	183500	0	0	0					
Underground Conduit	184000	0	0	0					
Underground Conductors and Devices	184500	0	0	0					
Line Transformers Overhead	185000	0	0	0					
Services Overhead	185500	0	0	0					
Meters	186000	-443,031	0	3,452,097					
Annual OH Burden adjustment									
Distribution Station Equipment	182000	0	0	0	-4,218	-29	12,407		
Poles, Towers and Fixtures	183000	0	0	12,883	26,466	17,035	66,533		
Overhead Conductors and Devices	183500	0	0	11,781	22,056	17,382	146,253		
Underground Conduit	184000	0	0	1,673	3,273	1,466	1,011		
Underground Conductors and Devices	184500	0	0	3,644	17,629	3,163	15,954		
Line Transformers Overhead	185000	0	0	1,419	11,630	990	23,691		
Services Overhead	185500	0	0	9,234	35,545	21,866	52,817		
Meters	186000	0	0	684	1,534	-15	1,830		

Total Projects		-\$84,160	\$687,070	\$3,508,123	\$408,138	\$308,049	\$1,362,195	\$100,000	\$382,000
Contributed Capital		-6,030	-18,463					0	

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2 **2013 – 2018 System Service** investments are modifications to a distributor’s distribution
3 system to ensure the distribution system continues to meet distributor operational objectives
4 while addressing anticipated future customer electricity service requirements. WPI does minimal
5 System Service capital work. The notable exception is the Mobile Transformer Substation
6 purchased in 2016. This allows for redundant transformer capacity which will allow for better
7 management of refurbishment programs and outages. It can serve as an emergency backup, for
8 any of the existing stations, in case of a station component failure

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Table 14 - OEB Appendix 2-AA General Plant Variances

General Plant		2011	2012	2013	2014	2015	2016	2017	2018
Land	186500								
Buildings and Fixtures	180800			8,091	39,432	40,949	7,144		35,000
Other Installations on Customer's Premise	186500								
Major Spare Parts Inventory	189999	-6,783	9,424						
Office Furniture and Equipment	191500	10,589	2,642	12,647	42,234	21,091	6,259	15,000	35,000
Computer Equipment Hardware	192000	45,385	9,258	82,496	2,446	179,867	35,314		
Computer Software	192500	89,765	-17,677	309,217	115,489	187,990	52,127	52,800	30,000
Esri ArcGIS Software	192500						354,685		
Transportation Equipment	193000	145,500	266,096		371,134	58,226	93,165	10,000	500,000
Stores Equipment	193500	-5,900	1,241		580	0			
Tools, Shop and Garage Equipment	194000	18,505	1,180	41,298	73,832	93,460	1,275	25,000	35,000
Measurement and Testing Equipment	194500	4,405	13,143			0			
Power Operated Equipment	195000	-11,000				0			
Communication Equipment	195500				545	20,845	763		
Miscellaneous Equipment	196000		17,197	26,266	17,556	17,800	100,662		
Load Management Controls Utility Prem	197500								
Sentinel Lighting Rental Units	198500								
Total Non-Projects		\$290,467	\$302,504	\$480,015	\$663,247	\$620,228	\$651,394	\$102,800	\$635,000
Contributed Capital									
Sub-Total General Plant		290,467	302,504	480,015	663,247	620,228	651,394	102,800	635,000

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3 **2013-2018 General Plant** investments are modifications, replacements or additions to a
4 distributor's assets that are not part of its distribution system; including land and buildings; tools
5 and equipment; rolling stock and electronic devices and software used to support day to day
6 business and operations activities. The larger amounts are typically related to system upgrades
7 for the Billing / CIS and Engineering systems system and some web enhancement.

8 In 2018: Replace an existing 1.5-ton truck with 3-ton truck, and replace an existing single bucket
9 and three (3) pickup trucks with new as they have reached their end of life per Westario's life-
10 cycle policy. The reason for replacement is to reduce maintenance costs and obtain newer/larger
11 trucks to mirror operation requirements.

12 In compliance with the filing requirements, the capital additions are presented by traditional
13 functions in Table 15 below.

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Table 15 – Yearly Investments by Traditional Functions¹³

			2013	2014	2015	2016	2017	2018
Distribution Plant	1611	Computer Software	\$309,217	115,489	187,990	406,812	52,800	30,000
Distribution Plant	1808	Building	\$8,091	39,429	40,949	7,144		35,000
Distribution Plant	1820	Distribution Station Equipment < 50 kV	\$30,940	1,810,684	866,731	2,315,620	1,520,000	1,662,000
Distribution Plant	1830	Poles, Towers & Fixtures	\$823,865	412,618	563,724	677,325	639,652	554,157
Distribution Plant	1835	Overhead Conductors & Devices	\$852,013	400,615	849,171	856,408	815,191	687,193
Distribution Plant	1840	Underground Conduit	\$147,176	67,599	48,936	56,706	79,020	96,015
Distribution Plant	1845	Underground Conductors & Devices	\$246,127	421,513	539,283	258,280	438,283	535,769
Distribution Plant	1850	Line Transformers	\$146,902	351,725	309,609	607,982	513,137	525,026
Distribution Plant	1855	Services (Overhead & Underground)	\$206,121	214,778	196,699	254,476	483,924	478,726
Distribution Plant	1860	Meters	\$69,439	79,997	154,402	291,747		
Distribution Plant	1860	Meters (Smart Meters)	\$3,849,692	298,853	77,709		57,976	57,899
		Subtotal	6,689,583	4,213,298	3,835,202	5,732,500	4,599,983	4,661,785
General Plant	1915	Office Furniture & Equipment (10 years)	\$12,647	42,234	21,091	6,259	15,000	35,000
General Plant	1920	Computer Equipment - Hardware	\$82,496	2,446	179,867	35,314		
General Plant	1930	Transportation Equipment	\$-	371,134	58,226	93,165	10,000	500,000
General Plant	1935	Stores equipment	\$-	580				
General Plant	1940	Tools	\$41,298	73,832	93,460	1,275	25,000	35,000
General Plant	1955	Communication Equipment	\$-	545	20,845	763		
General Plant	1960	Miscellaneous Equipment	\$26,266	17,556	17,800	100,662		
General Plant	1995	Contributions & Grants	-\$473,674	-\$394,426	-\$360,794	-\$584,438	-\$340,541	-\$340,541
		Subtotal	-\$310,966	113,901	30,495	-\$347,000	-\$290,541	229,459
		Total	6,378,616	4,327,199	3,865,697	5,385,500	4,309,442	4,891,244

2

years
working capital allowance (historical actuals, bridge and test year forecast)
¹⁰ MFR - Op

2.2.2 ACCUMULATED DEPRECIATION

WPI has adopted depreciation rates based on the Kinetrics Asset Depreciation Study. The Summary of Accumulated Depreciation are presented in the table below.

WPI's depreciation expense policy and methodology are provided on the next page. The depreciation expenses continuity schedules are presented in Exhibit 4.

Table 16 below provides WPI's depreciable lives by asset class.

Table 16 – Summary of Accumulated Depreciation

OEB	Description	NEWGAAP	NEWGAAP	MIFRS	MIFRS	MIFRS	MIFRS
		2013	2014	2015	2016	2017	2018
1611	Computer Software (Formally known as Account 1925)	\$1,011,866	\$1,126,735	\$1,251,481	\$1,252,645	\$1,388,804	\$1,538,764
1808	Buildings	\$303,000	\$356,024	\$409,494	\$463,471	\$515,110	\$567,098
1820	Distribution Station Equipment <50 kV	\$1,920,701	\$2,180,139	\$2,480,186	\$2,811,477	\$3,018,175	\$3,260,229
1830	Poles, Towers & Fixtures	\$2,627,413	\$2,754,376	\$2,896,775	\$3,051,195	\$3,221,981	\$3,404,706
1835	Overhead Conductors & Devices	\$3,714,688	\$3,868,675	\$4,031,340	\$4,206,769	\$4,431,954	\$4,668,696
1840	Underground Conduit	\$1,055,254	\$1,084,775	\$1,114,987	\$1,145,823	\$1,186,257	\$1,227,721
1845	Underground Conductors & Devices	\$3,056,587	\$3,267,306	\$3,483,170	\$3,706,649	\$3,893,223	\$4,087,914
1850	Line Transformers	\$3,092,352	\$3,317,518	\$3,544,091	\$3,763,648	\$4,011,557	\$4,272,443
1855	Services (Overhead & Underground)	\$1,500,927	\$1,591,553	\$1,686,553	\$1,786,152	\$1,898,799	\$2,018,850
1860	Meters	\$439,760	\$499,021	\$557,159	\$903,732	\$968,790	\$1,033,847
1860	Meters (Smart Meters)	\$918,666	\$1,206,771	\$1,498,599	\$1,498,599	\$1,788,518	\$2,082,299
1915	Office Furniture & Equipment (10 years)	\$203,214	\$191,683	\$208,346	\$225,829	\$238,608	\$253,888
1920	Computer Equipment - Hardware	\$275,946	\$275,946	\$275,946	\$327,109	\$334,172	\$341,235
1920	Computer Equip.-Hardware(Post Mar. 22/04)	\$52,212	\$52,212	\$52,212	\$52,212	\$52,212	\$52,212
1920	Computer Equip.-Hardware(Post Mar. 19/07)	\$177,665	\$215,860	\$253,347	\$253,347	\$295,586	\$337,825
1930	Transportation Equipment	\$1,283,064	\$1,400,415	\$1,531,796	\$1,653,067	\$1,844,196	\$2,053,325
1935	Stores Equipment	\$40,206	\$49,988	\$59,803	\$69,617	\$76,908	\$84,200
1940	Tools, Shop & Garage Equipment	\$214,316	\$241,215	\$274,656	\$312,584	\$346,175	\$382,765
1945	Measurement & Testing Equipment	\$47,919	\$57,104	\$65,153	\$69,446	\$72,366	\$75,287
1950	Power Operated Equipment	\$50,978	\$60,487	\$68,789	\$77,091	\$84,117	\$91,143
1955	Communications Equipment	\$125,010	\$133,603	\$143,267	\$154,128	\$166,535	\$178,941
1960	Miscellaneous Equipment	\$37,389	\$45,557	\$54,509	\$69,485	\$88,907	\$109,755
1975	Load Management Controls Utility Premises	\$258,631	\$258,631	\$258,631	\$258,631	\$258,631	\$258,631
1985	Miscellaneous Fixed Assets	\$1,427	\$1,427	\$1,427	\$1,427	\$1,427	\$-
1995	Contributions & Grants	-\$2,032,770	-\$2,208,650	-\$2,393,237	-\$2,589,564	-\$2,788,770	-\$2,993,651
	Total	\$20,376,422	\$22,028,370	\$23,808,479	\$25,524,568	\$27,394,238	\$29,388,121

2.2.3 CAPITALIZATION POLICY

WPI's capitalization policy has not changed since its last Cost of Service in 2013¹⁴ other than it now records capital assets at cost in accordance with MIFRS accounting principles as well as guidelines set out by the Ontario Energy Board, where applicable.

All expenditures by the Corporation are classified as either capital or operating expenditures. The intention of these classifications is to allocate costs across accounting periods in a manner that appropriately matches those costs with the related current and future economic benefits. The amount to be capitalized is the cost to acquire or construct a capital asset, including any ancillary costs incurred to place a capital asset into its intended state of operation. WPI does not currently capitalize interest on funds used for construction.

WPI's adherence to the capitalization policy can be described as follows;

- ✓ Assets that are intended to be used on an on-going basis and are expected to provide future economic benefit (generally considered to be greater than one year) will be capitalized.
- ✓ General Plant items with an estimated useful life greater than one year and valued at greater than \$1000 will be capitalized.
- ✓ Expenditures that create a physical betterment or improvement of the asset (i.e. there is a significant increase in the physical output or service capacity, or the useful life of the capital asset is extended) will be capitalized.
- ✓ Maintenance services are contracted out.

Indirect overhead costs, such as general and administration costs that are not directly attributable to an asset, are not, nor have they ever been capitalized.

ending and closing balances of gross assets and accumulated depreciation must correspond to fixed asset continuity statements. If not, an explanation must be provided (e.g., WIP, ARO). Reconciliation must be between net book va

2.3 ALLOWANCE FOR WORKING CAPITAL

2.3.1 DERIVATION OF WORKING CAPITAL

WPI has used the 7.5% Allowance Approach for calculating its Allowance for Working Capital. This was done in accordance with the letter issued by the Board on June 03, 2015 for a rate of 7.5% of the sum of Cost of Power and controllable expenses (i.e., Operations, Maintenance, Billing and Collecting, Community Relations, Administration and General). WPI attests that the Cost of Power is determined by the split between RPP and non-RPP customers based on actual data, using most current RPP price, using current UTR. Table 17 presented below show WPI's calculations in determining its Allowance for Working Capital.

Table 17 - Allowance for Working Capital

	CGAAP	CGAAP	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS
<i>Expenses for Working Capital</i>	Last Board Approved	2013	2014	2015	2016	2017	2018
<i>Eligible Distribution Expenses:</i>							
<i>3500-Distribution Expenses - Operation</i>	440,000	381,172	278,333	264,131	390,384	419,927	580,760
<i>3550-Distribution Expenses - Maintenance</i>	2,298,000	1,769,218	1,574,688	1,398,823	1,720,696	1,560,909	1,386,773
<i>3650-Billing and Collecting</i>	1,191,000	1,268,735	1,224,007	1,131,494	1,043,796	1,130,000	1,202,000
<i>3700-Community Relations</i>	46,000	11,983	15,351	34,398	29,681	30,000	31,000
<i>3800-Administrative and General Expenses</i>	2,181,700	2,266,129	2,119,773	2,367,840	2,522,440	2,548,000	2,747,500
<i>6105-Taxes other than Income Taxes</i>	33,000	36,453	35,704	34,605	34,097	35,000	35,000
<i>6205-Donations (LEAP)</i>	12,500	12,500	12,500	12,500	25,000	13,000	13,000
<i>Total Eligible Distribution Expenses</i>	6,202,200	5,746,190	5,260,356	5,243,790	5,766,094	5,736,836	5,996,033
<i>3350-Power Supply Expenses</i>	46,149,156	44,875,052	47,497,179	51,288,235	57,528,471	59,669,247	57,377,618
<i>Total Expenses for Working Capital</i>	52,351,356	50,621,242	52,757,535	56,532,025	63,294,565	65,406,083	63,373,651
<i>Working Capital factor</i>	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	7.50%
<i>Total Working Capital</i>	6,282,163	6,074,549	6,330,904	6,783,843	7,595,348	7,848,730	4,753,024

2.3.2 LEAD LAG STUDY¹⁵

WPI is not proposing to use a lead lag study to determine its Working Capital Allowance and has chosen to follow the Board's June 03, 2015 letter which provided two options for the calculation of the allowance for working capital:¹⁶

- (1) The 7.5% allowance approach; or
- (2) The filing of a lead/lag study.

WPI notes that it has not previously been directed by the Board to undertake a lead/lag study.

2.3.3 CALCULATION OF COST OF POWER¹⁷

WPI calculated the cost of power for the 2017 Bridge Year and the 2018 Test Year based on the results of the load forecast discussed in detail in Exhibit 3. The commodity prices used in the calculation were prices published in the Board's Regulated Price Plan Report – May 1, 2017, to April 30, 2018. Should the Board publish a revised Regulated Price Plan Report prior to the Board's Decision in the application, WPI will update the electricity prices in the forecast.

The sale of energy is a flow through revenue, and the cost of power is a flow through expense. Energy sales and the cost of power expense are presented in the table below. WPI records no profit or loss resulting from the flow through energy revenues and expenses. Any temporary variances are included in the RSVA account balances.

The components of WPI's cost of power are summarized in Table 18 below and detailed in Table 19 to 27.

due balances
reported on Appendix 2-BA and balances included in rate base calculation

¹¹ MFR - Complete Appendix 2-AA along with: explanation for variances, including that of actuals v. OEB-approved amounts for last OEB-approved CoS application; for capital projects that have a project life cycle greater than one year, the proposed accounting

Table 18 – Summary of Cost of Power

CoP Components	Total \$
<i>Commodity</i>	\$49,587,880
<i>Transmission Network</i>	\$2,688,180
<i>Transmission Connection</i>	\$1,924,959
<i>Wholesale Market Service</i>	\$1,568,380
<i>Rural Rate Protection</i>	\$130,698
<i>Smart Meter Entity Charge</i>	\$221,495
<i>Low Voltage</i>	\$1,256,025
TOTAL	\$57,377,617

Table 19 - Calculation of Commodity

Last Actual kWh's			
<i>Customer Class Name</i>	Last Actual kWh's	non-RPP	RPP
<i>Residential</i>	179,260,363	2,738,661	176,521,702
<i>General Service < 50 kW</i>	65,187,475	17,923,398	47,264,076
<i>General Service > 50 to 4999 kW</i>	178,050,372	170,676,915	7,373,457
<i>Unmetered Scattered Load</i>	275,586	59,560	216,026
<i>Sentinel Lighting</i>	7,843	165	7,679
<i>Street Lighting</i>	2,112,226	227,927	1,884,300
<i>other</i>	-	-	0
<i>other</i>	-	-	0
<i>other</i>	-	-	0
TOTAL	424,893,866	191,626,626	233,267,240
%	100.00%	45.10%	54.90%
<u><i>Forecast Price</i></u>			
<i>HOEP (\$/MWh)</i>		\$24.83	
<i>Global Adjustment (\$/MWh)</i>		\$87.68	
<i>Adjustments</i>			
TOTAL (\$/MWh)		\$112.51	\$114.90
\$/kWh		\$0.11251	\$0.11490
%		45.10%	54.90%
WEIGHTED AVERAGE PRICE	\$0.1138	\$0.0507	\$0.0631

1

Table 20 - Electricity Projections

Customer		2017				2018			
		Revenue	Expense						
<i>Class Name</i>		USA #	USA #	Volume	rate (\$/kWh):	Amount	Volume	rate (\$/kWh):	Amount
<i>Residential</i>	kWh	4006	4705	200,973,045	0.1156	\$23,232,484	194,963,413	\$0.11382	\$22,191,148
<i>General Service < 50 kW</i>	kWh	4010	4705	69,859,015	0.1156	\$8,075,702	67,770,044	\$0.11382	\$7,713,730
<i>General Service > 50 to 4999 kW</i>	kWh	4035	4705	177,954,393	0.1156	\$20,571,528	172,633,080	\$0.11382	\$19,649,462
<i>Unmetered Scattered Load</i>	kWh	4010	4705	293,164	0.1156	\$33,890	280,182	\$0.11382	\$31,891
<i>Sentinel Lighting</i>	kWh	4025	4705	15,193	0.1156	\$1,756	14,493	\$0.11382	\$1,650
<i>Street Lighting</i>	kWh	4025	4705	2,349,808	0.1156	\$271,638	2,287,335	\$0.11382	\$260,349
<i>other</i>	kWh	4025	4705	0	0	\$0	0	\$0.11092	\$0
<i>other</i>	kWh	4025	4705	0	0	\$0	0	\$0.11092	\$0
<i>other</i>	kWh	4025	4705	0	0	\$0	0	\$0.11092	\$0
TOTAL				449,094,811		\$51,915,360	435,661,211		\$49,587,880

2

3 The Commodity share of the Cost of Power is calculated in the same manner as has been
4 previously approved by the OEB in WPI's previous Cost of Service application as well as other
5 applications. The utility used Table ES-1: Average RPP Supply Cost Summary from the Regulated
6 Price Plan Price Report - May 1, 2017, to April 30, 2018, issued by the Ontario Energy Board.

7

Table 21 - RPP Supply Cost Summary

8 **Table ES-1: Average RPP Supply Cost Summary**

9 ***RPP Supply Cost Summary***

10 for the period from May 1, 2017 through April 30, 2018

Forecast Wholesale Electricity Price	\$22.81
Load-Weighted Price for RPP Consumers (\$ / MWh)	\$24.83
Impact of the Global Adjustment (\$ / MWh)	+ \$87.68
Adjustment to Address Bias Towards Unfavourable Variance (\$ / MWh)	+ \$1.00
Adjustment to Clear Existing Variance (\$ / MWh)	+ \$1.40
Average Supply Cost for RPP Consumers (\$ / MWh)	= \$114.90

11 The utility uses the split between the RPP and Non-RPP to determine the weighted average
12 price. The weighted average price is applied to the projected 2018 Load Forecast to determine
13 the commodity to be included in the Cost of Power. The commodity for 2018 is projected at
14 \$114.90/MWh.

15

16

Table 22 - Transmission Network

Customer	2017			2018		
	Volume	Rate	Amount	Volume	Rate	Amount
<i>Residential</i>	200,973,045	0.0062	\$1,246,033	194,963,413	0.0064	\$1,244,698
<i>General Service < 50 kW</i>	69,859,015	0.0056	\$391,210	67,770,044	0.0058	\$390,791
<i>General Service > 50 to 4999 kW</i>	447,732	2.3500	\$1,052,171	434,344	2.4198	\$1,051,044
<i>Unmetered Scattered Load</i>	293,164	0.0056	\$1,642	280,182	0.0058	\$1,616
<i>Sentinel Lighting</i>	17	1.7835	\$30	17	1.8365	\$30
<i>Street Lighting</i>	6,846	1.7697	\$12,115	6,664	1.8223	\$12,144
TOTAL	271,572,974		\$2,691,087	263,447,999		\$2,688,180

The Transmission Network charges are calculated in the OEB's RTSR model. The Rates are applied to the 2018 Load Forecast to determine the amount to be included in the Cost of Power. The RTSR model is filed in conjunction with this application. The transmission network charges included in the Cost of Power for 2018 is projected at \$2,688,180.

Table 23 - Transmission Connection

Customer	2017			2018		
	Volume	Rate	Amount	Volume	Rate	Amount
<i>Residential</i>	200,973,045	0.0045	\$904,379	194,963,413	0.0047	\$906,853
<i>General Service < 50 kW</i>	69,859,015	0.0041	\$286,422	67,770,044	0.0042	\$287,206
<i>General Service > 50 to 4999 kW</i>	447,732	1.6253	\$727,700	434,344	1.6800	\$729,691
<i>Unmetered Scattered Load</i>	293,164	0.0041	\$1,202	280,182	0.0042	\$1,187
<i>Sentinel Lighting</i>	17	1.2842	\$22	17	1.3271	\$22
<i>Street Lighting</i>	6,846	1.2544	\$8,588	6,664	1.2966	\$8,641
TOTAL	271,572,974		\$1,919,724	263,447,999		\$1,924,959

The Transmission Connection charges are also calculated in the OEB's RTSR model. The Rates are applied to the 2018 Load Forecast to determine the amount to be included in the Cost of Power. The RTSR model is filed in conjunction with this application.

1

Table 24 - Wholesale Market

Customer	2017			2018		
		rate (\$/kWh):	0.0052		rate (\$/kWh):	0.0052
<i>Class Name</i>	Volume		Amount	Volume		Amount
<i>Residential</i>	200,973,045	0.00360	\$723,503	194,963,413	0.00360	\$701,868
<i>General Service < 50 kW</i>	69,859,015	0.00360	\$251,492	67,770,044	0.00360	\$243,972
<i>General Service > 50 to 4999 kW</i>	177,954,393	0.00360	\$640,636	172,633,080	0.00360	\$621,479
<i>Unmetered Scattered Load</i>	293,164	0.00360	\$1,055	280,182	0.00360	\$1,009
<i>Sentinel Lighting</i>	15,193	0.00360	\$55	14,493	0.00360	\$52
<i>Street Lighting</i>	2,349,808	0.00360	\$8,459	2,287,335	0.00360	\$8,234
TOTAL	449,094,811		\$1,616,741	435,661,211		\$1,568,380

2

3 On December 15, 2016, the OEB released Decision and Order for the Wholesale Market Service
4 (WMS) effective January 1, 2017. The Board's decision is summarized as follows:

- 5 • The WMS rate used by rate-regulated distributors to bill their customers shall be \$0.0032
6 per kilowatt-hour, effective January 1, 2017. For Class B customers, a CBR component of
7 \$0.0004 per kilowatt-hour shall be added to the WMS rate for a total of \$0.0036 per
8 kilowatt-hour. For Class A customers, distributors shall bill the actual CBR costs to Class A
9 customers in proportion to their contribution to peak.

10 In compliance with this order, WPI has applied the Board Approved \$0.0036/kWh to its 2018
11 Load Forecast to include \$1,568,380 in its Cost of Power.

12

Table 25 - Remote Electricity Rate Protection

Customer	2017			2018		
		rate (\$/kWh):			rate (\$/kWh):	
<i>Class Name</i>	Volume		Amount	Volume		Amount
<i>Residential</i>	200,973,045	0.00130	\$261,265	194,963,413	0.00030	\$58,489
<i>General Service < 50 kW</i>	69,859,015	0.00130	\$90,817	67,770,044	0.00030	\$20,331
<i>General Service > 50 to 4999 kW</i>	177,954,393	0.00130	\$231,341	172,633,080	0.00030	\$51,790
<i>Unmetered Scattered Load</i>	293,164	0.00130	\$381	280,182	0.00030	\$84
<i>Sentinel Lighting</i>	15,193	0.00130	\$20	14,493	0.00030	\$4
<i>Street Lighting</i>	2,349,808	0.00130	\$3,055	2,287,335	0.00030	\$686
TOTAL	449,094,811		\$583,823	435,661,211		\$130,698

On December 15, 2016, the OEB released Decision and Order for the Rural or Remote Electricity Rate Protection (RRRP) effective January 1, 2017. The Board's decision is summarized as follows:

- The RRRP charge used by rate regulated distributors to bill their customers shall be 0.0003 cents per kilowatt-hour, effective July 1, 2017. This unit rate shall apply to a customer's metered energy consumption adjusted by the distributor's Board-approved Total Loss Factor.

In compliance with this order, WPI has applied the Board Approved \$0.0003/kWh to its 2018 Load Forecast to include \$130,698 in its Cost of Power.

Table 26 - Smart Meter Entity

		2017		2018	
Customer		rate (\$/kWh):		rate (\$/kWh):	
<i>Class Name</i>	Volume		Amount	Volume	Amount
<i>Residential</i>	20,567	0.79000	\$194,970	20,786	\$197,056
<i>General Service < 50 kW</i>	2,574	0.79000	\$24,402	2,578	\$24,439
<i>General Service > 50 to 4999 kW</i>	208	0.00000	\$0	207	\$0
TOTAL	23,349		\$219,372	23,571	\$221,495

In compliance with this order, WPI has applied the Board Approved \$0.79/kWh to its 2018 Customer Forecast to include \$221,495 in its Cost of Power.

Low Voltage Charges:

The table below presents the derivation of proposed retail rates for Low Voltage ("LV") service. The 2018 estimates of total LV charges were calculated based on an average of the last 2 years. The projections were allocated to customer classes, according to each class' share of projected Transmission-Connection revenue, in accordance with Board policy. The resulting allocated LV charges for each class were divided by the applicable 2018 volumes from the load forecast, as presented in Exhibit 3. Current LV revenues are recovered through a separate rate adder and therefore are not embedded within the approved Distribution Volumetric rate. 2018 LV rates appear on a distinct line item on the proposed schedule of rates.

1

Table 27 - Low Voltage Charges

ALLOCATION BASED ON TRANSMISSION-CONNECTION REVENUE

Customer Class Name		RTSR Rate	Uplifted Volumes	Revenue	% Alloc
Residential	kWh	\$0.0047	194,963,413	\$906,853	46.90%
General Service < 50 kW	kWh	\$0.0042	67,770,044	\$287,206	14.85%
General Service > 50 to 4999 kW	kW	\$1.6800	434,344	\$729,691	37.74%
Unmetered Scattered Load	kWh	\$0.0042	280,182	\$1,187	0.06%
Sentinel Lighting	kW	\$1.3271	17	\$22	0.00%
Street Lighting	kW	\$1.2966	6,664	\$8,641	0.45%
TOTAL			263,454,666	\$1,933,600	100.00%

Low Voltage Charges Rate Rider Calculations

PROPOSED LOW VOLTAGE CHARGES & RATES					
Customer Class Name	% Allocation	Charges	Not Uplifted Volumes	Rate	per
Residential	46.90%	590,295	194,963,413	\$0.0030	kWh
General Service < 50 kW	14.85%	186,950	67,770,044	\$0.0028	kWh
General Service > 50 to 4999 kW	37.74%	474,975	434,344	\$1.0935	kW
Unmetered Scattered Load	0.06%	773	280,182	\$0.0028	kWh
Sentinel Lighting	0.00%	14	17	\$0.8638	kW
Street Lighting	0.45%	5,624	6,664	\$0.8440	kW
TOTAL	100.00%	1,258,631	263,454,666		

Low Voltage Charges to be added to power supply expense for bridge and test year.

Customer		Revenue		Expense		2017		2018	
Class Name		USA #	USA #	Volume	Rate	Amount	Volume	Rate	Amount
Residential	kWh	4075	4750	187,825,276	\$0.0018	\$338,085	194,963,413	\$0.0030	\$584,890
General Service < 50 kW	kWh	4075	4750	65,288,799	\$0.0016	\$104,462	67,770,044	\$0.0028	\$189,756
General Service > 50 to 4999 kW	kW	4075	4750	447,732	\$0.6184	\$276,878	434,344	\$1.0935	\$474,955
Unmetered Scattered Load	kWh	4075	4750	273,985	\$0.0016	\$438	280,182	\$0.0028	\$785
Sentinel Lighting	kW	4075	4750	17	\$0.4888	\$8	17	\$0.8638	\$14
Street Lighting	kW	4075	4750	6,846	\$0.4773	\$3,268	6,664	\$0.8440	\$5,624
TOTAL		0	0	253,842,659		\$723,140	263,454,666		\$1,256,025

2

2.4 SMART METER DEPLOYMENT & STRANDED METERS

2.4.1 DISPOSITION OF SMART METERS AND TREATMENT OF STRANDED METERS

WPI's disposition and treatment of smart meter related costs were address and approved as part of its 2013 Cost of Service Application. Therefore, the utility is not seeking any further resolution on this matter.¹⁸

On the topic of Smart Meters, the utility notes that it has not witnessed any cost efficiencies since its last Cost of Service in 2013 related to the utility's use of Smart Meter.¹⁹

g treatment, including the treatment of the cost of funds for construction work-in-progress meters has not been reviewed and approved, a proposal for a Stranded Meter Rate Rider must be made
Explanation for approaches that are not the OEB approach

¹⁹ MFR - Discussion outlining capital and operating efficiencies realized as a result of the deployment and operationalization of smart meters and related technologies (e.g., AMI communications networks, ODS) in its networks. Qualitative and quantitative description and support should be provided as applicable

2.5 CAPITAL EXPENDITURES

2.5.1 PLANNING

Introduction to Distribution System Plan

WPI's distribution system strategy is the set of policies, rules, guidelines, that WPI utilizes to transition its current system into its desired future system. The strategy, as described in this Distribution System Plan provides the rationale for the capital expenditures and supporting activities planned for the 2017-2021 period.

WPI has pursued the best practices of the electricity distribution industry for many years. This has included adhering to the OEB's Distribution System Code that sets out both good utility practice and minimal performance standards for electricity distribution systems in Ontario, and inspection requirements for distribution equipment. Over the years WPI has maintained its equipment in safe and reliable working order, including a consistent replacement and refurbishment program. The maintenance/upgrade of its equipment has permitted WPI to extract an extended useful working life from its assets; moreover, while the age of the distribution equipment has increased, the equipment has been maintained and upgraded to improve the reliability and to ensure we meet the expectations of WPI's customers. The priorities set forth in the DSP are such that continued system reliability and safety is enhanced while being mindful of financial constraints and monetary impacts to its customers.

The future distribution system will be designed to deliver electricity at the quality and reliability levels required by customers and will minimize the lifetime cost by balancing preventive maintenance, life-extending refurbishment, and end-of-life replacement; in short, the system will meet the customers' needs for quality and reliability of power at the minimal cost to the customer.

WPI places a high priority on balancing its obligations to accommodate growth while addressing the upkeep and replacement of its aging infrastructure. The following are the actions that WPI plans to take over the next 5-10 years to bring about the desired future.

- Priority will be given to WPI's legislated/mandatory requirements; for example:
 - o System access including the obligation to connect customers – mostly Residential, but Commercial as well.
- Accommodate City, Region, Ministry, etc. mandatory project requirements.
- Meet the OEB's – and other regulatory bodies' – quality, reliability, health, safety, environmental, etc. performance standards.
- To safeguard the major investments already made in its critical assets and continue to maintain and upgrade as necessary.
- Continue to invest prudently in modern information technology to provide customers with clear, meaningful bills that can assist them in managing their electricity usage.
- Optimal life extension, for example:
 - o Intensify condition monitoring to minimize uncertainty regarding decisions relating to equipment maintenance, renewal, and replacement.
- Where economically viable, refurbish cables and equipment in-situ to extend their reliable useful lives.

WPI notes that the topic of regional issues around WPIs proposed capital expenditure plan and discussed in the DSP.²⁰

WPI's Distribution System Plan was created with the assistance of Costello Utility Consultants and is designed to present a fully integrated approach to capital expenditure planning. This includes a comprehensive documentation of its asset management process that supports its future 5-year capital expenditure plan while detailing the history of its past 5 years' activities. It recognizes its responsibilities to provide its customers with reliable service that is acknowledged as excellent value for money, by ensuring that its asset management activities maintain a focus on customers, operational effectiveness, public policy responsiveness and financial performance.

²⁰ MFR - As applicable - file evidence that demonstrates that regional issues have been appropriately considered and where applicable addressed in developing the applicant's proposed capital expenditure plan. As part of its planning an applicant should consider municipal planning, including any plans for expansion of boundaries from a regional perspective to demonstrate the most cost effective solutions are being considered

- 1 WPI has relied on the OEB's filing requirements Chapter 5 to guide its presentation of its
- 2 policies, practices, and decision-making processes. OEB appendices related to capital
- 3 investments are shown at the next page. The Distribution System Plan follows in Section 2.5.2

1 2.5.2 DISTRIBUTION SYSTEM PLAN

2 WPI is pleased to present its Distribution System Plan on the next page.²¹

3

²¹ MFR - DSP filed as a stand-alone document; a discrete element within Exhibit 2

Westario Power Incorporated Distribution System Plan for Plan Period 2013-2022



Written in Collaboration with Costello Associates

May 16, 2017



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5.2.1 Distribution System Plan Overview

- 5.2.1.1 Community and History

- 5.2.1.2 Westario Power Inc.

Westario Power Inc. was incorporated on November 1, 2000, in affiliation with Westario Power Services Inc. and Westario Power Holdings Inc. These three were amalgamated in 2007 under Westario Power Inc. The list of shareholders follows:

- The Township of Huron-Kinloss 3.19%
- The Municipality of Kincardine 13.48%
- The Municipality of South Bruce 3.67%
- The Town of Saugeen Shores 24.98%
- The Township of North Huron 7.71%
- The Municipality of Brockton 12.61%
- The Town of Hanover 15.09%
- The Town of Minto 9.28%
- Fortis Ontario Inc. 9.99%

- Westario Power Inc. Local Distribution Company (LDC)

Westario Power Holdings Inc. filed an application with the OEB in 2007 to amalgamate the three corporations into one LDC, naming it Westario Power Inc. (henceforth Westario). The OEB

approved the application on July 17, 2007, and the amalgamation was made official on January 1, 2008.

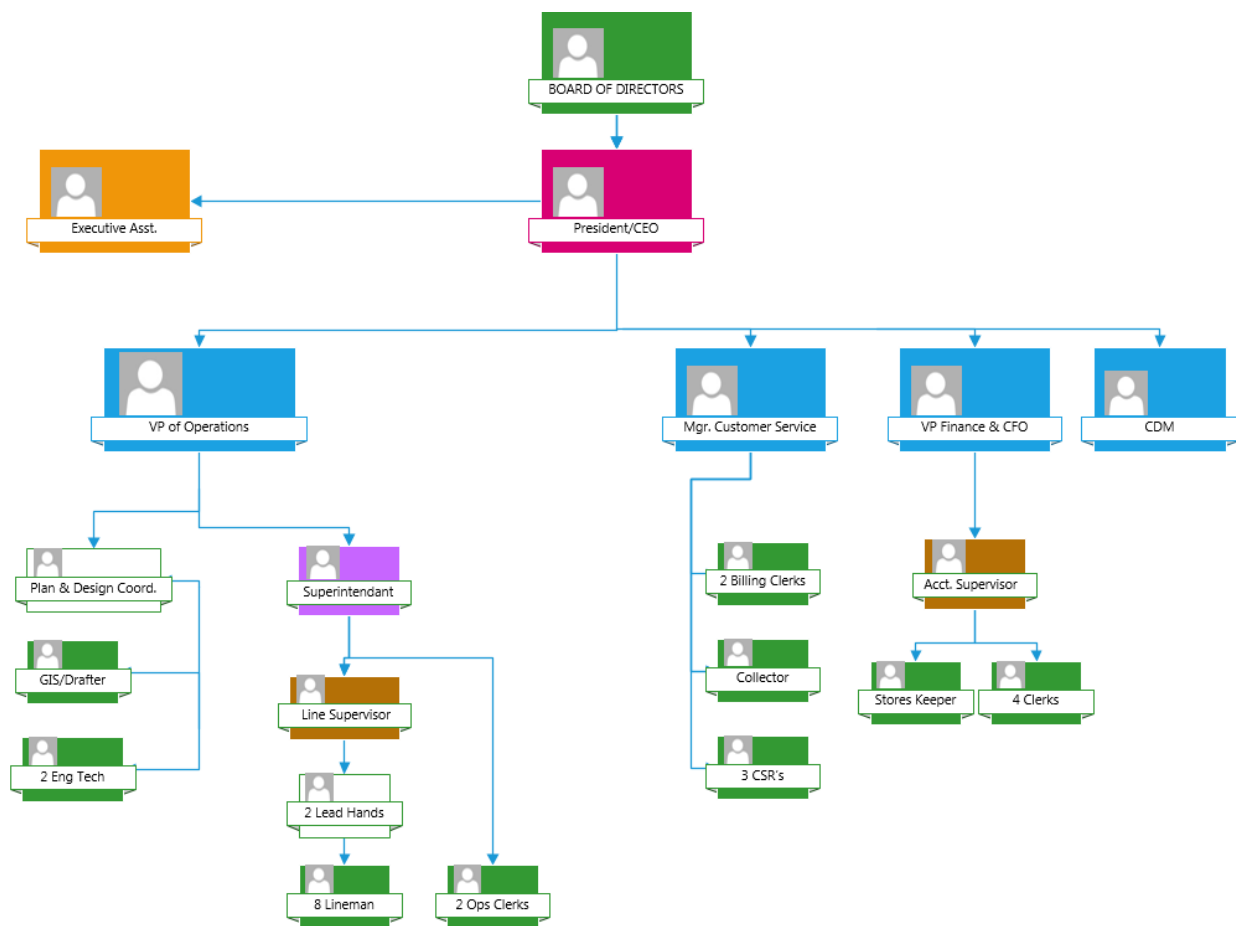
Prior to Westario's incorporation in 2000, the region was serviced by eight municipal utilities. Table #1 lists the utilities, their service areas and their customer counts.

Table #1: Municipalities in Westario's Service Area

Municipal Entity	Predecessor Utility Service Area	November 2000 Customer Count
The Township of Huron-Kinloss	Village of Ripley Village of Lucknow	1,200
The Municipality of Kincardine	Kincardine (Ward 1)	3,098
The Municipality of South Bruce	Village of Mildmay Village of Teeswater	1,094
The Town of Saugeen Shores	Town of Port Elgin Town of Southampton	5,293
The Township of North Huron	Town of Wingham	1,484
The Municipality of Brockton	Town of Walkerton Village of Elmwood	2,367
The Town of Hanover	Town of Hanover Village of Neustadt	3,283
The Town of Minto	Village of Clifford Town of Harriston Town of Palmerston	2,360

As a corporation, Westario operates through the organization outlined with the following chart.

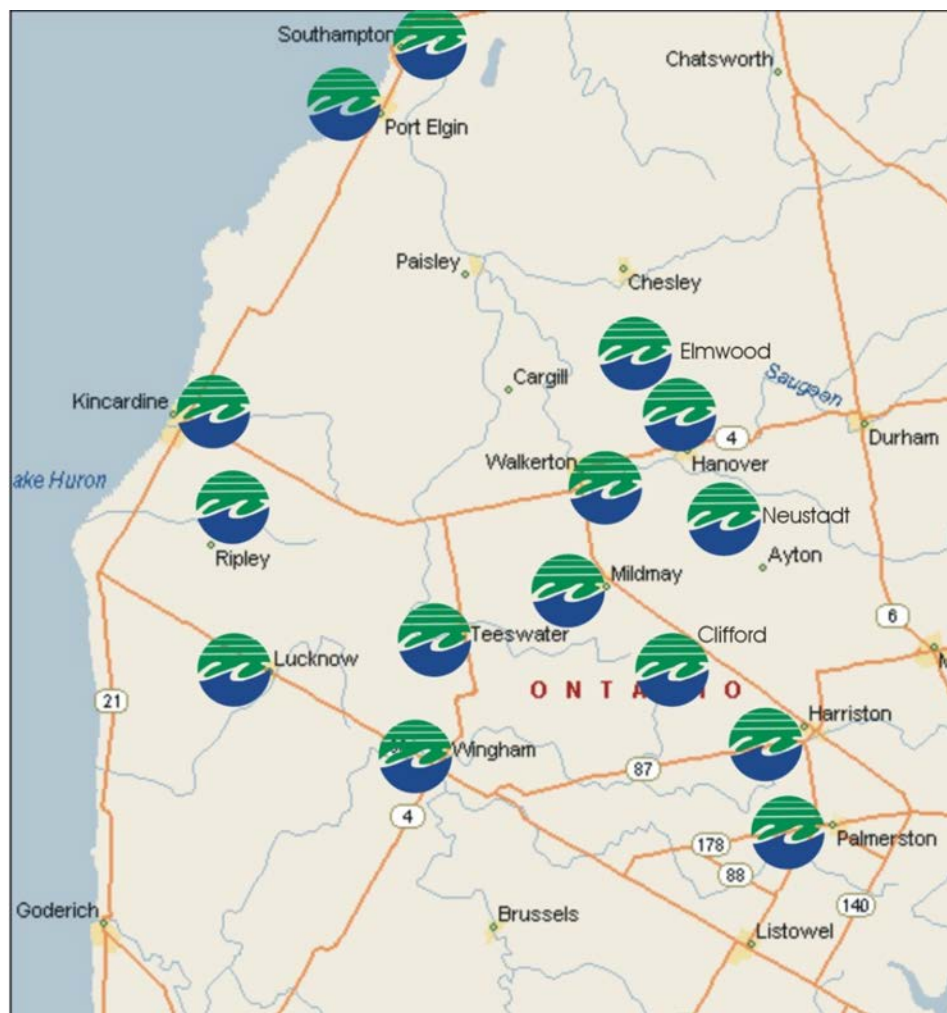
Chart #1: Westario Power Inc. Organization Chart, 2016



Westario distributes power to its customers through either direct transmission-connected feeders or through its municipal distribution substations. Westario owns 27 municipal substations within its service territory along with one mobile substation. Within its service territory, there are a total of five communities that are directly fed by Hydro One-owned distribution stations as there is no Westario-owned distribution station. These communities are Clifford, Elmwood, Mildmay, Neustadt, and Ripley.

The service area of Westario covers a large geographical area spanning approximately 60 kilometers east/west by 80 kilometers north/south. The service territory is non-contiguous and areas between these service territories are served by Hydro One Network Inc. (HONI). (the AMP in Appendix A contains more specific maps of the service areas.) Below is a map of the fifteen communities in Bruce, Grey, Huron and Wellington counties where Westario operates.

Chart #2: Westario's Service Territory



Westario's Mission and Vision statements are as follows:

Westario Power Mission Statement:

Westario Power Inc. is an energy distribution corporation committed to providing quality, customer focused services in a safe, reliable, cost effective manner. We will foster sustainable growth while respecting the environment and the communities we serve.

Westario Power Vision Statement:

We are dedicated to creating superior value for our customers and shareholders, and a safe and rewarding work environment for our employees. We will grow our business through innovation and creative leadership, based on sound fiscal management and business practices.

- 5.2.1.3 Distribution System Plan Objectives

The purpose of the DSP is to provide a management framework to ensure that Westario:

- Maintains service levels that will meet customer, community, and regulatory expectations for its distribution system network;
- Understands what levels of distribution system capacity, reliability, and security of supply will be required both now and in the future, and what issues will drive these requirements;
- Has programs and procedures to manage all phases of the distribution system life cycle from inception to retirement;
- Has considered the management of the distribution system in terms of the best risk management practices with the ultimate goal of minimizing identified risks;
- Has made adequate provisions to fund all phases of the distribution system asset life cycle;
- Makes decisions based on structured business strategies and models;
- Considers renewable energy generation applications, identifying how capital will be allocated to include such alternative systems into the DSP; and
- Has a continuously improving knowledge of its assets with respect to locations, age, condition, capacity, and attributes.

- 5.2.1.4 Distribution System Plan Key Elements

This DSP is written on the basis of the Asset Condition Assessment (ACA), the Asset Management Plan (AMP) and the capital expenditure projections over the forecast period of five years going forward. Westario has collected data about its assets, both distribution and non-distribution, and has created a plan to best care for them, ensuring proper safety to its employees and customers, and optimal service provision. In cases where data was incomplete or insufficient, implementation of the new ESRI ArcGIS will allow for improvement. Westario's capital expenditure projections are based on current knowledge of the asset base, informed estimates on the lifespans of the assets, and the decided costs of maintaining and replacing the assets as needed throughout the forecast period.

The development of this DSP is based on a series of key assumptions that are made as a foundation for planning and forecasting predictions of future activities, whether to maintain, replace or develop new assets (discretionary capital projects).

The key assumptions for this DSP are as follows:

- Westario is required to file a Cost of Service rate application, which includes Chapter 5: Consolidated Distribution System Plan of the Filing Requirements for Electricity Transmission and Distribution Applications, as mandated by the Ontario Energy Board in March 2013;
- Electricity growth rates are not expected to change drastically in the next five years due to an economy in slow recovery and the impact of the Conservation and Demand Management (CDM) Programs in lowering demand and electricity usage;

- Recognition that the economy of the areas served by Westario depends on a secure and reliable supply of electricity;
- The Green Energy Act will continue to drive investments in the distribution infrastructure in order to meet the Smart Grid characteristics and renewable generation alluded to in the legislation;
- With reference to the Smart Grid, new technologies have developed within the previous planning horizon and will continue to develop into the future. Westario has taken steps to install more system automation through its device upgrades at municipal transformer stations, as well as new software systems to allow for better use of all the available data, and will continue to make investments in these areas whenever they improve efficiency and reliability and benefit Westario's customers;
- Present service levels will continue to be maintained or improved, and will remain a balance between customer needs, price-quality trade-offs, and industry best practice(s).
- Westario's DSP is a strategic document to convey future distribution system development and maintenance plans to stakeholders;
- Westario's asset management systems will continue to be developed in order to process performance information to meet demand, capacity, security, and reliability levels in a timely manner;
- Use of outside line construction firms to perform distribution maintenance, replace, and install assets (as prescribed by work plans of projects) will continue;
- Compliance with relevant regulatory requirements as they pertain to electricity rates, filing requirements, health & safety, and environmental protection will be maintained;
- The requirements of our shareholders will be met by achieving the objectives set down in Westario's Mission statement;
- Westario focuses its capital expenditures and projects within four categories, which include system access, system renewal, system service and general plant. All decisions are made with these categories in mind as they direct Westario's priorities;
- Where practical, a proactive replacement strategy will be performed prior to equipment failure (preventing unplanned loss of service to customers). Asset condition assessments will be completed to ensure that equipment life-cycle management is maximized; and
- Asset management planning involves forecasts based on information collected from many sources. Distribution system development for the forecasted years (2018-2022) has been established; the initial two years of the forecast are certain. The final three years of the forecast (2020-2022) are less certain, and are based largely on trending. A regular review of this plan will ensure it is the best it can be.

Review of future achievement (apart from regulatory compliance) will be centred on the following areas:

- Health & Safety Performance;
- Customer Experience;
- System Reliability;
- Financial Performance; and
- Environmental Performance.

Westario's capital expenditure projections for the forecast period are in Table #2 below.

Table #2: Capital Expenditures over the Forecast Period

Investment Category	Project/Activity	Budget 2018	Budget 2019	Budget 2020	Budget 2021	Budget 2022	Totals
System Renewal	Poletran Conversion	463,286	384,553	-	-	-	847,839
	Substation Upgrades	1,310,000	1,200,000	1,200,000	1,270,000	1,270,000	6,250,000
	#6 Copper Replacements	370,772	272,120	145,598	-	-	788,490
	Decrepit Pole Replacement	780,146	789,866	799,586	1,153,628	1,167,236	4,690,463
	Distribution Transformer Replacement	307,305	317,023	322,691	327,790	329,645	1,604,454
	Fiberglass Transformer Base Replacement	-	-	690,804	698,101	700,045	2,088,950
Total:		3,231,509	2,963,562	3,158,679	3,449,520	3,466,927	16,270,196
System Service	SCADA	282,000	36,750	39,690	39,690	39,690	437,820
	Metering	30,000	30,000	30,000	30,000	30,000	150,000
	Cyme and GIS integration	70,000	-	-	-	-	70,000
Total:		382,000	66,750	69,690	69,690	69,690	657,820
System Access	Capital Poles	306,742	325,481	328,883	332,285	335,687	1,629,078
	New O/H Service Connections	166,129	167,899	169,561	171,277	185,580	860,446
	New Underground Service Connections	124,663	126,055	127,363	128,719	125,625	632,425
	Non-demarkation Customers	45,200	45,200	45,200	45,200	40,000	220,800
Total:		642,734	664,635	671,006	677,481	686,893	3,342,750
General Plant	Technology	30,000	30,000	35,000	-	-	95,000
	Vehicle Replacement	500,000	160,000	465,000	55,000	530,000	1,710,000
	Tools & Equipment	35,000	35,000	35,000	30,000	30,000	165,000
	Facilities Enhancements	35,000	95,000	40,000	-	-	170,000
	Office Furniture and Equipment	35,000	30,000	15,000	10,000	10,000	100,000
Total:		635,000	350,000	590,000	95,000	570,000	2,240,000
Total		4,891,243	4,044,947	4,489,375	4,291,691	4,793,510	22,510,766

By working through the process of conducting an asset condition assessment and creating an asset management plan, Westario has managed to gain a clear understanding of its distribution asset base, as well as its general plant assets, and the costs required in maintaining them and providing reliable service to customers. This sound planning and asset management allow Westario to save its customers money by ensuring the best possible capital investment planning. Investing in a new GIS is allowing Westario to better understand its distribution assets, and the conditions of said assets, which in turn means being able to proactively target areas of concern before they become problems. The new GIS is an important asset to the asset management process and this DSP as a whole.

As demonstrated by the tables below, the System Renewal category, which largely includes replacement and refurbishment of distribution system assets, accounts for 72% of capital expenditures over the life of this plan; Westario plans to invest \$16,270,196 into sustaining the distribution system over the forecast period of five years.

Table #3: Investment Categories by Year

Investment Category	Budget 2018	Budget 2019	Budget 2020	Budget 2021	Budget 2022	Totals
System Renewal	3,231,509	2,963,562	3,158,679	3,449,520	3,466,927	16,270,196
System Service	382,000	66,750	69,690	69,690	69,690	657,820
System Access	642,734	664,635	671,006	677,481	686,893	3,342,750
General Plant	635,000	350,000	590,000	95,000	570,000	2,240,000
Total:	4,891,243	4,044,947	4,489,375	4,291,691	4,793,510	22,510,766

Table #4: Investment Categories by Percentage by Year

Investment Category	Budget 2018	Budget 2019	Budget 2020	Budget 2021	Budget 2022	Totals
System Renewal	66%	73%	70%	80%	72%	72%
System Service	8%	2%	2%	2%	1%	3%
System Access	13%	16%	15%	16%	14%	15%
General Plant	13%	9%	13%	2%	12%	10%
Total:	100%	100%	100%	100%	100%	100%

The key elements of this DSP include: outlining the asset management process Westario is committed to following; detailing Westario's efforts at coordinated planning with third parties, which include the Independent Electricity System Operator (IESO), Hydro One, the Greater Bruce-Huron region's LDCs, and its customers; highlighting Westario's current performance metrics, both financial and non-financial, to understand where it is succeeding and where it could bear improvement; and, lastly, justifying its capital expenditure planning for the forecasted five-year period through the asset management process and discussions of the capital projects that meet a materiality threshold of \$50,000 in any given year within the forecast period.

- **5.2.1.5 Expected Cost Savings**

By developing and implementing sound asset management plans, Westario expects to experience cost savings as compared to maintaining the distribution system without sound management planning. Implementing effective planning, and following a multiyear decision-making process will allow for improved budgeting and more accurate adherence to annual budgets. Evidence-based decisions for future projects and capital expenditures, such as asset replacement programs based on testing data, help the utility to better project its future capital investments, and therefore save customers' money through lower rates (unplanned replacements versus planned), as well as a more reliable distribution system.

One of the more significant capital projects that will positively impact Westario's ability to plan for the future is the implementation of a new Geographic Information System (GIS) from ESRI, known as ArcGIS. Westario previously had a system known as RamSys, which became antiquated, offered no operability with other systems, was poorly supported, and had no real prospect of being the technology platform needed for moving forward. Consequently, Westario embarked on the selection of a GIS system, balancing capital and operating costs against functionality offered, and what customers as a whole valued. Westario selected for its new GIS the ESRI ArcGIS, which will provide more thorough, comprehensive, and accurate data on the utility's assets, along with interoperability with existing back-end systems like SAP (an enterprise-wide accounting system). Having a clearer understanding of the assets' conditions and other pertinent factors, such as geographic location, will allow for better planning in terms of replacement and refurbishment.

The asset condition assessment is helpful in identifying the remaining useful life of Westario's distribution assets (the Asset Condition Assessment can be found within Appendix A: Asset Management Plan). Certain testing programs, such as pole testing, give specific data about which of these assets are in need of attention, and in how urgent. Health indices are created to assign quantitative values to the life expectancy of the assets. Capital is then allocated toward the refurbishment and replacement of assets that are at the end of their useful life. Conducting these types of tests creates costs savings for the utility because the specific data on asset conditions means the utility is only replacing or refurbishing assets that absolutely need it: instead of merely estimating the remaining amount of that asset's useful life based solely on age. Poles, for example, will need to be replaced. If Westario bases the replacement timing on their age alone, then that might lead to replacing more poles than necessary. Currently, the estimated useful life does not take into account those that may still be in good condition, resulting in the utility replacing an asset ahead of its time. The pole testing program pinpoints exactly which poles are at risk and Westario can plan to replace them. In this type of example, capital spending is deferred until it is necessary instead of being spent prematurely. Keeping customers' expectations of lower bills in mind achieves this objective through this investment.

When the utility is able to better project the failure of its assets, it can make informed decisions on their replacement times, which better balances risks and investment. This asset management philosophy will make optimal use of each asset's lifecycle.

In addition to the asset condition assessment and asset management plan, Westario relies on the following applications for future cost savings:

- Fewer outages, and of shorter durations, with minimized financial effects on customers through proactive refurbishment and replacement of aging and failing assets;
- Steady refurbishment of existing substations identified as requiring attention over the Cost of Service period will improve system reliability, reducing outages and the costs associated by customers while reducing the ongoing maintenance (lower as is planned versus break-fix) and operating costs;
- Implementation of ESRI GIS will provide a number of cost savings:
 - Ongoing conversion of RAMSYS data to the new ESRI GIS will provide greater detail on the condition and performance of the distribution assets;

- Controlling the costs of asset replacements by using the GIS to accumulate and maintain asset condition data and maintenance histories;
- The expanded use of SCADA systems to monitor, track, diagnose, and optimize distribution system loading configuration. This will reduce the burden on existing equipment, eliminating the shortened useful life for those distribution system assets (savings for customers through lower rates), while improving reliability and stability;
- Increased knowledge of distribution system loading and configuration, and improved data collection and maintenance, through better use of GIS, software, and mobile equipment; and
- Optimization of distribution feeder utilization and the reduction to unplanned outages.

Westario also plans to implement a SCADA system and Utilismart's HealthMAP software. This will allow for near-real time analysis of the network to manage overloading, under/over voltage, outages, and line losses. This will lead to improved asset management and decisions will be substantiated with historical evidence. Additionally, it will serve as a new tool to aid in troubleshooting outages more quickly, focusing the crew in on a probable cause, saving time and money, as well as decreasing outage response time and outage durations for the customer.

In an effort to improve efficiency and reduce overall cost to the customer, Westario has done an analysis of the substations and determined that, based on future growth and current loading, Port Elgin MS6 substation could be decommissioned. This will save costs on inspections, maintenance, and life cycle management (overhauls/refurbishment). Westario will keep this substation in service until it is certain it can be removed without impacting operating flexibility.

An efficiency committee has recently been created with representation from all departments: participants include all levels of the organization, from front line staff to management. The intent is to have the committee focus on business processes that are the least efficient, identified by the people who are involved with the processes themselves. The expected outcome will be recommendations and actions required to improve the processes, ultimately providing a more efficient and thus lower cost of delivery of service.

- 5.2.1.6 Distribution System Plan Period

The planning horizon of this DSP is from 2013 through 2022 inclusively. It is intended that the DSP will be reviewed on a periodic basis.

The planning horizon extends for a ten-year period, including five years of history and five years of forecast. The historical period includes the years from 2013 to 2016, with 2017 serving as the bridge year; 2018 the test year; and the years of 2019 to 2022 serving as the forecast period. A high-level plan has been established for 2018 to 2022, and analysis tends to be more trend-related and based on asset end of life rates as detailed in the ACA. The ACA and the AMP (Appendix A: Asset Management Plan) are based on a planning horizon of five years and predict the sustainment of assets through to 2021.

It is very likely that new developments, which are not identified here, will arise at any given time even in the short term of five years.

There is an obvious degree of uncertainty in any predictions of the future and as such the DSP contains a level of uncertainty. It does, however, speak to the intentions of the utility, and outlines its planning philosophies, which will be followed regardless of unforeseen circumstances that affect the plan. The influence of government regulation, ongoing adjustments to LDC regulation by the OEB, customer growth, and the general state of the economy add a degree of uncertainty.

- [5.2.1.7 Vintage of Information](#)

Investment information is current as of December 31, 2016. Westario has incorporated the following relevant stakeholder feedback:

- Residential and Industrial/Commercial Customers: Results of UtilityPULSE Customer Survey conducted in October, 2015 and February, 2016 (Appendix B);
- Meetings with Industrial Customers: throughout 2015 and 2016;
- Independent Electricity System Operators (IESO): Letter of Comment regarding Westario's DSP received February 11, 2016 (Appendix C); and
- Hydro One Networks Inc.: Regional Planning document (Appendix D).

- [5.2.1.8 Asset Management Process Changes](#)

Westario's asset management process (discussed further in section 5.3) has largely remained the same as in previous years. The process' priorities are to 1) gather and maintain information; 2) update the Asset Condition Assessment report; 3) assess the impacts of the strategies; 4) implement asset management strategies; and 5) project the costs for upcoming years. There has been no major change to this process.

With the recent implementation of the ESRI ArcGIS, Westario is able to improve upon step #1 of gathering and maintaining information. As a more effective system than Westario's previous tool, the RamSys, the ESRI ArcGIS will track connectivity, and gather and maintain more comprehensive data on the utility's assets. Having upgraded this tool, Westario will be able to conduct step #1 more effectively, which will cause a ripple effect of improved asset management and planning in the rest of the steps throughout the process.

- [5.2.1.9 Distribution System Plan Contingencies and Risks](#)

Some aspects of this DSP are contingent on the outcomes of on-going and future factors that are not entirely within the control of Westario.

- Customer Connections and Development

Customer connections and new developments are entirely driven by economic factors and municipal planning processes that are outside of Westario's control. The planned investments in these areas are based on historical levels of activity, which have proven to be a good measure, but are subject to change for the reasons cited above.

- Impact of Natural Gas to the Area

More of the Westario distribution area may see the introduction of natural gas as an available fuel source for heating towards the end of the planning period. The municipalities of Kincardine

and Huron-Kinloss are partnering with EPCOR Utilities to make natural gas accessible in their communities. The timeline of this project indicates that full service of natural gas will be available in 2021, which is within the planning period of this DSP. (The projected timeline for the arrival of natural gas in Westario can be found in Appendix E.) When this occurs, the rate of conversions from electrical to natural gas heating will be difficult to determine. It may take some time for residents in the community to switch their main sources of heat from electrical to natural gas, but it is likely that many will, given the difference in costs. The introduction of natural gas to the area serves to reduce the peak demand for electricity in the area. The magnitude of the ultimate impact on electrical consumption in the area is therefore out of Westario's control. This change would, at the earliest, only impact Westario's electrical consumption rates beginning in 2021.

- Regional Planning Process

Westario is part of the Greater Bruce/Huron Regional Planning Group in Group 3. The regional process has commenced for this area (November 2015); Westario is actively participating in the process. Hydro One issued the final version of the "Needs Assessment Report" (May 6, 2016) of which a copy is included in Appendix H. Hydro One issued a detailed report regarding the Low Power Factor at Wingham TS (October 18, 2016) which is included in Appendix I. Neither of these reports suggest any changes that will affect Westario's plans for the period of this DSP.

5.2.2 Coordinated Planning with Third Parties

Westario consults with the various stakeholder groups to ensure that the input from those stakeholders is taken into consideration when developing the DSP. Westario has considered the input from the following stakeholders when preparing the DSP:

- Hydro One (local transmission/distribution);
- Independent Electricity System Operator (IESO and former OPA);
- Towns and Regions; and
- Customers.

- 5.2.2.1 Regional Planning Consultations

5.2.2.1.1 Hydro One Consultation

Hydro One is the transmission and distribution company supplying Westario's service area. Westario receives power from 20 supply points. Most of Westario's interactions with Hydro One are related to operational issues regarding Hydro One supply points. Hydro One and Westario jointly participate in the Group 3: Greater Bruce-Huron Region Integrated Regional Resource Plan (IRRP). In addition to Hydro One, the IRRP consultation process includes the IESO, and the following regional distributors:

- Festival Hydro Inc.
- West Coast Huron Energy Inc.
- Wellington North Power Inc.
- Erie Thames Power Lines Inc.

- Entegrus Power Lines Inc.
- Westario Power Inc.

The IRRP process was led by the Independent Electricity System Operator (IESO) and the final results are discussed in the final deliverables of the Regional Planning Process (5.2.2.2).

On an operating basis Westario meets with Hydro One representatives twice per year in Hydro One hosted distributor sessions:

- Hydro One Customer Conference to discuss the Annual Outage Plan

This provides an opportunity to coordinate any outage requirements and therefore minimize interruptions and multiple operations.

- Daily Operations

Westario Operations staff coordinate system requirements with Hydro One. These are in the form of daily operational needs to information exchange at the system planning level.

- Impact on DSP

We do not see an impact on Westario's DSP from consultation with Hydro One regarding any operational matters. See the final deliverable of the Regional Planning Process (5.2.2.2) for the results of the IRRP process.

5.2.2.1.2 Independent Electricity System Operator Consultation

Westario has consulted with the Independent Electricity System Operator (IESO) in two significant areas: the Greater Bruce-Huron Region (Group 3) Integrated Regional Resource Plan (IRRP) and Conservation and Demand Management (CDM).

For the results of the Greater Bruce-Huron Region (Group 3) Integrated Regional Resource Plan (IRRP) see Final deliverable of the Regional Planning process (5.2.2b)

- Conservation and Demand Management

Westario offered the IESO Province-Wide Conservation and Demand Management programs from 2012 to 2014. Westario has now transitioned to the new 2015-2020 Conservation First framework.

Westario continues to consult with its stakeholders including customers, consultants, other distributors and the IESO in an effort to effectively promote and deliver the CDM programs.

- Impact on DSP

Westario continues to plan its system based on a number of factors captured within the system access, system renewal and system service categories. It is anticipated that there will be no major impact of CDM on Westario's DSP.

5.2.2.1.3 Town & Developer Meetings

Town Meetings: As part of the ongoing processes Westario consults with different towns on a regular basis. The Operations staff meet and consults annually with the majority of the towns (not all have full operations departments) on their respective upcoming capital projects, status,

and any Municipal Road Act work. The discussions include specific development plans and infrastructure plans regarding scope and timing of road widenings or other infrastructure consultations.

- The utility co-ordinates any capital work to save tax/rate payers

Development Community Consultations: The operations staff consults with various local and regional land developers about their needs. The meetings include discussing their development plans. In terms of project specific plans, it is important for the utility to consult with the development community to seek level of growth. These meetings are approximately 60 times per year with over 12 different developers. (See a partial listing of customer engagement activities [5.2.2.3].)

- Impact on DSP

Westario's DSP has incorporated the input from the town and the development community into the preparation of the DSP.

5.2.2.1.4 Greater Bruce-Huron Regional Planning Process

Westario participated in a regional planning meeting for the Greater Bruce/Huron Region, (which is part of Group 3 in the IESO Regional Planning Process) held on November 24, 2015, hosted by Hydro One. In attendance were representatives from Hydro One Distribution, Hydro One Transmission, Festival Hydro, Wellington North Power, Erie Thames, Entegrus and the IESO. The objective of the meeting was to initiate communication between Hydro One Transmission and the LDCs in the region as part of the Regional Planning Process; this meeting sought to initiate the Needs Assessment portion of the Planning Process. Westario was invited to participate in this consultation. This marks the beginning of the Greater Bruce-Huron Regional Planning Process. (The minutes for this meeting can be found in Appendix F.)

A second meeting was held on January 22, 2016, which was attended by representatives from Hydro One Distribution, Hydro One Transmission, Festival Hydro, West Coast Huron Energy, Wellington North Power, Westario Power, Erie Thames, and the IESO. The purpose of this meeting was to discuss net load forecasts (found in Appendix G), LDC and Hydro One Transmission capital investment plans, transformer ratings, and to assess the next steps in the planning process. (The minutes from this meeting can also be found in Appendix F.)

The outcome of this meeting provided that a Needs Assessment study was to be initiated by Hydro One Transmission in February, 2016. The LDCs in The Greater Bruce-Huron Region were required to submit their lists of distributed generation and transmission-connected stations' emergency ratings to Hydro One Transmission by the end of January, 2016 so this study could commence. A meeting was held on March 31, 2016 to review the preliminary draft of this study (see meeting minutes in Appendix F). The final Needs Assessment report can be found in Appendix H.

- *5.2.2.2 Final Deliverables of the Regional Planning Process*

The Regional Planning Process for the Greater Bruce-Huron Region has resulted in the creation of the Needs Assessment Report and two Local Planning reports of which one includes the Wingham TS. These reports are included in Appendix H and I, and as of the writing of this DSP,

there are no direct impacts to the work planned in this DSP. The Regional Infrastructure Planning (RIP) for the Greater Bruce-Huron Region commenced in 2017 with the drafting of the Terms of Reference (TOR) in February. No other details are available at the time of preparing this DSP.

- **5.2.2.3 Customer Consultations**

Westario conducted town hall meetings, or focus groups, for its residential and general service customers (<50kVA) in February, 2016. Westario contracted the help of UtilityPULSE to conduct these surveys. Feedback from these surveys show two consistent priorities among residential customers: they are concerned with a) cost, and b) reliability.

Westario serves 15 communities covering a wide geographic area, and the area served is experiencing extremely low economic growth (approximately one percent). The utility has 23,109 customers with 746km of distribution lines.

To demonstrate that a distributor has met the OEB's expectations in relation to coordinating infrastructure planning with customers, Westario commissioned UtilityPULSE to interview customers as part of the development of the DSP. The purpose of the feedback from customers was to assist Westario to make decisions about investments (capital and maintenance) and on operational/service quality improvements.

UtilityPULSE interviewed its customers via a telephone survey (October, 2015) and conducted meetings with three focus groups (February, 2016).

A complete copy of the Westario Power Inc's Customer Engagement Survey is included in Appendix B: UtilityPULSE Electric Utility Customer Survey.

Customer telephone survey conducted by UtilityPULSE: In this survey, 342 residential customers, 60 small commercial customers, and 20 general service customers were interviewed via a comprehensive telephone survey. The customers were interviewed from a customer list provided by Westario. The overview included feedback from customers who participated in providing a range of issues related to Westario.

Some of the highlights from each segment are presented with direct customer comments in quotations.

Focus group sessions conducted by UtilityPULSE: The utility initiated the focus group sessions consisting of 36 participants in three focus sessions. Data/findings were augmented via comments, insights, and recommendations received.

The customer focus groups were moderated by UtilityPULSE to provide customers with core information about the utility and the distribution system. It is important to note that participants in all three focus groups wanted to voice their views about the cost of electricity. They made it clear to the moderator that issues affecting costs, as well as the cost of solar and wind were important.

Customer telephone and focus group sessions results: Sixty percent of participants in the focus groups claimed that they were "not familiar" or "not familiar at all" with the percentage of the bill that went to Westario, prior to attending a focus group session.

The breakdown of the survey responses were as follows:

- Overall Satisfaction with the Utility (Survey Page 6)

Almost nine-in-ten (88%) of respondents indicate being “very + fairly satisfied” with the service they receive from Westario. It was clear from the focus group discussions that participants were very concerned about the overall costs associated with electricity. We have included three tables that show the breakdown comparing the utility to the provincial benchmark, and a breakdown of scores by customer groups.

Table #5: Satisfaction Scores – Electricity customers’ satisfaction – Averages

Top 2 Boxes: ‘very + fairly satisfied’	Westario	National	Ontario
Satisfaction Scores	88%	89%	88%

Table #6: Satisfaction Scores – Electricity customers’ satisfaction – by customer types

Top 2 Boxes: ‘very + fairly satisfied’	Residential	Small Commercial	Large Commercial
Satisfaction Scores	88%	85%	85%

Table #7: Satisfaction Scores – Electricity customers’ satisfaction (kWh usage)

Top 2 Boxes: ‘very + fairly satisfied’	kWh Group 1	kWh Group 2	kWh Group 3
Satisfaction Scores	95%	88%	81%

- Satisfaction with Customer Service (Survey Page 10)

Westario scored 52%, as compared to 69% province wide. Respondents who said they contacted the utility were also asked, “When contacting the utility did you consider the problem solved or not solved?” Fifty-two percent of Westario’s respondents said that the problem was solved. The Ontario benchmark is 69%.

Table #8: Overall satisfaction with most recent experiences

Top 2 Boxes: ‘very + fairly satisfied’	Westario	National	Ontario
Satisfaction Scores	52%	79%	69%

- Outage Management (Survey Page 14 & 18)

Westario's scores of 87% are in line with the Ontario LDC average of 88%. Focus group participants provided extensive feedback about outages and outage management. Comments about the geography and high winds (particularly along Highway 21) were made. The tone of the focus groups was not always about blaming, but recognizing the realities of the environment.

When asked about the number of acceptable number of outages in a year, 22% of residential customers said "none", while 27% of small commercial and 25% of large commercial said "none". There was a slight difference in the response rate of the kWh groups for "none": 18% of kWh Group 1; 27% of kWh Group 2; and 19% of kWh Group 3.

Focus group input on the topic of frequency and length of outages fell in the one-to-two range, but were less rigid about the length of the outage. From the focus group participants, up to four hours of planned outages was considered acceptable. Knowing and communicating, the reason(s) for the outage, whether planned or unplanned, was a requirement for many of the customers.

Sixty-seven percent of respondents for Westario, versus 32% of respondents for Ontario LDCs, felt that emphasis should be placed on both reducing the number of outages and reducing the duration of outages. Some of the comments included:

"If outages get long, they get more impactful"

"We have a lot of electronic equipment that don't take those 'blips' very well"

"I'd pay more, \$2-\$3 per month, if I really knew there would be [fewer] outages and the length would be reduced as well".

Table #9: Standard of reliability meeting customer expectations – by kWh usage groups

Top 2 Boxes: 'very + fairly satisfied'	kWh Group 1	kWh Group 2	kWh Group 3
Satisfaction Scores	92%	87%	86%

- Responding to Outages (Survey Page 21 & 22)

Focus group participants did have a lot to say about outages and outage management. The scores for Westario are still in line with the Ontario LDC average. The respondents insisted that timely information on outages be provided. The type of information that customers would require during the outages included: when the power would be restored; a clear definition of the area that was affected; and the number of customers affected; whether crews had been dispatched to the affected area; and, most importantly, the cause of the power outage.

Table #10: LDC effectiveness responding to outages

	Ontario LDCs	Westario
Responding to the power outage	85%	87%
Responding power quickly	96%	89%
Using media channels for updates	54%	62%
Providing information about the outage	61%	68%

Table #11: LDC effectiveness responding to outages – Top 2 Boxes

	Residential	Small Commercial	Large Commercial
Responding to the power outage	88%	85%	80%
Responding power quickly	89%	92%	80%
Using media channels for updates	62%	67%	50%
Providing information about the outage	69%	70%	45%

It is clear that improving reliability, at the lowest possible cost, and communicating outages are customers' primary issues. The DSP has been crafted with this in mind, for all the future capital investment, particularly the substation refurbishment (not replacement – same effect but lower investment), and leveraging existing technologies to create an outage management system through the Utilismart Health Map versus a complete stand-alone implementation.

- Strategy for Replacing Equipment (Survey Page 23 & 24)

When asked about the strategy for replacing equipment, 62% of residential and 63% of small commercial respondents chose the statement, "Pro-Active replacement, even though it may cost more..." as the statement that best describes their view about replacing equipment. Eighty percent of large commercial customers also subscribed to pro-active replacement.

When participants of the focus groups were given financial information about capital expenditures, they did have a difficulty in determining if the numbers were reasonable.

Table #12: Strategy for replacing equipment – against provincial averages

	Ontario LDCs	Westario
Run-to-failure when there are limited customers affected ensures full-value is received from the equipment	27%	28%
Pro-active replacement even though it may cost more, should ensure reliable power	65%	63%
Don't Know	8%	9%

Table #13: Strategy for replacing equipment – by customer types

	Residential	Small Commercial	Large Commercial
Run-to-failure when there are limited customers affected ensures full-value is received from the equipment	29%	27%	10%
Pro-active replacement even though it may cost more, should ensure reliable power	62%	63%	80%
Don't Know	9%	10%	10%

- Level of Confidence in Westario use good judgement prioritizing investments (Survey Page 25 & 26)

Table #14: Level of confidence in LDC to use good judgement prioritizing investments – by customer types

Westario	Residential	Small Commercial	Large Commercial
Very confident	16%	15%	20%
Somewhat confident	54%	60%	45%
Neither	9%	5%	20%
Somewhat unconfident	13%	12%	10%
Very unconfident	6%	8%	5%

Table #15: Level of confidence in LDC to use good judgement prioritizing investments – by kWh usage groups

Westario	kWh Group 1	kWh Group 2	kWh Group 3
Very confident	25%	16%	9%
Somewhat confident	52%	57%	55%
Neither	10%	7%	11%
Somewhat unconfident	8%	14%	18%
Very unconfident	6%	7%	7%

In describing the level of confidence, Westario received good ratings.

- Which of the following items are you willing to pay for per month (Survey Page 28, Pages 32 and 33)

Westario customers responding to the telephone survey showed lower levels of willingness to pay for various operational items, as compared to the LDC average for 2015.

Table #16: Services customers are willing to pay for each month

Westario	Yes	No	Not Sure
A proactive outage management system	44%	50%	7%
Increased self-service options on the website	23%	70%	7%
Extended office hours	16%	81%	3%
Increased tree trimming to improve reliability	53%	45%	2%
Educating customers about energy conservation	40%	58%	2%
Educating customers and the public about electrical safety	32%	66%	2%

Table #17: Capital items customers are willing to pay for each month – by customer type

Westario	Yes	No	Not Sure	Residential Yes	Small Commercial Yes
Replacing aging equipment to improve safety and reliability	70%	27%	3%	70%	72%
Upgrading equipment to accommodate future growth in the community	55%	39%	6%	51%	58%
Adding automation and technology to reduce outage time	50%	45%	5%	49%	58%

Table #18: Capital items customers are willing to pay for each month – by kWh usage groups

Westario	kWh Group 1	kWh Group 2	kWh Group 3
Replacing aging equipment to improve safety and reliability	72%	72%	64%
Upgrading equipment to accommodate future growth in the community	58%	56%	46%
Adding automation and technology to reduce outage time	53%	49%	49%

As it relates to “upgrading equipment to accommodate future growth”, projected growth in Westario’s geographic area is about one percent, which is extremely low. Capital investments for system access average just over \$600,000 per year in the forecast period.

One in four customers are not willing to pay anything for any capital item; 28% of respondents were not willing to support any increase for any operational item.

Individual sessions conducted by Westario staff: The utility staff initiated meetings with nine of the largest industrial, commercial, and general service customers. These discussions were an opportunity for different staff members to collect customer feedback about their needs and requirements.

The major topics included conversations to discuss issues customers face. Specifically, the utility wanted to address issues that the customers were currently experiencing with Westario and wanted to know how they would like to resolve these issues. Also, in terms of future

infrastructure requirements, the utility wanted to discuss the customers' power expectations in the near future (one-to-two years) and long term planning requirements (three-to-ten years). The customers were also given an opportunity to find out how Westario could assist them with their corporate goals, and the utility wanted to get customers' perspectives on how willing they were to pay for improvements, and how much.

Generally, the respondents provided senior staff with their concerns with the existing aging equipment, charges issued by the utility, and concerns with communications by the utility.

Table #19: Customer survey results

Westario	Customer 1	Customer 2	Customer 3	Customer 4	Customer 5	Customer 6	Customer 7	Customer 8	Customer 9
What priority do you place on cost, customer service, and reliability	Reliability Customer Service Cost	Reliability Cost Customer Service	Reliability Cost Customer Service	Reliability Cost Customer Service	Cost	Reliability Customer Service Cost	Reliability Cost	Customer Service Cost Reliability	Reliability Customer Service
Willing to Pay for Issues Identified?	No	No	Yes	No	N/A	No	N/A	No	N/A
What do you want from Westario in the long term?	Improved Communication	Improved Communication	Improved Communication	Improved Communication	Status quo	Better Services	Better Services	Improved Communication	Improved Communication
Willing to Pay for Issues Identified?	No	N/A	N/A	No	N/A	No	No	No	No
What are your power expectations in 1-2 years 3-10 years?	Not much Expansion	Expansion	Major Expansion	Expansion	No Expansion	Expansion	Expansion	Expansion	No Expansion
Impact of New Technology – Smart Grid	Not much	Not much	Not much	Minor Interest	Minor Interest	Minor Interest	Minor Interest	Minor Interest	Minor Interest

Westario's Response to Customer preferences:

1. Affordable Electricity Costs

It is important to note that participants in all focus groups wanted to voice their views about the cost of electricity. Westario is proposing a Cost of Service Application that balances customer focus, operational effectiveness, public policy responsiveness and solid financial performance. The rate impact of the customer is always considered when budgeting for future plans in order to be affordable for the utility's customers while at the same time having the ability to provide a reliable distribution system and excellent customer service.

Westario consistently looks for cost savings opportunities such as improved planning of capital investments, making work processes more efficient, and exercising prudence with respect to staffing. The planning associated with this DSP will allow for steady capital expenditures.

2. Reliability of Service

The UtilityPULSE survey results indicate clearly that cost and reliability are customer priorities. As a result, Westario's asset management and capital expenditure plans have been formulated to address these concerns. Westario has prioritized the maintenance of its distribution system, through renewing assets before their deterioration has negative effects on service, providing system access to new connection customers, and upgrading technologies used to better monitor service and assets, such as smart meters and a new GIS. The constant monitoring of the reliability of the distribution system points the utility towards issues or areas that need attention. When Westario is aware of a problem, it can direct capital towards fixing it; this is consistent with the customer priority of staying ahead of deteriorating assets and replacing before failure.

3. Positive Communications for Outages

Within the customer surveys, customers conveyed the need for effective communication in the midst of a power outage. This is one area where there can always be improvement. Westario currently utilizes the follow programs to communicate with customers:

- Bill inserts (planned outages);
- Updates on the website;
- CDM program opportunities to interface with customers; and
- Direct interface with commercial customers through direct meeting or conference calls.

4. Delivery of High Quality of Services

All of Westario's capital investment and asset management planning work towards delivering consistently high-quality distribution service to its customer base.

As a utility, Westario recognizes that these are common concerns, and takes them into account when planning its capital projects and asset management. Sound planning will allow Westario to keep customer costs low while providing the most reliable service possible.

- [5.2.2.4 Comment Letter](#)

Westario has been in contact with the IESO about the Integrated Regional Planning Process (IRPP). The IESO sent a letter of comment to Westario on February 11, 2016 confirming that the Regional Planning for Group 3 has begun, and that Westario is a part of it. The letter also confirms that much of Westario's planning is dependent on the IESO and the other LDCs in the region, as it is an embedded distributor. The IESO acknowledges Westario's FIT and microFIT projects. The letter from the IESO can be found in Appendix C.

[5.2.3 Performance Measurement for Continuous Improvement](#)

- [5.2.3.1 Performance Metrics](#)

Westario maintains the required list of service quality indicators, as mandated by the OEB through the Reporting & Record Keeping Requirements (RRR) Filing requirements and the utility scorecard process. The three indicators of concern include:

- Customer performance;
- Physical and financial performance; and
- Asset and system operations performance.

- [5.2.3.2 Performance Summary](#)

The summary tables below provide a view of Westario's historical performance in the non-financial categories.

5.2.3.2.1 Non-Financial Performance Measures

Table #20: Non-financial performance measures

	2012	2013	2014	2015	2016
<u>General Information</u>					
# of Customers	22,610	22,763	22,850	23,109	23,240
Total km of line	515	516	523	523.4	531.2
Total km of line Overhead	371	372	375	375.6	378.4
Total km of line Underground	144	144	148	148.2	152.8
Total km of 3 phase line	307	308	310	310.6	314
Total km of 2 phase line	1	1	1	1	2
Total km of 1 phase line	207	207	212	212	215
# of customers per km of line	43.9	44.1	43.7	44.2	43.8
Number of stations >= 50kV	0	0	0	0	0
Number of stations >= 27.6kV <50Kv	27	27	27	27	27
Transformers at stations >= 50kV	0	0	0	0	0
Transformers at stations >= 27.6kV <50Kv	27	27	28	28	29
<u>System Peak Monthly Loading</u>					
Maximum Monthly Winter Peak Load (Kw) with embedded generation	83,916	83,335	86,152	94,884	75,257
Maximum Monthly Winter Peak Load (Kw) without embedded generation	N/A	N/A	85,470	93,386	76,774
Maximum Monthly Summer Peak Load (Kw) with embedded generation	71,136	72,566	68,204	69,124	69,686
Maximum Monthly Summer Peak Load (Kw) without embedded generation	N/A	N/A	67,522	67,626	71,203
Average Peak Load with embedded generation (Kw)	70,342	71,805	70,855	70,032	67,889
Average Peak Load without embedded generation	N/A	N/A	70,172	68,534	69,406
Average Load factor with embedded generation (Kw)	70	72	69.2	60.8	76.8
Average Load factor without embedded generation (Kw)	N/A	N/A	69.8	61.8	75.2

* N/A indicates data not available

The extent of the Westario distribution system remained relatively static over the period of 2012-2015. Amounts of overhead and underground conductor varied by less than two percent over this period, and the number of distribution stations remained unchanged. This matches the general trends in customer growth of less than one percent annually over the same period.

From a system peak load perspective, Westario remains a winter peaking utility, mainly due to the above-average amount of electrical heating in many of the communities they serve. A review of the peak loading data also reveals a relatively static position for the period of 2012-2015. The impacts of embedded generation on the peak loading numbers does not appear to be significant, and is likely overshadowed by the amount of seasonal loading in the Westario service territory. This is evident from the fact that the peak kW demand data with embedded generation is higher than without embedded generation for both the summer and winter periods.

5.2.3.2.2 Service Quality Indicators

Table #21: Non-financial service quality indicators

Service Quality Indicators	2012	2013	2014	2015	Min Standard
Connection of New Services					
Number of LV Services connected within five days (annually)	172	111	118	117	
Number of LV services requested (annually)	187	122	118	125	
Percentage of LV services connected within five days(annually)	100%	90%	100%	93%	90%
number of HV services connected within ten days(annually)	n/a	n/a	n/a	n/a	
number of HV services requested (annually)	n/a	n/a	n/a	n/a	
Percentage of HV services connected within ten days(annually)	n/a	n/a	n/a	n/a	90%
Appointment Scheduling					
annual number of appointment requests Rec'd	6,484	351	4,758	4990	
annual number of appointments scheduled and completed	5384	351	4679	4872	
percentage of appointments scheduled and completed	98.50%	100%	98%	97%	65%
Appointments Met					
annual number of appointments scheduled with customer Rep.	6,810	5,695	356	408	
annual number of appointments scheduled and completed	6,695	5,534	356	408	
percentage of appointments met	98%	97%	100%	100%	90%
Telephone Accessibility					
annual number of qualifying calls	28,196	7,608	28,722	25,779	
annual number of calls answered	27,066	7,336	25,866	24,234	
annual number of calls answered within 30 sec	27,062	5,510	22,860	20,992	
percentage of qualifying calls answered	96%	96%	90%	94%	80%
percentage of qualifying calls answered within 30 sec	96%	75%	80%	87%	80%
Rescheduling of Appointments Missed					
annual number of appointments missed	115	164	80	118	
annual number of appointments rescheduled and complete	115	164	80	118	
percentage of appointments rescheduled	100%	100%	100%	100%	80%
Telephone Abandon Rate					
annual number of qualifying calls	28,196	7,608	28,722	25779	
annual number of calls abandoned after 30 sec	1,130	272	2,856	1419	
percentage of qualifying calls abandoned after 30 sec	4%	4%	10%	6%	80%
Written Response To Enquiries					
annual number of qualifying enquiries	47	624	789	755	
annual number of written responses provided within 10 days	47	583	706	646	
percentage of written responses provided within 10 days	100%	93%	89%	86%	90%
Emergency Response (Urban)					
annual number of emergency calls	17	12	10	18	
annual number of emergency calls responded to within 60 min	15	11	10	15	
percentage of emergency calls responded to within 60 min	88%	91%	100%	83%	90%
Emergency Response (Rural)					
annual number of emergency calls	n/a	n/a	n/a	n/a	
annual number of emergency calls responded to within 120 min	n/a	n/a	n/a	n/a	
percentage of emergency calls responded to within 120 min	n/a	n/a	n/a	n/a	90%
Reconnection Performance Standard					
annual number of reconnections for customers disconnected for non-payment	572	293	238	246	
annual number of reconnections completed within 2 business days	518	293	238	246	
percentage of reconnections completed within 2 business days	91%	100%	100%	100%	85%
Micro Embedded Generation facilities					
annual number of micro generation facilities	n/a	14	2	4	
annual number of micro generation facilities for which service reliability was met	n/a	14	2	4	
percentage of micro generation facilities for which service reliability was met	n/a	100%	100%	100%	90%

A review of the service quality indicators data above indicates that Westario continues to meet the OEB requirements for new low voltage service connections, appointment scheduling/rescheduling, and telephone accessibility. Westario also continues to meet the OEB requirements in the areas of emergency response in urban areas, but it should be noted that Westario does not serve any territory defined as rural.

5.2.3.2.3 Service Interruption Indices

Table #22: Service Interruption Indices

Service Interruption Indices	2012	2013	2014	2015	2016
Momentary Average Interruption Frequency Index (MAIFI)	Exempt				
System Average Interruption Duration Index (SAIDI) (HOURS ANNUALLY)	4.78	9.45	6.39	6.91	5.97
System Average Interruption Frequency Index (SAIFI) (number per year)	1.43	1.53	1.70	2.30	1.67
Customer Average Interruption Duration Index (CAIDI) (hours)	3.34	6.20	3.75	3.01	3.56
Adjusted Momentary Average Interruption Frequency Index (MAIFI) excluding Loss of Supply	Exempt				
Adjusted System Average Interruption Duration Index (SAIDI) excluding Loss of Supply	0.83	2.64	3.39	0.88	2.41
Adjusted System Average Interruption Frequency Index (SAIFI) excluding Loss of Supply	0.34	0.65	0.83	0.37	0.62
Adjusted Customer Average Interruption Duration Index (CAIDI) excluding Loss of Supply	2.45	4.04	4.10	2.38	3.85

When reviewing the above service interruption information, it is very evident that the Westario outage frequencies and durations are heavily impacted by the loss of supply from Hydro One. Since it is embedded within the Hydro One distribution system, Westario has no control in responding to outages caused by loss of supply. When the loss of supply events are taken out of the calculation of the above indices, both the frequency and duration of service outages to Westario customers are significantly decreased.

- **5.2.3.3 Comparison of Westario System Reliability Indices vs. Industry Average**

The following tables display Westario's system reliability performance against the industry averages and those of comparator LDCs, based on information obtained from the OEB Yearbook of Electrical Distributors (2012 to 2015 Editions).

In addition to comparing itself to the industry as a whole, Westario also wanted to compare its reliability statistics with a select group of LDCs that are similar to Westario in terms of customer base, geographic area and locations, and that are also embedded within Hydro One service territory. The group that has been used for this comparison consists of Wellington North Power, Center Wellington Hydro, Bluewater Power, Entegrus, Festival Hydro, Collus Powerstream, and Halton Hills Hydro. The OEB Yearbook data for these LDCs was used to develop the comparable LDC average values contained in the tables below.

The values for CAIDI in 2014 were discontinued in the OEB 2014 Yearbook, and are therefore not available for the industry and comparable LDC averages.

The following tables demonstrate how Westario compares to industry averages for SAIDI, SAIFI, and CAIDI, both including and excluding loss of supply.

Table #23: Westario **SAIDI** vs. Industry Average (Including Loss of Supply)

	2012	2013	2014	2015	2016
Westario SAIDI	4.78	9.45	7.38	6.91	0.99
Industry Average	2.38	5.56	2.26	3.50	n/a
Comparable LDC Average	2.29	5.84	1.43	2.92	n/a

Table #24: Westario **SAIFI** vs. Industry Average (Including Loss of Supply)

	2012	2013	2014	2015	2016
Westario SAIFI	1.42	1.52	1.9	2.29	0.27
Industry Average	1.95	2.37	1.82	1.82	n/a
Comparable LDC Average	2.25	2.62	1.37	1.93	n/a

Table #25: Westario **CAIDI** vs. Industry Average (Including Loss of Supply)

	2012	2013	2014	2015	2016
Westario CAIDI	3.36	6.2	3.88	3.01	3.56
Industry Average	1.31	2.44	n/a	n/a	n/a
Comparable LDC Average	1.12	2.17	n/a	n/a	n/a

Table #26: Westario **SAIDI** vs. Industry Average (Excluding Loss of Supply)

	2012	2013	2014	2015	2016
Westario SAIDI	.83	2.64	4.76	0.87	2.41
Industry Average	1.39	3.33	1.45	1.59	n/a
Comparable LDC Average	1.06	1.86	.69	1.35	n/a

Table #27: Westario **SAIFI** vs. Industry Average (Excluding Loss of Supply)

	2012	2013	2014	2015	2016
Westario SAIFI	.34	.65	1.2	0.36	0.62
Industry Average	1.28	1.47	1.09	1.09	n/a
Comparable LDC Average	1.3	1.34	.77	.99	n/a

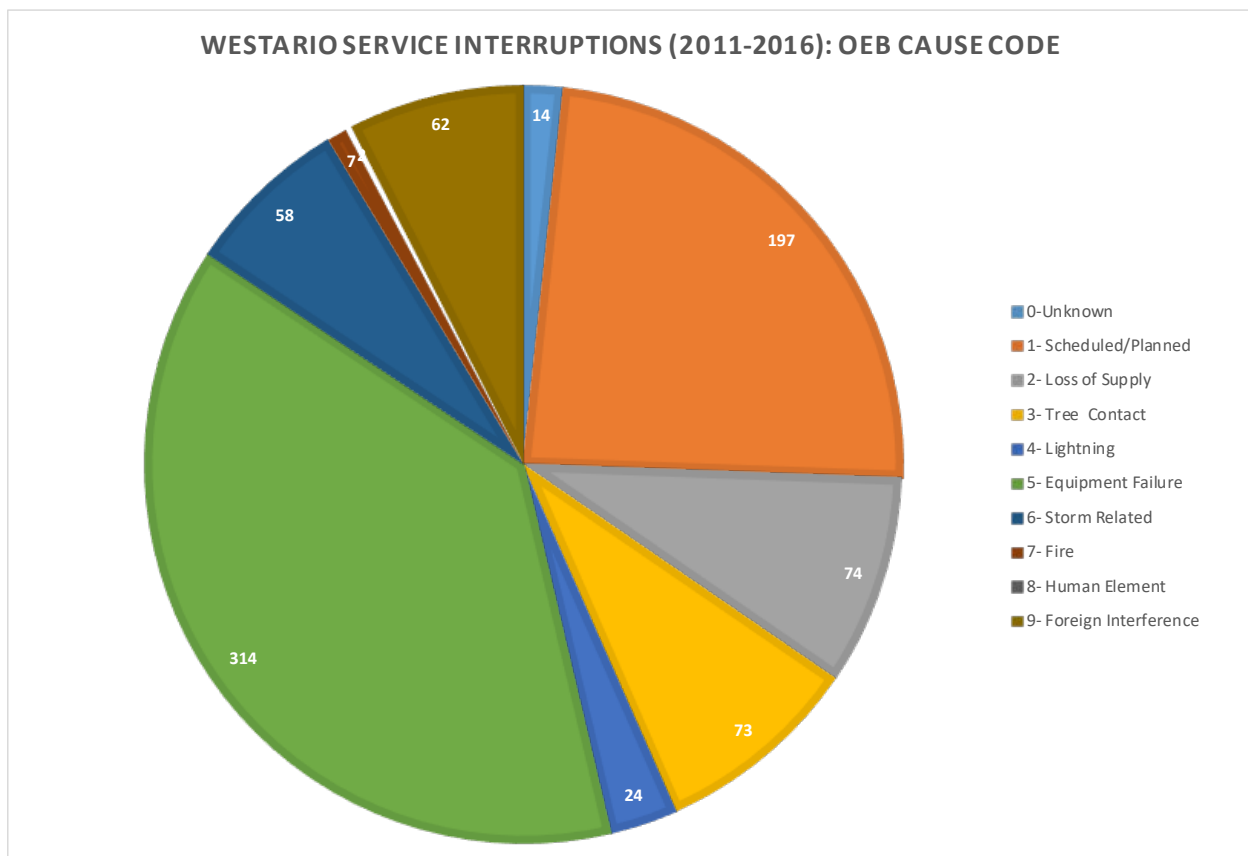
Table #28: Westario **CAIDI** vs. Industry Average (Excluding Loss of Supply)

	2012	2013	2014	2015	2016
Westario CAIDI	2.45	4.04	3.98	2.37	3.85
Industry Average	1.32	2.17	n/a	n/a	n/a
Comparable LDC Average	1.32	1.5	n/a	n/a	n/a

With regards to Tables #23-28, the 2016 figures from other LDCs have not yet been released. The 2015 data is the most recent data available.

A further review into the root causes of Westario distribution system outages is indicated here:

Chart #3: Westario Service Interruptions by OEB Cause Code (2011-2016)



This data reveals that loss of supply accounts for 74 of the 825 outage events (just over 9%) over the period of 2011 to 2016. However, the top ranked cause of distribution system outage is equipment failure, and this amounted to 317 outage events (38%) over the same time frame.

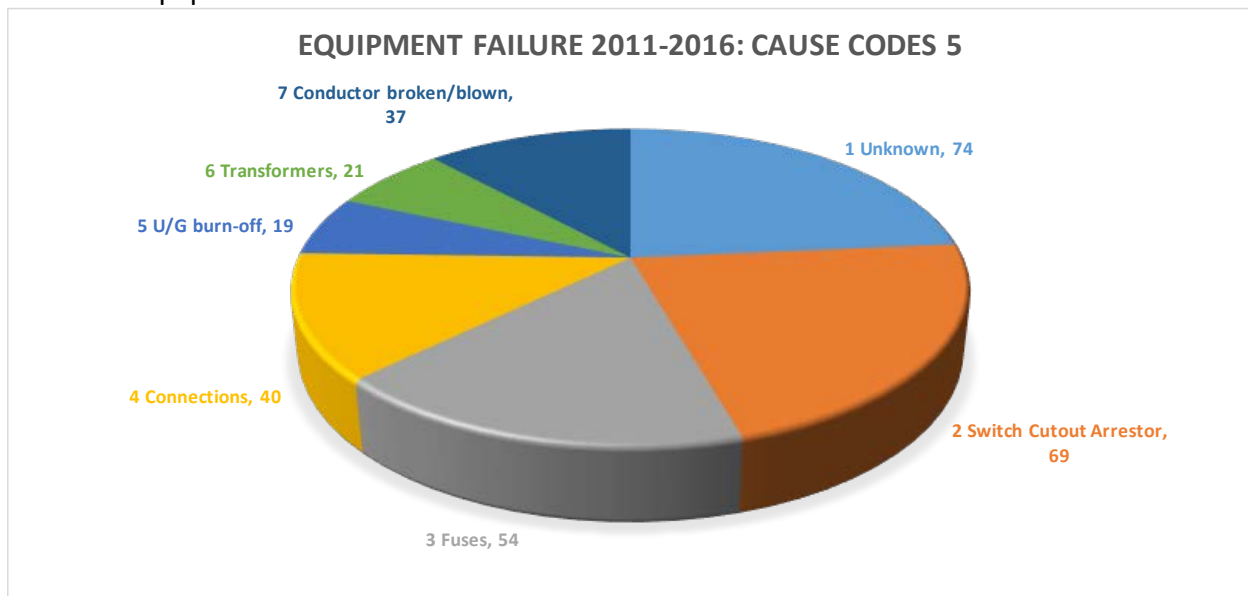
- 5.2.3.4 Equipment Failures

Of these 314 equipment failure events, Table #29 shows the detailed breakdown by type of equipment.

Table #29: Equipment Failure (Breakdown by Westario subcategory)

Westario Subcategory	Code Description	# of Occurrences
1	Unknown	74
2	Switch Cutout Arrestor	69
3	Fuses	54
4	Connections	40
5	U/G burn-off	19
6	Transformers	21
7	Conductor broken/blown	37

Chart #4: Equipment Failures: Cause Code 5



This information confirms that Westario’s proposed plans for targeted equipment replacements are warranted. Improved outage information through use of the GIS system will also allow the information to be displayed on a geographical basis. This can further serve to target failures and assist with outage information and restoration.

5.2.4 Financial Performance Measures

Based on its most recent Scorecard, it is evident that Westario Power continues to focus on customer satisfaction and is a financially sound, safe and reliable Local Distribution Company. Information provided by such things as the Customer satisfaction survey and other forms of feedback are recognized as essential contributors to operating and strategic decisions and are an important influence in Westario's decision making processes. Westario's investment in technologies has provided greater choice to customers as to how, when and where they can communicate with Westario staff and will continue to provide an effective platform for customer interactions. Technologies have also been utilised to assist Westario in reaching its customer base to better inform them of such things as planned outages, operations planned or ongoing in the area and expectations with respect to account management.

These efforts combined with sound financial management practices have resulted in positive Financial Performance Measures as follows:

- **5.2.4.1 Efficiency Assessment – (PEG Report Ranking)**

Efficiency Assessment - the total costs for Ontario local electricity distribution companies are evaluated by the Pacific Economics Group LLC on behalf of the OEB to produce a single efficiency ranking. Westario for the fourth year has been assessed as having actual costs within +/- 10 percent of predicted costs.

- **5.2.4.2 Performance Trend & Assessment**

Westario continues to strive to achieve greater efficiency through productivity improvements and cost control, while improving the safety and reliability of the distribution system.

- **5.2.4.3 Total Cost per Customer**

Total Cost per Customer - Westario achieved a Total Cost per Customer, operating and capital combined of \$550, a slight increase of \$10 (1.85%) from the previous year.

- **5.2.4.4 Performance Trend & Assessment**

Westario continues to monitor and manage its cost structure to balance the cost effectiveness while ensuring the reliability and safety of the distribution system.

- **5.2.4.5 Total Cost per km of Line**

Total Cost per km of Line - Westario achieved a total cost per km of line of \$24,190; resulting in a slight increase of 1.49% over the previous year.

- 5.2.4.6 Performance Trend & Assessment

As noted above, Westario continues to operate and maintain the distribution system in a most cost-effective manner, while ensuring capital investments are undertaken in a manner to maximize both safety and reliability for its customers.

5.2.5 Performance Objectives

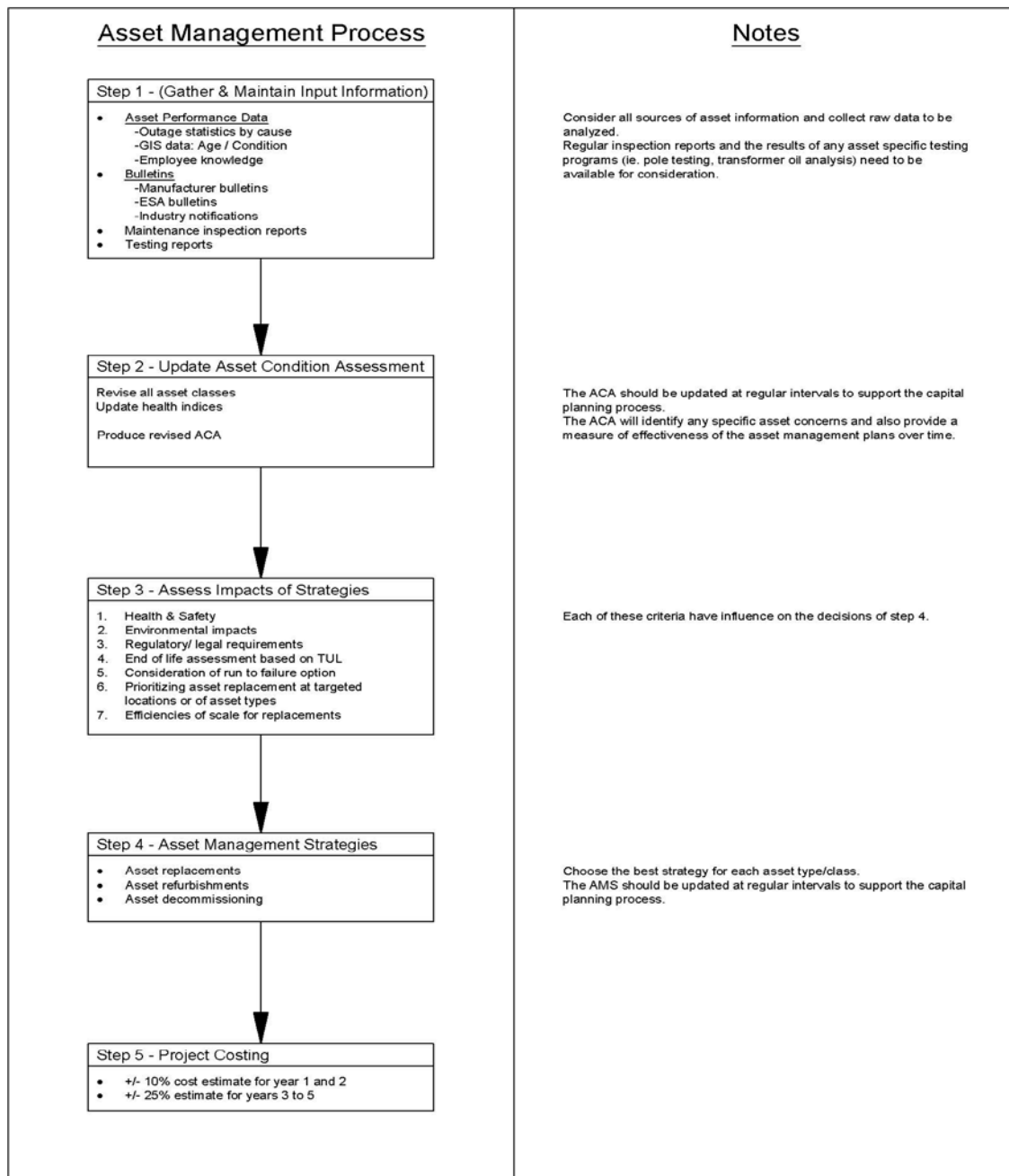
Based on the analysis above, Westario intends to maintain current efforts in the areas of the various indicators, where they are currently meeting or exceeding the OEB minimum required performance levels.

5.3 Asset Management Process

5.3.1 Asset Management Process Overview

The asset management process flow chart below documents the current practice for data review and decision making process in place at Westario.

Chart #5: Asset Management Process



- [5.3.1.1 The Asset Management Process Objectives](#)

The process is designed to guarantee:

- Excellent source data;
- Targeted analysis of the current asset conditions;
- A review of the risks and impacts of the identified operational strategies; and
- Asset replacement plans that are cost effective, have the best effects on the outage statistics, and are consistent with providing the best value for all stakeholders.

- [5.3.1.2 Asset Management Process Components](#)

The process starts (Step 1) with data gathering from all available sources, which includes the Geographical Information System (GIS), outage statistics for the prior planning period, employee knowledge, maintenance inspection and test reports, as well as any manufacturer or industry issued safety bulletins.

Once the data has been collected, the Asset Condition Assessment (ACA) (found in Appendix A: Asset Management Plan) can be updated (Step 2) since the last planning period. This will make adjustments for assets that have been removed from service, refurbished, and or added to the system since the last update. The updated ACA will provide evidence to support the actions of the previous planning period, and also provide adjustments to the direction needed in the proposed plan period.

The outcome of the ACA will be to set the new priorities for asset replacements, which will then be reviewed against a list of operational strategies (Step 3) that include:

- Health and safety impacts;
- Environmental impacts;
- Regulatory and legal impacts;
- Comparison against the Westario assessment of end of life;
- Consideration of the run-to-failure option on the above criteria and outage statistics;
- Asset location and political impact; and
- Any efficiencies of scale that can be realized from grouping asset replacements into projects.

Step 4 produces a planned list of projects for the planning period that can be estimated by the engineering department.

The engineering estimate (Step 5) will define the project costs at:

- +/-10% for projects occurring within one-to-two years

- +/- 25% for projects occurring in the period beyond two years.

5.3.2 Managed Assets

• 5.3.2.1 Service Area

Westario's distribution system covers approximately 64 square kilometers and serves 15 communities in the region. Westario is the LDC supplying electricity to the Ontario communities of: Clifford, Elmwood, Hanover, Harriston, Kincardine, Lucknow, Mildmay, Neustadt, Palmerston, Port Elgin, Ripley, Southampton, Teeswater, Walkerton and Wingham.

All areas between communities served by Westario are serviced by Hydro One. The greatest single customer population is in the Town of Saugeen Shores (Port Elgin/Southampton) representing 30% of the overall customer base. Westario currently serves 23,109 customers. (A map of the service territory is shown within Appendix A: Asset Management Plan).

Generally speaking, the urban service territory is made up of mostly residential development, with small supporting commercial and industrial areas.

The climate in this region is relatively mild compared to the broader provincial area due to its proximity to the Great Lakes. The coldest months of the year are typically January and February; the average lowest temperatures across the area are between -11° and -13°C. Record low temperatures have been as extreme as -40°C. The warmest months are July and August, with average high temperatures of 24° to 26°C. Record summer temperatures have been as high as 35° to 37°C.

This region receives its highest precipitation levels during the summer and fall months. While most precipitation in the months between November and March is snow, the region receives less snow than other parts of southwestern Ontario since most of its precipitation occurs in the warmer months.

The Westario region has been experiencing an increased number of storms in recent years, with increased levels of severity. As storms become more frequent and more intense, they pose risks to the reliability of Westario's distribution system. There have been instances of stronger winds than previous years' storms created. This is one case where projects like tree trimming are especially important in preventing branches from getting in the way of distribution lines and causing outages.

Colder winters have created higher usage partially due to some communities utilizing electrical heat where there is no natural gas available, which translates into higher load demands. There is, however, potential that additional communities in Westario's service territory (specifically Kincardine, Ripley, and Lucknow), will be introducing the possibility for natural gas. This could have an effect on these communities' electrical consumption depending on how quickly and rapidly residents begin initiating connections. Most general service customers <50kW and >50kW are already using propane, resulting in low impact to Westario's load demands.

Westario's service territory has seen regular but not significant growth, averaging around one percent annually throughout the historical period. Not much load growth can be anticipated in the rate class above 50kW, based on customer engagement. Only one customer is considering a plant expansion in the foreseeable future.

- **5.3.2.2 System Configuration**

Generally speaking, the urban service territory is made up of mostly residential development, with a small supporting commercial area.

Westario is connected to the Ontario power transmission grid at four transformer stations which are owned by Hydro One. Westario customers are supplied via seven 44kV feeder circuits which feed 27 Westario-owned sub-stations. Within the service territory of Westario, there are also multiple customer-owned distribution stations fed from the 44kV circuits.

Within Westario's service area there are 49.1km of primary underground cables.

- **5.3.2.3 Asset Type**

The following table is drawn from the ACA and summarizes the distribution assets that are managed by Westario.

Table #30: Westario's distribution assets and populations (as of October 2016)

Asset Group	Asset Class	Population
Substation	Power Transformers	31
	5/15kV Circuit breakers	49
	28kV/15kV Reclosers (3 Phase)	26
	Protective relays	53
	MV Switchgear assemblies	9
	HV Switchgear assemblies (44kV)	1
	Buildings	27
	MV Primary Cables	n/a
	HV Primary Cables (44kV)	n/a
Distribution (Overhead and Underground)	Distribution poles (Wood)	6674
	Distribution poles (Steel)	1547
	Distribution poles (Concrete)	11
	Distribution poles (Other)	2290
	Total distribution poles	10522
	Cross arms	n/a
	Pole mounted transformers	1935
	Pad mounted transformers	1028
	Pole trans	59
	Switches – 3Ph load break	4
	Switches – 3Ph air break	736
	Switches – 1Ph air break	444
	Switches – inline	52
	Switches – Switching cubicles	49.1km
	Protective line relays	N/A
	Line circuit breakers/reclosers	N/A

"n/a" indicates "Not Available". "N/A" indicates "Not Applicable"

(Appendix A: Asset Management Plan contains exhaustive information on the utility's assets.)

- 5.3.2.4 Asset Capacity

The following table summarizes the current system capacities and peak loads for each of the communities served by Westario.

Table #31: Capacity vs. load demand

Community	Trend	Peak (KVA)	Month	Comments	Capacity (MVA)
Clifford	↓	1,386	JAN	Dropping	-
Elmwood	↓	545	FEB		-
Hanover	↑	16,000	JAN/FEB	2.4% Average/year	25.25
Harriston	↑	3,430	JUNE	14% Average/year	5
Kincardine	↑	22,000	JAN/FEB/MAR	7.5%	29
Lucknow	↑	3,823	FEB	11%	6.65
Mildmay	↑	2,300	MAR	7%	-
Neustadt	↑	1,200	FEB	4%	-
Palmerston: Mtr 1	↑	3,900	FEB	4%	5
Palmerston: Mtr 2	↑	700	FEB		Customer
Palmerston: Mtr 3	↑	5,850	SEP	4%	Customer
Port Elgin	↑	13,000	MAR	3-5%	33
Ripley	↑	1,730	MAR	9%	-
Southampton: MS #1	↓	2,430	JAN/FEB	-2%	8
Southampton: MS #2	↑	2,990	FEB	1.5%	5
Southampton: MS #3	→	1,100	JAN/FEB		5
Southampton Water Plant	→	300			
Teeswater	→	2,000	JAN	%	3
Walkerton	↓	12,000	JAN	-2%	17.3
Wingham	↑	5,700	FEB	1.75%	10

As can be seen, all of the communities have available capacity to meet the forecasted load growth in their areas.

The condition of sub-station transformers in each community, which determine the capacity for growth, have been assessed and prioritized for replacement/refurbishment.

The following table demonstrates the actual energy consumption by community over the history period:

Table #32: Actual energy consumption (MW hrs.)

Community	2011	2012	2013	2014	2015	Trend	Change (%)
Clifford	6462.9	6170.9	6263.0	6020.4	5654.7	↓	-2.58%
Elmwood	2096.7	1971.1	2067.6	2059.6	1873.3	↓	-2.30%
Hanover	96029.3	93736.5	93382.6	94557.1	95604.0	↑	1.30%
Harriston	15534.4	15494.6	15598.4	15956.8	16042.8	↑	0.47%
Kincardine	75698.1	71231.8	74219.0	74824.2	71375.7	↓	-0.76%
Lucknow	11199.8	10706.3	11209.6	11336.9	10863.5	↓	-0.50%
Mildmay	9833.8	9481.2	9416.2	9273.4	8748.6	↓	-2.25%
Neustadt	4653.0	4434.7	4624.4	4751.5	4524.1	→	0.05%
Palmerston: Mtr 1 & Mtr 2	19277.4	19281.3	20626.9	21060.2	21147.8	↑	1.61%
Palmerston: Mtr 3	19362.4	20297.2	23605.3	24371.4	26395.1	↑	4.10%
Port Elgin	71806.6	69429.2	69394.0	68825.7	66363.2	↓	-1.67%
Ripley	6001.6	5558.1	5873.3	5919.1	5576.2	↓	-1.24%
Southampton: MS #1	11652.4	11268.9	11742.5	11680.7	11028.6	↓	-1.49%
Southampton: MS #2	15538.5	14878.4	15033.2	15201.9	14657.3	↓	-1.17%
Southampton: MS #3	5743.2	5333.3	5365.7	5431.3	5073.7	↓	-3.12%
Southampton Water Plant	736.8	806.8	786.9	774.2	730.6	↓	-0.76%
Teeswater	7807.0	7635.2	7621.2	6846.4	6612.1	↓	-2.99%
Walkerton	58338.8	59169.0	59242.0	57687.4	59037.0	↓	-0.72%
Wingham	27879.5	27310.2	28046.4	27934.3	26968.2	↓	-1.06%

The above table shows energy consumption trends over the last five years. As can be seen, energy consumption in general has dropped in most communities but not by a significant amount. Energy consumption trends in Westario's service territory are affected mostly by the weather patterns and the severity of winter weather specifically. Economic-driven consumption is not present, given the smaller scale of the local economies, and slow rebound from the 2008-2010 financial crisis.

5.3.3 Asset Lifecycle Optimization

- 5.3.3.1 Overview

Historically, Westario has taken an as-needed risk assessment approach into consideration when making decisions on asset replacements and refurbishments. With the availability of the new asset condition assessment however, which utilizes the condition assessments from the existing database information to generate a health index for each asset type, a new more systematic approach will be available to aid in formulating asset replacement programs. Having these health

index results along with new information from the GIS system will allow Westario to be more methodical and make a much more informed decision in replacing or refurbishing assets.

The health indices will now allow Westario to assess which assets are most vulnerable based on all of the evaluation criteria and to pinpoint where some of these assets may be grouped for more efficient treatment. Comparing these groups of assets with risk assessments, it will now be possible to develop specific replacement programs/jobs to target multiple assets in a small geographical area and ultimately reducing the replacement costs through economies of scale.

The asset assessments used to develop the health index results consider a multitude of factors, depending on the information available in the database for each asset type. Where available, the asset's age is first considered and compared to the typical useful life of the device. Other factors, such as the condition assessment, material composition, and historical fault information, are also assessed with the intention of either extending the typical useful life where possible, or reducing it where necessary.

Westario has divided its distribution system by area into 15 sections, by towns, each of which is thoroughly inspected on a three-year cycle by competent staff. The lines staff utilizes detailed overhead and underground system inspection sheets to report any deficiencies, which are then recorded by the GIS administrator and acted upon appropriately. These ongoing inspections, along with the health indices, will bring attention to any issues not found in the asset condition assessment, and help optimize asset lifecycles/lifespans by pinpointing serious problems. This will allow Westario to identify and resolve the issue before it causes damages to neighbouring assets.

Westario also performs routine substation inspections. This program is critical to assist staff in identifying any issues and to remediate them as quickly as possible to ensure continuous operation of the substations, protect the assets through preventative maintenance measures, and eliminate any dangers to employees and the public. Further details on Westario's "Distribution System Maintenance and Inspection Program" can be found within Appendix A: Asset Management Plan.

In addition to these routine inspections, Westario also employs a comprehensive vegetation management program. This program ensures that safety of both the public and distribution equipment. This type of ongoing preventative maintenance aids in extending the useful life of distribution assets and reducing the frequency of replacement and refurbishments needed by reducing the frequency and severity of faults due to vegetation contact.

- **5.3.3.2 Asset Replacement/Refurbishment Prioritization**

Westario takes numerous factors into consideration when prioritizing the replacement or refurbishment of any single or group of assets. Going forward, Westario will evaluate the risk of failure, which may result in reliability, service or safety concerns to the public and employees. Any observed issue is placed into a five-level "priority matrix" as seen below and acted upon appropriately.

Priority 1: Replace immediately

Priority 2: Replace within one week

Priority 3: Replace within three months

Priority 4: Replace within one year

Priority 5: Replace after one year, per asset management plan

- **5.3.3.3 Potential Asset Refurbishment Summary**

While refurbishing assets can reduce the capital investments required where viable, it is not always practical or possible for all asset classes. As such, Westario assesses whether an asset should be refurbished or replaced on a case by case basis. If it is feasible and beneficial to have an asset refurbished, it will generally be considered. Once an asset has previously been refurbished, it would seldom be considered for another refurbishment unless necessary. The following table summarizes which asset classes would generally be considered for refurbishment by Westario.

Table #33: Asset Refurbishment Summary Table

	Asset Details		Refurbishment Considered
Category	Asset #	Asset Type	Yes / No
O/H	1	Pole mount Transformers	No
	2	3 Phase Air Break Switches	No
	3	1 Phase Air Break Switches	No
	4	3 Phase Load Break Switches	Yes
	5	Wood Hydro Poles	No
		Insulators/Hardware	No
	6	Overhead Conductors	No
	7	Protective Relays	No
	8	Line Circuit Breakers/ Reclosers	No
U/G	9	Pad mount Transformers	No
	10	U/G Cables	No
Substations	11	44kV Power Transformers	Yes
	12	15kV Circuit Breakers/ Reclosers	Yes
	13	Protective Relays	No
	14	15kV Switchgear Assemblies	No
	15	Buildings	Yes
	16	15kV Primary Cables	No
General Plant	17	Vehicles	Trucks
			Trailers
	18	Office Building/ Garage	Yes
	19	Backup Generators	Yes
	20	Computer Equipment/ Software	No
	21	Meters	No
	22	Office Furniture & Equipment	No
	23	Tools, Shop & Garage Equipment	Yes
	24	Measurement & Test Equipment	No

- 5.3.3.4 Distribution Class Asset Optimization Policies and Practices

5.3.3.4.1 Pole Mount Transformers

Historically, Westario has not practiced refurbishing overhead transformers, nor do they generally require any maintenance. Westario has generally replaced pole mount transformers only upon failure, unless the device is supplying critical loads, or when carried out with the replacement of an old pole. However, facing an aging population of overhead transformers, Westario will require increased capital investments in its transformer replacement. Starting in 2016 and annually through the plan period, Westario will replace 30 pole mount transformers that have reached the end of their useful lives, or showing degradation, to avoid increased failure

rates and to maintain service quality. To optimize the useful life of its transformers, Westario uses available metering data to ensure that transformers are sized adequately for the loads they are supplying. This will help to avoid overloading and thereby reducing the life of the devices.

5.3.3.4.2 Switches

Westario operates many types of switches including manually gang operated switches, fused and unfused inline openers, and fused and unfused cutouts. Westario does not currently refurbish inline and cutout switches as it is more cost and time effective for these items to be replaced. When existing load break switches become obsolete and parts for refurbishments are not available, replacement is the only option remaining. The most common refurbishment which would be considered in this case would be switch insulator replacements. This is sometimes a cost-effective alternative to complete switch replacement. Westario routinely inspects its overhead switches as part of its Distribution System Maintenance and Inspection Program.

5.3.3.4.3 Fully Dressed Wood Poles

Westario has previously completed a pole testing program that was carried out by a single individual and was based on visual inspections and bore samples. This effort produced a consistent assessment, but lacked the scientific basis that is common in most LDC practices today.

Historically, Westario replaced its wood poles individually as deemed necessary during routine inspections, or in larger groups as part of distribution line upgrades. With the recently developed ACA and the results of a new planned pole testing program, Westario intends to replace its hydro poles more strategically.

It is intended that the proposed pole testing will provide an assessment of the remaining pole strength relative to that of a new pole on a percentage basis. This information allows for a comparison of this remaining strength to the actual loading on the pole. If the required level of structural support required by the pole exceeds the allowable safety margins as per the CSA standards, then the pole can be identified and prioritized for replacement. This approach will allow Westario to clearly identify older poles that are still structurally sound and not in situations beyond their remaining physical strength. These poles can therefore be left in service until, at least, the next round of pole testing is completed.

Where groups of poor-condition poles have been identified, Westario will plan pole replacements in clusters to reduce the replacement costs per unit. Along with the pole testing services currently being acquired by Westario to better determine wood pole condition. As Westario's asset knowledge continues to progress with the newly integrated GIS, Westario will be in a better position to implement wood pole treatment programs to ward off deterioration. Where possible, Westario considers such components as down guys, steel crossarms, and metal stand-off brackets for reuse if they are considered fit after inspection.

5.3.3.4.4 Conductors

Westario does not refurbish its overhead conductors, because there are no utility standards for their refurbishment and they are not suited for refurbishment. It does, however, inspect its overhead conductors as part of a maintenance and inspection program, and is therefore able to identify concerns and remedy them as needed.

5.3.3.4.5 *Underground Cables*

Most of Westario's service territory is served by overhead distribution lines; in general, downtown core areas and subdivisions are the only areas that are supplied by underground cables. Asset assessment shows that most underground conductors will require replacement within the next ten years. In some cases, this asset can be rehabilitated through the use of silicone injection, but not in all. Variance in cable construction over the years means that not all cable is suited for this practice. Westario will take this into consideration when deciding the rehabilitation/replacement strategy for underground cables.

5.3.3.4.6 *Pad mount Transformers*

The pad mount transformers in Westario's distribution system are, in general, in very good condition. This asset type is typically replaced based on a combination of asset condition and the criticality of the load. Pad mount transformers do not require much maintenance, generally, but are cleaned and inspected regularly, as per Westario's Maintenance and Inspection Program. Refurbishment of pad mount transformers is not standard utility practice; currently Westario does not refurbish pad mount transformers.

5.3.3.4.7 *U/G Foundations*

The underground infrastructure in Westario's territory is in good condition, however, the system's fibreglass foundations will need replacing in the upcoming years. Westario plans to reuse existing foundations for second lifecycles wherever possible, even though underground foundations are not typically refurbished. In the replacement of pad mount transformers, or in switching kiosks, some foundations are deemed fit for reuse. When this is the case, they are left in place for use with the new transformer. This extends the useful life of the foundation to the general maximum of 70 years.

- **5.3.3.5 Substation Class Asset Optimization Policies and Practices**

Westario has historically been maintaining and refurbishing its station assets where possible in an attempt to extend the useful life of these costly assets and reduce the required capital expenses. A detailed refurbishment/replacement plan has been developed for substation assets (The Distribution Substation Inspection Standards can be found in Appendix A: Asset Management Plan).

5.3.3.5.1 *Power Transformers*

Power transformers are devices which generally require ongoing maintenance and testing, and are conducive to refurbishment. Based on regular "Transformer Dissolved Gas in Oil Analysis Reports", in 2014 Westario identified several station transformers that were a very serious concern and were slated for replacement/refurbishment. From 2014 to 2016, three transformers were refurbished and two new units were purchased. Two of the next most urgent units will be refurbished in 2017. The prioritized replacement/refurbishment list also identified nine substation transformers that are showing cautionary values in the gas analysis. These units are regularly monitored for worsening test results, and the replacement strategy is modified accordingly.

Westario's current plan endeavors to refurbish/upgrade one substation per year for the period of 2017-2022. This will lower the average age of the station asset class significantly, and place Westario in a better position to manage future replacements and upgrades. (The Transformer Fleet Strategy can be found within Appendix A: Asset Management Plan.)

5.3.3.5.2 15kV Switchgear Assemblies

These assets were reviewed and assessed as part of the overall substation replacement/refurbishment plans. When found to be in acceptable condition, the switchgear will be reused or refurbished in a cost-effective manner.

5.3.3.5.3 Buildings

Westario's substation buildings are inspected regularly as part of its maintenance and inspection program. Many portions of the buildings, such as roofing and doors would be considered for refurbishment to prolong the life of a building and avoid the costs of replacing such assets.

5.3.3.5.4 Station Reclosers

Some of the existing station feeders employ new vacuum style reclosers, which have been installed as replacements for older style oil reclosers. These reclosers are all fairly new and are constructed to withstand tens-of-thousands of operations. Vacuum devices are relatively maintenance free, but are inspected regularly as part of the Maintenance and Inspection Program.

Parts for the older style oil reclosers are becoming more difficult to obtain and the units have a limited number of operations before maintenance is required. Westario only has two of these left, and they are slated for replacement with the upcoming station upgrades. They will be replaced with the newer technology vacuum style units.

5.3.3.6 General Plant Asset Optimization Policies and Practices

Most general plant items are generally not considered for replacement due to the costs of refurbishment versus the cost of replacements. Some of the assets that are considered for refurbishment however would include the hydro pole and reel trailers, as it is more economical to refurbish these as required than to replace outright. Refurbishments such as office roof repairs and repaving of parking lot are considered as required.

Of the other small ticket items such as tools and shop equipment, most are replaced as necessary, other than hoist and saws which are often refurbished or repaired.

Items such as computers, software, printers, copiers etc. are generally used to the full extent of their useful life and then they are replaced.

5.4 Capital Expenditure Plan

5.4.1 Plan Summary

This Westario DSP has been derived using data from Westario's historical capital spending, capital projections, the asset management plan and the asset condition assessment. Along with these documents, the target of the DSP is to deliver optimal value for the customer's electricity rates by managing the four performance outcomes set by the OEB's renewed regulatory framework.

Attention on meeting the customer focus, operational effectiveness, public policy responsiveness, and financial performance outcomes will ensure optimal distributor performance by Westario. Westario's new GIS system will provide a very helpful tool in meeting these outcomes, by allowing Westario to more effectively manage its assets by strategically replacing greater risk assets reaching their end of useful life, but before failure.

The following table shows the major capital projects/activities where items meet the annual materiality threshold of \$50,000. This table shows their associated investment categories and the amounts allocated to them in capital expenditures for the forecast period. The single largest project falls within the system renewal category; as a category, system renewal includes a larger number of total projects, and therefore has the largest budget. An additional project of major significance to this DSP is included, despite that it does not meet the materiality threshold. This table shows the projects descending in expenditure amounts. (This discussion is further elaborated upon in section 5.4.5.2 of this DSP.)

Table #34: Capital projects meeting the materiality threshold

Project/Activity	Investment Category	Total 2018 to 2022
Substation Upgrades	System Renewal	6,250,000
Decrepit Pole Replacement	System Renewal	4,690,463
Fiberglass Transformer Base Replacement	System Renewal	2,088,950
Vehicle Replacement	General Plant	1,710,000
Capital Poles	System Access	1,629,078
Distribution Transformer Replacement	System Renewal	1,604,454
New O/H Service Connections	System Access	860,446
Poletran Conversion	System Renewal	847,839
#6 Copper Replacements	System Renewal	788,490
New Underground Service Connections	System Access	632,425
SCADA	System Service	437,820
Non-demarcation Customers	System Access	220,800
Facilities Enhancements	General Plant	170,000
Tools & Equipment	General Plant	165,000
Metering	System Service	150,000
Office Furniture and Equipment	General Plant	100,000
Technology	General Plant	95,000
Cyme and GIS integration	System Service	70,000
		22,510,766

1) Substation Upgrades, Refurbishments and Replacements

Westario owns and maintains 27 municipal substations (MS) and over the past three years has completed a detailed review of the substation assets. Through this process, Westario has been able to create a prioritized list of transformers that need refurbishing, and station switchgear, breakers, fencing, grounding, and control systems that need replacing and upgrading.

Westario has identified several station transformers that were cause for concern, as a result on the regular “Transformer Dissolved Gas in Oil Analysis Reports”, as of 2014. From 2014 to 2016, three transformers were refurbished and two new units were purchased. In 2017, two more units will be refurbished. The prioritized replacement/refurbishment list also identified several substation transformers that are showing cautionary values in the gas analysis. These units are regularly monitored for worsening test results, and the replacement strategy is modified accordingly. From 2014 to 2016, three transformers were refurbished and two new units were purchased. In 2017, two more units will be refurbished. The prioritized replacement/refurbishment list also identified several substation transformers that are showing cautionary values in the gas analysis. These units are regularly monitored for worsening test results, and the replacement strategy is modified accordingly.

Westario’s current plan endeavors to refurbish/upgrade one substation per year for the period of 2017-2022. This will lower the average age of the station asset class significantly, and place Westario in a better position to manage future replacements and upgrades. (Appendix A: AMP contains the Transformer Fleet Strategy.)

2) Decrepit Pole Replacement

Distribution poles are Westario’s single form of support for low and medium voltage overhead feeders and distribution equipment. Data was collected on the existing poles for the purpose of producing an Asset Condition Assessment (ACA) (Appendix D of the AMP). A health index was used to categorize poles into groups rated “very good”, “good”, “fair”, “poor” and “very poor”, and life expectancies were given to correlate to each category. Based on the age criteria alone, it is evident that over half of the wood poles in the system have already reached, or will have reached, their “industry accepted” end of life within the next five-to-ten years. A comprehensive pole testing program, targeted at this aged population is being conducted to further assess the condition of this asset group. This effort will provide a more scientific based result for the condition of the pole and therefore allow a much more targeted approach to the replacement plans and capital spending.

Early results from the pole testing have indicated that many of the poles are currently assessed at less than 60% of the strength of a new pole. This does not necessarily indicate that all of these poles are failing, because the CSA requirement for replacing a pole is based on 60% of the load currently applied to the pole.

As an example, a class 3 pole holding up a short span of secondary wire only, may be years away from degrading to the point where it cannot support the wire under maximum design conditions. Capital has been allocated in each year of the planning period, beginning in 2013, to address the need for decrepit pole replacement, at a rate of approximately 100 poles per year from 2017 to 2020. It can be noted that when some other key capital projects conclude in 2020, expenditures for decrepit pole replacement are planned to increase in 2021 to approximately 150 poles per year and going forward for the remainder of the plan period. This reflects a more aggressive approach to replacing poles that are rated “very poor” and are therefore at the end of their life expectancies.

3) Fiberglass Transformer Base Replacement

These are pad mounted transformers that were installed on fiberglass foundations and are vintage 1970s to 1980s. These units are regularly inspected, and the foundations are degrading. The seasonal freeze-thaw cycle has begun to show on the fiberglass base structures, and has led to the planned replacements. In order to proactively replace these units before they fail, the project has been scheduled for 2020-onward, after poletrun conversions and #6 copper conductor replacements have been completed.

4) Vehicle Replacement

Within Westario’s General Plant assets are all types of vehicles, trailers, tensioners, diggers, etc. which are used for servicing the distribution assets. Many of these pieces of equipment are fairly costly, which means that their replacement is one of the larger capital projects in Westario’s asset management plan. Just like any other asset, vehicles and equipment have a life expectancy, and therefore their replacement is planned and budgeted for. (Appendix F of the AMP has a listing of Westario’s fleet, as part of their General Plant assets.)

5) Capital Poles

This project covers new poles that are required to provide new customer connections, either through line extensions, pole relocations, or new poles for service connections.

These expenditures are driven by the rate of development in the various customer classes, and as a result are somewhat up-predictable. However, historical rates of activity have been used to determine the expected level of spending of approximately 50 poles per year.

6) Distribution Transformer Replacement

Westario’s distribution system includes pole mount and pad mount transformers. Both pole mount and pad mount transformers were assessed based on inspection by Westario crews. While the GIS database did contain a PCB level field for transformers, all applicable transformers have been tested completely. The remaining transformers came from the manufacturers in the 1980s

and later, and therefore had acceptable PCB levels. (The letter certifying that Westario's tested transformers are PCB-free can be found in Appendix E of the AMP.)

Pole mounted transformers are used to step down voltage from a primary level to a secondary utilization level on the overhead distribution system. These transformers are mounted above ground on a pole and are liquid-filled with mineral oil in a sealed tank. An industry standard for the life expectancy for pole mounted transformers is 40 years.

The Health Index analysis revealed that 57% of the population of pole mount transformers will reach their statistical end of life within the next five-to-ten years. For transformers that supply a small number of customers only, a "Run-To-Failure" strategy is most cost effective while having a very small impact on the overall system reliability. The analysis of the available data could not take into account any "run-to-failure" transformers within this group due to the lack of customer connection information.

7) New O/H Service Connections

Most of the older residential and small commercial areas are supplied via overhead conductors. When these services are upgraded, replaced, or vacant in-fill lots are developed, overhead conductors are used.

The design, materials procurement, installation, and acceptance of these assets are driven by the pace of development. Although new customer growth has been small, historical spending trends are stable and have been used for determining the value of this investment over the new planning period.

8) Poletran Conversion

Poletran units can best be described as a streetlight pole that contains an electrical transformer inside of it. These units were a common installation around the late 1960s and into the early 1970s and were driven by an effort to reduce the numbers of pieces of equipment on a residential lot.

Over time it became evident that these poletran installations posed some concerns with electrical clearances and working space allowances due to their compact design. Many LDCs have been making efforts to remove these units from service, either through voltage conversions and/or end of life replacements.

The purpose of this project is to eliminate all remaining poletran units by the end of 2019 and to replace the existing primary cables that are at/beyond the end of their life.

9) #6 Copper Replacements

In the past, #6 copper primary wire was an inexpensive solution for extending power lines to areas with small energy demands. These areas are now experiencing load growth and feeder

extensions off the #6 primary wire. Over time the copper wire has grown brittle and is undersized for the current applications.

Due to its brittle nature, #6 copper wire poses a public and worker safety issue, should the wire break and fall. Westario has experienced incidents of #6 copper wire breaking and falling to the ground unrelated to weather events.

These events are a potential and significant safety risk to line workers and the public. As a result, efforts have been made throughout the industry to remove the majority of #6 copper wire from service by the end of 2020.

10) New Underground Service Connections

Most new residential subdivisions are installed as underground cables and padmount transformers placed on the boulevard.

The design, materials procurement, installation, and acceptance of these assets are driven by the pace of development. Although new customer growth has been small, historical spending trends are stable and have been used for determining the value of this investment over the new planning period.

11) SCADA

SCADA stands for Supervisory Control and Data Acquisition and is a computer based operations software that can control and monitor Smart Devices throughout the Westario system.

A SCADA system will provide better monitoring, system load forecasting, and automated control which can allow Westario to improve its outage restoration time by providing better fault location information and faster outage notification to the Westario staff through event initiated pager or text messaging.

SCADA falls under the System Service investment category. In terms of SCADA-preparedness, Westario's stations fall into three categories: 1) old stations that are not SCADA-ready, meaning that they have not been fitted with the necessary hardware upgrades of reclosers and relays that allow for SCADA installations, (this includes the bulk of Westario's stations); 2) stations that have been upgraded with the necessary hardware and are therefore SCADA-ready, but have not had SCADA installed as of yet, (of this category, there are four); and, 3) stations that have been upgraded for SCADA and have had SCADA installed (this category includes two stations at this time). Westario installed SCADA on one of the SCADA-ready stations in 2015, two (2) more in 2016, with three (3) more units planned for 2017, and one unit in 2018. The SCADA monitoring system is planned to be purchased and installed in 2018. Going forward, regular station upgrades will include SCADA installations.

12) Non-demarcation Customers

This refers to non-serviced vacant lots for non-expansion of an existing distribution line for residential customers only. Westario provides and makes the hydro line accessible to such

customers on the opposite side of the road, i.e. bore, ducts under the road and overhead service poles.

13) Facilities Enhancements

This represents the cost of improvements and other changes to the existing facility to allow for the more effective use of space and rooms

14) Tools & Equipment

This constitutes the cost of tools, implements and equipment of significant value used in repair work and other utility operations.

15) Metering

Smart meters represent a large portion of Westario's distribution system. Smart meters were installed between 2009 and 2011 when the provincial government mandated the replacement of the electromechanical billing meters with the new smart meter and Advanced Meter Infrastructure ("AMI") two-way communication system.

Meter re-verifications are required due to regulations under the Electricity and Gas Inspection Act enforced by Measurement Canada to ensure that all revenue meters meet strict accuracy and operational standards over the life of the meter. The process of removing and testing the meter is referred to as re-verification. Although meter re-verifications are not, as of yet, required on smart meters, all will be due for re-verification in 2019. Since typical meter re-verification can take up to one week, Westario must install a replacement smart meter on the premises. Once the meter comes back from evaluation, it is then used as a replacement at another location.

Westario has also experienced a significant number of smart meter failures that has/will be contributing to the expected capital spending on meters. The following table indicates the failure rate experienced by Westario:

Table #35: Smart Meter Failure Summary

Meter Type	Number of Meters Installed	Number of Failed Meters Since Installation	Percentage Rate of Failure
Single Phase	19,649	1,996	10.16%
Three Phase (A3RL)	956	12	1.26%
Three Phase (A3RL)	44	18	40.9%

Westario continues discussions with the meter vendor to review performance and to find a possible source of the failures, but to date no resolution has been made. The cost of these replacements is covered under OM&A.

The Primary Metering Enclosures (PME) will be upgraded over the next five years to meet requirements and obligations under the Market Rules. These costs are covered in the Metering forecast spending of \$30,000 per year.

16) Office Furniture and Equipment

This represents the investment in general office furniture and equipment with an expected long life and of significant cost.

17) Technology

Technology, as a capital project, includes spending for computer hardware and software, and is classified as General Plant. Some software programs are relatively costly; likewise, keeping computer hardware up-to-date is typically an on-going expense. The bulk of the technology spending, however, includes replacing servers, and the application of mobile mapping technology related to the Geographic Information System (GIS) which is necessary for keeping accurate records of all of the asset bases and capital projects. The GIS system is now fully implemented and is being used daily to capture and track asset information for the distribution system. In the coming years, Westario intends to further invest in mobile technology to allow field staff access to the GIS system data while in the field. This will improve the efficiency of the data collection, inspection reporting, and maintenance of the system asset data. Westario has also implemented the first phase of a manual (OMS) outage management system (HealthMap) that will improve their ability to manage service interruptions within the distribution system. This OMS accesses the smart meter system to detect and report outages and allow better information to be available during outage restoration activities.

18) Cyme and GIS Integration

The CYMDIST Distribution Analysis software is a suite of applications composed of a network editor, analysis modules and user-customizable model libraries that enables WPI staff to obtain engineering solutions for its distribution network. It will be used for planning studies and simulating the behavior of Westario's electrical distribution networks under different operating conditions and scenarios.

- 5.4.1.1 System Capability to Connect New Load or Generation Customers

The following table summarizes the current system capacities and peak loads for each of the communities served by Westario.

Table #36: Capacity vs. load demand

Community	Trend	Peak (KVA)	Month	Comments	Capacity (MVA)
Clifford	↓	1,386	JAN	Dropping	-
Elmwood	↓	545	FEB		-
Hanover	↑	16,000	JAN/FEB	2.4% Average/year	25.25
Harriston	↑	3,430	JUNE	14% Average/year	5
Kincardine	↑	22,000	JAN/FEB/MAR	7.5%	29
Lucknow	↑	3,823	FEB	11%	6.65
Mildmay	↑	2,300	MAR	7%	-
Neustadt	↑	1,200	FEB	4%	-
Palmerston: Mtr 1	↑	3,900	FEB	4%	5
Palmerston: Mtr 2	↑	700	FEB		Customer
Palmerston: Mtr 3	↑	5,850	SEP	4%	Customer
Port Elgin	↑	13,000	MAR	3-5%	33
Ripley	↑	1,730	MAR	9%	-
Southampton: MS #1	↓	2,430	JAN/FEB	-2%	8
Southampton: MS #2	↑	2,990	FEB	1.5%	5
Southampton: MS #3	→	1,100	JAN/FEB		5
Southampton Water Plant	→	300			
Teeswater	→	2,000	JAN	%	3
Walkerton	↓	12,000	JAN	-2%	17.3
Wingham	↑	5,700	FEB	1.75%	10

As can be seen, all of the communities have available capacity to meet the forecasted load growth in their areas.

The condition of sub-station transformers in each community, which determine the capacity for growth, have been assessed and prioritized for replacement/refurbishment to maintain or increase the available capacity in each community.

Applications for renewable generation connections have historically been low, with only seven FIT and 31 microFIT applications over the past five years. The existing connected capacity consists of a 2952 kW FIT generator and 300.29 kW of microFIT.

Westario plans to perform a Distributed Generation Readiness Review as part of the Regional Planning Process, which started in November, 2015.

- **5.4.1.2 Total Annual Capital Expenditures**

The following table is provided to summarize planned capital expenditures by investment category and year over the forecast period:

Table #37: Investment Categories by Year

Investment Category	Budget 2018	Budget 2019	Budget 2020	Budget 2021	Budget 2022	Totals
System Renewal	3,231,509	2,963,562	3,158,679	3,449,520	3,466,927	16,270,196
System Service	382,000	66,750	69,690	69,690	69,690	657,820
System Access	642,734	664,635	671,006	677,481	686,893	3,342,750
General Plant	635,000	350,000	590,000	95,000	570,000	2,240,000
Total:	4,891,243	4,044,947	4,489,375	4,291,691	4,793,510	22,510,766

The following table shows the forecasted capital expenditures in the investment categories by percentages:

Table #38: Investment Categories by Percentage by Year

Investment Category	Budget 2018	Budget 2019	Budget 2020	Budget 2021	Budget 2022	Totals
System Renewal	66%	73%	70%	80%	72%	72%
System Service	8%	2%	2%	2%	1%	3%
System Access	13%	16%	15%	16%	14%	15%
General Plant	13%	9%	13%	2%	12%	10%
Total:	100%	100%	100%	100%	100%	100%

- **5.4.1.3 Investment, Asset Management Output, Planning Effects on Expenditures**

1) System Access investments are primarily customer motivated and are generally consistent year to year. With Westario already having access to all customers in its service area, and no foreseeable significant customer growth, there is little need to invest in expanding the distribution system.

Based on the projected new service connection requirements, a total of \$3,342,750.00 is being allocated to System Access for the planning period. Although variations are possible due to access requirements of unexpected customers, the proposed System Access expenditures represent fifteen (15) percent of Westario's total five-year forecast period capital expenditure plans.

2) System Renewal is the investment category demanding the greatest contribution due to Westario's aging infrastructure. As indicated in Westario's recent Asset Condition Assessment (ACA) report (found within Appendix A: Asset Management Plan), increased investments are required for renewal of a number of distribution assets. The findings of the report have resulted

in Westario planning on investing an increased amount of money to renewing the distribution system in the coming years.

Although the ACA report indicated a large number of hydro poles requiring replacement, Westario is planning to engage contracted wood pole testing services to review this aging asset group. This analysis, and the GIS information on customer connections, will allow the preparation of a prioritized list of poles requiring replacement and to defer the replacements of old poles that are still in good condition or where the impact of failure is low.

The ACA also indicated an increasing number of distribution transformers that are beyond, or soon to surpass, their typical end of life. Included in this is the poletrun replacements project, which targets an older asset that is surrounded by safety concerns.

In both of these cases, the GIS customer connection information that is under development will allow a better assessment of the risks of failure and will allow Westario to prepare a prioritized replacement list to be tackled over the planning period.

In addition to the above, Westario also still has a fair amount of #6 copper conductor still in service. This asset is a relic of past utility practice, and has been planned for replacement based on safety concerns and new system capacity needs.

Based on the projected system renewal plans, a total of \$16,270,196.00 is being allocated to System Renewal for the planning period. Although variations are possible due to unknown outcome of the pole testing and a possibility of an early substation transformer failure, the proposed System Renewal expenditures represent 72% of Westario's total five-year forecast period capital expenditure plans.

3) System Service spending encompasses investments which are planned to ensure the reliability of the distribution system to customers and to allow Westario to meet its operational objectives while addressing any anticipated future customer electricity service requirements.

Projects included in the category are:

- Metering
 - New and replacement primary meters and communication systems as driven by Market Rules
- SCADA
 - Installation of smart devices in the system to allow computer monitoring of status and provide remote control capabilities
- Cyme and GIS Integration
 - This will allow WPI to model the distribution system for better analysis and replacement planning

System Service investments planned for the coming forecast period include \$657,820.00 over the forecast period, representing 3% of the total budget.

4) General Plant investments include non-distribution assets and are focused on allowing Westario to perform its day-to-day operations.

This spending category includes the following groups of assets:

- Technology
 - o Computers, software, training
 - o Mobile applications for work efficiency
- Vehicle/Trailer replacements
- Tools and Equipment
- Buildings/fixtures/facilities enhancements
- Office furniture and equipment

While Westario's General Plant assets are currently in good order, some regular spending is required to maintain operational efficiency and deal with Information Technology changes as they occur. Over the forecast period, Westario is planning for \$2,240,000.00 in reinvestments, which amounts to 10 percent of the total planned capital investments over the forecast period.

• 5.4.1.4 Summary of Annual Capital Expenditures by Category

The following table has been developed to summarize individual projects by investment category and year while demonstrating the primary investment category for each project. It should be noted that since the following information is being "forecasted", it is susceptible to variances due to unforeseeable outcomes.

Table #39: Capital Expenditures over the Forecast Period

Investment Category	Project/Activity	Budget 2018	Budget 2019	Budget 2020	Budget 2021	Budget 2022	Totals
System Renewal	Poletran Conversion	463,286	384,553	-	-	-	847,839
	Substation Upgrades	1,310,000	1,200,000	1,200,000	1,270,000	1,270,000	6,250,000
	#6 Copper Replacements	370,772	272,120	145,598	-	-	788,490
	Decrepit Pole Replacement	780,146	789,866	799,586	1,153,628	1,167,236	4,690,463
	Distribution Transformer Replacement	307,305	317,023	322,691	327,790	329,645	1,604,454
	Fiberglass Transformer Base Replacement	-	-	690,804	698,101	700,045	2,088,950
	Total:	3,231,509	2,963,562	3,158,679	3,449,520	3,466,927	16,270,196
System Service	SCADA	282,000	36,750	39,690	39,690	39,690	437,820
	Metering	30,000	30,000	30,000	30,000	30,000	150,000
	Cyme and GIS integration	70,000	-	-	-	-	70,000
	Total:	382,000	66,750	69,690	69,690	69,690	657,820
System Access	Capital Poles	306,742	325,481	328,883	332,285	335,687	1,629,078
	New O/H Service Connections	166,129	167,899	169,561	171,277	185,580	860,446
	New Underground Service Connections	124,663	126,055	127,363	128,719	125,625	632,425
	Non-demarcation Customers	45,200	45,200	45,200	45,200	40,000	220,800
	Total:	642,734	664,635	671,006	677,481	686,893	3,342,750
General Plant	Technology	30,000	30,000	35,000	-	-	95,000
	Vehicle Replacement	500,000	160,000	465,000	55,000	530,000	1,710,000
	Tools & Equipment	35,000	35,000	35,000	30,000	30,000	165,000
	Facilities Enhancements	35,000	95,000	40,000	-	-	170,000
	Office Furniture and Equipment	35,000	30,000	15,000	10,000	10,000	100,000
	Total:	635,000	350,000	590,000	95,000	570,000	2,240,000
Total		4,891,243	4,044,947	4,489,375	4,291,691	4,793,510	22,510,766

- [5.4.1.5 Regional Planning Process/Regional Infrastructure Plan effects](#)

Westario is part of the Greater Bruce/Huron Regional Planning Group. The regional process commenced for this area in November 2015, and Westario is actively participating in the process. Hydro One lead the process resulting in a Needs Assessment (Appendix H).

- [5.4.1.6 Customer Engagement Activities](#)

Westario engaged residential and industrial/commercial customers through means of a customer satisfaction survey conducted during October, 2015 and February, 2016. The customer survey also included focus group sessions that proved highly informative.

For the UtilityPULSE customer survey, refer to Appendix B.

This survey allowed Westario to gain insight into customer needs, values, preferences and expectations.

- [5.4.1.7 Distribution System Development Over the Forecast Period](#)

New customer growth in Westario's service territory has been regular, but has not been significant. The average customer growth has been around one percent annually over the prior planning period. Customer engagement for the 'general service over 50kW' rate class has indicated not much can be anticipated in load growth, with only one customer considering a plant expansion in the foreseeable future.

There has also been a recent interest that might bring natural gas distribution into areas of Westario service territory that are currently not served by natural gas. Over time and depending on the degree of energy conversion to natural gas, Westario can expect to see a decrease in electrical demand as current electrical heat customers convert to natural gas for their heating needs.

- [5.4.1.8 Total Capital Costs of Planned Projects](#)

The following table lists the capital projects and planned spending amounts for the forecast period:

Table #40: Capital Projects by Year

Investment Category	Project/Activity	Budget 2018	Budget 2019	Budget 2020	Budget 2021	Budget 2022	Totals
System Renewal	Poletrun Conversion	463,286	384,553	-	-	-	847,839
	Substation Upgrades	1,310,000	1,200,000	1,200,000	1,270,000	1,270,000	6,250,000
	#6 Copper Replacements	370,772	272,120	145,598	-	-	788,490
	Decrepit Pole Replacement	780,146	789,866	799,586	1,153,628	1,167,236	4,690,463
	Distribution Transformer Replacement	307,305	317,023	322,691	327,790	329,645	1,604,454
	Fiberglass Transformer Base Replacement	-	-	690,804	698,101	700,045	2,088,950
Total:		3,231,509	2,963,562	3,158,679	3,449,520	3,466,927	16,270,196
System Service	SCADA	282,000	36,750	39,690	39,690	39,690	437,820
	Metering	30,000	30,000	30,000	30,000	30,000	150,000
	Cyme and GIS integration	70,000	-	-	-	-	70,000
Total:		382,000	66,750	69,690	69,690	69,690	657,820
System Access	Capital Poles	306,742	325,481	328,883	332,285	335,687	1,629,078
	New O/H Service Connections	166,129	167,899	169,561	171,277	185,580	860,446
	New Underground Service Connections	124,663	126,055	127,363	128,719	125,625	632,425
	Non-demarkation Customers	45,200	45,200	45,200	45,200	40,000	220,800
Total:		642,734	664,635	671,006	677,481	686,893	3,342,750
General Plant	Technology	30,000	30,000	35,000	-	-	95,000
	Vehicle Replacement	500,000	160,000	465,000	55,000	530,000	1,710,000
	Tools & Equipment	35,000	35,000	35,000	30,000	30,000	165,000
	Facilities Enhancements	35,000	95,000	40,000	-	-	170,000
	Office Furniture and Equipment	35,000	30,000	15,000	10,000	10,000	100,000
Total:		635,000	350,000	590,000	95,000	570,000	2,240,000
Total		4,891,243	4,044,947	4,489,375	4,291,691	4,793,510	22,510,766

These projects are being planned in response to customer preferences, to take advantage of technology based opportunities and to study or demonstrate innovative processes, services, business models, or technologies.

5.4.1.8.1 Customer Preferences

Westario customer consultations to date have indicated a general customer desire for stable electrical rates, and maintained or improved system reliability.

The following list of planned Westario projects has a component or characteristic that can address the above customer preferences.

Substation Upgrades, Refurbishment, and Replacements

One aspect of the planned station upgrades is to install state-of-the-art electronic reclosers that are controlled by protective relays that are Smart Grid capable and will allow quicker notifications of outages to Westario staff, and allow some level of remote operation for outage restoration.

SCADA

In 2015, Westario installed a pilot project for SCADA on one substation in its system. The station was already equipped with electronic protective relays, so all that was required was to install a Remote Terminal Unit (RTU) to connect the station to a host Master SCADA system. For the pilot

project, Westario connected its station RTU to the host system of another LDC to allow it to use the system without the initial start-up cost of its own host master console.

Westario plans, in keeping with its customers' expectations of cost control, to continue using an external host for its SCADA master computer console to complete the connection of all newly renovated substations to the system unit 2018, at which time Westario plans to purchase and install its own SCADA monitoring system. This will allow the collection and archiving of system operational data that can be used for the following activities:

- System load studies to identify capacity versus load issues;
- Faster outage notifications to Westario staff;
- Increased ability to locate faults by feeder/station; and
- Eventual remote control capability for outage restoration.

Geographic Information System

Westario has implemented a new GIS system in 2015/16, which will greatly assist in the collection, maintenance, accuracy of the asset information and customer connections details. These two aspects, in conjunction with the SCADA project, will allow more accurate reporting of outage frequency, duration, and customers affected. This, in turn, will improve the reporting of the system reliability statistics to the OEB, for internal control purposes.

5.4.1.8.2 Technology Based Opportunities

Both the SCADA and GIS projects mentioned above also represent the implementation of state-of-the-art technology being applied by Westario in order to advance the operation of its distribution system toward the goals identified by the customer consultation activities

5.4.1.8.3 Study/Innovation Projects

The following projects are planned for the forecast period and can be designated specifically to "study and innovation". Westario is embarking on a pole testing program that will provide data to be used in the decision-making process for pole replacements. By testing the oldest group of poles in the system, Westario can confirm or refute the condition assessment, which is currently based on age only.

5.4.2 Plan Process Overview

• 5.4.2.1 Expenditure Plan Objectives

The objectives of Westario's capital planning are to meet its Vision and Mission statement. The Mission is to build a quality, customer focused organization. This is done by providing customers with reliable, cost effective services, to ensure public and worker safety, meet regulatory requirements, and to maximum operational efficiency and cost effectiveness while respecting the community and environment. Ultimately, the plan is structured to allow Westario to meet its operational objectives. Below are more specific details relating to the capital plan objectives for each investment category.

Westario Power Mission Statement:

Westario Power Inc. is an energy distribution corporation committed to providing quality,

customer focused services in a safe, reliable, cost effective manner. We will foster sustainable growth while respecting the environment and the communities we serve.

Westario Power Vision Statement:

We are dedicated to creating superior value for our customers and shareholders, and a safe and rewarding work environment for our employees. We will grow our business through innovation and creative leadership, based on sound fiscal management and business practices.

5.4.2.1.1 System Access Investments

The main objective of the capital expenditures in the system access category is to allocate sufficient funds for new connections in both the existing distribution system area, and for the growth needs of the Westario customers, such as extension of the system to developing regions. These new developments include three phase customer connections, new single phase commercial connections and new subdivisions and relate to the asset management plan's objective of addressing growth of the communities it serves.

5.4.2.1.2 System Renewal Investments

The main objective of the capital expenditures in the system renewal category is to allocate sufficient funds for the replacement and refurbishment of existing assets, to keep the distribution system as safe and reliable as feasibly possible. This objective is particularly significant as Westario's system is an aging one which required significant renewal investments to maintain this safety and reliability. Major targeted assets for renewal include wood poles, pole mount transformers and poletrun. Attempts to perform these investments as efficiently as possible are made through the implementation of the Asset Condition Assessment (ACA) (found within Appendix A: Asset Management Plan) which include health indices and evaluate where assets are currently positioned relative to their end of life. Another project in this category is the #6 copper conductor replacement work, which not only relates to safety, but also cost efficiency to the customers. By replacing this high line loss conductor, Westario is ultimately passing savings onto its customers. All of these expenditures relate to Westario's asset management plan's objective of addressing service safety and reliability while minimizing line losses.

5.4.2.1.3 System Service Investments

The main objective of the capital expenditures in the system service category is to allocate sufficient funds for providing the most reliable service and meeting regulatory requirements. This has become another significant category for Westario as it is undertaking significant refurbishments to its distribution substations over the forecast period to ensure the reliability of services provided to its customers. Other ongoing investments in this category include ongoing customer and station metering replacements. These expenditures align with Westario's asset management plan's objective of addressing service reliability to its customers.

5.4.2.1.4 General Plant Investments

The main objective of the capital expenditures in the general plant category is to allocate sufficient funds to allow Westario to perform its day to day activities, and ultimately fulfil its Vision and Mission statement, and achieving all other investment categories objectives. Ongoing investments to help achieve these objectives include the GIS system integration and SCADA pilot

programs. Other investments include tools, small vehicles and large trucks and technology such as computers and software. All of these expenditures align with Westario's asset management plans objective of addressing service reliability to its customers and of achieving its Mission of building a quality, customer focused organization, as without these general plant items, no objective could be reached.

- **5.4.2.2 Non-distribution System Alternatives**

While there are currently no known system loading or renewable energy generation (REG) capacity constraints on the Westario distribution system (other than points supplied by #6 copper). However, there have been no engineering studies targeted at determining any system REG capacity constraints. It is difficult to relate non-distribution system investments to relieving system capacity issues, however, there are significant capital projects both planned and currently underway which will aid in determining system REG connections.

The GIS system installation for Westario is a major capital investment which should allow Westario to relieve some operational constraints such as lack of asset knowledge, which has been an issue since the amalgamation of 15 utilities into Westario. The new GIS system will not only allow for more accurate condition assessments and asset management such as strategic replacement plans, but will enable Westario to better estimate the number of customers and load per feeder. Additionally, this investment will allow Westario to better maintain power quality by implementing the modeling of the electrical distribution system in GIS. Although the significant material investments for this GIS project are already complete, continuous time and effort investment will be required to ensure the system is adequately maintained and up to date to remain useful.

Another project which will aid in alleviating operational constraints and identifying capacity constraints is the SCADA pilot project currently under way. With SCADA capabilities, Westario would be able to identify feeders which may be approaching their loading limits, and could allow them to accurately track loading and outage trends. With this loading data, Westario could then perform load transfers between feeders as necessary to avoid over loading feeders and equipment. Additionally, with minimum station loading information, it would be possible to more accurately determine the feeder REG capacity limitations. With a single SCADA pilot project currently under way, if results prove useful to Westario, significant capital investments may be in line for future capital investment plans.

- **5.4.2.3 Prioritization of Capital Investments**

Westario makes decisions on prioritizing capital investments through following the steps outlined in the asset management flow chart found in section 5.3.1, as the capital investment process is fundamentally related to this process.

When conflicts arise in the prioritization of capital investments, they will be managed as follows:

- Safety must be first priority - Safety of staff, contractors, and the public will always be the highest priority even if this means exceeding budgets or risking non-compliance.

All other interests must be managed as the situation dictates and will out of necessity be a balance of some proportion (not necessarily equal proportions) between the following:

- Financial stability – Westario must be financially viable or it will not exist to manage other conflicts;
- Quality of supply – Customers want value and are willing to pay for a certain level of quality;
- Electricity rates – Rates reflect an appropriate balance between revenues and expenditures; and
- Compliance – Other than safety.
- [5.4.2.4 Mechanisms for Customer Engagement](#)

Existing customer engagement mechanisms include the following:

- Electricity Bill – View your usage – through “My Hydro Eye”;
- Pre-Authorized Payment Plans – Electronic Access;
- E-billing (view your e-bill online);
- Power Interruptions – Notification;
- Bill inserts;
- Updates on the website;
- CDM program opportunities to interface with customers; and
- Direct interface with commercial customers through direct meeting or conference calls.

Westario also engaged residential and industrial/commercial customers through means of a customer satisfaction survey conducted during November and December, 2015.

Based on the survey findings, Westario is planning on implementing the following projects over the DSP horizon:

- CIS integration into GIS in 2017; and
- Outage Management in 2018.

- [5.4.2.5 REG Investment Method/Criteria](#)

As there is no existing data on the overall system capacity for renewable energy generation (REG) (discussed further in section 5.4.3.3), applications are considered on a case-by-case basis. Depending on the size (kW) of the connection under consideration, and the capacity available from the feeder in question, applications are either accepted for further inquiry and assessment, or are rejected. Some applications are accepted and offers are extended for connection: this does not necessarily mean that the project is completed. In many cases, offers are issued but projects are terminated or remain incomplete for various reasons.

5.4.3 System Capability Assessment for Renewable Energy Generation (REG)

• 5.4.3.1 Renewable Energy Applications

In the years since 2010, Westario has received 187 microFIT applications for renewable energy generation (REG). The following table shows the numbers of applications, by year, and their sizes (kW), that were issued offers. It also shows how many of those offers were ultimately connected, and the size of the connections (kW).

Table #41: Westario's microFIT Applications and Connections

Year	Offers to Connect Issued/Completed	Size of Offers (kW)	Connections Made	Size (kW)
2011	28	255.13	18	161
2012	20	184	19	190
2013	17	161.4	14	130.3
2014	9	82	2	20
2015	5	30	4	40
2016	2	13.5	1	8.5
2017	1	9.7	1	9.765
Total	82	735.73	59	559.565

In sum, Westario extended 82 offers to connect microFITs, sized at 734kW in total, over this period; 59 of those were completed for a total of 560kW. There were several projects already connected prior to the historical plan period. (Further data in Appendix J.)

Westario has seven connected FIT projects and one storage facility, all of which were initiated since 2012. Three of these FIT connections are fully complete; the four remaining FIT connections are in progress. These FIT projects, including the storage facility, have a combined total of 2952kW. The table below lists these projects, as well as their sizes, and the relevant feeder and transformer information. (Appendix K is an example of the review process for a FIT application.)

Table #42: Westario's FIT application connections

Project ID	Year Connected	Size (KW)	Westario Feeder	Connecting TX	Renewable Fuel
Price Schonstrom	2012	100	F1	4-037	Solar - Rooftop
Larsen & Shaw	2013	76	F4	2-002	Solar - Rooftop
NRStor Storage	2014	2000	N/A	N/A	Flywheel Storage
Leader Resources	2015	42	F2	T05460	Solar - Rooftop
MSW Plastics	2015	250	N/A	N/A	Solar - Rooftop
Hanover Rona	2015	134	F2	4-0002	Solar - Rooftop
Howard Johnson	2015	100	F1	T05463	Solar - Rooftop
Dollarama	2015	250	F1	2-0025	Solar - Rooftop
	Total:	2952			

These eight connections (seven FITs and one storage facility) represent all of the FIT applications that Westario received in the historical plan period. There were no additional applications that were denied or failed to connect.

- **5.4.3.2 Number/capacity of REG Connections Over Forecast Period**

Because Westario does not have a comprehensive knowledge of its connection capacity, and the Integrated Regional Planning Process (IRPP) is not yet complete, it is difficult to estimate the size of the connections that will occur over the forecast period. At this point, applications are assessed on an individual basis.

Based on the historical applications for FIT projects, Westario does not expect to receive many applications in the next five years.

- **5.4.3.3 Capacity to Connect to REG**

As stated previously, Westario has not conducted a thorough review of the capacity available for REG connections. It does, however, have a process for reviewing applications as they come in, looking at the proposed project and its location. At that point, Westario concludes that either the project is not feasible, or it conducts a further assessment to see if there is capacity and feasibility for the project in the proposed location based on the feeders in that area. When a project is deemed feasible, the offer is issued for connection. (Appendix H contains the IRPP Needs Assessment Report.)

- **5.4.3.4 REG Connection Constraints**

Westario's REG connection constraints depend largely on the outcomes of the IRPP. Since this process is still under way, Westario's ability to assess future REG connection capacities is limited.

- **5.4.3.5 Embedded Distributor Connection Restraints**

The results of the IRPP will determine the REG connection capacity restraints associated with being an embedded distributor.

5.4.4 Expenditure Summary

- **5.4.4.1 Forecast Period Detailed Capital Project Summary**

In order to provide a "snapshot" of Westario's capital expenditures over the coming forecast period, the following table has been developed to summarize individual projects by investment category and year while demonstrating the primary investment driver for each project. It should be noted that since the following information is being "forecasted", it is susceptible to variances due to unforeseeable outcomes.

Table #43: Capital Expenditures over the Forecast Period

Investment Category	Project/Activity	Budget 2018	Budget 2019	Budget 2020	Budget 2021	Budget 2022	Totals
System Renewal	Poletran Conversion	463,286	384,553	-	-	-	847,839
	Substation Upgrades	1,310,000	1,200,000	1,200,000	1,270,000	1,270,000	6,250,000
	#6 Copper Replacements	370,772	272,120	145,598	-	-	788,490
	Decrepit Pole Replacement	780,146	789,866	799,586	1,153,628	1,167,236	4,690,463
	Distribution Transformer Replacement	307,305	317,023	322,691	327,790	329,645	1,604,454
	Fiberglass Transformer Base Replacement	-	-	690,804	698,101	700,045	2,088,950
	Total:	3,231,509	2,963,562	3,158,679	3,449,520	3,466,927	16,270,196
System Service	SCADA	282,000	36,750	39,690	39,690	39,690	437,820
	Metering	30,000	30,000	30,000	30,000	30,000	150,000
	Cyme and GIS integration	70,000	-	-	-	-	70,000
	Total:	382,000	66,750	69,690	69,690	69,690	657,820
System Access	Capital Poles	306,742	325,481	328,883	332,285	335,687	1,629,078
	New O/H Service Connections	166,129	167,899	169,561	171,277	185,580	860,446
	New Underground Service Connections	124,663	126,055	127,363	128,719	125,625	632,425
	Non-demarcation Customers	45,200	45,200	45,200	45,200	40,000	220,800
	Total:	642,734	664,635	671,006	677,481	686,893	3,342,750
General Plant	Technology	30,000	30,000	35,000	-	-	95,000
	Vehicle Replacement	500,000	160,000	465,000	55,000	530,000	1,710,000
	Tools & Equipment	35,000	35,000	35,000	30,000	30,000	165,000
	Facilities Enhancements	35,000	95,000	40,000	-	-	170,000
	Office Furniture and Equipment	35,000	30,000	15,000	10,000	10,000	100,000
	Total:	635,000	350,000	590,000	95,000	570,000	2,240,000
Total		4,891,243	4,044,947	4,489,375	4,291,691	4,793,510	22,510,766

- 5.4.4.2 Actual/Budget Capital Expenditure Summary

As required by the OEB Chapter 5 Filing Requirements Section 5.4.4, following tables have the Actual/Budget Capital Expenditure Summary. The first table outlines the capital expenditures, for both the historical and the forecast period, providing a means of comparing historical planned to actual investments, and historical to forecasted investments.

Table #44: Westario's capital expenditures over the plan period: historical

Investment Category	Project/Activity	Budget 2012	Actual 2012	Budget 2013	Actual 2013	Budget 2014	Actual 2014	Budget 2015	Actual 2015	Budget 2016	Actual 2016
System Renewal	Poletrun Conversion	490,065	327,587	612,345	287,667	354,467	287,498	379,439	344,055	489,000	
	Substation Upgrades	143,891		385,658	23,541	1,641,605	1,809,644	848,371	815,176	1,824,000	1,457,532
	#6 Copper Replacements	1,290,202	1,164,788	1,326,425	1,303,085	149,619	449,151	851,195	773,415	880,000	281,923
	Decrepit Pole Replacement	573,418	490,800	571,220	534,153	479,884	289,729	428,573	475,884	469,000	985,871
	Distribution Transformer Replacement								1,328	435,000	335,460
	Total:	2,497,576	1,983,175	2,895,648	2,148,446	2,625,575	2,836,022	2,507,578	2,409,858	4,097,000	3,060,786
System Service	SCADA									70,000	55,932
	Metering		82,765	444,524	517,995	435,123	299,478	105,705	235,882	53,000	254,808
	Cyme and GIS integration										354,684
	Wholesale Metering (PME)			14,638	15,940			10,000	10,308		
	ESRI ArcGIS							361,825		210,000	
	Mobile Transformer Substation							978,000			688,929
	Hanover MS1 Reactor Installation	242,020		217,173							
	Station Grid Code Upgrade Non Compliant	120,928		288,371		288,657		198,000		100,000	97,962
	Stranded and Smart Metering				3,452,097						
	IFRS and 2013 COS Entries		616,024		(519,226)						
	Annual OH Burden Adj		(457,708)		41,317		113,916		61,930		320,497
	Total:	362,948	241,081	964,706	3,508,123	723,780	413,394	1,653,530	308,120	433,000	1,772,811
System Access	Capital Poles	472,558	268,206	173,790	241,160	298,288	113,970	228,091	276,202	199,000	277,122
	New O/H Service Connections									16,000	
	New Underground Service Connections	292,934	385,763	169,141	282,317	187,853	374,338	218,651	287,736	86,000	99,313
	Non-demarcation Customers	31,716	1,429	40,000	6,613	40,000	11,639	42,000	14,487	13,000	32,139
	3 Phase Customers	320,091	162,158	229,970	111,353	230,857	97,994	215,840	105,763	223,000	173,013
	Single Phase		44,645		11,998		1,585				47,878
	New Lots Developed	270,633	327,308	187,150	62,265	120,951	209,439	115,399	204,099	79,000	106,223
	Relocates and Replacements										103,944
	Contributed Capital	(433,861)	(708,331)	(343,740)	(473,674)	(344,627)	(394,428)	(313,340)	(360,794)		(584,438)
	Total:	954,071	481,178	456,311	242,032	533,322	414,537	506,641	527,493	616,000	255,194
General Plant	Technology	72,000	17,197	73,600	391,713	15,000	118,480	268,600	388,702	55,000	210,994
	Vehicle Replacement	490,000	266,096	445,000		400,000	371,134	35,000	58,226	115,000	93,165
	Tools & Equipment	72,000	7,145	72,000	41,298	70,000	74,412	85,000	93,460	85,000	1,275
	Facilities Enhancements	5,000		9,000	8,091	35,000	39,429	46,000	40,949	20,000	7,906
	OfficeFurniture and Equipment	5,000	2,642	2,000	12,647	5,000	42,234	5,000	21,091	20,000	6,259
	Miscellaneous Equipment				26,266	30,000	17,556	30,000	17,800		100,662
	Change in Major Spare Parts Inventory		9,424		(75,974)		(28,543)		(113,560)		
	Total:	644,000	302,504	601,600	404,041	555,000	634,702	469,600	506,668	295,000	420,262
Total		4,458,595	3,007,938	4,918,265	6,302,642	4,437,677	4,298,655	5,137,349	3,752,139	5,441,000	5,509,052

Table #45: Westario's capital expenditures over the plan period: forecast

Investment Category	Project/Activity	Bridge Year Budget 2017	Budget 2018	Budget 2019	Budget 2020	Budget 2021	Budget 2022	Budget Totals (2018- 2022)
System Renewal	Pole/Tran Conversion	285,118	463,286	384,553	-	-	-	847,839
	Substation Upgrades	1,450,000	1,310,000	1,200,000	1,200,000	1,270,000	1,270,000	6,250,000
	#6 Copper Replacements	652,215	370,772	272,120	145,598	-	-	788,490
	Decrepit Pole Replacement	772,820	780,146	789,866	799,586	1,153,628	1,167,236	4,690,463
	Distribution Transformer Replacement	306,200	307,305	317,023	322,691	327,790	329,645	1,604,454
	Fiberglass Transformer Base Replacement	-	-	-	690,804	698,101	700,045	2,088,950
	Total:	3,466,354	3,231,509	2,963,562	3,158,679	3,449,520	3,466,927	16,270,196
System Service	SCADA	70,000	282,000	36,750	39,690	39,690	39,690	437,820
	Metering	30,000	30,000	30,000	30,000	30,000	30,000	150,000
	Cyme and GIS integration	-	70,000	-	-	-	-	70,000
	Total:	100,000	382,000	66,750	69,690	69,690	69,690	657,820
System Access	Capital Poles	304,300	306,742	325,481	328,883	332,285	335,687	1,629,078
	New O/H Service Connections	166,129	166,129	167,899	169,561	171,277	185,580	860,446
	New Underground Service Connections	124,663	124,663	126,055	127,363	128,719	125,625	632,425
	Non-demarcation Customers	45,200	45,200	45,200	45,200	45,200	40,000	220,800
	Total:	640,292	642,734	664,635	671,006	677,481	686,893	3,342,750
General Plant	Technology	52,800	30,000	30,000	35,000	-	-	95,000
	Vehicle Replacement	10,000	500,000	160,000	465,000	55,000	530,000	1,710,000
	Tools & Equipment	25,000	35,000	35,000	35,000	30,000	30,000	165,000
	Facilities Enhancements	-	35,000	95,000	40,000	-	-	170,000
	Office Furniture and Equipment	15,000	35,000	30,000	15,000	10,000	10,000	100,000
	Total:	102,800	635,000	350,000	590,000	95,000	570,000	2,240,000
Total		4,309,446	4,891,243	4,044,947	4,489,375	4,291,691	4,793,510	22,510,766

Table #46: Westario's capital expenditures by investment driver: historical (OEB-mandated Table 2 of Chapter 5)

Category	Historical											
	2013			2014			2015			2016		
	Plan	Actual	Variance	Plan	Actual	Variance	Plan	Actual	Variance	Plan	Actual	Variance
	\$		%	\$		%	\$		%	\$		%
System Renewal	2,910,286	2,164,386	-25.6%	1,902,154	2,156,474	13.4%	2,517,578	2,420,166	-3.9%	4,097,000	3,060,786	-25.3%
System Service	950,068	3,492,183	267.6%	1,447,201	1,092,942	-24.5%	1,643,530	297,812	-81.9%	433,000	1,772,811	309.4%
System Access	456,311	242,032	-47.0%	533,322	414,537	-22.3%	506,641	527,493	4.1%	616,000	255,194	-58.6%
General Plant	601,600	404,041	-32.8%	555,000	634,702	14.4%	469,600	506,668	7.9%	295,000	420,262	42.5%
Total	4,918,265	6,302,642	28.1%	4,437,677	4,298,655	-3.1%	5,137,349	3,752,139	-27.0%	5,441,000	5,509,053	1.3%
System OM&A	6,156,700	5,697,237	-7.5%	5,697,237	5,212,152	-8.5%	5,212,152	5,196,686	-0.3%	5,757,000	5,706,997	-0.9%

Table #47: Westario's capital expenditures by investment driver: forecast (OEB-mandated Table 2 of Chapter 5)

Category	Forecast (planned)					
	Bridge 2017	2018	2019	2020	2021	2022
		\$	\$	\$	\$	\$
System Renewal	3,466,354	3,231,509	2,963,562	3,158,679	3,449,520	3,466,927
System Service	100,000	382,000	66,750	69,690	69,690	69,690
System Access	640,292	642,734	664,635	671,006	677,481	686,893
General Plant	102,800	635,000	350,000	590,000	95,000	570,000
Total	4,309,446	4,891,243	4,044,947	4,489,375	4,291,691	4,793,510
System OM&A	5,676,836	5,936,033	6,054,754	6,175,849	6,299,366	6,425,353

5.4.5 Capital Expenditure Justifications

- 5.4.5.1 Overall Plan

Westario's DSP integrates asset knowledge, asset management, third-party coordination, and sound financial planning, allocated into the four investment categories.

5.4.5.1.1 Comparative expenditures by category

The following pie charts show historical capital expenditures in each of the investment categories. Historical spending on system service has fluctuated the most from as low as \$240,000 to as high as nearly \$3.5 million. Other categories in each year remain fairly consistent with the exception of 2013.

Chart #6: 2012 investment driver expenditures

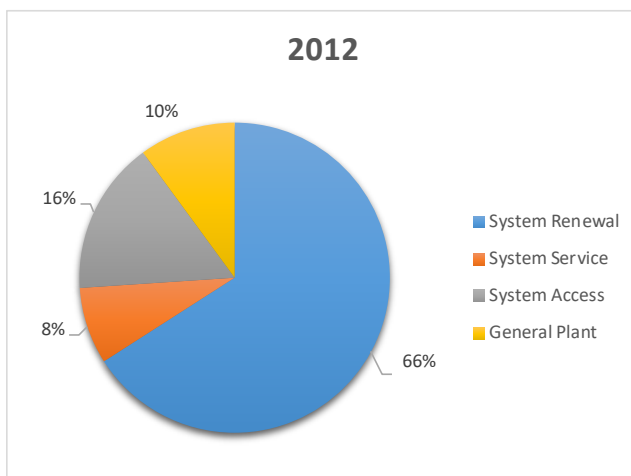


Chart #7: 2013 investment driver expenditures

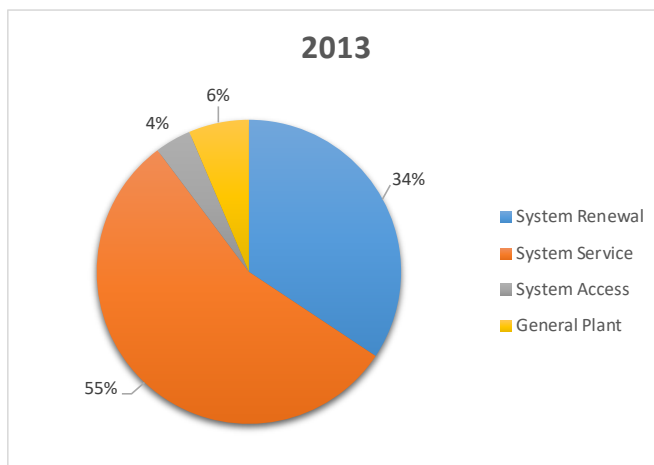


Chart #8: 2014 investment driver expenditures

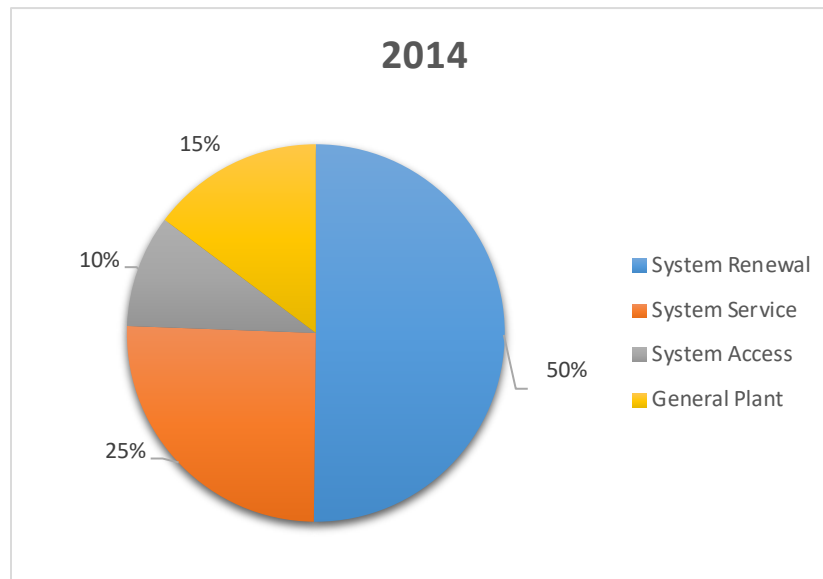


Chart #9: 2015 investment driver expenditures

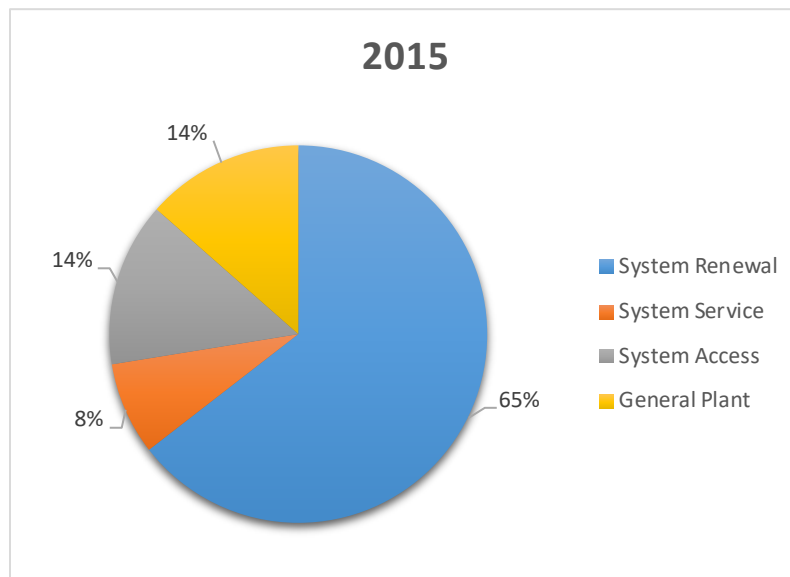
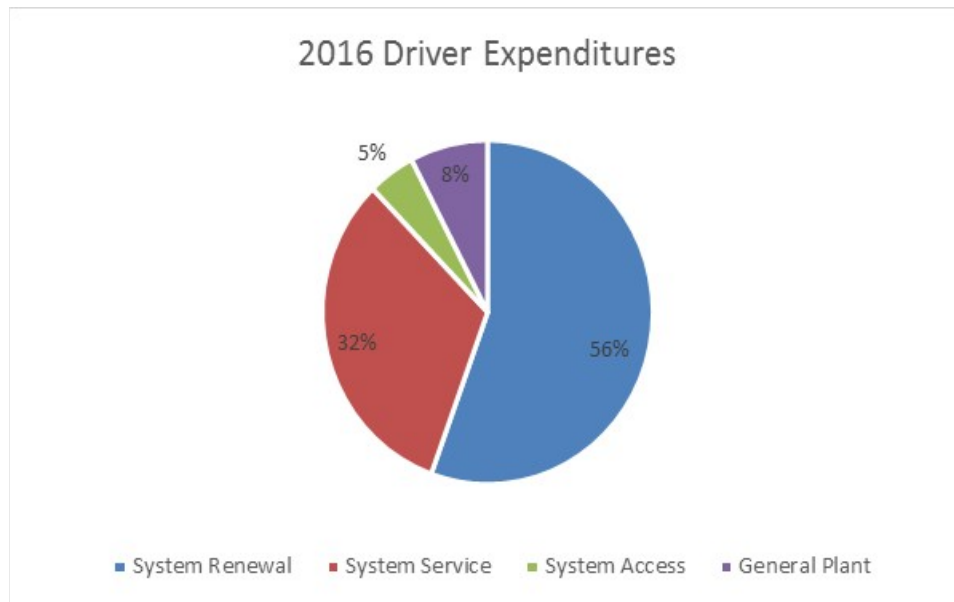


Chart #10: 2016 investment driver expenditures



System Access

Projects in this classification are undertaken to meet customer demand under the Distribution System Code so variances are based on actual numbers.

2012 Budget vs Actual: new developments and new services were slightly higher than expected. Both 3 phase and single phase upgrades remained fairly constant. Capital poles projects values are based on actual number of poles changed or installed, which was less than expected. Capital contributions were much higher than expected, giving the appearance that this category was underspent.

2013 Budget vs Actual: less new developments and slightly less new services than expected. Both 3 phase and single phase upgrades decreased slightly. Capital poles projects values are based on actual number of poles changed or installed, which were more than expected.

2014 Planned vs Actual: more new developments and services were installed than expected. Both 3 phase and single phase upgrades remained fairly constant. Capital poles projects values are based on actual number of poles changed or installed, which was less than expected.

2015 Budget vs Actual: a few more new developments and services were installed than expected. Both 3 phase and single phase upgrades remained fairly constant. Capital poles projects values are based on actual number of poles changed or installed, which were more than expected.

2016 Budget vs Actual: a few more new developments and services were installed than expected. Both 3 phase and single phase upgrades remained fairly constant. Capital poles projects values are based on actual number of poles changed or installed, which were more than expected. The biggest variance was more than expected funds for contributed capital.

System Renewal

Projects in this classification are undertaken to upgrade distribution infrastructure to increase system capacity, replace deteriorated plant, address potential safety issues, and improve reliability.

2012 Budget vs Actual: The biggest variance was a deferral of substation spending.

2013 Budget vs Actual: The poletran project costs were below budget, and substation upgrades were deferred to accommodate greater effort needed for smart meters.

2014 Budget vs Actual: Project costs remained fairly constant.

2015 Budget vs Actual: Project costs remained fairly constant.

2016 Budget vs Actual: Work related to poletran conversion, substations, and #6 copper replacements was scaled back to allow for a greater focus on pole replacements and smart metering.

System Service

Projects in this classification are undertaken to improve public and worker safety, increase efficiency, and control reliability.

2012 Budget vs Actual: The biggest portion of this variance is due to the transition from CGAAP to IFRS as mandated by the OEB. With these changes included the deployment of smart meters, collectors and repeaters as well as dealing with the old obsolete meters and implementation of AMI software and upgrades. Although this project was split between 2012 and 2013 most of the costs were applied in 2013.

2013 Budget vs Actual: Aside from 2013 taking most of the costs for new metering, that year also included the approved recovery and cost transfer of the smart meters.

2014 Budget vs Actual: The installation of 3 phase smart meters continued into 2014 and 2015 with costs decreasing as the project finalized.

2015 Budget vs Actual: The installation of 3 phase smart meters continued into 2015 which increased the expected costs associated with this projects end. The purchase of a mobile substation (~\$1M) was deferred.

2016 Budget vs Actual: The installation of 3 phase smart meters continued into 2015 which increased the expected costs associated with this projects end. The purchase a mobile substation was completed and under budget. The Cyme software was purchased but not budgeted.

General Plant

General plant investments are modifications, replacements or additions to a distributor's assets that are not part of its distribution system; including land and buildings; tools and equipment; rolling stock and electronic devices and software used to support day to day business and operations activities.

2012 Budget vs Actual: although a new bucket truck was purchased expenditures decreased due to the disposal of two bucket trucks that had reached the end of its useful life.

2013 Budget vs Actual: expenditures decreased due to the disposal of the stranded meters recovery and the deferral of a vehicle purchase. However, there was an increase in software and hardware due to the purchase of safety training software and new computers. Tools and miscellaneous equipment increased due to the purchase of a trailer and replacement of line tools.

2014 Budget vs Actual: expenditures increased due to engineering software was purchased as well the upgrade of the company's operating system software. Tools and miscellaneous equipment increased due to the purchase of a trailer and replacement of line tools.

2015 Budget vs Actual: in 2015 Westario purchased new equipment to update their administration server as well as new software for a filing system. However, other expenditures decreased due to the delay in the new GIS program project.

2016 Budget vs Actual: in 2016 costs increased with the start of the new GIS program project.

The charts #11-16 below indicate the capital expenditures for the forecast period for the investment categories. System service in the early years of the forecast covers items such as SCADA and GIS implementation, which are operational tools intended to improve efficiency and system reliability. Once these are implemented, the majority of system service is attributed to managing the replacement and resealing of the primary metering units (PMEs).

Going forward, Westario intends to increase the amount of capital spending on system renewal in an effort to address the recommendations of the asset condition assessment (Appendix A: Asset Management Plan) which indicated a significant portion of several asset classes reaching or exceeding typical end of life within the next five-to-ten years.

During the forecast period, system access expenditures have been set at the average values as seen in the historical period. This value is around \$650,000 annually and is driven by development and load growth, which are factors outside of Westario's control.

Expenditures in general plant for the forecast period range from \$95,000 to nearly \$650,000 annually. The higher numbers in 2018, 2020, and 2022 reflects the planned purchase of new vehicles. General plan expenditures tend to be lumpy in nature due to the fact that these assets have a service life driven by usage and maintenance practices.

Chart #11: 2017 projected investment driver expenditures

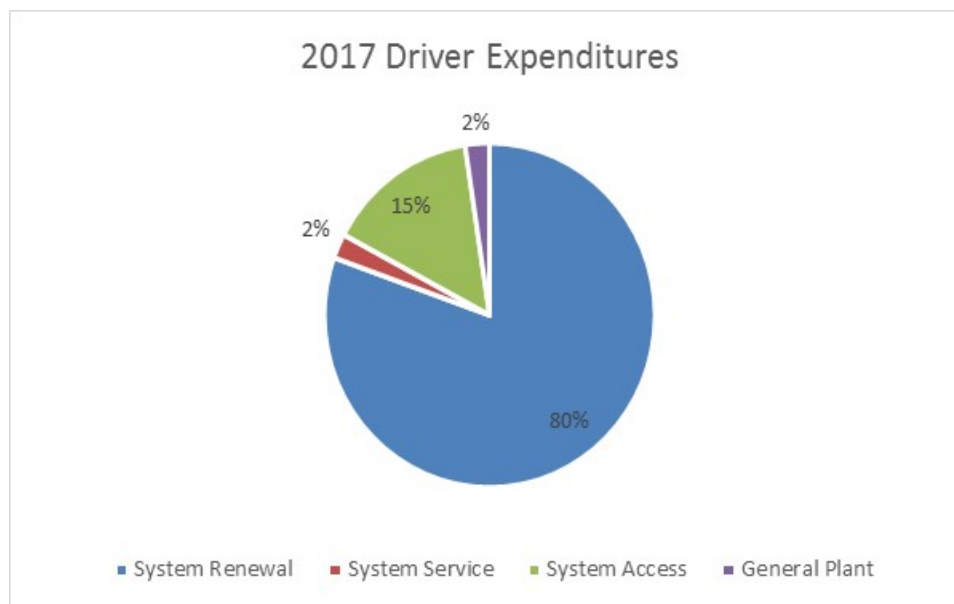


Chart #12: 2018 projected investment driver expenditures

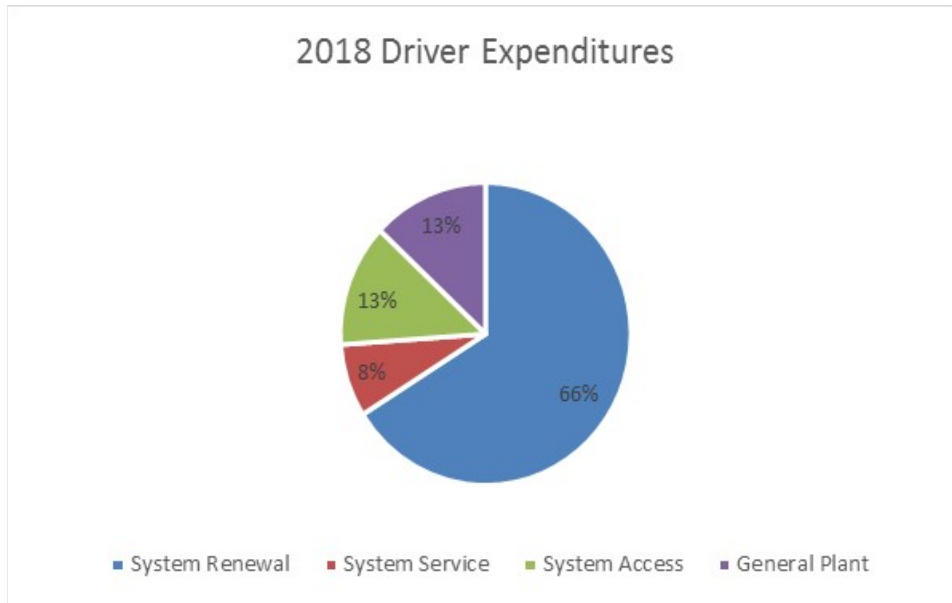


Chart #13: 2019 projected investment driver expenditures

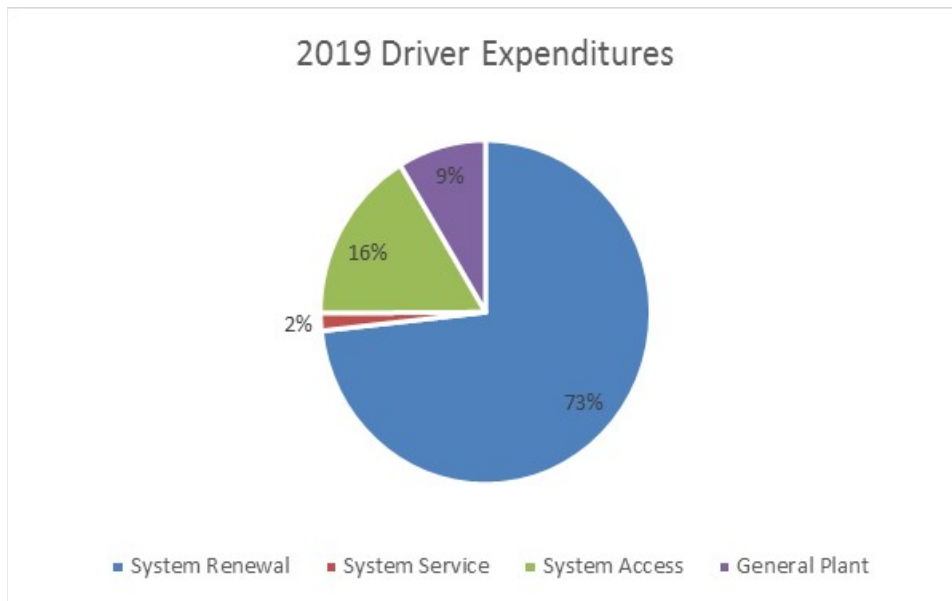


Chart #14: 2020 projected investment driver expenditures

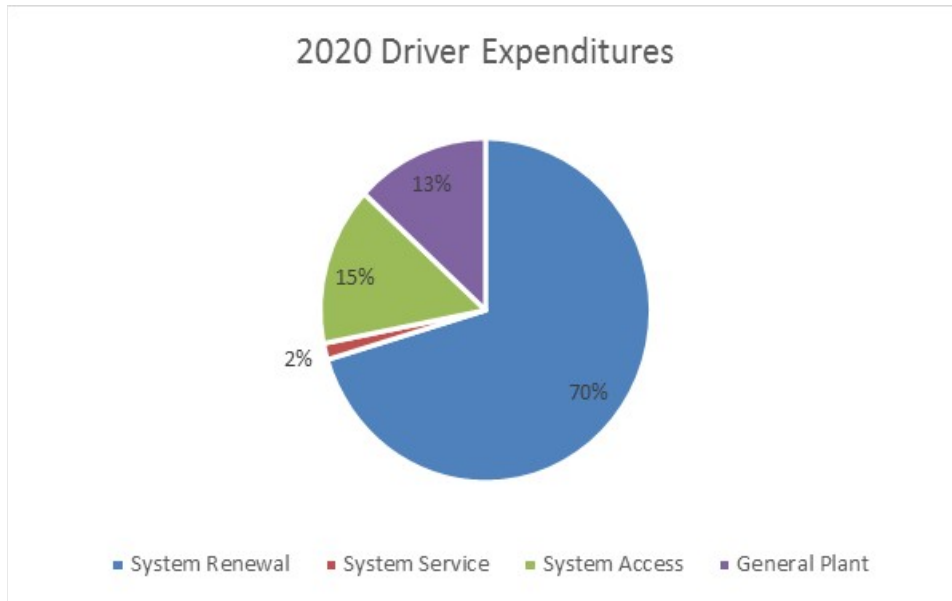


Chart #15: 2021 projected investment driver expenditures

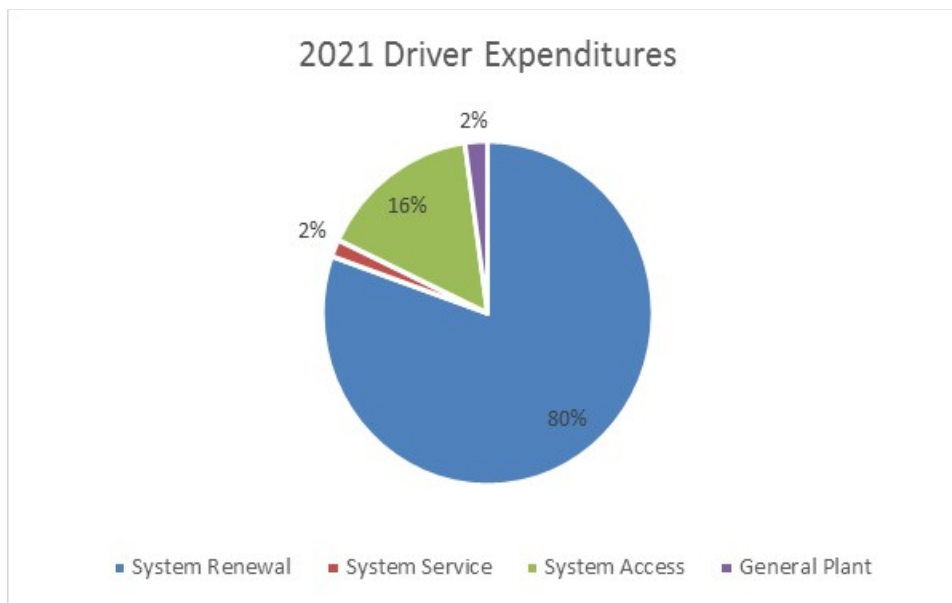
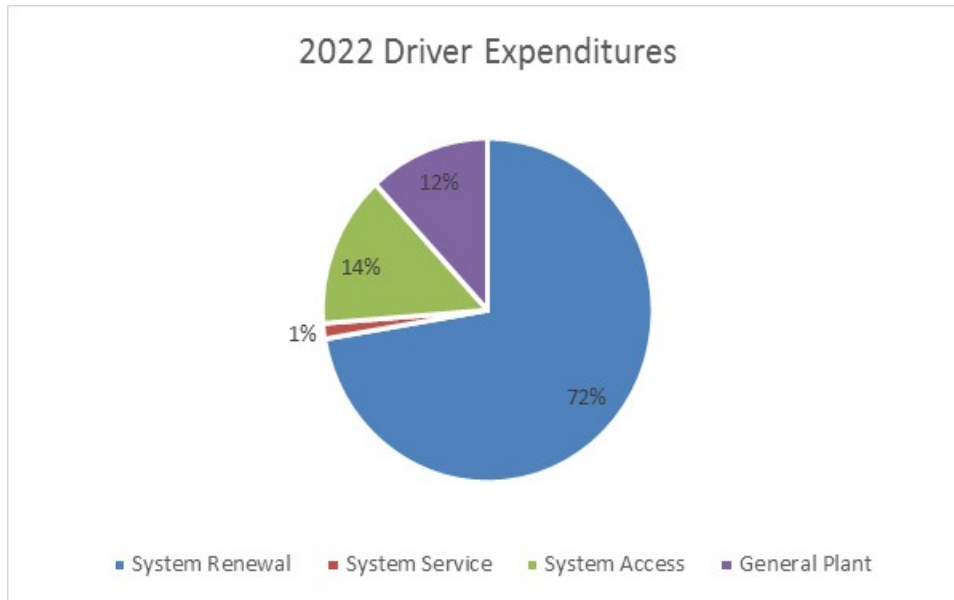


Chart #16: 2022 projected investment driver expenditures



5.4.5.1.2 Forecast impact of system investment on OM&A costs

Table #48: Westario's capital expenditures by investment category: forecast

Category	Bridge Year Budget 2017	Budget 2018	Budget 2019	Budget 2020	Budget 2021	Budget 2022
System Renewal	3,466,354	3,231,509	2,963,562	3,158,679	3,449,520	3,466,927
System Service	100,000	382,000	66,750	69,690	69,690	69,690
System Access	640,292	642,734	664,635	671,006	677,481	686,893
General Plant	102,800	635,000	350,000	590,000	95,000	570,000
Total	4,309,446	4,891,243	4,044,947	4,489,375	4,291,691	4,793,510

The table above indicates Westario's plan to proactively invest in capital to maintain operations, maintenance, and administration (OM&A) costs at current levels during the forecast period with an increase due to inflation. Without the planned capital expenditures as detailed above, OM&A costs would be expected to increase annually due to the increasing demand of asset repair and replacement in a reactive approach.

This sound asset management planning allows Westario to keep its system OM&A costs consistently over the forecast years.

5.4.5.1.3 Drivers of Investments

Each investment category has its own purposes and motivations. The three main drivers for the system renewal category include: reliability improvement; worker and public safety; and power quality improvements. The drivers for system access are capacity for connections and support

economic growth (where and when it occurs). For system service, the drivers are improvements for efficiency of delivery service. Lastly, general plant plays the role of providing all of the necessary tools and equipment that facilitate the effectiveness of the distribution system.

5.4.5.1.4 Information Related to Capacity Assessment

Based on historical levels of FIT and microFIT applications, Westario does not see renewable energy (REG) connections having any significant impact on any of the investment drivers listed above. REG capacity can, if located advantageously, help an LDC manage capacity and demand issues but most often, it is not the LDC's decision where REG would be connected to the system. Westario's capacity and constraints regarding REG connections rely heavily on the results of the Integrated Regional Planning Process (IRPP), as Westario is an embedded distributor. Without the knowledge produced through this third-party coordination, it is difficult for Westario to assess its future REG connection capacity.

- 5.4.5.2 Material Investments

The materiality threshold for Westario is \$50,000 for any given year during the forecast period.

The table below summarizes the capital material investment projects described within this section. An addition project that does not meet the materiality threshold, but is important enough to warrant discussion, is also included in the table. The discussion that follows these tables highlights these projects in the descending order of budgeted capital per project within the forecast period, excluding the bridge year of 2016.

Table #49: Capital projects meeting the materiality threshold

Project/Activity	Investment Category	Total 2018 to 2022
Substation Upgrades	System Renewal	6,250,000
Decrepit Pole Replacement	System Renewal	4,690,463
Fiberglass Transformer Base Replacement	System Renewal	2,088,950
Vehicle Replacement	General Plant	1,710,000
Capital Poles	System Access	1,629,078
Distribution Transformer Replacement	System Renewal	1,604,454
New O/H Service Connections	System Access	860,446
Poletran Conversion	System Renewal	847,839
#6 Copper Replacements	System Renewal	788,490
New Underground Service Connections	System Access	632,425
SCADA	System Service	437,820
Non-demarcation Customers	System Access	220,800
Facilities Enhancements	General Plant	170,000
Tools & Equipment	General Plant	165,000
Metering	System Service	150,000
Office Furniture and Equipment	General Plant	100,000
Technology	General Plant	95,000
Cyme and GIS integration	System Service	70,000
		22,510,766

Table #50: Capital Expenditures over the Forecast Period

Investment Category	Project/Activity	Budget 2018	Budget 2019	Budget 2020	Budget 2021	Budget 2022	Totals
System Renewal	Poletrun Conversion	463,286	384,553	-	-	-	847,839
	Substation Upgrades	1,310,000	1,200,000	1,200,000	1,270,000	1,270,000	6,250,000
	#6 Copper Replacements	370,772	272,120	145,598	-	-	788,490
	Decrepit Pole Replacement	780,146	789,866	799,586	1,153,628	1,167,236	4,690,463
	Distribution Transformer Replacement	307,305	317,023	322,691	327,790	329,645	1,604,454
	Fiberglass Transformer Base Replacement	-	-	690,804	698,101	700,045	2,088,950
Total:		3,231,509	2,963,562	3,158,679	3,449,520	3,466,927	16,270,196
System Service	SCADA	282,000	36,750	39,690	39,690	39,690	437,820
	Metering	30,000	30,000	30,000	30,000	30,000	150,000
	Cyme and GIS integration	70,000	-	-	-	-	70,000
Total:		382,000	66,750	69,690	69,690	69,690	657,820
System Access	Capital Poles	306,742	325,481	328,883	332,285	335,687	1,629,078
	New O/H Service Connections	166,129	167,899	169,561	171,277	185,580	860,446
	New Underground Service Connections	124,663	126,055	127,363	128,719	125,625	632,425
	Non-demarcation Customers	45,200	45,200	45,200	45,200	40,000	220,800
Total:		642,734	664,635	671,006	677,481	686,893	3,342,750
General Plant	Technology	30,000	30,000	35,000	-	-	95,000
	Vehicle Replacement	500,000	160,000	465,000	55,000	530,000	1,710,000
	Tools & Equipment	35,000	35,000	35,000	30,000	30,000	165,000
	Facilities Enhancements	35,000	95,000	40,000	-	-	170,000
	Office Furniture and Equipment	35,000	30,000	15,000	10,000	10,000	100,000
Total:		635,000	350,000	590,000	95,000	570,000	2,240,000
Total		4,891,243	4,044,947	4,489,375	4,291,691	4,793,510	22,510,766

5.4.5.2.1 Substation Upgrades – (System Renewal)

Project Information

Investment Category:	System Renewal
Capital Project Name:	Substation Upgrades
Drivers:	Service Quality, Reliability, Power Quality, Safety, End of Life
Asset Type(s):	Substation Transformers, Switches, Reclosers, Structures, SCADA
Total Capital Cost (2018-2022):	\$ 6,250,000
Average Annual Capital Cost:	\$ 1,250,000
Start Date:	January 1 st 2018
End Date:	December 30 th 2022

A. General information of the project/activity

Westario owns and maintains 27 municipal substations (MS) and over the past three years has completed a detailed review of the substation assets. This effort has resulted in a prioritized list of plans to refurbish existing transformers, as well as the replacement and upgrade of the station switchgear, breakers, fencing, grounding, and control systems.

Based on regular “Transformer Dissolved Gas in Oil Analysis Reports”, in 2014 Westario identified several station transformers that were a very serious concern and were slated for replacement/refurbishment. Three transformers were refurbished in 2014-2016, and the two more units were purchased. Two of the next most urgent units will be done in 2017. The prioritized replacement/refurbishment list also identified more substation transformers that are showing cautionary values in the gas analysis. These units are regularly monitored for worsening test results, and the replacement strategy is modified accordingly.

Westario’s current plan endeavors to refurbish/upgrade one substation per year for the period of 2017-2022. This will lower the average age of the station asset class significantly, and place Westario in a better position to manage future replacements and upgrades. (Appendix A: Asset Management Plan contains the Transformer Fleet Strategy.)

Table #51: Substation upgrades over the forecast period

	2018	2019	2020	2021	2022	Total
Substation Upgrades	1,310,000	1,200,000	1,200,000	1,270,000	1,270,000	6,250,000

B. Evaluation criteria and information requirements for each project/activity

1. Efficiency, Customer value, Reliability

The main drivers for this project are reliability and risk of failure. With many stations reaching their end of life and containing transformers with high levels of dissolved gases, investments in the substations will ensure that system reliability is maintained. In some communities, the extended loss of a substation would have drastic effects on the service to customers. Additionally, Westario has invested in a mobile substation that can serve as an emergency backup, for any of the existing stations, in case of a station component failure. Steps are being taken to install more system automation through the device upgrades at municipal transformer stations, these investments will allow Westario to improve its Smart Grid readiness.

In the coming years, the substation upgrades projects will take high priority as Westario tries to eliminate the transformers with a high risk of failure. Catastrophic failure of a station transformer poses significant environmental and safety risks, and affects reliability, which are the reasons for the high priority of these projects.

2. Safety

These investments are directly linked to public and worker safety, as they aim to eliminate power transformers with high risks of catastrophic failure. Additionally, improved system automation and protection systems provide better public safety through improved fault protection.

3. Cyber-security, Privacy

Upgrades to substation equipment will include communications and protection/control (Intelligent Electronic Devices, or IED) upgrades. Westario ensures that all of its communication systems and IEDs are configured in a secure manner and in compliance with Westario's security and privacy policies.

4. Co-ordination, Interoperability

All construction and upgrades of Westario substations conform to the Ontario Electrical Safety Code (OESC).

Investments in system automation during station upgrades will allow Westario to be Smart grid ready, once Smart Grid activities are being coordinated.

5. Economic Development

A significant portion of the investments for these projects will remain in Ontario. Contractors used for the construction of Westario substations are Ontario-based and employ Ontarians with profitable work for the duration of the projects. The majority of the materials used for the substation upgrades are purchased through Ontario suppliers who utilise many Ontario manufacturers. Additionally, other services such as excavation and trenching are generally performed by local companies. As a result, a significant majority of the investments for these projects will benefit the local and provincial economy.

6. Environmental Benefits

In the event of catastrophic transformer failures, transformer insulating oil can be spilled over the station area. There is also a risk of fire from the spilled oil. Although transformer oil is simple mineral oil, it is obviously important to keep it out of the environment. Although there is no current requirement for oil containment systems to be installed, Westario is planning to install transformer oil containment systems during substation upgrades, where required, to minimize the environmental impacts of a failed transformer.

C. Category-specific requirements for each project/activity

System Renewal:

Benefits to customers due to these projects are that significant outages due to station failure are reduced by eliminating or refurbishing the high-risk assets. Additionally, cost benefits are present in the sense that it is more cost effective to replace a station at a strategic time rather than after it has failed, when environmental cleanup may be required and construction of a station will likely be much more expensive on a rush basis.

Advanced technologies are included in the project through implementation of advanced system automation equipment, which will enable future Smart Grid activities to take place. Additionally, the implementation of this automation increases public safety, coordination and reliability through enhanced fault protection capabilities.

Projects in this category are being prioritized by their risk of failure. With transformer dissolved gas analysis, Westario is capable of determining which transformers are most likely to fail, and as such prioritize upgrades with this information.

Cost benefits are always considered by Westario during the implementation of such station upgrade projects. Alternatives are considered where feasible. Such alternatives include consideration of the benefits of transformer refurbishments versus replacements, as well as the consideration of refurbishing a substation rather than replacing it outright. While weighing the refurbishment versus replacement options, the major factors considered are the assets useful life extension and cost comparisons.

5.4.5.2.2 Decrepit Pole Replacement – (System Renewal)

Project Information

Investment Category:	System Renewal
Capital Project Name:	Decrepit Pole Replacement
Drivers:	Safety, Reliability, Asset End of Life
Asset Type(s):	Wood hydro pole
Total Capital Cost (2018-2022):	\$ 4,690,463
Average Annual Capital Cost:	\$ 938,093
Start Date:	January 1 st 2018
End Date:	December 30 th 2022

A. General information of the project/activity

Distribution poles are Westario's single form of support for low and medium voltage overhead feeders and distribution equipment. Data was collected on the existing poles for the purpose of producing an Asset Condition Assessment (found within Appendix A: Asset Management Plan). A health index was used to categorize poles into groups rated "very good", "good", "fair", "poor" and "very poor" and life expectancies were given to correlate to each category. Based on the age criteria alone, it is evident that over half of the wood poles in the system have already reached, or will have reached, their "industry accepted" end of life within the next five-to-ten years. A comprehensive pole testing program, targeted at this aged population was conducted to further assess the condition of this asset group.

Based on experience, many of the poles in this old group will still be in good condition. Capital has been allocated in each year of the planning period, beginning in 2013, to address the need for decrepit pole replacement. It can be noted that when some other key capital projects conclude in 2020, expenditures for decrepit pole replacement are planned to increase in 2021 and going forward for the remainder of the plan period. This reflects a more aggressive approach to replacing poles that are rated "very poor" and are therefore at the end of their life expectancies.

Westario has included in its System Operations, Maintenance & Administration (OM&A) budget for some pole testing to be distributed across all of the towns' inspections over a three-year period. This effort will provide a more scientific based result for the condition of the pole and therefore allow a much more targeted approach to the replacement plans and capital spending.

Table #52: Decrepit Pole Replacements over the forecast period

	2018	2019	2020	2021	2022	Total
Decrepit Pole Replacement	780,146	789,866	799,586	1,153,628	1,167,236	4,690,463

B. Evaluation criteria and information requirements for each project/activity

1. Efficiency, Customer Value, Reliability

The main drivers for the decrepit pole project are reliability, risk of failure and safety. Poles targeted by this project are those which have a significantly higher risk of failure. Failed poles cause serious safety concerns to the public and workers; they also cause lengthy power outages which undoubtedly affect service reliability.

Due to the elevated risks posed by these poles, these projects are assigned a high priority, which will be even higher come 2021, when other projects also posing safety concerns have been completed, and more funding is available. The investments for decrepit pole replacement are set to increase in 2021, which will then allow these replacements to be a key priority on Westario's work list.

Replacing an aged pole before it fails is the ideal case, but often old poles fail outside of working hours and can result in extended service outages. Considering these impacts to reliability and budget, replacing aged poles before failure provides a significant net benefit to Westario's customer safety, service reliability, and cost effectiveness.

The alternative to simply replacing all poles which have been classified as decrepit is to contract pole testing services. It is expected that many of the old poles that have been identified by age alone are, in fact, not yet at their end of life. A comprehensive pole testing plan will provide a list of which poles must be replaced, and which may have some, or significantly more, useful life remaining. Additionally, pole testing firms generally provide pole treatment services, which can halt the deterioration of poles for the near future and extend the useful life of poles which have not yet deteriorated to a dangerous condition.

2. Safety

Decrepit poles pose serious safety concerns due to their elevated potential of failure. They pose both electrocution and impact dangers to the public and workers. This investment directly decreases these safety concerns by eliminating these very poor-conditioned poles.

3. Cyber-security, Privacy

Not Applicable.

4. Co-ordination, Interoperability

Westario utilises Utility Standards Forum (USF) standards as its distribution pole line design standards, and meets the Ontario Regulations 22/04 requirements. These considerations ensure that the hydro pole framing is constructed safely and to the industry standard. Additionally, Westario generally takes the space and pole-loading requirements of existing and future third-party service providers into consideration when designing hydro pole classification and framing.

5. Economic Development

Generally, all the materials used for the decrepit pole replacement projects will be supplied from Ontario manufacturers. Other services regularly used during hydro pole installation, such as vacuum excavation and trenching, are contracted from local service providers. As such, the majority of the investments for these projects stay directly within the local and provincial economies.

6. Environmental Benefits

Removing decrepit poles from Westario's distribution system provides environmental benefits by eliminating environmental safety hazards. A failed hydro pole not only has the potential of igniting forest fires, but also poses the potential of oil spills from pole mount transformers. Oil spills can be extremely damaging to waterways, vegetation, and wildlife. These projects will aid in eliminating these dangers by removing the poles with high risks of failure.

C. Category-specific requirements for each project/activity

System Renewal:

Due to Westario's high number of poles labeled as decrepit, it is critical that investments be focused on these projects. Over half of the wood poles in Westario's distribution system are expected to have surpassed the industry accepted expected life within the coming five-to-ten years. With a better understanding of the condition of the hydro pole database, it is critical that Westario invest in pole replacements in the coming future to avoid having an unmanageable asset class, hence Westario's plan to increase investments and efforts into decrepit pole replacements beginning in 2021, once other major capital projects are completed.

The consequences of catastrophic hydro pole failure are significant in numerous categories. A failed pole poses serious safety concerns to the public due to potential electrocution or impact with falling poles. It is also much more dangerous for workers to be working on a failed hydro pole, or sections of distribution line which have failed due to one pole. Additionally, catastrophic failure generally occurs during harsh weather conditions. This adds additional dangers to workers who must reinstate power to the distribution system. These failures during poor weather conditions will also generally cause extended power outages, as working conditions for the hydro crews are less than ideal.

When replacing these decrepit poles, Westario will consider certain components of the pole framing for reuse after a thorough inspection. Given that the pole and all equipment on it are generally the same age, refurbishment is not likely an option. However, certain items such as down guys and stand-off brackets may be considered for reuse or a second lifecycle to minimize costs where possible.

If these projects are not implemented, OM&A costs related to decrepit pole will eventually rise. It is significantly more cost effective for the utility to replace a pole during regular working hours and before failure, than after hours, once poles have failed, and damage has been sustained to other equipment.

With the aid of Westario's new ESRI GIS system, Westario will be able to more strategically reduce the risks posed by these poles by focusing on the replacement of poles which supply a greater number of customers, as well as critical loads.

5.4.5.2.3 Fiberglass Transformer Base Replacements – (System Renewal)

Project Information

Investment Category:	System Renewal
Capital Project Name:	Fiberglass Transformer Base Replacements
Drivers:	Safety, Asset End of Life
Asset Type(s):	U/G Foundations
Total Capital Cost (2018-2022):	\$ 2,088,950
Average Annual Capital Cost:	\$ 417,790 (3-year project period)
Start Date:	January 1 st 2020
End Date:	December 30 th 2022

A. General information of the project/activity

These are pad mount transformers that were installed on fiberglass foundations and are vintage 1970s and 1980s.

These units are regularly inspected; as they are showing signs of degradation, and are anticipated to reach the end of their expected life around 2020, are slotted for proactive replacement beginning in 2020. The seasonal freeze-thaw cycle has begun to show on the fiberglass base structures, and has led to the planned replacements.

It is Westario's plan to replace these existing foundations with now industry standard cement foundations, which have been known to last up to two transformer lifecycles, up to 80 years.

Table #53: Fiberglass Transformer Base Replacements over the forecast period

	2018	2019	2020	2021	2022	Total
Fiberglass Transformer Base Replacement	-	-	690,804	698,101	700,045	2,088,950

B. Evaluation criteria and information requirements for each project/activity

1. Efficiency, Customer Value, Reliability

The main drivers for these replacements are the assets end of life and associated safety risks. While the fiberglass transformer foundations generally do not currently pose safety concerns, they are deteriorating due to the weather conditions over their lifetime. Westario is planning on replacing these foundations before they become a concern to public and worker safety to due weakened structural integrity.

Due to the fact that these devices do not currently pose safety concerns, they are not as high of a priority as the aforementioned projects. However, Westario is focused on starting the replacement of these foundations by 2020 to ensure none of them become safety concerns.

2. Safety

Although the foundations have not been found to currently pose any serious safety concerns, they are deteriorating in a manner which could cause safety concerns in the future. As such, Westario will be replacing these with industry standard cement foundations.

3. Cyber-security, Privacy

Not applicable.

4. Co-ordination, Interoperability

Westario installs pad mount transformer foundations in accordance with the USF standards and complies with the Ontario Regulations 22/04.

5. Economic Development

Replacement pad mount transformer foundations will generally be purchased from Ontario suppliers and manufacturers, or constructed in place by local contractors. Additionally, other services regularly used during foundation installation such as vacuum excavation and trenching are contracted from local service providers. As a result, the majority of the investments for these projects stay directly within the local and provincial economies.

6. Environmental Benefits

While there are no direct environmental benefits to the fiberglass foundation replacement project, Westario performs all restoration and construction activities by following all environmental regulations.

C. Category-specific requirements for each project/activity

System Renewal:

Due to the vintage of these fiberglass transformer foundations, it is important that a strategic plan be adopted to ensure they are replaced before they become a safety concern or risk failing. A customer outage due to a failed transformer foundation could potentially be extensive and prolonged due to the type of rehabilitation work which would be required. It is also important that this work be prioritized in time and does not become backlogged, due to the tedious and time-consuming nature of pad mount transformer foundation replacements.

O&M costs regarding these foundations will be significantly lower if they are all replaced in a timely manner, during normal operating hours. As with other unplanned afterhours work, there would be significantly higher costs associated with the work, as well as increased risk for workers.

Due to the nature of these fiberglass foundations, these units will not be considered for reuse. Unlike cement transformer foundations which are much sturdier and have a maximum useful life of up to 80 years, these devices will not have enough remaining structural integrity for a second life cycles use.

5.4.5.2.4 Vehicle Replacement – (General Plant)

Project Information

Investment Category:	General Plant
Capital Project Name:	Vehicle Replacement
Drivers:	Safety, Asset End of Life, Service Reliability
Asset Type(s):	Vehicles
Total Capital Cost (2018-2022):	\$ 1,710,000
Average Annual Capital Cost:	\$ 342,000 (5-year project period)
Start Date:	January 1 st 2018
End Date:	December 30 th 2022

A. General information of the project/activity

Within Westario's general plant assets are all types of vehicles, trailers, tensioners, diggers, etc. which are used for servicing the distribution assets. Many of these pieces of equipment are fairly costly, which means that their replacement is one of the larger capital projects in Westario's asset management plan. Just like any other asset, vehicles and equipment have a life expectancy, and therefore their replacement is planned and budgeted for. (Appendix A: Asset Management Plan has a listing of Westario's fleet, as part of its general plant assets.)

These general plant assets are important to Westario's day-to-day operations as they are required to perform all operations work effectively and efficiently, and to respond to after-hours emergencies in a timely manner. It is necessary for these vehicles and trailers to be in proper condition, as it would be dangerous to both workers and the public if any were mechanically unfit or unreliable.

Table #54: Vehicle replacement over the forecast period

	2018	2019	2020	2021	2022	Total
Vehicle Replacement	500,000	160,000	465,000	55,000	530,000	1,710,000

2018: Replace an existing 1.5-ton truck with 3-ton truck, and replace an existing single bucket and pickup trucks with new as they have reached their end of life per Westario's life-cycle policy. The reason for replacement to reduce maintenance and obtain newer/larger trucks for greater operation requirements.

2019: Replace an existing car with a van for customer service department and training, and replace an existing on-call pickup truck.

2020: Replace an existing single bucket truck with a double bucket truck as maintenance are increasing on the existing and it will reach its end of life cycle per Westario's policy.

2021: Replace an existing pickup truck.

2022: Replace an existing double bucket truck with a new double bucket truck as maintenance are increasing on the existing and it will reach its end of life cycle per Westario's policy.

B. Evaluation criteria and information requirements for each project/activity

1. Efficiency, Customer Value, Reliability

The main driver for this project is the assets' end of useful life and operational effectiveness. Vehicles and trailers will generally have a useful life of ten-to-fifteen years, after which vehicles may become unreliable. It should be noted that Westario performs quarterly mechanical, hydraulic, and structure inspections along with monthly greasing and visual inspections in an attempt to extend these assets typical useful life. It is important for the utility to have reliable vehicles as they are necessary to perform its day-to-day operations. Also, it is very important that any vehicles used for after-hours/on-call work be reliable, as they may often be required for critical calls.

These investments also have high priority since, as mentioned above, reliable vehicles are necessary to complete day-to-day activities.

2. Safety

These investments are important for worker and public safety for numerous reasons. If vehicles or trailers are mechanically unfit, workers or the public could become seriously injured due to a vehicle accident. Additionally, it is important for public safety that the after-hours workers have a reliable vehicle to respond to emergency calls.

3. Cyber-security, Privacy

Not applicable.

4. Co-ordination, Interoperability

Westario's vehicles and trailers are inspected regularly by licenced mechanics in order to ensure they meet the standards required for vehicles to safely be used on public roads.

5. Economic Development

Westario's vehicles are purchased mainly from local and Ontario suppliers, who often have manufacturing facilities in Ontario. As such, a considerable portion of these investments will stay in the local and provincial economies.

6. Environmental Benefits

Older model vehicles are often less environmentally friendly than newer ones, as newer vehicles are generally more fuel efficient with better emissions controls.

C. Category-specific requirements for each project/activity

General Plant:

Obtaining new vehicles as necessary is critical in keeping day to day operations effective and efficient. Vehicles which are unreliable will cause increased OM&A costs as valuable work hours are wasted.

It is important for the service to customers that the vehicle fleet be maintained. After-hours workers need reliable vehicles to be able to provide responsive service to customers with service outages. It is also important for workers to have reliable work trucks, as they allow them to perform work activities more efficiently and safely.

5.4.5.2.5 Capital Poles – (System Access)

Project Information

Investment Category:	System Access
Capital Project Name:	Capital Poles
Drivers:	Safety, Reliability, Asset End of Life
Asset Type(s):	Wood hydro poles
Total Capital Cost (2017-2021):	\$ 1,629,087
Average Annual Capital Cost:	\$ 325,816
Start Date:	January 1 st 2018
End Date:	December 30 th 2022

A. General information of the project/activity

This project covers new poles that are required to provide new customer connections, either through line extensions, pole relocations, or new poles for service connections.

These expenditures are driven by the rate of development in the various customer classes, and as a result are somewhat unpredictable. However, historical rates of activity have been used to determine the expected level of spending.

Table #55: Capital Poles over the forecast period

	2018	2019	2020	2021	2022	Total
Capital Poles	306,742	325,481	328,883	332,285	335,687	1,629,078

B. Evaluation criteria and information requirements for each project/activity

1. Efficiency, Customer Value, Reliability

The drivers for this project are customer service requests and third-party development requests. Westario must allocate capital to be able to accommodate the expansion or modification of its distribution system as necessary. Examples of modifications include relocation of a distribution line for road widening or development purposes.

While this investment is important, since it is only needed as required by customer demand, it is not as high of a priority as the aforementioned projects, which are generally dealing with service reliability and safety concerns.

2. Safety

While safety is not a driver for this project, Westario always designs and constructs its pole lines to necessary standards and regulations.

3. Cyber-security, Privacy

Not Applicable.

4. Co-ordination, Interoperability

Westario installs all hydro poles in accordance with the USF standards and complies with the Ontario Regulations 22/04, ensuring adequate clearances remain for future third-party requirements.

These investments also address future operational requirements by expanding the distribution system in order to be able to provide services to all customers making requests.

5. Economic Development

Generally, all the materials used for capital pole installation projects will be supplied from Ontario manufacturers. Other services regularly used during hydro pole installation such as vacuum excavation and trenching are contracted from local service providers. As such, the majority of the investments for these projects stay directly within the local and provincial economies.

6. Environmental Benefits

While there are no direct environmental benefits to the capital pole installation project, Westario performs all restoration and construction activities by following all environmental regulations.

C. Category-specific requirements for each project/activity

System Access:

Since there are no actual (or little) planned projects as of yet for this category, it is difficult to elaborate further than the investments are required for future customer connection and local authority requirements. The estimates on investments required are based off of historical figures and aim to request enough to fund the year's projects without coming up significantly short. While it is difficult to estimate the projected required figures, "actual" values from the historical period range from \$114,000 to over \$277,000, averaging \$235,332. Given the overall condition of the pole population, the projected annual investment needs are proposed at slightly more than \$300,000 and growing slightly each year to accommodate an increase in the number of poles that need to be replaced or upgraded to enable customer connections.

These capital pole projects will often include materials which can be reused. When sections of line are to be relocated to allow infrastructure expansion, materials such as poles, conductors and other framing equipment will be assessed based condition and age to determine if they are fit for reuse. If it is determined there is enough remaining life and value in keeping the existing equipment, they may be reused to reduce project costs.

5.4.5.2.6 Distribution Transformer Replacement – (System Renewal)

Project Information

Investment Category:	System Renewal
Capital Project Name:	Distribution Transformer Replacement
Drivers:	Safety, Reliability, Asset End of Life
Asset Type(s):	Pad mount transformers, Pole mount transformers
Total Capital Cost (2018-2022):	\$ 1,604,454
Average Annual Capital Cost:	\$ 320,891
Start Date:	January 1 st 2018
End Date:	December 30 th 2022

A. General information of the project/activity

Westario's distribution system includes pole mount and pad mount transformers. Both types were assessed in Westario's asset condition assessment based on age.

Pole mount transformers are used to step down voltage from a primary level to a secondary utilization level on the overhead distribution system. These transformers are mounted above ground on a pole and are liquid-filled with mineral oil in a sealed tank. An industry standard for the life expectancy for pole mount transformers is 40 years.

The Health Index analysis revealed that 57% of the population of pole mount transformers will reach their statistical end of life within the next five-to-ten years. This analysis could not take into account any "run-to-failure" transformers within this group due to the lack of customer connection information. This however will likely change in the coming years, as the integration of the new ESRI GIS system will allow more detailed analysis including connected customer information.

Table #56: Distribution Transformer Replacements over the forecast period

	2018	2019	2020	2021	2022	Total
Distribution Transformer Replacement	307,305	317,023	322,691	327,790	329,645	1,604,454

B. Evaluation criteria and information requirements for each project/activity

1. Efficiency, Customer Value, Reliability

The main driver for this project is service reliability due to risk of failure. With more than half of the pole mount transformers reaching or having reached their typical useful life (TUL), it is important that they be replaced before failing and causing unnecessary service interruptions. Replacing a transformer in a planned manner is much more cost effective and produces

significantly shorter outages than when replacing a failed transformer, often after normal operating hours.

With such a significant portion of Westario's transformers needing replacement in the coming years, this investment is critical as to ensure Westario does not fall further behind on these replacements. Westario is therefore putting a high priority on the replacement of the transformers that have reached their end of useful life.

2. Safety

While it is quite uncommon for a transformer to fail catastrophically, these older transformers are at an elevated risk of such occurrence. Eliminating these old units will reduce the likeliness of catastrophic transformer failures and as such make the distribution system safer for workers and the public.

3. Cyber-security, Privacy

Not Applicable.

4. Co-ordination, Interoperability

Westario installs its transformers in accordance with the USF standards and complies with the Ontario Regulations 22/04 to ensure adequate clearances.

5. Economic Development

Materials and equipment relating to transformer replacements are generally purchased from local or provincial suppliers, and as a result, these investments help the local and provincial economies.

6. Environmental Benefits

While it is again uncommon for these smaller transformers to fail catastrophically, in such occurrences the transformer coolant oil is generally spread to the surrounding environment. By eliminating these transformers with a higher risk of failing, the chances of such occurrences leading to environmental contamination are greatly reduces.

C. Category-specific requirements for each project/activity

System Renewal:

Westario's asset condition assessment report has identified that 57% of the pole mount transformers and 33% of the pad mount transformers will have reached their end of life within the next ten years. The replacement strategy is to replace before failure, rather than after failure. This is largely why Westario has invested in the ESRI GIS, for better quality information on assets. Westario is planning on replacing 30 pole mount transformers and 5 pad mount transformers per year, during the forecast period.

While this project will replace a significant number of the transformers labeled as being in "very poor" condition, Westario will soon be able to also prioritize transformer replacements, and assign some of these to a "run to failure" status, where the device supplies only a single customer, and focus on more critical units. This will be possible with the addition of the new ESRI GIS system will allow Westario to track the number of customers supplied through specific units.

If not enough attention is paid to this project, there is a significant risk of negative impacts against service reliability. With many transformers actually nearing their maximum useful life, the failure rate can be expected to increase, causing unnecessary and prolonged service interruptions. Again, it is better for Westario to invest in replacing units serving high numbers of customers during regular work hours before failure, as opposed to after failure has occurred. Failures of such units will often occur outside of regular operating hours, which generally increases OM&A costs and risk for workers.

When replacing transformers, there is generally little that can be considered for reuse or refurbishment. The cost of refurbishing a pole mount or pad mount distribution type transformer would not justify doing so. Cement pad mount transformer foundations are however considered for a second lifecycle where possible. If the foundations are deemed fit for reuse after a thorough inspection, they may be reused to minimize project costs.

5.4.5.2.7 New Overhead Service Connections – (System Access)

Project Information

Investment Category:	System Access
Capital Project Name:	New Overhead Service Connections
Drivers:	Customer Service Requests
Asset Type(s):	Conductors
Total Capital Cost (2018-2022):	\$ 860,446
Average Annual Capital Cost:	\$ 172,089
Start Date:	January 1 st 2018
End Date:	December 30 th 2022

A. General information of the project/activity

Most of the older residential and small commercial areas are supplied via overhead conductors. When these services are upgraded, replaced, or vacant in-fill lots are developed, overhead conductors are used.

The design, materials procurement, installation, and acceptance of these assets are driven by the pace of development. Although new customer growth has been small, historical spending trends are stable and have been used for determining the values of this investment over the new planning period.

Table #57: New O/H Service Connections over the forecast period

	2018	2019	2020	2021	2022	Total
New O/H Service Connections	166,129	167,899	169,561	171,277	185,580	860,446

B. Evaluation criteria and information requirements for each project/activity

1. Efficiency, Customer Value, Reliability

The driver for this project is customer service requests. Westario must allocate capital to be able to accommodate the expansion of its distribution system and service connections as necessary. The majority of overhead service requests will come from customers upgrading existing services or new in-fill developments.

While this investment is important, it is not as high of a priority as other high priority projects, which are generally dealing with service reliability and safety concerns.

2. Safety

While safety is not a driver for this project, Westario always designs and performs its service connections to necessary standards and regulations.

3. Cyber-security, Privacy

Not Applicable.

4. Co-ordination, Interoperability

Westario installs all overhead service connections in accordance with the USF standards and complies with the Ontario Regulations 22/04.

5. Economic Development

Materials for service connections are also generally procured from local and Ontario suppliers and manufacturers. As such, the majority of the investments required for underground service connections will remain within the local and provincial economy.

6. Environmental Benefits

While there are no direct environmental benefits to the new underground service connections project, Westario performs all restoration and construction activities by following all environmental regulations.

C. Category-specific requirements for each project/activity

System Access:

Since there are no actual planned projects as of yet for this category, it is difficult to elaborate further than the investments are required for future customer connection and local authority requirements. The estimates on investments required are based off of historical figures and aim to request enough to fund the year's projects without coming up significantly short. While it is difficult to estimate the projected required figures, the projected annual investment needs are proposed at slightly more than \$165,000 each year. Note that prior to 2016, these service connections were included in a more general "three phase customers" project that included both overhead and underground. Starting in 2016, the connections of overhead and underground will be tracked separately.

5.4.5.2.8 Poletran Conversion – (System Renewal)

Project Information

Investment Category:	System Renewal
Capital Project Name:	Poletran Conversion
Drivers:	Safety, Reliability, Asset End of Life
Asset Type(s):	Hydro poles, pad mount transformers
Total Capital Cost (2018-2022):	\$ 847,839
Average Annual Capital Cost:	\$ 423,919 (2-year project period)
Start Date:	January 1 st 2018
End Date:	December 30 th 2019

A. General information of the project/activity

Poletran units can best be described as a streetlight pole that contains an electrical transformer inside of it. These units were a common installation around the late 1960s and into the early 1970s and were driven by an effort to reduce the number of pieces of equipment on a residential lot.

Over time it became evident that these poletran installations posed some concerns with electrical clearances and working space allowances due to their compact design. Many LDCs have been making efforts to remove these units from service, either through voltage conversions and/or end of life replacements.

This has been an ongoing ten-year project with the purpose of eliminating all remaining poletran units and to replace the existing primary cables that are at/beyond the end of their life. The project is expected to be completed in 2019.

Table #58: Poletran conversions over the forecast period

	2018	2019	2020	2021	2022	Total
Poletran Conversion	463,286	384,553	-	-	-	847,839

B. Evaluation criteria and information requirements for each project/activity

1. Efficiency, Customer Value, Reliability

The main drivers for this project are safety and the assets end of life. Having been installed in the 1960s and 1970s, these units are generally between 40-to-50 or more years old. Any type of transformer at this age can be said to be at its end of life. The fact that these units are at their end of life only adds to the safety concerns that they pose. Composed of a transformer mounted inside of a steel pole, they not only pose safety risks to workers but also public. These devices are a concern for worker safety as they do not provide near sufficient working

clearances between the transformer and the steel pole. Additionally, if a transformer were to fail and come in contact with the steel pole, it would become an electrocution hazard for both workers and the public.

Service reliability is another concern with these units. One reason is that these devices are prone to failure, due simply to their age. Additionally, when a poletran does fail, outages can be extensive and may last for extended periods of time. Replacing a poletran is not as simple as installing a new device. When replacing these units, a new pad mount transformer must be installed on a new foundation, with new ducts and often new cables. This extensive work is time-consuming and can be done more efficiently with short planned outages.

As a result of these safety and reliability concerns, this project has been and must continue to be given high priority. Due to its high priority, the majority of this project has already been completed during the historical period, and should be completed in 2018, allowing for other critical projects to be prioritized.

2. Safety

Safety is one of the primary concerns leading to this project. With insufficient working clearances within the poletran devices, it is dangerous for workers to perform any operations live. Additionally, due to the small clearance between the transformer and steel pole, there is potential for the transformer to make contact with the steel pole during failure, posing serious safety risks to both workers and the public. Removing and replacing these devices with pad mount transformers will create a safer distribution system for both workers and the public.

3. Cyber-security, Privacy

Not Applicable.

4. Co-ordination, Interoperability

This project is in place to remove existing units which would not conform to today's standards, and is replacing them with equipment in accordance with the USF standards and which complies with the Ontario Regulations 22/04.

5. Economic Development

Replacement equipment such as pad mount transformers, foundations, and cables will generally be purchased from Ontario suppliers and manufacturer, or constructed by local contractors. Additionally, other services regularly used during these projects such as excavation and trenching are contracted from local service providers. As a result, the majority of the investments for these projects stay directly within the local and provincial economies.

6. Environmental Benefits

While there are no direct environmental benefits to the poletran conversion project, Westario performs all restoration and construction activities by following all environmental regulations.

C. Category-specific requirements for each project/activity

System Renewal:

Due to the safety and reliability concerns with these old poletran devices, it is important that the project be completed as planned. Safety concerns to both workers and the public will only increase as the devices age. These devices are all between 40 and 50 years or older, which is generally equal to or older than the average useful life of distribution level transformers. Reliability of the units will also continue to decrease as they get older, which creates more potential for extended unplanned outages and increased replacement costs.

Considering the significant portion of the safety concerns related to these poletran units, they are not devices which would be considered for refurbishment. It is important that these units be removed from service and replaced with standard acceptable pad mount type transformers.

Replacing these devices before failure can ensure OM&A costs are kept to a minimum. When work on poletran needs to be done after hours, once failure has occurred, costs and risks to workers will both increase significantly.

5.4.5.2.9 #6 Copper Replacements – (System Renewal)

Project Information

Investment Category:	System Renewal
Capital Project Name:	#6 Copper Replacements
Drivers:	Safety, Reliability, Asset End of Life, System Efficiency
Asset Type(s):	Overhead conductors
Total Capital Cost (2018-2022):	\$ 788,490
Average Annual Capital Cost:	\$ 157,698 (3-year project period)
Start Date:	January 1 st 2018
End Date:	December 30 th 2020

A. General information of the project/activity

In the past, #6 copper primary wire was an inexpensive solution for extending power lines to areas with small energy demands. These areas are now experiencing load growth and feeder extensions off the #6 primary wire. Over time, the copper wire has become brittle and is under-sized for the current applications.

Due to its brittle nature, #6 copper wire poses a public- and worker-safety issue, should the wire break and fall. Westario has experienced incidents of #6 copper wire breaking and falling to the ground unrelated to weather events.

These events are a potential and significant safety risk to line workers and the public. As a result, efforts have been made throughout the industry to remove #6 copper wire from service and as such, this project has been made a priority until its anticipated completion in 2020.

Table #59: #6 Copper Replacement over the forecast period

	2018	2019	2020	2021	2022	Total
#6 Copper Replacements	370,772	272,120	145,598	-	-	788,490

B. Evaluation criteria and information requirements for each project/activity

1. Efficiency, Customer Value, Reliability

The main drivers for this project are safety and service reliability. With the high potential of this type of conductors breaking and falling to the ground, public safety is of great concern and is, therefore, a primary reason for the prioritized replacement of these lines. These lines have also been known to attenuate fault levels due to their small diameter and high resistance, causing ground faults to go undetected by fault protection systems and posing

serious safety risks to the public and workers. Additionally, with each failure of a conductor comes an unplanned outage. These outages will generally be lengthy as it takes time for workers to re-string conductors in the failed area. It is also important to replace these lines in the near future, as the #6 conductor is only further deteriorating as time goes on.

Replacement of this #6 copper wire will also improve operational efficiency and cost effectiveness. Once completely replaced, the utility workers will have to spend less time on unplanned work such as the replacement of broken conductors and will have more time for daily operations. It is also more cost effective for the utility to replace this wire as it is known to be inefficient with high power losses.

2. Safety

The brittle #6 copper wire is among one of the highest existing public and worker safety concerns for Westario. With its high likelihood of failing, and potential to go undetected by fault protection, this wire's elimination will greatly increase the safety of the Westario distribution system.

3. Cyber-security, Privacy

Not Applicable.

4. Co-ordination, Interoperability

Replacing the #6 copper wire from the distribution system will follow suit with the standard utility practice that has been to eliminate the wire from the distribution system.

By removing the small wire from service, it will be possible to better implement protection systems for fault detection. Additionally, while the existing conductor is limited in its current carrying ability, the project addresses operational requirements by allowing increased loading for growth and will also allow for increased renewable energy generation (REG) when necessary as the existing wire would be a limiting factor.

5. Economic Development

Replacement conductor for this project will be procured from Ontario suppliers, and as such will benefit the provincial economy.

6. Environmental Benefits

While this project is limited in environmental benefits, it will reduce the likeliness of any forest fires being ignited from fallen conductors. Additionally, Westario performs all restoration and construction activities by following all environmental regulations.

C. Category-specific requirements for each project/activity

System Renewal:

Due to the condition of this #6 copper wire, it is important for Westario to complete eliminating it from its distribution system. If the project is not completed, it is undoubtable that they will continue to cause service reliability concerns and pose safety risks to the public and workers. With these conductors failing in all types of conditions, not necessarily only poor weather

conditions, there is an elevated public safety risk of electrocution, which alone should justify the replacement of this wire. Outage frequency and duration is another statistic which is certain to rise if this project is not completed. It would be much more effective for the utility to have either planned outages or to re-route the supply for the duration of the work, as compared to the time it would take to re-string a section of fallen conductor.

Completing this project should also help reduce unnecessary future OM&A costs. If the project was ignored, increased outages would require unplanned work, likely after hours, which is always significantly costlier. Additionally, with this #6 copper wire being an inefficient conductor, increased costs due to power losses will be avoided.

5.4.5.2.10 New Underground Service Connections – (System Access)

Project Information

Investment Category:	System Access
Capital Project Name:	New Underground Service Connections
Drivers:	Customer Service Requests
Asset Type(s):	Cables, duct banks
Total Capital Cost (2018-2022):	\$ 632,425
Average Annual Capital Cost:	\$ 126,485
Start Date:	January 1 st 2018
End Date:	December 30 th 2022

A. General information of the project/activity

Most new residential subdivisions are installed with underground cables and pad mount transformers placed on the boulevard.

The design, materials procurement, installation, and acceptance of these assets are driven by the pace of development. Although new customer growth has been small, historical spending trends are stable and have been used for determining the values of this investment over the new planning period.

Table #60: New underground service connections over the forecast period

	2018	2019	2020	2021	2022	Total
New Underground Service Connections	124,663	126,055	127,363	128,719	125,625	632,425

B. Evaluation criteria and information requirements for each project/activity

1. Efficiency, Customer Value, Reliability

The driver for this project is customer service requests. Westario must allocate capital to be able to accommodate the expansion of its distribution system and service connections as necessary. The majority of underground service requests will come from customers in new subdivision developments.

While this investment is important, it is not as high of a priority as other high priority projects, which are generally dealing with service reliability and safety concerns.

2. Safety

While safety is not a driver for this project, Westario always designs and performs its service connections to necessary standards and regulations.

3. Cyber-security, Privacy

Not Applicable.

4. Co-ordination, Interoperability

Westario installs all underground service connections in accordance with the USF standards and complies with the Ontario Regulations 22/04.

5. Economic Development

Services typically used for new underground service connections such as boring, trenching, and excavating are acquired from local contractors. Materials for service connections are also generally procured from local and Ontario suppliers and manufacturers. As such, the majority of the investments required for underground service connections will remain within the local and provincial economy.

6. Environmental Benefits

While there are no direct environmental benefits to the new underground service connections project, Westario performs all restoration and construction activities by following all environmental regulations.

C. Category-specific requirements for each project/activity

System Access:

Since there are no actual planned projects as of yet for this category, it is difficult to elaborate further than the investments are required for future customer connection and local authority requirements. The estimates on investments required are based off of historical figures and aim to request enough to fund the year's projects without coming up significantly short. While it is difficult to estimate the projected required figures, the "actual" value from 2016 (\$99,000) was used to create the projected annual investment needs at proposed at slightly more than \$124,000 each year.

5.4.5.2.11 SCADA – (System Service)

Project Information

Investment Category:	System Service
Capital Project Name:	SCADA
Drivers:	Service Quality, Reliability, Power Quality
Asset Type(s):	SCADA
Total Capital Cost (2018-2022):	\$ 437,820
Average Annual Capital Cost:	\$ 87,564
Start Date:	January 1 st 2018
End Date:	December 30 th 2022

A. General information of the project/activity

SCADA stands for Supervisory Control and Data Acquisition and is a computer-based operations software that can control and monitor Intelligent Electronic Devices (IEDs) throughout the Westario system.

Better monitoring and automated control can allow Westario to improve its outage restoration time by providing better fault location information and faster outage notification to the Westario staff through event initiated pager or text messaging.

SCADA falls under the system service investment category. This project began in 2016 and carries through to 2022. In 2018, the monitoring system is planned to be purchased and installed.

Table #61: SCADA over the forecast period

	2018	2019	2020	2021	2022	Total
SCADA	282,000	36,750	39,690	39,690	39,690	437,820

B. Evaluation criteria and information requirements for each project/activity

1. Efficiency, Customer Value, Reliability

The main drivers for this project are service reliability and operational effectiveness. With the implementation of a SCADA system, Westario should be able to provide faster outage responses and ultimately reduce outage durations. This will be possible with the ability to more accurately detect fault locations before customers call to report outages. Additionally, operational effectiveness could be improved with the ability to accurately track feeder loading. This would allow Westario to determine where feeders are situated with regards to loading capacities.

The SCADA project is of medium priority as it is not critical or relating to any safety concerns. This is an investment which should allow Westario to improve its service and operations as the SCADA system expands.

2. Safety

A SCADA system will allow remote implementation of protective settings such as “hold-offs”, and better supervision of the distribution system. It will also allow Westario to determine if sections of the system are overloaded, which may cause safety concerns for the system, workers, and the public.

3. Cyber-security, Privacy

SCADA systems are interconnected with communications systems and IEDs which must be program with necessary security features. Westario ensures that its SCADA system is configured in a secure manner and in compliance with Westario’s security and privacy policies.

4. Co-ordination, Interoperability

This project will enable future technological functionalities in numerous ways. The system will allow Westario to better track system loading and in turn more accurately determine renewable generation capacities. Additionally, SCADA systems can be integrated with the most advanced IED, such as protective devices, to allow the distribution system to function more safely and effectively.

The SCADA system will also aid with Westario’s operational requirements with its ability to track loading, load growth, outage locations and outage statistics.

5. Economic Development

Components for the SCADA system are generally procured from Ontario suppliers and manufacturers and as such, contribute to the provincial economy.

6. Environmental Benefits

While the SCADA project does not provide any direct environmental benefits, it does allow the utilities to track station and feeder loading, which may help in avoiding unnecessary failure of station equipment which could lead to environmental contamination.

C. Category-specific requirements for each project/activity

System Service:

A modern day SCADA system is composed by implementing advanced technology (smart devices), remotely connected to the SCADA master station. This allows optimal use of new protection and control devices and the information they can provide. Ultimately, SCADA allows the utility to better manage its distribution system assets.

This project will also offer reliability benefits to the utility and customers. With the ability to track fault and outage locations, workers could potentially arrive on site at a fault location and be working before the utility receives a customer outage report.

Additionally, with the ability to track loading information, Westario could more strategically plan distribution designs and determine feeder and station renewable energy generation (REG) capacities.

As previously mentioned, this is a medium priority project, as it is not in place to address serious safety concerns as some of the other projects. It is however important to Westario, as it should allow significant improvements in outage responses, better analysis of the distribution system, and allow operations to be more effective.

5.4.5.2.12 Non-Demarcation Customers – (System Access)

Project Information

Investment Category:	System Access
Capital Project Name:	Non-Demarcation Customers
Drivers:	Customer Service Requests
Asset Type(s):	Cables, duct banks
Total Capital Cost (2018-2022):	\$ 220,800
Average Annual Capital Cost:	\$ 44,160
Start Date:	January 1 st 2018
End Date:	December 30 th 2022

A. General information of the project/activity

This refers to non-serviced vacant lots for non-expansion of an existing distribution line for residential customers only. Westario provides and makes the hydro line accessible to such customers on the opposite side of the road, i.e. bore, ducts under the road and overhead service poles.

The design, materials procurement, installation, and acceptance of these assets are driven by the pace of development. Although new customer growth has been small, historical spending trends are stable and have been used for determining the values of this investment over the new planning period.

Table #62: Non-Demarcation Customers over the forecast period

	2018	2019	2020	2021	2022	Total
Non-demarcation Customers	45,200	45,200	45,200	45,200	40,000	220,800

B. Evaluation criteria and information requirements for each project/activity

1. Efficiency, Customer Value, Reliability

The driver for this project is customer service requests. Westario must allocate capital to be able to accommodate the expansion of its distribution system and service connections as necessary. The majority of these service requests will come from customers in developed areas.

While this investment is important, it is not as high of a priority as other high priority projects, which are generally dealing with service reliability and safety concerns.

2. Safety

While safety is not a driver for this project, Westario always designs and performs its service connections to necessary standards and regulations.

3. Cyber-security, Privacy

Not Applicable.

4. Co-ordination, Interoperability

Westario installs all service connections in accordance with the USF standards and complies with the Ontario Regulations 22/04.

5. Economic Development

Services typically used for new underground service connections such as boring, trenching, and excavating are acquired from local contractors. Materials for service connections are also generally procured from local and Ontario suppliers and manufacturers. As such, the majority of the investments required for underground service connections will remain within the local and provincial economy.

6. Environmental Benefits

While there are no direct environmental benefits to the new underground service connections project, Westario performs all restoration and construction activities by following all environmental regulations.

C. Category-specific requirements for each project/activity

System Access:

Since there are no actual planned projects as of yet for this category, it is difficult to elaborate further than the investments are required for future customer connection and local authority requirements. The estimates on investments required are based off of historical figures and aim to request enough to fund the year's projects without coming up significantly short. While it is difficult to estimate the projected required figures, the "actual" value from 2016 (\$32,000) was used to create the projected annual investment needs at proposed at slightly more than \$45,000 each year.

5.4.5.2.13 Facilities Enhancements – (General Plant)

Project Information

Investment Category:	General Plant
Capital Project Name:	Facilities Enhancements
Drivers:	Efficiency
Asset Type(s):	Buildings and fixtures
Total Capital Cost (2018-2022):	\$ 170,000
Average Annual Capital Cost:	\$ 56,667 (3-year project)
Start Date:	January 1 st 2018
End Date:	December 30 th 2020

A. General information of the project/activity

Facilities, such as buildings, are classified as general plant. While no major investments are planned, some costs will be incurred to update / replace / enhance existing facilities to allow for the more effective use of space and rooms.

Table #63: Facilities Enhancements over the forecast period

	2018	2019	2020	2021	2022	Total
Facilities Enhancements	35,000	95,000	40,000	-	-	170,000

2018: Westario has plans to build meeting rooms and renovate the customer service department for its needs and greater office operations.

2019: Westario plans to build large truck parking in the yard with overhead covers to eliminate snow covers and cold start-ups in the winter season.

2020: Westario plans to renovate the existing lunch room to accommodate staff and provide a healthier/cleaner eating room.

B. Evaluation criteria and information requirements for each project/activity

1. Efficiency, Customer Value, Reliability

The main drivers for this project are asset end of life and operational effectiveness. As facilities age, some components require replacements and minor changes need to be made to adapt the space to current requirements. These investments will allow customer service and operations activities to perform as expected and more efficiently.

This project does not have a high priority, but is necessary for the LDC to efficiently perform any daily activities and requirements.

2. Safety

While safety is not a driver for this project, Westario always maintains the facilities to necessary standards and regulations for safety.

3. Cyber-security, Privacy

Not Applicable.

4. Co-ordination, Interoperability

Not Applicable.

5. Economic Development

Westario attempts to procure facilities services from local vendors where possible. This, in turn, helps support the local and provincial economy.

6. Environmental Benefits

While there are no direct environmental benefits from this project, some upgrades to facilities will marginally improve energy efficiency.

C. Category-specific requirements for each project/activity

General Plant:

Maintaining the facilities is critical in keeping day-to-day operations effective and efficient. Without the regular enhancements and changes to adapt to a changing workforce, daily operations activities would either be compromised or slowed. This, in turn, would lead to higher OM&A costs as operations.

5.4.5.2.14 Tools and Equipment – (General Plant)

Project Information

Investment Category:	General Plant
Capital Project Name:	Tools and Equipment
Drivers:	Efficiency
Asset Type(s):	Tools, equipment
Total Capital Cost (2018-2022):	\$ 165,000
Average Annual Capital Cost:	\$ 33,000
Start Date:	January 1 st 2018
End Date:	December 30 th 2022

A. General information of the project/activity

Tools and equipment used for constructing and maintaining the distribution system are classified as general plant. While no major investments are planned, some costs will be incurred to update / replace / enhance existing tools and equipment.

Table #64: Tools and Equipment over the forecast period

	2018	2019	2020	2021	2022	Total
Tools & Equipment	35,000	35,000	35,000	35,000	30,000	165,000

2018-2020: Westario plans to purchase new large tools/equipment to be utilize for efficient results of construction and maintenance of its distribution network, i.e. tools include presses/cutters, testing and hydraulic equipment etc.

B. Evaluation criteria and information requirements for each project/activity

1. Efficiency, Customer Value, Reliability

The main drivers for this project are asset end of life and operational effectiveness. As tools and equipment age, some require replacement to continue to be effective.

This project does not have a high priority, but is necessary for the LDC to efficiently perform any daily activities and requirements.

2. Safety

While safety is not a driver for this project, Westario always maintains the tools and equipment to necessary standards and regulations for safety.

3. Cyber-security, Privacy

Not Applicable.

4. Co-ordination, Interoperability

Not Applicable.

5. Economic Development

Westario attempts to procure tools and equipment from local vendors where possible. This, in turn, helps support the local and provincial economy.

6. Environmental Benefits

Not Applicable.

C. Category-specific requirements for each project/activity

General Plant:

Maintaining tools and equipment is critical in keeping day-to-day operations effective and efficient.

5.4.5.2.15 Metering – (System Service)

Project Information

Investment Category:	System Service
Capital Project Name:	Metering
Drivers:	Service Quality, Reliability, Asset End of Life
Asset Type(s):	Meters
Total Capital Cost (2018-2022):	\$ 150,000
Average Annual Capital Cost:	\$ 30,000
Start Date:	January 1st 2018
End Date:	December 30th 2022

A. General information of the project/activity

Primary meters are required by Westario to be a Market Participant and settle with the IESO and Hydro One. These units are typically installed at the demarcation point between Hydro One and Westario, and include a main meter, alternate meter, and communication equipment. As with other meters, Measurement Canada has specific requirements for re-verification and testing, and the IESO / Hydro One have specified the required communication technology and protocols. To remain compliant, Westario will need to upgrade the primary meters over the coming years.

Table #65: Meter investments over the forecast period

	2018	2019	2020	2021	2022	Total
Primary Meter Upgrades	30,000	30,000	30,000	30,000	30,000	150,000

B. Evaluation criteria and information requirements for each project/activity

1. Efficiency, Customer Value, Reliability

The main driver for this project is efficiency. Ensuring the primary metering units are accurate and in compliance with Market Rules will allow Westario to properly settle the wholesale billing with the IESO and Hydro One with minimal intervention.

These metering investments are of relatively high priority, to remain compliant with Market Rules.

2. Safety

While safety is not a driver for this project, Westario always installs its meters to necessary standards and regulations.

3. Cyber-security, Privacy

Primary meters are interconnected with communications systems which must be programmed with necessary security features. Westario ensures that its meter communications are configured in a secure manner and in compliance with Westario's security and privacy policies.

4. Co-ordination, Interoperability

Westario's primary meters have been put into place as mandated by the Market Rules and will be re-verified as required through this project. The equipment used is similar to other market participants and are readily available from suppliers.

5. Economic Development

New meters and communication components are purchased from Ontario suppliers and re-verification processes will be performed within the province as well. This in turn will provide benefits to the provincial economy.

6. Environmental Benefits

Not Applicable.

C. Category-specific requirements for each project/activity

System Service:

Primary meters were installed shortly after Market Opening and are maintained by a registered Meter Service Provider (MSP). The MSP ensures the primary metering installations remain compliant with Market Rules and the requirements of the IESO and Hydro One. As technology changes and meters reach seal expiry, upgrades are necessary within the timelines specified by the Market Rules. Westario will be using an MSP to facilitate these upgrades.

5.4.5.2.15 Office Furniture and Equipment – (General Plant)

Project Information

Investment Category:	General Plant
Capital Project Name:	Office Furniture and Equipment
Drivers:	Efficiency
Asset Type(s):	Furniture, equipment
Total Capital Cost (2018-2022):	\$ 100,000
Average Annual Capital Cost:	\$ 20,000
Start Date:	January 1 st 2018
End Date:	December 30 th 2022

A. General information of the project/activity

Office furniture and equipment used for operating and maintaining the office are classified as general plant. While no major investments are planned, some costs will be incurred to update / replace / enhance existing furniture and equipment as they reach end of life.

Table #66: Office Furniture and Equipment over the forecast period

	2018	2019	2020	2021	2022	Total
Office Furniture & Equipment	35,000	30,000	15,000	10,000	10,000	100,000

B. Evaluation criteria and information requirements for each project/activity

1. Efficiency, Customer Value, Reliability

The main drivers for this project are asset end of life and operational effectiveness. As furniture and equipment age, some require replacement to continue to be effective.

This project does not have a high priority, but is necessary for the LDC to efficiently perform any daily activities and requirements.

2. Safety

While safety is not a driver for this project, Westario always maintains furniture and equipment to necessary standards and regulations for safety.

3. Cyber-security, Privacy

Not Applicable.

4. Co-ordination, Interoperability

Not Applicable.

5. Economic Development

Westario attempts to procure furniture and equipment from local vendors where possible. This, in turn, helps support the local and provincial economy.

6. Environmental Benefits

Not Applicable.

C. Category-specific requirements for each project/activity

General Plant:

Maintaining furniture and equipment is critical in keeping day-to-day office work effective and efficient.

5.4.5.2.17 Technology – (General Plant)

Project Information

Investment Category:	General Plant
Capital Project Name:	Technology
Drivers:	Efficiency
Asset Type(s):	Computers (hardware/ software)
Total Capital Cost (2018-2022):	\$ 95,000
Average Annual Capital Cost:	\$ 31,667 (3-year project)
Start Date:	January 1 st 2018
End Date:	December 30 th 2020

A. General information of the project/activity

Technology, as a capital project, includes spending for computer hardware, software, and training, and is classified as general plant. Some software programs are relatively costly; likewise, keeping computer hardware up-to-date is typically an on-going expense. The bulk of the technology spending, however, includes replacing servers, and the application of mobile mapping technology related to the Geographic Information System (GIS) which is necessary for keeping accurate records of all asset bases and capital projects.

Table #67: Technology over the forecast period

	2018	2019	2020	2021	2022	Total
Technology	30,000	30,000	35,000	-	-	95,000

B. Evaluation criteria and information requirements for each project/activity

1. Efficiency, Customer Value, Reliability

The main drivers for this project are asset end of life and operational effectiveness. With the rapidness in which technology, such as computer hardware and software, becomes obsolete in today's society, it is important to invest in the technological infrastructure to ensure adequate service to customers. If investments in this category are lacking, the LDC may quickly fall behind in the capability to efficiently and effectively serve its customers. Additionally, with the recent investments into the ESRI GIS system, technological equipment such as servers is required to allow the system to function as intended. These investments will allow customer service and operations activities to perform as expected and more efficiently.

This project does have a high priority, since as mentioned, technology becomes obsolete very quickly. Without the proper up-to-date equipment, software, and program licenses, the LDC would quickly lose the ability able to perform any daily activities and requirements.

2. Safety

These investments will ensure that Westario is capable of performing all of its daily activities, which include responding to emergency calls from the public and workers. While potentially only a small portion of investments will be allocated to equipment for performing these activities, without the adequate technology, safety of customers and workers could be compromised.

3. Cyber-security, Privacy

Investments into this project are partially meant to fund technology and training which ensure cyber-security and privacy of employees and customers.

4. Co-ordination, Interoperability

This project is critical to enabling future technological functionalities and addressing future operational requirements. Investments into servers for the ESRI GIS system will be instrumental to allowing Westario to properly track and manage its assets in the future. Additionally, the computer hardware and software that will be procured are essentially required to allow Westario to continue all of its operations activities.

5. Economic Development

Westario attempts to procure software, hardware, and training services from local vendors where possible. This, in turn, helps support the local and provincial economy.

6. Environmental Benefits

While there are no direct environmental benefits from this project, it will allow Westario to better track its assets and the assets' conditions with its new ESRI GIS system. This in turn will aid in removing assets from service before failure, which will likely lead to fewer environmental incidents.

C. Category-specific requirements for each project/activity

General Plant:

Obtaining adequate technology is critical in keeping day-to-day operations effective and efficient. Without the required technology, daily operations activities would either be compromised or slowed. This, in turn, would lead to higher OM&A costs as operations would not work regularly.

It is also important for customer service that the utility uses adequate technology. Without it, Westario would likely not be able to assist as many customers in the same amount of time. Additionally, operations activities, such as designing and implementing, would surely be compromised, resulting in poor operational effectiveness.

5.4.5.2.18 Cyme and GIS Integration – (System Service)

Project Information

Investment Category:	System Service
Capital Project Name:	Cyme and GIS Integration
Drivers:	Operational Effectiveness, Efficiency, Service Reliability
Asset Type(s):	Geographic Information System, technology
Total Capital Cost (2018-2022):	\$ 70,000
Average Annual Capital Cost:	\$ 70,000 (1-year project period)
Start Date:	January 1 st 2018
End Date:	December 30 th 2018

A. General information of the project/activity

The CYMDIST Distribution Analysis software is a suite of applications composed of a network editor, analysis modules and user-customizable model libraries that enables WPI staff to obtain engineering solutions for its distribution network. It will be used for planning studies and simulating the behavior of Westario's electrical distribution networks under different operating conditions and scenarios.

Table #68: Cyme and GIS Integration over the forecast period

	2018	2019	2020	2021	2022	Total
Cyme and GIS integration	70,000	-	-	-	-	70,000

B. Evaluation criteria and information requirements for each project/activity

1. Efficiency, Customer Value, Reliability

The main driver for this project is operational effectiveness. The CYMDIST software will allow for the modelling of the distribution system under different scenarios to optimize the existing configuration and plan for future changes.

2. Safety

With the ability to model the system under different scenarios, Westario will be able to identify weak spots and upgrade them before failure, leading to a safer distribution system for both the public and workers.

3. Cyber-security, Privacy

Investments into this project will be designed to meet the cyber-security and privacy of employees and customers.

4. Co-ordination, Interoperability

This project will integrate with the existing GIS system.

5. Economic Development

This project utilises services and equipment procured through Ontario service providers and suppliers and as such helps the provincial economy.

6. Environmental Benefits

Not applicable.

C. Category-specific requirements for each project/activity

System Service:

The CYMDIST system is composed of advanced technology including server equipment and software. During implementation of the project, Westario ensures cybersecurity is met through the implementation of all necessary safety features to ensure only those with adequate credentials have access to the data.

The project also offers many reliability and efficiency benefits. It will enable Westario to model the system under different operating conditions. With this information, Westario can more strategically replace aging assets in an effort to limit significant outages while ensuring all assets are utilised as long as possible without compromising safety.

This project is of high priority for Westario, as the investment requirements remaining are relatively small compared to the operational effectiveness benefits the project will provide.

Glossary

Acronym	Term	Definition
ACA	Asset Condition Assessment	A report created on the basis of the utility's knowledge of its assets and the assessment of their conditions as compared to industry standards and their lifecycles
AMP	Asset Management Plan	A report derived from the Asset Condition Assessment that uses forecasted capital expenditures to create a plan for managing the utility's assets in the future
DSP	Distribution System Plan	The document created as Chapter 5 of the Ontario Energy Board's Cost of Service filings
GIS	Geographical Information System	A system designed to capture, store, manipulate, analyze, manage and present all types of data
HONI	Hydro One Network Incorporated	The electricity transmission and distribution utility serving Ontario, which supplies local distribution companies with electricity, and acts as a local distribution company to parts of the province without a local distribution company
IED	Intelligent Electronic Devices	Electronic relays that can do many functions including relay protections, SCADA interface and metering
IESO	Independent Electricity Service Operators	A Crown corporation responsible for operating the electricity market and direction the operation of the bulk electrical system in Ontario
LDC	Local Distribution Company	The local hydroelectric utility companies in the towns and cities that are supplied by the larger electricity distribution utility
MS	Municipal Substation	Substations owned by local municipalities that transmit electricity to the customer
NG	Natural Gas	Primarily methane gas, in this case referring to an alternate source of heating and power
O&M	Operations and Maintenance	A portion of the budget set aside for ongoing maintenance of the distribution system
OEB	Ontario Energy Board	The regulatory board in Ontario responsible for overseeing licensing and rates for natural gas and electricity supply
OESC	Ontario Electricity Safety Code	Ontario's set of regulations for guaranteeing safety with regards to electrical transmission
REG	Renewable Energy Generation	Alternative sources of energy supply that come from renewable resources such as sun and wind
RRR	Reporting and Record-keeping Requirements	The Ontario Energy Board's current requirements for maintaining and filing information under licence conditions
RTU	Remote Terminal Unit	A microprocessor-controlled electronic device that interfaces objects in the physical world to a distributed control system (SCADA) by transmitting data to a master system using messages to control connected objects

SCADA	Supervisory Control and Data Acquisition	A system for remote monitoring and control that includes a large-scale data acquisition system that gathers and stores data
TUL	Typical Useful Life	The life expectancy of a particular asset as determined by an established standard
USF	Utility Standards Forum	A group of local distribution companies that develop and share a common set of construction standards
Westario	Westario Power Inc.	The local distribution company in the region of Western Ontario that borders lake Huron, spanning Grey County, Huron County, Wellington County, and Bruce County. Also known as Westario Power or WPI.

Appendix A:
Asset Management Plan
2013-2022

Westario Power Inc.
Asset Management Plan
2013-2022



May 2, 2017

Introduction

Utilities are able to make the most of their assets and create realistic plans for their future by conducting asset assessments and developing asset management plans. The content of these reports allows utilities to understand the ages and conditions of their assets, helping them to make informed decisions on their replacement.

Asset management planning helps utilities save on costs and increase the efficiency of their distribution systems. Efficiency can be optimized when assets are analyzed effectively, the proper data are gathered and the appropriate planning and strategies are set in place. Then, operating in accordance with the plans, utilities can move forward providing the best possible service to their customers.

Along with its predecessors, Westario Power Inc. (henceforth Westario) has been managing the electrification of this region of Ontario, overseeing all of the distribution system assets, since electrification first occurred in the province.

This Asset Management Plan (AMP) provides an explanation of how Westario plans to manage its distribution system assets in accordance with the mandated requirements, all the while providing efficient and safe electrical supply to its customers.

Westario is open to feedback on this AMP from its stakeholders and interested parties on its approach to providing safe, cost-effective service to its customer base.

Liability Disclaimer

This AMP was written by Costello Associates, as contracted by Westario. The information herein is based on the data collected through the asset analyses conducted by Costello Associates in conjunction with Westario.

The projections and forecasts in this AMP are subject to change as they are based on assumptions and predictions. Unforeseen circumstances may occur that require Westario to divert from this plan. In all circumstances, Westario intends to adhere to the key tenets of providing safe and reliable service; in the event that unforeseeable changes occur, Westario may take actions not outlined in this plan, but that are consistent with its key values.

Neither Westario nor Costello Associates can be held liable for any injuries, losses or damages that result, either directly or indirectly, from the reliance upon any information presented in this AMP.

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1 Background

1.1 Westario's Distribution System & Approach to Asset Management

Westario is the licensed electricity distributor serving approximately 23,000 customers in Westario's service territory which encompasses 15 communities. Westario was created by the amalgamation of eight former municipal hydro-electric commissions and currently serves the communities of Clifford, Elmwood, Hanover, Harriston, Kincardine, Lucknow, Mildmay, Neustadt, Palmerston, Port Elgin, Ripley, Southampton, Teeswater, Walkerton, and Wingham.

Westario distributes power to its customers through either direct transmission station-connected feeders or through its own municipal distribution substations which consist of primarily urban customers. Westario owns 27 municipal substations within its service territory along with one mobile substation. Within its service territory, there are a total of five communities that are directly fed by Hydro One-owned distribution stations as there is no Westario-owned distribution station. These communities are Clifford, Elmwood, Mildmay, Neustadt, and Ripley.

The service area of Westario covers a large geographical area spanning approximately 60 kilometers east/west by 80 kilometers north/south. The service territory is non-contiguous and areas between these service territories are served by Hydro One Networks Inc.

A breakdown of the assets in terms of their original costs is shown in Appendix A and a map of the service territory shown in Appendix B.

1.2 Service Levels

Westario abides by the OEB prescribed levels of service and reliability standards dictated by the following:

- The Ontario Energy Board Act, 1998;
- The Electricity Act, 1998;
- The Municipal Franchises Act, 2003;
- The Statutory Powers Procedure Act, 1990;
- Chapter 15 of the 2006 Electricity Distribution Rate Handbook – Service Quality Regulation;
- Amendments to the Distribution System Code - Board File No. EB-2008-0001, 2008;

- Filing Requirements for Electricity Transmission and Distribution Applications Chapter 5: Consolidated Distribution System Plan Filing Requirements as mandated by the OEB, 2013.

1.3 Historical Perspective

Prior to the merger, local utility offices and/or service centers existed in nine communities – namely Hanover, Harriston, Kincardine, Lucknow, Mildmay, Port Elgin, Teeswater, Walkerton, and Wingham. None of these was large enough to accommodate the combined staff, fleet and inventory of the new LDC, nor did any of these sites have enough land to expand the facility to meet these needs. Merging such a collection of small utilities spread over a large area produced a number of significant customer service, and distribution system operating/maintenance issues. Generally, the former utilities had little, if any, documentation on the distribution system assets. Information that was available was usually limited to maps of the system. There were no records containing such information as age of equipment, years in service, fuse/disconnect ratings, equipment manufacturer, PCB surveys, condition assessments, failure history, transformer connections, etc.

Since that time Westario has made a significant effort to collect operational information on the distribution assets and has been using a custom software package to record and maintain this information. As such, detailed information on the assets is much better than it was, but some areas still need work. Better information allows the further development of cost-effective asset management plans that address growth, line loss minimization, reliability performance measures, and financial capabilities of the Company.

Table 1 shows the major capital projects/activities planned for 2018 to 2022 where items meet the annual materiality threshold of \$50,000. This table shows their associated investment categories and the amounts allocated to them in capital expenditures for the forecast period. The single largest project falls within the System Renewal category; as a category, System Renewal includes a larger number of total projects, and therefore has the largest budget. This table shows the projects descending in expenditure amounts.

Table 1

Project/Activity	Investment Category	Total 2018 to 2022
Substation Upgrades	System Renewal	6,250,000
Decrepit Pole Replacement	System Renewal	4,690,463
Fiberglass Transformer Base Replacement	System Renewal	2,088,950
Vehicle Replacement	General Plant	1,710,000
Capital Poles	System Access	1,629,078
Distribution Transformer Replacement	System Renewal	1,604,454
New O/H Service Connections	System Access	860,446
Poletran Conversion	System Renewal	847,839
#6 Copper Replacements	System Renewal	788,490
New Underground Service Connections	System Access	632,425
SCADA	System Service	437,820
Non-demarcation Customers	System Access	220,800
Facilities Enhancements	General Plant	170,000
Tools & Equipment	General Plant	165,000
Metering	System Service	150,000
Office Furniture and Equipment	General Plant	100,000
Technology	General Plant	95,000
Cyme and GIS integration	System Service	70,000
		22,510,766

1. Substation Upgrades

Westario owns and maintains 27 municipal substations (MS) and over the past three years has completed a detailed review of the substation assets. This effort has resulted in a prioritized list of plans to refurbish existing transformers, as well as the replacement and upgrade of the station switchgear, breakers, fencing, grounding, and control systems.

Based on regular “Transformer Dissolved Gas in Oil Analysis Reports”, in 2014 Westario identified several station transformers that were a very serious concern and were slated for replacement/refurbishment. From 2014 to 2016, three transformers were refurbished and two new units were purchased. In 2017, two more units will be refurbished. The prioritized replacement/refurbishment list also identified several substation transformers that are showing cautionary values in the gas analysis. These units are regularly monitored for worsening test results, and the replacement strategy is modified accordingly.

Westario's current plan endeavors to refurbish/upgrade one substation per year for the period of 2017-2022. This will lower the average age of the station asset class significantly, and place Westario in a better position to manage future replacements and upgrades. (Appendix C is the Transformer Fleet Strategy.)

2. Decrepit Pole Replacement

Distribution poles are Westario's single form of support for low and medium voltage overhead feeders and distribution equipment. Data was collected on the existing poles for the purpose of producing an Asset Condition Assessment (ACA) (Appendix D). A health index was used to categorize poles into groups rated "very good", "good", "fair", "poor" and "very poor", and life expectancies were given to correlate to each category. Based on the age criteria alone, it is evident that over half of the wood poles in the system have already reached, or will have reached, their "industry accepted" end of life within the next five-to-ten years. A comprehensive pole testing program, targeted at this aged population is being conducted to further assess the condition of this asset group. This effort will provide a more scientific based result for the condition of the pole and therefore allow a much more targeted approach to the replacement plans and capital spending.

Early results from the pole testing have indicated that many of the poles are currently assessed at less than 60% of the strength of a new pole. This does not necessarily indicate that all of these poles are failing, because the CSA requirement for replacing a pole is based on 60% of the load currently applied to the pole.

As an example, a class 3 pole holding up a short span of secondary wire only, may be years away from degrading to the point where it cannot support the wire under maximum design conditions. Capital has been allocated in each year of the planning period, beginning in 2013, to address the need for decrepit pole replacement, at a rate of approximately 100 poles per year from 2017 to 2020. It can be noted that when some other key capital projects conclude in 2020, expenditures for decrepit pole replacement are planned to increase in 2021 to approximately 150 poles per year and going forward for the remainder of the plan period. This reflects a more aggressive approach to replacing poles that are rated "very poor" and are therefore at the end of their life expectancies.

3. Fiberglass Transformer Base Replacement

These are pad mounted transformers that were installed on fiberglass foundations and are vintage 1970s to 1980s. These units are regularly inspected, and the foundations are degrading. The seasonal freeze-thaw cycle has begun to show on the fiberglass base structures, and has led to the planned replacements. In order to proactively replace these units before they fail, the project has been scheduled for 2020-onward, after pole-trans conversions and #6 copper conductor replacements have been completed.

4. Vehicle Replacement

Within Westario's General Plant assets are all types of vehicles, trailers, tensioners, diggers, etc. which are used for servicing the distribution assets. Many of these pieces of equipment are fairly costly, which means that their replacement is one of the larger capital projects in Westario's asset management plan. Just like any other asset, vehicles and equipment have a life expectancy, and therefore their replacement is planned and budgeted for. (Appendix F has a listing of Westario's fleet, as part of their General Plant assets.)

5. Capital Poles

This project covers new poles that are required to provide new customer connections, either through line extensions, pole relocations, or new poles for service connections.

These expenditures are driven by the rate of development in the various customer classes, and as a result are somewhat up-predictable. However, historical rates of activity have been used to determine the expected level of spending of approximately 50 poles per year.

6. Distribution Transformer Replacement

Westario's distribution system includes pole mount and pad mount transformers. Both pole mount and pad mount transformers were assessed based on inspection by Westario crews. While the GIS database did contain a PCB level field for transformers, all applicable transformers have been tested completely. The remaining transformers came from the manufacturers in the 1980s and later, and therefore had acceptable PCB levels. (The letter certifying that Westario's tested transformers are PCB-free can be found in Appendix E.)

Pole mounted transformers are used to step down voltage from a primary level to a secondary utilization level on the overhead distribution system. These transformers are mounted above ground on a pole and are liquid-filled with mineral oil in a sealed tank. An industry standard for the life expectancy for pole mounted transformers is 40 years.

The Health Index analysis revealed that 57% of the population of pole mount transformers will reach their statistical end of life within the next five-to-ten years. For transformers that supply a small number of customers only, a “Run-To-Failure” strategy is most cost effective while having a very small impact on the overall system reliability. The analysis of the available data could not take into account any “run-to-failure” transformers within this group due to the lack of customer connection information.

7. New O/H Service Connections

Most of the older residential and small commercial areas are supplied via overhead conductors. When these services are upgraded, replaced, or vacant in-fill lots are developed, overhead conductors are used.

The design, materials procurement, installation, and acceptance of these assets are driven by the pace of development. Although new customer growth has been small, historical spending trends are stable and have been used for determining the value of this investment over the new planning period.

8. Poletran Conversion

Poletran units can best be described as a streetlight pole that contains an electrical transformer inside of it. These units were a common installation around the late 1960s and into the early 1970s and were driven by an effort to reduce the numbers of pieces of equipment on a residential lot.

Over time it became evident that these poletran installations posed some concerns with electrical clearances and working space allowances due to their compact design. Many LDCs have been making efforts to remove these units from service, either through voltage conversions and/or end of life replacements.

The purpose of this project is to eliminate all remaining poletran units by the end of 2019 and to replace the existing primary cables that are at/beyond the end of their life.

9. #6 Copper Replacements

In the past, #6 copper primary wire was an inexpensive solution for extending power lines to areas with small energy demands. These areas are now experiencing load growth and feeder extensions off the #6 primary wire. Over time the copper wire has grown brittle and is under sized for the current applications.

Due to its brittle nature, #6 copper wire poses a public and worker safety issue, should the wire break and fall. Westario has experienced incidents of #6 copper wire breaking and falling to the ground unrelated to weather events.

These events are a potential and significant safety risk to line workers and the public. As a result, efforts have been made throughout the industry to remove the majority of #6 copper wire from service by the end of 2020.

10. New Underground Service Connections

Most new residential subdivisions are installed as underground cables and padmount transformers placed on the boulevard.

The design, materials procurement, installation, and acceptance of these assets are driven by the pace of development. Although new customer growth has been small, historical spending trends are stable and have been used for determining the value of this investment over the new planning period.

11. SCADA

SCADA stands for Supervisory Control and Data Acquisition and is a computer based operations software the can control and monitor Smart Devices throughout the Westario system.

A SCADA system will provide better monitoring, system load forecasting, and automated control which can allow Westario to improve its outage restoration time by providing better fault location

information and faster outage notification to the Westario staff through event initiated pager or text messaging.

SCADA falls under the System Service investment category. In terms of SCADA-preparedness, Westario's stations fall into three categories: 1) old stations that are not SCADA-ready, meaning that they have not been fitted with the necessary hardware upgrades of reclosers and relays that allow for SCADA installations, (this includes the bulk of Westario's stations); 2) stations that have been upgraded with the necessary hardware and are therefore SCADA-ready, but have not had SCADA installed as of yet, (of this category, there are four); and, 3) stations that have been upgraded for SCADA and have had SCADA installed (this category includes two stations at this time). Westario installed SCADA on one of the SCADA-ready stations in 2015, two (2) more in 2016, with three (3) more units planned for 2017, and one unit in 2018. The SCADA monitoring system is planned to be purchased and installed in 2018. Going forward, regular station upgrades will include SCADA installations.

12. Non-demarcation Customers

This refers to non-serviced vacant lots for non-expansion of an existing distribution line for residential customers only. Westario provides and makes the hydro line accessible to such customers on the opposite side of the road, i.e. bore, ducts under the road and overhead service poles.

13. Facilities Enhancements

This represents the cost of improvements and other changes to the existing facility to allow for the more effective use of space and rooms

14. Tools & Equipment

This constitutes the cost of tools, implements and equipment of significant value used in repair work and other utility operations.

15. Metering

Smart meters represent a large portion of Westario's distribution system. Smart meters were installed between 2009 and 2011 when the provincial government mandated the replacement of

the electromechanical billing meters with the new smart meter and Advanced Meter Infrastructure (“AMI”) two-way communication system.

Westario has also experienced a significant number of smart meter failures that has/will be contributing to the expected capital spending on meters. The following table indicates the failure rate experienced by Westario:

Table 2: Smart Meter Failure Summary

Meter Type	Number of Meters Installed	Number of Failed Meters Since Installation	Percentage Rate of Failure
Single Phase	19,649	1,996	10.16%
Three Phase (A3RL)	956	12	1.26%
Three Phase (A3RL)	44	18	40.9%

Westario continues discussions with the meter vendor to review performance and to find a possible source of the failures, but to date no resolution has been made. The cost of these replacements is covered under OM&A.

The Primary Metering Enclosures (PME) will be upgraded over the next five years to meet requirements and obligations under the Market Rules. These costs are covered in the Metering forecast spending of \$30,000 per year.

16. Office Furniture and Equipment

This represents the investment in general office furniture and equipment with an expected long life and of significant cost.

17. Technology

Technology, as a capital project, includes spending for computer hardware and software, and is classified as General Plant. Some software programs are relatively costly; likewise, keeping

computer hardware up-to-date is typically an on-going expense. The bulk of the technology spending, however, includes replacing servers, and the application of mobile mapping technology related to the Geographic Information System (GIS) which is necessary for keeping accurate records of all of the asset bases and capital projects. The GIS system is now fully implemented and is being used daily to capture and track asset information for the distribution system. In the coming years, Westario intends to further invest in mobile technology to allow field staff access to the GIS system data while in the field. This will improve the efficiency of the data collection, inspection reporting, and maintenance of the system asset data. Westario has also implemented the first phase of a manual (OMS) outage management system (HealthMap) that will improve their ability to manage service interruptions within the distribution system. This OMS accesses the smart meter system to detect and report outages and allow better information to be available during outage restoration activities.

18. Cyme and GIS Integration

The CYMDIST Distribution Analysis software is a suite of applications composed of a network editor, analysis modules and user-customizable model libraries that enables WPI staff to obtain engineering solutions for its distribution network. It will be used for planning studies and simulating the behavior of Westario's electrical distribution networks under different operating conditions and scenarios.

1.4 Managing Stakeholder Interests

1.4.1 *Identifying Stakeholders*

Westario is governed by a Board of Directors and has eight municipal shareholders and Fortis Ontario. Other stakeholders include:

- Electricity retailers, customers, and end consumers
- Contractors and service providers
- Distribution Supplier - Hydro One
- Government agencies such as the OEB, and the IESO
- Land owners where Westario lines run

Westario continues to have contact with all of its stakeholders through direct customer consultations, participation in the Regional Planning Process, and regulatory interactions. The suggestions of our stakeholders provide opportunities for Westario to conduct its business and provide perspective about rates and service levels.

1.4.2 Accommodating Stakeholder Interests

Stakeholder interests can be viewed from a number of perspectives including financial stability, electricity rates, and quality of supply, safety, and compliance. Financial stability is required to ensure that shareholders and lending institutions have sufficient confidence to continue owning and investing in Westario. Electricity rates provide the means for Westario to create revenue and signal underlying costs. Not charging appropriate rates has economic implications for both Westario and its customers. Quality of supply includes emphasis on reliability with respect to the number of interruptions, the duration of interruptions, the amount of flicker, and the quality of voltage. Safety involves staff, contractors, customers, and the general public. Westario must ensure the operation of the distribution system is safe for all. Compliance with respect to financial, safety, and environmental matters needs to be adhered to.

Westario accommodates stakeholder interests as follows:

Table 3

Interest	How Westario accommodates stakeholder interests
Financial Stability	Westario will accommodate stakeholders' needs for long term viability by returning a dividend to the shareholders.
Electricity Rates	Westario's revenue is constrained by regulatory requirements, conservation and demand management activities, and the state of the economy. Failure to collect enough revenue to fund reliable assets will impact customers in a negative way. Conversely collecting too much revenue penalizes customers and transfers a disproportionate amount of wealth to the shareholder. Westario's pricing strategy must be cost effective and at the same time be enough to continue to balance distribution system security, capacity, reliability, and return on investment.
Quality of Supply	Westario conducts annual customer satisfaction surveys. The last surveys were done in November and December, 2015, where customers indicated that they expect their utility to provide consistent, reliable energy, handle outages and restore power quickly, and prioritize the safe usage of electricity. For this reason, Westario will continue to effectively rebuild its infrastructure with funds available.
Safety	Westario will ensure that the public is kept safe by ensuring all assets are structurally sound, live conductors have maintained at least minimum clearances, enclosures are kept locked, and touch & step potentials are kept to a minimum. Westario will ensure the safety of its staff by implementing and continuously improving its safety management program.
Compliance	Westario will disclose performance information as required by regulators and ensure that safety issues are thoroughly documented.

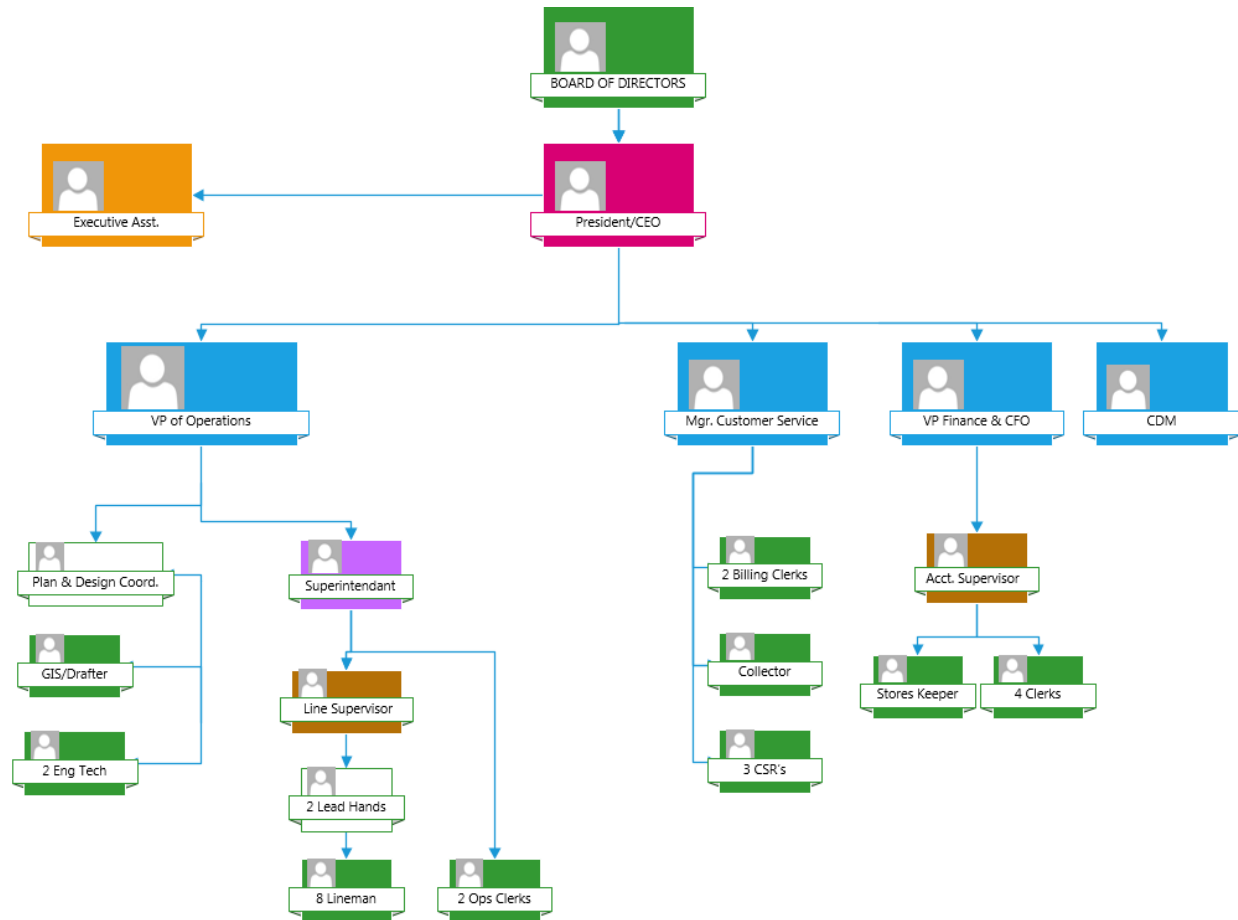
1.4.3 Managing Conflicting Interests

Conflicting interests will be managed as follows:

- Safety must be first priority - Safety of staff, contractors, and the public will always be the highest priority even if this means exceeding budgets or risking non-compliance.
- All other interests must be managed as the situation dictates and will, out of necessity, be a balance of some proportion (not necessarily equal proportions) between the interests:
- Approval from the OEB
- Financial Stability – Westario must be financially viable or it will not exist to manage other conflicts.
- Quality of Supply – Customers want value and are willing to pay for a certain level of quality.
- Electricity Rates – Rates reflect an appropriate balance between revenues and expenditures.
- Compliance – Other than safety.

1.5 Accountabilities for Asset Management

Westario's accountabilities for asset management are reflected in the following figures describing the corporate entities and corporate organizational structure with area of responsibility.



1.5.1 Accountability at Governance Level

Westario is governed by a Board of Directors, as appointed by each of the shareholders. Each shareholder has one representative on the Board of Directors. Directors are approved on an annual basis by the shareholders of Westario at the Annual General Meeting of Shareholders.

1.5.2 Accountability at the Executive and Management Level

The Chief Executive Officer (CEO) is accountable to the Board of Directors and the management level is accountable to the CEO through business goals, the development and execution of annual budgets, and various standards and processes that apply to the distribution system assets.

Accountability for financial and regulatory activities lies with the Chief Financial Officer. This role provides all financial reporting, assets funding provisions, and budgeting process for all phases of the AMP.

Accountability for managing the lifecycle of existing assets, the installation of new developments, and the installation of new assets lies with the VP of Operations. This role addresses long-term planning issues such as capacity and security.

Accountability for the daily continuity and restoration of electrical supply lies with the Line Superintendent. This role provides control and dispatch for electrical restoration.

1.5.2 Key Reporting Lines

The Board of Directors governs Westario's electrical distribution business and manages this overall responsibility through the CEO.

The Westario Board of Directors meets quarterly and receives quarterly reporting from management outlining financial, operational, and safety performance as well as the progress in maintenance, operational, and capital programs.

1.5.3 Westario Operating Structure

1.5.3.1 Operations Group

The Operations Department provides a seamless design to build process which includes:

- Planning and design for new capital works including all new connections to the distribution system;

- Analysis of system configuration with such inputs as growth, new connections, voltage levels, and capacity information with a view to optimize the configuration of the distribution system;
- Operating, emergency response, connection services, maintenance services, and capital construction services;
- In conjunction with contractors, collecting information required by the “Distribution System Maintenance & Inspection Program” in the management of existing assets;
- Executing the design plans;
- Producing material requirements to be utilized and warehoused.

1.5.3.2 Finance Group

The Shared Services Department provides financial reporting & analysis, budget support, accounting, rate design, and regulatory support to meet regulatory requirements.

2 Introduction to the Asset Management Plan

Asset management planning is the process of making the best possible decisions regarding the building, operating, maintaining, renewing, replacing and disposing of infrastructure assets. The objective is to maximize benefits, manage risk, and provide satisfactory levels of service to the public in a sustainable manner.

Asset management requires a thorough understanding of the characteristics and condition of infrastructure assets, as well as the service levels expected from them. It also involves setting strategic priorities to optimize decision-making about when and how to proceed with investments.

This Asset Management Plan (AMP) is intended to be a description of the thinking, the policies, the strategies, the plans, and the resources that Westario uses to manage the assets, rather than being a detailed description of Westario's distribution system assets.

2.1 Purpose of this AMP

The purpose of the AMP is to provide a management framework to ensure that Westario:

- Maintains service levels that will meet customer, community, and regulatory expectations for its distribution system network;
- Understands what levels of distribution system capacity, reliability, and security of supply will be required both now and in the future, and what issues will drive these requirements;
- Has programs and procedures to manage all phases of the distribution system life cycle from inception to retirement;
- Has considered the management of the distribution system in terms of the best risk management practices with the ultimate goal of minimizing identified risks;
- Has made adequate provisions to fund all phases of the distribution system asset life cycle;
- Makes decisions based on structured business strategies and models;
- Considers renewable energy generation applications, identifying how capital will be allocated to include such alternative systems into the distribution system plan;

- Has a continuously improving knowledge of its assets with respect to locations, age, condition, capacity, and attributes.

2.2 Period Covered

The planning horizon of the AMP is from 2013 to 2022. It is intended that the AMP will be reviewed on a periodic basis.

The planning horizon extends for a ten-year period, including five years of history and five years of forecast. The historical period includes the years from 2013 to 2017, with 2017 serving as the bridging year; the years of 2018 to 2022 serve as the forecast period. A high-level plan has been established for 2018 to 2022, and analysis tends to be more trend-related and based on asset end of life rates as detailed in the Asset Condition Assessment (ACA). The ACA (Appendix D) is based on a planning horizon of five years and predicts the sustainment of assets through to 2021.

It is very likely that new developments, which are not identified here, will arise at any given time even in the short term of five years.

There is an obvious degree of uncertainty in any predictions of the future and as such the AMP contains a level of uncertainty. The influence of government regulation, ongoing adjustments to LDC regulation by the OEB, customer growth, and the general state of the economy make for a substantial degree of uncertainty.

Accordingly, Westario has established the following certainties to the timeframes of the AMP:

Table 4

Timeframe	Residential	Commercial/Industrial
Year 1	Certain	Little if any certainty
Year 2	Certain	Little if any certainty
Year 3 to 5	Some Certainty	Little if any certainty

2.3 Planning and Operating Contexts

All of Westario's distribution system assets exist within a strategic context that is shaped by a wide range of issues including Westario's vision and mission, this AMP, regulatory environment, government policy objectives, commercial pressures, and technology trends. Westario's distribution assets are also influenced by technical regulations (i.e., construction and clearance standards), asset deterioration, and various risk exposures independently of the strategic context.

2.3.1 Strategic Context

Westario's strategic context includes many issues that range from the local and Canadian economy to developing technologies. Issues that are considered to impact this AMP include:

- The prevailing regulatory environment which constrains electricity rates and rates of return, requires stable or improving reliability indices, and requires complex reporting of financial and operating performance;
- Government policy objectives such as the implementation of conservation and demand management programs, smart meters and the introduction of the Green Energy Act;
- Westario's commercial goals;
- Local, national, and global economic cycles;
- Interest rates and the general business confidence within the communities Westario serves which influences the rates at which new customers connect to lines;
- Ensuring sufficient funds and skilled people are available in the short, medium, and long term to resource Westario's service requirements.

2.3.2 Independence from Strategic Context

While Westario's assets and asset configuration, which are relevant to its stakeholders, will be shaped by the strategic issues identified above in 2.3.1 Strategic Context, it is also important to recognize that the assets will also be influenced (and sometimes constrained) by issues independent of the strategic context. For example, the rate at which wooden poles rot is independent of the scarcity of skilled contractors. This issue may constrain the rate at which Westario replaces rotten poles, but it does not influence the rate of rot.

Samples of issues that are independent of Westario's strategic context include:

- Asset configuration, condition, and deterioration – these parameters will significantly limit the rate at which Westario can invest in upgrades or enhancements to the distribution system;
- The physical characteristics of electricity systems which govern such fundamental issues as voltage regulation, capacity, power flows, and faults;
- Physical risk exposures – exposure to such events as animal contacts, wind, lightning, snow/ice, motor vehicle impacts, theft of copper, and unwanted human interference are independent of strategic context;
- Health and safety requirements such as line clearances and grounding of equipment.

2.4 Key Assumptions

The development of this AMP is based on a series of key assumptions that are made as a foundation for planning and forecasting predictions of future activities, whether to maintain, replace or develop new assets (discretionary capital projects).

The key assumptions for this AMP are as follows:

- Westario is required to file a Cost of Service rate application, which includes Chapter 5: Consolidated Distribution System Plan of the Filing Requirements for Electricity Transmission and Distribution Applications, as mandated by the Ontario Energy Board in March 2013;
- Electricity growth rates are not expected to change drastically in the next five years due to an economy in slow recovery and the impact of the Conservation and Demand Management (CDM) Programs in lowering demand and electricity usage;
- Recognition that the economy of the areas served by Westario depends on a secure and reliable supply of electricity;
- The Green Energy Act will continue to drive investments in the distribution infrastructure in order to meet the Smart Grid characteristics and renewable generation alluded to in the legislation. Very recent provincial government decisions to suspend/constrain the level of

renewable energy projects has not been considered at this stage, due to the evolving nature of governmental decisions;

- With reference to the Smart Grid, new technologies have developed within the previous planning horizon and will continue to develop into the future. Westario has taken steps to install more system automation through its device upgrades at municipal transformer stations, as well as new software systems to allow for better use of all the available data, and will continue to make investments in these areas whenever they improve efficiency and reliability and benefit Westario's customers;
- Present service levels will continue to be maintained or improved, and will remain a balance between customer count, needs, price-quality tradeoffs, and industry best practice(s).
- Westario's AMP is a strategic document to convey future distribution system development and maintenance plans to stakeholders;
- Westario's asset management systems will continue to be developed in order to process performance information to meet demand, capacity, security, and reliability levels in a timely manner;
- Use of outside line construction firms to perform distribution maintenance, replace, and install assets (as prescribed by work plans of projects) will continue;
- Compliance with relevant regulatory requirements as they pertain to electricity rates, filing requirements, health & safety, and environmental protection will be maintained;
- The requirements of our shareholders will be met by achieving the objectives set down in Westario's mission statement;
- Westario focuses its capital expenditures and projects within four categories, which include system access, system renewal, system service and general plant. All decisions are made with these categories in mind as they direct Westario's priorities;
- Where practical, a proactive replacement strategy will be performed prior to equipment failure (preventing unplanned loss of service to customers) asset condition assessments will be completed to ensure that equipment life-cycle management is maximized;
- Asset management planning involves forecasts based on information collected from many sources. Distribution system development for the forecasted years (2018-2022) has been established; the initial two years of the forecast are certain. The final three years of the forecast (2020-2022) are less certain, and are based largely on trending. As the years pass, a regular review of this plan will ensure it is the best it can be.

Review of future achievement (apart from regulatory compliance) will be centered on the following areas:

- Health & Safety Performance
- Customer Experience
- System Reliability
- Financial Performance
- Environmental Performance

3 Asset Management Systems

3.1 Asset Knowledge

Asset information is essential to a properly functioning asset management plan. Westario has various records, both paper and electronic, which identify asset attributes and condition data. The following table summarizes the status of the collection of asset attributes with respect to each asset category (based on 2015 information).

Table 5

Description of Asset	% Of Asset Attributes Known	% of Condition Data Collected	% of Data Entered into ESRI GIS Database
Distribution Station Transformers	100%	100%	100%
Pole Mounted Transformers	100%	100%	98%
Pad Mounted Transformers	100%	100%	98%
Poles	100%	100%	95%
Smart Meters	100%	100%	60%
Fleet	100%	100%	0%

The method of information collection and storage is a key component to successfully managing the data from all assets. Records are kept in a number of formats either paper based files, database (RamSys), or spreadsheet (MS Excel) based. In 2015, Westario moved to a new ESRI Geographic Information System (GIS) to record and manage all of the asset related data. Field confirmation of the data is also part of the project plan. In addition to the installation of the software system and field data collection, Westario is also reviewing all of its operational work procedures in order to integrate the GIS system into the work processes. This effort will ensure that the data stays current through normal business practices and does not become out of date and untrustworthy. As of the time of the preparation of the Asset Management Plan, column 4 above in Table 4 indicates the amount of data for each asset class that has been collected and verified.

3.2 Improving and Using Asset Knowledge

Currently, asset data for poles and distribution transformers, such as global coordinates, asset number (unique ID number) and physical attributes, will be available or accessible directly from the new ESRI GIS system. Condition data is being collected (electronically) for poles, transformers and switchgear, and downloaded into databases. This information is then analyzed and used to prepare meaningful asset condition assessments upon which replacement and development activities and budget related decisions can be made.

3.3 Key Systems and Processes

In order to manage its assets, Westario uses an ESRI GIS system which shows the geographical location of the specific asset; the asset is then linked to a database software which stores all relevant information on the asset in question. The previous system (Ramsys) was a proprietary system and was becoming increasingly costly to change, therefore Westario made the decision to move toward a more robust, better supported, and industry common platform.

Westario also endorses and adheres to the required practice of regular system asset inspections. Operations field staff performs regular, periodic, visual inspections of the poles, wires, switches, etc. in the distribution system. The results of these inspections are provided to the GIS system administrator for inclusion in the asset information. Problems found during these inspections are prioritized and acted upon on a schedule determined by the level of concern.

3.4 Key Planning Documents

3.4.1 Westario's Vision and Mission Statements

Westario's vision and mission statement is as follows:

Westario Power is an energy distribution corporation with a mission to build a quality, customer focused organization.

Our company will provide safe, reliable cost-effective services and products achieving sustainable growth while respecting the community and the environment.

We are dedicated to creating superior value for our customers and shareholders, and a safe and rewarding work environment for our employees.

We will grow our business through innovation and creative leadership, based on sound fiscal management and business practices.

3.4.2 Purpose of an Asset Strategy

The asset strategy is primarily for use by the utility to establish the optimum form of the assets required for them to deliver, within resource limits, the results and services sought by the customers and regulators. The strategy details the actions the utility proposes to undertake to manage its asset needs.

3.4.3 Asset Strategy

The asset strategy, has been utilized to varying degrees since the inception of the distribution system in Ontario. The guiding principles for today's distribution system asset strategy are to:

- Maintain awareness of safety around electricity at the forefront for company, customers, and the general public;
- Exploit the availability of lines constructed for up to 44kV to improve reliability and electrical losses;
- Upgrade hardware on all distribution equipment, as maintenance and construction occur, to facilitate a seamless transition up to the 44kV feeder voltage;
- Design the distribution system with the intent of maximizing the reduction in electrical losses;

- Improve customer reliability through effective maintenance plans and planned replacement of assets at their end of life;
- Maintain power quality by implementing the modeling of the electrical distribution system in GIS;
- Assist the connection of renewable embedded generation by identifying the constraints and providing solutions which enable proponents to connect to the distribution system.

The implications of these guiding principles are rooted in Westario's sustainment and discretionary projects.

3.4.4 Prevailing Regulatory Environment

The Electricity Distribution Industry in Ontario is regulated under the Ontario Energy Board Act, 1998, the Electricity Act, 1998, and the Electricity Restructuring Act, 2004 all of which are administered by the Ontario Energy Board (OEB). In 2013, OEB put forth the Cost of Service rate application requirement; a significant component of this application is the Distribution System Plan (Chapter 5). The necessary components for this Plan are laid out in the Filing Requirements for Electricity Transmission and Distribution Applications.

The Ontario Energy Board Act, 1998 sets out the following guiding objectives for the OEB with respect to electricity:

- To protect the interests of consumers with respect to prices and the adequacy, reliability, and quality of electricity service;
- To promote economic efficiency and cost effectiveness in the generation, transmission, distribution, sale and demand management of electricity and to facilitate the maintenance of a financially viable electricity industry.

These regulatory requirements dictate or heavily influence Westario's rates, fees, and return on equity. Rates are required by legislation to be approved annually by the mechanisms specified by the OEB.

3.4.5 Government Policy Objectives

In May 2009, the Ontario Legislature passed Bill 150, the Green Energy and Green Economy Act, 2009. This legislation is a framework legislation aimed at making fundamental changes to the roles and responsibilities of local distribution companies (LDCs). The implications of the act have resulted in asset expenditures to support embedded generation and the ideals of a “smart grid”.

3.4.6 Annual Business Planning

Westario has produced, or updated, a number of key documents that support the annual business planning process. These documents include the distribution system maintenance and inspection program, asset condition assessment, and detailed budgets. Going forward, this AMP will also be reviewed and revised on a regular basis.

3.4.7 Annual Budgets

Each year Westario produces an annual budget for the year ahead, which reflects the costs of individual projects and expenditures over the year. This budget is created by reviewing asset and operational issues experienced in the past and anticipated for the future. This budget contributes to the long-term alignment with the strategic context. It must be understood that this alignment process is very much a moving target.

For the last two years, and in support for Westario’s rate application, Westario has produced budgets going forward two years. Moving forward, a critical activity for Westario is to ensure that the annual budget reflects the fundamentals of this AMP and the budget extends out five or more years to provide better planning and cost forecasting.

3.4.8 Risk Management

Ontario Regulation 22/04 - Electrical Distribution Safety is a key regulation which requires Westario and all other LDCs to maintain distribution standards, material standards, and construction verification programs to safeguard the public from hazards associated with the distribution system. The Electrical Safety Authority (ESA) is responsible for enforcing the regulation and this is done through a system of annual audits and regular field inspections.

Westario promotes excellence in health and safety management in order to prevent losses to people, assets, environment, and reputation. Keys to this health and safety (H&S) management system are the evaluation of risk for all workplace hazards, regular H&S meetings with staff, and feedback on losses or near losses occurring in the workplace.

Written emergency response procedures have been prepared as follows:

- Distribution System Emergency Preparedness Plan
- System Restoration Plan

Westario will follow all regulatory requirements and guidelines to ensure the distribution system has a low risk impact on the environment.

4 Summary of Assets Covered

4.1 Distribution Area

Westario's distribution system covers approximately 64 square kilometers and serves fifteen communities in the region. Westario is the local distribution company (LDC) supplying electricity to the Ontario communities of:

Clifford, Elmwood, Hanover, Harriston, Kincardine, Lucknow, Mildmay, Neustadt, Palmerston, Port Elgin, Ripley, Southampton, Teeswater, Walkerton and Wingham.

These communities have a population of 49,092 that has seen very slow growth.

All areas between communities served by Westario are serviced by Hydro One Networks. The greatest single customer population is in the Town of Saugeen Shores (Port Elgin/Southampton) representing 30% of the overall customer base. Westario currently serves approximately 23,000 customers. (A map of the service territory is shown in Appendix B.)

Generally speaking, the urban service territory is made up of mostly residential development, with a small supporting commercial area.

The climate in this region is relatively mild compared to the broader provincial area due to its proximity to the Great Lakes. The coldest months of the year are typically January and February; the average lowest temperatures across the area are between -11° and -13°C. Record low temperatures have been as extreme as -40°C. The warmest months are July and August, with average high temperatures of 24° to 26°C. Record summer temperatures have been as high as 35° to 37°C.

This region receives its highest precipitation levels during the summer and fall months. While most precipitation in the months between November and March is snow, the region receives less snow than other parts of southwestern Ontario since most of its precipitation occurs in the warmer months.

The Westario region has been experiencing an increased number of storms in recent years, with increased levels of severity. As storms become more frequent and more intense, they pose risks to the reliability of Westario's distribution system. There have been instances of stronger winds than previous years' storms created. This is one case where projects like tree trimming are especially important in preventing branches from getting in the way of distribution lines and causing outages.

Colder winters have created higher usage of electrical heat, which translates into higher load demands. However, there is potential that Kincardine will be introducing the possibility for natural gas for a possible heating source. This, along with future natural gas prices and carbon taxation, are expected to have an effect on the town's electrical consumption depending on how quickly and vastly residents begin initiating connections.

4.1.1 Demographics

4.1.1.1 Key Economic Activities

Westario is home to a small number of larger manufacturers in the auto parts, food processing, furniture industry, and industrial processing sectors, along with a stable base of smaller family-owned businesses that manufacture and provide services. Throughout the service territory, Westario has schools, hospitals, government, and recreation facilities. These serve the following sectors: manufacturing; business services; retail; tourism; healthcare, transportation; construction; technology; and education. This past decade saw the manufacturing industry being

challenged with cost pressures, with many closures and scale backs. While there is a ripple effect on those businesses and employees that serve the manufacturing industries, all businesses suffered from the general economic fallout from the financial crisis of 2008-2010. The economic impact has adversely affected employment throughout the service territory, thereby resulting in a decrease in population and a shortage of skilled workers. While there has been some recovery, it has not been to the same extent as other, more urban centers in Ontario.

While not in the Westario service territory, the Bruce Nuclear Plant, located between Saugeen Shores and Kincardine on Lake Huron, employs over 4,000 people. This underpins the social and economic health and stability of the Counties of Bruce, Grey, and Huron. Currently, the Bruce Nuclear Plant is planning on refurbishing part of its nuclear generation. While this is slated to start in 2020, it has already been delayed by four years, for political and economic reasons. It may be delayed again as the province grapples with the predecessor nuclear projects at Darlington and Pickering. Once this project is underway, it is anticipated that another 2,000 workers will be on-site at the Bruce Nuclear plant for many years, increasing the entire area's long-term prosperity and employment opportunities at that time.

It was recently announced that EPCOR is bringing natural gas distribution to Kincardine (September 21, 2015). This will affect the load forecast for this community, as currently there remain a significant number of residential and general service below 50kW (GS<50 kW) customers who use electricity to heat their homes and premises. EPCOR has indicated that it believes it will be starting the project in the first quarter of 2017. Since that announcement there have been significant developments from other gas distributors; the OEB issued EB-2016-0004, setting out a generic process for all that will take place April, 2016. It is anticipated that the project start date will be consequently delayed such that the process of setting a fixed distribution rate (2019) for the residential class for Westario will likely have been completed before conversions to natural gas take place. The impact on the GS<50 kW customer class is not known at this time. The impact on the GS>50 kW customer class is not expected to be significant as the hospitals, municipal offices, and large business are predominately using propane for heat.

Over the planning horizon of this report, Westario expects: very low residential and GS<50 kW customer class growth; a slight shrinkage in the GS>50 kW customer class demand; and due to the increasing adoption of LED lighting technology, there has been a reduction in consumption for the Streetlight, Sentinel and USL customer classes.

4.1.1.2 Energy & Demand Characteristics

Key energy and demand figures separated into transformer station areas and based on historical information from 2012 to 2016 are as follows:

Table 6

Westario: Capacity vs Load Demand					
Community	Trend	Peak (KVA)	Month	Comments	Capacity (MVA)
Clifford	↓	1,386	JAN	Dropping	-
Elmwood	↓	545	FEB		-
Hanover	↑	16,000	JAN/FEB	2.4% Average/year	25.25
Harriston	↑	3,430	JUNE	14% Average/year	5
Kincardine	↑	22,000	JAN/FEB/MAR	7.5%	29
Lucknow	↑	3,823	FEB	11%	6.65
Mildmay	↑	2,300	MAR	7%	-
Neustadt	↑	1,200	FEB	4%	-
Palmerston: Mtr 1	↑	3,900	FEB	4%	5
Palmerston: Mtr 2	↑	700	FEB		Customer
Palmerston: Mtr 3	↑	5,850	SEP	4%	Customer
Port Elgin	↑	13,000	MAR	3-5%	33
Ripley	↑	1,730	MAR	9%	-
Southampton: MS #1	↓	2,430	JAN/FEB	-2%	8
Southampton: MS #2	↑	2,990	FEB	1.5%	5
Southampton: MS #3	→	1,100	JAN/FEB		5
Southampton Water Plant	→	300			
Teeswater	→	2,000	JAN	%	3
Walkerton	↓	12,000	JAN	-2%	17.3
Wingham	↑	5,700	FEB	1.75%	10

Table 7 demonstrates the actual energy consumption by community over the history period:

Table 7

Community	Actual Energy Consumption (MW hrs.)					Trend	Change (%)
	2011	2012	2013	2014	2015		
Clifford	6462.9	6170.9	6263.0	6020.4	5654.7	↓	-2.58%
Elmwood	2096.7	1971.1	2067.6	2059.6	1873.3	↓	-2.30%
Hanover	96029.3	93736.5	93382.6	94557.1	95604.0	↑	1.30%
Harriston	15534.4	15494.6	15598.4	15956.8	16042.8	↑	0.47%
Kincardine	75698.1	71231.8	74219.0	74824.2	71375.7	↓	-0.76%
Lucknow	11199.8	10706.3	11209.6	11336.9	10863.5	↓	-0.50%
Mildmay	9833.8	9481.2	9416.2	9273.4	8748.6	↓	-2.25%
Neustadt	4653.0	4434.7	4624.4	4751.5	4524.1	→	0.05%
Palmerston: Mtr 1 & Mtr 2	19277.4	19281.3	20626.9	21060.2	21147.8	↑	1.61%
Palmerston: Mtr 3	19362.4	20297.2	23605.3	24371.4	26395.1	↑	4.10%
Port Elgin	71806.6	69429.2	69394.0	68825.7	66363.2	↓	-1.67%
Ripley	6001.6	5558.1	5873.3	5919.1	5576.2	↓	-1.24%
Southampton: MS #1	11652.4	11268.9	11742.5	11680.7	11028.6	↓	-1.49%
Southampton: MS #2	15538.5	14878.4	15033.2	15201.9	14657.3	↓	-1.17%
Southampton: MS #3	5743.2	5333.3	5365.7	5431.3	5073.7	↓	-3.12%
Southampton Water Plant	736.8	806.8	786.9	774.2	730.6	↓	-0.76%
Teeswater	7807.0	7635.2	7621.2	6846.4	6612.1	↓	-2.99%
Walkerton	58338.8	59169.0	59242.0	57687.4	59037.0	↓	-0.72%
Wingham	27879.5	27310.2	28046.4	27934.3	26968.2	↓	-1.06%

The above Table 7 shows energy consumption trends over the last five years. As can be seen, energy consumption in general has dropped in most communities but not by a significant amount. The upward trend in electrical demand of Table 7 above tends to be weather driven based on the winter heating requirement.

4.2 Network Configuration

Westario is connected to the Ontario power transmission grid at four transformer stations which are owned by Hydro One Networks Inc. (HONI). Westario customers are supplied via seven 44kv feeder circuits which feed 27 Westario-owned sub-stations. Within the service territory of Westario, there are also multiple customer-owned distribution stations fed from the 44KV circuits.

4.3 Assets by Category

Westario has the following major assets:

Table 8 (as of October 2016)

Asset Group	Asset Class	Population
Substation	Power Transformers	31
	5/15kV Circuit breakers	49
	28kV/15kV Reclosers (3 Phase)	26
	Protective relays	53
	MV Switchgear assemblies	9
	HV Switchgear assemblies (44kV)	1
	Buildings	27
	MV Primary Cables	n/a
	HV Primary Cables (44kV)	n/a
Distribution (Overhead and Underground)	Distribution poles (Wood)	6674
	Distribution poles (Steel)	1547
	Distribution poles (Concrete)	11
	Distribution poles (Other)	2290
	Total distribution poles	10522
	Cross arms	n/a
	Pole mounted transformers	1935
	Pad mounted transformers	1028
	Pole trans	59
	Switches – 3Ph load break	4
	Switches – 3Ph air break	736
	Switches – 1Ph air break	444
	Switches – inline	52
	Switches – Switching cubicles	49.1km
	Protective line relays	N/A
	Line circuit breakers/reclosers	N/A

“n/a” indicates “Not Available”. “N/A” indicates “Not Applicable”

5 Managing the Existing Assets

Electricity assets, like any other type of physical asset, have a lifecycle. This section describes how Westario assets are managed over their entire lifecycle from conception to retirement.

5.1 Maintenance Planning

Westario manages assets with the intent of providing a safe, efficient, reliable, and cost-effective electricity distribution system.

For example, distribution transformers are manufactured with the intent that there is no need to provide regular maintenance (maintenance-free) for the duration of their lifecycle. Generally speaking, they remain in service providing continuous service until they reach the end of their lifecycle. Westario current practice is to identify, through inspection and data analysis, those transformers that are approaching end of life with an intention of replacing prior to failure.

Some distribution assets remain in service, delivering electricity with little required maintenance. However, a small percentage of distribution assets, such as substation equipment and transformers, do require regular maintenance. Substation transformers generally supply many hundreds or thousands of customers, and a failure would likely result in a lengthy outage and a significant number of resources to replace the failed unit. This maintenance involves regular condition testing which highlights or identifies possible problems.

The inspection and maintenance of distribution assets is detailed in Westario's "Distribution System Inspection under Ontario Regulation 22/04" attached as Appendix G. The document is continuously being updated with new information upon which maintenance or inspections of equipment are based, and has been converted to a GIS application. Maintenance standards in the program are built upon manufacturer's recommendations, industry regulatory requirements, industry best practices, and Westario's own experience with performing the maintenance or inspection. This document clearly describes the geographic area and frequency of programs, the specifications or standards for the work, who is responsible to carry out specific actions, the accounting job numbers associated with the work, and the forms necessary to document the field work.

The strategy behind this program was based on the fact that for the most part minimal maintenance had been performed or documented for the majority of distribution assets. The initial intent of the program is to provide base knowledge to provide enough information to make informed decisions on future maintenance. Initial intervals for maintenance may be changed based on actual experience with field data collected. For example, most of the maintenance forms have the following questions, which are required to be filled out by the maintainer:

Appendix D
Patrol Deficiency Record

Town _____	Date: _____
Circuit _____	Patrolled By _____
Grid _____	Page: _____ of _____

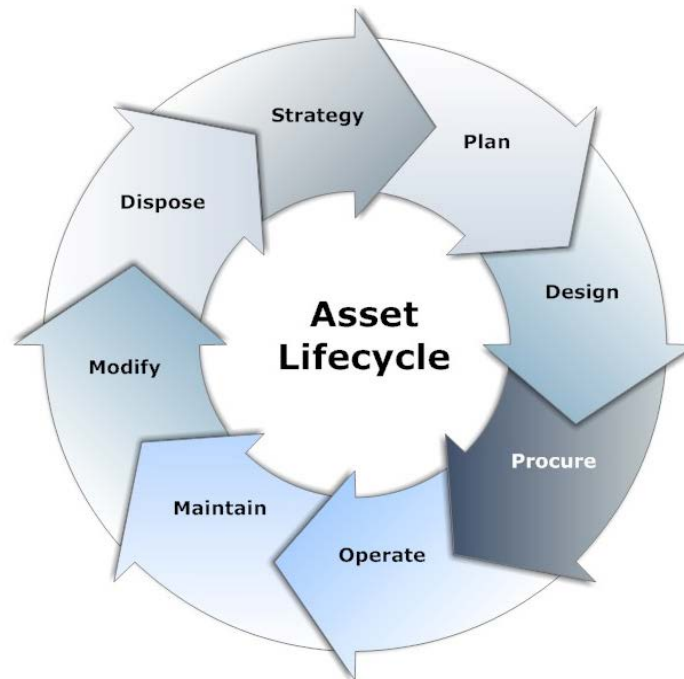
Location	Equipment No.	Equipment Type	Describe Problem	Severity			Repair Work Order	Date repair completed
				High	Med	Low		
				☐	☐	☐		
				☐	☐	☐		

This process will allow Westario to collect information and base future intervals on the actual existing condition of the asset. In this way, the cost to perform maintenance can be optimized. The data collected from the maintenance provides valuable information upon which to base repair work, refurbishment activities and asset replacement schedules.

In addition to actual asset maintenance a number of programs exist to enhance the reliability of the assets or to identify problems with assets. These programs are as follows:

- Pole Testing – A scientific-based pole testing program is starting in 2016 on a town-by-town basis, and on a three-year rotation. This, along with a detailed assessment of the amount and voltage of the wire on the pole and the number of customers affected by a failure, will allow setting the priority of replacements among these older poles.
- Line Clearing and Tree Trimming – Tree contacts are a major cause of distribution system outages and momentary interruptions for Westario customers. Westario has a regular line clearing and tree trimming maintenance program. This program cycles through the service territory on a three-year basis. In 2011, the program was changed to an area by area program. Currently the schedule is to complete each area at least once in a three-year period subject to change based on conditions found. (The tree trimming program can be found in Appendix H.)

5.2 Understanding Asset Lifecycles



Definition of **Key** Lifecycle Activities that impact the AMP:

Table 9

Activity	Detailed Definition
Strategy/Planning and Procurement	Cost Replacement • Estimate replacement costs of key elements (structure, services, equipment, furniture) • Estimate replacement costs using life spans • Prepare annualized costs and rates Recurrent Costs • Identify energy costs • Identify maintenance costs and rates Identify Operating Budget • Annual Maintenance, Periodic, Life Cycle, Recurrent • Management and Administration Prepare plans and financial analysis for maintenance of life cycle items

Operations	Involves changing the design parameters of an asset such as changes in circuit configuration or setting a tap setting on a transformer. Does not involve a physical change to the asset. Line clearing of trees is an operations activity.
Maintenance	Involves replacing consumable components on asset assemblies but not the whole assembly. Generally, these sub components wear out before the whole assembly fails. For example, an insulator on a pole assembly or an arc snuffer/muffler on a gang operated load break switch.
Sustainment/Modify	Involves replacing assets in terms of the assets listed under asset categories. For example, replacing a pole in a pole line.
Disposal/Retirement	Removes an asset from the distribution system. For example, removing a redundant pole line from service. By definition retirement would be a reduction in the distribution system footprint.

5.3 Operating the Assets

Operational activities generally arise in dealing with distribution system issues when assets are not operating as normal. For example, a number of triggers exist as follows:

- Voltage levels are too high or too low – outside of Canadian Standards Association Voltage Variation Limits for circuits up to 1000V under “Normal Operating and Extreme Operating Conditions”;
- Fault current exceeds thresholds on protective devices such as reclosers, fuses, and breakers;
- Demand exceeds thresholds on protective devices and or the asset’s current carrying capacity
- Customer concerns about the quality or reliability of electricity being supplied to them

5.4 Maintaining the Assets

As stated above, maintenance is primarily about replacing consumable components of assets. Components wear out in a number of ways including oxidation, pitting or erosion of contact

surfaces, material rot, gasket degradation, pitting of insulators, etc. Continued operations of devices which clearly exhibit component degradation will eventually lead to a failure in the distribution system. What leads to failure is a complex interaction of parameters such as quality of manufacture, quality of installation, age, operating hours, number of operations, loading cycles, stress due to fault events, ambient temperature, contaminants, and the maintenance performed during the life of the asset.

6 Sustaining Existing Assets

6.1 Assets by Category

Westario's distribution assets are grouped as follows:

- Municipal Substations
- Pole Mounted Transformers
- Pad Mounted Transformers – separated into single and three phase units
- Poles
- Gang Operated Overhead Switches
- Pad Mounted Switchgear
- Underground Cable
- Meters
- General Assets
 - o Fleet
 - o Office Buildings

6.2 Asset Condition Assessment

Westario's current asset management strategy came into effect in 2001 when Westario inherited assets from eight separate utilities. Prior to the merger, Westario engaged the services of Elecsar Engineering and Pollutech Geoenvironmental Limited to perform a Health and Safety and Operational Audit of Saugeen Shores, Hanover, Kincardine, South Bruce, Huron-Kinloss and Wingham Electric Systems, Brockton (Walkerton, Elmwood) and Minto (Palmerston, Harrison, Clifford). The conditions of the inherited distribution systems in many communities were poor to fair. While some former utilities had made reasonable investments in their systems, the majority took a reactive approach rather than a proactive approach to

maintaining their assets. Smaller communities are often subject to local pressures to keep rates down and therefore preventative type investments in capital and maintenance are often put on the backburner.

Westario has recently completed an assessment on assets to meet the IFRS accounting standards. In its analysis, Westario utilized the Kinectrics Inc. Report number K-418033-RA-001-R000 dated July 8, 2010 titled “Asset Depreciation Study for the Ontario Energy Board” (available online) to assist with the determination of the useful lives of its assets. With each of the asset categories, a typical useful life (TUL) has been determined and this life has been utilized to extrapolate the replacement of assets into the future over the next five-year horizon.

In 2015, Costello Utility Consultants performed another Asset Condition Assessment (ACA) based on the data available in the Westario databases and spreadsheets. This ACA (Appendix D) provided a Health Index for all asset classes where data was available.

6.3 Asset Maintenance Strategies

6.3.1 Municipal Substation

6.3.1.1 Condition Assessment

There are currently 27 municipal substations and one mobile substation, with a total of 31 transformers within Westario’s territory. All substation transformers undergo quarterly gas and oil analysis, monthly visual checks, as well as quarterly inspections by third party contractors.

6.3.1.2 Westario Sustainment Strategy

Westario’s sustainment strategy is predicated on the following factors:

- The average age of Westario’s substations is 31 years, with substations ranging from 17 – 51 years old. Eighteen of the 27 substations are greater than 30 years old and will reach the typical useful life (TUL) of 45 years for power transformers within the next 15 years;
- Testing of substation transformer oil is a very good predictor of when a transformer is reaching the end of its life. Regular testing allows time to make decisions about transformer replacement, and capital investment is, therefore, based on a proactive approach. Westario also performs monthly inspections and hires a contractor for quarterly inspections to identify any emerging deficiencies;

- The mobile substation is intended to serve as a backup for any station in the system if necessary.

These factors have led Westario to adopt the following strategy:

- Thorough analysis and reporting of the inspection results and close monitoring of older substations;
- Westario's capital budget process will include projects that upgrade or replace aging transformers and substation equipment at a rate of one substation per year.

6.3.2 Pole Mounted Transformers

6.3.2.1 Results of Asset Evaluation

Pole mounted transformers, as a whole, constitute a very large asset base. The age (and condition) of transformers is spread over a broad range, from 1961 to 2016, with an average age of 26 years old. Westario has used a TUL of 40 years for pole mounted transformers. When 40 years are added to the age distribution, the number of potential replacements at end of life can be forecasted. This projection revealed 609 transformers that have met or exceeded the 40-year-old TUL criteria. Westario proposes to replace pole mount transformers on a prioritized basis at a rate of 30 units per year. Priority replacement will be reviewed on the basis of the safety risk and potential impact to the customer reliability indices.

6.3.2.2 Westario's Sustainment Strategy

Westario's sustainment strategy is predicated on the following factors:

- The distribution transformer requires no maintenance;
- The outage impact of an individual transformer failure is limited to a very small number of customers and in some cases, due to the low-density nature of parts of the service territory, only one customer is involved.

These factors have led Westario to adopt the following strategy:

- Determine the number of customers connected to each unit and use this to prioritize replacements based on the possible reliability impact
- Inspect and monitor condition;
- Replace when conditions dictate - such as cracked bushings, leaking oil, etc.;
- Replace prior to failure, on a proactive basis;
- Closely monitor the number of failures occurring between 2012 and 2022; if failure rates indicate an increasing trend, change strategy to a preplanned replacement program to minimize the financial and operational effects on the large number of transformer replacements that could potentially occur between 2017 and 2022.

6.3.3 Pad Mounted Transformers

6.3.3.1 Results of Asset Evaluation

Pad mounted transformers also make up a large asset base. This category includes both single phase and three phase pad mounted transformers. There are currently 979 pad mounted transformers in service. The age of these transformers is spread over a broad range from 1961 to 2016 with an average age of 25 years old. Westario has used a TUL of 30 years for pad mounted transformers. When 30 years are added to the age distribution, the number of potential replacements at end of life can be forecasted. This projection revealed 68 transformers that have met the 30-year-old TUL criteria in the year 2022. This quantity of transformers has been averaged and spread over the plan period and beyond: Westario will replace ten pad mounted transformers each year of the plan.

6.3.3.2 Westario's Sustainment Strategy

Westario's sustainment strategy is predicated on the following factors:

- Pad mounted distribution transformers require very little maintenance. Maintenance is generally confined to replacing faded warning labels and potentially painting the units;
- The outage impact of an individual single phase pad mounted transformer failure is limited to usually 10-12 customers; the outage impact of an individual three phase pad mounted transformer failure is limited to one service site, either commercial or industrial.

These factors have led Westario to adopt the following strategy:

- Inspect and monitor condition;
- Replace when conditions dictate - such as rusted tanks and frames, cracked bushings, leaking oil, etc.;
- Replace prior to failure, on a proactive basis;
- Continue with the preplanned ten transformer replacements per year that warrant replacements as established from yearly inspections. If inspections reveal that transformer conditions are worsening, increase the number of transformer replacements per year as required.

6.3.4 Poles

6.3.4.1 Results of Asset Evaluation

Poles comprise the largest number of assets, by far, within the distribution system. The age and condition of poles covers the full range of possibilities from newly installed to 74 years of age. The recently completed Asset Condition Assessment flagged a large group of poles that are at or beyond their TUL. Previously, Westario had adopted a TUL of 50 years for poles. To support this decision, Westario plans to undertake a scientific-based pole testing program on the oldest group of poles in their system over a three-year period. This quantitative testing, along with the customer connection information being collected through the GIS project, will confirm the condition of this group of poles and allow Westario to adjust their plans for proactive pole replacements based on the condition and the potential impact to system reliability.

Westario plans to replace up to 100 decrepit poles per year from 2017 to 2020, increasing to approximately 150 poles for 2021 and beyond, pending results of pole testing.

6.3.4.2 Westario's Sustainment Strategy

Westario's sustainment strategy is predicated on the following factors:

- The life expectancy of poles ranges from 35-75 years and condition is affected by many factors such as weather, soil condition and structural loading;

- Westario's inspection procedure is regulated by the OEB. Poles will be inspected and tested on a three-year cycle to trend their remaining strength. Their condition is therefore, readily known at regular intervals allowing time for budgeting and replacement before they fail and cause an emergency response;
- A pole failure (depending on its function) can be a significant risk as the results of a failure could injure the public and result in lengthy interruptions in service to a widespread area and a large number of customers;
- Westario will also take the liberty of changing poles when it makes good business sense to do so. For example, if a pole mounted transformer is in need of replacement and the pole shows early signs of aging, Westario may decide to replace the pole before it has reached its useful life.

These factors have led Westario to adopt the following strategy:

- Inspect and monitor condition;
- Replace when conditions dictate replacement – thus, a proactive replacement basis;
- Continuing with the upgrades to the distribution system will eliminate a substantial amount of the older poles from the system;
- Continue with the preplanned 100 pole replacements in 2017, with an increase to 150 replacements per year expected in 2021. If inspections reveal that pole conditions are worsening, increase the number of pole replacements per year as required.

6.3.5 Smart Meters

6.3.5.1 Results of Asset Evaluation

Smart meters represent a large portion of Westario's distribution system. Smart meters were installed between 2009 and 2011 when the provincial government mandated the replacement of the electromechanical billing meters with the new smart meter and Advanced Meter Infrastructure ("AMI") two-way communication system.

Meter re-verifications are required due to regulations under the Electricity and Gas Inspection Act enforced by Measurement Canada to ensure that all revenue meters meet strict accuracy and

operational standards over the life of the meter. The process of removing and testing the meter is referred to as re-verification. Although meter re-verifications are not, as of yet, required on smart meters, all will be due for re-verification in 2019. Since typical meter re-verification can take up to one week, Westario must install a replacement smart meter on the premises. Once the meter comes back from evaluation, it is then used as a replacement at another location. On average, Westario replaces 900 meters in their system annually, however the rate of meter failures that have been experienced are concerning. The reasons for the failure of these units has been discussed with the manufacturers, but to date has not provided any explanation or cause.

6.3.5.2 Westario's Sustainment Strategy

Westario's sustainment strategy is predicated on the following factors:

- The TUL expectancy of smart meters is determined to be fifteen years however, Westario is finding that smart meters tend to break easily and more often than traditional meters;
- Westario intends to use an external company to perform statistical testing of a population of meters that will allow the extension of the life of the meters;
- When a smart meter fails, replacement must take place as soon as possible to minimize the time that customer energy consumption data is lost. Such a failure does not typically involve a significant risk since it mainly affects a single customer;
- Westario may decide to replace the smart meter before it reaches its useful life if it makes good business sense.

6.3.6 Fleet

6.3.6.1 Results of Asset Evaluation

This sub-category involves the purchase in three vehicle classifications: heavy duty; light/medium and miscellaneous. A vehicle is considered for replacement based on an expected life. Westario has established an expected life for each class of vehicle. Replacement is determined by achieving years of use, mileage or hours of use as per manufacturers' recommendations for replacement.

This expected life replacement approach is in keeping with industry practice and is important to assist Westario's ability to forecast vehicle spending, assist Westario in achieving a lower risk of catastrophic vehicle failure and enhancing Westario's ability to negotiate long term procurement contracts with vendors and realize savings.

Westario has nine (9) heavy duty units including derricks and diggers for work on distribution lines.

Westario has ten (10) light/medium units such as pickups and automobiles used across the organization by various roles such as line superintendent, line supervisors, lead-hand, engineering technicians, customer service representatives, etc.

Westario has nineteen (19) miscellaneous units including pole trailers, general use trailers, tension machines, forklifts, and a mobile substation. These units are either used to move material around or assist in the distribution line work.

Shown below are tables showing the age of Westario's fleet by category.

Heavy Duty Units

Type	Year	Make	Model
Dump Truck	1999	GMC	8500
Dump Truck	2006	Ford	F350
Single Bucket	2005	Freightliner	M2
Single Bucket	2006	Freightliner	M2
Single Bucket	2007	International	7400
Single Bucket	2010	Freightliner	M2
Line/Boom Truck	2011	Freightliner	M2
Double Bucket	2012	Freightliner	FM2
RBD/Digger	2014	Freightliner	M2-106

Light/Medium Units

Type	Year	Make	Model
Car	2009	Toyota	Matrix
Pick Up - 4x4	2008	Toyota	Tundra
Pick Up - 4x4	2008	Toyota	Tundra
Pick Up - 4x4	2010	Ford	F150
Pick Up - 4x4	2011	Chevrolet	SIL
Pick Up - 4x4	2014	Chevrolet	Silverado
Pick Up - 4x4	2015	Chevrolet	Silverado
Van	2016	Dodge	Grand Caravan
Pick Up - 4x4	2016	Chevrolet	Silverado 2500H
Pick Up - 4x4	2016	Chevrolet	Silverado 2500H

Misc. Units

Type	Year	Make	Model
Puller	1993	Frieburger	
Tensioner	1999	Frieburger	
Dump	2005	JDJ	
Pole	1991	Frieburger	
Dump	1996	JDJ	
Chipper	2008	Bandit	250XP
Lawn Tractor	2008	John Deere	X320
Chipper	2007	Altec	DC 1217HP
Forklift	2009	JCB	930
Job Trailer	2010	USCG	Trail'n Sport
Pole Trailer	2012	PTB	141-15KE
Pole Trailer	2013	PTB	
Cargo Trailer	2014	Stealth	LT7
Tensioner Trailer	2014	TSC International	DPT 30B
Single Reel Trailer	2014	Brooks	STRT 7106-7KE
Tensioner Trailer	2015	TSC International	DPT 30B
Single Reel Trailer	2015	Brooks	STRT 7106-7KE
Substation Recovery Trailer	2016	Sauber	
Mobile Utility Substation	2016		

6.3.6.2 Westario's Sustainment Strategy

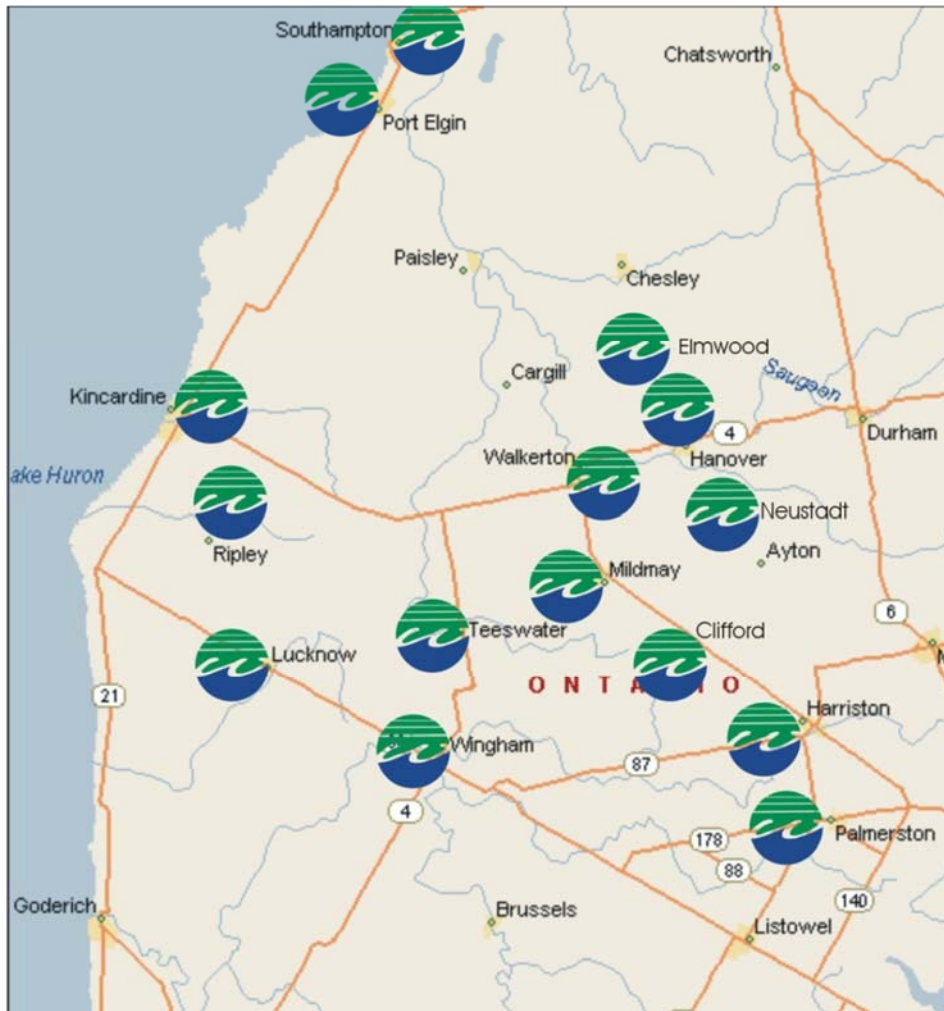
Westario's sustainment strategy is predicated on the following factors:

- Vehicles categorized as heavy-duty are essential to the day-to-day operation of the utility;
- Due to the large service territory that requires a drive time of up to an hour, Westario's vehicle utilization tends to be high in comparison to other utilities of similar size;
- Westario's fleet management strategy links in the utility's other strategic priorities and also link in with the utility's environmental aims;
- The operations department, including the vehicle drivers, offers a broad perspective on the strategic direction of fleet management. Regular communication and consultation with these groups of users contribute to the strategy by being well-informed;
- Westario also looks outside the utility to consider the benefits of working with external bodies to provide the most effective and efficient fleet;
- As much as possible, Westario will try to reduce the number and length of journeys by adopting a well-planned and efficient scheduling process. This produces financial savings, reducing the impact on the environment and reducing the risk of accidents.

Appendix A: Asset Cost Summary

Summary of Assets (as at December 31, 2015)			
Category		Original Cost	% of Total
Distribution Stations		\$ 4,706,139	11.8%
Distribution Lines - Overhead		\$17,366,279	43.4%
Distribution Lines - Underground		\$12,161,833	30.4%
Distribution Transformers		\$ 5,740,020	14.4%
Total		\$39,974,271	

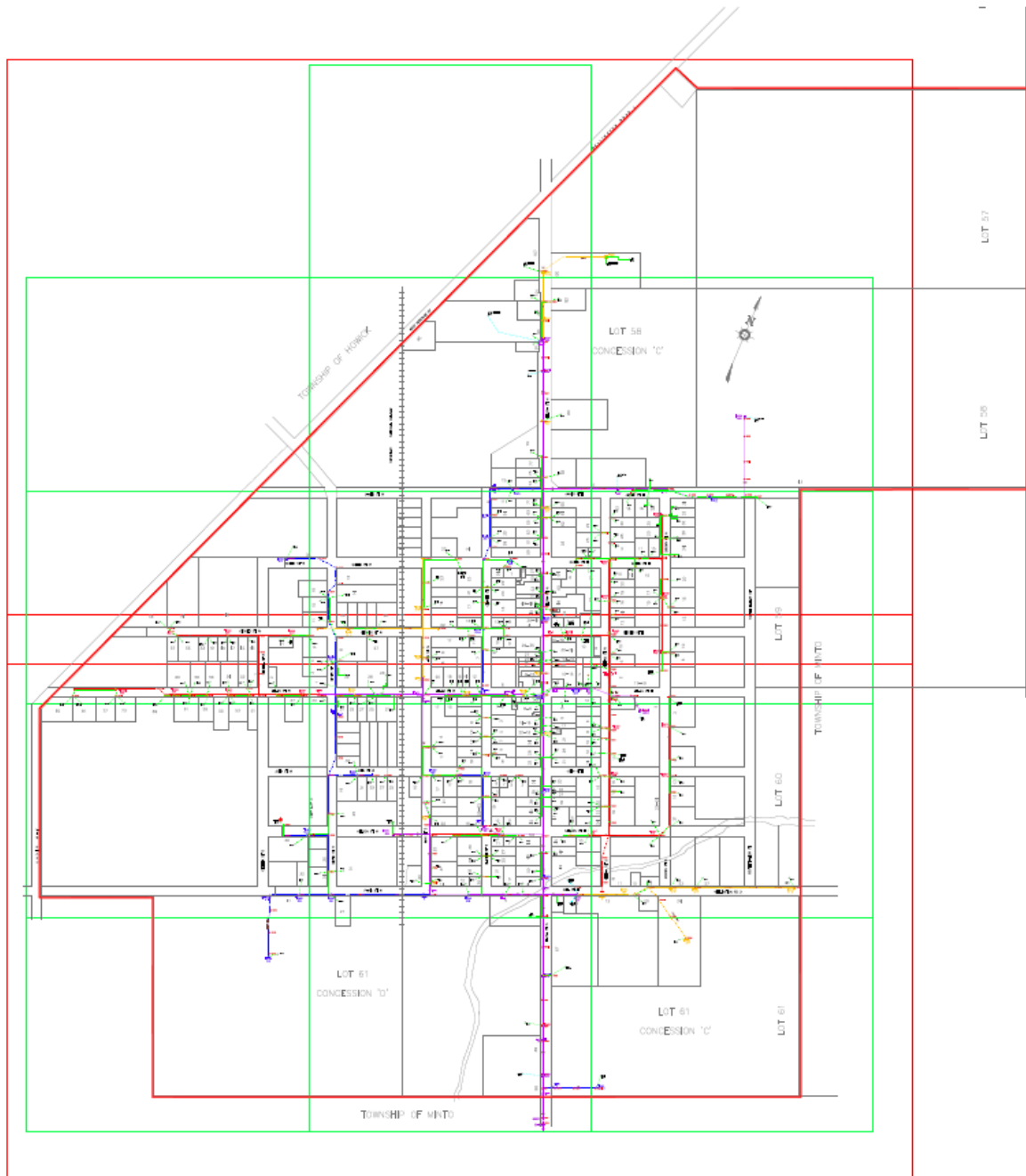
Appendix B: Map of Service Areas



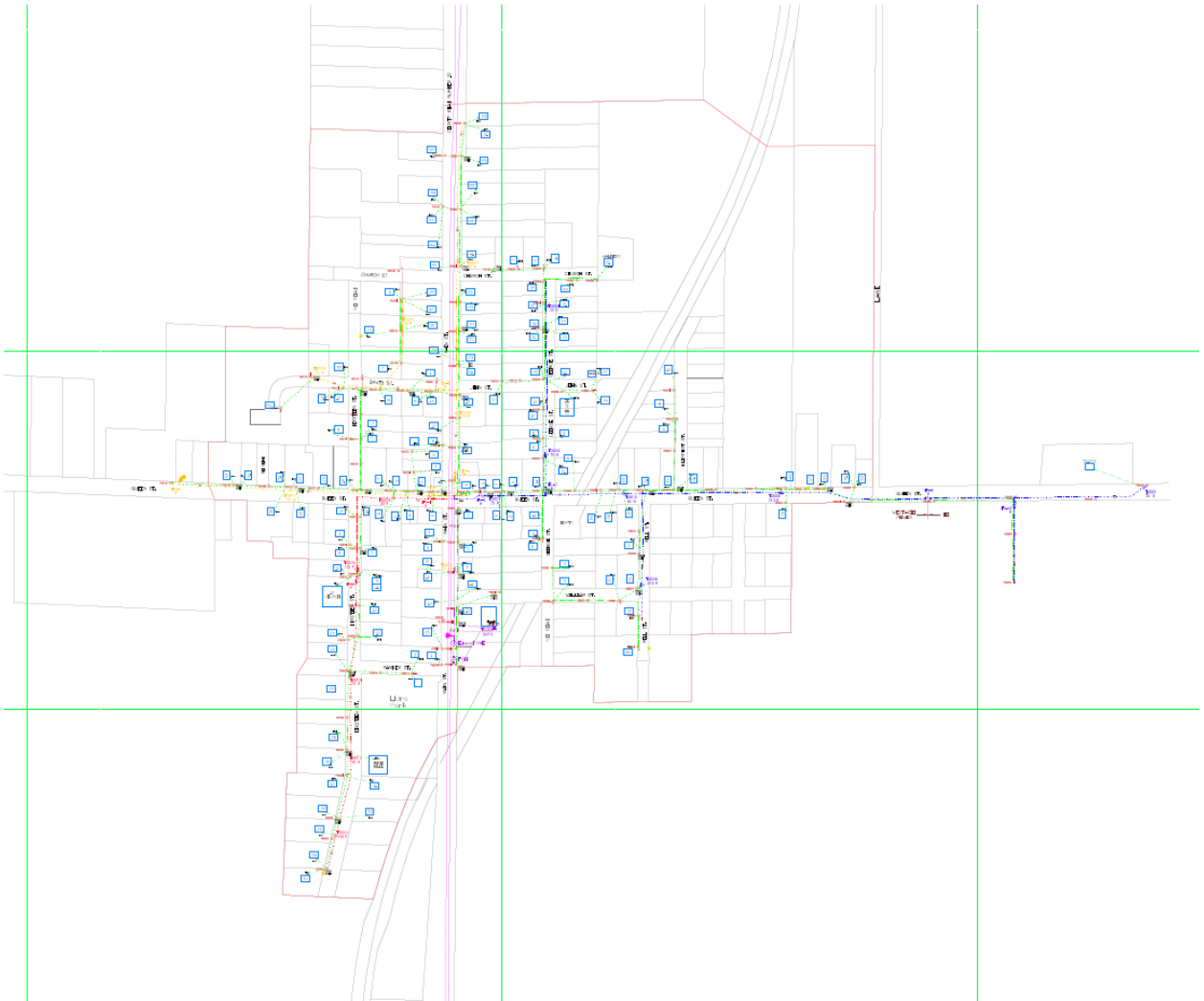
This is a map of the service area of Westario Power, Inc. in the region of southwestern Ontario.

The following is a compilation of maps of each community within Westario's distribution area:

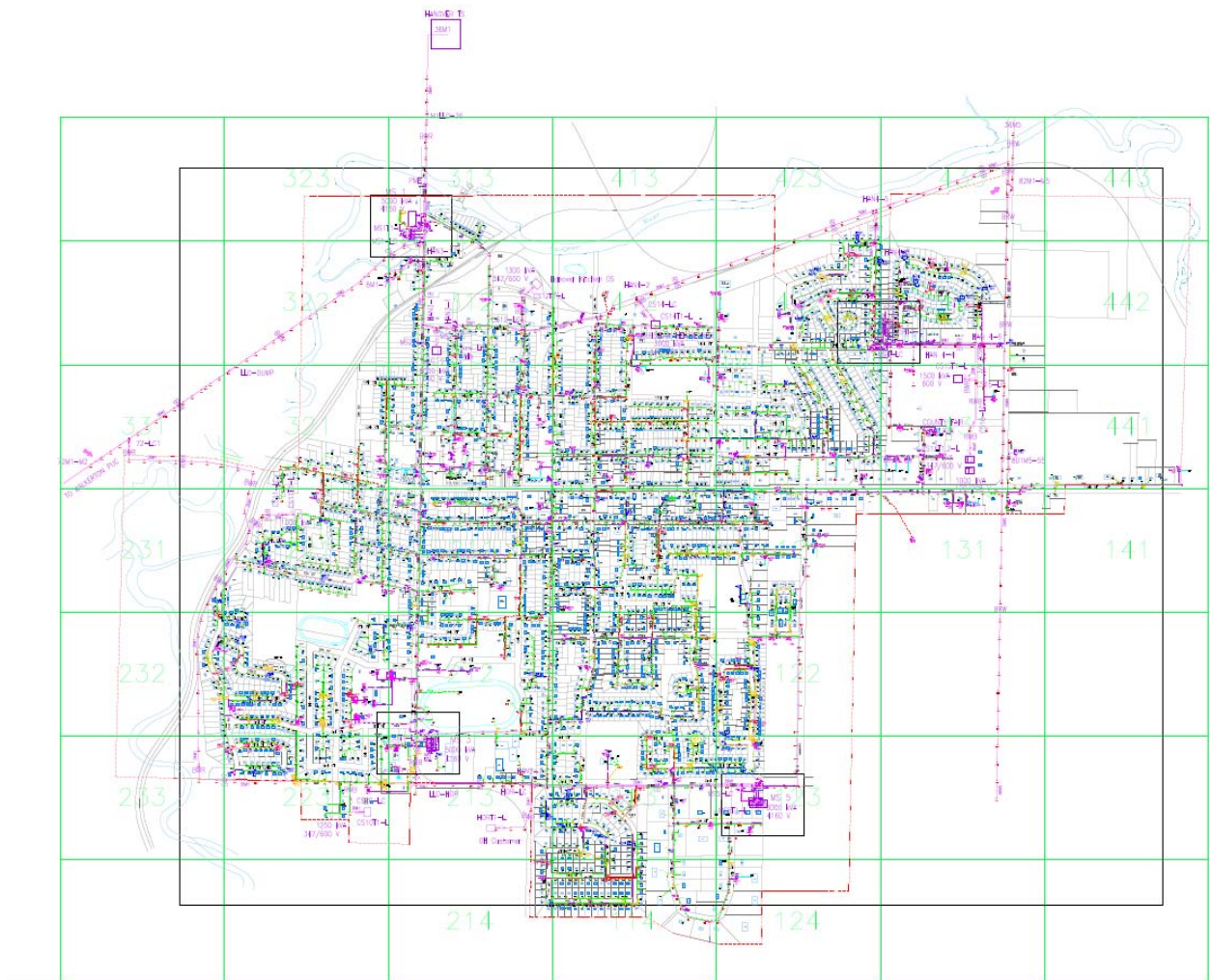
Village of Clifford



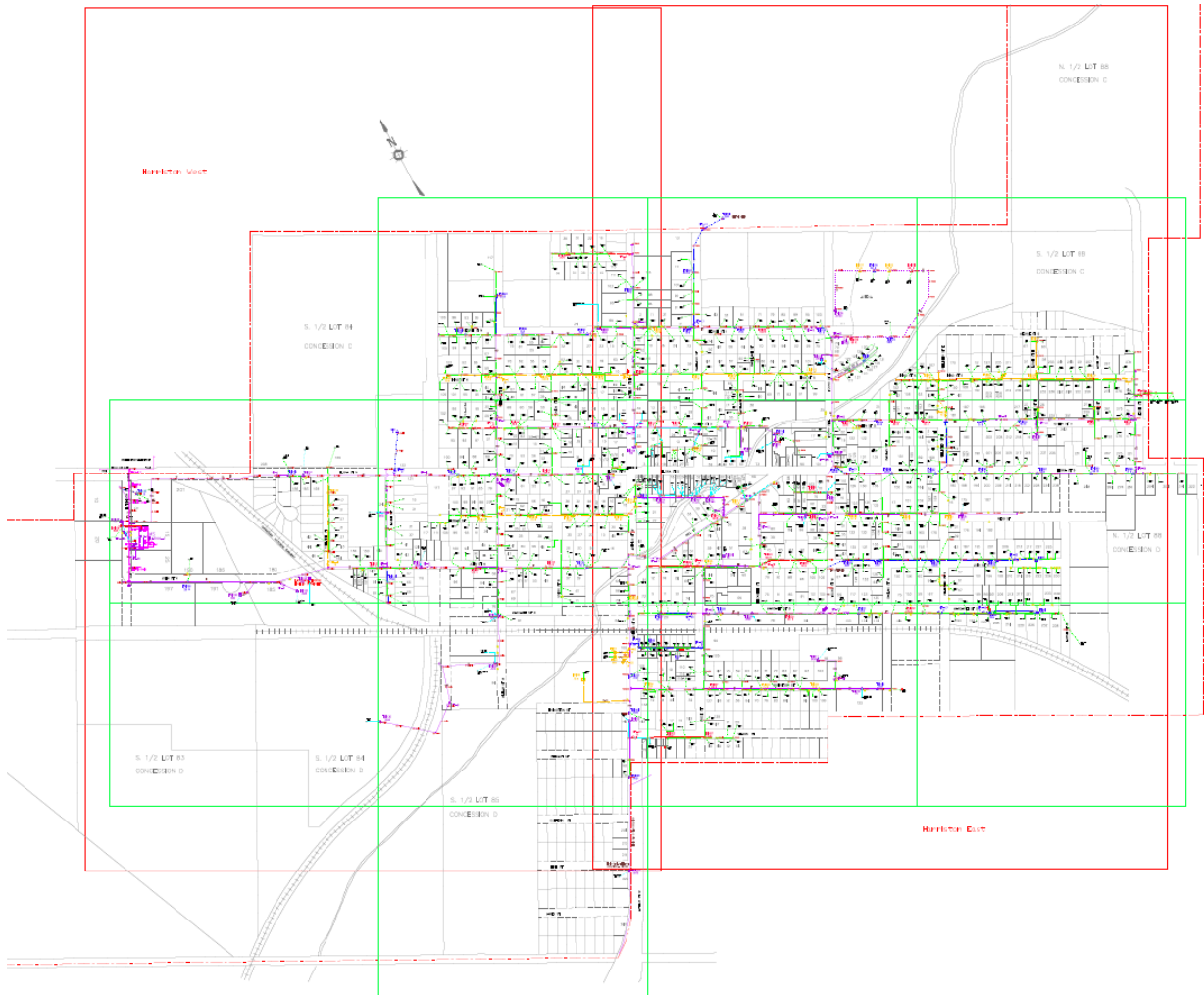
Village of Elmwood



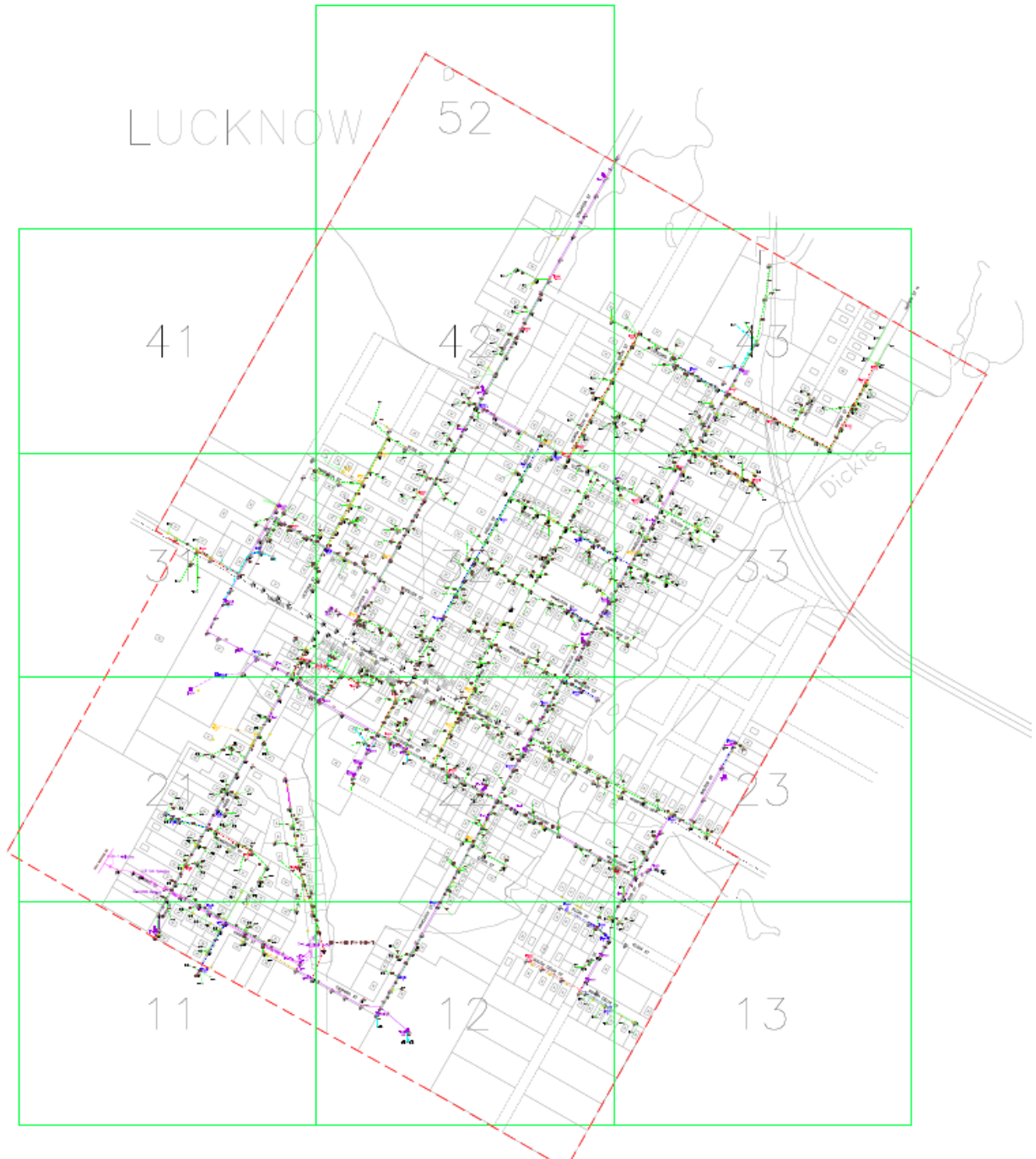
Town of Hanover



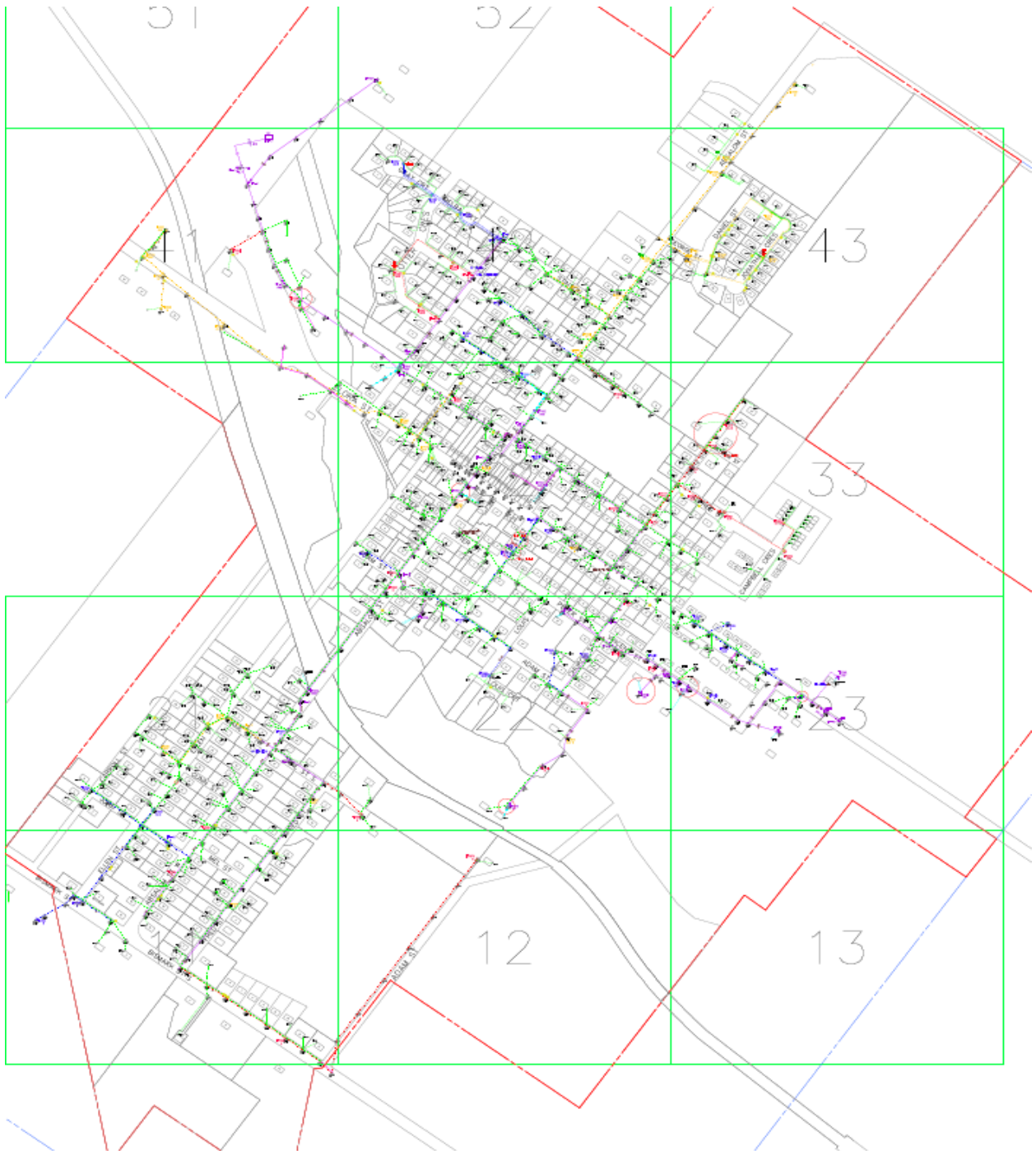
Town of Harriston



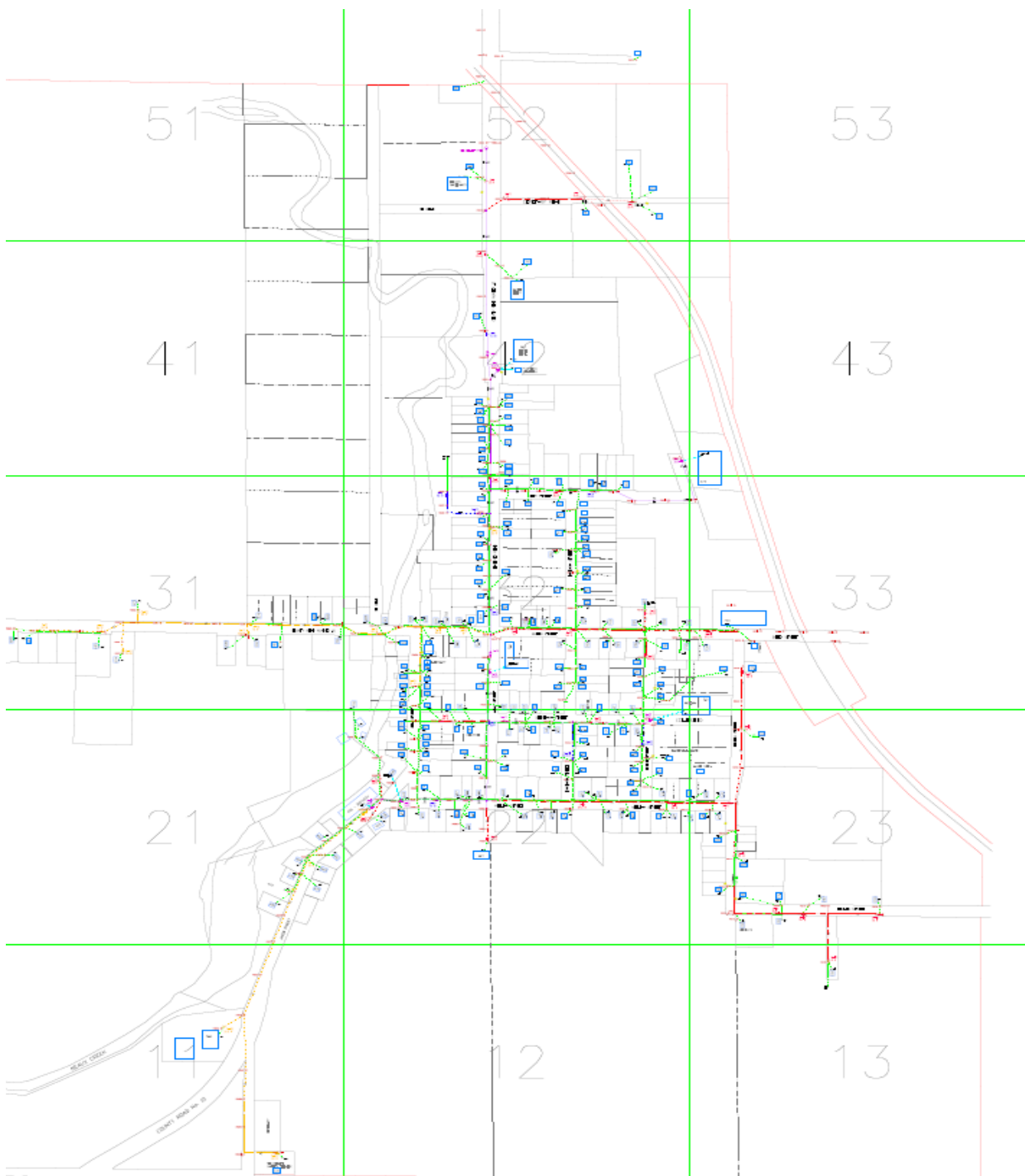
Village of Lucknow



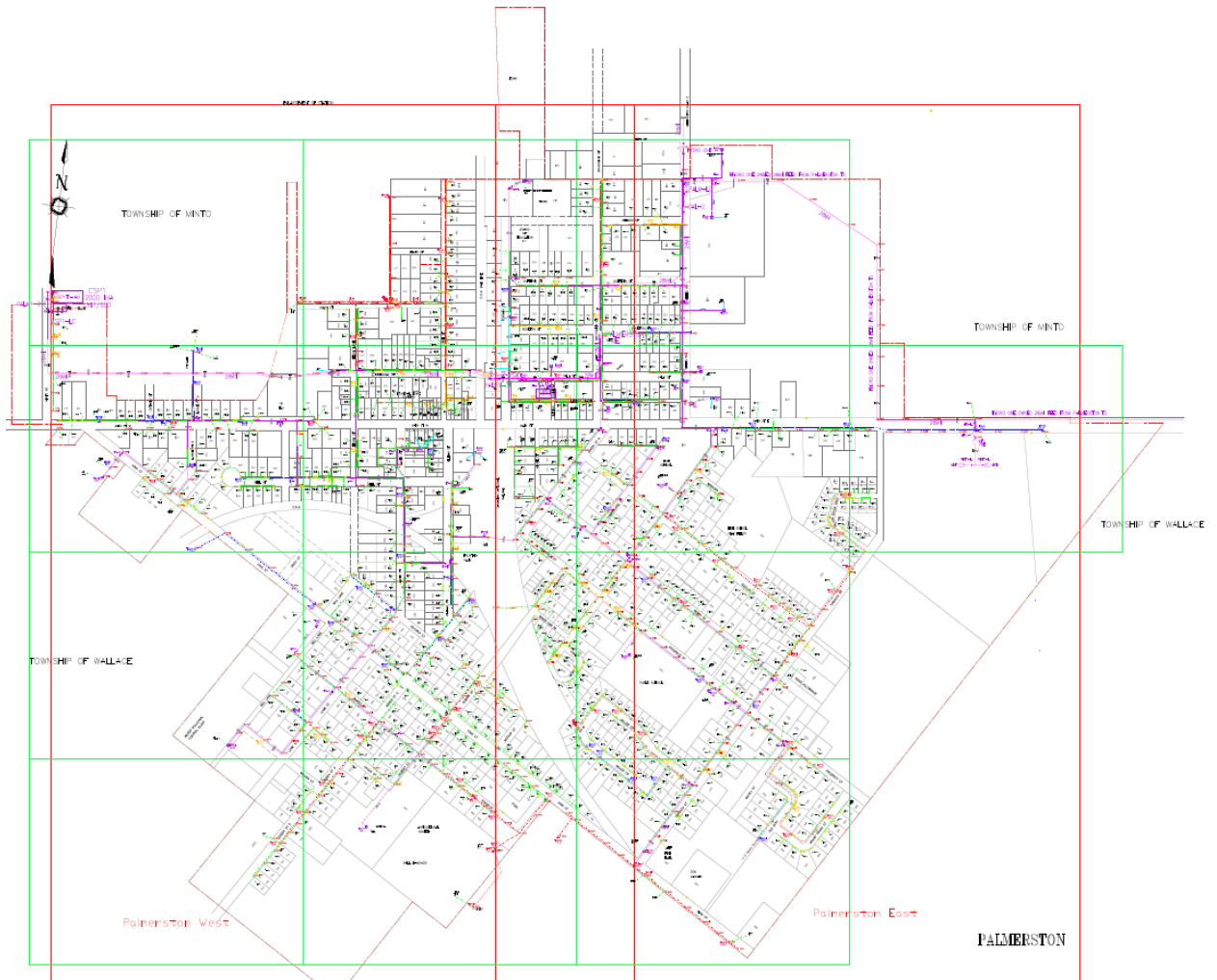
Village of Mildmay



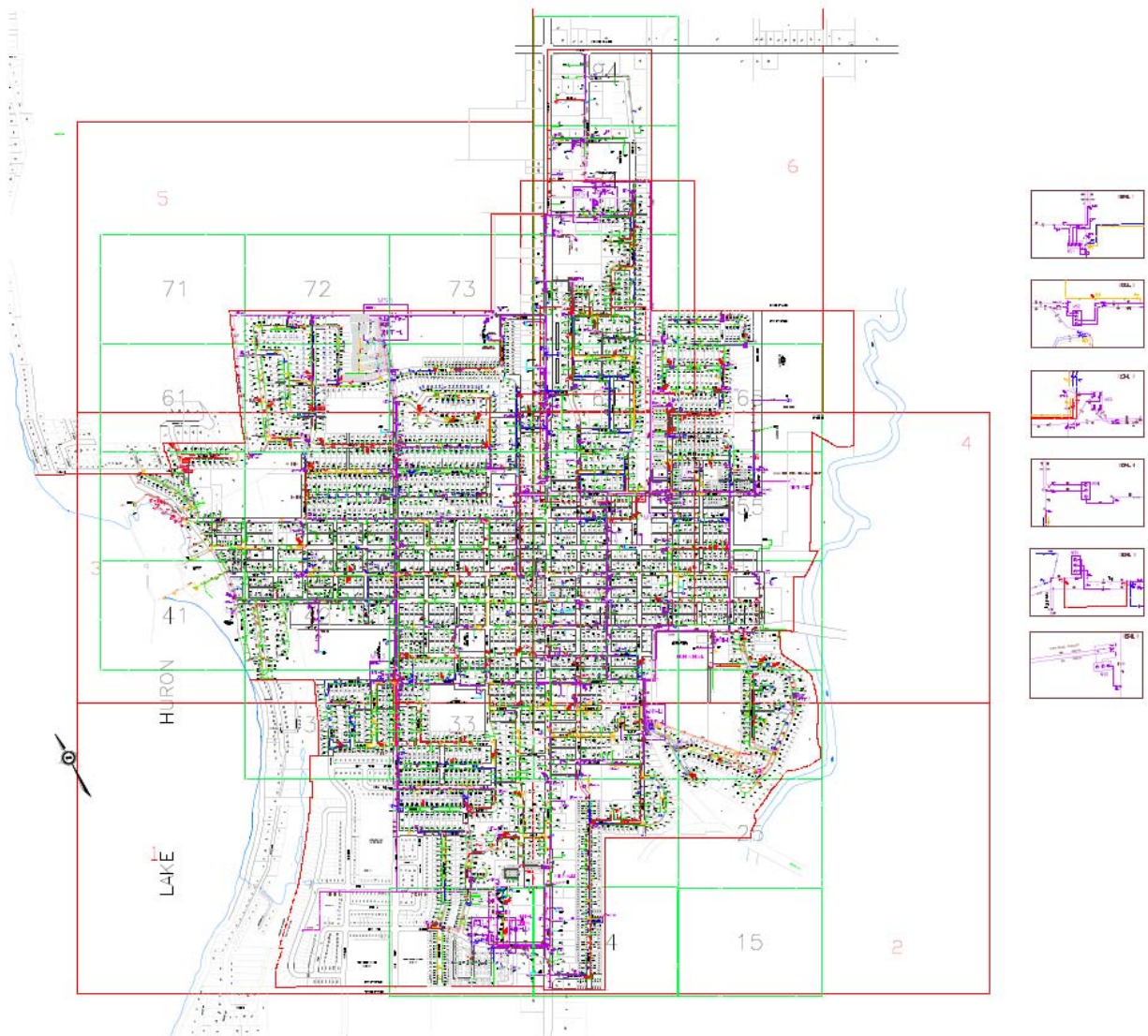
Village of Neustadt



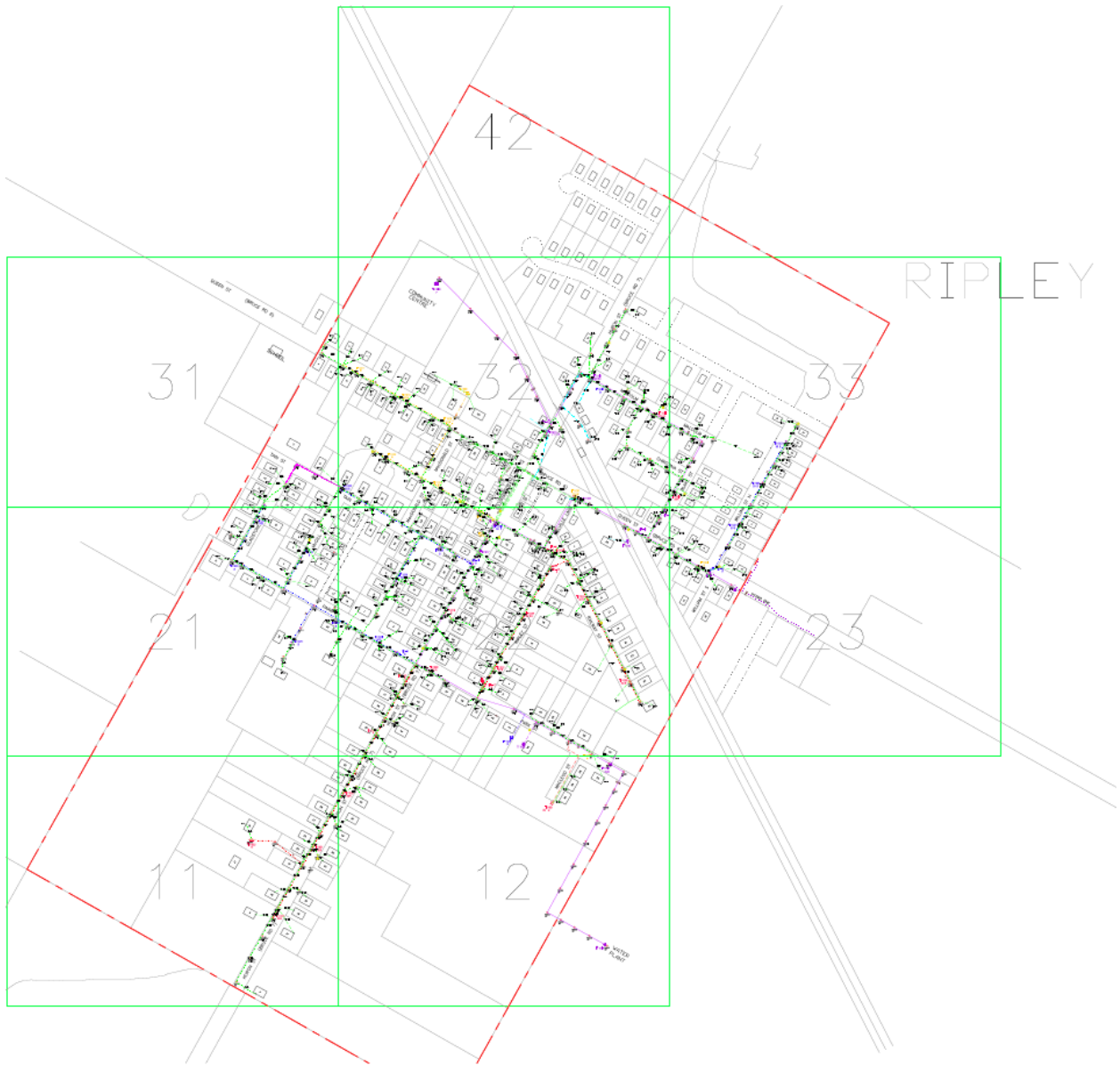
Town of Palmerston



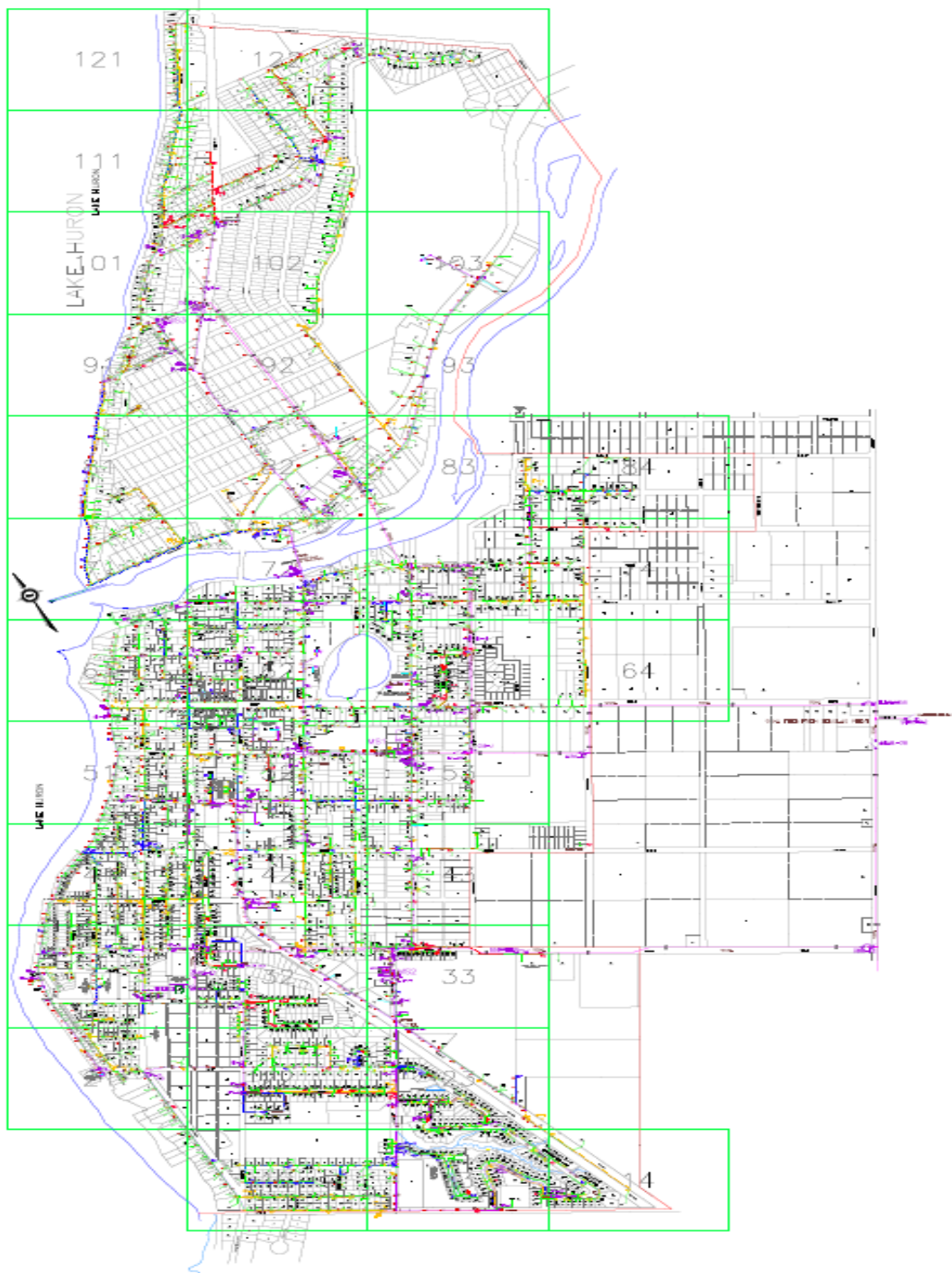
Town of Port Elgin



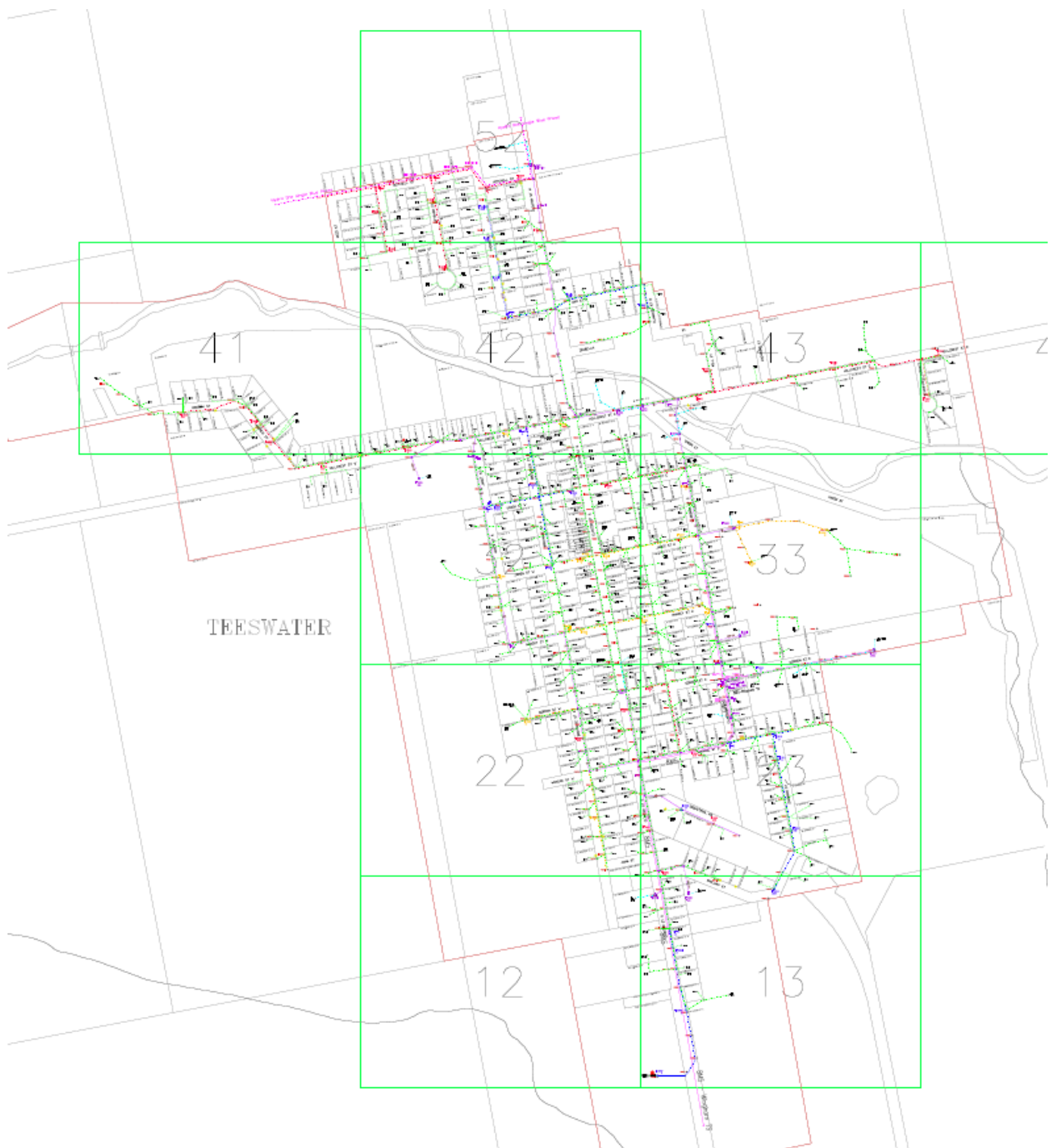
Village of Ripley



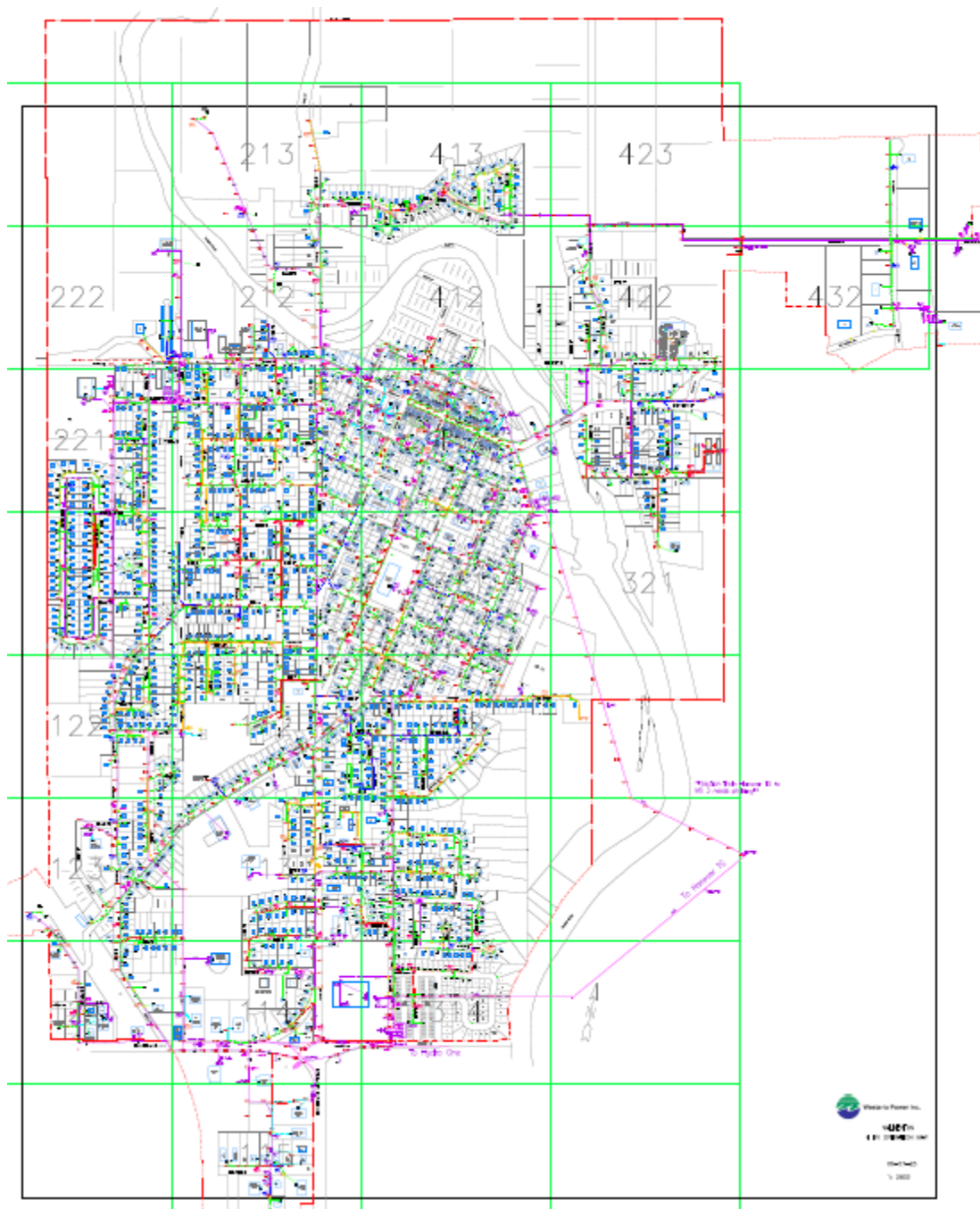
Town of Southampton



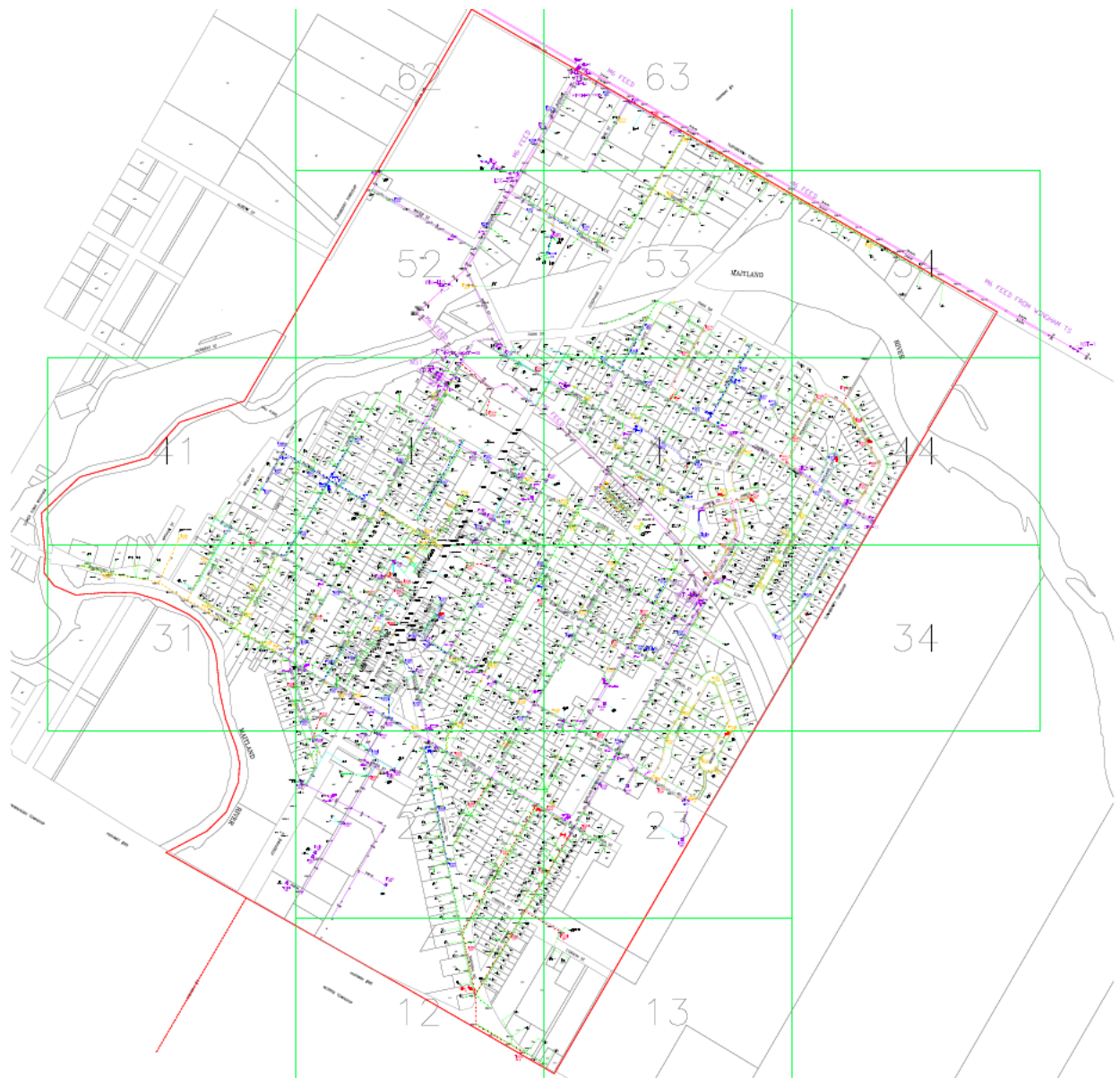
Village of Teeswater



Town of Walkerton



Town of Wingham



Appendix C: Transformer Fleet Inventory

Westario Power Incorporated (Mar 1, 2016)
Transformers Fleet:

Transformers comprise the largest component of Westario Power Inc.'s municipal stations. There are 26 municipal stations, 1 radial customer station and a mobile utility station (MUS). All station transformers operate at a primary sub-transmission voltage level of 44kV with distribution voltages of either: 13.8, 8.32, 4.16 or 0.6 kV.

Transformers; ranked by age, voltage levels and risk condition, are outlined in Table 1.

Table 1: Transformer ranked by Age and Voltage Levels

Transformer Count	Sta.	Age yrs	Primary Voltage (kV)	Secondary Voltage (kV)
1	MUS	0	44	8320Y/4800, 4160Y/2400
2	Pal T1(fut re-wind of a 37 yr old tx)	0	44	4160Y/2400
3	Kinc 1	2	44	4160Y/2400
4	Pal T1(temp T2 pos)	2	44	4160Y/2400
5	Harr T2 (fut refurb)	3	44	13.8Y/8000, 8320Y/4800, 4160Y/2400
6	Walk 1	8	44	4160Y/2400
7	Harr T1	22	44	13.8Y/7967
8	Luck	23	44	8320Y/4800
9	S-hamp 1	23	44	4160Y/2400
10	PE 6	26	44	4160Y/2400 (vector diff)
11	Han 2	29	44	600Delta
12	Kinc 3	32	44	4160Y/2400
13	Han 4	34	44	4160Y/2400
14	Kinc 2	36	44	4160Y/2400
15	Wing 2 (age assumed)	36	44	4160Y/2400
16	S-ham 3	38	44	4160Y/2400
17	PE 4	39	44	4160Y/2400
18	PE 1	39	44	4160Y/2400 (vector diff)
19	S-ham 2	40	44	4160Y/2400
20	Kinc 4	40	44	4160Y/2400
21	PE 3	41	44	4160Y/2400
22	Spare (formerly Kinc 1)	41	44	4160Y/2400
23	PE 2	42	44	4160Y/2400 (vector diff)
24	Han 3	44	44	4160Y/2400
25	Tees	44	44	4160Y/2400, 8320Y/4800
26	Walk 3	44	44	4160Y/2400
27	Walk 2	45	44	4160Y/2400
28	spare (Walkerton SC)	46	44	13.8Y/8000
29	Wing 1 (refurb spare)	46	44	4160Y/2400
30	Han 1	48	44	4160Y/2400
31	Han 5	53	44	4160Y/2400
32	PE 5	53	44	4160Y/2400

The asset strategy for transformers is to mitigate the risk of failures utilizing a pro-active refurbishment or replacement program. Opportunities to integrate transformer replacements with other work required at a municipal station are considered in order to improve work efficiency and minimize customer outages.

Transformer Demographics:

One of the indicators of transformer degradation is age. The age distribution of transformers is shown in Table 1. An expected service life of 50 years for station transformers is considered optimum. Transformers purchased today are not expected to achieve the same service life as those purchased from earlier years. As depicted in Table 1, the average age of the in-service transformer fleet is significant. Currently, two stations of the transformer fleet population are beyond expected service life. Four transformers will be at expected service life in the next 5 years. While not all of these beyond expected service life transformers require immediate replacement, they do pose a higher potential risk to system and customer reliability. Transformers of high risk are prioritized in Table 2 below. The long term management of many transformers reaching their expected service life shortly will require increased funding.

Condition:

The condition of a transformer is one of the leading predictive indicators of its reliability. The internal components degrade as a function of time. Other influencing factors include: transformer loading, switching or lightning surges, moisture contamination, and paper insulation ageing. Degradation of the paper insulation in the transformer windings causes it to lose its tensile strength and excessive moisture trapped in the insulation of the transformer winding can weaken its condition causing premature failures. Since the degradation of transformer insulation is irreversible, refurbishment or replacement is the only viable solution.

A transformer's condition is primarily determined from transformer oil test results by applying industry standard diagnostic testing such as: Dissolved Gas Analysis (DGA) and General Oil Quality (GOQ). Furanic compound testing has been completed for some station transformer. Moisture content is currently not completed on an annual basis for station transformers. Annual moisture content testing is a decisive test indicator of on-going transformer condition. These two tests; furanic compound and moisture content testing should be considered to be part of an on-going testing analysis program. The condition of the transformer bushings, transformer tanks and cooling systems are also assessed during preventive maintenance routines.

The condition of station transformers is continually evaluated based on routine inspections and oil sampling. It is expected more transformers will gradually deteriorate into a high risk of failure category in the next 5 years as the transformer population continues to age. There are also events that can cause damage that are not easily detected and can lead to a rapid deteriorating condition. These events include; electrical failures of components, faults occurring from animal contact or lightning, mechanical failure caused by movement of internal windings, or failures caused by malfunctioning cooling systems. Awareness and reaction to these types of events is critical.

Performance:

Municipal station transformer failures are highly impactful since many municipal customers are supplied by these stations. Service restoration following a transformer failure may include use of the mobile unit substation (MUS) to be temporarily installed while the station unit is replaced to minimize customer interruption which would otherwise be lengthy.

Diagnostic and oil test results have helped to identify transformers in failing condition (e.g., former Kincardine 1); promoting removal of the transformer thereby avoiding major failures. However, it is not possible to eliminate all risks of major failures.

With the approaching bow wave of transformers, at and beyond expected service life, the probability of failure trend is expected to increase over the next 5 years as transformer condition continues to degrade with age.

Replacement of failed transformers takes longer to complete, is more costly, and has more impact to customer supply when compared to replacements under planned situations. These factors, along with the aging demographics and the degrading condition of the transformer population highlight the need to increase the number of transformer refurbishments or replacements in order to maintain an acceptable level of risk.

Other Influencing Factors:

- Municipal stations are primarily located in rural areas and lack redundancy. This configuration can result in lengthy outages to customers supplied from the station in case of transformer failure.
- Environment Canada regulations require all oil-filled equipment to be tested for PCB contamination. Equipment not meeting the requirements must be removed from service by 2025.
- Spill containment systems are required in stations where there is high environmental risk of oil being released from the site, in adherence to the Ministry of Environment's *Environmental Protection Act*. This requirement strategy has been completed at Wingham 1 municipal station.
- Noise complaints from customers dwelling in proximity to municipal stations; where noise levels exceed acceptable limits, must be reduced through either transformer replacements or through the installation of sound barriers in order to be compliant with Ministry of Environment regulations.

Trends and Impacts:

Transformer refurbishment or replacement has begun on a planned annual basis.

Note: Various warning conditions exist for DGA testing (Condition 2, 3 and 4; 4 being the most serious associated with increased risk). For Tables 1 and 2, yellow signifies a condition 3 risk warning, red signifies a condition 4 risk warning.

Currently, as observed from annual DGA testing trends (Table 2); refurbishment ranking are as follows: four transformers are subject to a high risk of failure, ten transformers are demonstrating lesser but increasing failure risk and fifteen are currently at a low failure risk. Increasing DGA trending results are an indication of increase risks. At the rate of two refurbishments or replacement per year combined with any increasing DGA trends, the percentage of transformers beyond their expected service life will increase significantly.

Transformers, ranked by priority age and dissolved gas analysis are outlined in Table 2.

Date	Refurb. Prio.	(Priority)Sta.	Age yrs	H2 Hyd.	CH4 Meth.	C2H4 Ethylene	CO Carbon Mon.	CO2 Carbon Di.	TDCG Total Diss. Comb. Gas
Mar-13	1	Kinc 3				4	1341 (C3)	23556 (C4)	1397 (C2)
Aug-13		"				5	1380 (C3)	25325 (C4)	1442 (C2)
Jan-14		"				5	1276 (C3)	21914 (C4)	1336 (C2)
Sep-15		"	32			6	1399(C3)	31458(C4)	1472(C2)
Mar-13	2	S-ham 2				9	1327 (C3)	5684 (C3)	1365 (C2)
Aug-13		"				10	1366 (C3)	6334 (C3)	1405 (C2)
Feb-14		"				10	1260 (C3)	5244 (C3)	1299 (C2)
Sep-14		"				9	1299(C3)	6318(C3)	1332(C2)
Sep-15		"	40			11	1459(C4)	7345(C3)	1500(C2)
Jun-12	3	Luck				17	1178 (C3)	3552 (C2)	1214 (C2)
Jan-13		"				18	1045 (C3)	3782 (C2)	1085 (C2)
Apr-13		"				21	1244 (C3)	4016 (C2)	1267 (C2)
Aug-13		"				24	1337 (C3)	5114 (C2)	1385 (C2)
Feb-14		"				20	1098 (C3)	3474 (C2)	1146 (C2)
Sep-14		"				21	1231(C3)	5271(C3)	1273(C2)
Sep-15		"	23			27	1460(C4)	6066(C3)	1511(C2)
Mar-13	4	S-ham 3				2	373 (C2)	6937 (C3)	410
Aug-13		"				3	491 (C2)	9449 (C3)	541
Jan-14		"				4	450 (C2)	8469 (C3)	501
Sep-14		"				5	435(C2)	10215(C4)	479
Sep-15		"	38			3	559(C2)	11721(C4)	607
Mar-13	5	Kinc 2				137 (C3)	256	3495 (C2)	403
Aug-13		"				148 (C3)	316	4099 (C3)	477
Sep-15		"	36			156(C3)	299	4568(C3)	468
Mar-13	6	S-hamp 1				50 (C2)	905 (C3)	3813 (C2)	975 (C2)
Aug-13		"				53 (C2)	936 (C3)	4200 (C3)	1014 (C2)
Feb-14		"				54 (C2)	868 (C3)	3768 (C3)	944 (C2)
Sep-15		"	23			64(C2)	1044(C3)	5100(C3)	1133(C2)
Sep-14	7	Kinc 4	40			46	487	5544(C3)	546
Sep-15		"				56(C2)	621(C3)	6292(C3)	693
Jun-13	8	PE 4				34	716 (C3)	4134 (C3)	763 (C2)
Sep-14		"				39	797(C3)	6068(C3)	851(C2)
Sep-15		"	39			47	896(C3)	6760(C3)	959(C2)
Mar-13	9	PE 3				27	972(C3)	4249(C3)	1012(C2)
Aug-13		"				30	1100(C3)	5323(C3)	1146(C2)
Sep-14		"				29	1099(C3)	5632(C3)	1143(C2)
Sep-15		"	41			33	1183(C3)	5984(C3)	1232(C2)
Aug-13	10	Han 2				5	1162 (C3)	5028 (C3)	1210 (C2)
Sep-14		"				5	1173(C3)	5649(C3)	1225(C2)
Sep-15		"	29			6	1316(C3)	6174(C3)	1374(C2)
Mar-13	11	Han 4				20	611 (C3)	3894 (C2)	656
Aug-13		"				22	691 (C3)	4413 (C3)	744 (C2)
Sep-14		"				23	683(C3)	4468(C3)	734(C2)
Sep-15		"	34			28	802(C3)	5092(C3)	860(C2)
Apr-13	12	Harr T1				13	836 (C3)	1416	861 (C2)
Aug-13		"				15	930 (C3)	1878	959 (C2)
Sep-14		"				15	903(C3)	2090	930(C2)
Sep-15		"	22			19	1090(C3)	2392	1124(C2)
Sep-15	13	Walk 1	8			39	683(C3)	2817(C2)	762(C2)
Sep-15		scheduled							
Dec-15		Harr T2 (fut refurb)	3	702(C3)	68	1	133	700	923(C2)
		"		1158(C3)	93	2	132	589	1408(C2)
Mar-13	n.a.	PE 2				1	699 (C3)	3141 (C2)	712
Aug-13		"				1	857 (C3)	3644 (C2)	874 (C2)
Sep-14		"				1	658(C2)	3702(C2)	581
Sep-15		"	42			2	433(C2)	3931(C2)	455
Sep-15	n.a.	PE 6	26			3	510(C2)	3132(C2)	551
Sep-15	n.a.	Han 3	44			47	457(C2)	3261(C2)	516
Sep-15	n.a.	Han 5	53			9	311	3211(C2)	350
Sep-15	n.a.	Pal T1(temp T2 pos)	2			1	317	751	338
Sep-15	n.a.	PE 5	53			16	274	2028	300
Sep-15	n.a.	Wing 1 (refurb)	46			1	247	946	262
Sep-15	n.a.	Han 1	48			3	223	1942	243
Sep-15	n.a.	Walk 3	44			5	215	2025	256
Mar-13	n.a.	PE 1				1	148	1379	154
Sep-14		"				1	145	1606	155
Sep-15		"	39			2	175	1746	184
Sep-15	n.a.	Kinc 1	2			1	169	333	188
Sep-15	n.a.	Wing 2	?			4	161	1913	171
Sep-15	n.a.	Tees	44			3	138	1655	165
Sep-15	n.a.	Walk 2	45			1	47	1121	51
TBD - 16	n.a.	Pal T1(fut refurb)							

Proposed Yearly Transformer Fleet Strategy:

2016:

Year	Priority	Fleet Location	Intended Action	Estimated K\$
2016		Palm T1	Replace core and coils of existing T1 5MVA transformer, pri-top/sec-throat. (\$100K). Temporarily install MUS to carry station load - no outage. (costs included in overall station design modification requirements). Remove existing T1 position transformer (Northern, pri-top/sec-top.), relocate to T2 position (costs included in overall station design modification requirements). Install refurbished Palmerston transformer in original T1 position (costs included in overall station design modification requirements). Note: 1) some of these capital \$'s may have been spent in 2015.	100
2016		Kinc 3	Temporarily install MUS to carry station load - no outage. (costs included in overall station design modification requirements). Remove, refurbish and replace existing Kincardine MS3 @ 7.5MVA, pri-top/sec-throat (\$75K). Note: if refurbishment is not feasible, rebuild or replacement will be necessary @ \$170K.	75
2016		Lucknow	Temporarily install MUS to carry station load - no outage. (costs included in overall station design requirements). Remove, refurbish & replace existing Lucknow @ 5MVA pri-top/sec-throat (\$75K). Note: 1) If refurbishment is not feasible, rebuild or replacement will be necessary @ \$150K. 2) Lucknow was chosen over S-ham 2 due to increased ethylene content of DGA, being an radial 8.32kV station, unknown redundancy supply from Hydro One and uncertainty regarding long-term station locations in Southampton.	75
2016		Proposed 2016 Sub-total		250

2017:

Year	Priority	Fleet Location	Intended Action	Estimated K\$
2017		S-hampton 1	Refurbish and modify vectors - former Kinc 1 @ 5MVA, pri-top, sec-top (85K) <u>ship / store</u> @ S-hamp 1 in 2016, Temporarily install MUS to carry station load - no outage. (costs included in overall station design modification requirements). <u>install</u> in 2017. Note: existing S-hamp 1 @ 6MVA, pri-top, sec-top. former Kinc 1 @ 5MVA, pri-top, sec-top considered with an understanding of: - increasing ethylene content rate, -existing transformer's 6MVA capacity - not a concern regarding potential load growth due to load transfer capacity of S-hamp 2 and 3 stations. An alternative option: if S-hampton 1 station is not rapidly increasing in ethylene as time progresses and since the refurbished unit (former Kinc 1) is virtually interchangeable with any station with modification procedures: - an option is to keep (former Kinc 1) stored @ S-hampton -1 as a spare such that the mobile would not be tied up for months should an emergency failure occur at an alternative station.	85
2017		S-hampton 2	Temporarily install MUS to carry station load - no outage. (costs included in overall station design modification requirements). Remove, refurbish and replace existing S-ham 2 @ 5MVA, pri-top/sec-throat (\$75K). Note: if refurbishment is not feasible, rebuild or replacement will be necessary @ estimated \$150K.	75
2017		Proposed 2017 Sub-total		160

2018:

2018		S-hampton 3	Temporarily install MUS to carry station load - no outage. (costs included in overall station design modification requirements). Remove, refurbish or replace existing S-hampton @ 5MVA, pri-top/sec-throat (\$75K). Note: if refurbishment is not feasible, rebuild or replacement will be necessary @ \$150K.	75
2018		Kinc 2	Temporarily install MUS to carry station load - no outage. (costs included in overall station design modification requirements). Remove, refurbish or replace existing Kinc 2 @ 7.5MVA, pri-top/sec-throat (\$75K). Note: if refurbishment is not feasible, rebuild or replacement will be necessary @ \$170K.	75
2018		Proposed 2018 Sub-total		150

2019 Proposal:

Using enclosed Table 2;

2019 should be a continuation, as indicated by “**Refurb Priority**”. e.g., Kincardine 4 and PE 4.

2016, 2017 and 2018 DGA readings may change/advance existing priorities as indicated in Table 2.

2020 Proposal:

Using enclosed Table 2;

2020 should be a continuation, as indicated by “**Refurb Priority**”. e.g., PE 3 and Hanover 4.

2016, 2017, 2018 and 2019 DGA readings may change/advance existing priorities as indicated in Table 2.

System Planning Priorities: 1) Hanover 2:

- A radial customer station (New Life Mills)
- Existing transformer @ 5MVA, 600V Delta, pri-top/sec throat.
- Existing station loading @:

Year	Month	Peak (kW)	P.F.	Date	Peak (kVA)	P.F.	Date
2015	January	654	0.703	3-Jan-15	993	0.582	24-Jan-15
	February	657	0.701	17-Feb-15	937	0.701	17-Feb-15
	March	649	0.701	1-Mar-15	925	0.701	1-Mar-15
	April	654	0.703	29-Apr-15	930	0.703	29-Apr-15
	May	659	0.701	1-May-15	1143	0.564	27-May-15
	June	654	0.565	3-Jun-15	1156	0.565	3-Jun-15
	July	648	0.565	9-Jul-15	1149	0.558	17-Jul-15
	August	613	0.927	20-Aug-15	862.8	0.680	20-Aug-15
	September	649.2	0.89	27-Sep-15	704.4	0.828	27-Aug-15
	October	664.8	0.82	06-Oct-15	685.2	0.9	30-Oct-15
	November	661.2	0.9	21-Nov-15	867	0.99	30-Nov-15
	December	636	0.9	13-Dec-15	685.2	0.9	17-Dec-15

Year	Month	Peak (kW)	P.F.	Date	Peak (kVA)	P.F.	Date
2014	January	648	0.824	5-Jan-14	786	0.824	5-Jan-14
	February	642	0.829	5-Feb-14	786	0.817	16-Feb-14
	March	636	0.815	2-Mar-14	810	0.607	24-Mar-14
	April	648	0.812	10-Apr-14	798	0.812	10-Apr-14
	May	654	0.566	31-May-14	1154	0.566	31-May-14
	June	649	0.56	1-Jun-14	1161	0.56	1-Jun-14
	July	669	0.703	22-Jul-14	1104	0.561	1-Jul-14
	August	647	0.703	7-Aug-14	921	0.702	21-Aug-14
	September	652	0.702	1-Sep-14	950	0.677	26-Sep-14
	October	660	0.702	24-Oct-14	945	0.684	1-Oct-14
	November	662	0.701	1-Nov-14	944	0.701	1-Nov-14
	December	666	0.703	12-Dec-14	948	0.703	12-Dec-14

- Peak MVA load is minimally decreasing yearly.
- Station Peak kW and kVA loading for 2014 and 2015 confirms diminishing load profile.
- Transformer; currently 29 yrs old.
- Transformer is a category (3) risk from previous DGA results, Table 1 & 2.
- Design viability already requested: - winding new coils for the existing 2 MVA Ferranti Packard currently stored @ Walkerton Service Centre or consideration of a new transformer should be considered.
- Note: after design criteria has been evaluated with respect to the existing physical size of the spare Ferranti Packard unit (2 MVA, 13.8kV secondary - stored @ Walkerton). Winding new coils for this unit to provide 600V delta load is considered **doable**. Final evaluation is required to confirm this concept.
- A 2MVA unit should be considered, pending discussion with New Life Mills regarding future load requirements.
- Obtaining any replacement following a station transformer failure would be very difficult to complete in short order (e.g., 4 months).

System Planning Priorities: 2) Port Elgin 6:

- Existing transformer @ 5MVA, 4160/2400V Y **pri-throat/sec-throat**, requires an internal wiring modification requirement if required to be paralleled with the majority Dy11 vector configuration stations.
- Existing station loading provided:
Measured data for PE MS6 /Sept 2014:(monthly peak kW or kVA data not available).
Calculated peak kW and kVA from measured feeder amps @ kVA = 1,236, kW = 1,174.2 ,(95% pF assumed).
- Loading is known considered very low.
- Backup capability to adjacent stations undetermined.
- PE1, 2 and 6 are Dy1 vector configuration stations.
- The MUS is not a Dy1 vector configuration, previous Westario Planning was to modify these stations to Dy11 when appropriate.
- PE3, 4 and 5 are Dy11 vector configuration stations.
- This transformer is 26 yrs old.
- It is a low risk, from DGA test results, no current refurbishment ranking.
- If this station is not an asset that is considered necessary for supporting Kincardine, removal, refurbishment should be considered.
- Apparently, PE1 is of sufficient capacity to carry PE2 loading in an emergency scenario.
- PE1: Calculated peak kW and kVA from measured feeder amps @ 1,320.12 kW, 1,389.6 kVA (Jan 2015), (5 MVA – Pioneer Electric)
- PE2: Calculated peak kW and kVA from measured feeder amps @ 3,137.28 kW, 3,302.40 kVA (Jan 2015), (5 MVA – Federal Pioneer)
- From Jan 2015 feeder amp results, transfer capability between stations is dependent upon distribution line capability and station capability (e.g., station capacities: 3302 kVA + 1320 kVA = 4622 kVA). Summer station loading will likely be increased compared to winter station loading and restrict transfer capability.
- Addition of cooling fans @ PE1 and PE2 stations is a consideration.
- PE1 & PE2: **pri-top/sec-throat**.
- It is assumed, this station is no longer required in Kincardine.
- To best utilize the existing equipment, an equipment transfer to Hanover 5 would be optimum.
- Planning considerations will require an inspection of Hanover 5 to determine status of existing equipment that could be re-utilized or need replacement.

System Planning Priorities: 3 Hanover 5:

- Existing transformer @ 3MVA, 4160/2400V **pri-top/sec-throat**.
- Existing station loading provided:
- Measured data for Han 5 / April 2014:(monthly peak kW or kVA data not available).
Calculated peak kW and kVA from measured feeder amps @ kVA = 3,038.4, kW = 2,886.48 (95% pF assumed).
- Loading is considered very high, (transformer is overloaded).
- Transformer temperature is inordinately hot during summer months.
- Permanent load transfers to adjacent stations undetermined if feasible (to be considered).
- This transformer is 53 yrs old; considerably beyond expected life service.
- Oil leakage, site contamination and off-site drainage is apparent (radiators).
- Situated in an industrial area, bordering on a residential community.
- Currently; a low risk, from DGA tests, no existing refurbishment ranking.
- To upgrade this station transformer alternatives:
 - 1) Utilization of refurbished P.E 6 transformer, upgrading this station from 3 to 5 MVA is a consideration.
 - 2) Station switchgear alternatives:
 - a) Existing switchgear short circuit rating to be confirmed if acceptable for upgrade to a 5 MVA transformer.
 - b) Potential to transfer PE 6 switchgear or utilize pad mount G&W VIPERs.
 - 3) PE 6 Primary 44kkV pole is of concern as a pending danger pole. Pole contains fuse and switch arrangement, could be transferred to Han 5.

Appendix D: Asset Condition Assessment

Project # 15177

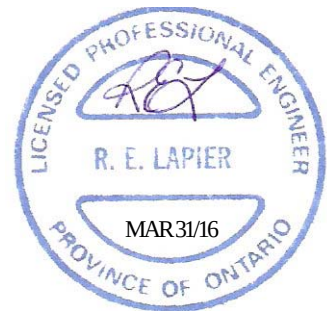
Asset Condition Assessment Report

Prepared for:

Westario Power Inc.

costello
Utility Consultants

March 31, 2016



Prepared By: 
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Executive Summary

Arising from the need to create a Distribution System Plan for the upcoming OEB rate filing, Westario Power contracted Costello Associates Inc. to assist in the development of an Asset Condition Assessment report. The Asset Condition Assessment is fundamental in developing and updating maintenance plans, long-term asset replacement planning, and on-going capital investment plans. The knowledge gained about the asset condition will assist in defining staged programs and expenditures to ensure that assets are well managed and eventually replaced prior to failure.

This report contains the findings of the asset condition assessment which was derived from available information provided by Westario Power. The information reviewed and analyzed included all data available from the current equipment databases and current employee knowledge. While there are significant gaps in the data available on many of the distribution assets, Westario Power is currently in the process of implementing an ESRI Geographical Information System which can be populated with up to date information to be used for a more accurate assessment.

Table 1-1 provides a summary of the Health Index analysis based on the information and study methods documented in this report. It is evident that the Westario Power assets which will require the most attention are the hydro poles and transformers.

The analysis reveals that, based on age alone, more work must be done to further assess the state of the aging group of poles. A comprehensive pole testing program, targeted at the “poor” and “very poor” groups of poles, will provide a more scientific based assessment of this asset group and allow targeted programs for replacement.

Once customer connections details are collected and confirmed in the GIS system, further evaluation of the transformer asset group can occur. Once this is complete, Westario Power will be able to further refine targeted programs for transformer replacements.

The attached report appendices, which contain the asset condition assessment results and health indices, offer supporting documentation for the results.

Health indices were not developed for all Westario assets. This is due to the fact that many of Westario Power’s assets are either not registered in their GIS database or do not contain enough valuable information to be assessed.

Table 1-1 Summary of Asset Conditions/ Health Indices

Asset Group	Asset Condition					Total Population	EOL within 10 years Units (%)
	Very Good	Good	Fair	Poor	Very Poor		
Distribution Station Transformers	3	12	11	1	4	31	5 (16.1%)
Circuit Breakers	2	0	2	45	0	49	45 (92%)
Reclosers	12	0	0	4	0	16	4 (25%)
Switchgear Assemblies	0	0	0	0	9	9	9 (100%)
Network Protectors	N/A						
Distribution Poles	3941	519	734	348	4322	9864**	5404 (55%)
Distribution Pole mount Transformers	678	81	187	212	609	1767	1008 (57%)
Distribution Pad mount Transformers	634	23	198	56	68	979	322 (33%)
Switches – 3 Phase Load Break	No Analysis Available						
Switches – 3 Phase Air Break	No Analysis Available						
Switches – 1 Phase Air Break	No Analysis Available						
U/G Primary Cables	4.2km	12.45km	7.35km	0km	25.1km	49.1km	32.45km (66%)

** Indicates values not consistent with database totals of 9864 poles total.

This discrepancy is expected to be clarified upon completion of the GIS data collection and verification process. Appendix A contains more information on the health indices.

Introduction

Costello Associates, Inc. has been retained by Westario Power, Inc. (henceforth, Westario Power or Westario) to provide assistance with their Distribution System Plan (DSP). The OEB now requires that asset condition assessments are to be included in local utilities (LDC) Distribution System Plan. Westario requested that Costello Associates complete a report containing an asset condition assessment and asset health index rating for their DSP.

The purpose of the asset condition assessment is to evaluate the current condition of the asset and to assess where the asset lies along the expected useful life cycle. Other factors, such as visual inspections, damage reports, and testing data also contribute to the evaluation of the asset condition in order to properly plan for replacement or refurbishment of the equipment and plan for major capital. All of these factors are important to identify which assets require attention or replacement to improve customer reliability, ensure better public safety, and provide on-going worker and environmental safety.

This report is based on all available information from all sources at Westario's disposal. The methods used in determining the health index for each asset class are detailed in this document, along with a discussion of the findings and appendices containing all the results of the asset condition assessment.

The final section of the report outlines recommendations for the urgency and the recommended rate of replacement for each of the asset types.

Study Methodology

2.0 Data Sources

In order to perform an accurate condition assessment of the Westario Power system assets, the most up to date information was necessary. Asset information was utilized from a GIS database, personal knowledge of Westario Power staff, and written records. Most asset information at Westario Power is currently contained in custom GIS-based software system.

This GIS database contains a variety of distribution asset information, such as asset IDs, ages, material types, and asset locations. Unfortunately, no condition information is contained in the database and therefore assessments were based solely on asset ages.

While the Westario Power municipal substation assets are not included in the GIS database, Westario Power and third party assistance have been working together to produce an accurate condition assessment of the station assets. These station specific asset condition assessments were reviewed by Costello Associates and the information has been included in this overall condition assessment report.

Westario is currently in the process of implementing a new ESRI Geographical Information System (GIS) which will fill in the gaps where valuable information has historically been missing.

The database received was dated August 2015. Some assumptions had to be made where there was missing information. These assumptions included the age of un-labeled poles, and transformers with missing manufacture dates.

Nearly 24% of distribution poles, 36% of pole mounted transformers, and 6% of pad mounted transformers in the database were found to contain no age data. Based on assumptions made by senior Westario Power staff, all poles found without a date label were assumed to have been installed in 1960 if made from concrete, 1965 if made from wood or where no material was listed, and 2000 if made of steel. While numerous transformers were also missing manufactured year data, the database did contain manufacturer name data. Referring to these manufacturer names, Westario Power staff were able to place an estimate on which decade the transformers would have been installed as seen below. The earlier of the estimated time frames were then assigned to each transformer without age data. For the few remaining transformers where no age estimate could be provided, a year of 1965 was assigned.

Table 2-1 Assigned Transformer Dates by Manufacturer for Undated Transformers

Manufacturer	Date	Manufacturer	Date
CAM TRAN	1978 to present	Moloney	1980 to present
Carte	1980 to present	McGraw Edison	1950
Federal Pioneer	1970	Packard	1950
Ferranti	1970	Porter	1960 to 1980
Ferranti Electric	1970	Reliance	1975
Ferranti Packard	1970	Siemens	1990
JIMs Electric	1970s to 1980	Westinghouse	1950 to 1980
Canadian Electrical Services (CES)	1978 to present		

2.1 Asset Classes Assessed

Westario Power's assets consist of 27 substations and the associated distribution systems, which supplies 15 towns in its service territory. The most critical of the assets, and their approximate population contained in the substations and the distribution system, are listed below in Table 2-2.

It is important to note that the asset classes have been generalized and do not represent a certain set of identical equipment. Assets such as distribution poles vary in height and class, and transformers vary in manufacturer, types, ratings, installation methods, and locations. Ultimately, these variances may cause differences in replacement costs, but on average, should provide a valid evaluation of the Capital Cost Estimates for replacement or upgrades.

Table 2-2 Assets Included in the Condition Assessment (As of 2015)

Asset Group	Asset Class	Population
Substation	Power transformers	29
	5/15kV Circuit breakers	49
	15kV reclosers (3 Phase)	16
	Protective relays	53
	MV Switchgear assemblies	9
	HV Switchgear assemblies (44kV)	1
	Buildings	27
	MV Primary Cables	n/a
	HV Primary Cables (44kV)	n/a
Distribution (Overhead and Underground)	Distribution poles (Wood)	7653**
	Distribution Poles (Steel)	1714**
	Cross arms	n/a
	Pole mounted transformers	1767
	Pad mounted transformers	979
	Switches – 3Ph load break	5
	Switches – 3Ph air break	586
	Switches – 1Ph air break	382
	Switches – Inline	55
	Switches – Switching Cubicles	76
	Primary U/G cables	49.1km
	Protective line relays	N/A
	Line circuit breakers/ reclosers	N/A

“n/a” indicates “Not Available”. “N/A” indicates “Not Applicable”

** Indicates values not consistent with database totals of 9864 poles total.

This discrepancy is expected to be clarified upon completion of the GIS data collection and verification process. Appendix B contains more data on asset assessment.

2.3 Asset Health Index Assessment Methods

2.3.1 Municipal Substations

Westario owns and maintains 27 municipal substations (MS). Over the past three years Westario Power has completed a detailed review of the substation assets. This effort has resulted in a prioritized list of plans to refurbish existing transformers, as well as the replacement and upgrade of the station switchgear, breakers, fencing, grounding, and control systems.

Westario is also building a “7.5MVA mobile substation” that will be used to facilitate the replacement plans and serve as a back-up substation for any future maintenance or equipment failures. The current substation assets range in age from the 1960s to the 2000s, but many of the stations are vintage 1960-1980. These assets have been recognized as near or beyond their normal life expectancy.

Based on regular “Transformer Dissolved Gas in Oil Analysis Reports”, in 2014 Westario identified four station transformers that were a very serious concern and were slated for replacement/refurbishment. Three transformers were refurbished in 2014-2015, and the fourth is in progress. Two of the next most

urgent units will be done in 2016. The prioritized replacement/refurbishment list also identified nine substation transformers that are showing cautionary values in the gas analysis. These units are regularly monitored for worsening test results, and the replacement strategy is modified accordingly.

Westario's current plan endeavours to refurbish/upgrade two substations per year for the period of 2016-2021. This will raise the average age of the station asset class significantly, and place Westario in a better position to manage future replacements and upgrades.

There are twelve sets of new electronic/vacuum reclosers in the system and one remaining oil-style recloser at the stations. Fourteen feeders are protected by either circuit breakers or fuses. All of these devices are original to the station and have exceeded their life expectancy. Two feeders are protected with newer circuit breakers that were retrofitted into the original switchgear.

2.3.2 Distribution Poles

Westario Power's distribution system contains wood, concrete, and steel poles, with the majority being wood. Data on these poles was extracted from the GIS system and included manufactured dates.

Even though Westario Power had not made its own condition rating of poles in the GIS database, age is one of the most important factors when assessing distribution poles since it gives a good indication of where it lies along its life expectancy. The Westario distribution poles were assessed based on the following Health Index categories:

Table 2-3 General Health Index Categories

Health Index	Condition	Description	Expected Lifetime	Age (yrs)	Requirements
85-100	Very Good	At worse, some aging or deterioration of a limited number of components	15+yrs	25 or younger	Normal inspection and maintenance
70-85	Good	Deteriorating of some components	10-15yrs	25-29	Normal inspection and maintenance
50-70	Fair	Noticeable deterioration or serious deterioration of specific components	5-10yrs	30-34	Increase diagnostic testing, possible replacements needed before 5 years depending on criticality
0-50	Poor	Widespread serious deterioration or significant deterioration of a dominant component	1-5 yrs	35-40	Start planning process to replace, considering risk and consequences of failure
0-30	Very Poor	Extensive serious deterioration or serious deterioration of a dominant component	0-1 yr	41-50+	At end-of -life, immediately assess risk; replace based of assessment

2.3.3 Transformers

Both pole mount and pad mount transformers were assessed based on age. While the GIS database did contain a PCB level field for transformers, all applicable transformers were tested completely. The remaining transformers came from the manufacturers in the 1980s and later, and therefore had acceptable PCB levels.

Based on the age data for Westario transformers, the Health Index was created on the same general categories as for distribution poles.

Subsequent review prompted Westario Power to provide a “PCB-Free Position Letter” (dated September 26, 2010) that states that Westario Power assets did not contain PCBs in excess of 50ppm. Appendix D contains a copy of the letter.

2.3.4 Switches

Westario Power’s distribution system includes numerous types of switching devices which include in-line switches, load break switches, and padmounted switching cubicles. While some information was available for these switches, there was not enough to formulate an accurate health index.

2.3.5 Underground Cables

Although Westario Power is currently in the process of collecting cable information which will eventually be used to formulate health index results, the database contains data for only 15% of the utilities underground cables.

Additional financial-based information was obtained from Westario that indicated the asset age for capital depreciation purposes. This information was used to collect the age related data contained in Table 2-4 below.

While this is currently not enough to provide an accurate health index, an attempt to evaluate the general Health Index was made. Eventually, the cable type and age data being gathered will eventually be sufficient to provide a proper assessment of this asset class.

Table 2-4 Underground Cables by Age Breakdown

Year of Installation	Amount (m)
1971-1980	14,750
1981-1990	10,350
1991-2000	7,350
2001	200
2002	200
2003	1,250
2004	1,700
2005	1,350
2006	2,850
2007	1,850
2008	1,800
2009	1,250
2010	500
2011	1,000
2012	1,450
2013	500
2014	750
2015	
Total length (not including removals)*	49,100

*Removals were not tracked until the 2015 fiscal reporting

2.3.6 Protective Relays and Line Circuit Reclosers

Since Westario Power currently has no line reclosers and protective line relays, no health index has been developed.

However, if line reclosers are ever installed in to the Westario distribution system, the GIS system should provide for an asset type and data structure. This information will be necessary to manage these assets in the future.

Analysis and Results

3.1 Municipal Transformer Station Assets

3.1.1 Station Power Transformers

Westario Power has a well thought out plan for refurbishment and replacement of the station transformers based on the on-going dissolved gas analysis reports for each transformer.

When the station transformers are refurbished it is recommended that all bushings, gaskets, and tap-changers also be refurbished. This will maximize the value of the rebuild so that Westario receives a refurbished unit that will have a reasonable extension of its useful life.

Appendix C contains details of the Westario plans for station transformer replacement/refurbishment.

No changes are recommended to this plan.

3.1.2 Medium Voltage Switchgear

Concurrent with the station transformer replacement plans, Westario are also planning to replace or upgrade any existing 5kV rated switchgear at the stations. The standard design that has been planned is to replace any old switch/fuse or circuit breakers with a combination of new 5kV rated switchgear and pad mounted electronic reclosers that are ready to accept future SCADA system automation.

3.1.3 Medium Voltage Cables and Bus Ducts

Currently no data is available on the age or condition of Westario's medium voltage cables, however as stations are refurbished, the plan also includes the replacement of old cables to current standards.

3.1.4 Station Reclosers and Relay Controllers

Currently no data is available on the age or condition of Westario's station reclosers and relay controllers. This gap in information necessary to perform an accurate assessment is one which could be filled by performing a proper substation assessment.

However, as the station refurbishment plans proceed, any old style oil reclosers can be replaced to the newer electronic style with SCADA system capability.

3.1.4 Station Fence and Grounding Systems

As Westario proceeds with the station refurbishment plans, the existing fencing and station grounding systems should also be replaced to current standards. These items were identified by Westario as not meeting current Electrical Safety Code requirements and therefore they pose an increased risk to public safety.

The substation asset assessment that was completed indicated two stations that required upgrades to the station ground counterpoise and the station perimeter fencing in order to ensure public safety and be in compliance with current electrical safety code requirements. The stations requiring upgrade are the Port Elgin MS 6, and Hanover MS1, which will be done only after the town addresses the issue of soil contamination at the site. All of the other station grid code upgrades have been completed.

3.2 Distribution System Assets

3.2.1 Distribution Transformers

3.2.1.1 Pole Mounted Transformers

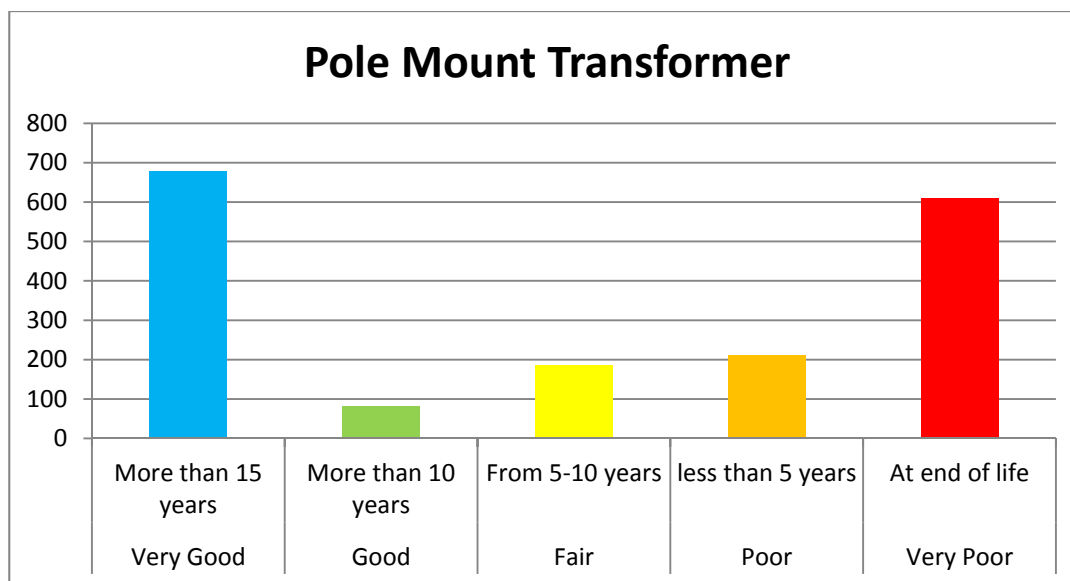
Pole mounted transformers are used to step down voltage from a primary level to a secondary utilization level on the overhead distribution system. These transformers are mounted above ground on a pole and are liquid filled with mineral oil in a sealed tank. An industry standard for the life expectancy for pole mounted transformers is 40 years.

Based on the evaluation criteria described in section 2.3.2 above, a summary and chart of the developed health index for the Westario Power pole mounted transformers are shown below, while the entire health index evaluation along with the condition assessment results can be found in Appendices A and B.

Table 3-1 Pole Mount Transformer Health Index

Pole Mount Tx Health Index		
Condition	Expected Life	Tx Count
Very Good	More than 15 years	678
Good	More than 10 years	81
Fair	From 5-10 years	187
Poor	less than 5 years	212
Very Poor	At end of life	609

Chart 3-1 Pole Mount Transformer Health Index



The pole mount transformers classified as being in “poor” condition are ones that have exceeded their average life expectancy. Those categorized in the “very poor” condition are estimated to be between 45-65 years old.

Based on the assumptions made for transformers with no age data, an estimated 57% of the pole mount transformers have no more than 10 years until they reach their end of useful life, while 34% are estimated to have already reached their end of useful life. Although there is the potential that these numbers may be skewed due to the assumptions made, no other data is currently available to perform a condition assessment of the pole mounted transformers.

Other factors that can affect the analysis and result are:

- Number of customers connected to a unit
- PCB levels (if any)
- Physical condition of the tank, bushings, etc.

Data to add these factors to the analysis were not available. These factors can drastically change the decision to replace an aging transformer. Any transformer serving a small number of customers may be left to “run to failure” replacement plan as the number of affected customers is low. This decision should also take in to account any potential environmental or public safety concerns.

3.2.1.2 Pad Mounted Transformers

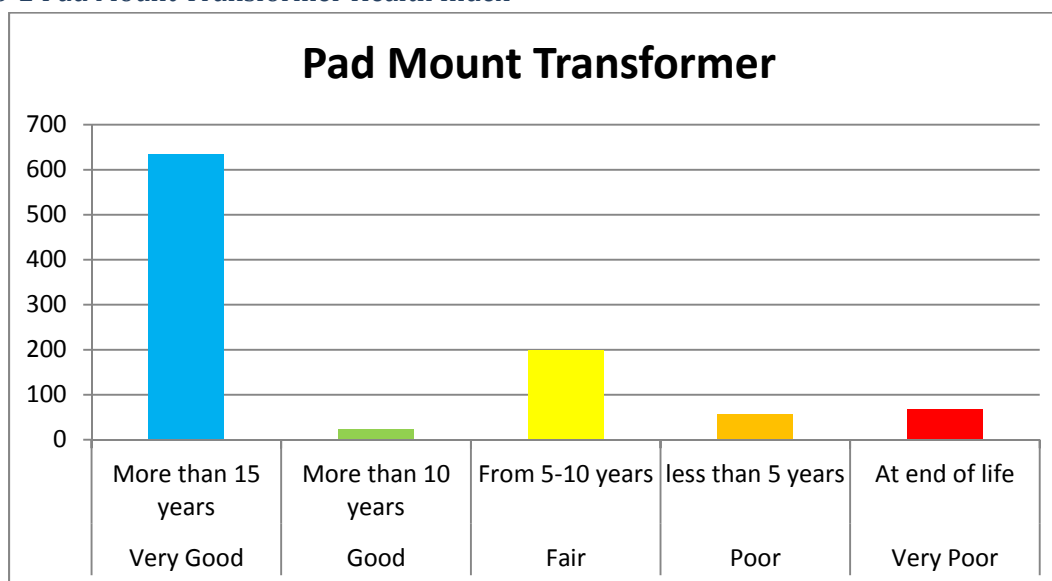
Pad mounted transformers are typically used for commercial services in urbanized areas and are also used extensively in residential developments.

A summary and chart of the developed health index for the Westario Power pad mounted transformers are shown below, while the entire health index along with the condition assessment results can be found in Appendices A and B.

Table 3-2 Pad Mount Transformer Health Index

Pad Mount Tx Health Index		
Condition	Expected Life	Tx Count
Very Good	More than 15 years	634
Good	More than 10 years	23
Fair	From 5-10 years	198
Poor	less than 5 years	56
Very Poor	At end of life	68

Chart 3-2 Pad Mount Transformer Health Index



Since the majority of Westario Power’s underground infrastructure is relatively new, most of the pad mounted transformers were assessed to be in excellent condition.

The same considerations as mentioned above for pole mount transformers related to a “run to failure” replacement plan also apply to pad mounted transformers.

3.2.2 Distribution Switches

3.2.2.1 Load Break Switches (3 Phase)

Westario Power’s distribution load break switches are devices which are mounted on the top of a distribution pole and are made to open a circuit under load. Three of Westario Power’s five load break switches are of the gang operated type, which operates all 3 phases simultaneously with the manual turn of a handle located at the base of the pole.

Of the five load break switches in Westario Power’s distribution system, three were listed in the database as having been inspected. All three switches were commented as being in “good” condition. Based on having so few load break switches and little information available for assessments, no health index has been created for the Westario Power load break switches.

3.2.2.2 Air Break Switches (3 Phase and 1 Phase)

Westario Power’s distribution air break switches are devices which are mounted either on the distribution poles or in line with the conductors and are made to open a circuit, **while not under load**. All of Westario Power’s air break switches are manually operated and can only be opened or closed one phase at a time. The asset class listed as 3 phase air break are simply a set of 3 single phase air break switches. The air break switches may be either solid blade devices, which offer no protection, or fused to offer a level of overload or fault protection.

Westario Power's switch database showed that there are 2140 air break switches in their distribution system, 382 single phase and 586 three phase (1758 single phase units). This database contains no age or condition information which could be evaluated for health index purposes.

A separate database also shows that 55 of these switches are in-line switches. This in-line switch database includes an age estimate, estimating the switches to be either less than 10 years old, 10 to 25 years old, 25 to 40 years old, or more than 40 years old. Due to the lack of available information, no health index could be formulated for Westario Power's air break switches.

3.2.2.3 Switching Cubicles

Switching cubicles are pad mounted devices contained within an enclosure which are utilised for switching underground circuits. These units can house either hot-stick operated switches or non-load break elbows. These devices must be operated manually to open circuits, **while not under load**.

There were 76 switching cubicles contained in Westario Power's distribution system. 24 of the 76 cubicles have been listed as inspected in the database and were commented as being in "good" condition. Having no other age or detailed condition information, an accurate health index could not be formulated for the Westario Power's switching cubicles.

3.2.3 Distribution Poles

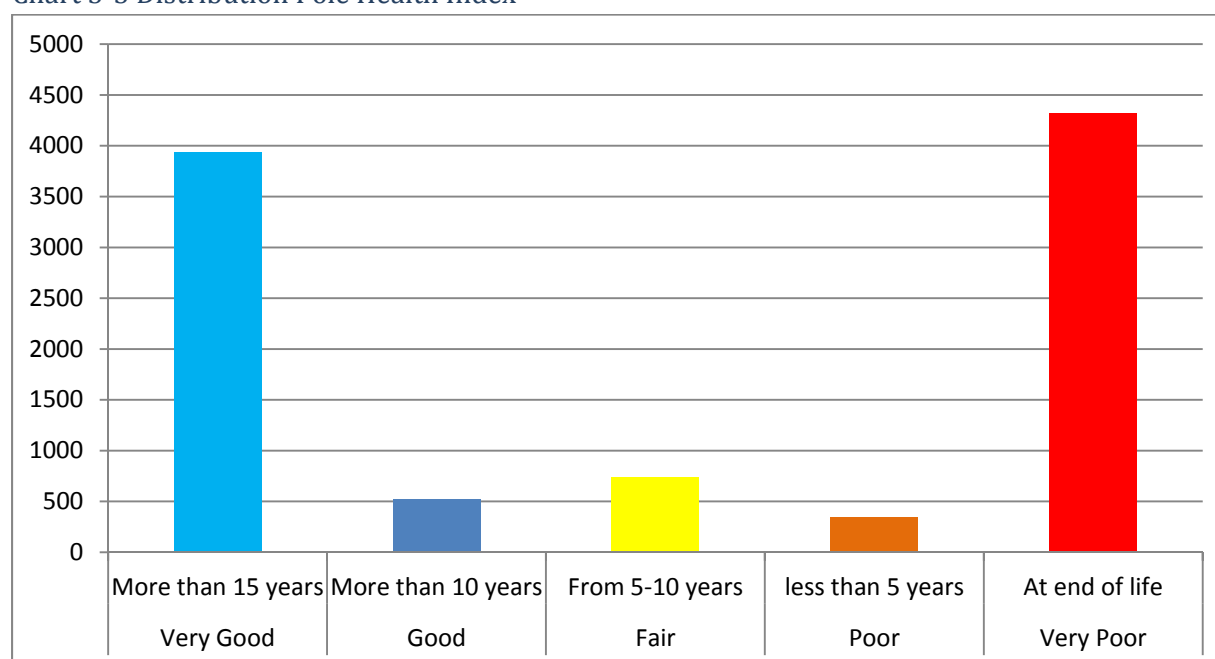
Distribution poles are also Westario Power's single form of support for low and medium voltage overhead feeders and distribution equipment. It should be noted that of the poles assessed, there is a wide variation in the height and class.

A summary and chart of the developed health index for the Westario Power distribution poles is shown below, while the entire health index along with the condition assessment results can be found in Appendices A and B.

Table 3-3 Distribution Pole Health Index

Distribution Pole Health Index		
Condition	Expected Life	Pole Count
Very Good	More than 15 years	3941
Good	More than 10 years	519
Fair	From 5-10 years	734
Poor	less than 5 years	348
Very Poor	At end of life	4322

Chart 3-3 Distribution Pole Health Index



Based on the assumption that any unlabeled concrete poles were installed in 1960, unlabeled wood poles in 1965, and unlabeled steel poles in 2000, a significant percentage of the poles have been classified as having reached their end-of-life. Of the 9864 wood poles assessed using the Westario Power GIS database, 55% are estimated to have no more than 10 years of useful life remaining and 44% are estimated to have reached their end of useful life. Although older poles may still be in good physical and structural condition, the assessment methods only took into consideration the pole age due to their being no other available data.

3.2.4 Underground Distribution Cables

Based on the age distribution of underground cables provided in Table 2-3 above, the numbers indicate that perhaps as much as 50% of the underground primary cables are at/beyond their industry accepted life span. However, given that asset removals were not tracked until the 2015 reporting year, it can be expected that some of the oldest cables in the system have already been removed or replaced. This would serve to reduce the amount of cables in the Very Poor category of the Health Index evaluation.

Table 3-4 Distribution Underground Cable Health Index

Distribution Underground Cable Health Index		
Condition	Expected Life	Length (m)
Very Good	More than 15 years	4,200
Good	More than 10 years	12,450
Fair	From 5-10 years	7350
Poor	less than 5 years	0
Very Poor	At end of life	25,100

All cables installed since the year 2000 can be considered to be in good condition, with at least 10-15 years of life expectancy remaining. All of the remaining cable has been slotted into the Poor or Very Poor categories.

A concerted effort to capture the actual installation dates of all primary underground cables into the Geographic Information System will improve the ability to further assess this asset and to prepare replacement/refurbishment plans.

3.3 Summary of Results

A summary of the results of the asset condition assessment and health indices are listed in Table 3-8 below. The summary lists the estimated total number of each asset class and how many fall into the condition categories varying from “very good” to “very poor”. Table 3-8 also lists the percentages of each asset class which have been estimated to likely require replacement within the next 10 years. The following relates the suggested replacement timeframes to the condition assessment of the asset:

Very Poor	= Replacement within the next year
Poor	= Replacement within the next 5 years
Fair	= Replacement within the next 10 years
Good	= Replacement within the 10-15 year period
Very Good	= More than 15 years of service life remaining

Table 3-5 Summary of Asset Conditions/ Health Indices

Asset Group	Asset Class	Population
Substation	Power transformers	29
	5/15kV Circuit breakers	49
	15kV reclosers (3 Phase)	16
	Protective relays	53
	MV Switchgear assemblies	9
	HV Switchgear assemblies (44kV)	1
	Buildings	27
	MV Primary Cables	n/a
	HV Primary Cables (44kV)	n/a
Distribution (Overhead and Underground)	Distribution poles (Wood)	7653**
	Distribution Poles (Steel)	1714**
	Cross arms	n/a
	Pole mounted transformers	1767
	Pad mounted transformers	979
	Switches – 3Ph load break	5
	Switches – 3Ph air break	586
	Switches – 1Ph air break	382
	Switches – Inline	55
	Switches – Switching Cubicles	76
	Primary U/G cables	49.1km
	Protective line relays	N/A
	Line circuit breakers/ reclosers	N/A

** Indicates values not consistent with database totals of 9864 poles total.

This discrepancy is expected to be clarified upon completion of the GIS data collection and verification process

3.4 Estimated Cost of Replacement

The following construction cost estimates are based on “one-off” replacements for each asset type. Some effort was made to identify the locations of assets that were recommended for replacement to group them into projects in order to gain efficiencies of scale.

Hourly rates used in the Replacement Cost Estimates:

Lineman labour cost rate = \$69.87/h

Leadhand labour cost rate = \$73.30/h

Engineering burden rate = 45%

Stores rate = 4%

1. Wood poles:

Pole and hardware: \$1,560.00

Average labour to frame and change a single pole = (8hrs x 3 men) + (8hrs x 1 Leadhand) + (contract service) = \$3,263.28

Total estimated cost per typical pole: **\$5,841.76**

2. Pole Mount Transformer (Single Phase):
Transformer and hardware: \$3,120
Average labour to frame and change transformer= (4hrs x 3 men) + (4hrs x 1 Leadhand) = \$1,131.64
Total estimated cost per typical single phase transformer: **\$4,760.88**

3. Pole Mount Transformer (Three Phase):
Transformer and hardware: \$8,320
Average labour to frame and change transformer= (8hrs x 3 men) + (8hrs x 1 Leadhand) = \$2,263.28
Total estimated cost per typical three phase transformer: **\$11,601.76**

4. Pad Mount Transformer (Single Phase):
Transformer, hardware and civil materials: \$4,680
Average labour to install and change transformer= (8hrs x 3 men) + (8hrs x 1 Leadhand) = \$2,263.28
Total estimated cost per typical single phase transformer: **\$7,961.76**

5. Pad Mount Transformer (Three Phase):
Transformer, hardware and civil materials: \$14,000
Average labour to install and change transformer= (8hrs x 3 men) + (8hrs x 1 Leadhand) = \$2,263.28
Total estimated cost per typical three phase transformer: **\$16,280**

6. Three Phase Load Break Switches:
Switch and hardware: \$9,000
Average labour to install and change transformer= (8hrs x 3 men) + (8hrs x 1 Leadhand) = \$2,263.28
Total estimated cost per typical single phase transformer: **\$11,300**

7. Single Phase Switches:
Switch and hardware: \$730
Average labour to frame and change transformer= (4hrs x 3 men) + (4hrs x 1 Leadhand) = \$1,131.64
Total estimated cost per typical single phase transformer: **\$2,700**

8. Crossarms:
-Expectation to change these with the pole

9. Underground Cable Replacement:
-Estimated cost per typical meter of underground cable direct buried in duct (per Ø): **\$97.50/m**

4.0 Recommendations

4.1 Development of Asset Replacement Plan

Given the above evaluation of the Westario Power distribution assets, it is evident that much of the distribution assets are aging, with over 50% of poles, 57% of pole mount transformers, and 33% of padmount transformers due for replacement within the next ten years.

Westario is currently beginning a plan to install an ESRI Geographic Information System (GIS), which will provide an opportunity to collect and manage data about all of the assets in the distribution system. This effort will provide Westario the ability to better manage and track the assets on age as well as other factors that arise out of the regular inspection processes.

Developing this proactive asset tracking and management program will allow Westario to develop a specific plan for each asset class and to target capital spending to the most critical asset groups in an effective and efficient approach.

4.1.1 Pole Replacements

Based on the age criteria alone, it is evident that over half of the wood poles in the system have already reached, or will have reached, their “industry accepted” end of life within the next 5-10 years. A comprehensive pole testing program, targeted at this aged population will help to further assess the condition of this asset group.

It can be expected that many of the old poles in the system are still in good condition, but pole testing is the only way to determine the actual extent of the group to be replaced. This along with regular inspections will allow Westario to keep more accurate track of the number of poles that should be replaced in any given fiscal year.

4.1.2 Pole Mount Transformer Replacements

The Health Index analysis also revealed that 57% of the population of pole mount transformers will reach their statistical end of life with in the next 5-10 years. This analysis could not take into account any “run-to-failure” transformers within this group due to the lack of customer connection information.

Once the GIS system is in place and the system connectivity model confirmed, a subsequent review of this aging transformer population will be possible.

4.1.3 Air Break Switch Replacements

Given the lack of useful data available on this asset, no analysis was possible. Once the GIS system is in place, better information on this asset will allow a proper assessment.

4.1.4 Load Break Switch Replacements

Given the lack of useful data available on this asset, no analysis was possible. Once the GIS system is in place, better information on this asset will allow a proper assessment.

4.1.5 Underground Cable Replacements

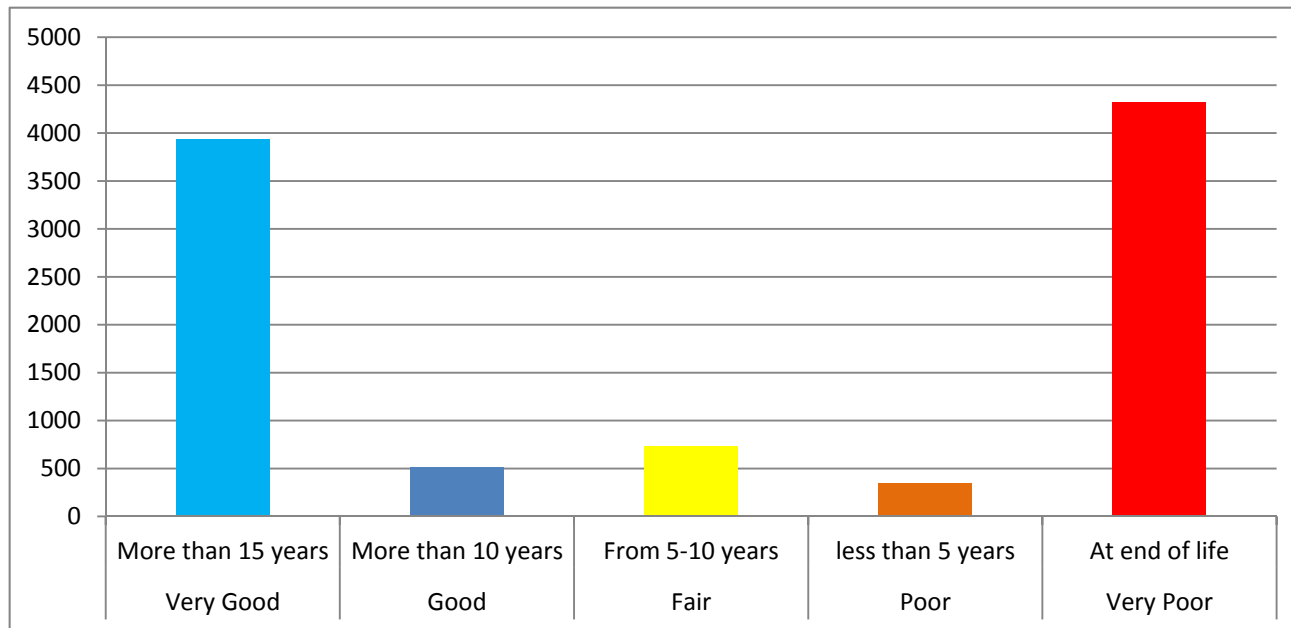
The data suggests that a great deal of underground cables are at/beyond their life expectancy. However, given the fact that removals were not tracked until very recently, and the lack of useful data available on this asset, no further analysis was possible. Once the GIS system is in place, and the cable inventory is completed, better information on this asset will allow a proper assessment.

4.2 Combining Asset Replacement Work to Reduce Costs

While estimated costs for replacement of individual devices may seem to make replacing many assets of the distribution system very expensive, costs can be reduced by strategically replacing multiple assets on a work site or in a specified area within one project. Costs for mobilizing the crews and equipment and the cost of work site setup can be shared between assets if multiple items are replaced at once. It is therefore recommended that multiple assets be considered simultaneously when planning replacement work.

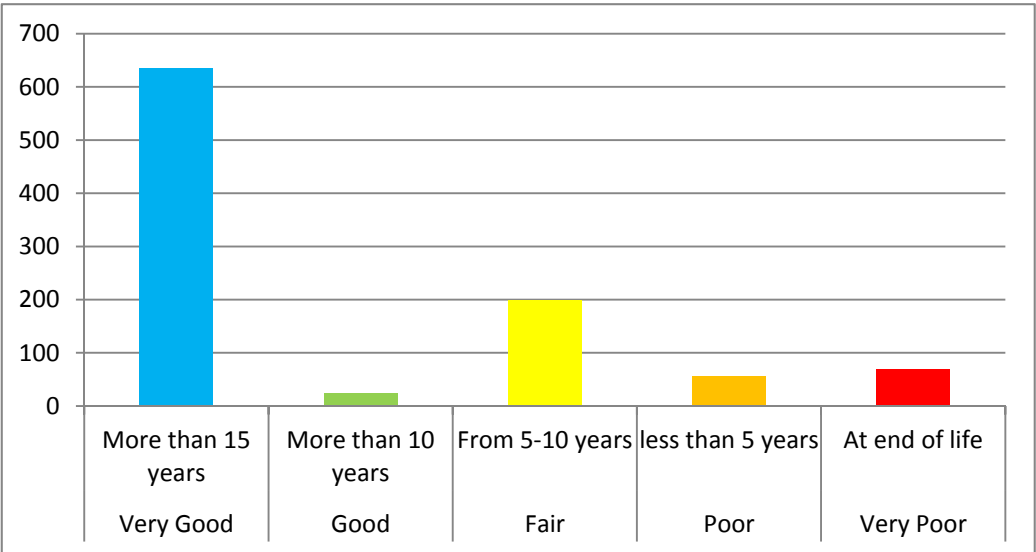
Appendix A - Health Index Results

Health Index		
Condition	Expected Life	Pole Count
Very Good	More than 15 years	3941
Good	More than 10 years	519
Fair	From 5-10 years	734
Poor	less than 5 years	348
Very Poor	At end of life	4322



Assumptions: Wood poles with no age data are assumed to be pine poles from the early 1960's to early 1970's (used 1965), concrete poles with no age data are assumed to be 1960, and steel poles with no age data are assumed to be 2000. (As per Westario Power staff) Poles with no age or material data are assumed to be wood and 1965.

Pad Mount Tx Health Index		
Condition	Expected Life	Pole Count
Very Good	More than 15 years	634
Good	More than 10 years	23
Fair	From 5-10 years	198
Poor	less than 5 years	56
Very Poor	At end of life	68

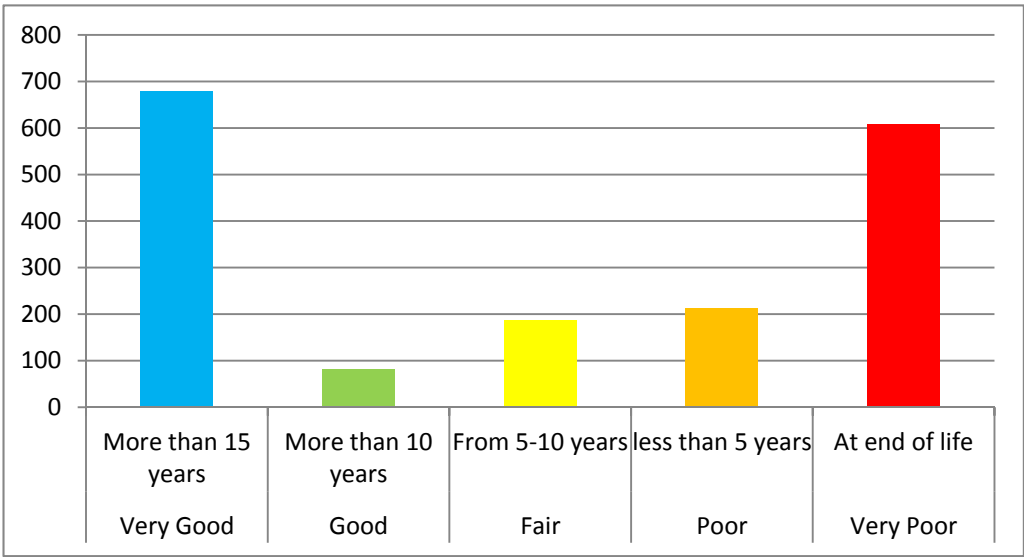


Assumptions: Any tranformer without age data has been assigned an age according to manufacturer as seen below.
Any transformer without age data which isnt listed below is assumed to be 1965. The following age estimates were provided by Westario Power staff.

Note: 55 of 979 pad mount transformers are missing age data.
641 of 1767 pole mount transformers are missing age data.

- ABB -
- Brown Boveri
- CAM TRAN - 1978 to present
- Canadian Electrical Services -CES - Same
- Carte - 1980 to present
- English Electric
- ERMCO
- Federal Pioneer - 1970
- Ferranti - 1970
- Ferranti Electric - 1970
- Ferranti Packard - 1970
- General Electric (GE)
- JIMs Electric - 1970's to 1980
- Moloney - 1980 to present
- McGraw Edison - 1950
- Packard-- 1950
- Porter - 1960 to 1980
- Reliance - 1975
- Siemens - 1990
- T&R Electric
- Westinghouse - 1950 to 1980

Pole Mount Tx Health Index		
Condition	Expected Life	Pole Count
Very Good	More than 15 years	678
Good	More than 10 years	81
Fair	From 5-10 years	187
Poor	less than 5 years	212
Very Poor	At end of life	609



Assumptions: Any tranformer without age data has been assigned an age according to manufacturer as seen below.
Any transformer without age data which isnt listed below is assumed to be 1965. The following age estimates were
provided by Westario Power staff

Note: 55 of 979 pad mount transformers are missing age data.
641 of 1767 pole mount transformers are missing age data.

- ABB -
- Brown Boveri
- CAM TRAN - 1978 to present
- Canadian Electrical Services -CES - Same
- Carte - 1980 to present
- English Electric
- ERMCO
- Federal Pioneer - 1970
- Ferranti - 1970
- Ferranti Electric - 1970
- Ferranti Packard - 1970
- General Electric (GE)
- JIMs Electric - 1970's to 1980
- Moloney - 1980 to present
- McGraw Edison - 1950
- Packard-- 1950
- Porter - 1960 to 1980
- Reliance - 1975
- Siemens - 1990
- T&R Electric
- Westinghouse - 1950 to 1980

Appendix B - Asset Assessment

Hydro Poles								
Pole_Year	Material	Treatment	Area	House #	Street	Address Descriptor	Pole_Id	Stock No
1988	WOOD CCA-PEG	PCP	Clifford	10	ALLAN ST W	FRONT	P00219	30334_C4
1988	WOOD CCA-PEG	PCP	Clifford	107	ELORA ST N		P00001	30334_C3
1988	WOOD CCA-PEG	PCP	Harriston	44	WILLIAM ST W		P00493	30334_C3
1988	WOOD CCA-PEG	PCP	Harriston	34	WILLIAM ST W		P00494	30334_C3
1988	WOOD CCA-PEG	PCP	Harriston	10	KING ST N		P00588	30318_C3
1988	WOOD CCA-PEG	PCP	Harriston	15	WILSON ST	ACROSS	P00300	30334_C3
1988	WOOD CCA-PEG	PCP	Harriston	76	ROBERTSON ST		P00315	30334_C3
1988	WOOD CCA-PEG	PCP	Harriston	59	MARGARET ST S		P00555	30318_C6
1988	WOOD CCA-PEG	PCP	Harriston	5	HUTCHISON ST	BACK	P00440	30526_C3
1988	WOOD CCA-PEG	PCP	Harriston	163	JOHN ST N		P00249	30334_C3
1988	WOOD CCA-PEG	PCP	Harriston	155	JOHN ST S		P00247	30334_C3
1988	WOOD CCA-PEG	PCP	Harriston	133	JOHN ST S		P00242	30334_C3
1988	WOOD CCA-PEG	PCP	Harriston	131	JOHN ST S		P00241	30334_C3
1988	WOOD CCA-PEG	PCP	Harriston				P00357	30334_C3
1988	WOOD CCA-PEG	PCP	Kincardine	367	DURHAM STREET	FRONT	P00106	30334_C5
1988	WOOD CCA-PEG	PCP	Kincardine	809	QUEEN ST	BACK	P00603	30334_C5
1988	WOOD CCA-PEG	PCP	Kincardine	577	BRUCE AVE		P00968	30526_C3
1988	WOOD CCA-PEG	PCP	Kincardine	591	BRUCE AVE		P00969	30526_C3
1988	WOOD CCA-PEG	PCP	Kincardine	0	BRUCE AVE		P00970	30526_C3
1988	WOOD CCA-PEG	PCP	Kincardine	0	BRUCE AVE		P01044	30526_C3
1988	WOOD CCA-PEG	PCP	Kincardine	0	BRUCE AVE		P01045	30526_C3
1988	WOOD CCA-PEG	PCP	Kincardine	0	BRUCE AVE		P01046	30526_C3
1988	WOOD CCA-PEG	PCP	Kincardine	0	BRUCE AVE		P01048	30526_C3
1988	WOOD CCA-PEG	PCP	Kincardine	0	BRUCE AVE		P01049	30526_C3
1988	WOOD CCA-PEG	PCP	Kincardine	0	BRUCE AVE		P01050	30526_C3
1988	WOOD CCA-PEG	PCP	Kincardine	0	BRUCE AVE		P01051	30526_C3
1988	WOOD CCA-PEG	PCP	Kincardine	192	PRINCESS STREET	SIDE	P01071	30526_C3
1988	WOOD CCA-PEG	PCP	Kincardine	189	PRINCESS STREET	SIDE	P01073	30526_C3
1988	WOOD CCA-PEG	PCP	Kincardine	554	KINCARDINE AVE	FRONT	P01178	30334_C5
1988	WOOD CCA-PEG	CCA - PEG	Kincardine	460	QUEEN ST	FRONT	P01294	30318_C6
1988	WOOD CCA-PEG	PCP	Kincardine	479	BRUCE AVE		P01081	30526_C3
1988	WOOD CCA-PEG		Lucknow	623	CAMPBELL ST	SIDE	P00091	30334_C3
1988	WOOD CCA-PEG	PCP	Mildmay	32	ABSALOM STREET WEST	FRONT	P00267	30334_C3
1988	WOOD CCA-PEG	PCP	Mildmay	1	FRED ST	FRONT	P00347	30334_C5
1988	WOOD CCA-PEG	PCP	Neustadt	373	ADAM ST		P00138	30318_C6
1988	WOOD CCA-PEG	PCP	Palmerson	547	PROSPECT ST	ACROSS	P00474	30334_C3
1988	WOOD CCA-PEG	PCP	Palmerson	559	PROSPECT ST		P00514	30334_C3
1988	WOOD CCA-PEG	PCP	Palmerson	505	TORONTO ST		P00645	30334_C4
1988	WOOD CCA-PEG	PCP	Palmerson	253	BOLTON ST		P00297	30334_C3
1988	WOOD CCA-PEG	PCP	Palmerson	212	WHITES RD		P00360	30334_C3
1988	WOOD CCA-PEG	PCP	Palmerson	370	NORMAN		P00311	30334_C3
1988	WOOD CCA-PEG	PCP	Palmerson	352	JANE ST		P00263	30334_C3
1988	WOOD CCA-PEG	PCP	Palmerson	410	JANE ST		P00259	30334_C3
1988	WOOD CCA-PEG	PCP	Palmerson	360	DERBY ST		P00426	30334_C3
1988	WOOD CCA-PEG	PCP	Port Elgin	515	GODERICH STREET		P00630	30334_C3
1988	WOOD CCA-PEG	CCA - PEG	Port Elgin	686	PEIRSON AVE		P00786	30334_C4
1988	WOOD CCA-PEG	PCP	Port Elgin	477	WELLINGTON ST		P00845	30334_C4
1988	WOOD CCA-PEG	PCP	Port Elgin	0	BRUCE ST		P01065	30334_C4
1988	WOOD CCA-PEG	PCP	Southampton	191	LAKE ST		P00215	30318_C5
1988	WOOD CCA-PEG	PCP	Southampton	165	BRUCE RD		P00395	30334_C4
1988	WOOD CCA-PEG		Teeswater	22	ANDREW ST	FRONT	P00216	30334_C3
1988	WOOD CCA-PEG	PCP	Walkerton	306	DURHAM RD	BACK	P00130	30334_C4
1988	WOOD CCA-PEG	PCP	Walkerton	33	YONGE ST N	ACROSS	P00153	30334_C4
1988	WOOD CCA-PEG	PCP	Walkerton	5	VALLEYSIDE DR		P00154	30334_C4
1988	WOOD CCA-PEG	PCP	Walkerton	14	VALLEYSIDE DR	ACROSS	P00156	30334_C4
1988	WOOD CCA-PEG	PCP	Walkerton	14	VALLEYSIDE DR	ACROSS	P00157	30334_C3
1988	WOOD CCA-PEG	PCP	Walkerton	35	1ST ST	ACROSS	P00159	30334_C4
1988	WOOD CCA-PEG	PCP	Walkerton	108	YONGE ST N		P00162	30334_C4
1988	WOOD CCA-PEG	PCP	Walkerton	11	COLBORNE ST		P00387	30334_C4
1988	WOOD CCA-PEG	PCP	Walkerton	226	DURHAM ST	BACK	P00388	30334_C4
1988	WOOD CCA-PEG	PCP	Walkerton	323	SOUTH ST		P00465	30334_C4
1988	WOOD CCA-PEG	PCP	Walkerton	3	HINKS ST		P00614	30334_C4
1988	WOOD CCA-PEG	PCP	Walkerton	18	WALLACE ST		P00988	30334_C3
1988	WOOD CCA-PEG	PCP	Walkerton	101	SOUTH ST		P01178	30334_C4
1988	WOOD CCA-PEG	PCP	Wingham	63	JOHN ST		P00323	30334_C3
1988	WOOD CCA-PEG	PCP	Wingham	83	JOHN ST		P00324	30334_C3
1988	WOOD CCA-PEG	PCP	Wingham	175	JOHN ST		P00333	30334_C3
1988	WOOD CCA-PEG	PCP	Wingham	0	JOHN ST		P00334	30334_C3
1988	WOOD CCA-PEG	PCP	Wingham	169	PATRICK ST		P00362	30334_C4
1988	WOOD CCA-PEG	PCP	Wingham	441	JOSEPHINE ST		P01703	30318_C4
1988	WOOD CCA-PEG	PCP	Wingham	129	JAMES CRT		P01740	30334_C3
1988	WOOD CCA-PEG	PCP	Wingham	437	SHUTER ST		P01759	30334_C3
1988	WOOD CCA-PEG	PCP	Wingham	447	SHUTER ST		P01767	30334_C3
1988	WOOD CCA-PEG	PCP	Wingham	79	SHUTER ST		P01769	30334_C3
1988	WOOD CCA-PEG	PCP	Wingham	79	SHUTER ST		P01773	30334_C3
1988	WOOD CCA-PEG	PCP	Wingham	105	PINE ST		P02042	30334_C3
1988	WOOD CCA-PEG	PCP	Wingham	107	PINE ST		P02045	30334_C3
1988	WOOD CCA-PEG	PCP	Wingham	0	OAK ST		P02049	30334_C3
1988	WOOD CCA-PEG	PCP	Wingham	245	CARLING TERRACE		P02248	30334_C3
1988	WOOD	PCP	Port Elgin	249	MILL STREET		P00118	30319_C3
1988	WOOD	PCP	Walkerton	305	VICTORIA ST		P00658	30319_C3
1988	WOOD	PCP	Harriston	52	QUEEN ST S		P00129	30321_C2
1988	WOOD	PCP	Port Elgin	413	PARKWOOD DR		P00238	30323_C3
1988	WOOD	PCP	Wingham	120	JOSEPHINE ST		P00006	30319_C5
1988	WOOD	PCP	Wingham	123	CHARLES ST		P01894	30319_C5
1988	WOOD	PCP	Lucknow	657	VICTORIA ST	FRONT	P00368	30319_C3
1988	WOOD	PCP	Southampton	300	ADELAIDE ST		P01280	30319_C5
1988	WOOD	PCP	Kincardine	791	QUEEN ST	BACK	P00608	30319_C5
1988	WOOD	PCP	Kincardine	0	BRUCE AVE		P01076	30323_C3

[illegible]

Hydro Poles									Factor from 0-4 based on age.
Pole_Year	Material	Treatment	Area	House #	Street	Address Descriptor	Pole_Id	Stock No	
1988	WOOD	PCP	Kincardine	569	BRUCE AVE	FRONT	P01087	30324_C3	3.5
1988	WOOD	PCP	Kincardine	577	BRUCE AVE	FRONT	P01091	30324_C3	3.5
1988	WOOD	PCP	Harriston	155	ARTHUR ST W	ACROSS	P00297	30321_C2	3.5
1988	WOOD	PCP	Harriston	15	HUTCHISON ST	FRONT	P00446	30323_C2	3.5
1988	WOOD	PCP	Harriston	15	HUTCHISON ST		P00445	30323_C2	3.5
1988	WOOD	PCP	Harriston	197	JOHN ST N		P00456	30321_C2	3.5
1988	WOOD	PCP	Harriston	197	JOHN ST N		P00457	30321_C2	3.5
1988	WOOD	PCP	Harriston	197	JOHN ST N		P00459	30321_C2	3.5
1988	WOOD	PCP	Harriston	187	JOHN ST N		P00614	30321_C2	3.5
1988	WOOD	PCP	Harriston	187	JOHN ST N		P00615	30321_C2	3.5
1988	WOOD	PCP	Harriston	185	JOHN ST N		P00616	30321_C2	3.5
1988	WOOD	PCP	Harriston	43	QUEEN ST S	ACROSS	P00126	30321_C2	3.5
1988	WOOD	PCP	Harriston	163	JOHN ST S		P00250	30321_C2	3.5
1988	WOOD	PCP	Harriston	172	ELORA ST S		P00198	30321_C2	3.5
1988	WOOD	PCP	Kincardine	0	BRUCE AVE		P01047	30323_C3	3.5
1988	WOOD	PCP	Kincardine	185	QUEEN ST	SIDE	P01067	30323_C3	3.5
1988	WOOD	CCA - PEG	Kincardine	321	BRUCE AVE	FRONT	P01069	30323_C3	3.5
1988	WOOD	PCP	Kincardine	331	BRUCE AVE	FRONT	P01070	30323_C3	3.5
1988	WOOD	PCP	Kincardine	189	PRINCESS STREET	SIDE	P01074	30323_C3	3.5
1988	WOOD	PCP	Kincardine	0	BRUCE AVE		P01075	30323_C3	3.5
1988	WOOD	PCP	Kincardine	0	BRUCE AVE		P01077	30323_C3	3.5
1988	WOOD	PCP	Kincardine	452	BRUCE AVE	FRONT	P01078	30323_C3	3.5
1988	WOOD	PCP	Kincardine	452	BRUCE AVE	FRONT	P01079	30323_C3	3.5
1988	WOOD	PCP	Kincardine	452	BRUCE AVE	FRONT	P01080	30323_C3	3.5
1988	WOOD	PCP	Kincardine	481	BRUCE AVE	FRONT	P09710	30323_C3	3.5
1988	WOOD	PCP	Kincardine	189	PARK STREET	SIDE	P01082	30323_C3	3.5
1988	WOOD	PCP	Kincardine	0	BRUCE AVE	SIDE	P01085	30323_C3	3.5
1988	WOOD	PCP	Kincardine	0	BRUCE AVE	BACK	P01086	30323_C3	3.5
1988	WOOD	PCP	Palmerson	320	NELSON		P00309	30319_C3	3.5
1988	WOOD	PCP	Palmerson	292	JANE ST		P00260	30319_C3	3.5
1988	WOOD	PCP	Palmerson	424	JANE ST		P00258	30319_C3	3.5
1988	WOOD	PCP	Port Elgin	633	HARBOUR STREET		P00049	30319_C4	3.5
1988	WOOD	PCP	Port Elgin	331	ELGIN ST		P00170	30319_C3	3.5
1988	WOOD	PCP	Port Elgin	351	MARKET ST		P00186	30319_C5	3.5
1988	WOOD	PCP	Port Elgin	337	RAY STREET		P00365	30319_C3	3.5
1988	WOOD	PCP	Port Elgin	514	STAFFORD STREET		P00382	30319_C5	3.5
1988	WOOD	PCP	Port Elgin	550	IVINGS DR		P00432	30319_C5	3.5
1988	WOOD	PCP	Port Elgin	518	WATERLOO ST		P00459	30319_C4	3.5
1988	WOOD	PCP	Port Elgin	432	GODERICH STREET		P00561	30319_C3	3.5
1988	WOOD	PCP	Port Elgin	433	GODERICH STREET		P00618	30319_C4	3.5
1988	WOOD	PCP	Port Elgin	275	GODERICH STREET		P00626	30319_C4	3.5
1988	WOOD	PCP	Port Elgin	616	PEIRSON AVE		P00664	30319_C3	3.5
1988	WOOD	PCP	Port Elgin	841	MILL STREET	ACROSS	P01032	30319_C5	3.5
1988	WOOD	PCP	Ripley	0	PARK ST		P00231	30319_C5	3.5
1988	WOOD	PCP	Southampton	260	WINDSOR BLVD		P00310	30319_C4	3.5
1988	WOOD	PCP	Southampton	370	HWY 21		P00469	30319_C5	3.5
1988	WOOD	PCP	Southampton	234	PALMERSON ST	SIDE	P00515	30319_C5	3.5
1988	WOOD	PCP	Southampton	250	ANGELISIA ST		P00814	30319_C4	3.5
1988	WOOD	PCP	Southampton	10	ANGELISIA ST		P00852	30319_C5	3.5
1988	WOOD	PCP	Southampton	12	ANGELISIA ST		P00859	30319_C5	3.5
1988	WOOD	PCP	Southampton	110	ANGELISIA ST		P00861	30319_C5	3.5
1988	WOOD	PCP	Southampton	33	ALBERT ST S		P01022	30319_C5	3.5
1988	WOOD	PCP	Southampton	370	HWY 21		P01330	30319_C5	3.5
1988	WOOD	PCP	Southampton	370	HWY 21		P01331	30319_C5	3.5
1988	WOOD	PAINT	Southampton	370	HWY 21		P01333	30319_C5	3.5
1988	WOOD	PCP	Southampton	420	HWY 21		P01334	30319_C5	3.5
1988	WOOD	PCP	Southampton	420	HWY 21		P01335	30319_C5	3.5
1988	WOOD	PCP	Southampton	420	ALLAN ST W		P01336	30319_C5	3.5
1988	WOOD	PCP	Southampton	252	ANGELISIA ST		P01484	30319_C5	3.5
1988	WOOD	PCP	Southampton	226	ANGELISIA ST		P01489	30319_C5	3.5
1988	WOOD	PCP	Southampton	218	ANGELISIA ST		P01490	30319_C5	3.5
1988	WOOD	PCP	Southampton	120	ANGELISIA ST		P01492	30319_C5	3.5
1988	WOOD	PCP	Walkerton	104	SOUTH ST		P00485	30321_C3	3.5
1988	WOOD	CCA - PEG	Walkerton	1108	YONGE ST		P01136	30319_C4	3.5
1988	WOOD	CCA - PEG	Elmwood	29	QUEEN ST E	WEST	P00055	30319_C5	3.5
1988	WOOD	PCP	Harriston	15	HUTCHISON ST		P00449	30323_C2	3.5
1988	WOOD	PCP	Harriston	197	JOHN ST N		P00454	30321_C2	3.5
1988	WOOD	PCP	Harriston	197	JOHN ST N		P00460	30321_C2	3.5
1988	WOOD	PCP	Harriston	55	QUEEN ST S		P00130	30321_C3	3.5
1988	WOOD	PCP	Neustadt	228	FORLER ST		P00120	30319_C5	3.5
1987	WOOD	CCA - PEG	Teeswater	9	BROWNLEE ST	FRONT	P00152	30319_C6	3.5
1987	WOOD CCA-PEG	CCA - PEG	Lucknow	698	STAUFFER ST		P00118	30318_C4	3.5
1987	WOOD	PCP	Southampton	180	LAIRD LANE		P01173	30319_C5	3.5
1987	WOOD	PCP	Walkerton	8	CAMBELL ST		P00053	30319_C4	3.5
1987	WOOD CCA-PEG	PCP	Mildmay	0	ADAM ST S		P00376	30334_C3	3.5
1987	WOOD CCA-PEG	PCP	Clifford	77	ALLAN ST W	ACROSS	P00150	30334_C3	3.5
1987	WOOD CCA-PEG	PCP	Clifford	5	JAMES ST E		P00015	30334_C3	3.5
1987	WOOD CCA-PEG	CCA - PEG	Elmwood	12	DAVID ST	FRONT	P00114	30334_C5	3.5
1987	WOOD CCA-PEG	CCA - PEG	Elmwood	14	DAVID ST	FRONT	P00115	30334_C4	3.5
1987	WOOD CCA-PEG	PCP	Harriston	105	GEORGE ST N		P00021	30318_C3	3.5
1987	WOOD CCA-PEG	PCP	Harriston	9	JOHN ST N		P00506	30334_C3	3.5
1987	WOOD CCA-PEG	PCP	Harriston	99	YOUNG ST W		P00327	30334_C4	3.5
1987	WOOD CCA-PEG	PCP	Harriston	80	ROBERTSON ST		P00317	30334_C3	3.5
1987	WOOD CCA-PEG	PCP	Harriston	0	ARENA		P00069	30334_C3	3.5
1987	WOOD CCA-PEG	PCP	Harriston	63	QUEEN ST N		P00108	30334_C3	3.5
1987	WOOD CCA-PEG	PCP	Harriston	21	UNION	SIDE	P00109	30334_C3	3.5
1987	WOOD CCA-PEG	PCP	Harriston	17	QUEEN ST S	ACROSS	P00123	30334_C3	3.5
1987	WOOD CCA-PEG	PCP	Harriston	26	QUEEN ST S		P00125	30334_C3	3.5
1987	WOOD CCA-PEG	PCP	Harriston	187	JOHN ST S		P00254	30334_C4	3.5

Hydro Poles

Pole_Year	Material	Treatment	Area	House #	Street	Address Descriptor	Pole_Id	Stock No
1965			Port Elgin				P00185	POLE_DEFAULT
1965			Port Elgin				P00190	POLE_DEFAULT
1965			Port Elgin				P00200	POLE_DEFAULT
1965			Port Elgin				P00201	POLE_DEFAULT
1965			Port Elgin				P00202	POLE_DEFAULT
1965			Port Elgin				P00209	POLE_DEFAULT
1965			Port Elgin				P00210	POLE_DEFAULT
1965			Port Elgin				P00211	POLE_DEFAULT
1965			Port Elgin				P00212	POLE_DEFAULT
1965			Port Elgin				P00217	POLE_DEFAULT
1965			Port Elgin				P00221	POLE_DEFAULT
1965			Port Elgin				P00223	POLE_DEFAULT
1965			Port Elgin				P00228	POLE_DEFAULT
1965			Port Elgin				P00229	POLE_DEFAULT
1965			Port Elgin				P00230	POLE_DEFAULT
1965			Port Elgin				P00237	POLE_DEFAULT
1965			Port Elgin				P00239	POLE_DEFAULT
1965			Port Elgin				P00240	POLE_DEFAULT
1965			Port Elgin				P00241	POLE_DEFAULT
1965			Port Elgin				P00242	POLE_DEFAULT
1965			Port Elgin				P00245	POLE_DEFAULT
1965			Port Elgin				P00246	POLE_DEFAULT
1965			Port Elgin				P00247	POLE_DEFAULT
1965			Port Elgin				P00248	POLE_DEFAULT
1965			Port Elgin				P00249	POLE_DEFAULT
1965			Port Elgin				P00250	POLE_DEFAULT
1965			Port Elgin				P00251	POLE_DEFAULT
1965			Port Elgin				P00252	POLE_DEFAULT
1965			Port Elgin				P00254	POLE_DEFAULT
1965			Port Elgin				P00256	POLE_DEFAULT
1965			Port Elgin				P00257	POLE_DEFAULT
1965			Port Elgin				P00258	POLE_DEFAULT
1965			Port Elgin				P00259	POLE_DEFAULT
1965			Port Elgin				P00261	POLE_DEFAULT
1965			Port Elgin				P00262	POLE_DEFAULT
1965			Port Elgin				P00263	POLE_DEFAULT
1965			Port Elgin				P00264	POLE_DEFAULT
1965			Port Elgin				P00265	POLE_DEFAULT
1965			Port Elgin				P00266	POLE_DEFAULT
1965			Port Elgin				P00267	POLE_DEFAULT
1965			Port Elgin				P00268	POLE_DEFAULT
1965			Port Elgin				P00269	POLE_DEFAULT
1965			Port Elgin				P00270	POLE_DEFAULT
1965			Port Elgin				P00276	POLE_DEFAULT
1965			Port Elgin				P00278	POLE_DEFAULT
1965			Port Elgin				P00280	POLE_DEFAULT
1965			Port Elgin				P00283	POLE_DEFAULT
1965			Port Elgin				P00284	POLE_DEFAULT
1965			Port Elgin				P00285	POLE_DEFAULT
1965			Port Elgin				P00291	POLE_DEFAULT
1965			Port Elgin				P00293	POLE_DEFAULT
1965			Port Elgin				P00294	POLE_DEFAULT
1965			Port Elgin				P00295	POLE_DEFAULT
1965			Port Elgin				P00298	POLE_DEFAULT
1965			Port Elgin				P00300	POLE_DEFAULT
1965			Port Elgin				P00304	POLE_DEFAULT
1965			Port Elgin				P00311	POLE_DEFAULT
1965			Port Elgin				P00313	POLE_DEFAULT
1965			Port Elgin				P00315	POLE_DEFAULT
1965			Port Elgin				P00316	POLE_DEFAULT
1965			Port Elgin				P00324	POLE_DEFAULT
1965			Port Elgin				P00325	POLE_DEFAULT
1965			Port Elgin				P00327	POLE_DEFAULT
1965			Port Elgin				P00332	POLE_DEFAULT
1965			Port Elgin				P00335	POLE_DEFAULT
1965			Port Elgin				P00347	POLE_DEFAULT
1965			Port Elgin				P00349	POLE_DEFAULT
1965			Port Elgin				P00355	POLE_DEFAULT
1965			Port Elgin				P00373	POLE_DEFAULT
1965			Port Elgin				P00376	POLE_DEFAULT
1965			Port Elgin				P00377	POLE_DEFAULT
1965			Port Elgin				P00384	POLE_DEFAULT
1965			Port Elgin				P00397	POLE_DEFAULT
1965			Port Elgin				P00399	POLE_DEFAULT
1965			Port Elgin				P00401	POLE_DEFAULT
1965			Port Elgin				P00405	POLE_DEFAULT
1965			Port Elgin				P00418	POLE_DEFAULT
1965			Port Elgin				P00424	POLE_DEFAULT
1965			Port Elgin				P00427	POLE_DEFAULT
1965			Port Elgin				P00430	POLE_DEFAULT
1965			Port Elgin				P00436	POLE_DEFAULT
1965			Port Elgin				P00447	POLE_DEFAULT
1965			Port Elgin				P00452	POLE_DEFAULT
1965			Port Elgin				P00453	POLE_DEFAULT
1965			Port Elgin				P00454	POLE_DEFAULT
1965			Port Elgin				P00458	POLE_DEFAULT
1965			Port Elgin				P00460	POLE_DEFAULT
1965			Port Elgin				P00463	POLE_DEFAULT
1965			Port Elgin				P00464	POLE_DEFAULT

Factor from 0-4 based on age.
0 if age = 51+
0.7 if age = 45 to 50
1.5 if age = 40 to 44
2.1 if age = 35 to 39
3.0 if age = 30 to 34
3.5 if age = 25-29
4 if age = 25-

[illegible]

Hydro Poles

Pole_Year	Material	Treatment	Area	House #	Street	Address Descriptor	Pole_Id	Stock No
1965			Port Elgin				P00475	POLE_DEFAULT
1965			Port Elgin				P00478	POLE_DEFAULT
1965			Port Elgin				P00481	POLE_DEFAULT
1965			Port Elgin				P00484	POLE_DEFAULT
1965			Port Elgin				P00489	POLE_DEFAULT
1965			Port Elgin				P00494	POLE_DEFAULT
1965			Port Elgin				P00504	POLE_DEFAULT
1965			Port Elgin				P00507	POLE_DEFAULT
1965			Port Elgin				P00511	POLE_DEFAULT
1965			Port Elgin				P00518	POLE_DEFAULT
1965			Port Elgin				P00528	POLE_DEFAULT
1965			Port Elgin				P00531	POLE_DEFAULT
1965			Port Elgin				P00535	POLE_DEFAULT
1965			Port Elgin				P00539	POLE_DEFAULT
1965			Port Elgin				P00540	POLE_DEFAULT
1965			Port Elgin				P00545	POLE_DEFAULT
1965			Port Elgin				P00547	POLE_DEFAULT
1965			Port Elgin				P00549	POLE_DEFAULT
1965			Port Elgin				P00558	POLE_DEFAULT
1965			Port Elgin				P00572	POLE_DEFAULT
1965			Port Elgin				P00573	POLE_DEFAULT
1965			Port Elgin				P00577	POLE_DEFAULT
1965			Port Elgin				P00579	POLE_DEFAULT
1965			Port Elgin				P00580	POLE_DEFAULT
1965			Port Elgin				P00582	POLE_DEFAULT
1965			Port Elgin				P00583	POLE_DEFAULT
1965			Port Elgin				P00590	POLE_DEFAULT
1965			Port Elgin				P00592	POLE_DEFAULT
1965			Port Elgin				P00593	POLE_DEFAULT
1965			Port Elgin				P00596	POLE_DEFAULT
1965			Port Elgin				P00600	POLE_DEFAULT
1965			Port Elgin				P00604	POLE_DEFAULT
1965			Port Elgin				P00641	POLE_DEFAULT
1965			Port Elgin				P00644	POLE_DEFAULT
1965			Port Elgin				P00652	POLE_DEFAULT
1965			Port Elgin				P00657	POLE_DEFAULT
1965			Port Elgin				P00662	POLE_DEFAULT
1965			Port Elgin				P00665	POLE_DEFAULT
1965			Port Elgin				P00669	POLE_DEFAULT
1965			Port Elgin				P00674	POLE_DEFAULT
1965			Port Elgin				P00676	POLE_DEFAULT
1965			Port Elgin				P00678	POLE_DEFAULT
1965			Port Elgin				P00679	POLE_DEFAULT
1965			Port Elgin				P00682	POLE_DEFAULT
1965			Port Elgin				P00683	POLE_DEFAULT
1965			Port Elgin				P00684	POLE_DEFAULT
1965			Port Elgin				P00685	POLE_DEFAULT
1965			Port Elgin				P00686	POLE_DEFAULT
1965			Port Elgin				P00690	POLE_DEFAULT
1965			Port Elgin				P00693	POLE_DEFAULT
1965			Port Elgin				P00706	POLE_DEFAULT
1965			Port Elgin				P00707	POLE_DEFAULT
1965			Port Elgin				P00711	POLE_DEFAULT
1965			Port Elgin				P00715	POLE_DEFAULT
1965			Port Elgin				P00720	POLE_DEFAULT
1965			Port Elgin				P00725	POLE_DEFAULT
1965			Port Elgin				P00727	POLE_DEFAULT
1965			Port Elgin				P00730	POLE_DEFAULT
1965			Port Elgin				P00731	POLE_DEFAULT
1965			Port Elgin				P00732	POLE_DEFAULT
1965			Port Elgin				P00744	POLE_DEFAULT
1965			Port Elgin				P00745	POLE_DEFAULT
1965			Port Elgin				P00747	POLE_DEFAULT
1965			Port Elgin				P00763	POLE_DEFAULT
1965			Port Elgin				P00785	POLE_DEFAULT
1965			Port Elgin				P00787	POLE_DEFAULT
1965			Port Elgin				P00788	POLE_DEFAULT
1965			Port Elgin				P00798	POLE_DEFAULT
1965			Port Elgin				P00800	POLE_DEFAULT
1965			Port Elgin				P00802	POLE_DEFAULT
1965			Port Elgin				P00804	POLE_DEFAULT
1965			Port Elgin				P00809	POLE_DEFAULT
1965			Port Elgin				P00810	POLE_DEFAULT
1965			Port Elgin				P00811	POLE_DEFAULT
1965			Port Elgin				P00812	POLE_DEFAULT
1965			Port Elgin				P00813	POLE_DEFAULT
1965			Port Elgin				P00814	POLE_DEFAULT
1965			Port Elgin				P00816	POLE_DEFAULT
1965			Port Elgin				P00817	POLE_DEFAULT
1965			Port Elgin				P00818	POLE_DEFAULT
1965			Port Elgin				P00819	POLE_DEFAULT
1965			Port Elgin				P00820	POLE_DEFAULT
1965			Port Elgin				P00821	POLE_DEFAULT
1965			Port Elgin				P00825	POLE_DEFAULT
1965			Port Elgin				P00826	POLE_DEFAULT
1965			Port Elgin				P00827	POLE_DEFAULT
1965			Port Elgin				P00828	POLE_DEFAULT
1965			Port Elgin				P00831	POLE_DEFAULT
1965			Port Elgin				P00837	POLE_DEFAULT

Factor from 0-4 based on age.
0 if age = 51+
0.7 if age = 45 to 50
1.5 if age = 40 to 44
2.1 if age = 35 to 39
3.0 if age = 30 to 34
3.5 if age = 25-29
4 if age = 25-

[illegible]

Hydro Poles

Pole_Year	Material	Treatment	Area	House #	Street	Address Descriptor	Pole_Id	Stock No
1965			Port Elgin				P00838	POLE_DEFAULT
1965			Port Elgin				P00839	POLE_DEFAULT
1965			Port Elgin				P00840	POLE_DEFAULT
1965			Port Elgin				P00841	POLE_DEFAULT
1965			Port Elgin				P00842	POLE_DEFAULT
1965			Port Elgin				P00843	POLE_DEFAULT
1965			Port Elgin				P00844	POLE_DEFAULT
1965			Port Elgin				P00846	POLE_DEFAULT
1965			Port Elgin				P00848	POLE_DEFAULT
1965			Port Elgin				P00849	POLE_DEFAULT
1965			Port Elgin				P00850	POLE_DEFAULT
1965			Port Elgin				P00851	POLE_DEFAULT
1965			Port Elgin				P00853	POLE_DEFAULT
1965			Port Elgin				P00854	POLE_DEFAULT
1965			Port Elgin				P00855	POLE_DEFAULT
1965			Port Elgin				P00856	POLE_DEFAULT
1965			Port Elgin				P00858	POLE_DEFAULT
1965			Port Elgin				P00859	POLE_DEFAULT
1965			Port Elgin				P00860	POLE_DEFAULT
1965			Port Elgin				P00861	POLE_DEFAULT
1965			Port Elgin				P00862	POLE_DEFAULT
1965			Port Elgin				P00863	POLE_DEFAULT
1965			Port Elgin				P00864	POLE_DEFAULT
1965			Port Elgin				P00865	POLE_DEFAULT
1965			Port Elgin				P00866	POLE_DEFAULT
1965			Port Elgin				P00867	POLE_DEFAULT
1965			Port Elgin				P00868	POLE_DEFAULT
1965			Port Elgin				P00869	POLE_DEFAULT
1965			Port Elgin				P00870	POLE_DEFAULT
1965			Port Elgin				P00871	POLE_DEFAULT
1965			Port Elgin				P00872	POLE_DEFAULT
1965			Port Elgin				P00873	POLE_DEFAULT
1965			Port Elgin				P00874	POLE_DEFAULT
1965			Port Elgin				P00875	POLE_DEFAULT
1965			Port Elgin				P00876	POLE_DEFAULT
1965			Port Elgin				P00877	POLE_DEFAULT
1965			Port Elgin				P00878	POLE_DEFAULT
1965			Port Elgin				P00879	POLE_DEFAULT
1965			Port Elgin				P00880	POLE_DEFAULT
1965			Port Elgin				P00881	POLE_DEFAULT
1965			Port Elgin				P00882	POLE_DEFAULT
1965			Port Elgin				P00883	POLE_DEFAULT
1965			Port Elgin				P00884	POLE_DEFAULT
1965			Port Elgin				P00885	POLE_DEFAULT
1965			Port Elgin				P00886	POLE_DEFAULT
1965			Port Elgin				P00887	POLE_DEFAULT
1965			Port Elgin				P00888	POLE_DEFAULT
1965			Port Elgin				P00891	POLE_DEFAULT
1965			Port Elgin				P00892	POLE_DEFAULT
1965			Port Elgin				P00893	POLE_DEFAULT
1965			Port Elgin				P00894	POLE_DEFAULT
1965			Port Elgin				P00895	POLE_DEFAULT
1965			Port Elgin				P00897	POLE_DEFAULT
1965			Port Elgin				P00898	POLE_DEFAULT
1965			Port Elgin				P00899	POLE_DEFAULT
1965			Port Elgin				P00900	POLE_DEFAULT
1965			Port Elgin				P00901	POLE_DEFAULT
1965			Port Elgin				P00904	POLE_DEFAULT
1965			Port Elgin				P00909	POLE_DEFAULT
1965			Port Elgin				P00910	POLE_DEFAULT
1965			Port Elgin				P00911	POLE_DEFAULT
1965			Port Elgin				P00916	POLE_DEFAULT
1965			Port Elgin				P00921	POLE_DEFAULT
1965			Port Elgin				P00922	POLE_DEFAULT
1965			Port Elgin				P00923	POLE_DEFAULT
1965			Port Elgin				P00927	POLE_DEFAULT
1965			Port Elgin				P00930	POLE_DEFAULT
1965			Port Elgin				P00931	POLE_DEFAULT
1965			Port Elgin				P00938	POLE_DEFAULT
1965			Port Elgin				P00939	POLE_DEFAULT
1965			Port Elgin				P00940	POLE_DEFAULT
1965			Port Elgin				P00942	POLE_DEFAULT
1965			Port Elgin				P00943	POLE_DEFAULT
1965			Port Elgin				P00945	POLE_DEFAULT
1965			Port Elgin				P00946	POLE_DEFAULT
1965			Port Elgin				P00947	POLE_DEFAULT
1965			Port Elgin				P00948	POLE_DEFAULT
1965			Port Elgin				P00952	POLE_DEFAULT
1965			Port Elgin				P00954	POLE_DEFAULT
1965			Port Elgin				P00955	POLE_DEFAULT
1965			Port Elgin				P00956	POLE_DEFAULT
1965			Port Elgin				P00957	POLE_DEFAULT
1965			Port Elgin				P00959	POLE_DEFAULT
1965			Port Elgin				P00960	POLE_DEFAULT
1965			Port Elgin				P00961	POLE_DEFAULT
1965			Port Elgin				P00962	POLE_DEFAULT
1965			Port Elgin				P00963	POLE_DEFAULT
1965			Port Elgin				P00965	POLE_DEFAULT
1965			Port Elgin				P00966	POLE_DEFAULT

Factor from 0-4 based on age.
0 if age = 51+
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1.5 if age = 40 to 44
2.1 if age = 35 to 39
3.0 if age = 30 to 34
3.5 if age = 25-29
4 if age = 25-

[illegible]

Hydro Poles

Pole_Year	Material	Treatment	Area	House #	Street	Address Descriptor	Pole_Id	Stock No
1965			Southampton				P00220	POLE_DEFAULT
1965			Southampton				P00225	POLE_DEFAULT
1965			Southampton				P00237	POLE_DEFAULT
1965			Southampton				P00276	POLE_DEFAULT
1965			Southampton				P00297	POLE_DEFAULT
1965			Southampton				P00301	POLE_DEFAULT
1965			Southampton				P00302	POLE_DEFAULT
1965			Southampton				P00338	POLE_DEFAULT
1965			Southampton				P00340	POLE_DEFAULT
1965			Southampton				P00341	POLE_DEFAULT
1965			Southampton				P00347	POLE_DEFAULT
1965			Southampton				P00358	POLE_DEFAULT
1965			Southampton				P00361	POLE_DEFAULT
1965			Southampton				P00377	POLE_DEFAULT
1965			Southampton				P00392	POLE_DEFAULT
1965			Southampton				P00393	POLE_DEFAULT
1965			Southampton				P00400	POLE_DEFAULT
1965			Southampton				P00413	POLE_DEFAULT
1965			Southampton				P00414	POLE_DEFAULT
1965			Southampton				P00417	POLE_DEFAULT
1965			Southampton				P00423	POLE_DEFAULT
1965			Southampton				P00425	POLE_DEFAULT
1965			Southampton				P00426	POLE_DEFAULT
1965			Southampton				P00428	POLE_DEFAULT
1965			Southampton				P00429	POLE_DEFAULT
1965			Southampton				P00430	POLE_DEFAULT
1965			Southampton				P00432	POLE_DEFAULT
1965			Southampton				P00433	POLE_DEFAULT
1965			Southampton				P00437	POLE_DEFAULT
1965			Southampton				P00441	POLE_DEFAULT
1965			Southampton				P00445	POLE_DEFAULT
1965			Southampton				P00467	POLE_DEFAULT
1965			Southampton				P00468	POLE_DEFAULT
1965			Southampton				P00470	POLE_DEFAULT
1965			Southampton				P00487	POLE_DEFAULT
1965			Southampton				P00488	POLE_DEFAULT
1965			Southampton				P00489	POLE_DEFAULT
1965			Southampton				P00494	POLE_DEFAULT
1965			Southampton				P00500	POLE_DEFAULT
1965			Southampton				P00523	POLE_DEFAULT
1965			Southampton				P00523	POLE_DEFAULT
1965			Southampton				P00526	POLE_DEFAULT
1965			Southampton				P00527	POLE_DEFAULT
1965			Southampton				P00528	POLE_DEFAULT
1965			Southampton				P00529	POLE_DEFAULT
1965			Southampton				P00530	POLE_DEFAULT
1965			Southampton				P00531	POLE_DEFAULT
1965			Southampton				P00532	POLE_DEFAULT
1965			Southampton				P00533	POLE_DEFAULT
1965			Southampton				P00534	POLE_DEFAULT
1965			Southampton				P00535	POLE_DEFAULT
1965			Southampton				P00591	POLE_DEFAULT
1965			Southampton				P00594	POLE_DEFAULT
1965			Southampton				P00602	POLE_DEFAULT
1965			Southampton				P00605	POLE_DEFAULT
1965			Southampton				P00609	POLE_DEFAULT
1965			Southampton				P00610	POLE_DEFAULT
1965			Southampton				P00611	POLE_DEFAULT
1965			Southampton				P00621	POLE_DEFAULT
1965			Southampton				P00660	POLE_DEFAULT
1965			Southampton				P00676	POLE_DEFAULT
1965			Southampton				P00687	POLE_DEFAULT
1965			Southampton				P00704	POLE_DEFAULT
1965			Southampton				P00710	POLE_DEFAULT
1965			Southampton				P00718	POLE_DEFAULT
1965			Southampton				P00719	POLE_DEFAULT
1965			Southampton				P00725	POLE_DEFAULT
1965			Southampton				P00757	POLE_DEFAULT
1965			Southampton				P00761	POLE_DEFAULT
1965			Southampton				P00763	POLE_DEFAULT
1965			Southampton				P00793	POLE_DEFAULT
1965			Southampton				P00794	POLE_DEFAULT
1965			Southampton				P00796	POLE_DEFAULT
1965			Southampton				P00797	POLE_DEFAULT
1965			Southampton				P00798	POLE_DEFAULT
1965			Southampton				P00799	POLE_DEFAULT
1965			Southampton				P00800	POLE_DEFAULT
1965			Southampton				P00801	POLE_DEFAULT
1965			Southampton				P00812	POLE_DEFAULT
1965			Southampton				P00849	POLE_DEFAULT
1965			Southampton				P00884	POLE_DEFAULT
1965			Southampton				P00885	POLE_DEFAULT
1965			Southampton				P00886	POLE_DEFAULT
1965			Southampton				P00902	POLE_DEFAULT
1965			Southampton				P00905	POLE_DEFAULT
1965			Southampton				P00910	POLE_DEFAULT
1965			Southampton				P00916	POLE_DEFAULT
1965			Southampton				P00927	POLE_DEFAULT
1965			Southampton				P00944	POLE_DEFAULT

Factor from 0-4 based on age.
0 if age = 51+
0.7 if age = 45 to 50
1.5 if age = 40 to 44
2.1 if age = 35 to 39
3.0 if age = 30 to 34
3.5 if age = 25-29
4 if age = 25-

[illegible]

Hydro Poles

Pole_Year	Material	Treatment	Area	House #	Street	Address Descriptor	Pole_Id	Stock No
1965			Walkerton				P00096	POLE_DEFAULT
1965			Walkerton				P00108	POLE_DEFAULT
1965			Walkerton				P00109	POLE_DEFAULT
1965			Walkerton				P00120	POLE_DEFAULT
1965			Walkerton				P00124	POLE_DEFAULT
1965			Walkerton				P00131	POLE_DEFAULT
1965			Walkerton				P00132	POLE_DEFAULT
1965			Walkerton				P00139	POLE_DEFAULT
1965			Walkerton				P00145	POLE_DEFAULT
1965			Walkerton				P00149	POLE_DEFAULT
1965			Walkerton				P00158	POLE_DEFAULT
1965			Walkerton				P00167	POLE_DEFAULT
1965			Walkerton				P00170	POLE_DEFAULT
1965			Walkerton				P00187	POLE_DEFAULT
1965			Walkerton				P00219	POLE_DEFAULT
1965			Walkerton				P00221	POLE_DEFAULT
1965			Walkerton				P00241	POLE_DEFAULT
1965			Walkerton				P00253	POLE_DEFAULT
1965			Walkerton				P00262	POLE_DEFAULT
1965			Walkerton				P00282	POLE_DEFAULT
1965			Walkerton				P00283	POLE_DEFAULT
1965			Walkerton				P00284	POLE_DEFAULT
1965			Walkerton				P00288	POLE_DEFAULT
1965			Walkerton				P00352	POLE_DEFAULT
1965			Walkerton				P00357	POLE_DEFAULT
1965			Walkerton				P00359	POLE_DEFAULT
1965			Walkerton				P00361	POLE_DEFAULT
1965			Walkerton				P00362	POLE_DEFAULT
1965			Walkerton				P00363	POLE_DEFAULT
1965			Walkerton				P00386	POLE_DEFAULT
1965			Walkerton				P00404	POLE_DEFAULT
1965			Walkerton				P00412	POLE_DEFAULT
1965			Walkerton				P00435	POLE_DEFAULT
1965			Walkerton				P00436	POLE_DEFAULT
1965			Walkerton				P00442	POLE_DEFAULT
1965			Walkerton				P00443	POLE_DEFAULT
1965			Walkerton				P00450	POLE_DEFAULT
1965			Walkerton				P00453	POLE_DEFAULT
1965			Walkerton				P00455	POLE_DEFAULT
1965			Walkerton				P00469	POLE_DEFAULT
1965			Walkerton				P00523	POLE_DEFAULT
1965			Walkerton				P00524	POLE_DEFAULT
1965			Walkerton				P00525	POLE_DEFAULT
1965			Walkerton				P00533	POLE_DEFAULT
1965			Walkerton				P00537	POLE_DEFAULT
1965			Walkerton				P00546	POLE_DEFAULT
1965			Walkerton				P00636	POLE_DEFAULT
1965			Walkerton				P00637	POLE_DEFAULT
1965			Walkerton				P00642	POLE_DEFAULT
1965			Walkerton				P00643	POLE_DEFAULT
1965			Walkerton				P00670	POLE_DEFAULT
1965			Walkerton				P00720	POLE_DEFAULT
1965			Walkerton				P00738	POLE_DEFAULT
1965			Walkerton				P00742	POLE_DEFAULT
1965			Walkerton				P00760	POLE_DEFAULT
1965			Walkerton				P00765	POLE_DEFAULT
1965			Walkerton				P00781	POLE_DEFAULT
1965			Walkerton				P00787	POLE_DEFAULT
1965			Walkerton				P00797	POLE_DEFAULT
1965			Walkerton				P00800	POLE_DEFAULT
1965			Walkerton				P00810	POLE_DEFAULT
1965			Walkerton				P00812	POLE_DEFAULT
1965			Walkerton				P00814	POLE_DEFAULT
1965			Walkerton				P00815	POLE_DEFAULT
1965			Walkerton				P00816	POLE_DEFAULT
1965			Walkerton				P00817	POLE_DEFAULT
1965			Walkerton				P00818	POLE_DEFAULT
1965			Walkerton				P00824	POLE_DEFAULT
1965			Walkerton				P00829	POLE_DEFAULT
1965			Walkerton				P00844	POLE_DEFAULT
1965			Walkerton				P00887	POLE_DEFAULT
1965			Walkerton				P00890	POLE_DEFAULT
1965			Walkerton				P00892	POLE_DEFAULT
1965			Walkerton				P00900	POLE_DEFAULT
1965			Walkerton				P00905	POLE_DEFAULT
1965			Walkerton				P00919	POLE_DEFAULT
1965			Walkerton				P00920	POLE_DEFAULT
1965			Walkerton				P00921	POLE_DEFAULT
1965			Walkerton				P00922	POLE_DEFAULT
1965			Walkerton				P00923	POLE_DEFAULT
1965			Walkerton				P00924	POLE_DEFAULT
1965			Walkerton				P00925	POLE_DEFAULT
1965			Walkerton				P00926	POLE_DEFAULT
1965			Walkerton				P00927	POLE_DEFAULT
1965			Walkerton				P00928	POLE_DEFAULT
1965			Walkerton				P00929	POLE_DEFAULT
1965			Walkerton				P00930	POLE_DEFAULT
1965			Walkerton				P00931	POLE_DEFAULT
1965			Walkerton				P00932	POLE_DEFAULT

Factor from 0-4 based on age.
0 if age = 51+
0.7 if age = 45 to 50
1.5 if age = 40 to 44
2.1 if age = 35 to 39
3.0 if age = 30 to 34
3.5 if age = 25-29
4 if age = 25-

[illegible]

Hydro Poles

Pole_Year	Material	Treatment	Area	House #	Street	Address Descriptor	Pole_Id	Stock No
1965			Walkerton				P00933	POLE_DEFAULT
1965			Walkerton				P00934	POLE_DEFAULT
1965			Walkerton				P00935	POLE_DEFAULT
1965			Walkerton				P00939	POLE_DEFAULT
1965			Walkerton				P00940	POLE_DEFAULT
1965			Walkerton				P00956	POLE_DEFAULT
1965			Walkerton				P00957	POLE_DEFAULT
1965			Walkerton				P00958	POLE_DEFAULT
1965			Walkerton				P00959	POLE_DEFAULT
1965			Walkerton				P00960	POLE_DEFAULT
1965			Walkerton				P00961	POLE_DEFAULT
1965			Walkerton				P00962	POLE_DEFAULT
1965			Walkerton				P00963	POLE_DEFAULT
1965			Walkerton				P00964	POLE_DEFAULT
1965			Walkerton				P00967	POLE_DEFAULT
1965			Walkerton				P00968	POLE_DEFAULT
1965			Walkerton				P00969	POLE_DEFAULT
1965			Walkerton				P00970	POLE_DEFAULT
1965			Walkerton				P00976	POLE_DEFAULT
1965			Walkerton				P00981	POLE_DEFAULT
1965			Walkerton				P00990	POLE_DEFAULT
1965			Walkerton				P00992	POLE_DEFAULT
1965			Walkerton				P00993	POLE_DEFAULT
1965			Walkerton				P00994	POLE_DEFAULT
1965			Walkerton				P00997	POLE_DEFAULT
1965			Walkerton				P00998	POLE_DEFAULT
1965			Walkerton				P00999	POLE_DEFAULT
1965			Walkerton				P01000	POLE_DEFAULT
1965			Walkerton				P01001	POLE_DEFAULT
1965			Walkerton				P01002	POLE_DEFAULT
1965			Walkerton				P01003	POLE_DEFAULT
1965			Walkerton				P01005	POLE_DEFAULT
1965			Walkerton				P01006	POLE_DEFAULT
1965			Walkerton				P01007	POLE_DEFAULT
1965			Walkerton				P01008	POLE_DEFAULT
1965			Walkerton				P01009	POLE_DEFAULT
1965			Walkerton				P01012	POLE_DEFAULT
1965			Walkerton				P01013	POLE_DEFAULT
1965			Walkerton				P01017	POLE_DEFAULT
1965			Walkerton				P01020	POLE_DEFAULT
1965			Walkerton				P01021	POLE_DEFAULT
1965			Walkerton				P01022	POLE_DEFAULT
1965			Walkerton				P01023	POLE_DEFAULT
1965			Walkerton				P01024	POLE_DEFAULT
1965			Walkerton				P01025	POLE_DEFAULT
1965			Walkerton				P01026	POLE_DEFAULT
1965			Walkerton				P01027	POLE_DEFAULT
1965			Walkerton				P01028	POLE_DEFAULT
1965			Walkerton				P01029	POLE_DEFAULT
1965			Walkerton				P01036	POLE_DEFAULT
1965			Walkerton				P01037	POLE_DEFAULT
1965			Walkerton				P01038	POLE_DEFAULT
1965			Walkerton				P01039	POLE_DEFAULT
1965			Walkerton				P01043	POLE_DEFAULT
1965			Walkerton				P01046	POLE_DEFAULT
1965			Walkerton				P01048	POLE_DEFAULT
1965			Walkerton				P01049	POLE_DEFAULT
1965			Walkerton				P01058	POLE_DEFAULT
1965			Walkerton				P01063	POLE_DEFAULT
1965			Walkerton				P01065	POLE_DEFAULT
1965			Walkerton				P01066	POLE_DEFAULT
1965			Walkerton				P01079	POLE_DEFAULT
1965			Walkerton				P01083	POLE_DEFAULT
1965			Walkerton				P01084	POLE_DEFAULT
1965			Walkerton				P01085	POLE_DEFAULT
1965			Walkerton				P01086	POLE_DEFAULT
1965			Walkerton				P01087	POLE_DEFAULT
1965			Walkerton				P01088	POLE_DEFAULT
1965			Walkerton				P01089	POLE_DEFAULT
1965			Walkerton	</				

Factor from 0-4 based on age.
0 if age = 51+
0.7 if age = 45 to 50
1.5 if age = 40 to 44
2.1 if age = 35 to 39
3.0 if age = 30 to 34
3.5 if age = 25-29
4 if age = 25-

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Hydro Poles

Pole_Year	Material	Treatment	Area	House #	Street	Address Descriptor	Pole_Id	Stock No
1965			Walkerton				P01130	POLE_DEFAULT
1965			Walkerton				P01131	POLE_DEFAULT
1965			Walkerton				P01133	POLE_DEFAULT
1965			Walkerton				P01134	POLE_DEFAULT
1965			Walkerton				P01135	POLE_DEFAULT
1965			Walkerton				P01137	POLE_DEFAULT
1965			Walkerton				P01138	POLE_DEFAULT
1965			Walkerton				P01140	POLE_DEFAULT
1965			Walkerton				P01141	POLE_DEFAULT
1965			Walkerton				P01142	POLE_DEFAULT
1965			Walkerton				P01145	POLE_DEFAULT
1965			Walkerton				P01150	POLE_DEFAULT
1965			Walkerton				P01151	POLE_DEFAULT
1965			Walkerton				P01152	POLE_DEFAULT
1965			Walkerton				P01154	POLE_DEFAULT
1965			Walkerton				P01156	POLE_DEFAULT
1965			Walkerton				P01157	POLE_DEFAULT
1965			Walkerton				P01158	POLE_DEFAULT
1965			Walkerton				P01159	POLE_DEFAULT
1965			Walkerton				P01160	POLE_DEFAULT
1965			Walkerton				P01161	POLE_DEFAULT
1965			Walkerton				P01162	POLE_DEFAULT
1965			Walkerton				P01163	POLE_DEFAULT
1965			Walkerton				P01165	POLE_DEFAULT
1965			Walkerton				P01166	POLE_DEFAULT
1965			Walkerton				P01167	POLE_DEFAULT
1965			Walkerton				P01168	POLE_DEFAULT
1965			Walkerton				P01169	POLE_DEFAULT
1965			Walkerton				P01170	POLE_DEFAULT
1965			Walkerton				P01171	POLE_DEFAULT
1965			Walkerton				P01172	POLE_DEFAULT
1965			Walkerton				P01173	POLE_DEFAULT
1965			Walkerton				P01174	POLE_DEFAULT
1965			Walkerton				P01177	POLE_DEFAULT
1965			Walkerton				P01180	POLE_DEFAULT
1965			Walkerton				P01183	POLE_DEFAULT
1965			Walkerton				P01185	POLE_DEFAULT
1965			Walkerton				P01186	POLE_DEFAULT
1965			Walkerton				P01187	POLE_DEFAULT
1965			Walkerton				P01188	POLE_DEFAULT
1965			Walkerton				P01189	POLE_DEFAULT
1965			Walkerton				P01190	POLE_DEFAULT
1965			Walkerton				P01191	POLE_DEFAULT
1965			Walkerton				P01192	POLE_DEFAULT
1965			Walkerton				P01193	POLE_DEFAULT
1965			Walkerton				P01194	POLE_DEFAULT
1965			Walkerton				P01195	POLE_DEFAULT
1965			Walkerton				P01196	POLE_DEFAULT
1965			Walkerton				P01197	POLE_DEFAULT
1965			Walkerton				P01198	POLE_DEFAULT
1965			Walkerton				P01199	POLE_DEFAULT
1965			Walkerton				P01200	POLE_DEFAULT
1965			Walkerton				P01201	POLE_DEFAULT
1965			Walkerton				P01202	POLE_DEFAULT
1965			Walkerton				P01203	POLE_DEFAULT
1965			Walkerton				P01204	POLE_DEFAULT
1965			Walkerton				P01205	POLE_DEFAULT
1965			Walkerton				P01206	POLE_DEFAULT
1965			Walkerton				P01207	POLE_DEFAULT
1965			Walkerton				P01208	POLE_DEFAULT
1965			Walkerton				P01209	POLE_DEFAULT
1965			Walkerton				P01210	POLE_DEFAULT
1965			Walkerton				P01211	POLE_DEFAULT
1965			Walkerton				P01212	POLE_DEFAULT
1965			Walkerton				P01213	POLE_DEFAULT
1965			Walkerton				P01214	POLE_DEFAULT
1965			Walkerton				P01216	POLE_DEFAULT
1965			Walkerton				P01220	POLE_DEFAULT
1965			Walkerton				P01221	POLE_DEFAULT
1965			Walkerton				P01222	POLE_DEFAULT
1965			Walkerton				P01223	POLE_DEFAULT
1965			Walkerton				P01224	POLE_DEFAULT
1965			Walkerton				P01231	POLE_DEFAULT
1965			Walkerton				P01232	POLE_DEFAULT
1965			Walkerton				P01240	POLE_DEFAULT
1965			Walkerton				P01241	POLE_DEFAULT
1965			Walkerton				P01242	POLE_DEFAULT
1965			Walkerton				P01245	POLE_DEFAULT
1965			Walkerton				P01246	POLE_DEFAULT
1965			Walkerton				P01247	POLE_DEFAULT
1965			Walkerton				P01248	POLE_DEFAULT
1965			Walkerton				P01249	POLE_DEFAULT
1965			Walkerton				P01250	POLE_DEFAULT
1965			Walkerton				P01251	POLE_DEFAULT
1965			Walkerton				P01252	POLE_DEFAULT
1965			Walkerton				P01253	POLE_DEFAULT
1965			Walkerton				P01270	POLE_DEFAULT
1965			Walkerton				P01271	POLE_DEFAULT
1965			Walkerton				P01276	POLE_DEFAULT

Factor from 0-4 based on age.
0 if age = 51+
0.7 if age = 45 to 50
1.5 if age = 40 to 44
2.1 if age = 35 to 39
3.0 if age = 30 to 34
3.5 if age = 25-29
4 if age = 25-

[illegible]

Hydro Poles								
Pole_Year	Material	Treatment	Area	House #	Street	Address Descriptor	Pole_Id	Stock No
1965			Lucknow	423	CAMPBELL ST	FRONT	P00197	POLE_DEFAULT
1965			Lucknow	423	CAMPBELL ST	FRONT	P00199	POLE_DEFAULT
1965			Lucknow	510	ROSE ST	BACK	P00334	POLE_DEFAULT
1965			Lucknow	510	ROSE ST	BACK	P00335	POLE_DEFAULT
1965			Lucknow	548	CAMPBELL ST		P00507	POLE_DEFAULT
1965			Mildmay				P00042	POLE_DEFAULT
1965			Neustadt				P00013	POLE_DEFAULT
1965			Neustadt				P00062	POLE_DEFAULT
1965			Neustadt				P00069	POLE_DEFAULT
1965			Neustadt				P00094	POLE_DEFAULT
1965			Neustadt				P00095	POLE_DEFAULT
1965			Neustadt				P00098	POLE_DEFAULT
1965			Neustadt				P00099	POLE_DEFAULT
1965			Neustadt				P00125	POLE_DEFAULT
1965			Neustadt				P00127	POLE_DEFAULT
1965			Neustadt				P00130	POLE_DEFAULT
1965			Neustadt				P00132	POLE_DEFAULT
1965			Neustadt				P00137	POLE_DEFAULT
1965			Neustadt				P00194	POLE_DEFAULT
1965			Palmerson	485	MAIN ST E		P00372	POLE_DEFAULT
1965			Southampton	0	18TH AVE		P10296	POLE_DEFAULT
1965			Southampton	429	PEEL ST		P00337	POLE_DEFAULT
1965			Southampton				P00693	POLE_DEFAULT
1965			Southampton	334	PEEL ST		P01300	POLE_DEFAULT
1960		CONCRETE	Teeswater	28	CLINTON ST S		P00040	POLE_DEFAULT
1960		CONCRETE	Teeswater	26	CLINTON ST S		P00043	POLE_DEFAULT
1960		CONCRETE	Teeswater	24	CLINTON ST S		P00045	POLE_DEFAULT
1960		CONCRETE	Teeswater	22	CLINTON ST S		P00046	POLE_DEFAULT
1960		CONCRETE	Teeswater	23	CLINTON ST S		P00047	POLE_DEFAULT
1960		CONCRETE	Teeswater	23	CLINTON ST S		P00048	POLE_DEFAULT
1960		CONCRETE	Teeswater	20	CLINTON ST S		P00049	POLE_DEFAULT
1960		CONCRETE	Teeswater	19	CLINTON ST S		P00050	POLE_DEFAULT
1960		CONCRETE	Teeswater	18	CLINTON ST S		P00051	POLE_DEFAULT
1960		CONCRETE	Teeswater	15	CLINTON ST S		P00052	POLE_DEFAULT
1960		CONCRETE	Teeswater	14	CLINTON ST S		P00053	POLE_DEFAULT
1960		CONCRETE	Teeswater	12	CLINTON ST S		P00054	POLE_DEFAULT
1960		CONCRETE	Teeswater	11	CLINTON ST S		P00055	POLE_DEFAULT
1960		CONCRETE	Teeswater	7	CLINTON ST S		P00056	POLE_DEFAULT
1960		CONCRETE	Teeswater	8	CLINTON ST S		P00057	POLE_DEFAULT
1960		CONCRETE	Teeswater	3	CLINTON ST S		P00058	POLE_DEFAULT
1960		CONCRETE	Teeswater	4	CLINTON ST S		P00059	POLE_DEFAULT
1960		CONCRETE	Teeswater	3	CLINTON ST S		P00060	POLE_DEFAULT
1960		CONCRETE	Teeswater	2	CLINTON ST S		P00061	POLE_DEFAULT
1960		CONCRETE	Teeswater	1	CLINTON ST S		P00062	POLE_DEFAULT
1960		CONCRETE	Teeswater	1	CLINTON ST N		P00063	POLE_DEFAULT
1960		CONCRETE	Teeswater	3	CLINTON ST N		P00064	POLE_DEFAULT
1960		CONCRETE	Teeswater	2	CLINTON ST N		P00065	POLE_DEFAULT
1960		CONCRETE	Teeswater	8	CLINTON ST N		P00066	POLE_DEFAULT
1960		CONCRETE	Teeswater	5	CLINTON ST N		P00067	POLE_DEFAULT
1960		CONCRETE	Teeswater	12	CLINTON ST N		P00068	POLE_DEFAULT
1960		CONCRETE	Teeswater	9	CLINTON ST N		P00069	POLE_DEFAULT
1965			Teeswater	227	CLARINDA ST S	SIDE	P00084	POLE_DEFAULT
2000	STEEL		Hanover	76	14TH AVE		P10277	30732
1965	WOOD		Hanover	161	9TH ST	FRONT	P20029	30319_C3
1965	STEEL - 2 PIECE		Hanover	234	9TH ST	FRONT	P20058	30329
2000	STEEL		Hanover	115	9TH ST	SIDE	P20015	30325
2000	STEEL		Hanover	120	9TH ST	FRONT	P20019	30325
2000	STEEL		Hanover	128	8TH ST	FRONT	P20022	30325
2000	STEEL		Hanover	141	9TH ST	ACROSS	P20025	30325
2000	STEEL		Hanover	188	9TH ST		P20038	30325
2000	STEEL		Hanover	200	9TH ST	FRONT	P20046	30325
2000	STEEL		Hanover	322	9TH ST		P20051	30325
2000	STEEL		Hanover	274	9TH ST	FRONT	P20054	30325
2000	STEEL		Hanover	256	9TH ST		P20055	30325
2000	STEEL		Hanover	244	8TH ST		P20057	30325
2000	STEEL		Hanover	294	9TH ST	FRONT	P20059	30325
1965	NA		Hanover	0	9TH ST	FRONT	P20053	NUMBER AVAILABLE
1965	WOOD CCA-PEG	CCA - PEG	Hanover	497	14TH ST	BACK	P40115	30334_C3
1965	WOOD CCA-PEG	CCA - PEG	Hanover	503	14TH ST		P40117	30334_C3
1965	WOOD CCA-PEG	CCA - PEG	Hanover	545	14TH ST	BACK	P40120	30334_C3
1965	WOOD CCA-PEG	CCA - PEG	Hanover	469	14TH ST		P40125	30334_C3
1965	WOOD CCA-PEG	CCA - PEG	Hanover	473	14TH ST		P40126	30334_C3
2000	STEEL		Hanover	514	19TH AVE	FRONT	P40242	30325
1965	WOOD	PCP	Lucknow	359	CLYDE ST	FRONT	P00288	30319_C5

[illegible]

Pad Mounted Transformer

Year	Year Assumed	Manufacturer	PCB PPM	Serial_No	TX Location	Stock No	Mount Type
NA	1965		0	NA8	3-073	TxStock_6	PADMOUNT
NA	1965		0	NA9	4-106	TxStock_3	PADMOUNT
0	1978	CAM TRAN	0	BC8096826204	T10651	30478	PADMOUNT
0	1978	CAM TRAN	0	08C3059504	T10735	30478	PADMOUNT
0	1978	CAM TRAN	0	08C3059502	T10736	30478	PADMOUNT
0	1978	CAM TRAN	0	08C3059501	T10737	30478	PADMOUNT
0	1978	CAM TRAN	0	08C3059503	T10738	30478	PADMOUNT
0	1978	CAM TRAN	0	BC-86B-25202	T05341	30465	PADMOUNT
0	1978	CAM TRAN	0	IM00330201	T12708	30473	PADMOUNT
0	1978	CamTran	3	BC-85J02111	2-0104	30465	PADMOUNT
0	1980	Carte	0	14716-001	1-0095	30478	PADMOUNT
0	1980	Carte	0	14762-001	1-0098	30478	PADMOUNT
0	1980	Carte	0	N0886-1	T10456	30479	PADMOUNT
0	1965	CGE	7	595082	4-0014	30469	PADMOUNT
0	1965	CGE	0	628794	T10315	30461	PADMOUNT
0	1965	English Electric	0	20P80676-6	T05487	TX_2.4_50_PAD	PADMOUNT
0	1965	English Electric	0	20N80268-2	T10238	30479	PADMOUNT
0	1970	Ferranti Packard	0	2-55665	T05488	30478	PADMOUNT
0	1965	GE	0	L707048TCLA	T15168	30476	PADMOUNT
0	1970	JIM'S ELECTRIC	0	82K24202	T10304	30461	PADMOUNT
0	1980	MALONEY	0	T5985-1	4-113	30472	PADMOUNT
0	1950	MCGRAW EDISON	0	74ZL787G18	T10011	30478	PADMOUNT
0	1950	MCGRAW EDISON	0	74ZG843004	T10143	30478	PADMOUNT
0	1950	MCGRAW EDISON	0	74ZL787026	T10031	30478	PADMOUNT
0	1950	MCGRAW EDISON	0	74ZL787013	T10437	30478	PADMOUNT
0	1950	MCGRAW EDISON	0	74ZG843033	T10261	30478	PADMOUNT
0	1950	MCGRAW EDISON	0	74ZG843038	T10131	30478	PADMOUNT
0	1950	MCGRAW EDISON	0	74ZG843076	T10132	30478	PADMOUNT
0	1950	MCGRAW EDISON	0	74ZG843016	T10136	30478	PADMOUNT
0	1950	MCGRAW EDISON	0	75ZE69C001	T11048	NA	PADMOUNT
0	1950	McGraw Edison/Cooper	0	L4730	T09160	30465	PADMOUNT
0	1980	Moloney	0	233780	T12169	30469	PADMOUNT
0	1980	Moloney	0	216997	T10355	30479	PADMOUNT
0	1980	Moloney	0	250705	2-0101	30479	PADMOUNT
0	1975	Reliance	0	KW 6469-2	3-070	30465	PADMOUNT
0	1975	Reliance	0	KW5591-18	T09164	30479	PADMOUNT
0	1965	RTE	0	746005914	T06076	30470	PADMOUNT
0	1965	T and R Electric	0	058827	4-0022	30465	PADMOUNT
0	1965	T and R Electric	0	58803	2-0012	30465	PADMOUNT
0	1965	T and R Electric	0	65060	2-0010	30465	PADMOUNT
0	1965	T and R Electric	0	65403	2-0013	30465	PADMOUNT
0	1965	T and R Electric	0	066828	T12080	30465	PADMOUNT
0	1965	T and R Electric	0	066829	T12078	30465	PADMOUNT
0	1965	T and R Electric	0	066830	T12079	30465	PADMOUNT
0	1965	T and R Electric	0	065817	3-067	30465	PADMOUNT
0	1965	T and R Electric	0	065385	2-0011	30465	PADMOUNT
0	1965	T and R Electric	0	058803	4-120	30438	PADMOUNT
0	1965	T and R Electric	0	058992	T06033	30463	PADMOUNT
0	1950	Westinghouse	0	741853026	T09061	30471	PADMOUNT
0	1950	Westinghouse	0	70JC170215	2-0030	30469	PADMOUNT
0	1950	Westinghouse	0	80JD194009	3-0004	30469	PADMOUNT
0	1950	Westinghouse	0	546714	3-072	30465	PADMOUNT
0	1950	Westinghouse	0	75C947006	T05408	30476	PADMOUNT
0	1950	Westinghouse	0	75H046028	T11040	30983	PADMOUNT
0	1950	Westinghouse	0	74G770055	T11039	30463	PADMOUNT
1985	1985	CamTran	0	BC85E05201	1-0011	30465	PADMOUNT
1987	1987	CamTran	0	DC87A23201	4-0038	30469	PADMOUNT
1989	1989	Carte	0	TO673001	2-0005	30465	PADMOUNT
1961	1961	General Electric	0	477689	T05089	30478	PADMOUNT
1963	1963	English Electric	23	20R21327.1	1-0071	30480	PADMOUNT
1963	1963	Ferranti Packard	0	2-60482	2-0024	30472	PADMOUNT
1964	1964	Ferranti Packard	4	2-69276	2-0016	30474	PADMOUNT
1964	1964	Moloney	0	25621	T05128	30471	PADMOUNT
1965	1965	Ferranti Packard	7	2-86341	1-0013	30471	PADMOUNT
1965	1965	Ferranti Packard	0	2-91594	2-0009	30465	PADMOUNT
1965	1965	General Electric	0	550535	T10212	30471	PADMOUNT
1965	1965	Moloney	2	230238	1-0014	30468	PADMOUNT
1966	1966	Canadian General Electric	0	591614	T10205	30480	PADMOUNT
1966	1966	Canadian General Electric	0	592068	T10303	30468	PADMOUNT
1966	1966	CGE	135	588135	2-0017	30466	PADMOUNT
1966	1966	CGE	0	591612	T10017	30480	PADMOUNT
1966	1966	Ferranti Packard	7	2-104849	T09012	30469	PADMOUNT
1966	1966	Moloney	0	16662-011	2-0107	30478	PADMOUNT
1966	1966	Moloney	0	235783	T10228	30466	PADMOUNT
1967	1967	Canadian General Electric	2	631071	T09093	30479	PADMOUNT
1967	1967	Ferranti Packard	2	2-107983	4-0011	30469	PADMOUNT
1967	1967	Moloney	0	237374	2-0003	TxStock_3	PADMOUNT
1968	1968	General Electric	29	592112	2-0025	30472	PADMOUNT
1968	1968	General Electric	3	679135	T09010	30469	PADMOUNT
1968	1968	General Electric	0	674144	4-079	30472	PADMOUNT
1969	1969	Canadian General Electric	0	69559-7	T12305	30473	PADMOUNT
1969	1969	Canadian General Electric	0	695649	T05308	30461	PADMOUNT
1969	1969	Ferranti Packard	0	2-121371	T05412	30469	PADMOUNT
1970	1970	CGE	0	749799	T10019	30472	PADMOUNT
1970	1970	CGE	0	748755	T10018	30472	PADMOUNT
1970	1970	Ferranti Packard	4	2-125630	2-0029	30472	PADMOUNT
1970	1970	Moloney	0	251087	T05410	30469	PADMOUNT
1970	1970	Westinghouse	0	8E4560	T05037	30465	PADMOUNT
1971	1971	Canadian General Electric	0	88698	T10345	30472	PADMOUNT
1971	1971	CGE	0	781397	4-0015	30897	PADMOUNT
1971	1971	Moloney	0	268679	T05301	30465	PADMOUNT
1971	1971	Moloney	0	268611	T05300	30465	PADMOUNT
1971	1971	Moloney	0	256677	T05169	30479	PADMOUNT
1971	1971	Moloney	0	268878	T05269	30465	PADMOUNT
1971	1971	Porter	1	20405	T09114	30466	PADMOUNT
1971	1971	Westinghouse	0	724377	T05298	30471	PADMOUNT
1971	1971	Westinghouse	0	724360	T05171	30476	PADMOUNT
1971	1971	Westinghouse	0	725957	T10020	30472	PADMOUNT
1972	1972	Porter	0	20773-1	4-107	TxStock_18	PADMOUNT
1972	1972	Westinghouse	0	770991	T12201	30472	PADMOUNT
1972	1972	Westinghouse	0	788633	T05463	30472	PADMOUNT
1973	1973	Canadian General Electric	2	871791	2-0027	30469	PADMOUNT

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Pad Mounted Transformer

Year	Year Assumed	Manufacturer	PCB PPM	Serial_No	TX Location	Stock No	Mount Type
2011	2011	CAM TRAN	0	IM00481001	T10410	30478	PADMOUNT
2011	2011	CAM TRAN	0	IM00514901	T05655	30471	PADMOUNT
2011	2011	Moloney	0	IM00475501	T12338	30472	PADMOUNT
2011	2011	Moloney	0	203415-5	T05551	30479	PADMOUNT
2011	2011	Moloney	0	203415-3	T05552	30479	PADMOUNT
2011	2011	Moloney	0	203415-2	T05556	30479	PADMOUNT
2011	2011	Moloney	0	203415-1	T05553	30479	PADMOUNT
2011	2011	Moloney	0	203415-6	T05555	30479	PADMOUNT
2011	2011		0	204177-1	T10779	30479	PADMOUNT
2012	2012	CAM TRAN	0	IM00593703	T10722	30478	PADMOUNT
2012	2012	CAM TRAN	0	IM00593701	T10723	30478	PADMOUNT
2012	2012	CAM TRAN	0	IM00569202	T10724	30478	PADMOUNT
2012	2012	CAM TRAN	0	IM00704502	T12711	30478	PADMOUNT
2012	2012	CAM TRAN	0	IM00704602	T12712	30478	PADMOUNT
2012	2012	CAM TRAN	0	IM00704601	T10418	30478	PADMOUNT
2012	2012	CAM TRAN	0	IM00722902	2-039	30479	PADMOUNT
2012	2012	CAM TRAN	0	IM00680401	T10420	30475	PADMOUNT
2012	2012	CAM TRAN	0	IM00703101	T10421	30479	PADMOUNT
2012	2012	CAM TRAN	0	IM00703102	T10542	30479	PADMOUNT
2012	2012	CAM TRAN	0	IM00593704	3-0054	30478	PADMOUNT
2012	2012	CAM TRAN	0	IM00704603	T10415	30478	PADMOUNT
2012	2012	CAM TRAN	0	IM00572201	T15458	30476	PADMOUNT
2012	2012	CAM TRAN	0	IM00784303	T10543	30479	PADMOUNT
2012	2012	CAM TRAN	0	IM005938-1	T05015	30465	PADMOUNT
2012	2012	CAM TRAN	0	IM00593702	T05677	30478	PADMOUNT
2012	2012	CAM TRAN	0	IM00784301	T05681	30479	PADMOUNT
2012	2012	CAM TRAN	0	IM00767801	T05554	30479	PADMOUNT
2012	2012	CAM TRAN	0	754701	T05568	30479	PADMOUNT
2012	2012	Moloney	0	IM00820802	3-100	30478	PADMOUNT
2012	2012	Moloney	0	202270-12	2-040	30478	PADMOUNT
2012	2012	Moloney	0	IM00756901	T13074	30476	PADMOUNT
2012	2012	Moloney	0	IM00784302	T10502	30479	PADMOUNT
2012	2012	Moloney	0	202290-11	T10780	30478	PADMOUNT
2012	2012	ONAN	0	IM00623001	T15175	30479	PADMOUNT
2012	2012	ONAN	0	IM00820801	T10522	30478	PADMOUNT
2012	2012	ONAN	0	IM00839901	T10516	30478	PADMOUNT
2012	2012	ONAN	0	IM00704501	T10514	30478	PADMOUNT
2012	2012	ONAN	0	IM00725801	T10526	30478	PADMOUNT
2013	2013	CAM TRAN	0	IM0106903	T10756	30478	PADMOUNT
2013	2013	CAM TRAN	0	IM0106902	T10754	30478	PADMOUNT
2013	2013	CAM TRAN	0	IM0106901	T10755	30478	PADMOUNT
2013	2013	CAM TRAN	0	IM1142001	T12651	30471	PADMOUNT
2013	2013	CAM TRAN	0	IM01128801	T05678	30478	PADMOUNT
2013	2013	Moloney	0	IM01069005	T10520	30478	PADMOUNT
2013	2013	Moloney	0	IM01164101	4-0104	30478	PADMOUNT
2013	2013	Moloney	0	IM01111002	T05398	30465	PADMOUNT
2014	2014	CAM TRAN	0	IM01208501	T10507	30478	PADMOUNT
2014	2014	CAM TRAN	0	IM01208504	T10511	30478	PADMOUNT
2014	2014	CAM TRAN	0	IM01208505	T10508	30478	PADMOUNT
2014	2014	CAM TRAN	0	IM01208507	T10527	30478	PADMOUNT
2014	2014	CAM TRAN	0	IM01208503	T10529	30478	PADMOUNT
2014	2014	CAM TRAN	0	IM01208506	T10530	30478	PADMOUNT
2014	2014	CAM TRAN					

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Pole Mounted Transformers

Year	Year		PCB			
Year	Assumed	Manufacturer	PPM	Serial_No	TX Location	Stock No
NA	1965	1	0	NA3	T12147	TxStock_117
NA	1978	CamTran	0	214496	T12085	30498
NA	1978	CamTran	0	238701	T12660	30612
NA	1980	Carte	0	2D172-001	T12649	TxStock_104
NA	1980	Carte	0	342003	T12026	TxStock_98
NA	1965	English Electric	0	186189	T12667	TxStock_96
NA	1970	Ferranti Packard	17	2-161664		TxStock_56
NA	1970	Ferranti Packard	17	2-161665		TxStock_13
NA	1970	Ferranti Packard	0	2-162663		TxStock_56
NA	1970	Ferranti Packard	0	21720	T12333	30482
NA	1970	Ferranti Packard	0	261848	T12258	30482
NA	1970	Ferranti Packard	0	261855	T12019	30482
NA	1970	Ferranti Packard	0	2-95169	T12239	30482
NA	1970	Ferranti Packard	0	60445	T12094	TxStock_101
NA	1970	Ferranti Packard	0	99150	T12273	30459
NA	1965	GE	7	471280	2-0065	30482
NA	1965	GE	0	460630	T12314	30482
NA	1965	GE	0	634658	T12208	30482
NA	1965	GE	0	475754	2-0052	TxStock_30
NA	1965	General Electric	0	470862	T12205	30482
NA	1965	General Electric	0	658541	T12658	30482
NA	1980	Moloney	0	187253	T12210	TxStock_97
NA	1980	Moloney	0	204906	T12315	30482
NA	1980	Moloney	0	221018		TxStock_11
NA	1980	Moloney	0	233746	T12400	30482
NA	1965	Norelco	0	NW-1028-11	3-018	30482
NA	1950	Packard	0	103343	T12209	30495
NA	1950	Packard	0	103345	T12299	30495
NA	1950	Packard	0	110657		30495
NA	1950	Packard	0	125974		30449
NA	1950	Packard	0	136078	T12666	30495
NA	1950	Packard	0	137453	T12076	30449
NA	1950	Packard	0	147004	T12018	TxStock_95
NA	1950	Packard	0	2-30082	T12152	30482
NA	1950	Packard	0	263754	T12075	30482
NA	1950	Packard	0	30083	T12065	30482
NA	1950	Packard	0	342785	T12114	TxStock_100
NA	1975	Reliance	0	K7564-1	3-0002	30489
NA	1975	Reliance	0	K7564-2	3-0002	30489
NA	1975	Reliance	0	K7564-3	3-0002	30489
NA	1975	Reliance	0	10473		TxStock_11
NA	1975	Reliance	0	K6738-3		30482
NA	1975	Reliance	0	KW - 5941 - 3		30482
NA	1975	Reliance	0	KW 5147-9	T12182	30482
NA	1975	Reliance	0	KW 5472 - 2	T12059	30482
NA	1975	Reliance	0	KW37454	T12049	30482
NA	1975	Reliance	0	KW5229-3	T12245	30482
NA	1975	Reliance	0	KW5369-10	T12232	30482
NA	1975	Reliance	0	KW-5839-1		30482
NA	1975	Reliance	0	KW5839-T		30482
NA	1975	Reliance	0	KW6539-28	T12042	30482
NA	1975	Reliance	0	KW8531-4	T12218	30482
NA	1975	Reliance	0	W-1376-10	T12146	30482
NA	1950	Westinghouse	0	2-3128	T12219	30482
NA	1950	Westinghouse	0	270456	T12294	TxStock_98
NA	1950	Westinghouse	0	336611	T12662	30482
NA	1950	Westinghouse	0	338620	T12324	30482
NA	1950	Westinghouse	0	369743	T12231	30482
NA	1950	Westinghouse	0	371310		TxStock_105
NA	1950	Westinghouse	0	372367	T12242	30482
NA	1950	Westinghouse	0	403264	T12236	TxStock_29
NA	1950	Westinghouse	0	423139	T12236	TxStock_29
NA	1950	Westinghouse	0	423627	T12246	30482
NA	1950	Westinghouse	0	436065	T	

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Pole Mounted Transformers

Year	Year Assumed	Manufacturer	PCB PPM	Serial_No	TX Location	Stock No	
	0	1970	Ferranti Packard	0	228078	5-12	30451
	0	1970	Ferranti Packard	22	234917	1-0073	TxStock_237
	0	1970	Ferranti Packard	0	247082	5-33	30456
	0	1970	Ferranti Packard	0	247083	5-46	30456
	0	1970	Ferranti Packard	0	2-54971	1-0065	TxStock_11
	0	1970	Ferranti Packard	5	257165	1-0078	30496
	0	1970	Ferranti Packard	3	265677	3-0022	30510
	0	1970	Ferranti Packard	15	2-7834	1-0019	30496
	0	1970	Ferranti Packard	16	2-8785	3-0026	TxStock_100
	0	1970	Ferranti Packard	0	31344	1-0049	TxStock_246
	0	1970	Ferranti Packard	0	3-144-791	T04029	TxStock_72
	0	1970	Ferranti Packard	0	3-144-793	T04029	TxStock_72
	0	1970	Ferranti Packard	0	3-144-794	T04029	TxStock_72
	0	1970	Ferranti Packard	10	34186	3-0026	TxStock_100
	0	1970	Ferranti Packard	0	2-142247	T12070	TxStock_15
	0	1970	Ferranti Packard	0	2-142830	T12200	30501
	0	1970	Ferranti Packard	0	231251	T12077	30496
	0	1970	Ferranti Packard	0	262831	T12105	30482
	0	1970	Ferranti Packard	0	265679	T12055	30510
	0	1970	Ferranti Packard	0	269676	T12072	30510
	0	1970	Ferranti Packard	0	2-80899	T12063	30482
	0	1970	Ferranti Packard	0	30086	T12181	30482
	0	1970	Ferranti Packard	0	20711	2-030	30496
	0	1970	Ferranti Packard	0	2-29611	4-052	30496
	0	1970	Ferranti Packard	0	2-34139	1-078	30496
	0	1970	Ferranti Packard	0	246477	1-104	TxStock_29
	0	1970	Ferranti Packard	0	2-4672	4-028	30501
	0	1970	Ferranti Packard	0	251021	1-104	TxStock_29
	0	1970	Ferranti Packard	0	259312	4-062	30482
	0	1970	Ferranti Packard	0	263027	3-063	30496
	0	1970	Ferranti Packard	0	263029	1-100	30496
	0	1970	Ferranti Packard	0	29609	1-105	30496
	0	1970	Ferranti Packard	0	55951	1-104	TxStock_38
	0	1970	Ferranti Packard	0	2-7851	T15120	TX_2.4_NA_25_POLE
	0	1970	Ferranti Packard	0	2-8951	T15009	TX_3PH_75_POLE
	0	1970	Ferranti Packard	0	2-18318	T15044	TX_2.4_NA_50_POLE
	0	1970	Ferranti Packard	0	2-109212	T15056	TX_2.4_NA_50_POLE
	0	1970	Ferranti Packard	0	2-179450	T15059	30510
	0	1970	Ferranti Packard	0	2-124981	T15060	TX_2.4_NA_50_POLE
	0	1970	Ferranti Packard	0	2-20866	T15094	TX_2.4_NA_37.5_POLE
	0	1970	Ferranti Packard	0	2-10458	T15029	TX_2.4_NA_37.5_POLE
	0	1970	Ferranti Packard	0	27825	T05061	30496
	0	1970	Ferranti Packard	0	3-114663	1-0032	30482
	0	1970	Ferranti Packard	0	2-139075	1-0019	30482
	0	1970	Ferranti Packard	0	2-29690	4-0002	30482
	0	1970	Ferranti Packard	0	E-79041	T06057	30482
	0	1970	Ferranti Packard	0	63857-34	T10739	30482
	0	1970	Ferranti Packard	0	2-131941	T10160	30510
	0	1965	GE	0	550516	T12329	30501
	0	1965	GE	1	226172	T01010	30456
	0	1965	GE	0	320545	T01011	TX_4.8_120/208_15_POLE
	0	1965	GE	5	372776	4-0048	TxStock_142
	0	1965	GE	5	372779	4-0048	TxStock_142
	0	1965	GE	2	374275	4-0048	TxStock_142
	0	1965	GE	20	457103	2-0118	30482
	0	1965	GE	0	468936	2-0052	TxStock_30
	0	1965	GE	0	468944	2-0052	TxStock_30
	0	1965	GE	9	475139	1-0016	TxStock_115
	0	1965	GE	0	484964	4-0058	TxStock_11
	0	1965	GE	0	492848	3-0009	30505
	0	1965	GE	21	506773	2-0073	30510
	0	1965	GE	0	383873	3-050	30482
	0	1965	GE	0	384098	4-038	30482
	0	1965	GE	0	456273	4-075	TxStock_30
	0	1965	GE	0	457257	4-075	TxStock_30
	0	1965	GE	0	460543	4-075	TxStock_30
	0	1965	GE	0	486050	2-011	30501
	0	1965	GE	0	208787	T15055	TX_2.4_NA_37.5_POLE
	0	1965	GE	0	264315	T15070	TX_3P_25_POLE
	0	1965	GE	0	552103	1-0034	30501
	0	1965	GE	0	216510	T13020	30496
	0	1965	GE	0	G449880-66Y	T13003	30510
	0	1965	General Electric	4	5-22935	4-0034	TxStock_11
	0	1965	General Electric	0	53910	5-5	TxStock_249
	0	1965	General Electric	0	560148	T01014	30457
	0	1965	General Electric	0	870596	T04031	TxStock_66
	0	1965	General Electric	15	992692	T01059	TxStock_5
	0	1965	General Electric	0	F913406-64Y	T09037	30510
	0	1965	General Electric	0	J183961469AA	T09009	30510
	0	1965	General Electric	0	454723	3-016	30496

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Pole Mounted Transformers

Year	Year	Manufacturer	PCB	Serial_No	TX Location	Stock No
Year	Assumed	Manufacturer	PPM	Serial_No	TX Location	Stock No
	0 1965	General Electric	0	465628	3-062	30501
	0 1965	General Electric	0	CAT24511XX2	T12197	30501
	0 1965	General Electric	0	374608	T10298	30501
	0 1965	General Electric	0	493794	T10105	30501
	0 1965	General Electric	0	661612	T10079	30482
	0 1965	General Electric	0	661609	T10079	30482
	0 1965	General Electric	0	661615	T10079	30482
	0 1965	General Electric	0	55041	T10208	30495
	0 1965	General Electric	0	4631958468AA	T13030	30510
	0 1965	General Electric	0	H636994468AA	T13012	30510
	0 1970	JIM'S ELECTRIC	0	81K0712	5-15	TxStock_59
	0 1970	JIM'S ELECTRIC	0	81K0715	5-51	30509
	0 1970	JIM'S ELECTRIC	0	82A1507	T02003	TxStock_209
	0 1965	KUHIRMAN	0	4636681004	T01034	TxStock_5
	0 1980	MALONEY	0	201317	T10010	30501
	0 1980	MALONEY	0	190362	T10146	30501
	0 1980	MALONEY	0	226324	T10094	30508
	0 1980	MALONEY	0	226323	T10094	30508
	0 1980	MALONEY	0	226322	T10094	30508
	0 1980	MALONEY	0	137191	T10177	30482
	0 1950	MCGRAW EDISON	0	3010463	2-0105	30482
	0 1950	McGraw Edison/Cooper	0	310204-73	T09087	TxStock_245
	0 1950	McGraw Edison/Cooper	0	7522507001	T01067	30514
	0 1950	McGraw Edison/Cooper	0	7528064002	T01070	TxStock_5
	0 1950	McGraw Edison/Cooper	0	752K064001	T01044	TxStock_5
	0 1980	Moloney	4	176492	T01038	30456
	0 1980	Moloney	0	173927	T12271	30501
	0 1980	Moloney	0	189942	T12255	30501
	0 1980	Moloney	0	201312	T12328	30501
	0 1980	Moloney	0	221027	T12194	30493
	0 1980	Moloney	0	222317	T12143	30510
	0 1980	Moloney	0	227810	T12287	30510
	0 1980	Moloney	0	227811	T12184	30510
	0 1980	Moloney	2	137190	1-0069	TxStock_220
	0 1980	Moloney	0	170288	1-0056	30496
	0 1980	Moloney	2	179189	T01020	TxStock_69
	0 1980	Moloney	2	179190	T01020	TxStock_69
	0 1980	Moloney	2	179191	T01020	TxStock_69
	0 1980	Moloney	4	194206	3-0047	TxStock_11
	0 1980	Moloney	4	201363	3-0023	30482
	0 1980	Moloney	6	209592	1-0059	30482
	0 1980	Moloney	0	2111576	4-0001	TxStock_230
	0 1980	Moloney	3	211577	4-0001	TxStock_230
	0 1980	Moloney	25	211578	4-0001	TxStock_230
	0 1980	Moloney	26	212491	3-0028	30496
	0 1980	Moloney	6	212492	4-0059	30496
	0 1980	Moloney	0	218390	1-0002	30499
	0 1980	Moloney	67	219273	2-0098	30496
	0 1980	Moloney	0	227162	1-0053	30501
	0 1980	Moloney	2	228336	T09054	30498
	0 1980	Moloney	0	233726	2-0001	30482
	0 1980	Moloney	0	318-12	1-0031	30482
	0 1980	Moloney	0	9472-1	T04030	TxStock_54
	0 1980	Moloney	0	9472-2	T04026	TxStock_54
	0 1980	Moloney	0	215441	T12150	TxStock_100
	0 1980	Moloney	0	189344	4-054	30482
	0 1980	Moloney	0	190389	3-064	30510
	0 1980	Moloney	0	190391	4-025	30510
	0 1980	Moloney	0	196791	3-049	30482
	0 1980	Moloney	0	198854	1-038	30504
	0 1980	Moloney	0	204525	2-008	30501
	0 1980	Moloney	0	219815	1-080	30482
	0 1980	Moloney	0	223089	4-031	30482
	0 1980	Moloney	0	226955	3-041	30501
	0 1980	Moloney	0	226956	1-069	30501
	0 1980	Moloney	0	278024	1-091	30482
	0 1980	Moloney	0	346411	3-048	30482
	0 1980	Moloney	0	177237	T15036	TX_2.4_NA_37.5_POLE
	0 1980	Moloney	0	220012	T15195	TX_2.4_NA_37.5_POLE
	0 1980	Moloney	0	204580	T15045	TX_2.4_NA_37.5_POLE
	0 1980	Moloney	0	223241	T15138	TX_2.4_NA_37.5_POLE
	0 1980	Moloney	0	177238	T15026	TX_2.4_NA_37.5_POLE
	0 1980	Moloney	0	204429	T15068	TX_2.4_NA_37.5_POLE
	0 1980	Moloney	0	227019	T15024	TX_2.4_NA_37.5_POLE
	0 1980	Moloney	0	UNKNOWN	T15069	TX_2.4_NA_25_POLE
	0 1980	Moloney	0	232134	T15071	TX_2.4_NA_37.5_POLE
	0 1980	Moloney	0	242Q688	T15129	TX_2.4_NA_50_POLE
	0 1980	Moloney	0	236097	T15097	TX_2.4_NA_50_POLE
	0 1980	Moloney	0	204269	T15104	TX_2.4_NA_25_POLE
	0 1980	Moloney	0	MOLONEYUNKNOWN	3-026	TX_2.4_120/240_50_POLE

[illegible]

Pole Mounted Transformers

Year	Year	Manufacturer	PCB	Serial_No	TX Location	Stock No
Year	Assumed	Manufacturer	PPM	Serial_No	TX Location	Stock No
0	1980	Moloney	0	202677-2	T15127	30496
0	1980	Moloney	0	209581	3-046	30482
0	1980	Moloney	0	209579	3-046	30482
0	1980	Moloney	0	209580	3-046	30482
0	1965	Norelco	0	N1319-2	1-0035	30482
0	1965	Northern Electric	0	203900	T10230	30449
0	1965	Northern Electric	0	NK5312-10	T13028	30496
0	1965	ONAN	0	5541-001	2-0080	30501
0	1950	Packard	0	115203	T12301	30496
0	1950	Packard	0	145957	T12664	30496
0	1950	Packard	0	147008	T12275	30496
0	1950	Packard	0	148990	T12216	30496
0	1950	Packard	0	234060	T12233	30501
0	1950	Packard	0	263482	T12254	30501
0	1950	Packard	0	82574	T12272	30496
0	1950	Packard	0	220320	3-010	30501
0	1950	Packard	0	66496	1-047	30496
0	1950	Packard	0	83199	T15119	TX_2.4_NA_50_POLE
0	1950	Packard	0	101343	1-0041	TxStock_217
0	1950	Packard	0	109884	5-47	TxStock_55
0	1950	Packard	0	129422	1-0061	TxStock_217
0	1950	Packard	0	152414	T09076	30496
0	1950	Packard	0	168161	T09122	30501
0	1950	Packard	0	197733	2-0064	30496
0	1950	Packard	0	197734	1-0043	30456
0	1950	Packard	0	201807	1-0060	30501
0	1950	Packard	0	203565	T09138	30496
0	1950	Packard	0	205322	T09146	30496
0	1950	Packard	0	205345	T09018	30501
0	1950	Packard	0	205444	T09082	30482
0	1950	Packard	0	207380	T01041	30456
0	1950	Packard	5	207387	T01023	30456
0	1950	Packard	0	209272	4-0093	30482
0	1950	Packard	0	215306	4-0051	TxStock_11
0	1950	Packard	0	220331	1-0055	30501
0	1950	Packard	0	220332	1-0036	30501
0	1950	Packard	11	220371	2-0047	30501
0	1950	Packard	0	221902	T09015	TxStock_12
0	1950	Packard	0	221904	T09015	TxStock_12
0	1950	Packard	0	221905	T09015	TxStock_12
0	1950	Packard	0	227538	1-0050	30456
0	1950	Packard	0	232708	3-0037	30482
0	1950	Packard	13	234054	2-020	30501
0	1950	Packard	13	234072	4-0051	TxStock_11
0	1950	Packard	5	245029	4-0051	TxStock_11
0	1950	Packard	2	64658	T01008	TxStock_28
0	1950	Packard	0	94347	T09121	30495
0	1950	Packard	0	145846	T12086	30495
0	1950	Packard	0	2-133935	T12057	30510
0	1950	Packard	0	2-3120	T12052	30482
0	1950	Packard	0	2-3127	T12069	30482
0	1950	Packard	0	246747	T12062	30482
0	1950	Packard	0	249592	T12185	30501
0	1950	Packard	0	256554	T12091	30496
0	1950	Packard	0	126461	4-045	30501
0	1950	Packard	0	130237	1-072	30501
0	1950	Packard	0	198796	4-058	30496
0	1950	Packard	0	205451	2-026	30482
0	1950	Packard	0	231340	4-027	30496
0	1950	Packard	0	241907	1-028	30496
0	1950	Packard	0	245382	4-105	30496
0	1950	Packard	0	70217	4-077	30501
0	1950	Packard	0	81179	4-045	30496
0	1950	Packard	0	81182	4-045	30496
0	1950	Packard	0	83198	T15119	TX_2.4_NA_50_POLE
0	1950	Packard	0	137594	T15032	TX_2.4_NA_50_POLE
0	1950	Packard	0	197106	T15033	TX_2.4_NA_37.5_POLE
0	1950	Packard	0	230679	T15021	TX_2.4_NA_25_POLE
0	1950	Packard	0	145704	T15003	TX_2.4_NA_25_POLE
0	1950	Packard	0	118982	T15149	TX_2.4_NA_25_POLE
0	1950	Packard	0	137045	T15084	TX_2.4_NA_25_POLE
0	1950	Packard	0	81254	T15086	TX_2.4_NA_15_POLE
0	1950	Packard	0	245484	T15088	TX_3PH_75_POLE
0	1950	Packard	0	225854	T15088	TX_3PH_75_POLE
0	1950	Packard	0	225857	T15088	TX_3PH_75_POLE
0	1950	Packard	0	157044	T15050	TX_2.4_NA_25_POLE
0	1950	Packard	0	149449	T15082	TX_2.4_NA_25_POLE
0	1950	Packard	0	55677	T15170	TX_2.4_NA_15_POLE
0	1950	Packard	0	72462	T15062	TX_2.4_NA_25_POLE
0	1950	Packard	0	66499	T15070	TX_3P_25_POLE

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Pole Mounted Transformers

Year	Year		PCB				
Year	Assumed	Manufacturer	PPM	Serial_No	TX Location	Stock No	
	0	1950	Packard	0	95365	T15070	TX_3P_25_POLE
	0	1950	Packard	0	61084	T15072	TX_2.4_NA_37.5_POLE
	0	1950	Packard	0	220437	T15013	TX_2.4_NA_50_POLE
	0	1950	Packard	0	119036	T15077	TX_3P_25_POLE
	0	1950	Packard	0	118981	T15077	TX_3P_25_POLE
	0	1950	Packard	0	111510	T15077	TX_3P_25_POLE
	0	1950	Packard	0	45401	T15011	TX_2.4_NA_37.5_POLE
	0	1950	Packard	0	199214	T15006	TX_2.4_NA_37.5_POLE
	0	1950	Packard	0	70210	T15101	TX_2.4_NA_25_POLE
	0	1950	Packard	0	47199	T15105	TX_2.4_NA_15_POLE
	0	1950	Packard	0	197104	T15137	TX_2.4_NA_37.5_POLE
	0	1950	Packard	0	245394	1-073	30496
	0	1950	Packard	0	76138	T05146	30449
	0	1950	Packard	0	49264	T05146	30449
	0	1950	Packard	0	49263	T05146	30449
	0	1950	Packard	0	146993	T10239	30496
	0	1950	Packard	0	156591	T10006	30495
	0	1950	Packard	0	136102	T13058	30496
	0	1950	Packard	0	205725	T13052	TX 45
	0	1950	Packard	0	184443	T13006	30482
	0	1950	Packard	0	197791	T13037	30482
	0	1950	Packard	0	81225	T13067	30449
	0	1950	Packard	0	87846	T05670	30495
	0	1950	Packard	0	84219	T05671	30449
	0	1950	Packard	0	197790	T13066	30496
	0	1965	Pioneer	6	3837-561	T01007	TX_4.8_120/208_15_POLE
	0	1965	Pioneer	0	T3501-23	T01051	30457
	0	1965	Pioneer	0	87917	1-085	30501
	0	1960	Porter	0	13	4-041	30482
	0	1960	Porter	0	21528-1	T09034	30510
	0	1960	Porter	0	21738-30	T09124	30482
	0	1960	Porter	0	22110-9	T02019	30509
	0	1960	Porter	0	22383-4	1-0070	TxStock_235
	0	1960	Porter	0	21608-9	1-106	30612
	0	1960	Porter	0	22106-19	T15046	30510
	0	1960	Porter	0	221127-1	T15085	TX_3P_45_POLE
	0	1975	Reliance	0	K6739-2	T12145	30501
	0	1975	Reliance	0	KW-0112-11	T12326	30510
	0	1975	Reliance	0	KW-1370-18	T12263	TxStock_112
	0	1975	Reliance	0	KW-5182-6	T12127	30496
	0	1975	Reliance	0	KW-5746-1	T12126	30510
	0	1975	Reliance	0	KW5746-2	T12227	30510
	0	1975	Reliance	0	KW5747-2	T12033	30496
	0	1975	Reliance	0	KW-6227-5	T12248	30501
	0	1975	Reliance	0	KW6227-6	T12013	30501
	0	1975	Reliance	0	KW-6425-11	T12306	30496
	0	1975	Reliance	0	TS129515	4-042	30453
	0	1975	Reliance	0	TS1295J45	4-042	30453
	0	1975	Reliance	0	88875	T09029	30495
	0	1975	Reliance	0	88953	T09120	30501
	0	1975	Reliance	1	89448	T09074	30482
	0	1975	Reliance	0	B417-11	5-49	30456
	0	1975	Reliance	0	KW1444-1	T09136	TxStock_46
	0	1975	Reliance	0	KW1444-2	T09136	TxStock_46
	0	1975	Reliance	0	KW1444-3	T09136	TxStock_46
	0	1975	Reliance	9	KW5201-20	4-0071	30496
	0	1975	Reliance	0	KW5207-1	4-0095	30496
	0	1975	Reliance	0	KW5207-2	4-0063	TxStock_95
	0	1975	Reliance	0	KW5229-18	1-0003	30482
	0	1975	Reliance	0	KW-5294-3	T09038	30501
	0	1975	Reliance	0	KW-5294-6	T09041	30501
	0	1975	Reliance	0	KW5425-1	3-0011	30482
	0	1975	Reliance	0	KW-5483-9	3-0051	TxStock_11
	0	1975	Reliance	0	KW5665-10	T09048	30482
	0	1975	Reliance	0	KW5665-13	T09008	30482
	0	1975	Reliance	0	KW5665-27	T09042	30482
	0	1975	Reliance	0	KW5665-28	T09128	30482
	0	1975	Reliance	27	KW5674-6	T09040	30504
	0	1975	Reliance	0	KW5701-17	T09059	30501
	0	1975	Reliance	0	KW5732-25	2-0033	30482
	0	1975	Reliance	0	KW5878-2	T09047	30496
	0	1975	Reliance	0	KW5908-2	T09030	30510
	0	1975	Reliance	0	KW6047-3	3-0042	30482
	0	1975	Reliance	0	KW6171-10	T09149	TxStock_12
	0	1975	Reliance	0	KW6171-9	T09149	TxStock_12
	0	1975	Reliance	0	KW6222-10	T09096	30482
	0	1975	Reliance	0	KW6222-9	T09115	30482
	0	1975	Reliance	2	KW6281-9	1-0067	30501
	0	1975	Reliance	0	KW6356-2	T09149	TxStock_12
	0	1975	Reliance	0	KW6384-3	1-0074	TxStock_100

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Pole Mounted Transformers

Year	Year	Manufacturer	PCB	Serial_No	TX Location	Stock No
Year	Assumed	Manufacturer	PPM	Serial_No	TX Location	Stock No
0	1975	Reliance	1	KW6512-33	T09109	30482
0	1975	Reliance	0	KW6889-39	1-0074	TxStock_100
0	1975	Reliance	0	KW-8454-4	T01025	TxStock_5
0	1975	Reliance	0	KW8755-34	T09094	30482
0	1975	Reliance	0	KW9576-77	T01066	TxStock_5
0	1975	Reliance	0	NA12	T09142	30482
0	1975	Reliance	0	K6612-7	T12048	30482
0	1975	Reliance	0	KW 5472-3	T12083	TxStock_101
0	1975	Reliance	0	KW5096-1	T12084	TxStock_113
0	1975	Reliance	0	KW-5213-1	T12071	30510
0	1975	Reliance	0	RW6166-11	T12655	TxStock_101
0	1975	Reliance	0	1264T4	4-063	TxStock_12
0	1975	Reliance	0	1264T5	4-063	TxStock_12
0	1975	Reliance	0	1264T6	4-063	TxStock_12
0	1975	Reliance	0	351130P7	1-014	30501
0	1975	Reliance	0	KW 6561-25	2-012	30482
0	1975	Reliance	0	KW-5000-5	2-025	30501
0	1975	Reliance	0	KW5025-1	4-068	30501
0	1975	Reliance	0	KW5089-3	3-025	30482
0	1975	Reliance	0	KW-5299-13	4-057	30501
0	1975	Reliance	0	KW5645-19	1-054	30482
0	1975	Reliance	0	LW 1409 18	3-030	30482
0	1975	Reliance	0	W1360-15	3-066	30482
0	1975	Reliance	0	W1654-9	4-040	30496
0	1975	Reliance	0	W1656-2	1-082	30482
0	1975	Reliance	0	KW5487-24	T15148	TX_2.4_NA_25_POLE
0	1975	Reliance	0	1409-6	2-0053	30482
0	1975	Reliance	0	8612-4	T10258	30482
0	1975	Reliance	0	K6912-3	T10259	30482
0	1975	Reliance	0	85087	T10226	30442
0	1975	Reliance	0	KW73985	T10125	30482
0	1975	Reliance	0	WP817412	T10064	30482
0	1975	Reliance	0	KW57453	T10108	30482
0	1975	Reliance	0	KW52266	T10167	30501
0	1975	Reliance	0	KW8531-28	T10356	30482
0	1975	Reliance	0	KW5146-11	T10085	30501
0	1975	Reliance	0	KW5523-14	T13013	30482
0	1965	RTE	0	81K0604	5-3	30509
0	1990	SIEMENS	0	64610	T10660	30496
0	1965	SUPREME	0	44777	4-005	30495
0	1965	SUPREME POWER	0	13524	5-48	TxStock_59
0	1965	SUPREME POWER SUPPLY	0	1587	2-0113	TxStock_22
0	1965	SUPREME POWER SUPPLY	0	1588	2-0113	TxStock_22
0	1965	SUPREME POWER SUPPLY	0	1589	2-0113	TxStock_22
0	1965	T and R Electric	0	068393	T02005	TxStock_209
0	1965	T and R Electric	0	070327	T02004	30507
0	1965	T and R Electric	0	075342	T04043	TxStock_54
0	1965	T and R Electric	0	070327	5-23	TX_4.8_120/240_50_POLE
0	1950	WESTING HOUSE	15	435839	1-0042	30501
0	1950	WESTING HOUSE	0	624617	T10007	30612
0	1950	WESTING HOUSE	0	917783	T10005	30482
0	1950	WESTING HOUSE	0	435767	T10100	30501
0	1950	WESTING HOUSE	0	435769	T10100	30501
0	1950	WESTING HOUSE	0	432543	T10100	30501
0	1950	WESTING HOUSE	0	414197	T10009	30482
0	1950	WESTING HOUSE	0	917787	T10008	30482
0	1950	WESTING HOUSE	0	436101	T10619	30482
0	1950	Westinghouse	33	464329	2-0071	30510
0	1950	Westinghouse	0	368293	T12222	30501
0	1950	Westinghouse	0	374360	T12270	30496
0	1950	Westinghouse	0	387323	T12312	30501
0	1950	Westinghouse	0	388779	T12262	30496
0	1950	Westinghouse	0	475815	T12196	30501
0	1950	Westinghouse	0	484471	T12236	30501
0	1950	Westinghouse	0	488983	T12217	30501
0	1950	Westinghouse	0	548631	T12228	30501
0	1950	Westinghouse	0	548642	T12250	30501
0	1950	Westinghouse	0	188449	3-039	TxStock_15
0	1950	Westinghouse	0	404092	4-012	30501
0	1950	Westinghouse	0	174613	1-0045	TxStock_225
0	1950	Westinghouse	0	335125	4-0009	30502
0	1950	Westinghouse	2	335143	4-0009	30502
0	1950	Westinghouse	0	335295	5-17	TxStock_247
0	1950	Westinghouse	0	342776	3-0038	TxStock_11
0	1950	Westinghouse	7	356828	3-0021	30502
0	1950	Westinghouse	2	359639	4-0009	30502
0	1950	Westinghouse	0	366990	T01045	30457
0	1950	Westinghouse	0	370381	5-50	30456
0	1950	Westinghouse	0	370382	5-45	30456
0	1950	Westinghouse	0	374833	3-0021	30502

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Pole Mounted Transformers

Year	Year	Manufacturer	PCB	Serial_No	TX Location	Stock No	
Year	Assumed		PPM				
	0	1950	Westinghouse	0	415870	4-0006	TxStock_46
	0	1950	Westinghouse	4	435914	3-0019	TxStock_11
	0	1950	Westinghouse	97	436163	2-0051	30482
	0	1950	Westinghouse	3	436190	T09003	30482
	0	1950	Westinghouse	340	475912	4-0085	30482
	0	1950	Westinghouse	0	475999	3-0012	30482
	0	1950	Westinghouse	3	476026	T09003	30482
	0	1950	Westinghouse	103	484513	1-051	30501
	0	1950	Westinghouse	103	484513	1-051	30501
	0	1950	Westinghouse	3	536575	3-0018	TxStock_105
	0	1950	Westinghouse	3	536585	3-0018	TxStock_105
	0	1950	Westinghouse	0	588359	T01040	TxStock_5
	0	1950	Westinghouse	0	588359	T01040	TxStock_5
	0	1950	Westinghouse	3	641232	T09003	30482
	0	1950	Westinghouse	1	670300	2-0081	30501
	0	1950	Westinghouse	0	LB10689	T04099	TxStock_54
	0	1950	Westinghouse	0	LB10748	T04084	TxStock_82
	0	1950	Westinghouse	0	LP10726	T04073	TxStock_5
	0	1950	Westinghouse	0	355689	T12170	30482
	0	1950	Westinghouse	0	415076	T12056	30482
	0	1950	Westinghouse	0	532623	T12164	30501
	0	1950	Westinghouse	0	624628	T12159	30482
	0	1950	Westinghouse	0	112360	4-064	30501
	0	1950	Westinghouse	0	190431	3-001	30501
	0	1950	Westinghouse	0	204523	4-064	30501
	0	1950	Westinghouse	0	336626	4-069	30482
	0	1950	Westinghouse	0	338574	2-033	30482
	0	1950	Westinghouse	0	343601	1-036	30501
	0	1950	Westinghouse	0	379095	3-040	TxStock_22
	0	1950	Westinghouse	0	379096	3-040	TxStock_22
	0	1950	Westinghouse	0	379101	3-040	TxStock_15
	0	1950	Westinghouse	0	385137	2-017	30482
	0	1950	Westinghouse	0	404097	4-009	TxStock_36
	0	1950	Westinghouse	0	413777	3-060	30482
	0	1950	Westinghouse	0	413906	4-064	30501
	0	1950	Westinghouse	0	432609	4-043	30501
	0	1950	Westinghouse	0	439585	4-048	30501
	0	1950	Westinghouse	0	571487	1-045	30449
	0	1950	Westinghouse	0	C41R1155ONS	1-026	30482
	0	1950	Westinghouse	0	514087	T10661	30510
	0	1950	Westinghouse	0	355677	T10161	30482
	0	1950	Westinghouse	0	333206	T10147	30501
	0	1950	Westinghouse	0	333204	T10147	30501
	0	1950	Westinghouse	0	333186	T10147	30501
	0	1950	Westinghouse	0	64AH11056	T13063	30510
	0	1965		0	KW5294-5	T09078	30501
	0	1965		0	NA13	3-0020	30493
	0	1965		0	387324	T12330	30501
	0	1965		11	20662-17	T09066	30501
	0	1965		0	20874-14	T09024	30510
	0	1965		19	2-52545	4-0068	TxStock_11
	0	1965		18	267968	T09053	30501
	0	1965		1	553364	T01009	TxStock_28
	0	1965		2	797617	T01049	TX_4.8_120/208_15_POLE
	0	1965		0	88849	T09039	30482
	0	1965		0	C-94-038-1	T04006	TxStock_54
	0	1965		0	KW5384-6	T09057	30482
	0	1965		0	KW572-14	T09058	30501
	0	1965		0	KW-6360-13	T09065	30482
	0	1965		0	NA16	1-061	30510
	0	1965		0	248278	2-010	30501
	0	1965		0	263723	1-084	30501
	0	1965		0	338933	2-013	30482
	0	1965		0	427349	4-006	30501
	0	1965		0	KW-5226-4	4-050	30501
	0	1965		0	244082	T15075	TX_2.4_NA_25_POLE
	0	1965		0	C-95215-2	T04011	TX_8000_50_POLE
	0	1965		0	C-95215-3	T04011	TX_8000_50_POLE
	0	1965		0	KC-92E20209	T04011	TX_8000_50_POLE
	0	1965		0	14187-002	T04018	30728
	0	1965		0	63551-2	T04019	TX_3P_13.8_37.5_POLE
	0	1965		0	63551-1	T04019	TX_3P_13.8_37.5_POLE
	0	1965		0	63551-3	T04019	TX_3P_13.8_37.5_POLE
	0	1965		0	KC86K12102	T09033	30482
	0	1965		0	KW-7643-34	1-0072	30482
	0	1965		0	C41R11537N4	1-067	30501
	0	1965		0	XXXXXX	T13041	30510
	0	1965		0	XXXXXX	T13040	30510
1964	1964	Reliance	2	KW6512-31	T09145	30482	
1965	1965	Ferranti Packard	0	80898	T12309	30482	

[illegible]

Pole Mounted Transformers

Year	Year		PCB			
Year	Assumed	Manufacturer	PPM	Serial_No	TX Location	Stock No
1965	1965	GE	0	561001	1-0016	30503
1965	1965	GE	21	561615	1-0016	TxStock_115
1974	1974	Porter	0	21738-32	T09125	30482
1980	1980	McGraw Edison/Cooper	0	200399-1	T09107	30482
1984	1984	CamTran	0	KC84H22129	4-0044	30482
1985	1985	CamTran	0	KC85B13205	3-0025	30510
1985	1985	CamTran	0	KC-85C12204	1-0017	30510
1985	1985	CamTran	0	KC-85C12205	2-0032	30510
1986	1986	CamTran	0	KC86J06204	1-0030	30510
1986	1986	CamTran	0	KC-86C23116	3-0010	TxStock_46
1986	1986	CamTran	0	KC86C24115	3-0010	TxStock_46
1986	1986	CamTran	0	KC86C-24117	3-0010	TxStock_46
1986	1986	CamTran	0	KC86J10205	2-0089	30510
1986	1986	CamTran	0	KC86K12104	3-0014	30482
1986	1986	CamTran	0	KC86K12105	1-0064	30482
1989	1989	CamTran	0	KC89F06205	T09101	30510
1990	1990	T and R Electric	0	067953	T09104	30482
1990	1990	T and R Electric	0	067954	T09104	30482
1991	1991	CamTran	0	KC91G31101	3-0018	TxStock_105
1986	1986	Ferranti Packard	0	3-165673	T09088	30510
1942	1942	BROWN BOVERI	0	9698	3-002	30501
1953	1953	Packard	0	115260	4-047	30482
1953	1953	Reliance	0	TS1199T2	T09027	TxStock_191
1953	1953	Reliance	0	TS1199T4	T09027	TxStock_191
1953	1953	Reliance	0	TS1199T5	T09027	TxStock_191
1957	1957	Packard	0	233301	1-016	30612
1961	1961	Moloney	0	210527	2-0045	30504
1961	1961	Packard	0	98363	3-019	30482
1962	1962	Reliance	0	KW8512-18	T09005	30482
1963	1963	FERRANTI	0	55960	T13056	30495
1963	1963	Ferranti Packard	0	2-64447	T12120	30482
1963	1963	Ferranti Packard	0	60451	T12310	30482
1963	1963	Ferranti Packard	0	2-54904	4-0040	30505
1963	1963	Ferranti Packard	0	60430	T12073	30482
1963	1963	Ferranti Packard	0	2-51745	T15098	30510
1963	1963	SUPREME	0	58514	3-008	30496
1963	1963	Westinghouse	2	385095	4-0006	TxStock_46
1963	1963	Westinghouse	10	422414	T01029	TxStock_5
1964	1964	FERRANTI	0	73014	T13068	30496
1964	1964	FERRANTI	0	73015	T13068	30496
1964	1964	FERRANTI	0	74875	T13068	30496
1964	1964	FERRANTI	0	2-64268	T13009	30482
1964	1964	Ferranti Packard	0	70295		TxStock_11
1964	1964	Ferranti Packard	0	67839	1-0052	30501
1964	1964	Ferranti Packard	0	67978	T12088	TxStock_30
1964	1964	Ferranti Packard	0	2-73863	4-059	TxStock_17
1964	1964	Ferranti Packard	0	2-73866	4-059	TxStock_17
1964	1964	Ferranti Packard	0	2-73867	4-059	TxStock_17
1964	1964	Ferranti Packard	0	2-70307	T15065	TX_2.4_NA_37.5_POLE
1964	1964	Northern Electric	0	ON123624	1-107	30495
1964	1964	Reliance	0	K8719-6	T09046	30510
1964	1964	Reliance	1	KW6512-30	T09108	30482
1964	1964	Reliance	1	KW6512-32	T09105	30482
1964	1964	Reliance	0	KW6521-17	4-0086	TxStock_11
1964	1964	Reliance	0	KW6523-5	T09051	30493
1964	1964	Reliance	0	KW9496-7	T09046	30510
1964	1964	Reliance	0	KW-6499-12	T12123	30482
1965	1965	Ferranti Packard	9	83834	4-0031	TxStock_100
1965	1965	Ferranti Packard	0	2-80921	T12024	30482
1965	1965	Ferranti Packard	0	80890	T12317	30482
1965	1965	Ferranti Packard	0	80948	T12144	30482
1965	1965	Ferranti Packard	3	85677	T09049	30612
1965	1965	Ferranti Packard	0	80888	T12163	30482
1965	1965	Ferranti Packard	0	80914	T12203	30482
1965	1965	Ferranti Packard	0	80678	1-049	30496
1965	1965	Ferranti Packard	0	2-93514	T15067	30872
1965	1965	Ferranti Packard	0	2-93616	T15067	TX_3P_150_POLE
1965	1965	Ferranti Packard	0	2-93515	T15067	TX_3P_150_POLE
1965	1965	Ferranti Packard	0	2-83821	T15102	TX_2.4_NA_37.5_POLE
1965	1965	GE	1	553327A	3-0022	30510
1965	1965	GE	0	24611XX2	T13019	30482
1965	1965	General Electric	0	560725	T12175	30482
1965	1965	General Electric	0	550975	T01026	30456
1965	1965	General Electric	0	552098	T12665	30501
1965	1965	General Electric	0	551218	1-012	TxStock_30
1965	1965	Packard	0	80874	T12249	30482
1965	1965	Packard	0	80894	T12006	30482
1965	1965	Packard	0	80947	T12020	30482
1965	1965	Reliance	0	80867	T12022	30482
1965	1965	Reliance	0	KW-6536-6	T12180	30510

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Pole Mounted Transformers

Year	Year	Manufacturer	PCB	Serial_No	TX Location	Stock No
Year	Assumed	Manufacturer	PPM	Serial_No	TX Location	Stock No
1965	1965	Reliance	0	KW-6538-4	T12195	30496
1965	1965	Reliance	0	KW 6561-3	3-029	30482
1965	1965	Reliance	0	KW6539-11	4-021	30482
1965	1965	Reliance	0	KW6561-16	4-0053	30482
1965	1965	Reliance	0	KW6561-4	4-0053	30482
1965	1965	Reliance	0	KW6561-5	4-0053	30482
1965	1965	Reliance	0	KW6562-22	T09046	30510
1965	1965	Reliance	0	KW6539-3	3-045	30482
1965	1965	Reliance	0	KW668640	1-008	30482
1965	1965	Reliance	0	KW668512	T10093	30501
1965	1965	Reliance	0	KW65406	T10180	30508
1966	1966	Ferranti Packard	3	95034	2-0068	30501
1966	1966	Ferranti Packard	0	102900	T12204	30482
1966	1966	Ferranti Packard	0	105977	3-014	30482
1966	1966	Ferranti Packard	0	2-101441	1-079	30482
1966	1966	Ferranti Packard	0	2-104117	T15034	TX_2.4_NA_37.5_POLE
1966	1966	GE	0	580502	T01019	TxStock_5
1966	1966	Moloney	2	231316	T01014	30457
1966	1966	Moloney	2	231317	T01014	30457
1966	1966	Reliance	0	KW-6821-55	T12300	30501
1966	1966	Reliance	0	KW-6865-36	T12303	30496
1966	1966	Reliance	0	KW-6891-9	T12318	30510
1966	1966	Reliance	0	KW6154-60	5-49	30456
1966	1966	Reliance	0	KW7129-17	3-0007	30482
1966	1966	Reliance	0	KW7129-47	2-0002	30482
1966	1966	Reliance	12	KW7131-10	1-0009	30501
1966	1966	Reliance	0	KW7138-9	5-49	30456
1966	1966	Reliance	0	KW-6891-2	T12168	30510
1966	1966	Reliance	0	KW 7155-9	2-031	30493
1966	1966	Reliance	0	KW7131-10-PALM	T09021	30501
1966	1966	Reliance	0	KW682271	T10087	30482
1966	1966	Reliance	0	KW689060	T10204	30482
1966	1966	Reliance	0	KW6869-5	T05074	30493
1966	1966	Westinghouse	0	498580	3-020	30510
1966	1966	Westinghouse	0	510204	T01064	TxStock_5
1967	1967	FERRANTI ELECTRIC	0	219557	T15023	30510
1967	1967	Ferranti Packard	0	2-111538	T15122	TX_2.4_NA_50_POLE
1967	1967	Ferranti Packard	0	108631	2-0114	TxStock_11
1967	1967	Ferranti Packard	2	109151	3-0045	TxStock_11
1967	1967	Ferranti Packard	0	112270	T09052	30510
1967	1967	Ferranti Packard	0	2-19558	T15042	30510
1967	1967	GE	5	631506	3-0022	30510
1967	1967	Moloney	0	241244	T12023	30501
1967	1967	Pioneer	0	T3301-24	T01073	30457
1967	1967	Reliance	0	KW-7127-44	T12247	30496
1967	1967	Reliance	0	KW-7153-41	T12128	TxStock_101
1967	1967	Reliance	0	KW-7153-79	T12257	30482
1967	1967	Reliance	0	KW-8531-16	T12160	30482
1967	1967	Reliance	0	KW8531-35	T12229	30482
1967	1967	Reliance	0	KW-7153-18	T09036	30482
1967	1967	Reliance	0	KW7153-20	T09075	30482
1967	1967	Reliance	0	KW7153-24	T09117	30482
1967	1967	Reliance	0	KW7153-25	T09123	30482
1967	1967	Reliance	0	KW7243-4	4-0032	30482
1967	1967	Reliance	0	KW7297-20	2-0127	30482
1967	1967	Reliance	0	KW8512-13	T09084	30482
1967	1967	Reliance	0	KW8531-34	T09071	30482
1967	1967	Reliance	0	KW9531-37	T09091	30482
1967	1967	Reliance	0	KW7153-59	T12051	30482
1967	1967	Reliance	0	KW 7297-23	3-051	30482
1967	1967	Reliance	0	KW-7297-12	4-024	30482
1967	1967	Reliance	0	KW-7297-17	4-0002	30482
1967	1967	Reliance	0	71539	T10176	30482
1967	1967	WA	0	11011Y	T09032	30510
1968	1968	Ferranti Packard	1	2-112425	1-0046	30482
1968	1968	Ferranti Packard	0	3-23029	T02010	30509
1968	1968	Moloney	0	232290	3-013	30482
1968	1968	Moloney	0	239531	T15061	TX_2.4_NA_37.5_POLE
1968	1968	Moloney	0	242745	3-0024	30482
1968	1968	Moloney	0	244788	1-0012	30510
1968	1968	Moloney	0	222464	1-012	TxStock_30
1968	1968	Moloney	0	239505	2-029	30501
1968	1968	Moloney	0	239532	1-012	TxStock_30
1968	1968	Moloney	0	239513	T15020	TX_2.4_NA_37.5_POLE
1968	1968	Reliance	0	KW7565-5	T09147	30501
1968	1968	Reliance	0	KW7649-5	5-41	30509
1968	1968	Reliance	0	KW7649-9	5-31	30509
1968	1968	Reliance	0	KW-7700-14	1-088	30510
1968	1968	Reliance	0	KW7700-17	2-0088	30510
1968	1968	Reliance	0	KW 7648-9	3-038	30482

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Pole Mounted Transformers

Year	Year	Manufacturer	PCB	Serial_No	TX Location	Stock No
Year	Assumed	Manufacturer	PPM	Serial_No	TX Location	Stock No
1968	1968	Reliance	0	KW-7700-21	4-0002	30510
1969	1969	FERRANTI	0	2-117685	T13035	30482
1969	1969	FERRANTI	0	2-117688	T13060	30482
1969	1969	FERRANTI	0	2-117684	T13021	30482
1969	1969	Ferranti Packard	0	2-117697	T12316	30510
1969	1969	Ferranti Packard	0	2119233	T09077	30510
1969	1969	Ferranti Packard	0	2-115582	T15196	TX_2.4_NA_50_POLE
1969	1969	Ferranti Packard	0	2-115583	T15154	TX_2.4_NA_50_POLE
1969	1969	Ferranti Packard	0	2-121264	T15005	TX_2.4_NA_37.5_POLE
1969	1969	Ferranti Packard	0	2-121285	T15096	TX_2.4_NA_50_POLE
1969	1969	GE	39	695027	T01046	30501
1969	1969	GE	0	699655	T01050	30501
1969	1969	Reliance	0	KW8646-29	T12241	30501
1969	1969	Reliance	0	KW7840-2	T09089	30493
1969	1969	Reliance	0	KW8753-37	T09126	30482
1970	1970	Ferranti Packard	0	2-124259	T15001	TX_2.4_NA_50_POLE
1970	1970	Porter	0	20223-2	T15117	TX_3P_25_POLE
1970	1970	Porter	0	20223-3	T15117	TX_3P_25_POLE
1970	1970	Porter	0	20223-1	T15117	TX_3P_25_POLE
1970	1970	Reliance	0	KW894414		30507
1970	1970	Reliance	0	KW818025	2-018	30482
1970	1970	Reliance	0	KW8180-11	T09080	30482
1970	1970	Reliance	0	KW8180-12	T09079	30482
1970	1970	Reliance	0	KW8317-18	T01015	30456
1970	1970	Reliance	0	KW8317-49	T01015	30456
1970	1970	Reliance	0	KW8317-49	T01015	30456
1970	1970	Reliance	0	KW8317-9	T01015	TX_4.8_120/240_25_POLE
1970	1970	Reliance	0	KW-8180-25	2-028	30482
1970	1970	Reliance	0	KW-8487-7	4-076	30482
1970	1970	Reliance	0	KW8305-29	T05019	30482
1970	1970	Reliance	0	KW8305-27	4-0055	30482
1970	1970	Westinghouse	0	370305	4-013	TxStock_30
1970	1970	Westinghouse	0	653405	4-013	TxStock_30
1970	1970	Westinghouse	0	670269	4-013	TxStock_30
1970	1970	Westinghouse	18	678335	T01039	TxStock_12
1971	1971	Ferranti Packard	0	2-134100	T01021	TxStock_69
1971	1971	Ferranti Packard	0	3-71627	1-031	30482
1971	1971	Ferranti Packard	0	2-134070	T15080	TX_2.4_NA_50_POLE
1971	1971	Ferranti Packard	0	2-134085	T15004	TX_2.4_NA_50_POLE
1971	1971	General Electric	0	780491	5-22	30509
1971	1971	General Electric	0	781301	5-14	TxStock_59
1971	1971	General Electric	0	782354	5-7	TxStock_179
1971	1971	Packard	0	2-134587	3-015	30482
1971	1971	Porter	5	20348-4	T09014	30482
1971	1971	Porter	2	20348-5	T09102	30482
1971	1971	Porter	4	20348-6	T09098	30482
1971	1971	Porter	3	20348-7	T09143	30482
1971	1971	Porter	0	21528-23	1-005	30510
1971	1971	Reliance	0	KW9027-90	T09044	30482
1971	1971	Reliance	0	KW910212	T09081	30482
1971	1971	Reliance	0	KW9107-13	T09069	30482
1971	1971	Reliance	0	KW9054-6	1-102	30482
1971	1971	Reliance	0	KW910716	T10295	30482
1971	1971	Reliance	0	KW910718	T10231	30482
1971	1971		0	2-131594	1-090	TX_2.4_120/240_50_POLE
1972	1972	FERRANTI	0	2-141532	T13004	30482
1972	1972	Ferranti Packard	0	2-140696	T15074	TX_2.4_NA_50_POLE
1972	1972	Ferranti Packard	0	2-135939	5-10	30509
1972	1972	Porter	0	20320-6	T01057	TxStock_5
1972	1972	Porter	0	20820-5	T01030	TxStock_5
1972	1972	Porter	0	20485-12	2-024	30510
1972	1972	Porter	0	20485-8	4-049	30510
1972	1972	Porter	0	20435-8	1-0106	30510
1972	1972	Reliance	0	KW-9231-3	T04028	TxStock_54
1972	1972	Westinghouse	0	790654	2-004	30501
1973	1973	Canadian General Electric	0	872061	T09141	30501
1973	1973	FERRANTI	0	2-142900	T13053	30482
1973	1973	Ferranti Packard	0	2-142925	T15186	TX_2.4_NA_50_POLE
1973	1973	Ferranti Packard	0	2-142920	T15007	TX_2.4_NA_50_POLE
1973	1973	GE	0	2-148424	T13020	30496
1973	1973	GE	0	2-148393	T13020	30496
1973	1973	General Electric	4	878068	5-1	30456
1973	1973	Moloney	0	271641	T02009	30502
1973	1973	Moloney	0	271650	T02008	30502
1973	1973	Moloney	0	269653	4-044	30493
1973	1973	Porter	0	21348-49	1-071	30482
1973	1973	Porter	0	21523-15	2-022	30482
1973	1973	Reliance	0	RELIANCE04	1-095	30482
1973	1973	Reliance	0	RELIANCE06	1-097	30482
1973	1973	Reliance	0	EW1219-14	3-0040	30482

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Pole Mounted Transformers

Year	Year	Manufacturer	PCB	Serial_No	TX Location	Stock No
Year	Assumed	Manufacturer	PPM	Serial_No	TX Location	Stock No
1973	1973	Reliance	0	EW1219-16	2-0126	30482
1973	1973	Reliance	0	1353-12	3-023	30482
1973	1973	Reliance	0	EW1219-2	4-039	30482
1973	1973	Reliance	0	EW1219-4	4-039	30482
1973	1973	Reliance	0	EW1219-5	4-039	30482
1973	1973	Reliance	0	EW1353-13	3-024	30482
1974	1974	FERRANTI	0	2-155585	T13061	30482
1974	1974	Ferranti Packard	0	2-158045	T12323	30482
1974	1974	Ferranti Packard	0	2-158046	T12321	30482
1974	1974	Ferranti Packard	0	2-158047	T12322	30482
1974	1974	Ferranti Packard	0	2-158052	T12320	TxStock_98
1974	1974	Ferranti Packard	0	2-158014	1-065	30482
1974	1974	Ferranti Packard	0	2-158016	1-068	30482
1974	1974	Ferranti Packard	0	2-155581	T15076	TX_3P_NA_50_POLE
1974	1974	Ferranti Packard	0	2-152019	T15076	TX_3P_NA_50_POLE
1974	1974	Ferranti Packard	0	2-155584	T15076	TX_3P_NA_50_POLE
1974	1974	Ferranti Packard	0	2-155579	T05159	30482
1974	1974	GE	0	978797	T01005	30514
1974	1974	Porter	0	21738-29	T09092	30482
1974	1974	Porter	0	21506-46	T01071	30509
1974	1974	Porter	0	21523-12	T09067	30482
1974	1974	Porter	0	21523-25	2-0121	30482
1974	1974	Porter	0	21525-1	T01065	TxStock_5
1974	1974	Porter	0	2173-27	T09023	30482
1974	1974	Porter	0	21738-13	T09060	30482
1974	1974	Porter	0	21738-25	T09026	30482
1974	1974	Porter	0	21738-31	T09073	30482
1974	1974	Porter	0	21738-34	T09083	30482
1974	1974	Porter	0	22037-115	T01006	TxStock_5
1974	1974	Porter	0	26005-45	T01037	TxStock_69
1974	1974	Porter	0	8528-2	T09031	30510
1974	1974	Porter	0	21523-17	1-011	30482
1974	1974	Porter	0	21528-9	4-001	30510
1974	1974	Porter	0	21713-1	3-042	30872
1974	1974	Porter	0	21738-35	T15012	TX_2.4_NA_50_POLE
1974	1974	Porter	0	21738-24	T15100	TX_2.4_NA_50_POLE
1974	1974	Porter	0	2173821	T13050	30482
1974	1974	Porter	0	21739-24	T13062	30510
1974	1974	Reliance	0	KW - 27	T12177	TxStock_46
1974	1974	Reliance	0	LW1380-23	T12269	30501
1974	1974	Reliance	0	LW1391-11	T12177	TxStock_46
1974	1974	Reliance	0	LW-1350-5	4-0077	30482
1974	1974	Reliance	0	LW 1409-21	3-031	30482
1974	1974	Reliance	0	LW1347-99	1-030	30482
1974	1974	Reliance	0	LW1350	1-021	30482
1974	1974	Reliance	0	LW-1350-6	4-029	30482
1974	1974	Westinghouse	0	874215	T12188	30482
1975	1975	CGE	0	974055	T07090	30456
1975	1975	Ferranti Packard	0	2-160720	T09085	30510
1975	1975	Ferranti Packard	10	2-161988	1-0033	30510
1975	1975	GE	0	911635	T01005	30514
1975	1975	GE	0	975337	T01005	30514
1975	1975	GE	9	992693	T04012	TxStock_71
1975	1975	GE	28	993162	T01074	TxStock_77
1975	1975	GE	0	994007	T01042	30457
1975	1975	Moloney	0	290564	5-4	30456
1975	1975	Porter	0	2199083	T01028	30456
1975	1975	Porter	0	22037-71	T04032	TxStock_54
1975	1975	Porter	0			

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Pole Mounted Transformers

Year	Year	Manufacturer	PCB	Serial_No	TX Location	Stock No
Year	Assumed	Manufacturer	PPM	Serial_No	TX Location	Stock No
1976	1976	Reliance	0	81565-8	T10328	30482
1976	1976	Reliance	0	WP81584-6	T10352	30493
1976	1976	Westinghouse	0	LA19165	2-0093	30482
1976	1976	Westinghouse	1	LB-10698	T04075	TxStock_5
1976	1976	Westinghouse	3	LB-10700	T04076	TxStock_5
1976	1976	Westinghouse	0	LB-10732	T04074	TxStock_5
1976	1976	Westinghouse	0	LB10757	T04077	TxStock_5
1977	1977	Federal Pioneer	0	2-169318	T01012	TxStock_5
1977	1977	FERRANTI	0	2-170234	T13042	30482
1977	1977	FERRANTI	0	2-168924	T13036	30510
1977	1977	FERRANTI	0	2-169324	T13008	30482
1977	1977	Ferranti Packard	0	2-171179	T02015	30451
1977	1977	Ferranti Packard	0	2-169870	2-0109	30482
1977	1977	Ferranti Packard	0	2-169891	T01062	30514
1977	1977	Ferranti Packard	0	2-169904	T02007	30509
1977	1977	Ferranti Packard	0	2-170581	T09113	30510
1977	1977	Ferranti Packard	0	2-171222	5-28	TxStock_231
1977	1977	Ferranti Packard	0	2-171223	5-28	TxStock_231
1977	1977	Ferranti Packard	0	2-171224	5-28	TxStock_231
1977	1977	Ferranti Packard	0	2-171426	1-062	30482
1977	1977	Ferranti Packard	0	2-168925	T15002	30510
1977	1977	Ferranti Packard	0	2-171292	T06072	30484
1977	1977	Reliance	0	WP82356-2	4-060	30493
1977	1977	Reliance	0	WP82404-4	1-023	30482
1977	1977	Reliance	0	82115-1598	T01003	30456
1977	1977	Reliance	0	WP82120	T10012	30510
1977	1977	Reliance	0	WP824045	T10209	30482
1977	1977	Reliance	0	WP824046	T10209	30482
1977	1977	Reliance	0	WP824047	T10209	30482
1977	1977		0	2-169314	T07005	30509
1978	1978	Carte	0	E731-13	T01004	30456
1978	1978	Carte	0	E730-82	T01013	30456
1978	1978	Federal Pioneer	0	3-71694	2-0096	30482
1978	1978	Ferranti Packard	0	2-174920	T01036	TX_3P_100_pole
1978	1978	Moloney	0	3525-6	1-060	30504
1978	1978	Reliance	0	WP824123	T10333	30510
1978	1978	Reliance	0	WP824122	T10365	30510
1978	1978	Westinghouse	0	LB10749	T04156	TX_8_120/240_50_POLE
1978	1978		0	3638-4	T12650	30612
1979	1979	FERRANTI	0	2-174847	T13064	30510
1979	1979	FERRANTI	0	2-174848	T13015	30510
1979	1979	Ferranti Packard	0	2-177246	T01024	TxStock_5
1979	1979	Ferranti Packard	0	2-177250	T01061	TxStock_5
1979	1979	Ferranti Packard	0	2-177332	T01022	TxStock_69
1979	1979	Ferranti Packard	0	2-177333	T01035	30507
1979	1979	Ferranti Packard	0	2-177736	T02011	30514
1979	1979	Ferranti Packard	0	2-175429	1-040	TxStock_22
1979	1979	Ferranti Packard	0	2-175433	1-040	TxStock_22
1979	1979	Packard	33	992322	T01018	30509
1979	1979	Porter	0	22383-1	1-0051	30482
1980	1980	CamTran	0	KC88L20208	4-018	30482
1980	1980	Ferranti Packard	0	2-179890	2-0035	30482
1980	1980	Ferranti Packard	0	2-179891	2-0034	30482
1980	1980	Ferranti Packard	0	2-178892	T15017	TX_2.4_NA_50_POLE
1980	1980	Ferranti Packard	0	2-178819	T15095	TX_2.4_NA_50_POLE
1980	1980	MCGRAW EDISON	0	200398-2	2-0087	30493
1980	1980	MCGRAW EDISON	0	301046-2	4-0070	30482
1980	1980	McGraw Edison/Cooper	0	200399-7	T09025	30482
1980	1980	Moloney	0	4340/6	1-0062	30493
1980	1980	Reliance	0	2-178876	3-009	TX_2.4_120/240_50_POLE
1981	1981	McGraw Edison/Cooper	0	200601	T04134	TxStock_66
1981	1981	RTE	2	3-109-279	T04120	TxStock_54
1981	1981	RTE	2	3-109-280	T04120	TxStock_54
1982	1982	Carte	2	K413-1	4-0005	30510
1982	1982	Carte	0	K451-1	2-0062	30510
1982	1982	Carte	0	K716-2	T01068	TxStock_5
1982	1982	FERRANTI ELECTRIC	0	3-114750	T15014	30510
1982	1982	Ferranti Packard	0	3-114792	T09006	30510
1982	1982	Ferranti Packard	0	3-114627	T04065	TxStock_73
1982	1982	Ferranti Packard	0	3-114628	T04067	TxStock_73
1982	1982	Ferranti Packard	0	3-114649	4-0062	30482
1982	1982	Ferranti Packard	0	3-114793	T09068	30510
1982	1982	Ferranti Packard	0	8175/3	4-0064	30510
1982	1982	Ferranti Packard	0	8175141	T09017	30510
1982	1982	Ferranti Packard	0	8175-45	T09013	30510
1982	1982	Ferranti Packard	4	8188/13	4-0047	30482
1982	1982	Ferranti Packard	0	8188/15	1-0068	30482
1982	1982	Ferranti Packard	0	8188-41	2-003	30482
1982	1982	Ferranti Packard	0	2-114784	T15022	30510
1982	1982	Ferranti Packard	0	3-113047	T15038	TX_2.4_NA_50_POLE

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Pole Mounted Transformers

Year	Year		PCB			
Year	Assumed	Manufacturer	PPM	Serial_No	TX Location	Stock No
1982	1982	Ferranti Packard	0	3-114746	T15066	TX_2.4_NA_50_POLE
1982	1982	JIM'S ELECTRIC	0	705412	5-25	TxStock_59
1982	1982	Moloney	0	3-114635	T05235	30482
1982	1982	NA	0	8188-52	1-0001	30482
1982	1982	Packard	0	8188-99	1-025	30482
1982	1982	Porter	0	8188-97	T09001	30482
1982	1982	Reliance	0	UNKNOWN1	T15073	30510
1982	1982	RTE	2	3-114-638	T04120	TxStock_54
1982	1982	RTE	0	8188181	2-0130	30482
1982	1982		0	3.114635	T04052	TxStock_54
1982	1982		0	3-114-629	T04097	TxStock_73
1983	1983	CamTran	0	KC830202	1-0063	30482
1983	1983	CamTran	0	KC-830203	3-0048	30482
1983	1983	Carte	0	J-364-1	3-006	30612
1983	1983	Carte	0	L0700-1	4-071	30510
1983	1983	Federal Pioneer	0	G-7713-1	1-099	TxStock_46
1983	1983	Federal Pioneer	0	G-7713-2	1-099	TxStock_46
1983	1983	Federal Pioneer	0	G-7713-3	1-099	TxStock_46
1983	1983	Ferranti Packard	0	3-124-119	T04016	TxStock_73
1983	1983	Ferranti Packard	0	3-124-120	T04133	TxStock_73
1983	1983	Ferranti Packard	0	3-124-287	T04117	TxStock_73
1983	1983	Ferranti Packard	0	367599	5-21	TxStock_59
1983	1983	Ferranti Packard	0	8389-10	T09045	30510
1983	1983	Ferranti Packard	0	8389-9	T09043	30510
1983	1983	Ferranti Packard	0	8426/1	T04078	TxStock_76
1983	1983	Ferranti Packard	0	8426/2	T04078	TxStock_76
1983	1983	Ferranti Packard	0	8426/3	T04078	TxStock_76
1983	1983	Ferranti Packard	0	003-114648	2-009	30482
1983	1983	Ferranti Packard	0	8388-27	T15054	TX_2.4_NA_50_POLE
1983	1983	Ferranti Packard	0	8389-12	T15064	30510
1983	1983	Moloney	0	601616	4-0073	30482
1983	1983	Westinghouse	0	357258	5-20	TxStock_59
1983	1983		0	3-124121	T04007	TxStock_73
1984	1984	CamTran	0	KC-84618102	3-0046	30510
1984	1984	CamTran	0	KC84-J17107	5-26	30509
1984	1984	CamTran	0	KC89D27207	T04112	TxStock_73
1984	1984	CamTran	0	KC84F1 9108	4-055	30482
1984	1984	CamTran	0	KC84L27102	4-051	30482
1984	1984	Ferranti Packard	0	3-131-374	T04020	TxStock_73
1984	1984	Ferranti Packard	0	3-133-118	T04090	TxStock_72
1984	1984	Ferranti Packard	0	3-133-119	T04090	TxStock_72
1984	1984	Ferranti Packard	0	3-133-120	T04090	TxStock_72
1984	1984	Ferranti Packard	0	3-133-121	T04130	TxStock_72
1984	1984	Ferranti Packard	0	3-133-122	T04130	TxStock_72
1984	1984	Ferranti Packard	0	3-133-123	T04130	TxStock_72
1984	1984	Westinghouse	0	LL15347	2-0059	TxStock_8
1985	1985	CamTran	0	KC-85B13202	2-0128	30510
1985	1985	CamTran	0	KC-85B13210	3-0053	30510
1985	1985	CamTran	0	KC 85I18103	3-052	30510
1985	1985	CamTran	0	KC-85125101	3-021	30482
1985	1985	Carte	0	N0266-1	3-0031	30510
1985	1985	Federal Pioneer	0	G-6576-2	4-034	30510
1985	1985	Ferranti Packard	0	3-138-520	T04068	TxStock_73
1985	1985	Ferranti Packard	0	3-138522	T04056	TxStock_73
1985	1985	Moloney	0	318-10	2-0078	30482
1985	1985	Moloney	0	318-31	1-053	30482
1985	1985	Packard	1	3138522	T04017	TxStock_73
1986	1986	CamTran	0	KC-86J06210	2-0004	30510
1986	1986	CamTran	0	KC-86K12103	1-0004	30510
1986	1986	CamTran	0	KC-86K12106	T05111	30482
1986	1986	CamTran	0	KC86K12107	2-0036	30482
1986	1986	CamTran	0	KC86F03110	4-101	30496
1986	1986	CamTran	0	KC86G28107	1-064	30482
1986	1986	CamTran	0	KC-86G28112	1-046	30482
1986	1986	CamTran	0	KC-86I29203	2-036	30510
1986	1986	Carte	0	P0349-3	T12256	30483
1986	1986	Carte	0	P-0565-1	2-015	TxStock_46
1986	1986	Carte	0	P-0826-1	2-015	TxStock_46
1986	1986	Carte	0	P-0826-2	2-015	TxStock_46
1986	1986	Carte	0	P0826-3	3-061	30482
1986	1986	FERRANTI	0	3-165664	T13011	30510
1986	1986	FERRANTI	0	3-165632	T13001	30510
1986	1986	FERRANTI	0	3-165631	T13055	30510
1986	1986	Ferranti Packard	0	3-165-674	T09035	30510
1986	1986	Ferranti Packard	0	3-153-184	T04080	TxStock_73
1986	1986	Ferranti Packard	0	3-153262	T09050	TxStock_17
1986	1986	Ferranti Packard	0	3-153263	T09050	TxStock_17
1986	1986	Ferranti Packard	0	3-153265	T09050	TxStock_17
1986	1986	Ferranti Packard	0	3-165326	T04131	TxStock_73
1986	1986	Ferranti Packard	0	3-165644	T09110	30510

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Year	Year		PCB			
Year	Assumed	Manufacturer	PPM	Serial_No	TX Location	Stock No
1986	1986	Ferranti Packard	0	3-153296	T15028	30510
1986	1986	Ferranti Packard	0	3-145456	T15047	TX_3P_NA_50_POLE
1986	1986	Ferranti Packard	0	3-145446	T15047	TX_3P_NA_50_POLE
1986	1986	Ferranti Packard	0	3-145453	T15047	TX_3P_NA_50_POLE
1986	1986	Ferranti Packard	0	2-145437	T15049	TX_2.4_NA_50_POLE
1986	1986	Ferranti Packard	0	3-65663	T15123	30510
1986	1986	Ferranti Packard	0	3-145404	T15092	TX_2.4_NA_50_POLE
1986	1986	Westinghouse	0	68-03E-9239-006	T01002	TxStock_190
1986	1986	Westinghouse	0	86-03E 9239	T01002	TxStock_190
1986	1986	Westinghouse	0	86-03E 9239-016	T01002	TxStock_190
1987	1987	CamTran	0	KC-87K26207	T04105	TxStock_85
1987	1987	CamTran	0	KC67D06203	T04137	TxStock_71
1987	1987	CamTran	0	KC67D06204	T04137	TxStock_78
1987	1987	CamTran	0	KC67D06205	T04137	TxStock_78
1987	1987	CamTran	0	KC-87H30211	T02012	TxStock_267
1987	1987	CamTran	0	KC87K26206	T04105	TxStock_85
1987	1987	CamTran	0	KC87L03201	T04105	TxStock_85
1987	1987	CamTran	0	KC87122103	T14001	30482
1987	1987	CamTran	0	KC87A14101	4-078	30482
1987	1987	CamTran	0	KC87A14102	4-019	30482
1987	1987	Carte	0	Q1312-3	T01056	TxStock_273
1987	1987	Carte	0	Q1312-1	T01056	TxStock_273
1987	1987	Carte	0	Q1312-2	T01056	TxStock_273
1987	1987	Carte	0	00331-1	1-070	30510
1987	1987	Carte	0	P1196-1	T10300	TX_3PH_75_POLE
1987	1987	Carte	0	00332-1	1-103	TX_2.4_120/240_50_POLE
1987	1987	Carte	0	012482	T10107	30482
1987	1987	Ferranti Packard	0	60087.1	T04094	TxStock_66
1987	1987	Ferranti Packard	0	600-87-2	T04059	TxStock_66
1987	1987	Ferranti Packard	0	600-87-3	T04102	TxStock_66
1987	1987		0	01248-1	T12161	30482
1988	1988	CAM TRAN	0	KC-88K17108R	T04045	TX_8_120/240_75_POLE
1988	1988	CAM TRAN	0	KC-88B29218	4-0018	30510
1988	1988	CamTran	0	SCH8022206		30504
1988	1988	CamTran	0	KC-88F14213	4-066	TxStock_47
1988	1988	CamTran	0	KC8816201	T01060	30509
1988	1988	CamTran	0	KC88C29205	5-32	30510
1988	1988	CamTran	0	KC88H29209	T04103	TxStock_73
1988	1988	CamTran	0	KC88H30207	T04108	TxStock_73
1988	1988	CamTran	0	KC88C04202	4-015	30493
1988	1988	CamTran	0	KC88C28201	4-074	30493
1988	1988	CamTran	0	KC88I29208	2-027	TxStock_46
1988	1988	CamTran	0	KC-88J14209	4-022	30510
1988	1988	CamTran	0	KC88J17203	2-027	TxStock_46
1988	1988	CamTran	0	KC88L20210	4-067	30482
1988	1988	CamTran	0	KC88L20211	2-027	TxStock_46
1988	1988	Carte	0	S1459002	T06073	30446
1988	1988	Federal Pioneer	0	A128031	T10106	30872
1988	1988	Ferranti Packard	0	60295-1	T09064	TxStock_186
1988	1988	Ferranti Packard	0	60295-2	T09064	TxStock_186
1988	1988	Ferranti Packard	0	60295-4	T09064	TxStock_186
1988	1988	Ferranti Packard	0	8188/100	2-0058	30482
1988	1988	Westinghouse	0	3E2996001	4-073	30493
1988	1988	Westinghouse	0	88-03E3995-001	2-019	30510
1989	1989	CamTran	0	KC-89F06206-25	T09127	30510
1989	1989	CamTran	0	KC89G17211	T04022	TxStock_73
1989	1989	CamTran	0	KC-89C02218	T12107	30503
1989	1989	Carte	0	T01-69-003	4-033	30493
1989	1989	Carte	0	T-1217-001	4-007	30510
1989	1989	Carte	0	S1577-001	T10357	30872
1989	1989	Westinghouse	0	89-03E4676-002	4-061	30493
1989	1989	Westinghouse	0	89-03E4675-001	4-046	30612
1989	1989	Westinghouse	0	89-03E4675-002	4-046	30612
1989	1989	Westinghouse	0	89-03E4675-003	4-046	30612
1989	1989	Westinghouse	0	89-03E4676-001	2-016	30493
1990	1990	CamTran	0	KC90E24202	T04127	TxStock_66
1990	1990	CamTran	0	KC-90C12203	2-0037	30482
1990	1990	CamTran	0	KC-90C12204	3-0015	30482
1990	1990	CamTran	0	KC90K14203	5-29	30451
1990	1990	CamTran	0	KC90K27204	5-29	30451
1990	1990	CamTran	0	KC90K27205	5-29	30451
1990	1990	CamTran	0	KC90L19-202	T09062	TxStock_85
1990	1990	CamTran	0	KC90L19-203	T09062	TxStock_85
1990	1990	CamTran	0	KC90L19-206	T09062	TxStock_85
1990	1990	Carte	0	TT-869-001	4-008	30510
1990	1990	Carte	0	T-1217-002	1-006	30612
1990	1990	Carte	0	T-1868-001	4-010	TxStock_46
1990	1990	Carte	0	T-1868-002	4-010	TxStock_46
1990	1990	Carte	0	T-1868-003	4-010	TxStock_46
1990	1990	Carte	0	T-1868-005	4-011	30482

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Year	Year		PCB			
Year	Assumed	Manufacturer	PPM	Serial_No	TX Location	Stock No
1990	1990	Carte	0	T-1868-006	4-014	30482
1990	1990	Carte	0	T-1869-002	1-087	30510
1990	1990	Carte	0	T-1869-003	1-006	30612
1990	1990	Carte	0	T-1870-001	4-023	TxStock_17
1990	1990	Carte	0	T-1870-002	4-023	TxStock_17
1990	1990	Carte	0	T-1870-003	4-023	TxStock_17
1990	1990	CES	0	CES002	T04129	TxStock_72
1990	1990	CES	0	CES003	T04129	TxStock_63
1990	1990	ERMCO	0	13T2382400	4-004	30510
1990	1990	Packard	0	83200	T15119	TX_2.4_NA_50_POLE
1990	1990		0	T1868-004	4-072	30482
1991	1991	CamTran	0	KC-91C21202	T04124	TxStock_66
1991	1991	CamTran	0	KC91C21203	T04123	TxStock_66
1991	1991	CamTran	0	KC91D02201	T04092	TxStock_66
1991	1991	CamTran	0	KC91D02202	T04141	TxStock_66
1991	1991	CamTran	0	KC91D02203	T04100	TxStock_66
1991	1991	CamTran	0	KC-91D02205	T04096	TxStock_66
1991	1991	CamTran	0	KC91D02206	T04098	TxStock_66
1991	1991	CamTran	0	KC91D02207	T04136	TxStock_66
1991	1991	CamTran	0	KC91G22204	T04135	TxStock_66
1991	1991	CamTran	0	KC91G22205	T04135	TxStock_66
1991	1991	CamTran	0	KC91G22206	T04135	TxStock_66
1991	1991	CamTran	0	KC91H12201	T02014	30514
1991	1991	CamTran	0	KC91H28211	T04101	TxStock_66
1991	1991	CamTran	0	KC91H28212	T04125	TxStock_66
1991	1991	CamTran	0	KC91J21204	T04104	TxStock_66
1991	1991	CamTran	0	KC91K04204	T02006	30514
1991	1991	CamTran	0	KC91K04205	T02018	30514
1991	1991	Carte	0	WO 855-001	T12074	30482
1991	1991	Moloney	0	8574-40		30456
1991	1991	Westinghouse	0	82A401556	T09148	30510
1992	1992	CAM TRAN	0	AC92E1-3207	3-0032	30510
1992	1992	CAM TRAN	0	SC92125209	T13023	30483
1992	1992	CamTran	0	1992	T04081	TxStock_66
1992	1992	CamTran	0	KC92A02201	3-0016	TxStock_270
1992	1992	CamTran	0	KC92A02202	3-0016	TxStock_270
1992	1992	CamTran	0	KC92A02203	3-0016	TxStock_270
1992	1992	CamTran	0	KC92A22201	T04088	TxStock_66
1992	1992	CamTran	0	KC92A22202	T04082	TxStock_66
1992	1992	CamTran	0	KC92B10201	T04111	TxStock_66
1992	1992	CamTran	0	KC92B13202	T04079	TxStock_66
1992	1992	CamTran	0	KC92B13206	T04113	TxStock_66
1992	1992	CamTran	0	KC92B13207	T04119	TxStock_66
1992	1992	CamTran	0	KC92E08204	T04121	TxStock_66
1992	1992	CamTran	0	KC92E08205	T04106	TxStock_66
1992	1992	CamTran	0	KC92E08206	T04070	TxStock_66
1992	1992	CamTran	0	KC92E08207	T04066	TxStock_66
1992	1992	CamTran	0	KC92E08208	T04054	TxStock_66
1992	1992	CamTran	0	KC92E08209	T04055	TxStock_66
1992	1992	CamTran	0	KC92E20208	T04114	30442
1992	1992	CamTran	0	KC92E20211	T04083	30442
1992	1992	Carte	0	XB053-001	T12274	TxStock_120
1992	1992	Carte	0	OW1093-001	1-022	30488
1992	1992	Carte	0	OW1093-003	1-022	30488
1992	1992	Carte	0	OW1093-002	1-022	30488
1992	1992	Carte	0	W-1092-001	4-020	30493
1992	1992	Carte	0	W-1092-002	4-020	30493
1992	1992	Carte	0	W-1092-003	4-020	30493
1992	1992	Carte	0	XA211003	T10497	30482
1992	1992	Carte	0	XD052001	T10443	30612
1992	1992	ERMCO	0	40V3225400	T09090	30510
1992	1992	ERMCO	0	40V3225401	T09022	30510
1992	1992	ERMCO	0	40V-322-5403	T12183	30493
1992	1992	Federal Pioneer	0	A20451-1	1-0079	30872
1993	1993	CAM TRAN	0	KC93K16203	T13034	30510
1993	1993	CamTran	0	KC.93H19204	T04064	TxStock_54
1993	1993	CamTran	0	KC93B03201	T04053	TxStock_54
1993	1993	CamTran	0	KC93B03202	T04057	TxStock_54
1993	1993	CamTran	0	KC93B03203	T04069	TxStock_54
1993	1993	CamTran	0	KC-93B03205	T04122	30458
1993	1993	CamTran	0	KC-93B03206	T04061	TxStock_54
1993	1993	CamTran	0	KC93B03207	T04071	TxStock_54
1993	1993	CamTran	0	KC93B03208	T04051	TxStock_54
1993	1993	CamTran	0	KC93B03209	T04058	TxStock_54
1993	1993	CamTran	0	KC93B03210	T04142	TxStock_72
1993	1993	CamTran	0	KC93B03211	T04142	TxStock_72
1993	1993	CamTran	0	KC93B03212	T04142	TxStock_72
1993	1993	CamTran	0	KC93G14207	T04042	TxStock_54
1993	1993	CamTran	0	KC93-G14209	T04062	TxStock_54
1993	1993	CamTran	0	KC93H19206	T04063	TxStock_54

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Pole Mounted Transformers

Year	Year	Manufacturer	PCB	Serial_No	TX Location	Stock No
Year	Assumed	Manufacturer	PPM	Serial_No	TX Location	Stock No
1993	1993	CAMTRANS	0	KC93H19205	T04041	TxStock_54
1993	1993	Carte	0	YA290002	T10626	30482
1993	1993	Carte	0	YA190002	T10623	30482
1993	1993	Carte	0	YA190003	T10444	30482
1993	1993	Ferranti Packard	0	2-142888	T12663	30482
1993	1993	Reliance	0	W14441		TxStock_119
1994	1994	CAM TRAN	0	KC-94C29-214	2-0122	30510
1994	1994	CAM TRAN	0	KC-94C01202	2-0125	30510
1994	1994	CamTran	0	KC94122221	T01058	TxStock_192
1994	1994	CamTran	0	KC94122222	T01058	TxStock_192
1994	1994	CamTran	0	KC94C29215	T04016	TxStock_66
1994	1994	CamTran	0	KC94C29216	T04016	TxStock_66
1994	1994	CamTran	0	KC94F07204	5-53	30509
1994	1994	Carte	0	342002	T10220	30482
1994	1994	Carte	0	342001	T10500	30482
1994	1994	CES	0	C-94039-2	T10666	30482
1994	1994	CES	0	2-164406	T04129	TxStock_63
1994	1994	CES	0	C94027-3	T04091	TxStock_54
1994	1994	CES	0	C-94038-2	T04025	TxStock_54
1995	1995	CamTran	2	KC95819202	5-18	30456
1995	1995	CamTran	0	KC95-J19203	5-19	30456
1995	1995	Carte	0	1A1040-003	4-109	TX_2.4_120/240_50_POLE
1995	1995	Carte	0	1A1040-004	4-109	30482
1995	1995	Carte	0	1A1040-005	4-109	30482
1995	1995	CES	0	C-95044-1	T04095	30448
1996	1996	CAM TRAN	0	96KC359701	T13005	30482
1996	1996	CES	0	C96083-1	T04116	TxStock_82
1996	1996	CES	0	C96099-1	T04128	TxStock_195
1996	1996	CES	0	C96099-2	T04128	TxStock_195
1996	1996	CES	0	C96099-3	T04128	TxStock_195
1997	1997	CES	0	C96209-1	2-032	30489
1997	1997	CES	0	C96209-2	2-032	30489
1997	1997	CES	0	C96209-3	2-032	30489
1997	1997	Ferranti Packard	0	62524-3	T01072	TxStock_251
1997	1997	Ferranti Packard	0	62524-2	T02017	30514
1997	1997	ONAN	0	R-699025	4-0033	30511
1997	1997	ONAN	0	R-699028	4-0033	30511
1997	1997	ONAN	0	R-699032	4-0033	30511
1998	1998	Carte	0	K557-12	T09087	TxStock_245
1998	1998	Carte	0	M1148-34	T09087	TxStock_73
1998	1998	Carte	0	T1217-002	3-0041	30510
1998	1998	CES	0	88108-1	T04085	TxStock_73
1998	1998	Reliance	0	WB82412-4	T05501	30510
1999	1999	CamTran	0	KC89K21210	T04015	TxStock_73
1999	1999	Carte	0	5541-002	2-0074	30501
2002	2002	CAM TRAN	0	KC85I23204	5-13	30509
2002	2002	CamTran	0	KC94F07203	T07011	30509
2002	2002	Carte	0	13218-005	5-34	30457
2002	2002	Carte	0	13218-004	5-27	30457
2002	2002	Carte	0	13217-002	T04157	30514
2002	2002	Carte	0	13217-0020	T04157	30514
2002	2002	Porter	0	NA-NEUSTADT	5-8	30514
2003	2003	Carte	0	13218-001	T07013	30457
2003	2003	Carte	0	5541-003	2-0069	30501
2003	2003	Ferranti Packard	0	63570-6	T12134	TX_2.4_NA_25_POLE
2003	2003	Ferranti Packard	0	63570-1	T12134	TX_2.4_NA_25_POLE
2003	2003	Ferranti Packard	0	63570-3	T12134	TX_2.4_NA_25_POLE

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Pole Mounted Transformers

Year	Year		PCB			
Year	Assumed	Manufacturer	PPM	Serial_No	TX Location	Stock No
2004	2004	Carte	0	17846-005	2-0123	30482
2004	2004	Carte	0	17846-004	2-0123	30482
2004	2004	Carte	0	17846-00	1-027	TX_2.4_120/240_50_POLE
2004	2004	Carte	0	17842-00	1-044	30496
2004	2004	Carte	0	1784300	T12701	30501
2004	2004	Carte	0	17843003	T15078	30501
2004	2004	Carte	0	17843-006	T13026	30501
2004	2004	Ferranti Packard	0	63857-3	T12292	30482
2004	2004	Moloney	0	A3751-1	T15091	TX_2.4_NA_50_POLE
2004	2004	Moloney	0	A3751-2	T15089	TX_2.4_NA_50_POLE
2004	2004	Moloney	0	55099-1	T04046	TX_13/8_120/208_112_POLE
2004	2004	Moloney	0	A3752-2	T06018	30446
2005	2005	CamTran	0	05C2399001	T04118	TX_13.8_150_POLE
2005	2005	Carte	0	18985-002	T04039	TX_13/8_120/208_112_POLE
2005	2005	Carte	0	19017-002	T04139	TX_13.8_75_POLE
2005	2005	Carte	0	19017-001	T04010	TX_13.8_75_POLE
2005	2005	Carte	0	05C2399101	T04109	TX_13.8_150_POLE
2005	2005	Carte	0	17846-003	3-053	TX_2.4_120/240_50_POLE
2005	2005	Federal Pioneer	0	63779-1	1-032	30496
2005	2005	Federal Pioneer	0	63856-6	T05200	30496
2005	2005	Federal Pioneer	0	63856-4	T05200	30496
2005	2005	Federal Pioneer	0	63856-2	T05200	30496
2005	2005	Federal Pioneer	0	63857-9	T05042	30482
2005	2005	Federal Pioneer	0	63814-5	T06028	30482
2005	2005	Ferranti Packard	0	63780-1	T01027	30456
2005	2005	Ferranti Packard	0	63780-4	T01017	30456
2005	2005	Ferranti Packard	0	63779-2	T13039	30496
2005	2005	Ferranti Packard	0	63824-1	T04048	TX_8_120/240_25_POLE
2005	2005	Ferranti Packard	0	63824-2	T04048	TX_8_120/240_25_POLE
2005	2005	Ferranti Packard	0	63824-3	T04048	TX_8_120/240_25_POLE
2005	2005	Ferranti Packard	0	63779	4-0065	30496
2005	2005	Ferranti Packard	0	63779-3	1-024	30496
2005	2005	Ferranti Packard	0	63779-4	4-053	30496
2005	2005	Ferranti Packard	0	63857-8	T15035	30482
2005	2005	Ferranti Packard	0	63828-1	T04157	30514
2005	2005	Ferranti Packard	0	63856-5	T10154	30496
2005	2005	Ferranti Packard	0	63856-10	T10154	30496
2005	2005	Ferranti Packard	0	63856-7	T10154	30496
2005	2005	Ferranti Packard	0	63857-6	T12118	30482
2005	2005	Ferranti Packard	0	63780-8	T06040	30456
2005	2005	Ferranti Packard	0	63780-10	T06056	30456
2005	2005	Ferranti Packard	0	63780-5	T06058	30456
2005	2005	Ferranti Packard	0	63857-12	T12290	30482
2005	2005	Ferranti Packard	0	63857-5	3-058	TX_2.4_120/240_50_POLE
2005	2005	Ferranti Packard	0	63857-11	3-057	TX_2.4_120/240_50_POLE
2005	2005	Ferranti Packard	0	63812-1	T12092	30501
2005	2005	Ferranti Packard	0	63857-7	T12095	30482
2005	2005	Ferranti Packard	0	A-4167-1	T12138	30482
2005	2005	Ferranti Packard	0	63825-6	T04060	30927
2005	2005	Ferranti Packard	0	63825-7	T04060	30927
2005	2005	Ferranti Packard	0	63825-5	T04060	30927
2005	2005	Ferranti Packard	0	63857-2	T15103	30482
2005	2005	Ferranti Packard	0	63857-1	3-056	TX_2.4_120/240_50_POLE
2005	2005	Ferranti Packard	0	63856-1	T13070	30496
2005	2005	Ferranti Packard	0	63814-2	T11015	30487
2005	2005	Ferranti Packard	0	63814-1	T11015	30487
2005	2005	Ferranti Packard	0	6-3814-7	T11015	30487
2005	2005	Ferranti Packard	0	63814-3	T06009	30482
2005	2005	Ferranti Packard	0	63826-5	T04027	30445
2005	2005	Ferranti Packard	0	63780-7	T06080	30456
2005	2005	Ferranti Packard	0	63780-2	T06081	30456
2005	2005	Ferranti Packard	0	63826-1	T04089	30445
2005	2005	Ferranti Packard	0	63826-3	T04086	30445
2005	2005	Ferranti Packard	0	63826-4	T04040	30445
2005	2005	Ferranti Packard	0	S5466-1	T06081	30456
2005	2005	Ferranti Packard	0	63780-3	T06081	30456
2005	2005	Ferranti Packard	0	63824-4	T04093	30441
2005	2005	MALONEY	0	S5466-2	T11022	30456
2005	2005	Moloney	0	3920-3	1-086	TX_2.4_120/240_50_POLE
2005	2005	Moloney	0	A3920-4	T12015	30482
2005	2005	Moloney	0	A3920-5	T12016	30482
2005	2005	Moloney	0	A3920-2	3-065	TX_2.4_120/240_50_POLE
2005	2005	Moloney	0	A3920-6	T09070	30482
2005	2005	Moloney	0	A4167-4	T12293	30482
2005	2005	Moloney	0	S5466-3	T07229	30456
2005	2005	Moloney	0	S5464-1	T06007	30507
2005	2005	Moloney	0	6378-9	T01001	30456
2005	2005	Moloney	0	A4167-3	T12066	30482
2005	2005	Moloney	0	A4167-7	T12332	30482
2005	2005	Moloney	0	A4167-8	T12308	30482

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Year	Year	Manufacturer	PCB			
Year	Assumed	Manufacturer	PPM	Serial_No	TX Location	Stock No
2005	2005	Moloney	0	S5465-2	T02013	30457
2005	2005	Moloney	0	S5466-6	T05257	30496
2005	2005	Moloney	0	S5464-10	T07057	30482
2005	2005	Moloney	0	S5464-9	5-30	30484
2005	2005	Moloney	0	S5464-8	T06070	30484
2005	2005	Moloney	0	S5466-5	T01031	30496
2005	2005	Moloney	0	S5464-4	T06062	30484
2005	2005	ONAN	0	63813-1	T01076	30457
2005	2005	ONAN	0	63856-3	T12695	TX_2.4_NA_25_POLE
2005	2005	Packard	0	6385710	T05105	30482
2006	2006	Ferranti Packard	0	63812-14	T09166	30501
2006	2006	Ferranti Packard	0	63812-9	T10644	30501
2006	2006	Ferranti Packard	0	63812-8	T10644	30501
2006	2006	Ferranti Packard	0	63812-3	T10644	30501
2006	2006	Ferranti Packard	0	63812-13	T15031	TX_2.4_NA_37.5_POLE
2006	2006	Ferranti Packard	0	63856-17	4-0054	30496
2006	2006	Ferranti Packard	0	63856-20	4-0054	30496
2006	2006	Ferranti Packard	0	63856-19	4-0054	30496
2006	2006	Ferranti Packard	0	63856-22	T15200	TX_2.4_NA_25_POLE
2006	2006	Ferranti Packard	0	63856-23	T15200	TX_2.4_NA_25_POLE
2006	2006	Ferranti Packard	0	63856-13	T15200	TX_2.4_NA_25_POLE
2006	2006	Ferranti Packard	0	63857-19	T15008	30482
2006	2006	Ferranti Packard	0	63857-21	T15125	30482
2006	2006	Ferranti Packard	0	63857-22	T15125	30482
2006	2006	Ferranti Packard	0	63857-23	T15125	30482
2006	2006	Ferranti Packard	0	63857-24	1-0107	30482
2006	2006	Ferranti Packard	0	63812-2	T05222	30501
2006	2006	Ferranti Packard	0	63812-12	T05110	30501
2006	2006	Ferranti Packard	0	63812-4	T15010	TX_2.4_NA_37.5_POLE
2006	2006	Ferranti Packard	0	6385621	T10734	30496
2006	2006	Ferranti Packard	0	63856-25	T13054	30496
2006	2006	Ferranti Packard	0	63856-27	T13054	30496
2006	2006	Ferranti Packard	0	63856-26	T13054	30496
2006	2006	Ferranti Packard	0	6385618	T12106	30496
2006	2006	Ferranti Packard	0	63857-13	4-0113	TX_3P_NA_50_POLE
2006	2006	Ferranti Packard	0	63857-14	4-0113	30482
2006	2006	Ferranti Packard	0	63857-25	4-0113	30482
2006	2006	Ferranti Packard	0	63856-14	T05679	30496
2006	2006	Ferranti Packard	0	63812-5	3-0030	30501
2006	2006	Ferranti Packard	0	63857-17	T05259	TX_2.4_120/240_50_POLE
2006	2006	Ferranti Packard	0	63857-20	T05259	TX_2.4_120/240_50_POLE
2006	2006	Ferranti Packard	0	63857-15	T05259	TX_2.4_NA_50_POLE
2006	2006	Ferranti Packard	0	63856-16	T10088	30496
2006	2006	Ferranti Packard	0	63812-6	4-111	30501
2006	2006	Ferranti Packard	0	63812-11	1-074	30501
2006	2006	Moloney	0	A4191-1	1-052	30496
2006	2006	Moloney	0	A4191-3	1-052	30496
2006	2006	Moloney	0	A4191-6	1-052	30496
2006	2006	Moloney	0	4164-1	1-029	30503
2006	2006	Moloney	0	A4167-2	3-074	TX_2.4_120/240_50_POLE
2006	2006	Moloney	0	A4167-9	3-054	TX_2.4_120/240_50_POLE
2006	2006	Moloney	0	A4155-11	T01054	30496
2006	2006	Moloney	0	A4155-3	T01054	30496
2006	2006	Moloney	0	A4206-5	T04132	30455
2006	2006	Moloney	0	A4206-2	T04132	30455
2006	2006	Moloney	0	A4206-6	T04132	30455
2006	2006	Moloney	0	A4155-9	T01054	30496
2006	2006	Moloney	0	S5465-5	T11052	30502
2006	2006	Moloney	0	A4167-6	T12280	30482
2006	2006	Moloney	0	A4167-5	T12021	30482
2006	2006	Moloney	0	2000670-5	T15040	30482
2006	2006	Moloney	0	200670-6	T15040	30482
2006	2006	Moloney	0	200670-5	T15040	30482
2006	2006	Moloney	0	A4166-1	T07076	30487
2006	2006	Moloney	0	A4166-6	T07076	30487
2006	2006	Moloney	0	A4166-5	T07076	30487
2006	2006	Moloney	0	4164-6	1-029	30503
2006	2006	Moloney	0	A4164-2	T13016	30502
2006	2006	Moloney	0	A4164-5	T13016	30502
2006	2006	Moloney	0	A4164-4	T13016	30502
2006	2006	Moloney	0	4164-3	1-029	30503
2006	2006	SIEMANS	0	63812-7	T10362	30501
2006	2006	SIEMANS	0	64096-2	T12696	30508
2006	2006	SIEMANS	0	64096-3	T12696	30508
2006	2006	SIEMANS	0	64096-1	T12696	30508
2006	2006	SIEMANS	0	63857-18	4-070	TX_2.4_120/240_50_POLE
2006	2006		0	A4155-2	T06059	30657
2006	2006		0	A4155-12	T06059	30657
2006	2006		0	A4155-5	T06059	30657
2007	2007	Ferranti Packard	0	63857-33	T10739	30482

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Year	Year	Manufacturer	PCB	Serial_No	TX Location	Stock No
Year	Assumed	Manufacturer	PPM	Serial_No	TX Location	Stock No
2007	2007	Ferranti Packard	0	63857-37	T10739	30482
2007	2007	Moloney	0	A4619-2	T10733	30508
2007	2007	Moloney	0	A4619-1	T10733	30508
2007	2007	Moloney	0	A4619-3	T10733	30508
2007	2007	Moloney	0	A-4642-1	T15455	30508
2007	2007	Moloney	0	A4642-2	T15455	30508
2007	2007	Moloney	0	A4643-3	T15455	30508
2007	2007	Moloney	0	200101-1	T05504	30482
2007	2007	Moloney	0	63857-39	T05523	30482
2007	2007	SIEMANS	0	63857-30	T15051	30482
2007	2007	SIEMANS	0	63857-35	T15057	30482
2007	2007	SIEMANS	0	6385729	T12207	30482
2007	2007	SIEMANS	0	63857-32	1-039	30482
2007	2007	VA TECH	0	63857-27	2-0120	30482
2007	2007	VA TECH	0	63857-38	2-0120	30482
2007	2007	VA TECH	0	63857-31	2-0120	30482
2008	2008	CAM TRAN	0	08C3007602	T15053	30482
2008	2008	CAM TRAN	0	08C3107801	1-113	30508
2008	2008	CAM TRAN	0	08C3107802	1-113	30508
2008	2008	CAM TRAN	0	08C3107806	1-113	30508
2008	2008	CAM TRAN	0	08C3108002	T12703	30496
2008	2008	CAM TRAN	0	08C3007601	1-0021	30482
2008	2008	CAM TRAN	0	08C3007603	T05675	30482
2008	2008	CAM TRAN	0	08C3108001	1-083	30496
2008	2008	CAM TRAN	0	08C3106901	3-0029	30501
2008	2008	CAM TRAN	0	08C3106902	3-0029	30501
2008	2008	CAM TRAN	0	08C3106904	3-0029	30501
2008	2008	CAM TRAN	0	08C3107803	T13022	30508
2008	2008	CAM TRAN	0	08C3107804	T13022	30508
2008	2008	CAM TRAN	0	08C3107805	T13022	30508
2008	2008	Ferranti Packard	0	63814-8	T11021	30509
2008	2008	Moloney	0	200102-1	T05183	30497
2008	2008	Moloney	0	200102-3	T05183	30497
2008	2008	Moloney	0	200102-2	T05183	30497
2008	2008	Moloney	0	200670-4	T05137	30508
2008	2008	Moloney	0	200670-1	T05137	30508
2008	2008	Moloney	0	200670-3	T05137	30508
2008	2008	SIEMANS	0	64278-1	T10102	30482
2008	2008	SIEMANS	0	64279-1	T10346	30482
2009	2009	CAM TRAN	0	IM00172602	2-0055	30482
2009	2009	CAM TRAN	0	IM0072803	1-0047	30482
2009	2009	CAM TRAN	0	IM00169906	T05672	30496
2009	2009	CAM TRAN	0	IM00169904	T05672	30496
2009	2009	CAM TRAN	0	IM00169903	T05672	30496
2009	2009	CAM TRAN	0	IM00046811	1-010	30482
2009	2009	CAM TRAN	0	IM00046810	T05191	30482
2009	2009	CAM TRAN	0	IM00046818	T05136	30482
2009	2009	CAM TRAN	0	IM00046808	T12707	30482
2009	2009	CAM TRAN	0	IM00046812	T15048	30482
2009	2009	CAM TRAN	0	IM00172701	T12140	30482
2009	2009	CAM TRAN	0	IM00172603	T12140	30482
2009	2009	CAM TRAN	0	IM00172703	T12140	30482
2009	2009	CAM TRAN	0	IM00172801	4-0035	30482
2009	2009	CAM TRAN	0	IM0046801	T15037	30482
2009	2009	CAM TRAN	0	IM00046801	T15039	30482
2009	2009	CAM TRAN	0	IM00046817	T13024	30482
2009	2009	CAM TRAN	0	IM00172-802	4-0091	30482
2009	2009	CAM TRAN	0	IM00046807	4-0084	30482</

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Pole Mounted Transformers

Year	Year		PCB			
Year	Assumed	Manufacturer	PPM	Serial_No	TX Location	Stock No
2009	2009	SIEMANS	0	64610-2	4-0096	30496
2009	2009		0	IM00046202	T15457	30508
2009	2009		0	IM00046203	T15457	30508
2009	2009		0	IM00046201	T15457	30508
2010	2010	Moloney	0	202724-3	T06054	30657
2010	2010	Moloney	0	202724-1	T06054	30657
2010	2010	Moloney	0	202724-2	T06054	30657
2010	2010	Moloney	0	202725-3	T06053	30509
2010	2010	Moloney	0	202677-1	T12253	30496
2010	2010	Moloney	0	202406-11	T05129	30501
2010	2010	Moloney	0	202650-5	T12099	30482
2010	2010	Moloney	0	202650-3	T12709	30482
2010	2010	Moloney	0	202650-9	T10294	30482
2010	2010	Moloney	0	202650-1	T12011	30482
2010	2010	Moloney	0	202802-4	T12010	30482
2010	2010	Moloney	0	202650-7	T12009	30482
2010	2010	Moloney	0	202802-3	4-026	30482
2010	2010	Moloney	0	202650-14	T12298	30482
2010	2010	Moloney	0	202650-10	1-007	30482
2010	2010	Moloney	0	202650-6	T12173	30482
2010	2010	Moloney	0	202650-13	1-076	30482
2010	2010	Moloney	0	202406-8	T15058	30501
2010	2010	Moloney	0	20265012	T05420	30482
2010	2010	Moloney	0	202726-1	T04126	30445
2010	2010	Moloney	0	202650-4	1-0029	30482
2010	2010	Moloney	0	202503-5	T10753	30508
2010	2010	Moloney	0	202503-1	T10753	30508
2010	2010	Moloney	0	202503-3	T10753	30508
2010	2010	Moloney	0	202802-2	T12657	30482
2010	2010	Moloney	0	202802-1	T12137	30482
2010	2010	Moloney	0	202406-10	T13027	30501
2010	2010	Moloney	0	202677-4	T12710	30496
2010	2010	Moloney	0	202650-8	2-0100	30482
2011	2011	CAM TRAN	0	IM00571801	T04147	30856
2011	2011	CAM TRAN	0	IM00665201	T13032	30482
2011	2011	CAM TRAN	0	IM00610805	T13038	30482
2011	2011	CAM TRAN	0	IM00540802	T13033	30482
2011	2011	CAM TRAN	0	IM00540804	T12714	30482
2011	2011	CAM TRAN	0	IM00557901	1-0119	30512
2011	2011	CAM TRAN	0	IM00557902	1-0119	30512
2011	2011	CAM TRAN	0	IM00557903	1-0119	30512
2011	2011	CAM TRAN	0	IM00172702	T15079	30482
2011	2011	CAM TRAN	0	IM00540801	T05505	30482
2011	2011	CAM TRAN	0	IM00571802	T04147	30856
2011	2011	CAM TRAN	0	IM00571803	T04147	30856
2011	2011	Moloney	0	202406-13	T10290	30501
2011	2011	Moloney	0	202406-14	T10290	30501
2011	2011	Moloney	0	202406-12	T10290	30501
2011	2011	Moloney	0	204097-3	2-0091	30510
2011	2011	Moloney	0	202725-6	T01077	30507
2011	2011	Moloney	0	202725-5	T01053	30507
2011	2011	Moloney	0	203536-8	T01047	30509
2011	2011	Moloney	0	204097-2	T12311	30510
2011	2011	Moloney	0	204097-1	2-023	30510
2011	2011	Moloney	0	202677-5	T12082	30496
2011	2011	Moloney	0	202677-9	T12081	30496
2011	2011	Moloney	0	203534-4	T10617	30503
2011	2011	Moloney	0	203534-5	T10617	30503
2011	2011	Moloney	0	203534-9	T10617	30503
2011	2011	Moloney	0	202677-6	1-048	30496
2011	2011	Moloney	0	204198-5	T11053	30456
2011	2011	Moloney	0	202677-8	T09158	30496
2011	2011	Moloney	0	203536-2	T01033	30509
2011	2011	Moloney	0	203534-3	T05461	30501
2011	2011	Moloney	0	203534-1	T05461	30501
2011	2011	Moloney	0	203534-2	T05461	30501
2012	2012	CAM TRAN	0	IM006100801	T09072	30482
2012	2012	CAM TRAN	0	IM00622801	T12113	30482
2012	2012	CAM TRAN	0	IM00665303	T05125	30612
2012	2012	CAM TRAN	0	IM00665301	T05125	30612
2012	2012	CAM TRAN	0	IM00665302	T05125	30612
2012	2012	CAM TRAN	0	IM00723003	T12174	30493
2012	2012	CAM TRAN	0	IM00724308	T12104	30482
2012	2012	CAM TRAN	0	IM00724311	T12097	30482
2012	2012	CAM TRAN	0	IM00724307	T12096	30482
2012	2012	CAM TRAN	0	IM00610803	T09184	30482
2012	2012	CAM TRAN	0	IM00724302	T12148	30482
2012	2012	CAM TRAN	0	IM00724304	T12149	30482
2012	2012	CAM TRAN	0	IM00724314	T12302	30482
2012	2012	CAM TRAN	0	IM00724310	T12277	30482

[illegible]

Pole Mounted Transformers

Year	Year		PCB			
Year	Assumed	Manufacturer	PPM	Serial_No	TX Location	Stock No
2012	2012	CAM TRAN	0	IM00724312	T12058	30482
2012	2012	CAM TRAN	0	IM00777202	T12304	30510
2012	2012	CAM TRAN	0	IM00724306	T12053	30482
2012	2012	CAM TRAN	0	IM00724303	T12139	30482
2012	2012	CAM TRAN	0	IM00724313	T12172	30482
2012	2012	CAM TRAN	0	IM00777201	T12162	30510
2012	2012	CAM TRAN	0	IM00724315	T12124	30482
2012	2012	CAM TRAN	0	IM00610802	T12278	30482
2012	2012	CAM TRAN	0	IM00610804	T12186	30482
2012	2012	CAM TRAN	0	IM00610806	T12187	30482
2012	2012	CAM TRAN	0	IM00724305	T12715	30482
2012	2012	CAM TRAN	0	IM00724301	T12122	30482
2012	2012	CAM TRAN	0	IM00729309	T12046	30482
2012	2012	Moloney	0	202725-4	T01077	30507
2012	2012	Moloney	0	203536-3	T01077	30507
2012	2012	Moloney	0	205060-3	T05460	30482
2012	2012	Moloney	0	202802-9	T12064	30482
2012	2012	Moloney	0	205060-31	T05154	30482
2012	2012	Moloney	0	205060-2	T12279	30482
2012	2012	Moloney	0	205060-10	T12260	30482
2012	2012	Moloney	0	205060-5	T12220	30482
2012	2012	Moloney	0	205060-6	T12008	30482
2012	2012	Moloney	0	205060-1	T12007	30482
2012	2012	Moloney	0	202802-8	T12067	30482
2012	2012	Moloney	0	204097-6	T05227	30510
2012	2012	Moloney	0	205060-33	T09097	30482
2012	2012	Moloney	0	205060-16	1-116	30482
2012	2012	Moloney	0	205060-26	1-0044	30482
2012	2012	Moloney	0	205060-23	2-0072	30482
2012	2012	Moloney	0	205060-8	T15205	30482
2012	2012	Moloney	0	204097-5	T05197	30510
2012	2012	Moloney	0	205060-25	T12716	30482
2012	2012	Moloney	0	205060-14	T12153	30482
2012	2012	Moloney	0	202802-6	T12068	30482
2012	2012	Moloney	0	205060-4	T12281	30482
2012	2012	Moloney	0	202802-7	T12110	30482
2012	2012	Moloney	0	205060-15	T10353	30482
2012	2012	Moloney	0	205060-32	1-037	30482
2012	2012	Moloney	0	205060-27	T12243	30482
2012	2012	Moloney	0	205060-7	T12206	30482
2012	2012	Moloney	0	205060-30	T12295	30482
2012	2012	Moloney	0	205060-19	T12297	30482
2012	2012	Moloney	0	205060-21	T12017	30482
2012	2012	Moloney	0	205060-24	T12043	30482
2012	2012	Moloney	0	20506017	T12044	30482
2012	2012	Moloney	0	202677-7	T12285	30496
2012	2012	Moloney	0	205060-11	T12288	30482
2012	2012	Moloney	0	204097-4	T12296	30510
2012	2012	Moloney	0	205060-28	T12230	30482
2012	2012	Moloney	0	205060-18	T12286	30482
2012	2012	Moloney	0	205060-13	T12283	30482
2012	2012	Moloney	0	205060-20	T12282	30482
2012	2012	Moloney	0	205060-9	T05178	30482
2012	2012	Moloney	0	205060-22	T12252	30482
2013	2013	CAM TRAN	0	IM00993701	T12045	30510
2013	2013	CAM TRAN	0	IM1101103	4-121	30482
2013	2013	CAM TRAN	0	IM01101102	T10361	30482
2013	2013	CAM TRAN	0	IM01101108	1-0040	30482
2013	2013	CAM TRAN	0	IM01089402	T05180	30510
2013	2013	CAM TRAN	0	IM01089401	T05120	30510
2013	2013	CAM TRAN	0	IM001101201	1-034	30496
2013	2013	CAM TRAN	0	IM01065901	T05121	30510
2013	2013	Moloney	0	205060-12	T12284	30482
2013	2013	ONAN	0	IM001101107	3-0049	30482
2014	2014	CAM TRAN	0	205060-36	T05119	30482
2014	2014	Moloney	0	205060-51	1-0113	30482
2014	2014	Moloney	0	205060-47	T12718	30482
2014	2014	Moloney	0	205060-49	T12718	30482
2014	2014	Moloney	0	205060-46	T12718	30482
2014	2014	Moloney	0	202677-10	1-040	30496
2014	2014	Moloney	0	205060-53	T12151	30482
2014	2014	Moloney	0	205060-34	T15124	30482
2014	2014	Moloney	0	205060-43	T15083	30482
2014	2014	Moloney	0	205060-35	T15081	30482
2014	2014	Moloney	0	205060-48	T10782	30482
2014	2014	Moloney	0	205060-39	T10781	30482
2014	2014	Moloney	0	205060-44	T10781	30482
2014	2014	Moloney	0	205060-45	T10781	30482
2014	2014	Moloney	0	205060-54	T15081	30482
2014	2014	Moloney	0	205060-38	T15081	30482

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Pole Mounted Transformers						
Year	Year Assumed	Manufacturer	PCB PPM	Serial_No	TX Location	Stock No
2014	2014		0	IM01192603	T05684	30482
NA	1980	Moloney	0	NA18		TX_2.4_120/240_50_POLETRAN
0	1975	Reliance	0	20202	3-034	TX_2.4_120/240_50_POLETRAN
0	1975	Reliance	0	40404	3-036	TX_2.4_120/240_50_POLETRAN
1972	1972	Reliance	0	1L80682T-13	4-080	TX_2.4_120/240_50_POLETRAN
1974	1974	Reliance	0	10101	3-033	TX_2.4_120/240_50_POLETRAN
1998	1998	Carte	0	4AB137-003		TX_2.4_120/240_50_POLETRAN

Risk factor due to PCBs	Factor from 0-4 based on age.
if >50: 10 years or less if <50 : ok	0 if age = 51+
	0.7 if age = 45 to 50
	1.5 if age = 40 to 44
	2.1 if age = 35 to 39
	3.0 if age = 30 to 34
	3.5 if age = 25-29
	4 if age = 25-
OK	4
OK	2.1
OK	1.5
OK	1.5
OK	1.5
OK	1.5
OK	4

Appendix C – Westario Station Transformer Replacement/Refurbishment Plan

Westario Power Incorporated (Mar 1, 2016)
Transformers Fleet:

Transformers comprise the largest component of Westario Power Inc.'s municipal stations. There are 26 municipal stations, 1 radial customer station and a mobile utility station (MUS). All station transformers operate at a primary sub-transmission voltage level of 44kV with distribution voltages of either: 13.8, 8.32, 4.16 or 0.6 kV.

Transformers; ranked by age, voltage levels and risk condition, are outlined in Table 1.

Table 1: Transformer ranked by Age and Voltage Levels

Transformer Count	Sta.	Age yrs	Primary Voltage (kV)	Secondary Voltage (kV)
1	MUS	0	44	8320Y/4800, 4160Y/2400
2	Pal T1(fut re-wind of a 37 yr old tx)	0	44	4160Y/2400
3	Kinc 1	2	44	4160Y/2400
4	Pal T1(temp T2 pos)	2	44	4160Y/2400
5	Harr T2 (fut refurb)	3	44	13.8Y/8000, 8320Y/4800, 4160Y/2400
6	Walk 1	8	44	4160Y/2400
7	Harr T1	22	44	13.8Y/7967
8	Luck	23	44	8320Y/4800
9	S-hamp 1	23	44	4160Y/2400
10	PE 6	26	44	4160Y/2400 (vector diff)
11	Han 2	29	44	600Delta
12	Kinc 3	32	44	4160Y/2400
13	Han 4	34	44	4160Y/2400
14	Kinc 2	36	44	4160Y/2400
15	Wing 2 (age assumed)	36	44	4160Y/2400
16	S-ham 3	38	44	4160Y/2400
17	PE 4	39	44	4160Y/2400
18	PE 1	39	44	4160Y/2400 (vector diff)
19	S-ham 2	40	44	4160Y/2400
20	Kinc 4	40	44	4160Y/2400
21	PE 3	41	44	4160Y/2400
22	Spare (formerly Kinc 1)	41	44	4160Y/2400
23	PE 2	42	44	4160Y/2400 (vector diff)
24	Han 3	44	44	4160Y/2400
25	Tees	44	44	4160Y/2400, 8320Y/4800
26	Walk 3	44	44	4160Y/2400
27	Walk 2	45	44	4160Y/2400
28	spare (Walkerton SC)	46	44	13.8Y/8000
29	Wing 1 (refurb spare)	46	44	4160Y/2400
30	Han 1	48	44	4160Y/2400
31	Han 5	53	44	4160Y/2400
32	PE 5	53	44	4160Y/2400

The asset strategy for transformers is to mitigate the risk of failures utilizing a pro-active refurbishment or replacement program. Opportunities to integrate transformer replacements with other work required at a municipal station are considered in order to improve work efficiency and minimize customer outages.

Transformer Demographics:

One of the indicators of transformer degradation is age. The age distribution of transformers is shown in Table 1. An expected service life of 50 years for station transformers is considered optimum. Transformers purchased today are not expected to achieve the same service life as those purchased from earlier years. As depicted in Table 1, the average age of the in-service transformer fleet is significant. Currently, two stations of the transformer fleet population are beyond expected service life. Four transformers will be at expected service life in the next 5 years. While not all of these beyond expected service life transformers require immediate replacement, they do pose a higher potential risk to system and customer reliability. Transformers of high risk are prioritized in Table 2 below. The long term management of many transformers reaching their expected service life shortly will require increased funding.

Condition:

The condition of a transformer is one of the leading predictive indicators of its reliability. The internal components degrade as a function of time. Other influencing factors include: transformer loading, switching or lightning surges, moisture contamination, and paper insulation ageing. Degradation of the paper insulation in the transformer windings causes it to lose its tensile strength and excessive moisture trapped in the insulation of the transformer winding can weaken its condition causing premature failures. Since the degradation of transformer insulation is irreversible, refurbishment or replacement is the only viable solution.

A transformer's condition is primarily determined from transformer oil test results by applying industry standard diagnostic testing such as: Dissolved Gas Analysis (DGA) and General Oil Quality (GOQ). Furanic compound testing has been completed for some station transformer. Moisture content is currently not completed on an annual basis for station transformers. Annual moisture content testing is a decisive test indicator of on-going transformer condition. These two tests; furanic compound and moisture content testing should be considered to be part of an on-going testing analysis program. The condition of the transformer bushings, transformer tanks and cooling systems are also assessed during preventive maintenance routines.

The condition of station transformers is continually evaluated based on routine inspections and oil sampling. It is expected more transformers will gradually deteriorate into a high risk of failure category in the next 5 years as the transformer population continues to age. There are also events that can cause damage that are not easily detected and can lead to a rapid deteriorating condition. These events include; electrical failures of components, faults occurring from animal contact or lightning, mechanical failure caused by movement of internal windings, or failures caused by malfunctioning cooling systems. Awareness and reaction to these types of events is critical.

Performance:

Municipal station transformer failures are highly impactful since many municipal customers are supplied by these stations. Service restoration following a transformer failure may include use of the mobile unit substation (MUS) to be temporarily installed while the station unit is replaced to minimize customer interruption which would otherwise be lengthy.

Diagnostic and oil test results have helped to identify transformers in failing condition (e.g., former Kincardine 1); promoting removal of the transformer thereby avoiding major failures. However, it is not possible to eliminate all risks of major failures.

With the approaching bow wave of transformers, at and beyond expected service life, the probability of failure trend is expected to increase over the next 5 years as transformer condition continues to degrade with age.

Replacement of failed transformers takes longer to complete, is more costly, and has more impact to customer supply when compared to replacements under planned situations. These factors, along with the aging demographics and the degrading condition of the transformer population highlight the need to increase the number of transformer refurbishments or replacements in order to maintain an acceptable level of risk.

Other Influencing Factors:

- Municipal stations are primarily located in rural areas and lack redundancy. This configuration can result in lengthy outages to customers supplied from the station in case of transformer failure.
- Environment Canada regulations require all oil-filled equipment to be tested for PCB contamination. Equipment not meeting the requirements must be removed from service by 2025.
- Spill containment systems are required in stations where there is high environmental risk of oil being released from the site, in adherence to the Ministry of Environment's *Environmental Protection Act*. This requirement strategy has been completed at Wingham 1 municipal station.
- Noise complaints from customers dwelling in proximity to municipal stations; where noise levels exceed acceptable limits, must be reduced through either transformer replacements or through the installation of sound barriers in order to be compliant with Ministry of Environment regulations.

Trends and Impacts:

Transformer refurbishment or replacement has begun on a planned annual basis.

Note: Various warning conditions exist for DGA testing (Condition 2, 3 and 4; 4 being the most serious associated with increased risk). For Tables 1 and 2, yellow signifies a condition 3 risk warning, red signifies a condition 4 risk warning.

Currently, as observed from annual DGA testing trends (Table 2); refurbishment ranking are as follows: four transformers are subject to a high risk of failure, ten transformers are demonstrating lesser but increasing failure risk and fifteen are currently at a low failure risk. Increasing DGA trending results are an indication of increase risks. At the rate of two refurbishments or replacement per year combined with any increasing DGA trends, the percentage of transformers beyond their expected service life will increase significantly.

Transformers, ranked by priority age and dissolved gas analysis are outlined in Table 2.

Date	Refurb. Prio.	(Priority)Sta.	Age yrs	H2 Hyd.	CH4 Meth.	C2H4 Ethylene	CO Carbon Mon.	CO2 Carbon Di.	TDCG Total Diss. Comb. Gas
Mar-13	1	Kinc 3				4	1341 (C3)	23556 (C4)	1397 (C2)
Aug-13		"				5	1380 (C3)	25325 (C4)	1442 (C2)
Jan-14		"				5	1276 (C3)	21914 (C4)	1336 (C2)
Sep-15		"	32			6	1399(C3)	31458(C4)	1472(C2)
Mar-13	2	S-ham 2				9	1327 (C3)	5684 (C3)	1365 (C2)
Aug-13		"				10	1366 (C3)	6334 (C3)	1405 (C2)
Feb-14		"				10	1260 (C3)	5244 (C3)	1299 (C2)
Sep-14		"				9	1299(C3)	6318(C3)	1332(C2)
Sep-15		"	40			11	1459(C4)	7345(C3)	1500(C2)
Jun-12	3	Luck				17	1178 (C3)	3552 (C2)	1214 (C2)
Jan-13		"				18	1045 (C3)	3782 (C2)	1085 (C2)
Apr-13		"				21	1244 (C3)	4016 (C2)	1267 (C2)
Aug-13		"				24	1337 (C3)	5114 (C2)	1385 (C2)
Feb-14		"				20	1098 (C3)	3474 (C2)	1146 (C2)
Sep-14		"				21	1231(C3)	5271(C3)	1273(C2)
Sep-15		"	23			27	1460(C4)	6066(C3)	1511(C2)
Mar-13	4	S-ham 3				2	373 (C2)	6937 (C3)	410
Aug-13		"				3	491 (C2)	9449 (C3)	541
Jan-14		"				4	450 (C2)	8469 (C3)	501
Sep-14		"				5	435(C2)	10215(C4)	479
Sep-15		"	38			3	559(C2)	11721(C4)	607
Mar-13	5	Kinc 2				137 (C3)	256	3495 (C2)	403
Aug-13		"				148 (C3)	316	4099 (C3)	477
Sep-15		"	36			156(C3)	299	4568(C3)	468
Mar-13	6	S-hamp 1				50 (C2)	905 (C3)	3813 (C2)	975 (C2)
Aug-13		"				53 (C2)	936 (C3)	4200 (C3)	1014 (C2)
Feb-14		"				54 (C2)	868 (C3)	3768 (C3)	944 (C2)
Sep-15		"	23			64(C2)	1044(C3)	5100(C3)	1133(C2)
Sep-14	7	Kinc 4	40			46	487	5544(C3)	546
Sep-15		"				56(C2)	621(C3)	6292(C3)	693
Jun-13	8	PE 4				34	716 (C3)	4134 (C3)	763 (C2)
Sep-14		"				39	797(C3)	6068(C3)	851(C2)
Sep-15		"	39			47	896(C3)	6760(C3)	959(C2)
Mar-13	9	PE 3				27	972(C3)	4249(C3)	1012(C2)
Aug-13		"				30	1100(C3)	5323(C3)	1146(C2)
Sep-14		"				29	1099(C3)	5632(C3)	1143(C2)
Sep-15		"	41			33	1183(C3)	5984(C3)	1232(C2)
Aug-13	10	Han 2				5	1162 (C3)	5028 (C3)	1210 (C2)
Sep-14		"				5	1173(C3)	5649(C3)	1225(C2)
Sep-15		"	29			6	1316(C3)	6174(C3)	1374(C2)
Mar-13	11	Han 4				20	611 (C3)	3894 (C2)	656
Aug-13		"				22	691 (C3)	4413 (C3)	744 (C2)
Sep-14		"				23	683(C3)	4468(C3)	734(C2)
Sep-15		"	34			28	802(C3)	5092(C3)	860(C2)
Apr-13	12	Harr T1				13	836 (C3)	1416	861 (C2)
Aug-13		"				15	930 (C3)	1878	959 (C2)
Sep-14		"				15	903(C3)	2090	930(C2)
Sep-15		"	22			19	1090(C3)	2392	1124(C2)
Sep-15	13	Walk 1	8			39	683(C3)	2817(C2)	762(C2)
Sep-15		scheduled							
Dec-15		Harr T2 (fut refurb)	3	702(C3)	68	1	133	700	923(C2)
		"		1158(C3)	93	2	132	589	1408(C2)
Mar-13	n.a.	PE 2				1	699 (C3)	3141 (C2)	712
Aug-13		"				1	857 (C3)	3644 (C2)	874 (C2)
Sep-14		"				1	658(C2)	3702(C2)	581
Sep-15		"	42			2	433(C2)	3931(C2)	455
Sep-15	n.a.	PE 6	26			3	510(C2)	3132(C2)	551
Sep-15	n.a.	Han 3	44			47	457(C2)	3261(C2)	516
Sep-15	n.a.	Han 5	53			9	311	3211(C2)	350
Sep-15	n.a.	Pal T1(temp T2 pos)	2			1	317	751	338
Sep-15	n.a.	PE 5	53			16	274	2028	300
Sep-15	n.a.	Wing 1 (refurb)	46			1	247	946	262
Sep-15	n.a.	Han 1	48			3	223	1942	243
Sep-15	n.a.	Walk 3	44			5	215	2025	256
Mar-13	n.a.	PE 1				1	148	1379	154
Sep-14		"				1	145	1606	155
Sep-15		"	39			2	175	1746	184
Sep-15	n.a.	Kinc 1	2			1	169	333	188
Sep-15	n.a.	Wing 2	?			4	161	1913	171
Sep-15	n.a.	Tees	44			3	138	1655	165
Sep-15	n.a.	Walk 2	45			1	47	1121	51
TBD - 16	n.a.	Pal T1(fut refurb)							

Proposed Yearly Transformer Fleet Strategy:

2016:

Year	Priority	Fleet Location	Intended Action	Estimated K\$
2016		Palm T1	Replace core and coils of existing T1 5MVA transformer, pri-top/sec-throat. (\$100K). Temporarily install MUS to carry station load - no outage. (costs included in overall station design modification requirements). Remove existing T1 position transformer (Northern, pri-top/sec-top.), relocate to T2 position (costs included in overall station design modification requirements). Install refurbished Palmerston transformer in original T1 position (costs included in overall station design modification requirements). Note: 1) some of these capital \$'s may have been spent in 2015.	100
2016		Kinc 3	Temporarily install MUS to carry station load - no outage. (costs included in overall station design modification requirements). Remove, refurbish and replace existing Kincardine MS3 @ 7.5MVA, pri-top/sec-throat (\$75K). Note: if refurbishment is not feasible, rebuild or replacement will be necessary @ \$170K.	75
2016		Lucknow	Temporarily install MUS to carry station load - no outage. (costs included in overall station design requirements). Remove, refurbish & replace existing Lucknow @ 5MVA pri-top/sec-throat (\$75K). Note: 1) If refurbishment is not feasible, rebuild or replacement will be necessary @ \$150K. 2) Lucknow was chosen over S-ham 2 due to increased ethylene content of DGA, being an radial 8.32kV station, unknown redundancy supply from Hydro One and uncertainty regarding long-term station locations in Southampton.	75
2016		Proposed 2016 Sub-total		250

2017:

Year	Priority	Fleet Location	Intended Action	Estimated K\$
2017		S-hampton 1	Refurbish and modify vectors - former Kinc 1 @ 5MVA, pri-top, sec-top (85K) <u>ship / store</u> @ S-hamp 1 in 2016, Temporarily install MUS to carry station load - no outage. (costs included in overall station design modification requirements). <u>install</u> in 2017. Note: existing S-hamp 1 @ 6MVA, pri-top, sec-top. former Kinc 1 @ 5MVA, pri-top, sec-top considered with an understanding of: - increasing ethylene content rate, -existing transformer's 6MVA capacity - not a concern regarding potential load growth due to load transfer capacity of S-hamp 2 and 3 stations. An alternative option: if S-hampton 1 station is not rapidly increasing in ethylene as time progresses and since the refurbished unit (former Kinc 1) is virtually interchangeable with any station with modification procedures: - an option is to keep (former Kinc 1) stored @ S-hampton -1 as a spare such that the mobile would not be tied up for months should an emergency failure occur at an alternative station.	85
2017		S-hampton 2	Temporarily install MUS to carry station load - no outage. (costs included in overall station design modification requirements). Remove, refurbish and replace existing S-ham 2 @ 5MVA, pri-top/sec-throat (\$75K). Note: if refurbishment is not feasible, rebuild or replacement will be necessary @ estimated \$150K.	75
2017		Proposed 2017 Sub-total		160

2018:

2018		S-hampton 3	Temporarily install MUS to carry station load - no outage. (costs included in overall station design modification requirements). Remove, refurbish or replace existing S-hampton @ 5MVA, pri-top/sec-throat (\$75K). Note: if refurbishment is not feasible, rebuild or replacement will be necessary @ \$150K.	75
2018		Kinc 2	Temporarily install MUS to carry station load - no outage. (costs included in overall station design modification requirements). Remove, refurbish or replace existing Kinc 2 @ 7.5MVA, pri-top/sec-throat (\$75K). Note: if refurbishment is not feasible, rebuild or replacement will be necessary @ \$170K.	75
2018		Proposed 2018 Sub-total		150

2019 Proposal:

Using enclosed Table 2;

2019 should be a continuation, as indicated by “**Refurb Priority**”. e.g., Kincardine 4 and PE 4.

2016, 2017 and 2018 DGA readings may change/advance existing priorities as indicated in Table 2.

2020 Proposal:

Using enclosed Table 2;

2020 should be a continuation, as indicated by “**Refurb Priority**”. e.g., PE 3 and Hanover 4.

2016, 2017, 2018 and 2019 DGA readings may change/advance existing priorities as indicated in Table 2.

System Planning Priorities: 1) Hanover 2:

- A radial customer station (New Life Mills)
- Existing transformer @ 5MVA, 600V Delta, pri-top/sec throat.
- Existing station loading @:

Year	Month	Peak (kW)	P.F.	Date	Peak (kVA)	P.F.	Date
2015	January	654	0.703	3-Jan-15	993	0.582	24-Jan-15
	February	657	0.701	17-Feb-15	937	0.701	17-Feb-15
	March	649	0.701	1-Mar-15	925	0.701	1-Mar-15
	April	654	0.703	29-Apr-15	930	0.703	29-Apr-15
	May	659	0.701	1-May-15	1143	0.564	27-May-15
	June	654	0.565	3-Jun-15	1156	0.565	3-Jun-15
	July	648	0.565	9-Jul-15	1149	0.558	17-Jul-15
	August	613	0.927	20-Aug-15	862.8	0.680	20-Aug-15
	September	649.2	0.89	27-Sep-15	704.4	0.828	27-Aug-15
	October	664.8	0.82	06-Oct-15	685.2	0.9	30-Oct-15
	November	661.2	0.9	21-Nov-15	867	0.99	30-Nov-15
	December	636	0.9	13-Dec-15	685.2	0.9	17-Dec-15

Year	Month	Peak (kW)	P.F.	Date	Peak (kVA)	P.F.	Date
2014	January	648	0.824	5-Jan-14	786	0.824	5-Jan-14
	February	642	0.829	5-Feb-14	786	0.817	16-Feb-14
	March	636	0.815	2-Mar-14	810	0.607	24-Mar-14
	April	648	0.812	10-Apr-14	798	0.812	10-Apr-14
	May	654	0.566	31-May-14	1154	0.566	31-May-14
	June	649	0.56	1-Jun-14	1161	0.56	1-Jun-14
	July	669	0.703	22-Jul-14	1104	0.561	1-Jul-14
	August	647	0.703	7-Aug-14	921	0.702	21-Aug-14
	September	652	0.702	1-Sep-14	950	0.677	26-Sep-14
	October	660	0.702	24-Oct-14	945	0.684	1-Oct-14
	November	662	0.701	1-Nov-14	944	0.701	1-Nov-14
	December	666	0.703	12-Dec-14	948	0.703	12-Dec-14

- Peak MVA load is minimally decreasing yearly.
- Station Peak kW and kVA loading for 2014 and 2015 confirms diminishing load profile.
- Transformer; currently 29 yrs old.
- Transformer is a category (3) risk from previous DGA results, Table 1 & 2.
- Design viability already requested: - winding new coils for the existing 2 MVA Ferranti Packard currently stored @ Walkerton Service Centre or consideration of a new transformer should be considered.
- Note: after design criteria has been evaluated with respect to the existing physical size of the spare Ferranti Packard unit (2 MVA, 13.8kV secondary - stored @ Walkerton). Winding new coils for this unit to provide 600V delta load is considered **doable**. Final evaluation is required to confirm this concept.
- A 2MVA unit should be considered, pending discussion with New Life Mills regarding future load requirements.
- Obtaining any replacement following a station transformer failure would be very difficult to complete in short order (e.g., 4 months).

System Planning Priorities: 2) Port Elgin 6:

- Existing transformer @ 5MVA, 4160/2400V Y **pri-throat/sec-throat**, requires an internal wiring modification requirement if required to be paralleled with the majority Dy11 vector configuration stations.
- Existing station loading provided:
Measured data for PE MS6 /Sept 2014:(monthly peak kW or kVA data not available).
Calculated peak kW and kVA from measured feeder amps @ kVA = 1,236, kW = 1,174.2 ,(95% pF assumed).
- Loading is known considered very low.
- Backup capability to adjacent stations undetermined.
- PE1, 2 and 6 are Dy1 vector configuration stations.
- The MUS is not a Dy1 vector configuration, previous Westario Planning was to modify these stations to Dy11 when appropriate.
- PE3, 4 and 5 are Dy11 vector configuration stations.
- This transformer is 26 yrs old.
- It is a low risk, from DGA test results, no current refurbishment ranking.
- If this station is not an asset that is considered necessary for supporting Kincardine, removal, refurbishment should be considered.
- Apparently, PE1 is of sufficient capacity to carry PE2 loading in an emergency scenario.
- PE1: Calculated peak kW and kVA from measured feeder amps @ 1,320.12 kW, 1,389.6 kVA (Jan 2015), (5 MVA – Pioneer Electric)
- PE2: Calculated peak kW and kVA from measured feeder amps @ 3,137.28 kW, 3,302.40 kVA (Jan 2015), (5 MVA – Federal Pioneer)
- From Jan 2015 feeder amp results, transfer capability between stations is dependent upon distribution line capability and station capability (e.g., station capacities: 3302 kVA + 1320 kVA = 4622 kVA). Summer station loading will likely be increased compared to winter station loading and restrict transfer capability.
- Addition of cooling fans @ PE1 and PE2 stations is a consideration.
- PE1 & PE2: **pri-top/sec-throat**.
- It is assumed, this station is no longer required in Kincardine.
- To best utilize the existing equipment, an equipment transfer to Hanover 5 would be optimum.
- Planning considerations will require an inspection of Hanover 5 to determine status of existing equipment that could be re-utilized or need replacement.

System Planning Priorities: 3 Hanover 5:

- Existing transformer @ 3MVA, 4160/2400V **pri-top/sec-throat**.
- Existing station loading provided:
- Measured data for Han 5 / April 2014:(monthly peak kW or kVA data not available).
Calculated peak kW and kVA from measured feeder amps @ kVA = 3,038.4, kW = 2,886.48 (95% pF assumed).
- Loading is considered very high, (transformer is overloaded).
- Transformer temperature is inordinately hot during summer months.
- Permanent load transfers to adjacent stations undetermined if feasible (to be considered).
- This transformer is 53 yrs old; considerably beyond expected life service.
- Oil leakage, site contamination and off-site drainage is apparent (radiators).
- Situated in an industrial area, bordering on a residential community.
- Currently; a low risk, from DGA tests, no existing refurbishment ranking.
- To upgrade this station transformer alternatives:
 - 1) Utilization of refurbished P.E 6 transformer, upgrading this station from 3 to 5 MVA is a consideration.
 - 2) Station switchgear alternatives:
 - a) Existing switchgear short circuit rating to be confirmed if acceptable for upgrade to a 5 MVA transformer.
 - b) Potential to transfer PE 6 switchgear or utilize pad mount G&W VIPERs.
 - 3) PE 6 Primary 44kkV pole is of concern as a pending danger pole. Pole contains fuse and switch arrangement, could be transferred to Han 5.

Appendix D – PCB-Free Position Letter



Consulting on Compliance!

September 26, 2010

Mr. Tony Vanden Boomen
Manager of Operations
WESTARIO POWER INC.
24 Eastridge Road, R. R. 2
Walkerton, Ontario N0G 2V8

RE: PCB Free Position Letter

Dear Mr. Vanden Boomen,

The Hespro Group has prepared this position letter which can be presented to regulatory agencies in support of the "PCB free" designation now held by the utility. This designation has been achieved based on the systematic approach of asset identification by geographic location; a review of records for accredited analytical documents, testing of transformers for which no accredited analytical was available and subsequent disposal of PCB contaminated units.

The highlights that support Westario Power no longer possessing electrical distribution equipment greater than 50 ppm PCBs and therefore "PCB free" based on this definition are listed below:

- Complete inventory of the transformer assets in service within the geographical areas operated by Westario Power which includes 15 towns located in Bruce County.
- The letter issued on November 24, 2005 by Westario's former CEO to Environment Canada already confirming that 9 of the 15 towns were PCB free and the intent of the utility to have the remainder of the communities free of PCB's by the year 2010.
- Review of historic files in December 2009 which translated into the retrieval of accredited analytical documents for 1902 transformer units against the April 2007 inventory of 1920 units in service.
- Testing of 63 transformers from Teeswater which represented the only area of concern, lacking accredited analytical on these units. Results returned confirmed no PCBs located in this town.
- Application for "Request for extension to the end of PCB use" originally submitted to Environment Canada on July 29, 2009 was later withdrawn as a result of the findings and confirmation of file closure received April 6, 2010.
- Confirmation that Westario Power has no underground cabling systems in its power distribution networks.

The PCB free designation held by Westario Power Inc is based on its current assets and does not reflect the potential for PCB's through mergers or acquisitions. Additionally this letter should not be considered an indemnification from the compliance requirements pertaining to the management of waste transformer oils that still meet the definition of "Leachate for PCB's – 251T" and are currently in inventory.

Please feel free to contact me should you have any questions or comments.

Sincerely

A handwritten signature in dark ink, appearing to read "Neno Testana".

Neno Testana
Executive Consultant
Hespro Group

Appendix E: PCB-Free Position Letter



Consulting on Compliance!

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Sincerely

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Neno Testana
Executive Consultant
Hespro Group

Appendix F: Westario's Fleet Listing

Active Fleet & Equipment List		As of April 28, 2017		
TRUCKS				
Truck #	Type	Year	Make	Model
3	Dump Truck	1999	GMC	8500
11	Single Bucket	2005	Freightliner	M2
13	Dump Truck	2006	Ford	F350
15	Single Bucket	2007	International	7400
24	Single Bucket	2006	Freightliner	M2
43	Car	2009	Toyota	Matrix
44	Pick Up - 4x4	2008	Toyota	Tundra
45	Pick Up - 4x4	2008	Toyota	Tundra
50	Pick Up - 4x4	2010	Ford	F150
52	Single Bucket	2010	Freightliner	M2
53	Pick Up - 4x4	2011	Chevrolet	SIL
54	Line/Boom Truck	2011	Freightliner	M2
55	Double Bucket	2012	Freightliner	FM2
61	RBD/Digger	2014	Freightliner	M2-106
62	Pick Up - 4x4	2014	Chevrolet	Silverado
66	Pick Up - 4x4	2015	Chevrolet	Silverado
68	Van	2016	Dodge	Grand Caravan
69	Pick Up - 4x4 - 3/4 Ton	2016	Chevrolet	Silverado 2500H
70	Pick Up - 4x4 - 3/4 Ton	2016	Chevrolet	Silverado 2500H
TRAILERS				
Trailer #	Type	Year	Make	
14	Dump	2005	JDJ	
30	Pole	1991	Frieburger	
39	Dump	1996	JDJ	
51	Job Trailer	2010	USCG	Trail'n Sport
56	Pole Trailer	2012	PTB	141-15KE
57	Pole Trailer	2013	PTB	
60	Cargo Trailer	2014	Stealth	LT7
64	Single Reel Trailer	2014	Brooks	STRT 7106-7KE
67	Single Reel Trailer	2015	Brooks	STRT 7106-7KE

EQUIPMENT / OTHER				
Other #	Type	Year	Make	Model
8	Puller	1993	Frieburger	
9	Tensioner	1999	Frieburger	
42	Chipper	2008	Bandit	250XP
46	Lawn Tractor	2008	John Deere	X320
47	Chipper	2007	Altec	DC 1217HP
49	Forklift	2009	JCB	930
63	Tensioner Trailer	2014	TSC International	DPT 30B
65	Tensioner Trailer	2015	TSC International	DPT 30B
OTHER - MISCELLANEOUS				
Other #	Type	Year	Make	Model
71	Substation Recovery Trailer	2016	Sauber	
72	Mobile Utility Station	2016		

Appendix G: Distribution System & Inspection under Ontario Regulation 22/04

Westario qualified field staff performs distribution system inspection per the DSC and ESA Reg. 22/04 for three-year cycle on town by town basis per year. This inspection scope includes Pole-mounted Transformers, Pad-mounted Transformers, HV/LV Overhead switches, HV/LV UG switches. A sample of the inspection program is attached.

Appendix H: Westario's Tree Trimming Program

This program is contracted out on a three-year cycle:

- 2016 – Southampton, Port Elgin, Hanover and Walkerton.
- 2017 – Palmerston, Harriston, Wingham and Teeswater.
- 2018 – Remaining small towns.

Appendix B:
UtilityPULSE Customer Survey
2015-2016

Westario Power Inc.



Westario Power Inc.

Electric Utility Customer Engagement Survey

The purpose of this report is to profile the connection between Westario Power Inc. and its customers.

The primary objective of this report is to assist decision makers in developing plans and in making decisions about improving both customer care and operations.

Information in this report is the result of interviewing residential customers, small commercial customers and general service customers via a telephone survey for Westario Power. In addition, the information is enhanced via comments and findings from focus group discussions.

This is privileged and confidential material and no part may be used outside of Westario Power Inc. without written permission from UtilityPULSE, the electric utility survey division of Simul Corporation.

All comments and questions should be addressed to:

Sid Ridgley, UtilityPULSE division, Simul Corporation

Toll free: 1-888-291-7892 or Local: 905-895-7900

Email: sidridgley@utilitypulse.com or sridgley@simulcorp.com





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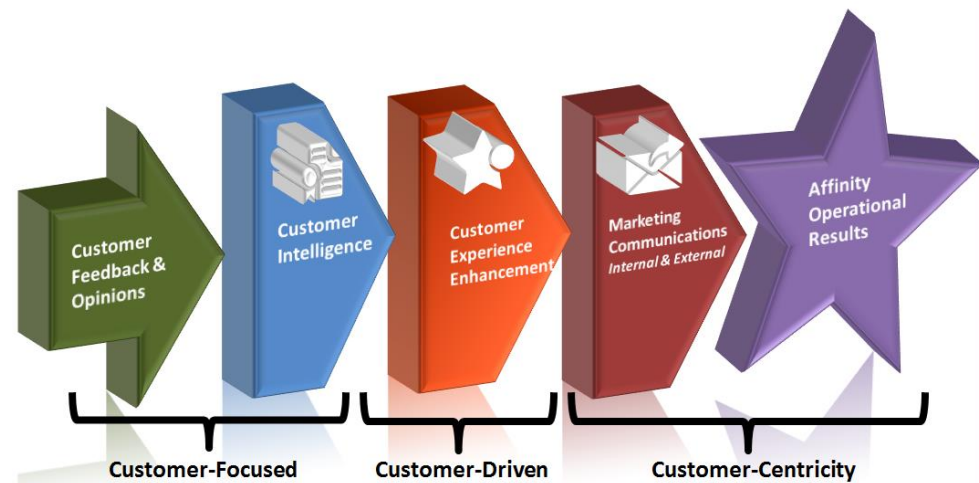
Survey Observations & Insights

Customer engagement is a key driver for the success of energy efficiency, demand response, adoption of smart energy technologies and other programs the LDC manages. The key to effective engagement lies in understanding customers' attitudes, wants, needs, motivations, and in recognizing that customers are smart people. In an effort to engage with its customers, Westario Power Inc. commissioned UtilityPULSE to interview its customers via a telephone survey and to conduct 3 focus groups.

From a research perspective, 342 Residential customers, 60 small commercial customers and 20 general service customers were interviewed via a comprehensive telephone survey. Data/findings were augmented via comments, insights and recommendations received via 36 participants in 3 focus group sessions.

The purpose of feedback from customers is to assist decision-makers as they make decisions about investments (capital and maintenance) and operational/service quality improvements.

Customer Engagement ROI

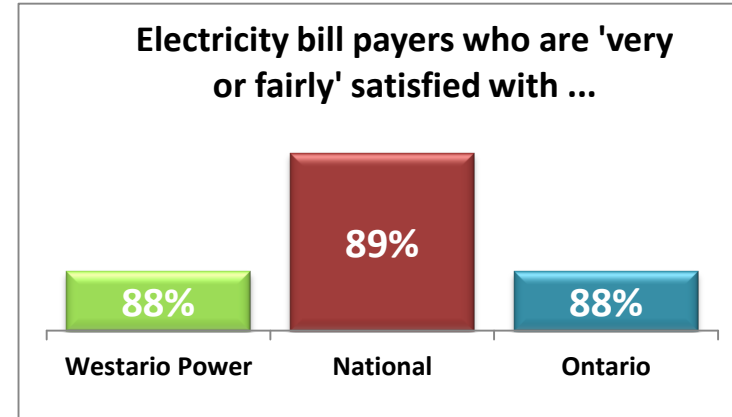


Customer Focus - Customer Satisfaction - Satisfaction Survey Results

A focus on satisfaction prompts an organization to continue to evolve in ways that make sense to those who pay the bills. A focus on satisfaction is a focus on effectiveness in the delivery of service to the customer.

Efficiency ratings, such as answering the phone in 30 seconds, won't lead to satisfaction but they can lead to dissatisfaction. Taking 90 seconds to answer the phone will create an agitated customer who, for the most part starts off being dissatisfied with the service – before you've even had a chance to deal with or solve their problem. Answering the phone in 20 seconds but not solving the customer's problem is not going to change, for the better, the customer's perception about the transaction.

- **Satisfaction** happens when utility core services meet or exceed customer's needs, wants, or expectations.
- **Loyalty** occurs when a customer makes an emotional connection with their electric utility on a diverse range of expectations beyond core services.



Base: total respondents

60% of participants in the Focus groups claimed they were “Not very familiar or Not familiar at all” regarding the percentage of their bill that went to Westario Power prior to attending a Focus group session. It is

important to note that participants in all 3 Focus groups wanted to voice their views about the cost of electricity. They made it clear to the moderator that issues such as the cost of solar, wind, and industry issues affecting costs were important. 97% of Focus group participants rated the percentage of the bill Westario Power gets to run its operations as “Very reasonable or Somewhat reasonable”.

Organizations are not successful; it is the people who work in the organization that are successful. They will move it forward, stall it, or move it backwards. As UtilityPULSE consultants have learned by working with executives and managers, it is the employees’ skills, quality of interpersonal relationships and willingness to work as a team that creates value for the organization and its customers.

SATISFACTION SCORES – Electricity customers’ satisfaction			
Top 2 Boxes: ‘very + fairly satisfied’	Westario Power	National	Ontario
Satisfaction Scores	88%	89%	88%

Base: total respondents

SATISFACTION SCORES – Electricity customers’ satisfaction			
Top 2 Boxes: ‘very + fairly satisfied’	Residential	Small Commercial	Large Commercial
Satisfaction Scores	88%	85%	85%

Base: total respondents

Customers, as human beings, are both rational and emotional. The rational side of the customer holds the LDC accountable for doing its job. The emotional side of the customer is about fulfilling



expectations. Not meeting rational needs – creates dissatisfaction. Meeting emotional needs can move a customer from neutral to higher levels of satisfaction.

SATISFACTION SCORES – Electricity customers' satisfaction [kwh usage]			
Westario: Top 2 Boxes: 'very + fairly satisfied'	kWh Group 1	kWh Group 2	kWh Group 3
Satisfaction Scores	95%	88%	81%

Base: total respondents

SATISFACTION SCORES – Electricity customers' satisfaction [Income]			
Westario: Top 2 Boxes: 'very + fairly satisfied'	<\$40K	\$40 – 70K	\$70K +
Satisfaction Scores	93%	88%	86%

Base: total respondents

SATISFACTION SCORES – Electricity customers' satisfaction [Age]			
Westario: Top 2 Boxes: 'very + fairly satisfied'	Age: 18-34	Age: 35-54	Age: 55 +
Satisfaction Scores	74%	87%	91%

Base: total respondents



Westario Power

In the Simul/UtilityPULSE Customer Satisfaction survey, the overall satisfaction question is asked both at the beginning (PRE) and the end (POST). Asking the general satisfaction question at the start of the survey avoids bias and we obtain a spontaneous rating. This allows measurement of customers' overall impressions of the utility prior to prompting them to think of specific aspects of the relationship. After we have asked about specific aspects of the customer experience, we gain a more *considered* (or conditioned) response.

POST Satisfaction Score

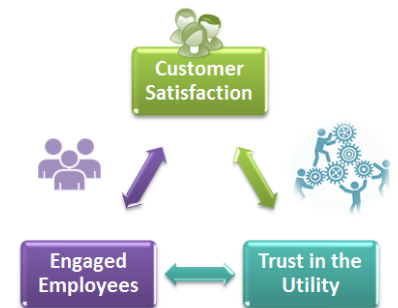
88%

PRE Satisfaction Score

88%

Base: total respondents

Satisfied and engaged employees who work in an organizational culture that promotes service excellence is key for completing the job both efficiently and effectively. After-all employees do more than deliver customer service – they personalize the relationship between customer and the utility.



SATISFACTION SCORES – Electricity customers' satisfaction			
Top 2 Boxes: 'very + fairly satisfied'	Westario Power	National	Ontario
PRE: Initial Satisfaction Scores	88%	89%	88%
POST: End of Interview	88%	88%	86%

Base: total respondents

Satisfaction with the contact experience

The difference between overall service quality and service encounter quality (most recent experience), viewing the service encounter as a discrete event occurring over a defined period/moment of time (such as a call about their “September billing”). Customers hold expectations of the quality of each service encounter, just as they hold expectations about the overall service quality of an LDC. When the expectations are about individual service encounters, they are likely to be more specific and concrete (such as the number of minutes one waited for a CSR) than the expectations about overall service quality (like prompt service).

While employees can’t control everything, they can control the quality of the experience. How a problem is handled can validate or invalidate a customer’s perception about the utility’s competency in providing excellent quality services.

It is clear from the Focus group discussions that participants are very concerned over the overall costs associated with electricity – as they are about the overall costs of taxes in their communities.



One Focus group participant said he was “against utilities being a for-profit organization.” And 4 other Focus group participants said the profit portion ought to be used to keep rates low. Despite what one Focus group participant said, “Westario people genuinely care about solving problems”, concerns over costs affect perceptions of service.

Customers, who contacted your LDC, rated their one-on-one transaction as follows:

Satisfaction with Customer Service			
Top 2 Boxes: 'very + fairly satisfied'	Westario Power	National	Ontario
The time it took to contact someone	57%	76%	70%
The time it took someone to deal with your problem	48%	74%	66%
The helpfulness of the staff who dealt with you	64%	73%	70%
The knowledge of the staff who dealt with you	61%	73%	70%
The level of courtesy of the staff who dealt with you	69%	72%	80%
The quality of information provided by the staff who dealt with you	62%	71%	69%

Base: total respondents who contacted the utility

Overall satisfaction with most recent experience			
	Westario Power	National	Ontario
Top 2 Boxes: 'very + fairly satisfied'	52%	79%	69%

Base: total respondents who contacted the utility



Problem solved rating

Respondents who said they contacted the utility were also asked “Do you consider the problem solved or not solved?” 54% of your LDC’s respondents said the problem was solved. The Ontario benchmark rating is 69%.

Problems aggravate customers. It could be said, some problems can actually anger customers. As a minimum, a problem is an inconvenience to the customer – and they want it solved/resolved. When the problem is solved with the first interaction (often called first call resolution) overall customer satisfaction improves. When customer satisfaction improves the utility benefits.

Percentage of Respondents who contacted their utility and had their problem solved in the last 12 months			
	Westario Power	National	Ontario
Yes	54%	81%	69%
No	44%	17%	27%

Base: total respondents

Customer Focus – Service Quality

Current measures in the LDC scorecard are: New Residential Services Connected on Time; Scheduled Appointments Met on Time; and, Telephone Calls Answered on Time. These are good examples of efficiency measures as all are time based. Showing up on time may not create satisfaction, not showing up on time will cause dissatisfaction.

Westario Power serves 15 communities covering a wide geographic area and the area served is experiencing extremely low economic growth (approximately 1%). Approximately 21,000 customers with 746km of distribution lines is the reality of Westario Power. Focus group comments seem to indicate there is an insufficient amount of communication / information about the performance of Westario Power as it relates to other LDCs. Comments such as:



“Let’s us know how we [Westario] benchmark its performance.”

“Let us know how our [Westario] performance compares year over year.”

“Help us recognize we do have a remarkable utility.”

UtilityPULSE findings from working with many LDCs over the past few years indicate it is much harder to get great ratings from customers who may not know much about their utility. Despite this, service quality ratings for Westario are, at least statistically, the same as the Ontario benchmark.

Other dimensions of Service Quality which customers value include:

Customer Service Quality			
Top 2 boxes, ‘strongly + somewhat agree’	Westario Power	National	Ontario
Deals professionally with customers’ problems	79%	82%	82%
Customer-focused and treats customers as if they’re valued	75%	74%	76%
Is a company that is ‘easy to do business with’	80%	81%	81%

Base: total respondents with an opinion



Customer Service Quality: Income			
Top 2 boxes, 'strongly + somewhat agree'	<\$40K	\$40 – 70K	\$70K +
Deals professionally with customers' problems	83%	83%	76%
Customer-focused and treats customers as if they're valued	80%	78%	71%
Is a company that is 'easy to do business with'	84%	84%	79%

Base: total respondents with an opinion

The Killer B's (Bills and Blackouts) and other Problems

There will always be issues. To the customer the expectations from the physical world i.e., call-centre and the virtual world i.e., website, are the same: Solving the problem is the first priority. 35% of those interviewed said they had a problem in the last 12 months. 41% of those with a problem said they had contacted Westario Power.

The UtilityPULSE database for 2015 shows 61% of billing problems are about “the amount owed is too high” and 12% are about “rates or charges”. For problems other than blackouts or bills, 19% are about “moving or setting up an account” and 23% are about a “maintenance request”.



Outages and billing problems, we call them the “Killer B's”, are the two issues that are most likely to cause grief to utility customers. Ensuring power reliability has been and will continue to be the key operational priority for electric utilities.

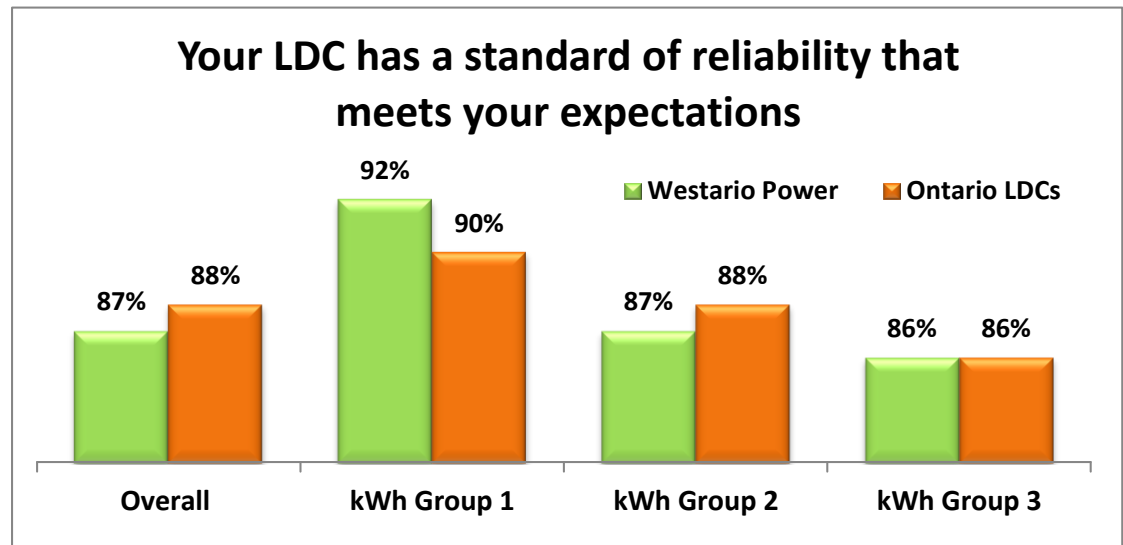
Outage Management

Customers have increased their expectations as it relates to getting information about outages. What makes the dissemination of information challenging for the LDC is the need to provide the information via multiple media channels and in a timely manner whilst trying to get the power restored. The perception of competency and value of the LDC are certainly linked to the frequency and duration of power outages.

Recognizing the importance of this topic to customers, a question about LDC reliability standards was asked in the survey.



Scores for Westario Power are in line with the Ontario LDC average.



Base: Extract from 2015 UtilityPULSE 17th Annual Customer Satisfaction Survey Ontario LDCs / total respondents

Focus group participants do have a lot to say about outages and outage management. Comments about the geography and high winds (particularly along Highway 21) were made. The tone of the Focus groups wasn't about "blaming" but recognizing the realities of the environment. Three different times during the Focus group sessions, a participant would state "the 'serious' outages seem to always be associated with HydroOne Networks."

Has a standard of reliability that meets expectations...			
Westario Power	Residential	Small Commercial	Large Commercial
Top 2 Boxes: 'agree strongly + agree somewhat'	87%	89%	80%

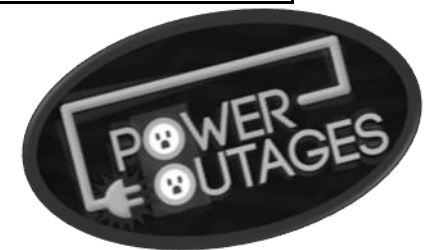
Base: total respondents with an opinion

Has a standard of reliability that meets expectations...			
Westario Power	kWh Group 1	kWh Group 2	kWh Group 3
Top 2 Boxes: 'agree strongly + agree somewhat'	92%	87%	86%

Base: total respondents with an opinion



Talking about acceptable number of outages in a year, 22% of residential customers with Westario Power said "none", while 27% small commercial and 25% large commercial said "none". There was a slight difference in the response rate of



the kWh Groups for “none”. kWh Group 1: 18%, kWh Group 2: 27% and kWh Group 3: 19%

How many outages are acceptable over 12 months?		
	Ontario LDCs	Westario Power
None	23%	23%
One	15%	13%
Two	26%	27%
Three	13%	13%
Four	5%	6%
Five or more	7%	7%
Don't Know	9%	11%

Reasonable amount of time for an unplanned outage?		
	Ontario LDCs	Westario Power
Less than 15 minutes	14%	4%
16-30 minutes	15%	7%
31-60 minutes	13%	8%
1 to 2 hours	29%	37%
3 to 5 hours	13%	23%
6 to 12 hours	5%	7%
More than 12	3%	5%
Don't Know	8%	8%

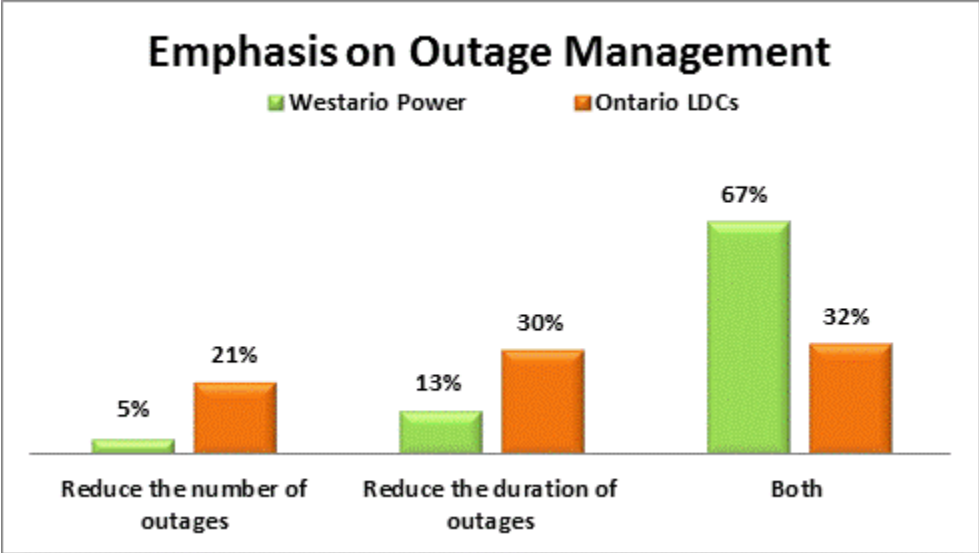
Base: Extract from 2015 UtilityPULSE 17th Annual Customer Satisfaction Survey Ontario LDCs / total respondents

Focus group input on the topic of frequency and length of outages fell in the 1-2 range, but interestingly Focus group participants were less rigid about the length of the outage. From the Focus group participants - up to 4 hours – for planned outages – was acceptable. In 2 of 3 Focus groups, participants acknowledged unplanned outages (e.g., automobile accident taking out a pole; wind storms, etc.) are not the fault of Westario Power.



Knowing, and communicating, the reason(s) for the outage whether they are planned or unplanned would be welcomed information.

If the utility were to improve reliability should they put more emphasis on reducing the number of unplanned outages or reducing the duration of the unplanned outage? Or both which requires an increase in costs and potentially rates.



Base: Extract from 2015 UtilityPULSE 17th Annual Customer Satisfaction Survey Ontario LDCs / total respondents

Emphasis on Outage Management			
Westario Power	Residential	Small Commercial	Large Commercial
Reduce the number of outages	4%	13%	5%
Reduce the duration of outages	14%	10%	10%
Both	66%	70%	70%
Don't know	17%	7%	15%

Base: total respondents



Quantifiable data from the telephone interviews show clearly the answer is “both”, even though there would be an increase in costs and rates.

67% of respondents for Westario Power vs 32% of respondents for Ontario LDCs feel that emphasis should be placed on **both** – reducing the number of outages – AND – reducing the duration of outages. The Focus group moderator asked participants to help explain or rationalize the difference between the survey findings for Westario Power and those of other Ontario-based LDCs.

Some of the comments include:

“If outages get long, they get more impactful.”

“We have a lot of electronic equipment that don’t take those ‘blips’ very well.”

“I’d pay more \$2-\$3 per month if I really knew there would be less outages and the length would be reduced as well.”



Emphasis on Outage Management			
Westario Power	kWh Group 1	kWh Group 2	kWh Group 3
Reduce the number of outages	8%	4%	5%
Reduce the duration of outages	15%	12%	15%
Both	61%	70%	65%
Don’t know	17%	14%	15%

Base: total respondents

Emphasis on Outage Management			
Westario Power	<\$40K	\$40 – 70K	\$70K +
Reduce the number of outages	1%	3%	6%
Reduce the duration of outages	15%	15%	11%
Both	61%	70%	65%
Don't know	19%	14%	13%

Base: total respondents

Which communication channel do customers prefer to use? The UtilityPULSE data base information from over 10,000 residential and small commercial customer interviews in 2015, shows the telephone is the most used and preferred method to contact the LDC to communicate with customer care representatives.

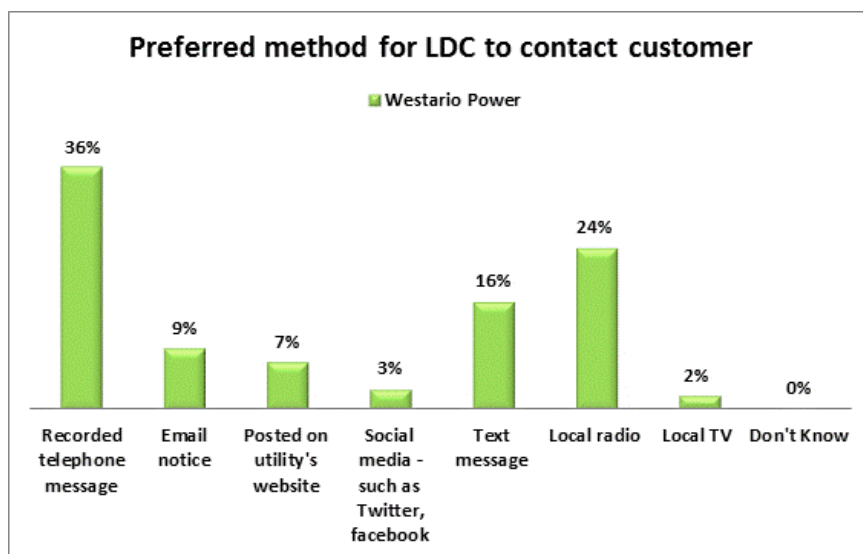


 Westario Power	 Telephone 76%	 Email 7%	 Utility Website 4%	 Social Media 1%	 Text Message 10%	 In Person 2%
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Base: total respondents

While the telephone is still the communication channel most would prefer to use to communicate with or to be communicated to, customers do have an expectation for the LDC to use varied methods to contact them. Communication channels other than the telephone received higher preference scores when asked about the utility contacting the customer versus the customer's use of such channels to contact the utility. This indicates the onus is on the utility to find a way to contact a customer when necessary and it should use various means/channels to ensure the message is communicated.

Proactive communication channels which include recorded calls, emails and SMS (text messaging) are increasingly being used by utilities to reach customers affected by outages.



- Top 4 methods:**
- Recorded Telephone Message
 - Local radio
 - Text message
 - Email notice

Base: total respondents

Being seen as effective during an outage situation from the point of view of a customer requires that:

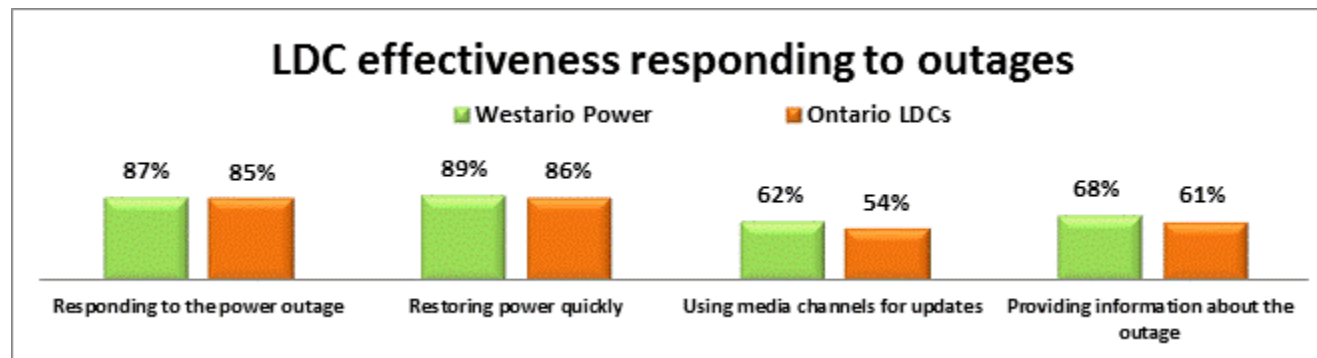
- timely information on outages is provided
- utilities understand that even a short outage in duration is impactful
- in large scale events, utilities should proactively provide tips on how to prepare for extended outages
- being kept informed about what is going on during an outage makes customers feel valued.

LDC effectiveness responding to outages		
	Ontario LDCs	Westario Power
Responding to the power outage	85%	87%
Restoring power quickly	86%	89%
Using media channels for updates	54%	62%
Providing information about the outage	61%	68%

Base: Extract from 2015 UtilityPULSE 17th Annual Customer Satisfaction Survey Ontario LDCs / total respondents

The types of information customers require during an outage include:

- *When will their power be restored?*
- *What areas are affected?*
- *How many customers are impacted?*
- *Have work crews been dispatched to the affected area and is the utility working to restore power?*
- *What was the cause of the power outage?*
- *What can customers do to cope during the outage?*



Base: Extract from 2015 UtilityPULSE 17th Annual Customer Satisfaction Survey Ontario LDCs / total respondents

LDC effectiveness responding to outages: Top 2 Boxes			
Westario Power	Residential	Small Commercial	Large Commercial
Responding to the power outage	88%	85%	80%
Restoring power quickly	89%	92%	80%
Using media channels for updates	62%	67%	50%
Providing information about the outage	69%	70%	45%

Base: total respondents

LDC effectiveness responding to outages: Top 2 Boxes			
Westario Power	<\$40K	\$40 – 70K	\$70K +
Responding to the power outage	90%	90%	88%
Restoring power quickly	93%	90%	86%
Using media channels for updates	60%	64%	70%
Providing information about the outage	71%	74%	66%

Base: total respondents

Operating & Capital Expenses

UtilityPULSE has been conducting research in the LDC industry in Ontario for 17 years. However, members of UtilityPULSE have been doing customer research for much longer. It is true, customers (but not all) can tell you what they want, but they have a very difficult time telling you what they need.



On the one hand many customers “want” lower prices, but they “need” reliability and responsiveness. Hence, it is up to the professionals in the LDC to use their experience and judgment to determine what needs to be done and when it should be done. No easy task.

UtilityPULSE asked customers: *“As it relates to replacing equipment electric utilities typically follow 2 main practices which are: let equipment run-to-failure OR pro-actively replace equipment. Which of the following best represents your view on equipment replacement?”*

Strategy for replacing equipment		
	Ontario LDCs	Westario Power
Run-to-failure when there are limited customers affected ensures full-value is received from the equipment	27%	28%
Pro-active replacement, even though it may cost more, should ensure reliable power	65%	63%
Don't Know	8%	9%

Base: Extract from 2015 UtilityPULSE 17th Annual Customer Satisfaction Survey Ontario LDCs / total respondents



62% of Residential and 63% of Westario Power small commercial respondents chose the statement “Pro-active replacement, even though it may cost more...” as the statement that best describes their view about replacing equipment. 80% of Large commercial customers also subscribed to pro-active replacement.

Strategy for replacing equipment			
Westario Power	Residential	Small Commercial	Large Commercial
Run-to-failure when there are limited customers affected ensures full-value is received from the equipment	29%	27%	10%
Pro-active replacement, even though it may cost more, should ensure reliable power	62%	63%	80%
Don't know	9%	10%	10%

Base: total respondents

Strategy for replacing equipment			
Westario Power	<\$40K	\$40 – 70K	\$70K +
Run-to-failure when there are limited customers affected ensures full-value is received from the equipment	30%	29%	32%
Pro-active replacement, even though it may cost more, should ensure reliable power	60%	64%	62%
Don't know	11%	8%	6%

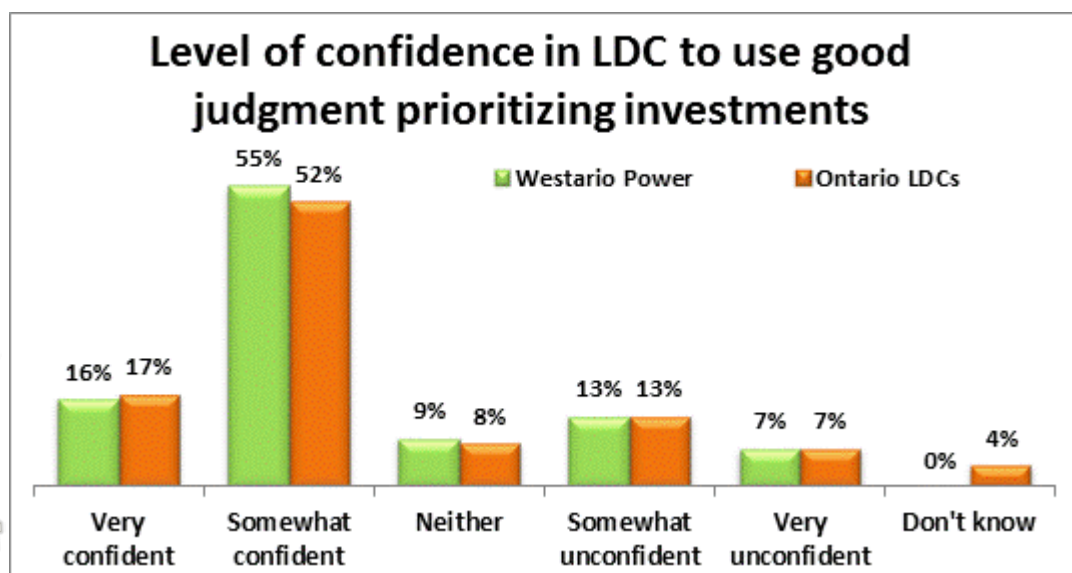
Base: total respondents



Understanding customer expectations, concerns, and desires does help an LDC to build their plans to ensure they remain relevant, viable, and valuable to customers, employees and other stakeholders.

Responding customers really don't know how much things cost or even what it takes to complete various operational tasks or capital projects. For example, when participants of the Focus groups were given the financial information about capital expenditures, they had difficulty determining if the numbers are reasonable. Hence, the importance of having confidence in LDC decision-makers.

We have heard customers tell us “we expect those that are being paid will make good decisions.”



Base: Extract from 2015 UtilityPULSE 17th Annual Customer Satisfaction Survey Ontario LDCs / total respondents

On the question of “level of confidence”, Westario Power gets good ratings.

Level of confidence in LDC to use good judgment prioritizing investments			
Westario Power	Residential	Small Commercial	Large Commercial
Very confident	16%	15%	20%
Somewhat confident	54%	60%	45%
Neither	9%	5%	20%
Somewhat unconfident	13%	12%	10%
Very unconfident	6%	8%	5%

Base: total respondents

Level of confidence in LDC to use good judgment prioritizing investments			
Westario Power	kWh Group 1	kWh Group 2	kWh Group 3
Very confident	25%	16%	9%
Somewhat confident	52%	57%	55%
Neither	10%	7%	11%
Somewhat unconfident	8%	14%	18%
Very unconfident	6%	7%	7%

Base: total respondents



Level of confidence in LDC to use good judgment prioritizing investments			
Westario Power	<\$40K	\$40 – 70K	\$70K +
Very confident	21%	19%	12%
Somewhat confident	50%	59%	52%
Neither	10%	4%	7%
Somewhat unconfident	15%	11%	20%
Very unconfident	4%	7%	9%

Base: total respondents

Operating Items

Much has been written and reported in regards to the cost of electricity. A goal of customer engagement, in addition to understanding wants & needs, is to reduce the worry customers have about the reliability and future costs of electricity. What readers may not know is, Westario Power has to focus on day-to-day operations while it builds, re-builds, re-furbishes and prepares the organization for a changed future. In addition, LDCs need to think in terms of decades, not just today, this week, this month, or this quarter. They need to do so in a regulated environment that is a 5 year planning environment. Respondents were asked to identify the items they were willing to pay more for and, they were asked “how much” they would be willing to pay.





Which of the following items are you willing to pay more for per month ...			
Ontario LDCs	Yes	No	Not sure
A proactive outage management system	51%	39%	9%
Increased self-service options on the website	34%	58%	7%
Extended office hours	16%	79%	5%
Increased tree trimming to improve reliability	58%	35%	6%
Educating customers about energy conservation	47%	48%	4%
Educating customers and the public about electricity safety	43%	53%	5%

Base: Extract from 2015 UtilityPULSE 17th Annual Customer Satisfaction Survey Ontario LDCs

Which of the following items are you willing to pay more for per month ...			
Westario Power	Yes	No	Not sure
A proactive outage management system	44%	50%	7%
Increased self-service options on the website	23%	70%	7%
Extended office hours	16%	81%	3%
Increased tree trimming to improve reliability	53%	45%	2%
Educating customers about energy conservation	40%	58%	2%
Educating customers and the public about electricity safety	32%	66%	2%

Base: total respondents

Westario customers responding to the telephone survey showed lower levels of willingness to pay for various operational items (as compared to UtilityPULSE LDC averages for 2015). In order to gather input and comment, the Focus groups' moderator asked for comments about what might be the rationale for Westario respondents having a lower willingness to pay level. Comments received include:

"We have a lot of retired people in our communities."

"My municipality just increased rates by X% and I'm not willing to pay more for anything."

"Most people already know about energy conservation; certainly the older generation."

"Shows there are diverse opinions."

"Maybe it has something to do with concrete (e.g., tree-trimming) versus abstract (e.g., web service)."

For those who said they would pay more, the following illustrates the amounts they would be willing to pay:



Willing to pay how much more per month for ...			
Westario Power	1 item	2 items	3 or more items
\$0.50 or less	54%	48%	37%
\$0.51 – \$1.00	16%	12%	5%
\$1.01 – \$2.00	10%	8%	9%
\$2.01 – \$3.00	1%	6%	4%
\$3.01 – \$5.00	7%	9%	16%
\$5.01+	10%	17%	29%

Base: total respondents willing to pay more



Respondents were not guided by the interviewer providing various ranges of rates.

Respondents were simply asked to give an amount of \$.

Their answers were categorized into one of the rate ranges shown in the table.

How much more per month -- 3 or more Operational items			
	Westario Power	Residential	Small Commercial
\$0.50 or less	37%	33%	37%
\$0.51 - \$1.00	5%	7%	0%
\$1.01 - \$2.00	9%	10%	7%
\$2.01 - \$3.00	4%	4%	4%
\$3.01 - \$5.00	16%	16%	26%
\$5.01+	29%	31%	26%

Base: total respondents willing to pay more

From the UtilityPULSE 2015 surveys: Not surprisingly lower income respondents identified lower amounts. For example, 92% of respondents <40K who were willing to pay for one operational item identified a number less than \$1.00, it was 83% for respondents 70K+.

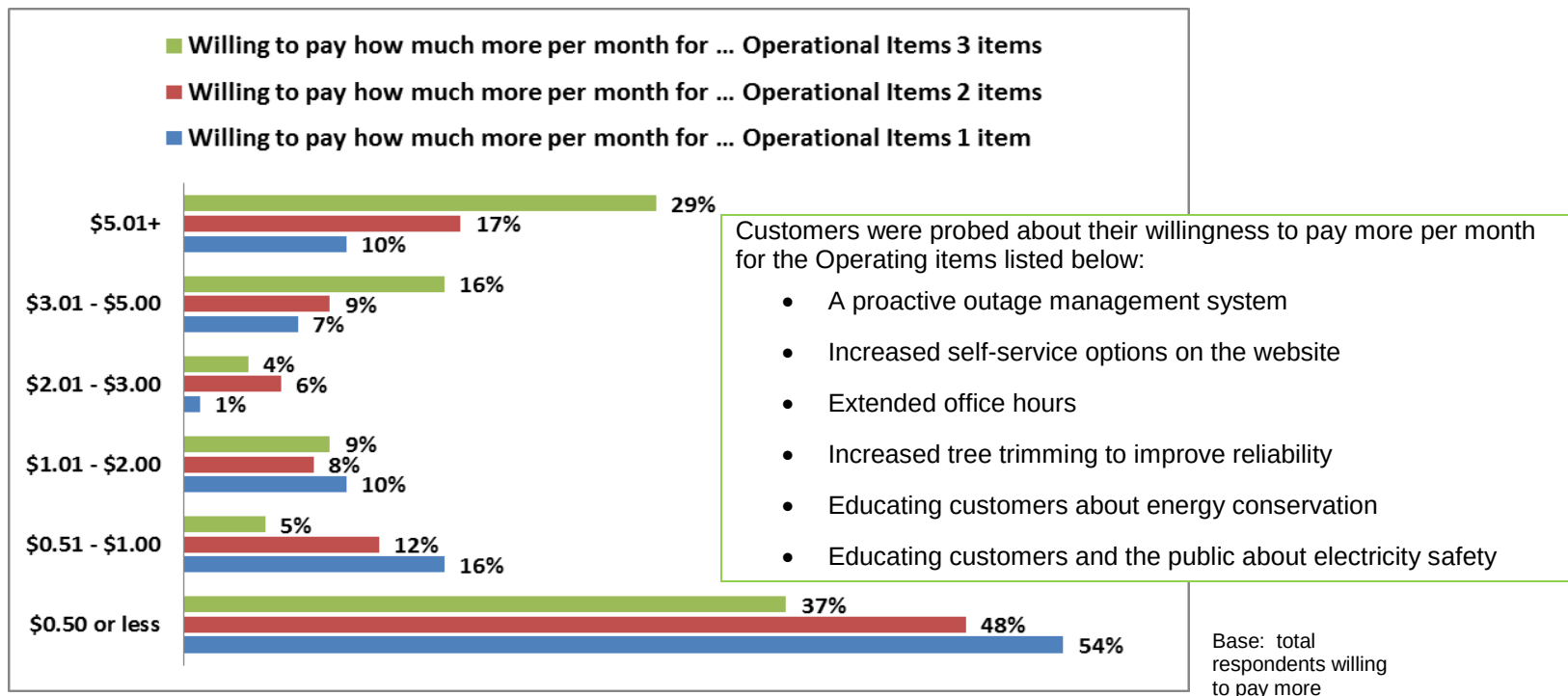
The UtilityPULSE Ontario database shows Secure customers identified a willingness to pay higher amounts more frequently than At Risk customers. When three or more operational items were involved, At Risk customers pick a number less than 50 cents, 66% of the time; Secure customers was 37%. Said a different way, only 34% of At Risk customers are willing to pay more than 50 cents for three or more operational items, while 66% of Secure customers would be willing to do so. This proves price increase receptivity is linked to customer affinity.

However, average kWh usage per month showed very little difference between customers in the lower quartile of kWh versus customers in the highest quartile. 43% of kWh Group 1 versus 46% of kWh Group 3 gave a number of \$1.00 or less.

Focus group feedback indicates there is more support for operational items each customer values. For example, if a customer values website services then their support would be much higher than those customers who really don't care about website services. While not statistically valid, as a



number for the whole Westario Power customer base, Focus group participants indicated they would pay about \$1 more per month for the operational items they are interested in. Results for Westario Power are shown below.



The above chart can certainly fuel debate between industry professionals, regulators, interveners and customers. Could an LDC ignore investing in self-service options on their website? Do the raw scores from the survey represent what the LDC needs to do? If the LDC didn't invest in increased

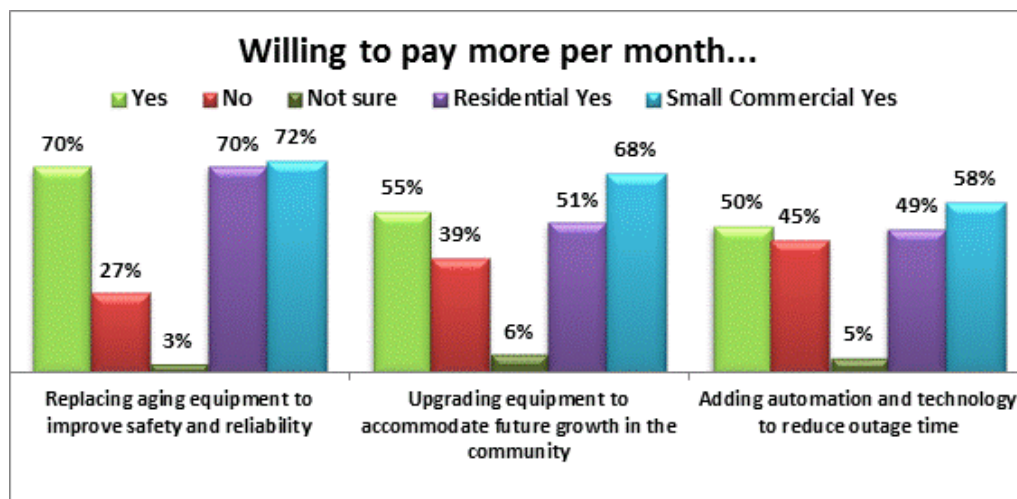
self-service options what might happen to operational costs? What might happen to the perceived brand of the LDC i.e., being seen as a modern enterprise?

Capital Items

Customers were also asked about the following capital items:

Which of the following items are you willing to pay more for per month...Capital items					
Westario Power	Yes	No	Not sure	Residential Yes	Small Commercial Yes
Replacing aging equipment to improve safety and reliability	70%	27%	3%	70%	72%
Upgrading equipment to accommodate future growth in the community	55%	39%	6%	51%	68%
Adding automation and technology to reduce outage time	50%	45%	5%	49%	58%

Base: total respondents



Base: total respondents



Which of the following items are you willing to pay more for per month...Capital items			
Westario Power	kWh Group 1	kWh Group 2	kWh Group 3
Replacing aging equipment to improve safety and reliability	72%	72%	64%
Upgrading equipment to accommodate future growth in the community	58%	56%	46%
Adding automation and technology to reduce outage time	53%	49%	49%

Base: total respondents

Which of the following items are you willing to pay more for per month...Capital items			
Westario Power	<\$40K	\$40 – 70K	\$70K +
Replacing aging equipment to improve safety and reliability	75%	70%	73%
Upgrading equipment to accommodate future growth in the community	57%	54%	49%
Adding automation and technology to reduce outage time	51%	51%	53%

Base: total respondents

Which of the following items are you willing to pay more for per month...Capital items			
Westario Power	Age: 18-34	Age: 35-54	Age: 55 +
Replacing aging equipment to improve safety and reliability	74%	75%	65%
Upgrading equipment to accommodate future growth in the community	56%	50%	52%
Adding automation and technology to reduce outage time	44%	51%	47%

Base: total respondents

Focus group participants were asked to comment on the telephone survey findings. As it relates to “replacing aging equipment to improve safety and reliability”:

“Surprised the numbers aren’t higher than they are.”

“My spouse is an accountant and as she tells me, every successful organization puts away money on a regular basis to replace equipment. As such, why do we have to pay more?”



As it relates to “upgrading equipment to accommodate future growth”:

Note: Projected growth in Westario Power geographic area is about 1%; extremely low.

Capital investments for System Access averages less than \$200,000 per year – a number which reflects the area’s low growth.

As it relates to “adding automation and technology to reduce outage time”, why such a low level of support? Focus group participants said:

“I don’t think people understand what is meant by adding automation.”

“[Automation] Sounds like bells & whistles and no one wants to pay for bells & whistles.”

“Technology has to show there is a return. The Smart-meter program is an example of technology that cost extra money with little return.”

“There is a general level of skepticism that technology will deliver on its promises.”

How much more per month – 1 Capital item				
Westario Power	ALL	Residential	Small Commercial	Large Commercial
\$0.50 or less	48%	45%	67%	67%
\$0.51 - \$1.00	11%	13%	0%	0%
\$1.01 - \$2.00	8%	9%	0%	0%
\$2.01 - \$3.00	6%	8%	0%	0%
\$3.01 - \$5.00	18%	21%	0%	0%
\$5.01+	8%	4%	33%	33%

Base: total respondents willing to pay more





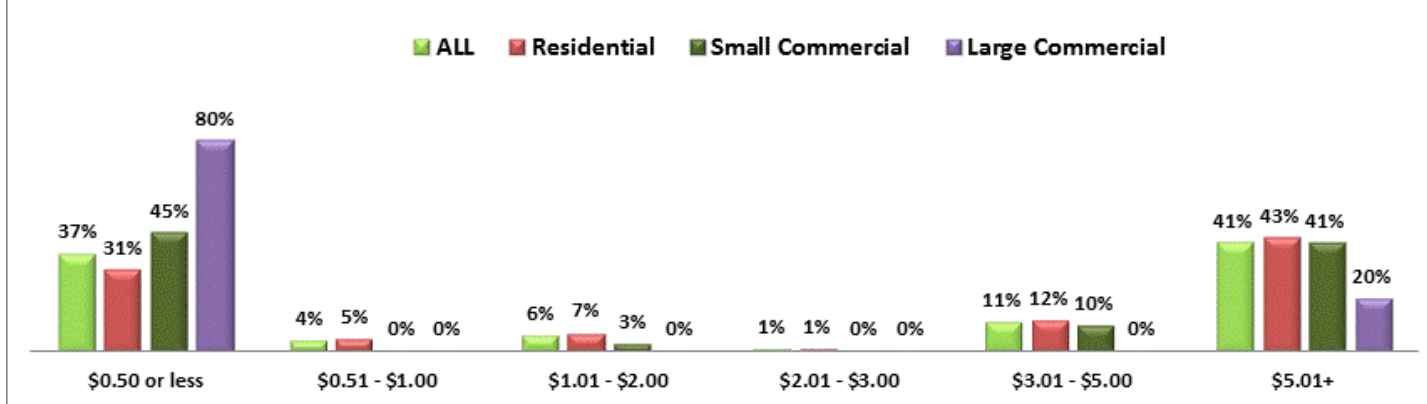
How much more per month -- 2 Capital items				
Westario Power	ALL	Residential	Small Commercial	Large Commercial
\$0.50 or less	36%	32%	46%	100%
\$0.51 - \$1.00	7%	9%	0%	0%
\$1.01 - \$2.00	10%	12%	0%	0%
\$2.01 - \$3.00	2%	2%	0%	0%
\$3.01 - \$5.00	14%	15%	15%	0%
\$5.01+	30%	30%	38%	0%

Base: total respondents willing to pay more

How much more per month -- 3 Capital items				
Westario Power	ALL	Residential	Small Commercial	Large Commercial
\$0.50 or less	37%	31%	45%	80%
\$0.51 - \$1.00	4%	5%	0%	0%
\$1.01 - \$2.00	6%	7%	3%	0%
\$2.01 - \$3.00	1%	1%	0%	0%
\$3.01 - \$5.00	11%	12%	10%	0%
\$5.01+	41%	43%	41%	20%

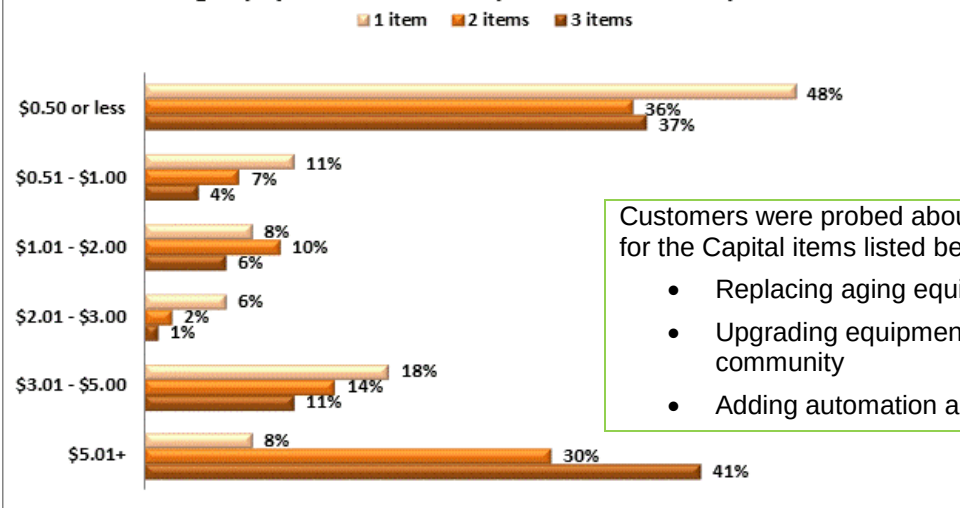
Base: total respondents willing to pay more

How much more per month -- 3 items or more



Base: total respondents willing to pay more

Willing to pay how much more per month for ... Capital items



Customers were probed about their willingness to pay more per month for the Capital items listed below:

- Replacing aging equipment to improve safety and reliability
- Upgrading equipment to accommodate future growth in the community
- Adding automation and technology to reduce outage time

Base: total respondents willing to pay more

The amount customers are willing to pay for 1 item versus 3 items did not translate into a proportional increase. While customers recognize 3 items would necessitate more money than 1 item, fewer customers were willing to pay that much more for 3 items. However, they are more willing to pay for items providing a direct benefit to themselves.

Data collected from Focus group participants seem to suggest an increase of about \$1.50 per month for capital items they were respectively interested in. The reality is, not everyone is interested in paying more for every capital item.

Quantifiable data from the telephone survey about paying more for capital items indicates:

- 15% respondents were willing to pay more for 1 item
- 23% willing to pay more for 2 items
- 38% willing to pay more for 3 items
- 24% were not willing to pay more for any items.



Regardless of what Westario Power needs to do, or their rationale for doing so, the reality is about 1 in 4 customers are not willing to pay anything for any capital item. While it would seem logical, particularly as it relates to replacing aging equipment for reliability & safety purposes, for a significant number of customers there would be resistance of any increase regardless of the rationale to do so. It is interesting to note, 28% of respondents were not willing to support any increase for any operational item.

Elasticity in willingness to pay more per month

It is true, self-interest will drive the choices people make. If an operational or capital item directly affects the respondent, then there is a willingness to support paying more per month. For example, 53% said they would pay more for tree-trimming. If a customer can see a benefit then there is higher level of support for paying more money. For example, respondents in the 35-54 age range are much more likely to be willing to pay more for “increased self-service options on the website” than respondents in the 55+ age range. Receptivity for paying more increases when there is a direct benefit to the customer or the customer sees the cost as a means to avoid adverse consequences (pain).

Data from respondents of Westario Power’s telephone survey who were asked if they were willing to pay more for any of the operational items, 28% were not willing to pay more for ANY of the operational items, 24% for capital items. Proof there is a significant number of people not willing to pay more for anything. It is extremely important that increases in rates are tied to customer benefits.

It is also important to note, data from all sources shows survey respondents do not have a sense of what things cost. Telling a customer an item/project costs \$750,000 means little, but telling them it would increase their bill by \$2.00 puts it in a context the customer can certainly understand. It is not the amount of the investment rather it is the impact of the investment that matters most.

As stated earlier about 1 in 4 customer respondents indicated they do not support any increase for any capital expense item or any operational expense item. This is a significant level of resistance.



Focus group participants were asked: “As it relates to increasing costs, what does Westario Power have to be mindful of?” Here are some of the comments:

“Educate the public, make sure people understand where the \$\$ are going.”

“Hydro is just one piece of the pie. People are approaching the breaking point.”

“Regularly tell us how we compare with other utilities.”

“Keep the rate of increase to the rate of inflation.”

Thinking ahead...a look into the future

Looking through the microscope while simultaneously looking through the telescope is what helps companies be more relevant & successful today while they prepare to be successful again “tomorrow” in a changed world. Though there are many factors that can affect the level of consumption for larger customers, respondents were asked the following about the future.



...Thinking ahead over the next 1-2 years do you anticipate any changes to your business that would affect electricity consumption more than 5% up or down?		
	Westario Power	UP Ontario Database
Yes	30%	31%
No	70%	65%

Base: Total Large Commercial respondents/ UtilityPULSE Ontario database



For those who did anticipate a change of more than 5% up or down:

...Could you tell us what might cause this change to electricity consumption...		
	Westario Power	UP Ontario Database
Business is growing	83%	28%
New machinery/change equipment	33%	22%
More work (e.g., products and services are being added)	17%	18%
More efficient lighting	-	14%
Implementing conservation measures	-	13%
Generating own electricity	-	6%
More space	-	3%
Business is falling off	-	3%
Moving to another location	-	1%
Costs	-	1%
Downsizing	-	1%
Retro-fits	-	1%
Other	-	4%
Don't know	-	2%

Base: Total Large Commercial respondents who anticipated changes to electricity consumption / UtilityPULSE Ontario database



The Loyalty Factor

If a customer is satisfied, it doesn't necessarily mean he or she is loyal. Satisfaction is about fulfilling promises/expectations; loyalty goes way beyond that by creating exceptional experiences and long-lasting relationships. There is a reason why marketing campaigns strive to build brand loyalty, not brand satisfaction. Measuring customer loyalty in an industry where many customers don't have a choice of providers doesn't make sense. Or does it?

The answer depends on how you define "customer loyalty."

Private industry often equates customer loyalty with basic customer retention. If a customer continues to do business with a company, the customer is, by definition, considered to be loyal. If this definition were applied to many companies in the utility industry, all customers would automatically be considered loyal. As such, measuring customer loyalty would appear to be unnecessary.

Natural monopolies (like LDCs) are not really different in what they should measure except that trying to determine which customers are "loyal" or "at risk" is not about their future behaviour but more about their "attitudinal" loyalty (are they advocates?).

Whether a customer is loyal and/or satisfied will be determined by an alignment of the emotion, experience and expectation of both the customer and the LDC.



© UtilityPULSE



Perhaps a better or more relevant way for utilities to approach the definition of customer loyalty is to further expand how they think about loyalty. Consider the following definition: Customer loyalty is an emotional disposition on the part of the customer that affects the way(s) in which the customer (consistently) interacts, responds or reacts towards the company – its products & services and its brand.

So what does it mean to respond favourably to a company? At a basic level, this can mean choosing to remain a customer. As previously mentioned however, this is essentially a non-issue for many utility companies. It then becomes necessary to think beyond just customer retention. One needs to consider other ways in which customers can respond favourably toward a company.

Other favourable responses or behaviours can be classified into one of three categories which reflect the concept of customer loyalty:

- Participation
- Compliance or Influence
- Advocacy

Specific examples of potential participatory behaviour in the electric utility industry include:

- Signing up for programs which help the customer reduce or manage their energy consumption
- Using the utility as a consultant when selecting energy products and services from a third party
- Participating in pilot programs or research studies.



Some Tips to build loyalty:

- ✓ Solve problems quickly
- ✓ Treat customers right
- ✓ Listen to complaints
- ✓ Be personal; create a great experience
- ✓ Friendly customer service
- ✓ Accessible information or help
- ✓ Good reputation
- ✓ Demonstrate you care



Specific examples of potential compliance or influence behaviours which utility customers might exhibit include:

- Seeking the utility's advice or expertise on an energy-related issue
- Voluntarily cutting back on electricity usage if the utility advised the customer to do so
- Accepting the utility's energy advice or referrals to energy contractors or equipment
- Being influenced by the utility's opinion regarding energy- management advice, equipment, or technologies
- Providing personal information that enables the utility to better serve the customer
- Paying bills online.

Creating customer advocates can be especially important for a company in a regulated industry. In the absence of customer advocates, or worse, in a situation where customers speak unfavourably about a company or actively work to support issues that are counter to those the company supports, companies can suffer a variety of negative consequences like increased business costs, lawsuits, fines and construction delays. For an electric utility, specific examples of potential advocacy behaviour include:

- Supporting the utility's positions or actions on energy-related public issues, including the environment
- Supporting the utility's position on the location and construction of facilities
- Providing testimonials about positive experiences with the utility.

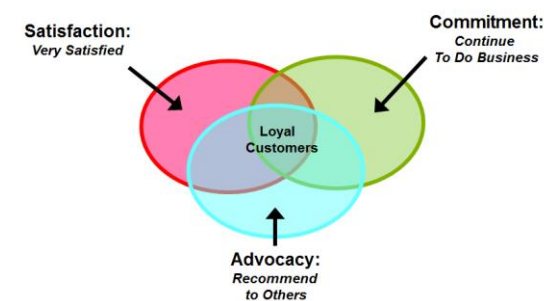


Loyalty is driven primarily by a company's interaction with its customers and how well it delivers on their wants and needs.

Loyalty is based on likelihood to:

- **Satisfaction:** overall satisfaction
- **Commitment:** continue as a customer
- **Advocacy:** willingness to recommend

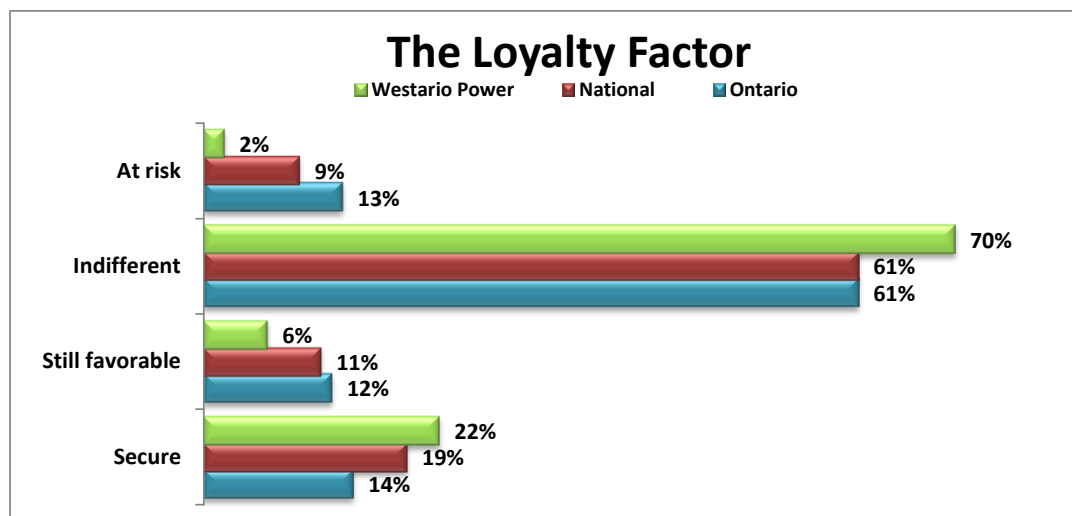
Customer Loyalty Model



Loyal behaviour in the utility industry may not be as evident as it is in a more competitive environment. Measuring customer loyalty in a generally non-competitive industry requires one to think about loyalty in non-traditional ways. Customer loyalty is an intangible asset that has positive consequences or outcomes associated with it. Properly measuring loyalty among utility customers requires thoughtful probing to identify the range of participation, compliance, and advocacy behaviours which ultimately benefit the company in meaningful ways, and foster satisfied customers.

Customer Loyalty Groups				
	Secure	Favorable	Indifferent	At Risk
Westario Power	22%	6%	70%	2%

Base: total respondents



Base: total respondents

Secure customers are “very satisfied” overall with their local electricity utility. They have a very high emotional connection with their utility and definitely would recommend their local utility.

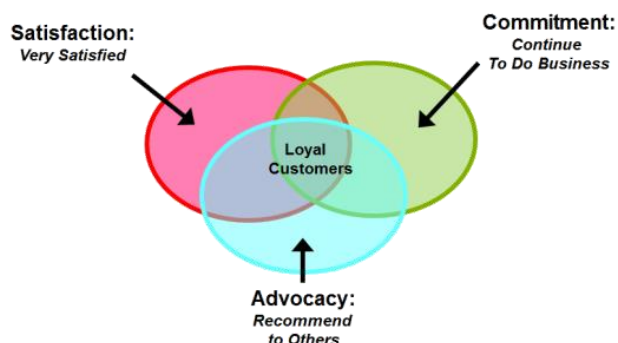
Still favorable customers are “very satisfied” overall, “definitely” or “probably” would recommend their local utility and not switch if they could.

Indifferent customers are less satisfied overall than secure and still-favorable customers and less inclined to recommend their local utility or say they would not switch.

At risk customers, who are “very dissatisfied” with their electricity utility, “definitely” would switch and “definitely” would not recommend it.

Customer commitment

Customer Loyalty Model



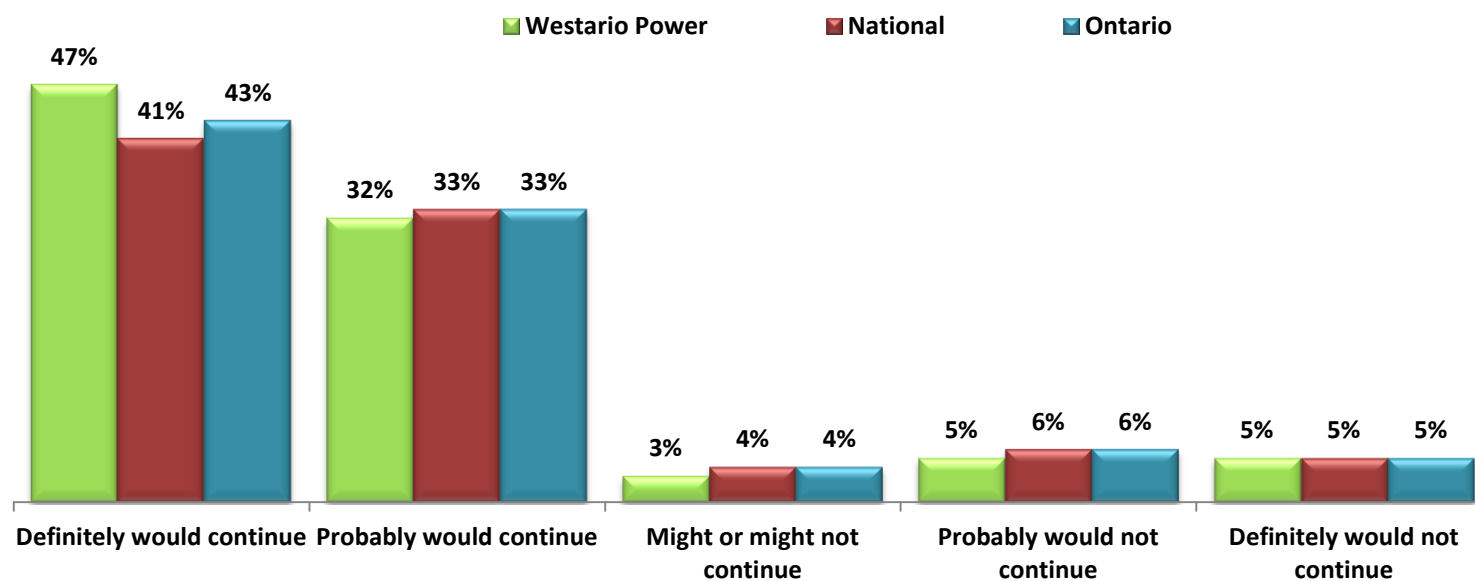
For electric utilities, this measurement is about identifying the number of customers who feel they “want to” vs “have to” do business with you. Potential benefits of commitment may include word of mouth communications - an important aspect of attitudinal loyalty. Committed customers have been known to demonstrate a number of beneficial behaviours, for example committed customers tend to:

- Come to you when they need a product or service
- Validate information received from 3rd parties with information and expertise you have
- Try new products/initiatives
- Perhaps they will even trust you when recommendations are made
- Be more price tolerant
- Be more receptive of utility viewpoints on various issues
- Be more tolerant of errors or issues that inevitably take a swipe at the utility
- Have stronger levels of perception regarding how the utility is managed.



Though customers can not physically leave you, they can emotionally leave you and when they do, it becomes an extreme challenge to garner their participation or support for utility initiatives.

Would you continue to do business with your local electricity provider ...

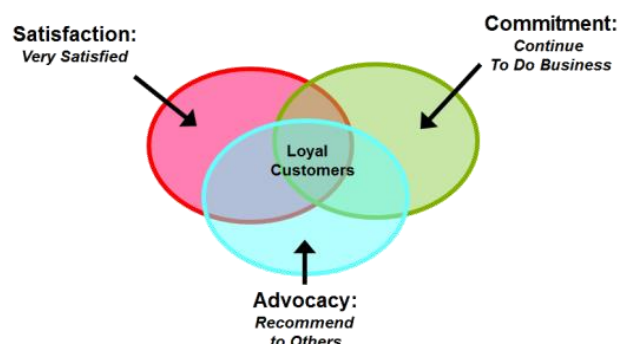


Base: total respondents



Customer Advocacy: Word of mouth

Customer Loyalty Model



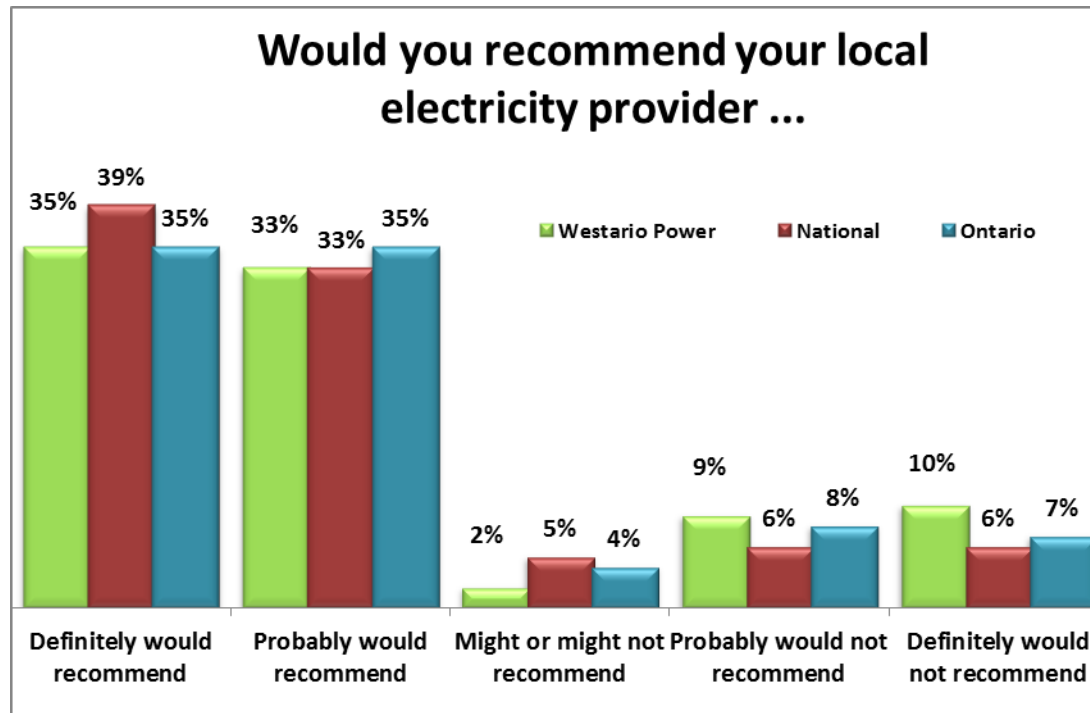
Advocacy is one of the metrics measured in determining customer loyalty. Essentially, companies believe a loyal customer is one that is spreading the value of the business to others, leading new people to the business and helping the company grow. Customer referrals, endorsements and spreading the word are extremely important forms of customer behaviour. For LDCs this is about generating positive referants about the LDC as a relevant and valuable enterprise.

When customers are loyal to a company, product or service, they not only are more likely to purchase from the company again, but they are more likely to recommend it to others – to openly share their positive feelings and experiences with others. In today's world, thanks to the Internet, they can tell and influence millions of people. That equates to new customers and revenue. The same holds true, if not more, when customers are disloyal. Disgruntled customers could share their negative experiences with an ever-widening audience, jeopardizing a company's reputation and resulting in fewer engaged customers and/or customers who are Favourable or Secure. Secure customers, typically are advocates and they are deeply connected and brand-involved.



WORD OF MOUTH

Would you tell me if you agree or disagree with the following statement? Westario Power is a company that you would recommend to a friend or colleague ...



Base: total respondents

Word of mouth communication is a very powerful form of communication and influence. When customers are speaking to other customers (or their peers) it is more credible, goes through less perceptual filters and can enhance the view of services or products better than marketing communication.

There are two forms of word of mouth which utilities need to understand. The first is Experience-based word of mouth which is the most common and most powerful form. It results from a customer's direct experience with the utility or the re-statement of a direct experience from a trusted source.

The second is Relay-based word of mouth. This is when customers pass along important messages to others based on what they have learned through the more traditional forms of communications. For example, if the utility was communicating an offer for "free LED lights" chances are high the offer will be "relayed" to others through word of mouth.

For an electric utility, specific examples of potential positive advocacy behaviour include:

- Recommending other customers specifically locate in the geographic area that is serviced by that utility
- Supporting the utility's positions or actions on energy-related public issues, including the environment
- Supporting the utility's position on the location and construction of facilities
- Providing testimonials about positive experiences with the utility

Corporate Credibility & Trust

While it is true customers don't know how much things cost or are in a position to rationalize the appropriateness of project costs, they will support plans and rationale from organizations they deem to be both credible and trustworthy. LDCs have to be both.

Creating credibility is a process, which advances only through honest, continuous communication between the utility, its regulators, and the public at large. Pro-active and credible communications from an LDC should do three things for its customers: 1- demonstrate competency 2- build confidence and 3- show a future orientation.

Attributes strongly linked to Credibility & Trust			
	Westario Power	National	Ontario
Keeps its promises to customers and the community	78%	79%	80%
Customer-focused and treats customers as if they're valued	75%	74%	76%
Is a trusted and trustworthy company	80%	81%	81%

Base: total respondents with an opinion



Trust and credibility are indicators of the degree of confidence stakeholders have in your organization's ability to deliver on its commitments. Trust and credibility are outcomes based on what your utility actually does, not what it might be doing. UtilityPULSE research shows the under-pinning components which lead customers to believe an organization has credibility and can be trusted are: Knowledge, Integrity, Involvement and Trust.

Knowledge is captured by the utility's ability to demonstrate it is actively aware of industry, regulatory and economic changes within the industry and how these might impact the lives of customers.

Integrity is established by demonstrating adherence to a code of conduct. It requires consistently acting in accordance with the values and goals that have been communicated to customers.

Involvement — Corporate Involvement is increasingly important to Canadian communities as it is an opportunity for their local utility to use their resources and man-power to benefit people at the community level. This helps to build credibility as customers see the organization is acting and delivering on its commitments. This helps customers regard the utility with esteem and respect.



Trust — Trust is achieved through a track record of consistent and reliable performance, delivering on commitments and demonstrated accountability.



Credibility and Trust Index

Westario Power 81%

Ontario 81%

National 83%

Value for money

Focus group participants were asked “What is it going to take for customers to see more value?”
Comments and suggestions received include:

“Send out a pie chart of how Westario spends its money.”

“Continue to be responsive to the needs of the (various) communities. A large company doesn’t care about smaller communities.”

“Good planning and the story behind the planning.”

“Be more service oriented.”

“Regularly tell us how we compare with other utilities.”

“Help us recognize we do have a remarkable utility.”

“I’m pretty impressed with Westario Power, just upset about the money going to electricity generators, time-of-use pricing, and HydroOne.”

Additional Data, Observations, Insights & Commentary from the UtilityPULSE Database

UtilityPULSE has interviewed over 10,000 Ontario Residential & Small Commercial LDC customers in 2015. As a result, we have included additional data and information about the following subjects:

- Corporate image
- How can service to customers be improved (suggestions received)
- What customers think about electricity costs
- What Small Commercial customers think
- Soliciting feedback



- SMART Grid
- Purchasing an electric vehicle.

The data on the importance of “feedback” tells us customers want their voice heard. We believe this is completely in sync with, what experts call, customer centricity. However asking for feedback, but not acting on that feedback or not using the feedback in a constructive way could have some adverse consequences for the LDC i.e., lower levels of trust, credibility and customer affinity.

Today’s consumers expect a ‘passion of service’ centered on quality and a proactive attitude toward the customer. LDCs are by no means excluded from this fundamental trend. Customers want respect, to feel they count, to be informed in case of power disruptions and to be reassured when unexpected large-scale outage events occur. To gain credibility as an LDC focused on the service it offers its customers, you need to empower staff at all levels of the organization with the tools and “know-how” so they will take initiative and responsibility in dealing with different situations as they arise.

It is important to note there are 2 sides of customer engagement. One side is getting customer participation in various activities while the other is about getting higher levels of emotional connection (affinity). Conducting surveys (like this telephone survey), holding town hall meetings, focus groups, etc. are examples of engaging your customers by getting your customers to participate in something.

Engagement is also about how customers think, feel and act towards the organization. Customer engagement is not about making customers “happy” with the costs or the service that is being provided by their LDC. Nor is customer engagement about making the industry regulator “happy”.



The purpose of engaging customers is to gather usable information that will help Westario Power be more effective and efficient with higher levels of customer affinity.

Keeping the lights on, billing customers properly and restoring power quickly is the core offering that must be provided by all LDCs in a competent and efficient manner. Westario Power covers a lot of territory and accomplishes much with a very small staff. But circumstances will affect the system. While staff can't control everything, they can control the quality of the experience. Making operational and capital investments certainly is important, however how a problem is handled can validate or invalidate a customer's perception about the utility's competency in providing excellent quality services.

We recommend having meaningful two-way dialogue with employees (and others) to leverage the results from your 2015 customer engagement survey derived from speaking with and meeting with Westario Power's customers. Ensuring customers are everyone's priority in the LDC through words, behaviours, actions and interactions creates an improved organization which can better meet tomorrow's challenges while keeping costs in check.



UtilityPULSE

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February, 2016

Additional Data, Observations, Insights & Commentary



Corporate image

Twenty years ago many LDCs didn't put too much effort into managing their corporate brand/image. One could argue customers cared less about image and more about operational items such as reliability, restoring power quickly and billing accuracy. In fact, our research from 2006 shows Company Image represented about an 18% weight in affecting the customer's perception about their utility.

But times and customer expectations have changed a lot since then. Customers expect their utility to do the core job exceptionally well AND be much more to customers and the community. They expect you'll be socially responsible, have information they can use to reduce energy costs, be available to answer questions about the industry, etc. In 2015, Company Image represents about a 33% weight in affecting the customer's perception.

In a world where most customers feel time pressed and bombarded with information, a utility should put some real energy behind communicating its brand. The brand of a company is really its reputation. Just like a personal reputation, a brand reputation is formed based on the behaviors and actions of the company (or person), and how those behaviors and actions are perceived. After-all a positive brand image supports a positive perception of the organization. There will always be a brand/image, an LDC should actively manage its reputation, image and brand in order to have the brand/image it desires.

think
Reputation
instead of
Brand



Every LDC has a brand and a brand image, while that image can be affected by events in the industry beyond the control of the LDC, the reality is there is a cost benefit to improving the customer experience, generating higher levels of customer engagement and growing the numbers of Favourable and Secure customers. Customers expect your utility will conduct its business professionally **AND** be a proactive enterprise. How would they know, if you don't communicate with them?

Marketing – Communications		
	National	Ontario
Topics that require more pro-active communication		
Cost of electricity is reasonable when compared to other utilities	63%	59%
Adapts well to changes in customer expectations	71%	71%
Provides good value for money	68%	66%
Spends money prudently to keep the system reliable and up-to-date	74%	73%
Operates a cost effective electricity distribution system	72%	68%
Topics that your utility scores very well on		
Is a respected company in the community	82%	83%
A company to “continue to do business with’	82%	82%
Overall the utility provides excellent quality services	85%	84%
Standard of reliability delivering electricity that meets expectations	88%	87%
Provides consistent, reliable energy	90%	89%

Base: total respondents with an opinion



How can service to customers be improved?

Every business, even natural monopolies, need to keep a focus on its customers, its standards of operations and in being responsive to problems. Insights into what isn't working or what can be done to improve often come from customers. Continuous improvement is the new normal.

Customers are more informed, more aware, more conscious of what's going on around them and in this age of internet and social media, they are better equipped to influence service quality and outcomes. They have learned to compare products and services, to document and monitor customer service and satisfaction, and to request or demand higher quality. And, when things go wrong, customers also know they are “one click” away from the world knowing about it.

As a further way to identify pressure points and areas of concern, respondents were asked to give their top one or two priorities for improvement to their local utility's service.

For 2015 there is heightened awareness for the need to maintain equipment, keep things up to date, improve reliability, and communicate effectively, but true to historical form the number one suggestion remains “better prices/lower rates”.



And we are interested in knowing what you think are the one or two most important things your LDC could do to improve service to their customers?

One or two most important things 'your local utility' could do to improve service	
	% of all suggestions
Better prices/lower rates	40%
Improve reliability of power	22%
Better communication with customers	16%
Better maintenance	12%
Be more efficient	8%
Eliminate SMART meters	7%
Improve/simplify/clarify billing	7%
Information & incentives on energy conservation	6%
Remove hidden costs on bills	5%
Extend service hours/availability of hydro representative	5%
Better online presence	4%
Staff related concerns	3%

Base: total respondents with suggestions from the 2015 17th Annual Customer Satisfaction Survey



What do customers think about electricity costs?

For years electric utility customers have had a very real concern about high bills and the cost of electricity. We've constantly and consistently have told our clients "when a value proposition doesn't exist or is unclear, then people will focus on price". LDCs in Ontario certainly score low on "value for money". The reality is, when a customer struggles to pay their electricity bill they struggle to see the LDC providing good value for money.

The good news is LDCs have been doing more to engage customers about the utilities' plans to spend money to improve operations and/or make capital investments. While this is seen as an important process, especially by the Ontario Energy Board, it doesn't deal with the basic issue at hand – the customer's own struggle to pay the bill. Our first year of research, 1999, showed us there was a very high correlation between ability to pay and satisfaction – in 2015 the correlation is still very high.



Next I am going to read a number of statements people might use about paying for their electricity. Which one comes closest to your own feelings, even if none is exactly right? Paying for electricity is not really a worry, Sometimes I worry about finding the money to pay for electricity, or Paying for electricity is often a major problem?

Is paying for electricity a worry or a major problem?				
	Not a worry	Sometimes	Often	Depends
Ontario				
2015	59%	26%	10%	2%
2014	59%	26%	11%	2%
2013	66%	21%	11%	1%
2012	59%	27%	11%	2%
2011	52%	31%	13%	3%
National				
2015	70%	20%	7%	2%
2014	69%	20%	7%	3%
2013	70%	18%	8%	2%
2012	67%	22%	8%	2%
2011	63%	25%	8%	2%

Base: 2015 Ontario and National benchmark surveys



What do small commercial customers think?

Small commercial customers represent a significant amount of any LDC's customer base yet the amount of customer intelligence a LDC has on this customer segment is extremely low. Beyond having a contact telephone number, name of company and address there often isn't much more information.

In an time when "targeted" communication is important, knowing the type of category of small commercial account would assist LDCs in delivering meaning messages in an effective way. This could be particularly important in the area of energy conservation i.e., pulling together messages and programs for specific types of businesses. After all, a small restaurant is different from a small accounting office.

Small commercial customers have, in many ways, very similar concerns with Residential customers but there are some differences. For example, small business customers are 1.5X more likely to contact their LDC when there is an outage or billing issue.

Small Commercial Customer (General Service < 50kW Demand)

A small commercial customer is defined by the OEB as a non-residential customer in a less than 50 kW demand rate class. These customers are similar to the residential customer in that their bill does not have a demand component to it and their charges are based upon KWH of consumption. Most of these customers would occupy small storefront locations or offices



Deposit requirements, monthly energy bills (and, therefore, energy usage), power quality, and reliability all directly impact a small business's financial situation. Unlike residential customers who tend to describe the cost of power interruptions in terms of a "inconvenience", commercial (and industrial) customers associate power interruptions with the cost of lost business, i.e., a loss in production is a loss in profits.

Likewise, based on the requirement of electricity to sustain business operations, there exists a difference in actual levels of demand response. For instance, small business and commercial users are unlikely to choose to decrease their electricity consumption if it is incompatible with efficient management of their business processes or threatens contracted deliveries to their primary product markets. In some cases, electricity consumption is a relatively small proportion of total input and operating costs, which substantially reduces the financial incentive for shutting down production during off peak pricing.

The tables associated with this report will contain Ontario LDC specific information as it relates to residential and commercial customers. Recognizing smaller data samples are susceptible to greater data swings, for most LDCs there would be 60 or 90 responses from small commercial customers. We have compiled the following based on a group composite of all of our 2015 discussions with small commercial and residential customers.



Satisfaction: Pre & Post		
Satisfaction (Top 2 Boxes: 'very + somewhat satisfied')	Residential	Commercial
Initially	89%	90%
End of Interview	89%	90%

Base: total respondents from the full 2015 database

As it relates to the six attributes associated with customer service:

Very or fairly satisfied with...	Residential	Commercial
The time it took to contact someone	73%	78%
The time it took someone to deal with your problem	70%	75%
The helpfulness of the staff who dealt with your problem	74%	80%
The knowledge of the staff who dealt with your problem	73%	82%
The level of courtesy of the staff who dealt with your problem	81%	88%
The quality of information provided by the staff member	72%	76%

Base: total respondents from the full 2015 database



Residential respondents had lower satisfaction levels with customer service versus Commercial respondents.



Overall satisfaction with most recent experience		
	Residential	Commercial
Top 2 Boxes: 'very + somewhat satisfied'	72%	77%
Bottom 2 Boxes: 'somewhat + very dissatisfied'	26%	22%

Base: total respondents from the full 2015 database

Comparisons between Residential and Commercial		
Loyalty Groups	Residential	Commercial
Secure	23%	25%
Still Favourable	10%	10%
Indifferent	59%	57%
At risk	8%	8%

Base: total respondents from the full 2015 database



Loyalty Model Factors	Residential	Commercial
Very/somewhat satisfied	89%	90%
Definitely/probably would continue	81%	81%
Definitely/probably would recommend	75%	78%

Base: total respondents from the full 2015 database

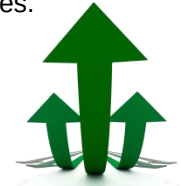
Outages & Bill problems	Residential	Commercial
Respondents with outage problems	44%	37%
Respondents with billing problems	10%	12%

Base: total respondents from the full 2015 database

Attempts to contact local utility...	Residential	Commercial
Respondents with outage problems	19%	30%
Respondents with billing problems	39%	63%

Base: total respondents from the full 2015 database

Residential respondents reported a considerably higher incidence of outages.



Commercial respondents were more likely to call in about billing and outage problems.

Important attributes which describe operational effectiveness		
	Residential	Commercial
Provides consistent, reliable electricity	90%	90%
Delivers on its service commitments to customers	86%	87%
Accurate billing	86%	85%
Quickly handles outages and restores power	87%	87%
Makes electrical safety a top priority	88%	90%
Uses responsible environmental practices when completing work	88%	89%
Is efficient at managing the electricity distribution system	82%	82%
Is a company that is 'easy to do business with'	84%	84%
Operates a cost effective electricity distribution system	72%	72%

Base: total respondents with an opinion from the full 2015 database



Important attributes which shape perceptions about corporate image		
	Residential	Commercial
Is a respected company in the community	85%	86%
A leader in promoting energy conservation	80%	81%
Keeps its promises to customers and the community	82%	83%
Is a socially responsible company	83%	84%
Is a trusted and trustworthy company	84%	85%
Adapts well to changes in customer expectations	74%	76%
Overall the utility provides excellent quality services	85%	86%

Base: total respondents with an opinion from the full 2015 database

Important attributes which shape perceptions about service quality and value		
	Residential	Commercial
Is pro-active in communicating changes and issues which may affect customers	79%	80%
Provides good value for money	68%	69%
Customer-focused and treats customers as if they're valued	79%	80%
Deals professionally with customers' problems	84%	87%
Spends money prudently	77%	77%
Quickly deals with issues that affect customers	82%	82%
Provides information and tools to help manage electricity consumption	79%	77%
Provides information to help customers reduce their electricity costs	78%	77%
The cost of electricity is reasonable when compared to other utilities	60%	59%

Base: total respondents with an opinion from the full 2015 database



Is paying for electricity a worry or a major problem?		
	Residential	Commercial
Not really a worry	63%	61%
Sometimes I worry	24%	27%
Often it is a major problem	8%	9%
Depends	3%	1%

Base: total respondents from the full 2015 database

When there is an outage, which of the following methods would you want your utility to use to give you information about the outage?

Preferred methods to give you information about the outage from your utility...		
	Residential	Commercial
Recorded telephone message	60%	58%
E-mail	32%	40%
Post on utility's website	25%	28%
Social media - Twitter	19%	20%
Text message	32%	35%
Local radio	41%	43%
Local TV	30%	30%

Base: total respondents from the full 2015 database



Soliciting Feedback

The Ontario Energy Board, in its publication: “*EB-2010-0379 Report of the Board Performance Measurement for Electricity Distributors: A Scorecard approach*”, referenced staff recommendations that distributors would be required to survey customer satisfaction among other items in an effort to continually seek ways in which to improve performance and productivity while better understanding and engaging with their customers.

UtilityPULSE asked 1,269 Residential customers, located throughout Ontario and who pay the electricity bill questions pertaining to the solicitation of customer feedback and opinions on different electricity industry matters. These questions were asked with intent of gauging the customer’s perception of requesting feedback and the importance thereof.

89%



89% of Ontario respondents feel it is 'very + somewhat' important for their LDC to solicit customer feedback on customers' overall satisfaction with the utility.

83%



83% of Ontario respondents feel it is 'very + somewhat' important for their LDC to solicit customer feedback on how much money is being spent on repairing equipment.

86%



86% of Ontario respondents feel it is 'very + somewhat' important for their LDC to solicit customer feedback on how much money is being spent on keeping the system reliable.

84%



84% of Ontario respondents feel it is 'very + somewhat' important for their LDC to solicit customer feedback on the utility's plans to spend money on extending the system to help economic development in the community.

Importance of soliciting customer opinions and feedback on				
	Top 2 boxes: 'very + somewhat' important	Bottom 2 boxes: 'somewhat + very' unimportant	Neither	Don't know
... customers' overall satisfaction with the utility ...	89%	8%	1%	3%
... how much money is being spent on repairing equipment ...	83%	9%	1%	6%
... how much money is being spent on keeping the system reliable ...	86%	6%	2%	6%
... the utility's plans to spend money on extending the system to help economic development in the community ...	84%	10%	2%	4%

Base: 1,269 Residential respondents from the 2015 Ontario Benchmark survey

The data reveals, customers do believe the LDC should be seeking their opinions on certain operational matters as well as their overall satisfaction. It could be the customer's view that by having their input counted especially where spending is concerned, they might play a part in controlling costs and stop any unnecessary spending.



SMART Grid

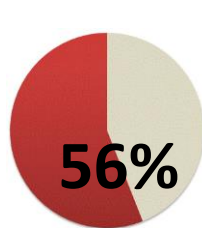
A number of functions will be available to electricity system stakeholders due to the advance of SMART Grid technologies. Providing tools to address peak demand, to improve system reliability, to manage distribution and energy storage are tools available to LDCs and system operators, SMART Grid technologies offer consumers possibilities as well. For the electricity customer, SMART grid technologies can provide the opportunity to manage electricity use, to control bills, and to sell power back the grid. How much of this is the average consumer aware of or “in the know”? While many industry insiders talk about the SMART Grid, i.e., its benefits and its challenges, the reality is, the average person is not very knowledgeable about it.



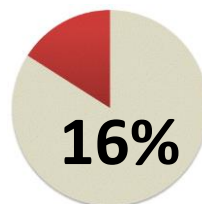
Level of knowledge about the SMART Grid		
	Ontario 2015	Ontario 2014
I have a fairly good understanding of what it is and how it might benefit homes and businesses	9%	9%
I have a basic understanding of what it is and how it might work	21%	25%
I've heard of the term, but don't know much about it	37%	36%
I have not heard of the term	32%	29%
Don't know	1%	1%

Base: total respondents from the 2015/2014 Ontario Benchmark survey

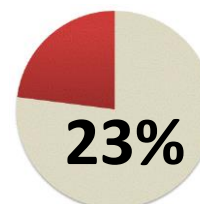
Once again, this year's survey probed around the concept of SMART Grid. While another year has passed, it is evident the SMART Grid is still not a much talked about concept, only 30% [34%;2014] have a basic or good understanding of what it is, 69% have either not heard of the term or if they did, do not know much about it.



56% of Ontario respondents feel it is 'very + somewhat' important to pursue the implementation of SMART Grid technologies



16% of Ontario respondents feel it is 'very + somewhat' unimportant to pursue the implementation of SMART Grid technologies



23%, one in four Ontarians simply admitted they "do not know" if SMART grid technologies should be pursued.

Base: total respondents from the 2015 Ontario Benchmark survey

Support towards working with neighbouring utilities on SMART Grid initiatives		
	Ontario 2015	Ontario 2014
Very supportive	40%	41%
Somewhat supportive	39%	37%
Neither supportive or unsupportive	2%	4%
Somewhat unsupportive	5%	4%
Unsupportive	6%	4%
Don't know	8%	10%

Base: total respondents from the 2015/2014 Ontario Benchmark survey

With inconsistencies between Ontario LDCs' about the definition of SMART Grid coupled with different levels of technical maturity --- collaboration amongst LDCs is very difficult.



Purchasing an Electric Vehicle

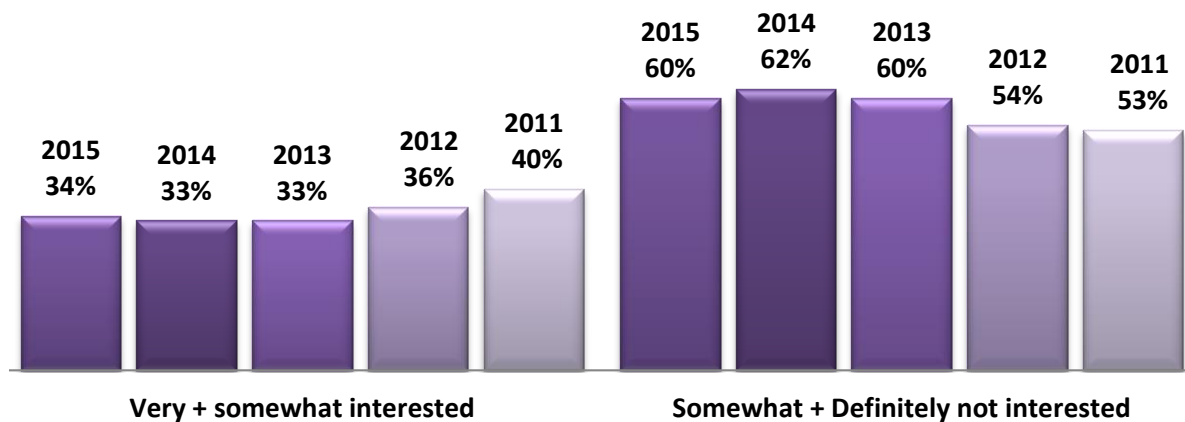
For 5 years UtilityPULSE has been collecting information and tracking electricity customers interest in purchasing an electric vehicle. In fact, we've asked the same questions in the same way for 5 years.

While the actual raw numbers are interesting e.g., 34% are very + somewhat interested in purchasing an electric vehicle, the 5 year trend is also interesting. Other than the first year when various manufacturers hit

the airwaves about their

EVs the interest level has remained in the 34% area. We can conclude that "interest" in purchasing doesn't actually translate to a customer acting on that interest and buying an electric vehicle. Perhaps it is because the EV industry has not done a good job in allaying fears about distances that can be travelled between charges, or time to charge from empty, or the higher depreciation costs associated with most EVs.

Interest in purchasing a fully electric vehicle



Base: total respondents from the 2015 Ontario Benchmark survey



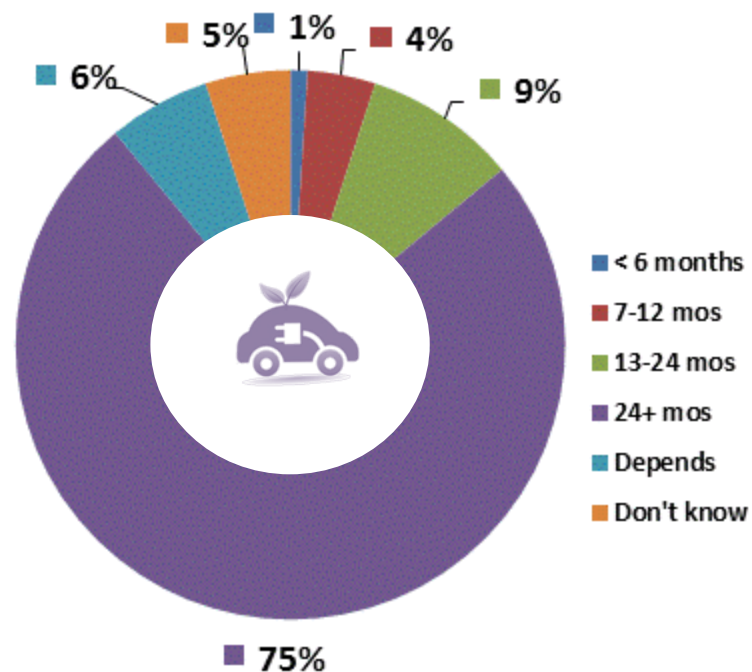
From a demographics perspective respondents in the 35-54 age group had the highest level of interest at 45% (39% in 2014). Data from the survey also tells us there is very little variance in interest to purchase based on the respondents ability to pay for their electricity bills. Customers who said they have “No worries” or said they “Often worry” about paying their electricity bills were statistically equal in their level of interest.

Interest in purchasing a fully electric vehicle						
	Income <\$40K	Income \$40K<\$70K	Income \$70K +	Age 18-34	Age 35-54	Age 55+
Top 2 Boxes: 2015 ‘very + somewhat interested’	30%	28%	41%	29%	45%	29%
Top 2 Boxes: 2014 ‘very + somewhat interested’	30%	28%	42%	27%	39%	28%

Base: total respondents from the 2015 Ontario Benchmark survey

Length of time before purchasing a fully electric vehicle		
	Ontario 2015	Ontario 2014
Immediately to next 6 months	6%	2%
7 to 12 months	4%	2%
13 to 24 months	9%	9%
Over 24 months	75%	79%
Depends	6%	5%
Don't know	5%	3%

Base: total respondents from the 2015/2014 Ontario Benchmark survey



Method

The findings in this report are based on telephone interviews conducted for Simul Corp. / UtilityPULSE by the Logit Group between October 7-21, 2015, with respondents who pay or look after the electricity bills from a list of residential and small and medium-sized business customers supplied by Westario Power Inc.

The sample of phone numbers chosen was drawn randomly to insure each business or residential phone number on the list had an equal chance of being included in the poll.

The sample was stratified so that 85% of the interviews were conducted with residential customers and 15% with commercial customers for 402 interviews. However this data was augmented by interviewing 20 large commercial customers. A total of 422 telephone interviews were completed.

In sampling theory, in 19 cases out of 20 (95% of polls in other words), the results based on a random sample of 422 residential and commercial customers will differ by no more than ± 4.77 percentage points where opinion is evenly split.

This means you can be 95% certain the survey results do not vary by more than 4.77 percentage points in either

direction from results that would have been obtained by interviewing all Westario Power Inc. residential and small and medium-sized commercial customers if the ratio of residential to commercial customers is 85%:15%.

The margin of error for the sub samples is larger. To see the error margin for subgroups use the calculator at <http://www.surveysystem.com/sscalc.htm>.

Interviewers reached 1,265 households and businesses from the customer list supplied by Westario Power Inc. The 422 who completed the interview represent a 33% response rate.

Westario Power contracted UtilityPULSE to conduct Focus group sessions. On February 1 & 2, 2016, three focus group sessions were held in two different geographic areas covered by Westario Power with a turnout of 36 participants.

The findings for the Simul/UtilityPULSE National Benchmark of Electric Utility Customers are based on telephone interviews with adults throughout the country who are responsible for paying electric utility bills. The ratio of 85% residential customers and 15% small and medium-sized business customers in the National study reflects the ratios

used in the local community surveys. The margin of error in the National poll is ± 2.7 percentage points at the 95% confidence level.

For the National study, the sample of phone numbers chosen was drawn by recognized probability sampling methods to insure that each region of the country was represented in proportion to its population and by a method that gave all residential telephone numbers, both listed and unlisted, an equal chance of being included in the poll.

The data were weighted in each region of the country to match the regional shares of the population.

The margin of error refers only to sampling error; other non-random forms of error may be present. Even in true random samples, precision can be compromised by other factors, such as the wording of questions or the order in which questions were asked.

Random samples of any size have some degree of precision. A larger sample is not always better than a smaller sample. The important rule in sampling is not how many respondents are selected but how they are selected. A reliable sample selects poll respondents randomly or in a manner that insures everyone in the population being surveyed has an equal chance of being selected.

How can a sample of only several hundred truly reflect the opinions of thousands or millions of electricity customers within a few percentage points?

Measures of sample reliability are derived from the science of statistics. At the root of statistical reliability is probability, the odds of obtaining a particular outcome by chance alone. For example, the chances of having a coin come up heads in a single toss are 50%. A head is one of only two possible outcomes.

The chance of getting two heads in two coin tosses is less because two heads are only one of four possible outcomes: a head/head, head/tail, tail/head and tail/tail.

But as the number of coin tosses increases, it becomes increasingly more likely to get outcomes that are either close to or exactly half heads and half tails because there are more ways to get such outcomes. Sample survey reliability works the same way but on a much larger scale.

As in coin tosses, the most likely sample outcome is the true percentage of whatever we are measuring across the total customer base or population surveyed. Next most likely are outcomes very close to this true percentage. A statement of potential margin of error or sample precision reflects this.

Some pages in the computer tables also show the standard deviation (S.D.) and the standard error of the estimate (S.E.) for the findings. The standard deviation embraces the range where 68% (or approximately two-thirds) of the respondents would fall if the distribution of answers were a normal bell-shaped curve. The spread of responses is a way of showing how much the result deviates from the "standard mean" or average.

For example, the mean score is 3.53 for providing consistent, reliable electricity. The average is 2.98 for customer-focused.

For quickly handles outages and restores power the standard of deviation is 0.77. For operates a cost effective electricity distribution system the S.D. is 1.05. These findings mean there is a wider range of opinion – meaning less consensus – about whether Westario Power Inc.operates cost effectively than Westario Power Inc.restores power quickly.

Beneath the S.D. in the tables is the standard error of the estimate. The S.E. is a measure of confidence or reliability, roughly equivalent to the error margin cited for sample sizes. The S.E. measures how far off the sample's results are from the standard deviation. The smaller the S.E., the greater the reliability of the data.

In other words, a low S.E. indicates that the answers given by respondents in a certain group (such as residential bill payers or women) do not differ much from the probable spread of the answers "predicted" in sampling and probability theory.

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Good things happen when work places work. You'll receive both strategic and pragmatic guidance about how to improve Customer satisfaction & Employee engagement with leaders that lead and a front-line that is inspired. We provide: training, consulting, surveys, diagnostic tools and keynotes. The electric utility industry is a market segment that we specialize in. Both large and small utilities have received actionable insights. For seventeen years we have been talking to 1000's of utility customers in Ontario and across Canada and we have expertise that is beneficial to every utility.

**Culture, Leadership & Performance –
Organizational Development**

Leadership development

Strategic Planning

Teambuilding

Organizational Culture Transformation

**Focus Groups, Surveys, Polls,
Diagnostics**

Diagnostics ie. Change Readiness, Leadership
Effectiveness, Managerial Competencies

Surveys & Polls

Customer Satisfaction and Loyalty
Benchmarking Surveys

Organization Culture Surveys

Customer Service Excellence

Service Excellence Leadership

Telephone Skills

Customer Care

Dealing with
Difficult Customers

Benefit from our expertise in Customer Satisfaction, Leadership development, Strategy development or review, and Front-line & Top-line driven-change. We're experts in helping you assess and then transform your organization's culture to one where achieving goals while creating higher levels of customer satisfaction is important. Anyone can present data, or design programs – we believe having an understanding of the industry before doing so is crucial. Call us when creating an organization where more employees satisfy more customers more often, is important.

Your personal contact is:

Sid Ridgley, CSP

Phone: (905) 895-7900 Fax: (905) 895-7970 E-mail: sidridgley@utilitypulse.com or sridgley@simulcorp.com

Appendix C: IESO Letter of Comment



WESTARIO POWER INC

24 East Ridge Road

R.R. #2

Walkerton, ON

N0G 2V0

January 31, 2016

Via email: Miriam.heinz@ieso.ca

Miriam Heinz, Regulatory Coordinator
Independent Electrical System Operator
1600 - 120 Adelaide Street West
Toronto, ON M5H 1T1

Re: Renewable Energy Generation (REG) Investment Comment for 2017 Rate Application

Dear Ms. Miriam Heinz;

Per the Ontario Energy Board "Filing Requirements for Electricity Transmission and Distribution Applications – Chapter 5" issued on March 28, 2013, Section 5.1.4.2, Westario Power is submitting information from our Distribution System Plan (DSP) related to REG investments for your comment.

Please find attached excerpts from our current draft of the Distribution System Plan related to renewable energy generation connections within Westario Power's territory. This information is based on our best current knowledge and predictions for the future based on historical activity.

As you are also aware, the Regional Planning Process for Group 3 utilities has only just begun and Westario is a participant in that process. The ultimate capacity for REG connections for Westario feeders will flow out of that Regional Planning Process, which also includes Hydro One Networks.

Please review and comment to us as soon as possible so we may include your response letter in our DSP filing. Should you have any questions or comments please do not hesitate to contact me at 519-507-6666 ext-216 or lisa.milne@westario.com.

Yours truly,

WESTARIO POWER INC.

Lisa Milne, CPA, CGA
President/CEO



5.4.3 System Capability Assessment for Renewable Energy Generation

• 5.4.3.1 Renewable energy applications

In the years since 2010, Westario has received 180 microFIT applications for Renewable Energy Generation (REG). The following table shows the numbers of applications by year, their size (kW), and issued offers. It also shows how many of those offers were ultimately connected, and the size of the connections (kW).

Year	Offers to Connect (Issue/Complete)	Size of Offers (kW)	Connections Made	Total Size Connected (kW)
2010	8	37.5	6	22.37
2011	29	265.13	17	143.7
2012	24	223.9	19	189.89
2013	23	216.4	14	130.29
2014	6	52.25	2	20
2015	6	60	4	40
Totals:	96	855.18	62	546.25

In total, Westario extended 96 offers to connect microFITs over this six year period; 62 of which were completed for a total of 546.25kW. There were several projects already connected prior to the historical plan period.

In addition, Westario has seven connected FIT projects and one storage facility, all of which were initiated since 2012. All of these FIT connections are fully complete. These FIT projects have a combined total of 2952kW. The table below lists these projects, as well as their sizes, and the relevant feeder and transformer information.

Project ID	Year Connected	Size (kW)	Westario Feeder	Connecting Transformer	Renewable Fuel
Price Schonstrom	2012	100	F1	4-037	Solar - Rooftop
Larsen & Shaw	2013	76	F4	2-002	Solar - Rooftop
NRStor Storage	2014	2000	N/A	N/A	Flywheel Storage
Leader Resources	2015	42	F2	T05460	Solar - Rooftop
MSW Plastics	2015	250	Palmerston TS 28M4	Customer owned station	Solar - Rooftop
Hanover Rona	2015	134	F2	4-0002	Solar - Rooftop
Howard Johnson	2015	100	F1	T05463	Solar - Rooftop
Dollarama	2015	250	F1	2-0025	Solar - Rooftop
Totals:		2952			

These eight connections (seven FITs and one storage facility) represent all of the FIT applications that Westario received in the historical plan period. There were no additional applications that were denied or failed to connect.



- 5.4.3.2 Number/capacity of renewable generation connections over forecasted period

Because Westario does not have a comprehensive knowledge of its connection capacity, and the Regional Planning Process has just begun, it is difficult to estimate the size of the connections that will occur over the forecast period. At this point, applications are assessed on an individual basis.

Based on the historical applications for FIT projects, Westario does not expect to receive many applications in the next five years.

- 5.4.3.3 Capacity to connect to REG

As stated previously, Westario has not conducted a thorough review of the capacity available for REG connections. WPI does however, have a process for reviewing applications as they are received, reviewing the proposed project and its location. After completing a full review, Westario will conclude that either the project is not feasible, or it conducts a further assessment to see if there is capacity and feasibility for the project in the proposed location based on the feeders in that area. When a project is deemed feasible, the offer is issued for connection.

- 5.4.3.4 REG connection constraints

Westario's REG connection constraints depend largely on the outcomes of the Regional Planning Process. Since this process has just begun, Westario's ability to assess future REG connection capacities is limited.

- 5.4.3.5 Embedded distributor connection restraints

The results of the Regional Planning process will determine the REG connection capacity restraints associated with being an embedded distributor.

IESO Letter of Comment

Westario Power Inc.

Renewable Energy Generation Plan

February 11, 2016

Introduction

On March 28, 2013, the Ontario Energy Board (“the OEB” or “Board”) issued its Filing Requirements for Electricity Transmission and Distribution Applications; Chapter 5 – Consolidated Distribution System Plan Filing Requirements (EB-2010-0377). Chapter 5 implements the Board’s policy direction on ‘an integrated approach to distribution network planning’, outlined in the Board’s October 18, 2012 Report of the Board - A Renewed Regulatory Framework for Electricity Distributors: A Performance Based Approach.

As outlined in the Chapter 5 filing requirements, the Board expects that the Ontario Power Authority¹ (“OPA”) comment letter will include:

- the applications it has received from renewable generators through the FIT program for connection in the distributor’s service area;
- whether the distributor has consulted with the OPA, or participated in planning meetings with the OPA;
- the potential need for co-ordination with other distributors and/or transmitters or others on implementing elements of the Renewable Energy Generation (“REG”) investments; and
- whether the REG investments proposed in the DS Plan are consistent with any Regional Infrastructure Plan.

Westario Power Inc. – Distribution System Plan

On February 2, 2016, the IESO received Westario Power Inc.’s (“Westario”) REG investments information (“Plan”) as part of its Distribution System Plan which will be filed with the OEB when Westario files its 2017 Rate Application. The IESO has reviewed the REG investments information and provides the following comments.

OPA FIT/microFIT Applications Received

Section 5.4.3.1 of the Plan shows that 62 microFIT projects representing 546.25 kW of capacity and 7 FIT projects totalling 952 kW of capacity are connected to Westario’s distribution system. This section indicates that Westario has also connected a storage facility of 2 MW in capacity.

According to the IESO’s information, as of December 31, 2015, the IESO has offered contracts to 63 microFIT projects totalling 546.7 kW of capacity, and 7 FIT projects totalling 950 kW of capacity - all of which are connected to Westario’s distribution system. In addition, the IESO has contracted with a 2 MW capacity storage facility that is connected in Westario’s territory. The renewable energy generation connections information in Westario’s Plan is therefore consistent with that of the IESO.

¹ On January 1, 2015, the Ontario Power Authority (“OPA”) merged with the Independent Electricity System Operator (“IESO”) to create a new organization that will combine the OPA and IESO mandates. The new organization is called the Independent Electricity System Operator.

Upstream Transmission Constraints

The Plan states that Westario has not conducted a comprehensive review of generation connection capability of its system, and that connection constraints associated with being an embedded LDC are dependent on the results of a completed regional planning process. Westario indicates that it currently has an established process to review and assess connection applications on an individual basis. The IESO understands that projects connecting on the upstream transmission or distribution system could impact the connection capability for REG projects that are downstream on Westario's distribution system. It is therefore necessary for Westario to coordinate with the relevant upstream transmitter and/or distributor when assessing REG project connection capability.

The updated Transmission Availability Table ("TAT Table") is available on the OPA's FIT website: <http://fit.powerauthority.on.ca/sites/default/files/version4/FIT-4-TS-TAT-table-final-July-9-2015.pdf>

Based on the information from the TAT Table, there are currently no known transmission constraints applicable to the Westario's system.

Consultation / Participation in Planning Meetings; Coordination with Distributors / Transmitters / Others; Consistency with Regional Plans

For regional planning purposes, Westario Power Inc. is part of Group 3 and the Greater Bruce-Huron Region, along with Entegrus Power Lines Inc., Erie Thames Power Lines Corporation, Festival Hydro Inc., Wellington North Power Inc., West Coast Huron Energy Inc., and Hydro One Networks Inc. ("HONI" or "Hydro One").

On December 1, 2015, HONI kicked off the needs assessment as the first step of the regional planning process by requiring load forecast information from the LDCs in the Greater Bruce-Huron Region. A kick-off meeting and subsequent discussion on load forecast information was organized by HONI. The IESO confirms its participation at these meetings along with Westario and other regional participants. Hydro One finalized the load forecast for the Greater Bruce-Huron Region at the end of January 2016 and is currently in the process of preparing the needs assessment. According to Hydro One, the needs assessment will be completed by April 2016. Further information on the Needs Assessment Process can be found on Hydro One's website:

<http://www.hydroone.com/RegionalPlanning/GreaterBruce-Huron/Pages/default.aspx>

The IESO will include Westario Power Inc. in its relevant communications on the regional planning activities in the Greater Bruce-Huron Region. The IESO looks forward to working with Westario Power Inc. on regional planning for the Greater Bruce-Huron Region and appreciates the opportunity to comment on Westario's REG investments information as part of its Distribution System Plan at this time.

Appendix D:
Hydro One Networks, Inc.
Regional Planning Document

Greater Bruce / Huron

Description of Region

The Greater Bruce / Huron Region is located to the west of the greater Toronto area in southwestern Ontario. The region includes the counties of Bruce, Huron, and Perth, as well as portions of Grey, Wellington, Waterloo, Oxford, and Middlesex counties.

Electrical supply to the Greater Bruce / Huron region is provided through a network 230kV and 115kV transmission lines supplied mainly by generation from the Bruce Nuclear Generating Station and local renewable generation facilities connected in the area. There are eleven (11) Hydro One step-down transformer stations in the region, as well as seven (7) customer-owned transformer stations supplied directly from the transmission network.

Bulk supply is provided through the 230kV circuits (B4V, B5V, B22D, B23D, B27S and B28S) radiating out from Bruce A TS. These circuits connect this region to the South Georgian Bay / Muskoka region and the Kitchener-Waterloo-Cambridge-Guelph region.

The Local Distribution Companies (LDC) in the Greater Bruce / Huron region are:

- Entegrus Power Lines Inc. (Middlesex)
- Erie Thames Power Lines Corporation
- Festival Hydro Inc.
- Wellington North Power Inc.
- West Coast Huron Energy Inc.
- Westario Power Inc.
- Hydro One Networks Inc. (Distribution (Dx))

Large transmission connected customers in the region will not be required to actively participate in the regional planning process, however their load forecasts will be used in determining regional supply needs.

Table 1 – Hydro One and Customer Assets Bounded by the Greater Bruce / Huron Region

115kV Circuits	230kV Circuits	Hydro One Transformer Stations	Customer Transformer Stations
61M18, D8S, D10H, L7S, S1H, S2S	B4V, B5V, B22D, B23D, B20P, B24P, B27S, B28S, B81HW, B82HW	Bruce HWB TS, Centralia TS, Douglas Point TS, Goderich TS, Hanover TS, Owen Sound TS, Palmerston TS, Seaforth TS, St. Marys TS, Stratford TS, Wingham TS	Constance DS, Enbridge Bryanston CTS, Festival MTS #1, Grand Bend East DS, Lake Huron WTP CTS, McGillivray CTS, St. Marys Cement CTS

Table 2 – List of Distributors supplied by Hydro One transformer stations

Station	Local Distribution Companies (LDCs)	Embedded LDCs
Bruce HWB TS	N/A	N/A
Centralia TS	Hydro One Networks Inc. (Dx)	Entegrus Power Lines Inc.
Douglas Point TS	Hydro One Networks Inc. (Dx)	Westario Power Inc.
Goderich TS	Hydro One Networks Inc. (Dx) West Coast Huron Energy Inc.	none
Hanover TS	Hydro One Networks Inc. (Dx)	Wellington North Power Inc. Westario Power Inc.
Owen Sound TS	Hydro One Networks Inc. (Dx)	none
Palmerston TS	Hydro One Networks Inc. (Dx)	Westario Power Inc.
Seaforth TS	Hydro One Networks Inc. (Dx)	Erie Thames Power Lines Corporation Festival Hydro Inc.
St. Marys TS	Hydro One Networks Inc. (Dx) Festival Hydro Inc.	none
Stratford TS	Hydro One Networks Inc. (Dx) Festival Hydro Inc.	Erie Thames Power Lines Corporation
Wingham TS	Hydro One Networks Inc. (Dx)	Westario Power Inc.

Table 3 – List of Customer-owned transformer stations and connected Distributors

Transmission-Connected Customer-Owned Transformer Stations	Type of Load	Owner (Transmission Customer)	Embedded LDCs
Enbridge Bryanston CTS	Industrial	Enbridge Pipeline Inc.	N/A
Festival MTS #1	LDC	Festival Hydro Inc.	N/A
Lake Huron WTP CTS	Industrial	Lake Huron Primary Water Supply System – Lake Huron Water Treatment Plant	N/A
McGillivray R&BP CTS	Industrial	Lake Huron Primary Water Supply System – McGillivray Reservoir & Pumping Station	N/A
St. Marys Cement CTS	Industrial	St. Marys Cement Inc. – St. Mary's	N/A
Constance DS	LDC	Hydro One Netowrk Inc. (Dx)	Erie Thames Power Lines Corporation
Grand Bend East DS	LDC	Hydro One Netowrk Inc. (Dx)	Festival Hydro Inc.

Table 4 – Transmission Lines in the Greater Bruce / Huron Region

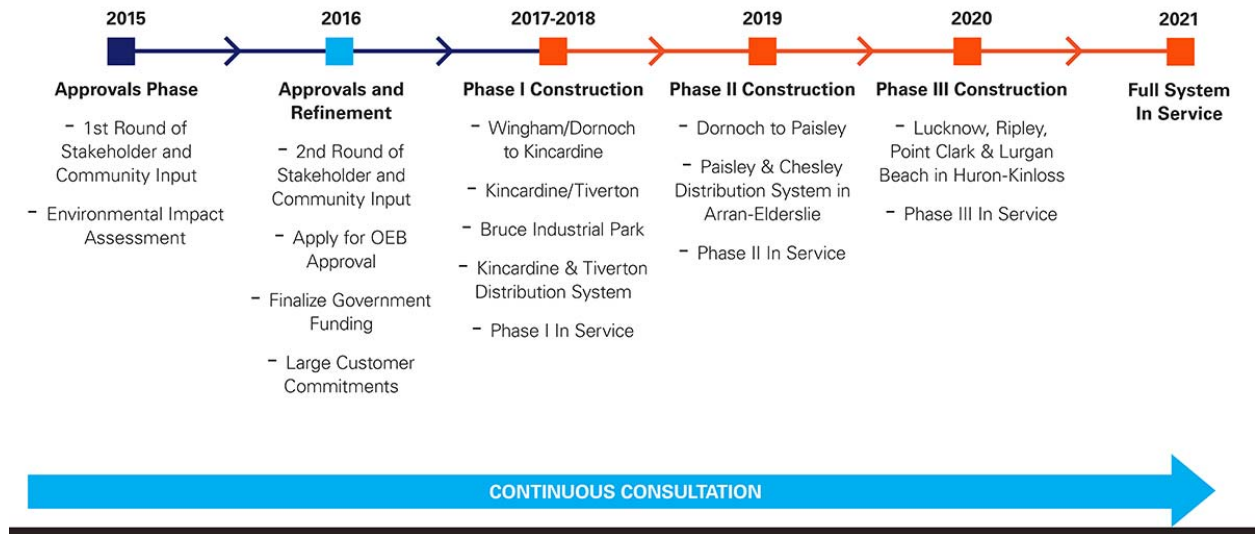
Voltage	Circuit	Location	Regional Stations Supplied
115 kV	61M18	Seaforth TS to Goderich TS	Constance DS Goderich TS
	D8S	Detweiler TS to St. Marys TS	St. Marys TS
	D10H	Detweiler TS to Hanover TS	Hanover TS Palmerston TS
	L7S	Seaforth TS to St. Marys TS	Centralia TS Enbridge Bryanston CTS Grand Bend East DS Lake Huron WTP CTS McGillivray CTS St. Marys Cement CTS St. Marys TS
	S1H	Owen Sound TS to Hanover TS	Hanover TS Owen Sound TS
	S2S	Owen Sound TS to Stayner TS	Owen Sound TS
230 kV	B4V/B5V	Bruce A TS to Orangeville TS	Hanover TS
	B22D/B23D	Bruce A TS to Detweiler TS	Festival MTS #1 Seaforth TS Stratford TS Wingham TS
	B27S/B28S	Bruce A TS to Owen Sound TS	Owen Sound TS
	B20P/B24P	Bruce A TS to Douglas Point TS	Douglas Point TS
	B81HW/B82HW	Bruce A TS to Bruce HWB TS	Bruce HWB TS



Map 1 – Map of Greater Bruce / Huron Region

Appendix E:
Natural Gas Expansion into
Westario Territory

Natural Gas Expansion into Westario Territory



Retrieved from <http://www.epcorsouthernbruce.com/images/project/timeline.jpg> on March 11, 2016

The project overview of the Southern Bruce County – EPCOR plans to bring natural gas to the region can be found at www.epcorsouthernbruce.com/project/overview.html.

Appendix F:
Greater Bruce-Huron Regional Planning
Meeting Minutes

Regional Planning	MoM: Rev 0.0
Minutes of Meeting	



Project:	Greater Bruce/Huron Region – Regional Planning - Needs Assessment (NA)		
Date of Meeting:	November 24, 2015	Location:	Conference Call / WebEx
Subject:	Greater Bruce/Huron Region Needs Assessment (NA)		
Written By:	Alessia Dawes		
Present / Attendees:			
NAME	ORG. / DEPT.	PHONE	EMAIL
Richard Shannon	Hydro One Dx	705-719-5716	richard.shannon@HydroOne.com
Nisar Ghulum-Ali	Hydro One Dx	416-345-4424	Nisar.Ghulam-Ali@HydroOne.com
Jeff Graham	Festival Hydro		grahamj@festivalhydro.com
Bill Smith	Festival Hydro		
Doug Eckel	Festival Hydro		
Jim Klujber	Wellington North Power	519-323-1710	jklujber@wellingtonnorthpower.com
Derek Rinn	Westario	519-507-6666 x231	derek.rinn@westario.com
Sheraz Mustafa	Westario	519-507-6666 x225	sheraz.mustafa@westario.com
Josh Smith	Erie Thames		jsmith@eriethamespower.com
Chuck DeJong	Erie Thames		cdejong@eriethamespower.com
Mike Steeper	Entegrus		mike.steeper@entegrus.com
Alex Merrick	IESO		Alex.Merrick@ieso.ca
Alessia Dawes	Hydro One Tx	416-345-5286	Alessia.dawes@hydroone.com
Sasha Constantinescu	Hydro One Tx	416-345-1293	Alexander.constantinescu@HydroOne.com
Bruce Parker	Hydro One Tx	416-345-5318	Bruce.parker@hydroone.com

Regional Planning	MoM: Rev 0.0
Minutes of Meeting	



Purpose:

The purpose of the conference call/WebEx was for the lead transmitter in the Greater Bruce/Huron region (Hydro One Transmission, Tx) to communicate with the LDCs in the region the Regional Planning process; and to prepare the region's participants for the initiation of the Needs Assessment phase of the process.

During this meeting the participants discussed the following items:

- Explanation of the Regional Planning process
- Detailed explanation of phase 1: Needs Assessment
- Review of regional boundary
- Review of the Needs Assessment schedule
- Explanation of the request for information templates (historical load/forecast/DG/CDM)
- Request for a list of Greater Bruce/Huron region working group members
- Reviewed next steps

During the meeting:

- Bruce Parker (Hydro One Tx) presented the 4 phases of the Regional Planning process: phase 1 – Needs Assessment, phase 2 Scoping Assessment, phase 3 Integrated Regional Infrastructure Plan, phase 4 – Regional Infrastructure Plan; presentation attached for your reference.
- Bruce's presentation also outlined details of the Needs Assessment phase of regional planning as the Greater Bruce/Huron region is in this phase. Note: not all regions proceed to the Scoping Assessment phase.
- Reminder that the lead transmitter in each region (Hydro One Tx in this region) provides Planning Status letters to LDCs reflecting in the status of regional planning. LDCs must submit these letters to the OEB during rate applications.
- Reminder that Hydro One Tx annually submits to the OEB a regional planning update each November.
- Alessia Dawes (Hydro One Tx) reviewed the geographical boundaries of the Greater Bruce/Huron region: counties of Bruce, Huron, Perth; and portions of Grey, Wellington, Waterloo, Oxford and Middlesex counties.
- Alessia walked everyone through the Needs Assessment schedule: 60 calendar days for Data Gathering and 60 calendar days for the Needs Study. A request for LDC and IESO information prior to Christmas holidays will facilitate data finalization (final load forecast) by the end of January, 2016. Note: previous experience shows that information provided requires some back-and-forth discussion prior to being finalized.
- Sasha Constantinescu walked everyone through the information gathering templates previously emailed. Sasha outlined LDC data responsibilities, IESO data responsibilities and Hydro One responsibilities. IESO was asked to stakeholder their Operators to seek their input. Hydro One will do the same.

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- Alessia outlined tables 2 and 3 of the Description of Region document and requested each LDC to review and provide comments as to the accuracy and/or missing information.
- Hydro One Tx requested each LDC to submit a list of regional planning working group participants: name/phone number/email. At least two are recommended.
- To view a sample Needs Assessment report go to Hydro One's Regional Planning website: <http://www.hydroone.com/RegionalPlanning/Pages/home.aspx>
- Reminder that Host LDCs (Hydro One Dx, Festival Hydro & West Coast Huron) must incorporate their embedded LDC forecasts before sending their forecasts to Hydro One Tx
- Next Steps: Hydro One Tx to trigger the beginning of the Information Gathering stage of Needs Assessment via email to each LDC and the IESO on **December 1, 2015**
- Next Steps: LDCs to submit the requested data to Hydro One Tx, no later than **January 14, 2016** however Hydro One Tx kindly requests submission prior to **December 18th, 2015**.
- Next Steps: Hydro One Tx to call West Coast Huron directly to ensure they understand their responsibility with respect to Regional Planning and the Needs Assessment phase as they did not attend this meeting.

Action Items

	Item	Responsibility	Status
1	Send November 24th Meeting Minutes	Hydro One Tx	Complete
2	LDC's to review tables 2 & 3 in the Description of Region document and notify Hydro One Tx if information is incorrect and/or missing by November 30, 2015	LDC's	Westario-complete
3	LDC's to provide Hydro One Tx their Working Group participants: name, phone, email by November 30, 2015	LDC's	Westario-complete
4	Trigger the Data Gathering step of Needs Assessment via email, December 1, 2015	Hydro One Tx	
5	IESO provide requested information to Hydro One Tx by December 18th, 2015	IESO	
6	LDC's provide requested information to Hydro One Tx not later than January 14, 2016 however by December 18th, 2015 is preferred.	LDC's	
7	Hydro One Tx to inform West Coast Huron of their Host LDC regional planning responsibilities as they did not attend this meeting, ASAP	Hydro One Tx	
8	Hydro One Tx to set up a conference call to review the submitted information, call to be sometime between January 14- January 21, 2016	Hydro One Tx	

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Updated – February 1, 2016 to incorporate comments on the draft

Project:	Greater Bruce/Huron Region – Regional Planning - Needs Assessment (NA)		
Date of Meeting:	January 22, 2016	Location:	Conference Call / WebEx
Subject:	Greater Bruce/Huron Region Needs Assessment (NA)		
Written By:	Alessia Dawes		
Present / Attendees:			
NAME	ORG. / DEPT.	PHONE	EMAIL
Richard Shannon	Hydro One Dx	705-719-5716	richard.shannon@HydroOne.com
Nisar Ghulum-Ali	Hydro One Dx	416-345-4424	Nisar.Ghulam-Ali@HydroOne.com
Jeff Graham	Festival Hydro	519-271-4703 x 241	grahamj@festivalhydro.com
Bill Smith	Festival Hydro	519-271-4703 X242	bsmith@festivalhydro.com
Larry McCabe	West Coast Huron Energy	519-524-7371 press 2	lmccabe@goderich.ca
Jim Klujber	Wellington North Power	519-323-1710	jklujber@wellingtonnorthpower.com
Sheraz Mustafa	Westario	519-507-6666 x225	sheraz.mustafa@westario.com
Josh Smith	Erie Thames	519-485-1820 x220	jsmith@eriethamespower.com
Yvonne Huang	IESO	416-969-6413	Yvonne.Huang@ieso.ca
Alex Merrick	IESO	416-969-6599	Alex.Merrick@ieso.ca
Alessia Dawes	Hydro One Tx	416-345-5286	Alessia.dawes@hydroone.com
Sasha Constantinescu	Hydro One Tx	416-345-1293	Alexander.constantinescu@HydroOne.com
Bruce Parker	Hydro One Tx	416-345-5318	Bruce.parker@hydroone.com

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Purpose:

The purpose of the conference call/WebEx was for the working group to review the information gathered and to review the draft load forecasts.

During this meeting the participants discussed the following items:

- Reviewed information gathered thus far and requested any outstanding items
- Reviewed the draft load forecasts
- Discussed LDC and Hydro One Tx planned investments
- Explained transformer ratings for regional planning & requested LDC-owned transformer station ratings
- Reviewed the Needs Assessment schedule and next steps

During the meeting:

- IESO described the Conservation & Demand Management (CDM) values provided for the development of Regional Planning load forecasts. The CDM values are generic assumptions for CDM savings through codes and standards, energy efficiency and time of use, and they are an allocation of the province wide CDM target. CDM values used a base year of 2015. IESO also described the Distributed Generation (DG) values. DG values provided are for those facilities with OPA/IESO contracts (FIT, CHP, RESOP). Legacy DG's are not included and any other DG without OPA/IESO contracts are not included. LDC's to provide DG and/or CHP and/or any other generation that may impact their load forecast by Tuesday January 26. Hydro One Tx to double check the Net load forecast w.r.t DG (may have double counted).

Subsequent to meeting: IESO checked their available microFIT data. The microFIT projects were connected in year 2015 or earlier and hence there is no change to the DG data already provided.

- IESO to send power factors associated with the coincident and non-coincident peak load to HONI Tx by Friday January 29 for basecase/simulation preparations.
- HONI Dx provided station forecasts as a sum of embedded forecasts. Waiting on one outstanding feeder forecast from one LDC for incorporation at Centralia TS.
- Festival Hydro described a fairly flat growth and no knowledge of major industrial load increases or decreases. Festival Hydro in discussions with local hospital on an 850 kVA Combined Heat and Power (CPH) installation; and in discussion with another private entity on a CPH installation. Once firm, they can be incorporated into the next cycle of Regional Planning.

Subsequent to meeting: IESO indicated that if regional needs require an integrated solution, CPH will be an option to explore.

- West Coast Huron Energy described a fairly flat growth and no knowledge of major industrial load increases or decreases. There are a couple of co-generation projects currently be discussed. Once firm, they can be incorporated into the next cycle of Regional Planning.

Subsequent to meeting: IESO indicated that if regional needs require an integrated solution, CPH will be an option to explore.

- HONI Tx explained the general methodology for the regional load forecast: Gross vs. Net, Coincident vs. Non-coincident.

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- The working group selected one of the eight load forecasts to review together (4 Gross & 4 Net). The working group reviewed the net summer coincident forecast station by station and discussed any oddities. These oddities appear in most of the forecasts.

Douglas Point TS

- o HONI Dx indicated growth potential (large industrial)
- o Growth based on a Westario supplied township.
- o HONI Dx to double check the high growth with Westario

Hanover TS

- o Sometime in 2016 approximately 50% of North Wellington's Mount Forest load on a Hanover TS feeder will be placed on a Palmerston TS feeder.
- o HONI Dx and North Wellington to discuss and update load forecast to reflect this.

Stratford TS

- o IESO, Hydro One Dx and Festival Hydro to double check historical peak load, Summer 2013 load may have had ~30 MW of temporary switched load (for 2 days)
- o Festival Hydro indicated that in 2014 about 20-25 MW was bypassed by Stratford TS to Festival MTS
- o Hydro One Dx and Festival Hydro to ensure the forecast does not double count load

Wingham TS

- o HONI Dx forecast did not include several commercial/industrial connections.
- o HONI Dx to revise and resubmit forecast

- LDC to provide a short explanation of discrepancies indicated in *Red Italics* in the draft load forecasts. Hydro One Tx to send out IESO's historical load timestamps to aid in this effort by Tuesday January 26, 2016.

Subsequent to meeting: on January 22, 2016 Hydro One Tx forwarded to the working group, IESO's excel file containing historical load (including timestamps), DG and CDM. Correction to the summer 2013 timestamp was made on Monday January 25th and update sent to working group.

- No separate/additional comments on the Gross load forecasts
- Planned Investments over the next five-ten years, to be mentioned in the Needs Assessment:

Hydro One Tx:

- o Some station refurbishment work, such as Goderich TS transformer replacement, Palmerston station refurbishment work & Centralia TS End-Of-Life (EOL)
- o Some line refurbishment work, such as S1H sections of skywire replacement

Hydro One Dx:

- o Will use existing feeders at Palmerston TS for North Wellington's load transfer from Hanover TS
- o There will be new feeder positions afforded by the Palmerston TS station refurbishment work.
- o Noted that in approximately 15 years Douglas Point TS will be EOL and would like the station to be physically relocated outside the Bruce Complex for easier accessibility.

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Festival Hydro:

- o The new MTS is only 2.5 years old; hence there is no need for additional capacity at this time.

Goderich Hydro/West Coast Huron

- o No major planned investments

- Hydro One Tx explained how they calculate a station's 10-day Limited-Time-Rating (LTR)/emergency rating. The non-coincident load forecasts will be compared to this rating. A station's 10-day LTR emergency rating is normally the 10-day overload rating of the most limiting transformer (assuming one of two transformers in a station is out of service). Within a continuous 10-day period, the load the expected to cycle through its typical daily load profile. Occasionally the transformers are not the limiting component of a station and hence the station's LTR may not be dictated by the transformers ratings. LDC's to submit their equivalent station ratings for their transmission-connected stations. Please indicate the limiting component. Festival MTS #1, Constance DS, Grand Bend East DS.
- The working group reviewed the Needs Assessment schedule.
 - o Load forecasts must be finalized by January 29, 2016.
 - o Hydro One Tx will prepare Summer and Winter basecases for the simulation of the transmission system. Hydro One Tx and IESO to agree on system assumptions.
 - o Hydro One Tx to finalize planning ratings of transmission circuits and transformers
 - o Hydro One Tx to begin the Needs Assessment study by February 16, 2016.
 - o Working Group meeting to review preliminary results the week of March 21, 2016
 - o Working Group meeting to review draft report the week of April 4, 2016
 - o Needs Assessment Report finalized by April 15, 2016

Action Items

	Item	Responsibility	Status
1	Hydro One Tx to forward IESO historical load data timestamps to working group to help verify historical load and aid in the explanation of identified major discrepancies by Friday January 22, 2016 .	Hydro One Tx	Complete
2	IESO to provide power factors that correlate with the provided historical peaks by Friday January 29, 2016 .	IESO	
3	LDC to provide list of DG not accounted for in the IESO list by end-of-day Tuesday January 26, 2016	LDC	
4	LDC's to provide Hydro One Tx any update to load forecast and explanations of discrepancies in Red Italics by end-of-day Tuesday January 26, 2016	LDC	
5	LDC's with transmission-connected stations to provide their station emergency ratings to Hydro One Tx by Friday January 29, 2016	Festival Hydro Hydro One Dx	
6	Hydro One Tx to consolidate and finalize the load forecast for the region's Needs Assessment by Friday January 29, 2016	Hydro One Tx	
7	Hydro One Tx to begin Needs Assessment study by February 16, 2016	Hydro One Tx	

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8	Next meeting to be arranged for week of March 21 to review preliminary study results.	Hydro One Tx	
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Regional Planning Greater Bruce/Huron Region

Date: March 31, 2016

Time: 10:30 AM - 12:00 PM

Location: Conference call / Webex

JOIN WEBEX MEETING

<https://hydroone.webex.com/hydroone/j.php?MTID=m1519d8191e819d19faa9e0826f13fe69>

Meeting number: 732 737 662 Meeting password: planning

Conference Call #: 1-877-385-4099 Toll Free (Canada & USA) or 416-883-0133 Toronto

Participant Access code: 9880688 #

AGENDA

Item	Topic	Lead
1	Introductions	Hydro One (Tx)
2	Review & Discuss Preliminary Needs Assessment Results	Hydro One (Tx)
3	Discuss Next Step in the Assessment	Hydro One (Tx)
4	Review Schedule	Hydro One (Tx)
5	Set Next Meeting(s)	Hydro One (Tx)

Updated - Needs Assessment Schedule

Data Gathering - <i>Complete</i>	60 Days
Trigger Date	Day 1 - December 1, 2015
LDC/IESO deadline to submit data	Day 45 – January 14, 2016
Meeting (Webex) to review submitted data	January 22, 2016
Data finalized	Day 60 – January 29, 2016
Needs Study - <i>Underway</i>	60 Days
Trigger Date	Day 1 – February 29, 2016
Meeting to review preliminary results	March 29, 2016
Additional meeting(s) to review ongoing results	TBD

Appendix G: Regional Planning Net Load Forecast

Net Load Forecast

<i>Winter Regional Coincident Station Peak</i>											
Station	Historical (MW)	Forecast (MW)									
	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25
Centralia TS	32.42	32.65	32.92	32.96	33.16	33.52	33.90	34.16	34.45	34.69	34.94
Constance DS	17.58	17.57	17.55	17.41	17.35	17.36	17.40	17.41	17.44	17.46	17.50
Douglas Point TS	70.95	71.54	72.09	72.19	72.59	73.20	73.94	74.64	75.45	76.23	77.08
Customer CTS #1	0.89*	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Festival MTS #1	19.26	19.29	19.33	19.29	19.27	19.28	19.31	19.36	19.43	19.49	19.56
Goderich TS	36.21	36.12	36.07	35.81	35.65	35.58	35.55	35.50	35.49	35.45	35.43
Grand Bend East DS	14.11	14.13	14.19	14.13	14.13	14.19	14.27	14.30	14.34	14.37	14.39
Hanover TS	101.59	101.72	101.94	101.69	101.76	102.01	102.42	102.56	102.84	103.02	103.23
Customer CTS #2	4.27**	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
Customer CTS #3	1.93**	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Owen Sound TS	133.69	134.70	136.07	136.18	137.02	138.53	140.18	141.21	142.35	143.29	144.25
Palmerston TS	60.95	61.53	62.17	62.50	63.20	63.80	64.60	65.20	65.92	66.58	67.25
Seaforth TS	33.27	33.24	33.26	33.06	32.98	32.98	33.02	33.02	33.06	33.06	33.07
Customer CTS #4	9.37	9.49	10.07	10.07	10.64	10.64	10.64	10.64	10.64	10.64	10.65
St. Marys TS	23.48	23.59	24.75	24.63	24.57	24.58	24.61	24.63	24.68	24.70	24.73
Stratford TS	79.16	79.30	79.52	79.30	79.29	79.42	79.65	79.86	80.16	80.39	80.64
Wingham TS	48.21	48.70	49.23	49.38	49.75	50.36	51.02	51.55	52.16	52.73	53.35
Bruce HWB TS	10.95	10.96	11.10	11.10	11.10	11.10	11.10	11.10	11.10	11.10	11.10

* Winter 2013/14

** Winter 2012/13

Net Load Forecast

<i>Summer Regional Coincident Station Peak</i>											
Station	Historical (MW)	Forecast (MW)									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Centralia TS	32.00	32.04	31.57	31.62	31.89	32.20	32.42	32.61	32.85	33.05	33.25
Constance DS	15.47	15.45	15.35	15.23	15.20	15.20	15.19	15.18	15.20	15.22	15.24
Douglas Point TS	45.48	45.43	45.11	44.89	44.87	44.93	45.02	45.10	45.26	45.35	45.49
Customer CTS #1	1.29*	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Festival MTS #1	24.84	24.85	24.86	24.77	24.69	24.66	24.70	24.74	24.82	24.87	24.93
Goderich TS	38.95	38.70	38.50	38.18	37.98	37.84	37.74	37.63	37.59	37.50	37.43
Grand Bend East DS	16.32	16.32	16.27	16.20	16.24	16.31	16.33	16.33	16.37	16.38	16.40
Hanover TS	76.22	75.82	75.51	75.32	75.37	75.34	75.33	75.25	75.32	75.30	75.29
Customer CTS #2	5.58	5.58	5.58	5.58	5.58	5.58	5.58	5.58	5.58	5.58	5.58
Customer CTS #3	4.17**	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20
Owen Sound TS	96.32	96.71	96.49	96.54	97.40	98.36	99.01	99.56	100.27	100.83	101.40
Palmerston TS	52.00	52.48	52.81	53.30	54.15	54.94	55.69	56.45	57.35	58.21	59.16
Seaforth TS	30.53	30.39	30.27	30.06	29.96	29.91	29.87	29.82	29.23	29.79	29.76
Customer CTS #4	14.42	14.62	15.54	15.54	16.47	16.47	16.47	16.47	16.47	16.47	16.47
St. Marys TS	25.16	25.07	25.01	24.87	24.79	24.76	24.75	24.74	24.77	24.77	24.78
Stratford TS	77.16	77.10	77.05	76.77	76.70	76.76	76.87	76.97	77.20	77.33	77.49
Wingham TS	37.69	37.72	37.57	37.40	37.49	37.65	37.71	37.76	37.88	37.94	38.03
Bruce HWB TS	5.05	5.06	5.12	5.12	5.12	5.12	5.12	5.12	5.12	5.12	5.12

* Summer 2014

** Summer 2013

Net Load Forecast

<i>Winter Non-Coincident Station Peak</i>											
Station	Historical (MW)	Forecast (MW)									
	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25
Centralia TS	33.69	33.93	34.20	34.24	34.46	34.82	35.23	35.50	35.79	36.05	36.31
Constance DS	18.63	18.62	18.61	18.45	18.39	18.40	18.44	18.45	18.48	18.51	18.55
Douglas Point TS	70.95	71.54	72.09	72.19	72.59	73.20	73.94	74.64	75.45	76.23	77.08
Customer CTS #1	3.79	3.79	3.79	3.79	3.79	3.79	3.79	3.79	3.79	3.79	3.79
Festival MTS #1	23.79	23.83	23.87	23.82	23.80	23.81	23.84	23.90	24.00	24.07	24.16
Goderich TS	40.95	40.85	40.79	40.49	40.32	40.23	40.20	40.15	40.14	40.09	40.06
Grand Bend East DS	14.63	14.66	14.72	14.65	14.65	14.72	14.81	14.84	14.88	14.90	14.93
Hanover TS	102.64	102.77*	102.99	102.75	102.81	103.07	103.48	103.63	103.90	104.09	104.30
Customer CTS #2	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90
Customer CTS #3	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63
Owen Sound TS	133.69	134.70	136.07	136.18	137.02	138.53	140.18	141.21	142.35	143.29	144.25
Palmerston TS	61.48	62.06*	62.70	63.04	63.75	64.36	65.15	65.77	66.49	67.16	67.83
Seaforth TS	33.69	33.66	33.68	33.48	33.39	33.40	33.44	33.44	33.47	33.47	33.49
Customer CTS #4	16.84	17.06	18.10	18.10	19.14	19.14	19.14	19.14	19.14	19.14	19.14
St. Marys TS	24.84	24.97	26.19	26.07	26.01	26.01	26.04	26.07	26.12	26.14	26.17
Stratford TS	83.48	83.62	83.86	83.63	83.62	83.75	84.00	84.21	84.53	84.77	85.04
Wingham TS	57.06	57.64	58.26	58.44	58.87	59.59	60.38	61.01	61.73	62.41	63.14
Bruce HWB TS	11.05	11.07	11.20	11.20	11.20	11.20	11.20	11.20	11.20	11.20	11.20

*Load Transfer from Hanover TS to Palmerston TS

Net Load Forecast

Summer Non-Coincident Station Peak

Station	Historical (MW)	Forecast (MW)									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Centralia TS	33.79	33.84	33.38	33.43	33.72	34.04	34.27	34.47	34.72	34.93	35.15
Constance DS	17.69	17.66	17.54	17.41	17.37	17.38	17.36	17.35	17.38	17.39	17.42
Douglas Point TS	46.11	46.06	45.74	45.52	45.49	45.56	45.65	45.72	45.89	45.98	46.13
Customer CTS #1	2.53	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Festival MTS #1	27.90	27.91	27.92	27.81	27.73	27.69	27.74	27.77	27.87	27.93	28.00
Goderich TS	39.27	39.02	38.81	38.49	38.29	38.15	38.05	37.93	37.89	37.81	37.74
Grand Bend East DS	18.74	18.75	18.68	18.61	18.65	18.73	18.75	18.76	18.80	18.81	18.83
Hanover TS	76.22	75.82*	75.51	75.32	75.37	75.34	75.33	75.25	75.32	75.30	75.29
Customer CTS #2	5.79	5.79	5.79	5.79	5.79	5.79	5.79	5.79	5.79	5.79	5.79
Customer CTS #3	4.53	4.53	4.53	4.53	4.53	4.53	4.53	4.53	4.53	4.53	4.53
Owen Sound TS	100.01	100.41*	100.21	100.26	101.16	102.15	102.82	103.40	104.13	104.72	105.31
Palmerston TS	52.32	52.80	53.13	53.63	54.48	55.27	56.03	56.79	57.70	58.57	59.52
Seaforth TS	30.53	30.39	30.27	30.06	29.96	29.91	29.87	29.82	29.23	29.79	29.76
Customer CTS #4	16.00	16.22	17.24	17.24	18.27	18.27	18.27	18.27	18.27	18.27	18.27
St. Marys TS	25.90	25.81	25.74	25.60	25.52	25.49	25.48	25.47	25.50	25.50	25.50
Stratford TS	86.43	86.36	86.31	86.00	85.92	85.99	86.12	86.22	86.48	86.63	86.81
Wingham TS	50.74	50.79	50.58	50.35	50.48	50.69	50.77	50.84	51.00	51.08	51.20
Bruce HWB TS	6.42	9.83	9.95	9.95	9.95	9.95	9.95	9.95	9.95	9.95	9.95

*Load Transfer from Hanover TS to Palmerston TS

Appendix H: Regional Planning Needs Assessment Study



Hydro One Networks Inc.
483 Bay Street
Toronto, Ontario
M5G 2P5

NEEDS ASSESSMENT REPORT

Region: Greater Bruce – Huron

Revision: Final

Date: May 6, 2016

Prepared by: Greater Bruce-Huron Study Team



Distribution



Transmission



Greater Bruce-Huron Region Study Team
Organization
Entegrus
Erie Thames Power
Festival Hydro Inc.
Goderich Hydro - West Coast Huron Energy Inc.
Hydro One Networks Inc. (Distribution)
Hydro One Networks Inc. (Lead Transmitter)
Independent Electricity System Operator
Wellington North Power Inc.
Westario Power Inc.

Disclaimer

This Needs Assessment Report was prepared for the purpose of identifying potential needs in the Greater Bruce-Huron Region and to assess whether those needs require further coordinated regional planning. The potential needs that have been identified through this Needs Assessment Report may be studied further through subsequent regional planning processes and may be reevaluated based on the findings of further analysis. The load forecast and results reported in this Needs Assessment Report are based on the information and assumptions provided by study team participants.

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NEEDS ASSESSMENT EXECUTIVE SUMMARY

REGION	Greater Bruce-Huron Region (the Region)		
LEAD	Hydro One Networks Inc. (Hydro One)		
START DATE	February 29, 2016	END DATE	April 28, 2016

1. INTRODUCTION

The purpose of this Needs Assessment report is to undertake an assessment of the Greater Bruce-Huron Region and determine if there are regional needs that require coordinated regional planning. Where regional coordination is not required, and a “localized” wires solution is necessary, such needs will be addressed between relevant Local Distribution Companies (LDCs) and Hydro One and other parties as required.

For needs that require further regional planning and coordination, the Independent Electricity System Operator (IESO) will initiate the Scoping Assessment process to determine whether an IESO-led Integrated Regional Resource Planning (IRRP) process, or the transmitter-led Regional Infrastructure Plan (RIP) process (wires solution), or whether both are required.

2. REGIONAL ISSUE/ TRIGGER

The Needs Assessment for the Greater Bruce-Huron Region was triggered in response to the Ontario Energy Board’s (OEB) Regional Infrastructure Planning process approved in August 2013. To prioritize and manage the regional planning process, Ontario’s 21 regions were assigned to one of three groups - Group 1 Regions are being reviewed first. The Greater Bruce-Huron Region belongs to Group 3. The Needs Assessment for this Region was triggered on February 29, 2016 and was completed on April 28, 2016.

3. SCOPE OF NEEDS ASSESSMENT

The scope of this Needs Assessment was limited to the next 10 years as per the recommendations of the Planning Process Working Group Report to the OEB.

The scope of the Needs Assessment includes a review of transmission system capability which covers transformer station capacity, transmission circuit thermal capacity, and voltage performance. System reliability, operational issues and asset replacement plans were also briefly reviewed as part of this Needs Assessment.

Needs emerging over the next 10 years and requiring coordinated regional planning may be further assessed as part of the IESO-led Scoping Assessment and/or IRRP, or in the next planning cycle. If required, an IRRP will develop a 20-year strategic direction for the Region.

4. INPUTS/DATA

Study team participants, including representatives from LDCs, the IESO, and Hydro One transmission provided information for the Greater Bruce-Huron Region. The information included: planning activities already underway, historical load and power factor, load forecast, conservation and demand management (CDM) and distributed generation (DG) information, system reliability performance, operational issues and major equipment approaching end-of-life.

5. ASSESSMENT METHODOLOGY

The assessment's primary objective was to identify the electrical infrastructure needs in the Region over the study period (2016 to 2025). The assessment reviewed available information and load forecasts and included single contingency analysis to identify needs.

6. RESULTS

Transmission System Capacity Needs

A. 230/115 kV Autotransformer Capacity

- Based on the gross regional-coincident load forecast, the 230/115 kV autotransformer capacity (Seaforth TS, Hanover TS) supplying the Region is adequate over the study period for the loss of a single 230/115 kV autotransformer in the Region.

B. 230 kV Transmission Lines

- Based on the gross regional-coincident load forecast, the 230 kV circuits supplying the Region are adequate over the study period for the loss of a single 230 kV circuit in the Region.

C. 115 kV Transmission Lines

- Based on the gross regional-coincident load forecast, thermal limits for 115 kV circuit L7S between Seaforth Junction and Kirkton Junction will be exceeded in the near term (summer 2019) for the loss of 115 kV circuit D8S.
- Based on the net regional-coincident load forecast, the need date is expected to be deferred to the end of the study period.
- Due to the limited recorded effectiveness of CDM uptake in this Region, further study is required to identify an action plan.
 - The Need will be managed via Local Planning with the Region's study team.

D. 230 kV and 115 kV Connection Facilities

- Based on the gross non-coincident load forecast, the capacity of the 230 kV and 115 kV connection facilities in the Region are adequate over the study period.

System Reliability, Operation and Restoration Needs

A. Load Security

- Based on the gross regional-coincident load forecast and the existing transmission configuration, load security criteria can be met over the study period.

B. Load Restoration

- Based on the gross regional-coincident load forecasts with the use of existing transmission infrastructure, restoration criteria can be met over the study period.

C. Power Factor at Connection Facilities

- Historically, power factor at Wingham TS and Bruce HWP B TS do not meet Market Rule requirements.
 - The Need at Wingham TS will be managed via Local Planning between the transmitter and the affected LDCs.
 - The Need at Bruce HWP B TS will be managed via Local Planning between the transmitter

and the affected customer.

D. Voltage Performance

- Under gross regional-coincident peak load conditions, post-contingency voltage at the Wingham TS 44 kV bus is below 6% of nominal voltage and may result in poor end-of-feeder voltages (winter 2020/2021).
- Based on the net regional-coincident peak load forecast at Wingham TS, the need date may be deferred by 2 years.
- Due to the synergy between voltage performance and power factor, this voltage deficiency Need will be further studied in coordination with Wingham TS's power factor.
 - The Need will be managed via Local Planning between the transmitters and the affected LDCs

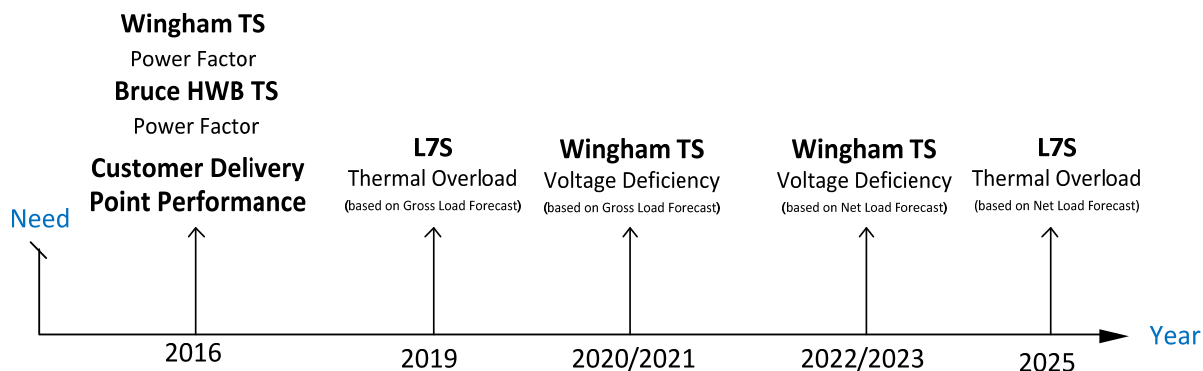
E. Customer Delivery Point Performance

- Based on a review of delivery point performance, several customer delivery points in the Region are below their historical measures.
 - Mitigation measures that align with Hydro One's OEB-approved process for addressing poor performance will be discussed between the transmitter and the affected LDCs and transmission customers.

F. Bulk Power System Performance in the Region

- Based on a limited analysis of the bulk power system in the Region, 230 kV transmission circuit D7V between Detweiler TS and Waterloo North Junction is over its thermal limit near the end of the study period. This result is consistent with the KWCG Regional Infrastructure Plan (RIP) findings.
 - As recommended in the KWCG RIP, this Needs Assessment also recommends further investigation via bulk system planning study.

Needs Timeline Summary



Aging Infrastructure / Replacement Plan

During the study period, plans to replace aged equipment at ten stations and several transmission circuits will take place. The replacement of aged equipment may improve customer delivery point performance. Investigation into customer delivery point performance will take into consideration this replacement work.

Further details of these investments can be found in Section 6.3 of this report.

7. RECOMMENDATIONS

Based on the findings of this Needs Assessment, the study team recommendations:

1. Poor power factor and voltage deficiency at Wingham TS to be managed by Local Planning between Hydro One transmission and Hydro One distribution and may include additional LDC's embedded within Hydro One distribution fed out of Wingham TS
2. Poor power factor at Bruce HWP B TS to be managed by Local Planning between Hydro One transmission and the transmission connected customer.
3. Mitigation of poor delivery point performance to several 115 kV connected customers to be managed according to Hydro One's OEB-approved process between Hydro One transmission, Hydro One distribution, Goderich Hydro and transmission connected customers.
4. Thermal overload on circuit L7S to be managed by Local Planning between Hydro One transmission and the Region's study team.

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1 INTRODUCTION

This Needs Assessment report provides a description of the analysis to identify needs that may be emerging in the Greater Bruce-Huron Region (the Region) over the next ten years. The development of the Needs Assessment report is in accordance with the regional planning process as set out in the Ontario Energy Board's (OEB) Transmission System Code (TSC) and Distribution System Code (DSC) requirements and the Planning Process Working Group (PPWG) Report to the OEB.

The purpose of this Needs Assessment report is to: consider the information from planning activities already underway; undertake an assessment of the Greater Bruce-Huron Region to identify near term and/or emerging needs in the area; and determine if these needs require a “localized” wires only solution(s) in the near-term and/or a coordinated regional planning assessment. Where a local wires only solution is necessary to address the needs, Hydro One, as transmitter, with LDCs or other connecting customer(s) will further undertake planning assessments to develop options and recommend solution(s). For needs that require further regional planning and coordination, the Independent Electricity System Operator (the IESO) will initiate the Scoping Assessment process to determine whether an IESO-led Integrated Regional Resource Planning (IRRP) process, or the transmitter-led Regional Infrastructure Plan (RIP) process (wires solution), or both are required.

This report was prepared by Hydro One (Lead Transmitter) with input from the Greater Bruce-Huron Region Needs Assessment study team listed in Table 1. The report captures the results of the assessment based on information provided by LDCs and the IESO.

Table 1: Study Team Participants for Greater Bruce-Huron Region

No.	Company
1	Hydro One Networks Inc. (Lead Transmitter)
2	Entegrus
3	Erie Thames Power
4	Festival Hydro Inc.
5	Goderich Hydro - West Coast Huron Energy Inc.
6	Hydro One Networks Inc. (Distribution)
7	Independent Electricity System Operator
8	Wellington North Power Inc.
9	Westario Power Inc.

2 TRIGGER OF NEEDS SCREEN

The Needs Assessment for the Greater Bruce-Huron Region was triggered in response to the Ontario Energy Board's (OEB) Regional Infrastructure Planning process approved in August 2013. To prioritize and manage the regional planning process, Ontario's 21 regions were assigned to one of three groups, where Group 1 Regions are being reviewed first. The Region falls into Group 3. The Needs Assessment for this Region was triggered on February 29, 2016 and was completed on April 28, 2016.

3 SCOPE OF NEEDS ASSESSMENT

This Needs Assessment covers the Greater Bruce-Huron Region over an assessment period of 2016 to 2025. The scope of the Needs Assessment includes a review of transmission system connection facility capability which covers transformer station capacity, transmission circuit thermal capacity, and voltage performance. System reliability, operational issues such as load restoration, and asset replacement plans were also briefly reviewed as part of this Needs Assessment.

3.1 Greater Bruce-Huron Region Description and Connection Configuration

The Greater Bruce-Huron Region includes the counties of Bruce, Huron and Perth, as well as portions of Grey, Wellington, Waterloo, Oxford and Middlesex counties. The boundary of the Greater Bruce-Huron Region is shown in Figure 1.



Figure 1: Greater Bruce-Huron Region Map

Electricity supply for the Region is provided through a network of 230 kV and 115 kV transmission lines supplied mainly by generation from the Bruce Nuclear Generating Station and local renewable generation facilities in the Region. The bulk of the electrical supply is transmitted through 230 kV circuits (B4V, B5V, B22D, B23D, B27S and B28S) radiating out from Bruce A TS. These circuits connect the Region to the adjacent South Georgian Bay/Muskoka Region and the adjacent Kitchener-Waterloo-Cambridge-Guelph (KWCG) Region.

Listed in Table 2 and shown in Figure 2, are the transmission and transmission connected assets in the Greater Bruce-Huron Region.

Table 2: Hydro One and Customer Assets Bounded by the Greater Bruce-Huron Region

115 kV Circuits	230 kV Circuits	Hydro One Transformer Stations	Customer Transformer Stations
61M18, D8S, D10H, L7S, S1H	B4V, B5V, B22D, B23D, B20P, B24P, B27S, B28S, B81HW, B82HW	Bruce HWP B TS, Centralia TS, Douglas Point TS, Goderich TS, Hanover TS, Owen Sound TS, Palmerston TS, Seaforth TS, St. Marys TS, Stratford TS, Wingham TS	Constance DS, Festival MTS, Grand Bend East DS, Customer CTS #1, Customer CTS #2, Customer CTS #3, Customer CTS #4

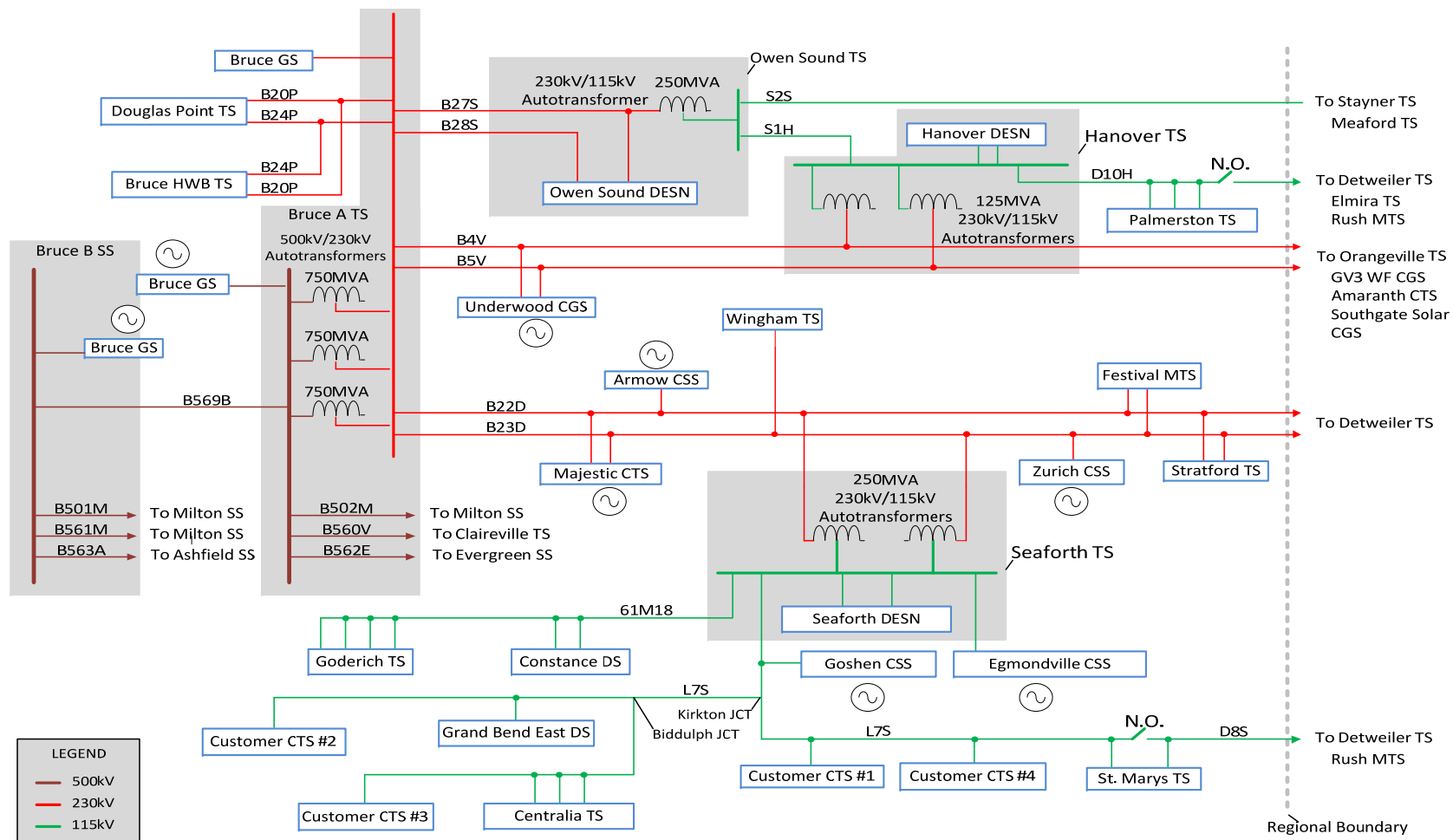


Figure 2: Single Line Diagram – Greater Bruce-Huron Region

4 INPUTS AND DATA

In order to conduct this Needs Assessment, study team participants provided the following information to Hydro One:

- IESO provided:
 - i. Historical regional coincident peak load and station non-coincident peak load
 - ii. List of existing reliability and operational issues
 - iii. Conservation and Demand Management (CDM) and Distributed Generation (DG) data
 - iv. Historical power factor data, MW and MVar for each station in the Region
- LDCs provided historical summer and winter net load (2013-2015) as well as summer and winter gross load forecast (2016-2025)
- Hydro One (Transmission) provided transformer, station and circuit ratings
- Hydro One (Transmission) provided existing reliability and operation issues
- Any relevant planning information, including planned transmission and distribution investments are provided by Hydro One (Transmission) and LDCs

4.1 Load Forecast

As per the data provided by the study team, the winter *gross* coincident load in the Region is expected to grow at an average rate of approximately 1.1% annually from 2016-2025 and the summer *gross* coincident load in the Region is expected to grow at an average rate of approximately 1.0% from 2016-2025.

As per the data provided by the study team, the winter *net* coincident load in the Region is expected to grow at an average rate of approximately 0.5% annually from 2016-2025 and the summer *net* coincident load in the Region is expected to grow at an average rate of approximately 0.3% from 2016-2025.

Based on historical load and on the load forecast, the Regions' winter coincident peak load is larger than its summer coincident peak load. As well, the majority of stations within the Region are winter peaking. The load forecasts utilized for this Needs Assessment are found in Appendix A: Load Forecasts.

5 NEEDS ASSESSMENT METHODOLOGY

The following methodology and assumptions are made in this Needs Assessment:

1. The Region contains some stations that are summer peaking and others that are winter peaking. Equipment ratings are normally lower in the summer than winter due to ambient temperature. Based on these factors this assessment is conducted for both summer and winter peak load.
2. Forecast loads are provided by the Region's LDCs using historical 2015 summer and historical 2014/2015 winter peak loads as reference points.
3. Forecast loads are provided by industrial customers in the Region. Where data was not provided, the load is assumed to be consistent with historical loads.
4. The historical peak loads are adjusted for extreme weather conditions according to Hydro One methodology.
5. The LDC's load forecast is translated into load growth rates and is applied onto the historical, extreme weather adjusted, reference points.
6. Accounting for (2), (3), (4), (5) above, a gross load forecast and a net load forecast are developed. The gross load forecast is used to develop a worst case scenario to identify needs. Where there are issues, the net forecast, which accounts for CDM and DG, is analyzed to determine if the needs can be deferred.
 - a. A gross and net non-coincident peak load forecast was used to perform the analysis for sections 6.1.4 and 6.2.3
 - b. A gross and net regional-coincident peak load forecast was used to perform the analysis for sections 6.1.1 to 6.1.3 and 6.2.1 and 6.2.2 and 6.2.4
7. Review impact of any on-going and planned development projects in the Region during the study period.
8. Review and assess impact of any critical/major elements planned/identified to be replaced at the end of their useful life such as transformers, cables, and stations.
9. Station capacity adequacy is assessed by comparing the non-coincident peak load with the station's normal planning supply capacity by assuming a 90% lagging power factor for stations without low-voltage capacitor banks or the historical low voltage power factor, whichever is more conservative. Normal planning supply capacity for transformer stations in this Region is determined by the summer and winter 10-Day Limited Time Rating (LTR), as appropriate.
10. Transmission adequacy assessment is primarily based on the following criteria:
 - Regional load is set to the forecasted regional-coincident peak load
 - With all elements in service, the system is to be capable of supplying forecast demand with equipment loading within continuous ratings and voltages within normal range.

- With one element out of service, the system is to be capable of supplying forecast demand with circuit loading within their long-term emergency (LTE) ratings and transformers within their 10-Day LTR.
- All voltages must be within pre and post contingency ranges as per the Ontario Resource and Transmission Assessment Criteria (ORTAC).
- The system to meet load security criteria as per the ORTAC, specifically, with one element out of service, no more than 150 MW of load is lost by configuration. With two elements out of service, no more than 600 MW of load is lost by configuration.
- The system is capable of meeting the load restoration timeframes as per the ORTAC.

6 RESULTS

This section summarizes the results of the Needs Assessment in the Greater Bruce-Huron Region. The results are based on all 8 Bruce nuclear generating units in-service and no local/renewable generating units in-service in order to verify whether the transmission system has adequate capacity to supply the forecasted regional load.

6.1 Transmission System Capacity Needs

6.1.1 230 kV and 115 kV Autotransformers

The 230/115 kV autotransformers (Seaforth TS, Hanover TS, Detweiler TS, Owen Sound TS) supplying the Region are adequate over the study period for the loss of a single 230/115 kV autotransformer in the Region.

6.1.2 230 kV Transmission Lines

The 230 kV lines supplying the Region are double circuit. The 230 kV circuits are adequate over the study period for the loss of a single 230 kV circuit in the Region.

6.1.3 115 kV Transmission Lines

The 115 kV lines supplying the Region are radial single circuit lines. These 115 kV circuits have adequate capacity over the study period.

115 kV circuit L7S that runs between Seaforth TS and St. Mary's TS is connected to 115 kV circuit D8S that runs between St. Marys TS and Detweiler TS, through the St. Marys TS low voltage bus-tie breaker. For the loss of D8S, L7S will exceed its short-term emergency (STE) and LTE ratings in the near term (summer 2019), under summer *gross*

peak load conditions. Under summer *net* peak load conditions, the flow on L7S decreases to ~97% of its emergency ratings at the end of the study period (summer 2025).

The sections of circuit explicitly over their ratings are: Seaforth Jct. x Goshen Jct., and Goshen Jct. x Kirkton Jct. The emergency ratings of these sections are limited by substandard clearances due to ground topology and a rural distribution line. Due to the limited recorded effectiveness of CDM uptake in this Region, this thermal overload Need will require further study and will therefore be managed by Local Planning with the Region's study team.

6.1.4 230 kV and 115 kV Connection Facilities

A station capacity assessment was performed over the study period for the 230 kV and 115 kV transformer stations in the Region using the winter and summer station non-coincident peak load forecasts. All stations in the Region have adequate supply capacity for the study period (2016-2025).

6.2 System Reliability, Operation and Restoration Review

6.2.1 Load Security

Based on the gross regional-coincident peak load forecast, with all transmission facilities in-service and coincident with an outage of the largest local generation units, all facilities are within applicable ratings. The largest local generation unit is a 230 kV-connected Bruce nuclear unit on the 230 kV system while on the 115 kV system Goshen wind farm is assumed out of service.

Based on the gross regional-coincident load forecast, the loss of one element will not result in load interruption greater than 150 MW by configuration, by planned load curtailment or by load rejection. In addition, under these conditions, all facilities are within their applicable ratings.

Based on the gross regional-coincident load forecast, the loss of two elements will not results in load interruption greater than 600 MW by configuration, by planned load curtailment or by load rejection. In addition, under these conditions, all facilities are within their applicable ratings.

Therefore, load security criteria for the Region are met.

6.2.2 Load Restoration

Based on the gross regional-coincident peak load forecasts, with the use of existing transmission infrastructure, all load can be restored within approximately 8 hours depending on the severity of the contingency, the prevailing system conditions and the relative distance from the nearest field maintenance centre. Existing transmission infrastructure includes switches that can be operated from the Ontario Grid Control Centre (OGCC), Mid-Span Openers (MSOs) and other isolating devices that require a bucket truck and line crew to open and close.

The largest loss of load in the Region is 325 MW in winter 2024/2025 for the loss of the double circuit line B22D/B23D. By use of existing 61B22D-21 and 61B23D-26 switches at Seaforth TS, the OGCC can quickly resupply, within 30 minutes, approximately 218 MW from Bruce A TS or approximately 268 MW from Detwiler TS. The remaining load can be resupplied in 4-8 hours by opening existing bolted openers along the circuits.

Therefore, load restoration criteria for the Region are met.

6.2.3 Power Factor at Connection Facilities

Based on the analysis of historical power factors at connection facilities under peak load conditions, the power factor at Wingham TS does not meet Market Rule requirements. Based on May 2014 to May 2015 historical data the power factor at Wingham TS does not meet Market Rule requirement of 0.9 lead-lag power factor at the defined meter point at least 60% of the time. This is a Need that will be managed by Local Planning between the transmitter and the affected LDCs.

Based on the analysis of historical power factors at connection facilities under peak load conditions, the power factor at Bruce HWP B TS does not meet Market Rule requirements. Based on January 2014 to December 2015 historical data the power factor at Bruce HWP B TS does not meet Market Rule requirement of 0.9 lead-lag power factor at the defined meter point approximately 80% of the time. This is a Need that will be managed by Local Planning between the transmitter and the affected customer.

6.2.4 Voltage Performance

Under winter 2020/2021 gross regional-coincident peak load conditions, post-contingency voltage at the Wingham TS 44 kV bus is below 6% of nominal voltage and may result in poor end-of-feeder voltages. Under winter *net* regional-coincident peak load conditions, the need is deferred by two years to winter 2022/2023. This is a Need that requires mitigation via Local Planning between the transmitter and the affected LDCs.

6.2.5 Customer Delivery Point Performance

Based on a review of Hydro One's historical delivery point performance statistics, several customer delivery points in the Region are below their historical measures. The delivery points are those fed from the Region's 115 kV system. These statistics are consistent with those provided by IESO. Mitigation measures that align with Hydro One's OEB approved process for addressing poor performance will be discussed between the transmitter and the affected LDCs and transmission customers.

6.2.6 Bulk Power System Performance in the Region

To bridge regional system planning with bulk system planning, a select number of bulk system planning contingencies within the Region are undertaken. With respect to the 230 kV circuits that supply regional load, breaker failure contingencies of these circuit's terminal breakers at BES and BPS station are analyzed to determine their impact. Gross regional-coincident peak load for the Greater Bruce-Huron region was used while a net regional-coincident peak load forecast for the KWCG region was used.

The results showed that 230 kV transmission circuit D7V between Detweiler TS and Waterloo North Junction is at its thermal rating at the end of the study period. This result is consistent with KWCG Regional Infrastructure Plan findings.

As recommended in the KWCG RIP, this Needs Assessment also recommends further investigation via bulk system planning study.

6.3 Aging Infrastructure and Replacement Plan of Major Equipment

Table 3 lists Hydro One transmission sustainment initiatives that are currently planned for aging and End-Of-Life (EOL) infrastructure.

Table 3: Hydro One Transmission Sustainment Initiatives

Station/Circuit	Description of Work	Planning In-Service Date
Bruce A TS	230 kV breaker replacement	2019
	500 kV breaker replacement	2024
Bruce B SS	500 kV breaker replacement	2020
Goderich TS	Station refurbishment: replace existing 3 transformers (T1/T2/T3) with a typical 50/83 MVA 2 transformer DESN arrangement (T4/T5)	2017
Detweiler TS	Replace AC station service	2017
	Replace T2 and T4 autotransformers	2021
Centralia TS	Station refurbishment: replace existing 3 transformers with a typical 25/42 MVA 2	2018

	transformer DESN arrangement	
Palmerston TS	Station refurbishment: replace existing 3 transformers with a typical 50/83 MVA 2 transformer DESN arrangement	2018
Wingham TS	Station refurbishment	2022
Seaforth TS	Station refurbishment: to include autotransformers and DESN	2023
Hanover TS	Station refurbishment: to include DESN	2023
Stratford TS	Station refurbishment	2023
Circuit L7S	Replacement of 4 wood poles	2016
	Insulator replacements	As required
Circuit S1H	Replacement of shield wire	2016
	Replacement of 9 wood poles	2017
Circuits B4V & B5V	Insulator and U-bolt replacement	As required
Circuits B22D & B23D	Insulator replacements	As required
Circuits B27S & B28S	Insulator replacements	As required
Circuits B20P & B24P	Insulator replacements	As required

The replacement and/or refurbishment of equipment may improve the overall reliability performance at customer delivery points. Further investigation is required to verify.

6.4 Planned Transmission and Distribution Investments

Listed in Table 4 are planned transmission and distribution investments in the Region. Note that other than the currently planned refurbishment work in table 3, Hydro One transmission does not have additional planned investments within the Region other than connecting generation upon request.

Table 4: Planned Local Distribution Company Investments

LDC	Investment Description	Planning In-Service Date
Wellington North Power	Transfer ~50% of LDC's Mount Forest load fed from Hanover TS to Palmerston TS in 2016. A feeder extension (M2) from Palmerston TS will be used for this load transfer. This transfer has been incorporated into the Region's station load forecast.	2016

7 RECOMMENDATIONS

Based on the findings of the Needs Assessment, the study team's recommendations are as follows:

1. To mitigate poor power factor and to prevent against voltage deficiency at Wingham TS, Local Planning between Hydro One transmission and Hydro One distribution (this may include additional LDC's embedded within Hydro One distribution fed out of Wingham TS) is recommended.
2. To mitigate poor power factor at Bruce HWP B TS, Local Planning between Hydro One transmission and the transmission connected customer is recommended.
3. To mitigate poor delivery point performance to several 115 kV connected customers, planning in accordance with Hydro One's OEB-approved process between Hydro One transmission, Hydro One distribution, Goderich Hydro and transmission connected customers is recommended.
4. To prevent against thermal overload on circuit L7S, Local Planning between Hydro One transmission and the Region's study team is recommended.

8 REFERENCES

- i) [Planning Process Working Group \(PPWG\) Report to the Board: The Process for Regional Infrastructure Planning in Ontario – May 17, 2013](#)
- ii) [IESO Ontario Resource and Transmission Assessment Criteria \(ORTAC\) – Issue 5.0](#)

9 ACRONYMS

BES	Bulk Electric System
BPS	Bulk Power System
CDM	Conservation and Demand Management
CIA	Customer Impact Assessment
CGS	Customer Generating Station
CTS	Customer Transformer Station
DESN	Dual Element Spot Network
DG	Distributed Generation
DSC	Distribution System Code
GS	Generating Station
IESO	Independent Electricity System Operator
IRRP	Integrated Regional Resource Planning
kV	Kilovolt
LDC	Local Distribution Company
LTE	Long Term Emergency
LTR	Limited Time Rating
LV	Low-voltage
MW	Megawatt
MVA	Mega Volt-Ampere
NERC	North American Electric Reliability Corporation
NA	Needs Assessment
OEB	Ontario Energy Board
ORTAC	Ontario Resource and Transmission Assessment Criteria
PF	Power Factor
PPWG	Planning Process Working Group
RIP	Regional Infrastructure Planning
SIA	System Impact Assessment
SS	Switching Station
TS	Transformer Station
TSC	Transmission System Code
ULTC	Under Load Tap Changer

APPENDIX A: LOAD FORECASTS

Table A1: Gross – Winter Regional-Coincident Peak Load Forecast

Station	Historical (MW)	Forecast (MW)									
	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25
Centralia TS	32.42	32.87	33.40	33.77	34.25	34.87	35.48	35.93	36.36	36.77	37.19
Constance DS	17.58	17.68	17.76	17.79	17.87	18.01	18.16	18.26	18.35	18.46	18.57
Douglas Point TS	70.95	71.97	72.93	73.75	74.76	75.95	77.17	78.29	79.41	80.58	81.80
Customer CTS #1	0.89*	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Festival MTS #1	19.26	19.41	19.55	19.70	19.85	20.00	20.15	20.30	20.45	20.60	20.76
Goderich TS	36.21	36.35	36.50	36.59	36.73	36.92	37.11	37.25	37.37	37.49	37.61
Grand Bend East DS	14.11	14.22	14.36	14.43	14.55	14.72	14.89	15.00	15.09	15.19	15.28
Hanover TS	101.59	102.37	103.16	103.93	104.95	105.99	107.05	107.73	108.39	109.06	109.72
Customer CTS #2	4.27**	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
Customer CTS #3	1.93**	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Owen Sound TS	133.69	135.53	137.73	139.21	141.20	143.81	146.38	148.20	149.90	151.56	153.19
Palmerston TS	60.95	61.92	62.92	63.88	65.12	66.22	67.44	68.42	69.41	70.41	71.40
Seaforth TS	33.27	33.44	33.65	33.78	33.97	34.22	34.47	34.64	34.80	34.95	35.10
Customer CTS #4	9.37	9.49	10.07	10.07	10.64	10.64	10.64	10.64	10.64	10.64	10.64
St. Marys TS	23.48	23.74	25.04	25.17	25.31	25.50	25.69	25.84	25.98	26.12	26.25
Stratford TS	79.16	79.78	80.45	81.03	81.67	82.41	83.14	83.76	84.37	84.98	85.59
Wingham TS	48.21	48.99	49.80	50.44	51.23	52.24	53.24	54.07	54.89	55.74	56.62
Bruce HWB TS	10.95	10.96	11.10	11.10	11.10	11.10	11.10	11.10	11.10	11.10	11.10

* Winter 2013/14

** Winter 2012/13

Table A2: Gross – Summer Regional-Coincident Peak Load Forecast

Station	Historical (MW)	Forecast (MW)									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Centralia TS	32.00	32.42	32.73	33.15	33.78	34.40	34.83	35.24	35.65	36.05	36.45
Constance DS	15.47	15.56	15.57	15.63	15.76	15.90	15.98	16.07	16.16	16.26	16.36
Douglas Point TS	45.48	45.81	45.81	46.11	46.56	47.04	47.41	47.78	48.16	48.51	48.90
Customer CTS #1	1.29*	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Festival MTS #1	24.84	25.03	25.22	25.41	25.60	25.79	25.98	26.18	26.37	26.57	26.77
Goderich TS	38.95	39.08	39.15	39.27	39.48	39.68	39.81	39.93	40.06	40.18	40.31
Grand Bend East DS	16.32	16.44	16.50	16.62	16.84	17.05	17.17	17.29	17.39	17.50	17.61
Hanover TS	76.22	76.71	76.94	77.62	78.60	79.25	79.71	80.12	80.53	80.93	81.32
Customer CTS #2	5.58	5.58	5.58	5.58	5.58	5.58	5.58	5.58	5.58	5.58	5.58
Customer CTS #3	4.17**	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20
Owen Sound TS	96.32	97.58	98.48	99.75	101.70	103.59	104.89	106.11	107.31	108.48	109.63
Palmerston TS	52.00	53.07	53.79	54.90	56.36	57.68	58.81	59.97	61.19	62.43	63.75
Seaforth TS	30.53	30.68	30.77	30.91	31.14	31.35	31.50	31.63	31.14	31.90	32.03
Customer CTS #4	14.42	14.62	15.54	15.54	16.47	16.47	16.47	16.47	16.47	16.47	16.47
St. Marys TS	25.16	25.31	25.42	25.57	25.75	25.94	26.09	26.24	26.38	26.52	26.66
Stratford TS	77.16	77.76	78.26	78.86	79.62	80.38	80.98	81.57	82.16	82.74	83.32
Wingham TS	37.69	37.99	38.11	38.36	38.87	39.37	39.67	39.97	40.26	40.54	40.83
Bruce HWB TS	5.05	5.14	5.24	5.34	5.44	5.54	5.64	5.74	5.84	5.93	6.03

* Summer 2014

** Summer 2013

Table A3: Gross – Winter Non-Coincident Peak Load Forecast

Station	Historical (MW)	Forecast (MW)									
	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25
Centralia TS	33.69	34.15	34.70	35.08	35.59	36.23	36.87	37.33	37.77	38.21	38.63
Constance DS	18.63	19.42	19.51	19.54	19.63	19.79	19.95	20.06	20.17	20.28	20.40
Douglas Point TS	70.95	71.97	72.93	73.75	74.76	75.95	77.17	78.29	79.41	80.58	81.80
Customer CTS #1	3.79	3.79	3.79	3.79	3.79	3.79	3.79	3.79	3.79	3.79	3.79
Festival MTS #1	23.79	25.47	25.66	25.85	26.05	26.24	26.44	26.64	26.84	27.04	27.24
Goderich TS	40.95	41.61	41.78	41.88	42.04	42.26	42.48	42.63	42.77	42.91	43.05
Grand Bend East DS	14.63	14.75	14.89	14.97	15.09	15.27	15.45	15.56	15.66	15.75	15.85
Hanover TS	102.64	96.65*	97.40	98.12	99.09	100.07	101.06	101.71	102.33	102.97	103.58
Customer CTS #2	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90
Customer CTS #3	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63
Owen Sound TS	133.69	135.53	137.73	139.21	141.20	143.81	146.38	148.20	149.90	151.56	153.19
Palmerston TS	61.48	68.03*	69.12	70.18	71.54	72.76	74.10	75.17	76.26	77.36	78.45
Seaforth TS	33.69	34.75	34.96	35.10	35.29	35.55	35.81	35.99	36.15	36.31	36.47
Customer CTS #4	16.84	17.06	18.10	18.10	19.14	19.14	19.14	19.14	19.14	19.14	19.14
St. Marys TS	24.84	25.13	26.50	26.64	26.79	26.99	27.19	27.35	27.50	27.64	27.78
Stratford TS	83.48	84.52	85.23	85.84	86.52	87.30	88.08	88.74	89.39	90.03	90.68
Wingham TS	57.06	57.98	58.94	59.70	60.63	61.82	63.01	63.98	64.96	65.96	67.00
Bruce HWB TS	11.05	11.07	11.20	11.20	11.20	11.20	11.20	11.20	11.20	11.20	11.20

*Load Transfer from Hanover TS to Palmerston TS

Table A4: Gross – Summer Non-Coincident Peak Load Forecast

Station	Historical (MW)	Forecast (MW)									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Centralia TS	33.79	34.23	34.56	35.01	35.67	36.32	36.78	37.22	37.64	38.07	38.49
Constance DS	17.69	17.78	17.79	17.86	18.01	18.17	18.27	18.36	18.47	18.58	18.70
Douglas Point TS	46.11	46.44	46.45	46.75	47.21	47.69	48.07	48.45	48.83	49.19	49.58
Customer CTS #1	2.53	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Festival MTS #1	27.90	28.11	28.32	28.53	28.74	28.96	29.18	29.39	29.61	29.84	30.06
Goderich TS	39.27	40.71	40.78	40.91	41.12	41.33	41.46	41.59	41.72	41.85	41.98
Grand Bend East DS	18.74	18.88	18.95	19.09	19.34	19.58	19.72	19.85	19.98	20.10	20.22
Hanover TS	76.22	75.61*	75.84	76.50	77.47	78.12	78.57	78.97	79.37	79.77	80.15
Customer CTS #2	5.79	5.79	5.79	5.79	5.79	5.79	5.79	5.79	5.79	5.79	5.79
Customer CTS #3	4.53	4.53	4.53	4.53	4.53	4.53	4.53	4.53	4.53	4.53	4.53
Owen Sound TS	100.01	101.31	102.25	103.57	105.59	107.55	108.90	110.17	111.41	112.63	113.82
Palmerston TS	52.32	54.71*	55.45	56.60	58.10	59.46	60.63	61.82	63.07	64.36	65.72
Seaforth TS	30.53	31.00	31.09	31.24	31.46	31.68	31.83	31.96	31.47	32.24	32.37
Customer CTS #4	16.00	16.22	17.24	17.24	18.27	18.27	18.27	18.27	18.27	18.27	18.27
St. Marys TS	25.90	26.05	26.17	26.31	26.51	26.70	26.86	27.01	27.16	27.30	27.44
Stratford TS	86.43	88.42	88.99	89.68	90.54	91.40	92.09	92.76	93.43	94.09	94.75
Wingham TS	50.74	54.05	54.21	54.58	55.29	56.00	56.43	56.86	57.27	57.67	58.08
Bruce HWB TS	6.42	6.54	6.66	6.79	6.91	7.04	7.16	7.29	7.42	7.54	7.67

*Load Transfer from Hanover TS to Palmerston TS

Table A5: Net – Winter Regional-Coincident Peak Load Forecast

Station	Historical (MW)	Forecast (MW)									
	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25
Centralia TS	32.42	32.65	32.92	32.96	33.16	33.52	33.90	34.16	34.45	34.69	34.94
Constance DS	17.58	17.57	17.55	17.41	17.35	17.36	17.40	17.41	17.44	17.46	17.50
Douglas Point TS	70.95	71.54	72.09	72.19	72.59	73.20	73.94	74.64	75.45	76.23	77.08
Customer CTS #1	0.89*	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Festival MTS #1	19.26	19.29	19.33	19.29	19.27	19.28	19.31	19.36	19.43	19.49	19.56
Goderich TS	36.21	36.12	36.07	35.81	35.65	35.58	35.55	35.50	35.49	35.45	35.43
Grand Bend East DS	14.11	14.13	14.19	14.13	14.13	14.19	14.27	14.30	14.34	14.37	14.39
Hanover TS	101.59	101.72	101.94	101.69	101.76	102.01	102.42	102.56	102.84	103.02	103.23
Customer CTS #2	4.27**	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
Customer CTS #3	1.93**	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Owen Sound TS	133.69	134.70	136.07	136.18	137.02	138.53	140.18	141.21	142.35	143.29	144.25
Palmerston TS	60.95	61.53	62.17	62.50	63.20	63.80	64.60	65.20	65.92	66.58	67.25
Seaforth TS	33.27	33.24	33.26	33.06	32.98	32.98	33.02	33.02	33.06	33.06	33.07
Customer CTS #4	9.37	9.49	10.07	10.07	10.64	10.64	10.64	10.64	10.64	10.64	10.65
St. Marys TS	23.48	23.59	24.75	24.63	24.57	24.58	24.61	24.63	24.68	24.70	24.73
Stratford TS	79.16	79.30	79.52	79.30	79.29	79.42	79.65	79.86	80.16	80.39	80.64
Wingham TS	48.21	48.70	49.23	49.38	49.75	50.36	51.02	51.55	52.16	52.73	53.35
Bruce HWB TS	10.95	10.96	11.10	11.10	11.10	11.10	11.10	11.10	11.10	11.10	11.10

* Winter 2013/14

** Winter 2012/13

Table A6: Net – Summer Regional-Coincident Peak Load Forecast

Station	Historical (MW)	Forecast (MW)									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Centralia TS	32.00	32.04	31.57	31.62	31.89	32.20	32.42	32.61	32.85	33.05	33.25
Constance DS	15.47	15.45	15.35	15.23	15.20	15.20	15.19	15.18	15.20	15.22	15.24
Douglas Point TS	45.48	45.43	45.11	44.89	44.87	44.93	45.02	45.10	45.26	45.35	45.49
Customer CTS #1	1.29*	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
Festival MTS #1	24.84	24.85	24.86	24.77	24.69	24.66	24.70	24.74	24.82	24.87	24.93
Goderich TS	38.95	38.70	38.50	38.18	37.98	37.84	37.74	37.63	37.59	37.50	37.43
Grand Bend East DS	16.32	16.32	16.27	16.20	16.24	16.31	16.33	16.33	16.37	16.38	16.40
Hanover TS	76.22	75.82	75.51	75.32	75.37	75.34	75.33	75.25	75.32	75.30	75.29
Customer CTS #2	5.58	5.58	5.58	5.58	5.58	5.58	5.58	5.58	5.58	5.58	5.58
Customer CTS #3	4.17**	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20
Owen Sound TS	96.32	96.71	96.49	96.54	97.40	98.36	99.01	99.56	100.27	100.83	101.40
Palmerston TS	52.00	52.48	52.81	53.30	54.15	54.94	55.69	56.45	57.35	58.21	59.16
Seaforth TS	30.53	30.39	30.27	30.06	29.96	29.91	29.87	29.82	29.23	29.79	29.76
Customer CTS #4	14.42	14.62	15.54	15.54	16.47	16.47	16.47	16.47	16.47	16.47	16.47
St. Marys TS	25.16	25.07	25.01	24.87	24.79	24.76	24.75	24.74	24.77	24.77	24.78
Stratford TS	77.16	77.10	77.05	76.77	76.70	76.76	76.87	76.97	77.20	77.33	77.49
Wingham TS	37.69	37.72	37.57	37.40	37.49	37.65	37.71	37.76	37.88	37.94	38.03
Bruce HWB TS	5.05	5.06	5.12	5.12	5.12	5.12	5.12	5.12	5.12	5.12	5.12

* Summer 2014

** Summer 2013

Table A7: Net – Winter Non-Coincident Peak Load Forecast

Station	Historical (MW)	Forecast (MW)									
	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25
Centralia TS	33.69	33.93	34.20	34.24	34.46	34.82	35.23	35.50	35.79	36.05	36.31
Constance DS	18.63	18.62	18.61	18.45	18.39	18.40	18.44	18.45	18.48	18.51	18.55
Douglas Point TS	70.95	71.54	72.09	72.19	72.59	73.20	73.94	74.64	75.45	76.23	77.08
Customer CTS #1	3.79	3.79	3.79	3.79	3.79	3.79	3.79	3.79	3.79	3.79	3.79
Festival MTS #1	23.79	23.83	23.87	23.82	23.80	23.81	23.84	23.90	24.00	24.07	24.16
Goderich TS	40.95	40.85	40.79	40.49	40.32	40.23	40.20	40.15	40.14	40.09	40.06
Grand Bend East DS	14.63	14.66	14.72	14.65	14.65	14.72	14.81	14.84	14.88	14.90	14.93
Hanover TS	102.64	102.77*	102.99	102.75	102.81	103.07	103.48	103.63	103.90	104.09	104.30
Customer CTS #2	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90
Customer CTS #3	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63
Owen Sound TS	133.69	134.70	136.07	136.18	137.02	138.53	140.18	141.21	142.35	143.29	144.25
Palmerston TS	61.48	62.06*	62.70	63.04	63.75	64.36	65.15	65.77	66.49	67.16	67.83
Seaforth TS	33.69	33.66	33.68	33.48	33.39	33.40	33.44	33.44	33.47	33.47	33.49
Customer CTS #4	16.84	17.06	18.10	18.10	19.14	19.14	19.14	19.14	19.14	19.14	19.14
St. Marys TS	24.84	24.97	26.19	26.07	26.01	26.01	26.04	26.07	26.12	26.14	26.17
Stratford TS	83.48	83.62	83.86	83.63	83.62	83.75	84.00	84.21	84.53	84.77	85.04
Wingham TS	57.06	57.64	58.26	58.44	58.87	59.59	60.38	61.01	61.73	62.41	63.14
Bruce HWB TS	11.05	11.07	11.20	11.20	11.20	11.20	11.20	11.20	11.20	11.20	11.20

*Load Transfer from Hanover TS to Palmerston TS

Table A8: Net – Summer Non-Coincident Peak Load Forecast

Station	Historical (MW)	Forecast (MW)									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Centralia TS	33.79	33.84	33.38	33.43	33.72	34.04	34.27	34.47	34.72	34.93	35.15
Constance DS	17.69	17.66	17.54	17.41	17.37	17.38	17.36	17.35	17.38	17.39	17.42
Douglas Point TS	46.11	46.06	45.74	45.52	45.49	45.56	45.65	45.72	45.89	45.98	46.13
Customer CTS #1	2.53	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Festival MTS #1	27.90	27.91	27.92	27.81	27.73	27.69	27.74	27.77	27.87	27.93	28.00
Goderich TS	39.27	39.02	38.81	38.49	38.29	38.15	38.05	37.93	37.89	37.81	37.74
Grand Bend East DS	18.74	18.75	18.68	18.61	18.65	18.73	18.75	18.76	18.80	18.81	18.83
Hanover TS	76.22	75.82*	75.51	75.32	75.37	75.34	75.33	75.25	75.32	75.30	75.29
Customer CTS #2	5.79	5.79	5.79	5.79	5.79	5.79	5.79	5.79	5.79	5.79	5.79
Customer CTS #3	4.53	4.53	4.53	4.53	4.53	4.53	4.53	4.53	4.53	4.53	4.53
Owen Sound TS	100.01	100.41*	100.21	100.26	101.16	102.15	102.82	103.40	104.13	104.72	105.31
Palmerston TS	52.32	52.80	53.13	53.63	54.48	55.27	56.03	56.79	57.70	58.57	59.52
Seaforth TS	30.53	30.39	30.27	30.06	29.96	29.91	29.87	29.82	29.23	29.79	29.76
Customer CTS #4	16.00	16.22	17.24	17.24	18.27	18.27	18.27	18.27	18.27	18.27	18.27
St. Marys TS	25.90	25.81	25.74	25.60	25.52	25.49	25.48	25.47	25.50	25.50	25.50
Stratford TS	86.43	86.36	86.31	86.00	85.92	85.99	86.12	86.22	86.48	86.63	86.81
Wingham TS	50.74	50.79	50.58	50.35	50.48	50.69	50.77	50.84	51.00	51.08	51.20
Bruce HWB TS	6.42	9.83	9.95	9.95	9.95	9.95	9.95	9.95	9.95	9.95	9.95

*Load Transfer from Hanover TS to Palmerston TS

Appendix I:

Wingham TS Power Factor Assessment Report

LOW POWER FACTOR AT WINGHAM TS ASSESSMENT

Date: October 18th, 2016



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Disclaimer

This Local Planning Report was prepared for the purpose of developing wires options and recommending a preferred solution(s) to address the local needs identified in the [Needs Assessment \(NA\) report](#) for the Niagara Region that do not require further coordinated regional planning. The preferred solution(s) that have been identified through this Local Planning Report may be reevaluated based on the findings of further analysis. The load forecast and results reported in this Local Planning Report are based on the information and assumptions provided by study team participants.

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Background

As part of the Ontario Energy Board's (OEB) Regional Planning process, a Needs Assessment was performed for the Greater Bruce / Huron Region. There were four (4) needs identified in the 2016 Needs Assessment for this Region, one of them being the poor power factor and voltage deficiency at Wingham TS.

This assessment addresses the low power factor and voltage deficiency issues at the Wingham TS identified in the Needs Assessment report.

Introduction

Wingham TS is a 230/44kV transformer station supplying Hydro One Distribution and Westario Power loads. The station is supplied via 230kV circuits B22D and B23D and has four (4) 44kV distribution feeders with an approximate loading of 60MW. There is also a significant amount of distributed generation (DG) connected at Wingham TS.

As per IESO Market Rules, customers are required to maintain a power factor of 0.9 or better at the point of connection. The power factor at Wingham TS has fallen below 0.5 on some occasions. A graph of the power factor performance at Wingham TS from June 2015 to June 2016 is shown in Figure 1 of Appendix A.

Findings

Upon further assessment, Hydro One Transmission, Hydro One Distribution and Westario Power determined that the low power factor was directly related to DGs connected on Hydro One's M4 feeder. The generation operates at a fixed power factor and is set to an appropriate value to help maintain the desired feeder voltage. DGs typically impact the load characteristic as seen from the transformer station. The DG will typically displace the loads real power (MW) absorbed from the transmission system while the reactive power (MVar) of the load will typically remain unchanged.

To determine the root cause for low power factor, Hydro One Distribution and Westario Power investigated whether there were any loads that had undergone any facility modifications that could have caused this concern, however this was not the case. It was observed that, prior to the connection of an 18MW wind farm to a Wingham TS feeder, the power factor at the transformer station was consistently above 0.9, however the power factor started oscillating sporadically once the wind farm was placed in service. A graph showing the power factor performance before and after the incorporation of the wind farm is shown in Figure 2 of Appendix A.

To further confirm that it is the wind farm that is causing the poor power factor performance, the Wingham TS load power factor was isolated to determine if it would be acceptable without the effect of the 18MW wind farm. The wind farm's power output (MW and MVar) was added to the Wingham TS load, and, the resulting load power factor was around 0.9. A graph showing the Wingham TS load power factor is shown in Figure 3 of Appendix A.

To ensure that the power factor performance was not negatively impacting the Wingham TS load customers, Hydro One Distribution and Westario Power looked into 1) customers' complaints about power quality (specifically voltage) and service, and 2) summer loading at Distribution Stations to confirm load power factors are acceptable. Neither Hydro One Distribution nor Westario Power received any customer complaints, and load power factors were found to be acceptable.

At this time, the Wingham TS load is well below the station's capacity, and therefore the higher MVA flow (caused by the absorption of VAR by the wind farm) will not result in equipment overload or cause equipment damage. It was also confirmed that both the 230kV and the 44kV bus voltage stayed within criteria during periods of low power factor. A graph of the Wingham TS MVA loading from May 2013 to May 2016 is shown in Figure 4 of Appendix A.

Conclusion

The power factor of loads at Wingham TS is within planning criteria, and the DGs connected at Wingham TS are the cause of the power factor deviating from Market Rules. Since there are no voltage issues at Wingham TS, and there is no lack of reactive power support in the local area, Hydro One Transmission, Hydro One Distribution and Westario Power propose that no action is required at this time and the occasional low power factor observed at Wingham TS is not a need that requires mitigation. Hydro One proposes to discuss, with the IESO, possible changes to the Market Rules that would take into account the effects DGs have on station power factor, and will continue to monitor the situation and act accordingly if the low power factor becomes an issue in the future.

APPENDIX A

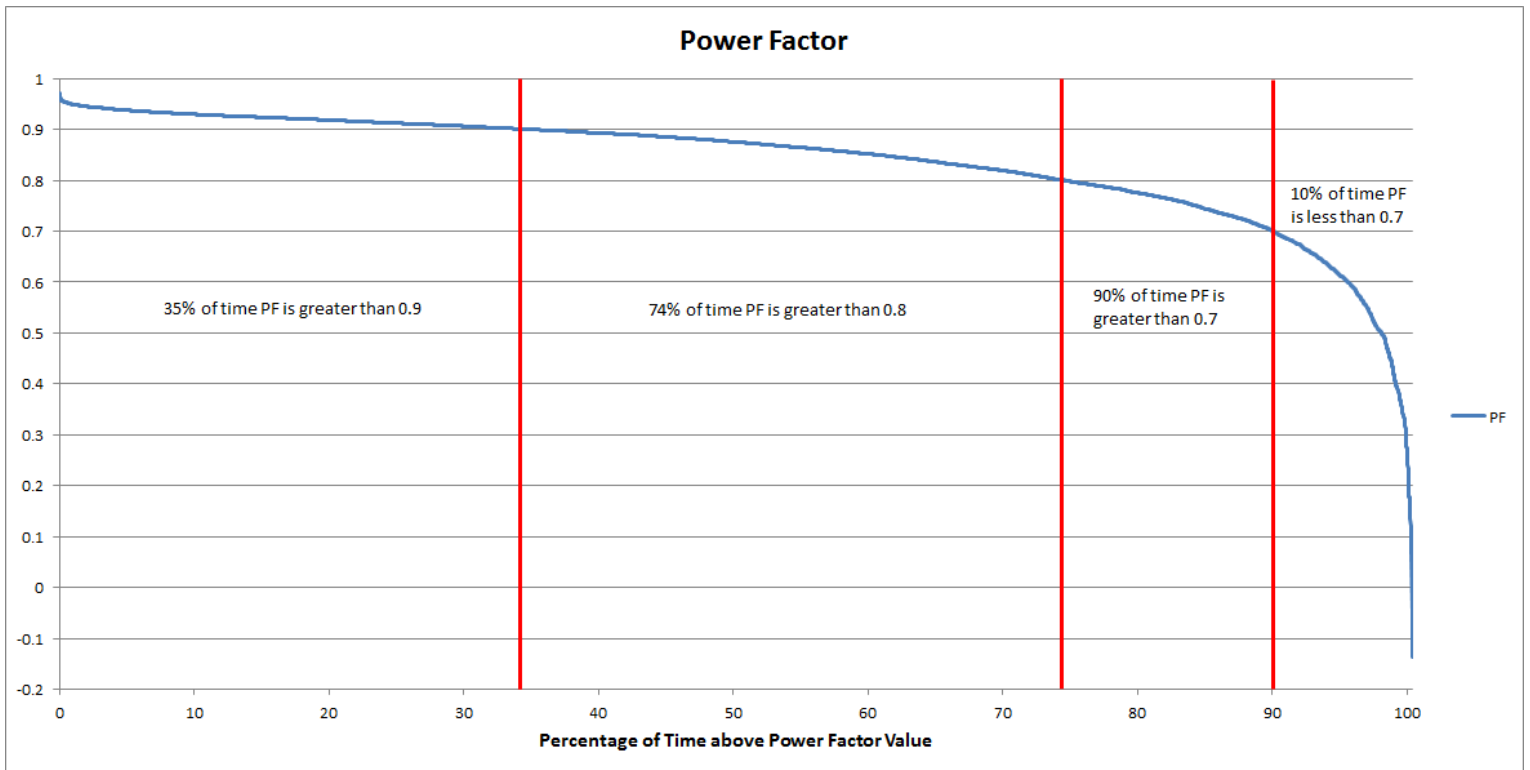


Figure 1: Graph showing the power factor performance of Wingham TS between June 2015 and June 2016

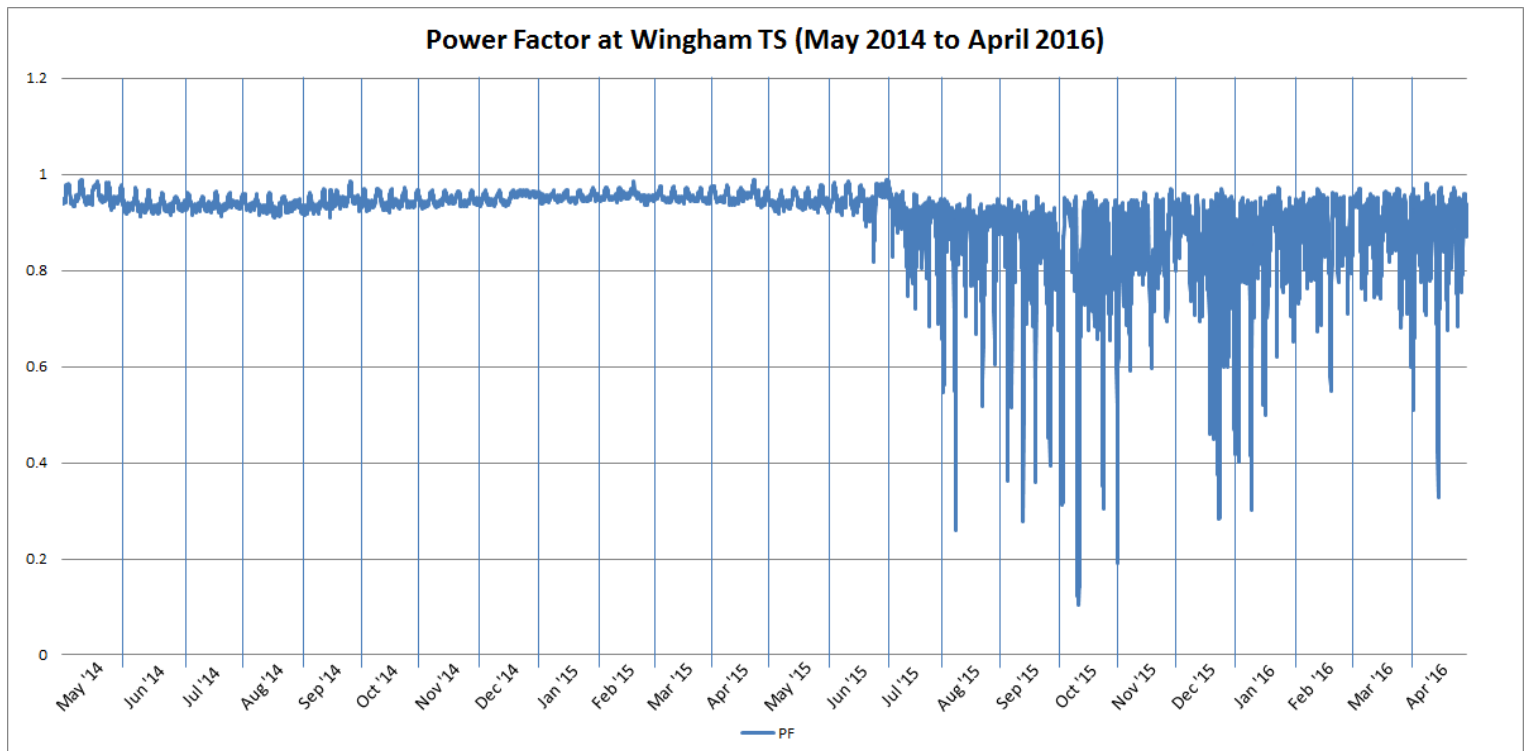


Figure 2: Graph showing Wingham TS power factor before and after wind farm was place in service.

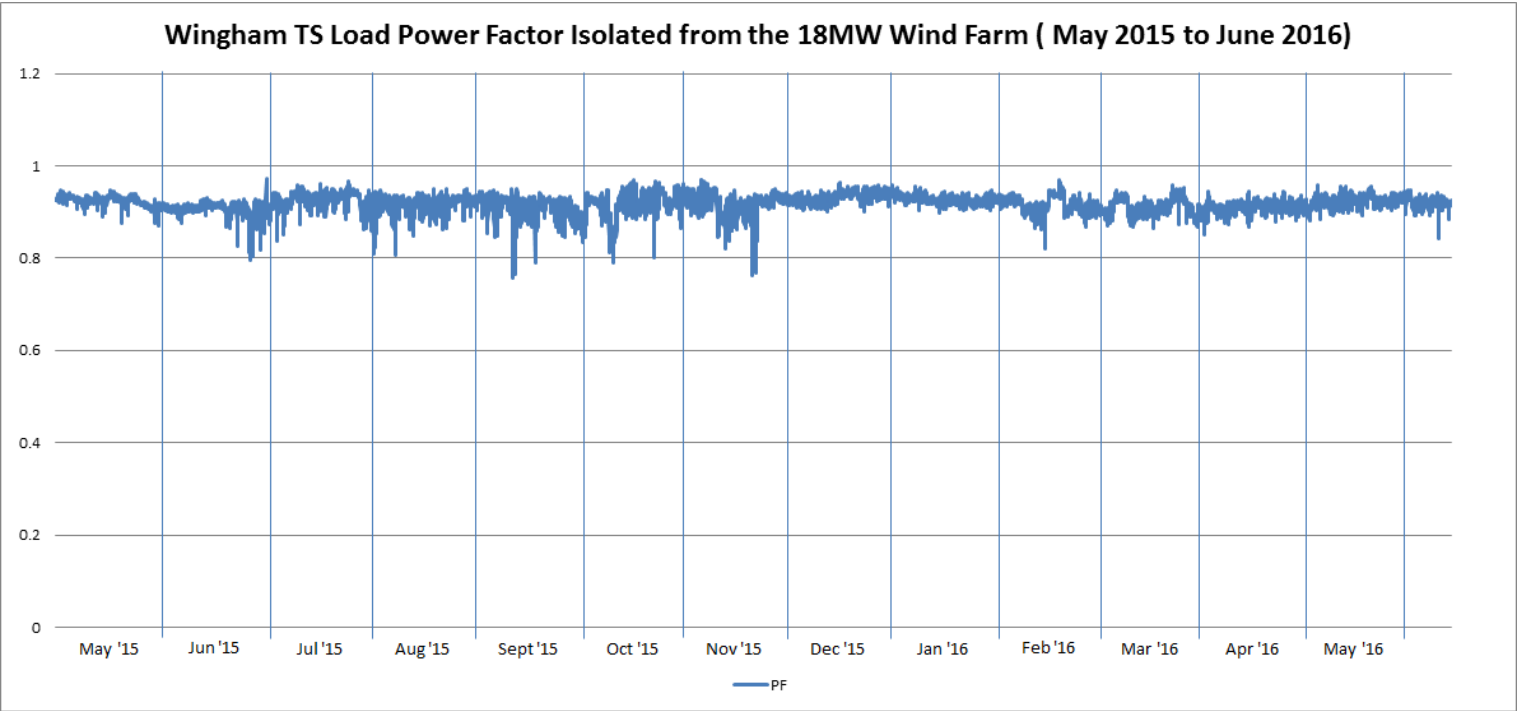


Figure 3: Graph showing Wingham TS load power factor since the connection of wind farm.

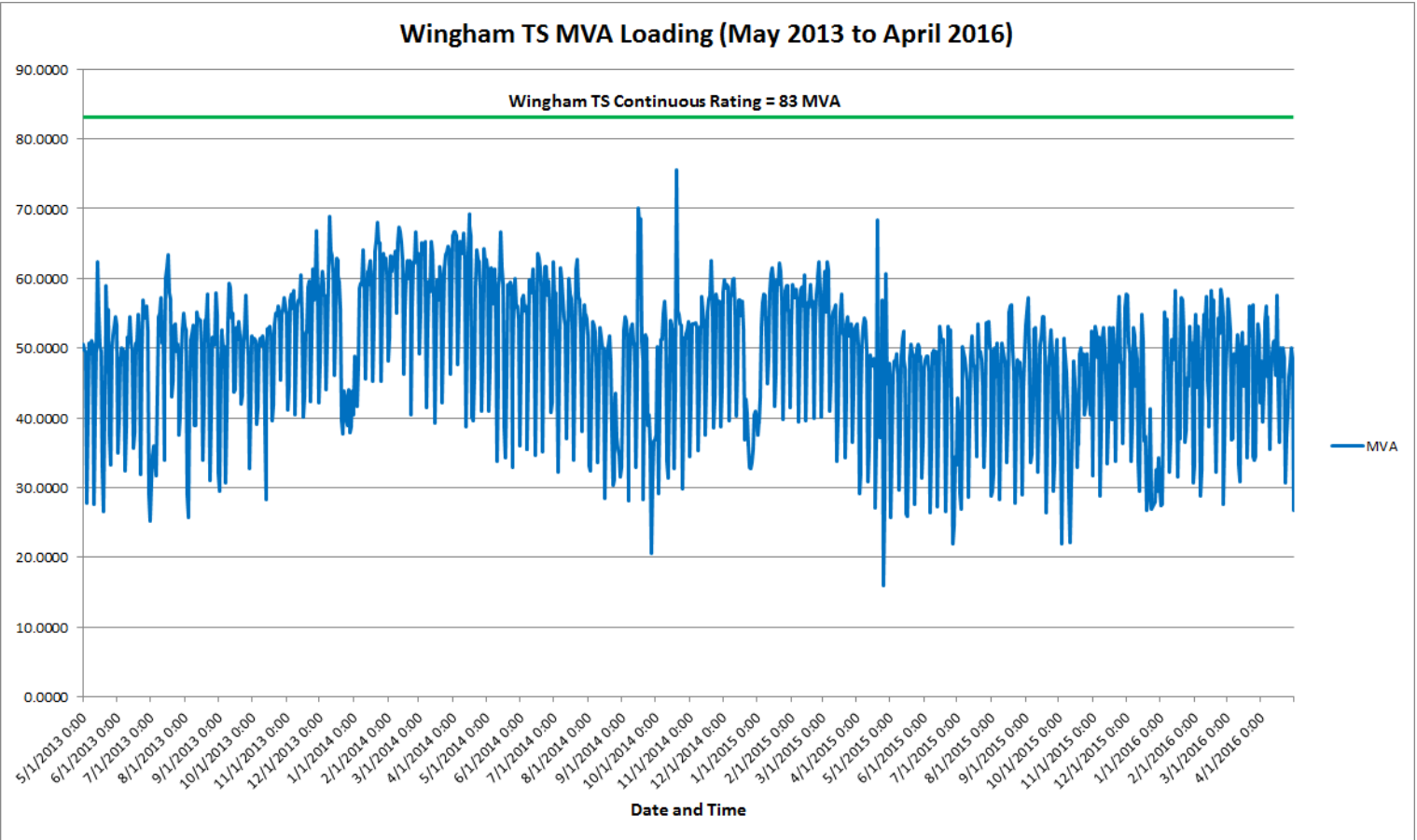


Figure 4: Graph showing MVA loading at Wingham TS over the last 3 years

Appendix J: Westario's MicroFIT Connections

Micro-Fit Summary
5/09/17

Micro-Fit Number	Town	Address	Status	Offer to Connect	Date Offer To Connect Issued	Customer	Size (KW)	Meter Number	Connection Date	Added To Read Schedule	Hydro One Connection	Westario M5	Westario Feeder	Westario Transformer
MR84T9V	Hanover	15 7th St	Connected	Issued	2017	Nicolas Masse & Jessica Sarah Bedard	9.765	n/a	n/a	N	Hanover T.S, T2, M1	3	2	TX 2-0093
2017														
MI27UYN	Hanover	641 12th St	Connected	Completed	2016	Kathie Joanne Tuhkanen	9.765	n/a	30-Mar-17	n	Hanover T.S, T2, M1			
NET	Walkerton	359 Westwood Dr	Not Connected	Issued	2016	N/A Dupuis	5	n/a	n	n	Hanover T.S, T2, M3	2	4	1-111
NET	Lucknow	443 Havelock St	Connected	Completed	2016	Tarah Coates & Bill Gordon	8.48		23-Aug-16	n	Wingham T.S, T1, M5	1		
2016														
MVHY6JJ	Kincardine	937 Saugeen St	Connected	Completed	2015	Robert Ogilvie	10	521567	07-Oct-15	n	Douglas Point T.S., T4, M4	2	2	T05193
MUFVZVJ	Southampton	56 Grosvenor St N	Connected	Completed	2015	Gordon Edward Cooke	10	521513	29-Jul-15	y	Douglas Point T.S, T3, M1	1	2	T12163
MJ6XUDP	Port Elgin	701 Highland St	Connected	Issued	2015	Ross Kirby Millette & Marie Millette	10	521507	11-Sep-15	n	Douglas Point T.S., T4, M8	3	4	T10117
MJTAWW3	Hanover	269 7th Ave	Not Connected	Issued	2015	The Municipal Corporation of the Town of Hanover	10	n/a	n/a		Hanover T.S, T2, M1			
M36YQXU	Hanover	140 7th Ave	Not Connected	Issued	2015	The Corporation of the Town of Hanover	10	n/a	n/a		Hanover T.S, T2, M1	3	1	2-0017
MVVEBCY	Hanover	644 11th St	Connected	Completed	2015	Neil Allan Ward	10	521566	10-Jul-15	y	Hanover T.S, T2, M1	4	2	4-0084
2015														
M6VHZTB	Teeswater	55 Clinton St N	Not Connected	Issued	2014	Wayne Bruce McKague and Wendy Rose McKague	10	n/a	n/a		Wingham T.S, T1, M5	1	2	T13052
MTCTEC4	Elmwood	23 Main St N	Not Connected	Issued	2014	Colleen Elizabeth Leeson	10	n/a	n/a		Pearl Lake DS, Feeder F1			T02007
MJ9HWJW	Hanover	145 6th Ave	Not Connected	Issued	2014	Ross Bolton	10	n/a	n/a	n	Hanover T.S, T2, M1	3	2	2-0104
MW7XU3X	Southampton	93 Island St	Connected	Completed	2014	Paul Sinclair & Susan Sinclair	10	521564	21-Nov-14	y	Douglas Point T.S, T3, M1	2	1	T12048
M77NMZM	Hanover	654 21st Ave A	Not Connected	Issued	2014	Zachary Szabo & Lacey Seidle	6.25	n/a	n/a	n	Hanover T.S, T2, M1	4	3	4-0018
M6NAWQK	Palmerston	545 Grand Trunk St	Not Connected	Issued	2014	Paul Lawrence Storms	8	n/a	n/a	n	Palmerston T.S, T1-A, M4	1	3	T09171
M6R4ZVK	Kincardine	756 Palmateer Dr	Not Connected	Issued	2014	Peter Muschalle	8	n/a	n/a	n	Douglas Point T.S., T4, M4	3	3	T05335
MEMUWKH	Southampton	36 Walnut St	Not Connected	Issued	2014	Peter Matthew Wood	10	n/a	n/a	n	Douglas Point T.S, T3, M1	3	4	T12295
MTM2HN1	Clifford	38 Elora St N	Not Connected	Issued	2014	Leonard Underwood	9.9	n/a	n/a	n	Triston DS #2, Palmerston T.S, T1-A,	1	1	T01064
2014														
	Kincardine	764 Johnston Cres.	Connected	Completed	2013	Nathaniel Michael Joyce	10	521565	28-May-14	y	Douglas Point T.S., T4, M4	3	3	T05329
M6QZ2GV	Walkerton	111 Yonge St N	Connected	Completed	2013	David Kinzel	10	521478	21-May-13	y	Hanover T.S, T2, M3			
MDCX8QE	Hanover	363 12th Ave	Connected	Completed	2013	Neil Ward	10	521545	01-Aug-13	n	Hanover T.S, T2, M1	5	1	1-0047
MZGBF3R	Hanover	484 12th Ave	Connected	Completed	2013	Wayne Sickle	5	521482	26-Sep-13	y	Hanover T.S, T2, M1	1	3	4-0064
MKTTTMM	Mildmay	24 Vincent St (Arena)	Connected	Completed	2013	Municipality of South Bruce	10	524224	07-Oct-13	y	Mildmay DS, Hanover T.S, T2, M2	1	1	T07043
M6DBUGN	Mildmay	12 Absalom St E (Medical)	Connected	Completed	2013	Municipality of South Bruce	10	521483	17-Sep-13	y	Mildmay DS, Hanover T.S, T2, M2	1	1	T07023
M29QFCU	Mildmay	9 Absalom St E (Fire)	Connected	Completed	2013	Municipality of South Bruce	10	524215	03-Oct-13	y	Mildmay DS, Hanover T.S, T2, M2	1	1	T07003
MOHQOPP	Teeswater	22 Clinton St S (Fire Hall)	Connected	Completed	2013	Municipality of South Bruce	10	521481	07-Oct-13	y	Wingham T.S, T1, M5	1	2	T13036
M2A9GNY	Teeswater	19 Marcy St E (Arena)	Connected	Completed	2013	Municipality of South Bruce	10	524223	03-Oct-13	y	Wingham T.S, T1, M5	1	2	T13014
MZDRCPN	Teeswater	25 Gordon St E (Town shed)	Connected	Completed	2013	Municipality of South Bruce	10	521480	03-Oct-13	y	Wingham T.S, T1, M5	1	2	T13018
MC93DD8	Hanover	70 14th Ave	Connected	Completed	2013	Town of Hanover	10	521546	04-Jul-13	n	Hanover T.S, T2, M1	5	2	
M8Q9K4R	Kincardine	1040 James St	Connected	Completed	2013	Scott & Esther Marshall	10	521554	21-Aug-13	y	Douglas Point T.S., T4, M4	2	3	T05154
MIBI2KP	Hanover	Across 628 11th St	Not Connected	Issued	2013	Hanover Missionary Church	10	n/a	n/a	n	Hanover T.S, T2, M1			4-0005
MI33TRB	Port Elgin	515 Elgin St	Not Connected	Issued	2013	James and Clodagh Brown	10	n/a	n/a	n	Douglas Point T.S., T4, M8	1	3	T10108
M6HIUAJ	Clifford	28 Clarke St N	Not Connected	Issued	2013	Donald Alfred William Kirk	10	n/a	n/a	n	Triston DS #2, Palmerston T.S, T1-A,	1	1	T01048
M66RIPA	Hanover	573 11th Ave	Connected	Completed	2013	Jesse Barber	10	521547	25-Jul-13	y	Hanover T.S, T2, M1	1	3	3-0040
NX7CTX7	Kincardine	960 Saugeen St	Connected	Completed	2013	Shelia Burr	5.4	521561	05-Jun-13	y	Douglas Point T.S., T4, M4	2	2	T05193
2013														
M6QZ2GV	Walkerton	111 Yonge St N	Not Connected	Issued	2012	David Kinzel	10	n/a	n/a	n	Hanover T.S, T2, M3			4-076
MWXT91M	Southampton	217 Thompson Lane	Not Connected	Issued	2012	Peter McQuire	6	n/a	n/a	n	Douglas Point T.S, T3, M1	1	2	T12183
MW6AMNP	Wingham	108 Victoria St W	Not Connected	Issued	2012	William & Nicole Glassier	5.4	n/a	n/a	n	Wingham T.S, T1, M5	1	3	T15021
MFA4CEA	Hanover	406 2nd St	Connected	Completed	2012	Elizabeth & Hartwig Wulff	9.89	521477	10-Jan-13	n	Hanover T.S, T2, M1	5	1	1-065
MJHC89Q	Lucknow	323 Havelock St	Connected	Completed	2012	Troy Snobelen	10	523552	17-Aug-12	y	Wingham T.S, T1, M5	1	2	T06047
MNPV8G6	Lucknow	505 Canning St	Connected	Completed	2012	Troy Snobelen	10	523570	09-Oct-12	y	Wingham T.S, T1, M5	1	2	T06048
M6XNBVH	Harriston	140 Robertson St	Connected	Completed	2012	Town of Minto	10	523021	03-Oct-12	y	Palmerston T.S, T1-A, M4	1	1	T04143
MJBMMHY	Harriston	Lot 19 Wilson St	Not Connected	Issued	2012	Harold Fisher	10	n/a	n/a	n	Palmerston T.S, T1-A, M4			
MNNR2C9	Kincardine	665 Kincardine Ave	Connected	Completed	2012	Troy Snobelen	10	521537	25-May-12	y	Douglas Point T.S., T4, M4			T05557
MKCKYBU	Kincardine	944 Queen St	Connected	Completed	2012	Bill Hutton	10	521476	07-Nov-12	n	Douglas Point T.S., T4, M4	2	3	T05192
MDQJ7AJ	Harriston	83 William St W	Connected	Completed	2012	Town of Minto	10	523018	03-Oct-12	y	Palmerston T.S, T1-A, M4	1	1	T04130
MGTGERU	Harriston	122 Robertson St	Connected	Completed	2012	Town of Minto	10	521560	03-Oct-12	y	Palmerston T.S, T1-A, M4	1	1	T04010
MG26CDK	Harriston	87 Elora St S	Connected	Completed	2012	Town of Minto	10	521469	03-Oct-12	y	Palmerston T.S, T1-A, M4	1	2	T04114
MAQD6FM	Palmerston	530 Prospect St	Connected	Completed	2012	Upper Grand District School Board	10	523554	23-Nov-12	y	Palmerston T.S, T1-A, M4	1	3	T09099
MJDE2BD	Palmerston	215 William St	Connected	Completed	2012	Town of Minto	10	521471	01-Oct-12	y	Palmerston T.S, T1-A, M4	1	1	T09053
MM8JFXQ	Palmerston	164 William St	Connected	Completed	2012	Town of Minto	10	521539	08-Jun-12	y	Palmerston T.S, T1-A, M4	1	3	T09092
MDJMJIE7	Palmerston	655 Lowe St	Connected	Completed	2012	Town of Minto	10	521468	01-Oct-12	y	Palmerston T.S, T1-A, M4	1	1	T09151
M7IRQ4Y	Palmerston	605 Mill Lane	Connected	Completed	2012	Town of Minto	10	523553	01-Oct-12	y	Palmerston T.S, T1-A, M4	1	1	T09064
MXVIFVB	Palmerston	845 King St	Connected	Completed	2012	Town of Minto	10	521470	01-Oct-12	y	Palmerston T.S, T1-A, M4	1	3	T09143
MEG8ITE	Southampton	173 High St	Connected	Completed	2012	Paul Schendel	10	521562	01-Aug-12	y	Douglas Point T.S, T3, M1	1	2	T12173
M24YVWF	Hanover	435 17th Ave	Connected	Completed	2011	Gerry Bain	2.8	521558	16-Jun-11	y	Hanover T.S, T2, M1	5	1	1-0029
MMK99QK	Hanover	307 11th Ave	Connected	Completed	2011	St Matthew Lutheran Apartments	10	523020	July 8th, 2011	y	Hanover T.S, T2, M1	5	1	1-0076
MT4VBKA	Hanover	235 17th Ave	Connected	Completed	2011	Trevor, Stephanie Bouchard	5	521553	01-Dec-11	y	Hanover T.S, T2, M1	5	3	1-0090
MTDOW3T7	Wingham	108 Sunset Cres	Connected	Completed	2011	Shawn H McKague	10	521538	17-Apr-12	n	Wingham T.S, T1, M5	2	1	T15174
MBTPOYT	Harriston	16 Wilson St	Connected	Completed	2011	Harold Fisher	10	521554	03-Nov-11	y	Palmerston T.S, T1-A, M4	1	1	T04002
MU8UOHG	Harriston	140 Robertson St	Connected	Completed	2011	Ralph and Betty Tarr	10	521101	26-Apr-11	y	Palmerston T.S, T1-A, M4	1	1	T04143
M374FGJ	Kincardine	427 Penetangore Row	Connected	Completed	2011	Paul Poetz	7.5	521104	27-Jul-11	y	Douglas Point T.S., T4, M4	1	1	T05227
MFFY8WV2	Kincardine	709 Russel St	Connected	Completed	2011	St. Anthon's Public School	10	523019	15-Dec-11	y	Douglas Point T.S., T4, M4	3	4	T05409
M9UJ4MG	Port Elgin	536 Iwings Dr	Connected	Completed	2011	Skyline Energy Inc	10	523550	05-Oct-12	y	Douglas Point T.S., T4, M8	5	2	T10268
MFFX27M	Port Elgin	764 Waterloo St	Connected	Completed	2011	Skyline Energy Inc	10	523551	05-Oct-12	y	Douglas Point T.S., T4, M8	6	2	T10018
M9C37TJ	Port Elgin	773 River St	Not Connected	Issued	2011	Allen Gerrior	10	n/a	n/a	n	Douglas Point T.S., T4, M8	1	4	T10008
M23VIQN	Port Elgin	609 Bricker St	Not Connected	Completed	2011	John Rich	4.1	n/a	n/a	n	Douglas Point T.S., T4, M8			T10444

Micro-Fit Summary
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MXC3DIN	Southampton	21 Chesley St	Not Connected	Issued	2011	Ronald Geard	3.44	n/a	n/a	n	Douglas Point T.S, T3, M1	3	1	T12258
MIM8A4K	Southampton	57 Grey St N	Not Connected	Issued	2011	John Mellor	10	n/a	n/a	n	Douglas Point T.S, T3, M1	1	3	T12218
MYTDBHK	Walkerton	Eastridge Rd	Connected	Completed	2011	Charles Cleland	9.5	521103	19-May-11	y	Hanover T.S, T2, M3	3	1	
M68F9YI	Walkerton	Eastridge Rd	Connected	Completed	2011	Charles Cleland	9.5	521100	19-May-11	y	Hanover T.S, T2, M3	3	1	
M6HTMK7	Walkerton	Eastridge Rd	Connected	Completed	2011	Charles Cleland	9.5	521556	03-Jun-11	y	Hanover T.S, T2, M3	3	1	
MCC89Y7	Walkerton	Eastridge Rd	Connected	Completed	2011	Charles Cleland	9.5	521557	03-Jun-11	y	Hanover T.S, T2, M3	3	1	
MUWVTC6	Walkerton	Eastridge Rd	Connected	Completed	2011	Charles Cleland	9.5	521541	06-Jul-11	y	Hanover T.S, T2, M3	3	1	
MQUBVVF	Walkerton	Eastridge Rd	Connected	Completed	2011	Charles Cleland	9.5	521540	06-Jul-11	y	Hanover T.S, T2, M3	3	1	
M29RB6B	Walkerton	Eastridge Rd	Connected	Completed	2011	Charles Cleland	9.5	521105	02-Sep-11	y	Hanover T.S, T2, M3	3	1	
MP98V89	Walkerton	Eastridge Rd	Connected	Completed	2011	Charles Cleland	9.5	521542	02-Sep-11	y	Hanover T.S, T2, M3	3	1	
MA4IH6N	Walkerton	201 McGivern St	Connected	Completed	2011	Charles Cleland	9.89	521107	05-Jun-12	n	Hanover T.S, T2, M3	1	4	1-001
M7RRP36	Walkerton	102 Kincardine Hwy	Not Connected	Issued	2011	Kelly Devries (Water and Wellness)	9.5	n/a	n/a	n	Hanover T.S, T2, M3	1	4	1-012
MLDVNRC8	Walkerton	19 Durham St E	Connected	Completed	2011	Walkerton on District Community Living	9.9	521555	01-Dec-11	y	Hanover T.S, T2, M3	2	1	4-066
MV8CTDW	Walkerton	29 Ridout St	Not Connected	Issued	2011	David Perdue	10	n/a	n/a	n	Hanover T.S, T2, M3	2	2	1-057
MZZTHJ6	Walkerton	47 Boulton St	Not Connected	Issued	2011	Rick Cameron	10	n/a	n/a	n	Hanover T.S, T2, M3	3	1	4-054
M3M7H9G	Walkerton	501 Napier St	Not Connected	Issued	2011	Ronald Fisk	10	n/a	n/a	n	Hanover T.S, T2, M3	3	3	3-023

2012

Year	Offers to Connect Issued/Completed	Size of Offer	Connections Made	Size (kW)
2011	28	255.13	17	151
2012	20	184	19	190
2013	17	161.4	14	130.3
2014	9	82	2	20
2015	6	60	4	40
2016	3	23	2	18.2
2017	1	9.7	1	9.765
Total	84	775.23	59	559.265

Appendix K: FIT Application Review Process Example

April 16, 2015

Mr. Brad Gilbert
Westario Power Inc.
24 Eastridge Road, R.R. #2
Walkerton, Ontario N0G 2V0

Subject: Hanover 500 kW Hydraulic Generation Project Initial Review

Dear Mr. Gilbert

Further to your recent request, we have performed an initial high level review of a proposed 500 kW induction-type hydraulic generator in the Town of Hanover. The purpose of this review was to determine if there are any obvious impediments to this project and to assess if it is reasonable to proceed to the more detailed connection impact assessment (CIA) phase.

Based on the preliminary information that we have at this point, we believe that this project is potentially feasible from a technical perspective, and see no reason why it should not proceed to the CIA phase. Note that only a detailed CIA by both Westario and Hydro One Distribution will determine if the project can ultimately proceed.

Our rationale for recommending that this project proceed to the CIA phase is as follows:

1. 500 kW is a reasonable generator size for 4 kV systems. Hydro One limits all generation on a 4 kV feeder to a total of 1.45 MW. The CHEK group suggests a limit of between 500-1000 kW depending on the local circumstances.
2. We don't have sufficient historical loading information for the MS-1 station to make a complete assessment, but based on a single snap-shot in Sept 2013, there is a total of about 1.5 MW on the station. Hydro One limits TS station DG capacity to 60% of the station capacity plus the minimum station load. This is not necessarily applicable to DS stations, but it's another "quick look" that passes in this case.
3. 500 kW is about 70A at 4 kV. Hydro One limits to 200A max on any feeder below 13 kV.
4. The generator is to be located very close to the MS-1 station, and therefore voltage disturbances due to the generator connecting or disconnecting from the system will be lower than if they were at the end of the feeder.

Please let me know if you have any questions or concerns in this regard.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'S. Costello', with a long horizontal flourish extending to the right.

Stephen Costello
President
Costello Associates Inc.

2.5.4 CAPITALIZATION OF OVERHEAD

Indirect overhead costs, such as general and administration costs that are not directly attributable to an asset, are not, nor have they ever been capitalized. (as such Appendix 2-D is not applicable in this case)²²

2.5.5 COSTS OF ELIGIBLE INVESTMENTS FOR DISTRIBUTORS

WPI attests that it has not included any costs or included any Investments to Connect Qualifying Generation Facilities in its capital costs or in its Distribution System Plan.

As such, details of any capital contributions made or forecast to be made to a transmitter with respect to a Connection and Cost Recovery Agreement are not applicable in this case.²³

WPI is not considering incremental conservation initiatives in order to defer or avoid future infrastructure projects as part of distribution system planning processes ²⁴ nor is it planning on applying for funding through distribution rates to pursue activities such as energy efficiency programs, demand response programs, energy storage programs etc. ²⁵ Lastly, WPI is not considering a generation facility. ²⁶

2.5.6 NEW POLICY OPTIONS FOR THE FUNDING OF CAPITAL

WPI is not proposing any special or different approach to funding its capital expenditure²⁷

²² MFR - Appendix 2-D complete; identification of burden rates and burden rates prior to changes, if any

²³ MFR - If applicable, details of any capital contributions made or forecast to be made to a transmitter with respect to a Connection and Cost Recovery Agreement. Details to be provided include, initial forecast used to calculate contribution, amount of contribution (if any), true-up dates and potential true-up payments

²⁴ MFR - Description of how incremental conservation initiatives have been considered in order to defer or avoid future infrastructure projects as part of distribution system planning processes

²⁵ MFR - If applying for funding through distribution rates to pursue activities such as energy efficiency programs, demand response programs, energy storage programs etc. the application must include a consideration of the projected affects to the distribution system on a long term basis and the projected expenditures. Distributors should explain the proposed program in the context of the distributors five year Distribution System Plan or explain any changes to its system plans that are pertinent to the program

²⁶ MFR - Generation Facilities - If applicable, proposal to divide the costs of eligible investments between the distributor's ratepayers and all Ontario ratepayers per O.Reg. 330/09:

- Appendices 2-FA through 2-FC identifying all eligible investments for recovery

²⁷ MFR - Distributor may propose ACM capital project coming into service during Price Cap IR (a discrete project documented in DSP). Provide cost and materiality calculations to demonstrate ACM qualification

2.5.7 ADDITION OF ICM ASSETS TO RATE BASE

WPI has never applied for a rate rider to recover an investment through the OEB's Incremental Capital Module.²⁸ And as such, WPI does not need to balances in Account 1508 sub-accounts, reconciliation with proposed rate base amounts; recalculated revenue requirement should be compared with rate rider revenue.²⁹

²⁸ MFR - Distributor with previously approved ICM(s) - schedule of ICM amounts, variances and explanation

²⁹ Balances in Account 1508 sub-accounts, reconciliation with proposed rate base amounts; recalculated revenue requirement should be compared with rate rider revenue

2.5.8 SERVICE QUALITY AND RELIABILITY PERFORMANCE³⁰

WPI records and reports annually the following Service Reliability Indices:

- SAIDI = Total Customer-Hours of Interruptions/Total Customers Served
- SAIFI = Total Customer Interruptions/Total Customers Served
- CAIDI = Total Customer-Hours of Interruptions/Total Customer Interruptions

These indices provide WPI with annual measures of its service performance that are used for internal benchmarking purposes when making comparisons with other distribution companies (e.g. to better understand the rankings that will support the OEB's Incentive Rate Making Mechanism and Performance Based Regulation). They are reported in accordance with Section 7.3.2 of the OEB's Electricity Distribution Rate Handbook.

WPI's ESQR have been improving year over year since 2012. This partly due to new tracking processes that were put in place following an OEB audit. With respect to SQIs, the results have been steady until 2016 when the utility had a higher than normal numbers of scheduled interruptions and outages from its supplier HONI. The utility doesn't expect this trend of higher than normal SAIFI and SAIDI results to continue in future years. Based on its experience, this should be minimal once the new TS is in service at the end of 2017.³¹

WPI is not proposing any benchmarking that is currently in place.³²

³⁰ MFR - 5 historical years of ESQRs, explanation for any under-performance vs standard and actions taken

³¹ MFR - 5 historical years of SAIDI and SAIFI - for all interruptions, all interruptions excluding loss of supply, and all interruptions excluding major events; explanation for any under-performance vs 5 year average and actions taken

³² MFR - Distributors may propose SAIDI and SAIFI benchmarks different than 5 year average; provide rationale

1

Table 28 – OEB App 2-G ESQR Results³³

Indicator	OEB Minimum Standard	2012	2013	2014	2015	2016
Low Voltage Connections	90.0%	100.0%	90.0%	100.0%	93.0%	92.1%
High Voltage Connections	90.0%	N/A	N/A	N/A	N/A	N/A
Appointment Scheduling	65.0%	98.5%	100.0%	98.0%	97.0%	99.7%
Appointments Met	90.0%	98.3%	97.0%	100.0%	100.0%	100.0%
Telephone Accessibility	80.0%	96.0%	75.1%	80.0%	87.0%	82.9%
Rescheduling a Missed Appointment	80.0%	100.0%	100.0%	100.0%	100.0%	N/A
Telephone Call Abandon Rate	10.0%	4.0%	3.6%	9.9%	5.5%	1.7%
Written Response to Enquires	80.0%	100.0%	93.4%	89.5%	85.6%	96.0%
Emergency Urban Response	90.0%	88.0%	91.0%	100.0%	83.3%	57.1%
Emergency Rural Response	100.0%	N/A	N/A	N/A	N/A	N/A
Reconnection Performance Standard	85.0%	90.6%	100.0%	100.0%	100.0%	100.0%
Micro-embedded generation facilities	90.0%	n/a	100.0%	100.0%	100.0%	N/A

2

2013			
Causes of Interruptions			
Code	Description	Total Customer Affected	Total Customer Hours
0	Unknown/Other	330	877
1	Scheduled Outage	2932	5990
2	Loss of Supply	19838	154976
3	Tree Contact	1770	3316
4	Lightning	413	1625
5	Defective Equipment	7461	43329
6	Adverse/Weather	1919	5126
7	Adverse Environment	0	0
8	Human Element	0	0
9	Foreign Interference	486	760

3

³³ MFR - Completed Appendix 2-G

2014

Causes of Interruptions			
Code	Description	Total Customer Affected	Total Customer Hours
0	Unknown/Other	42	127
1	Scheduled Outage	2414	8562
2	Loss of Supply	15785	58755
3	Tree Contact	802	1327
4	Lightning	1857	3322
5	Defective Equipment	11994	36081
6	Adverse/Weather	7358	51965
7	Adverse Environment	0	0
8	Human Element	100	600
9	Foreign Interference	3058	7829

1

2015

Causes of Interruptions			
Code	Description	Total Customer Affected	Total Customer Hours
0	Unknown/Other	71	142
1	Scheduled Outage	183	381
2	Loss of Supply	44523	139476
3	Tree Contact	2951	6188
4	Lightning	109	859
5	Defective Equipment	2966	4361
6	Adverse/Weather	140	363
7	Adverse Environment	298	745
8	Human Element	0	0
9	Foreign Interference	1817	7263

2

2016

Causes of Interruptions			
Code	Description	Total Customer Affected	Total Customer Hours
0	Unknown/Other	2590	16822
1	Scheduled Outage	838	5748
2	Loss of Supply	24345	82624
3	Tree Contact	1444	3634
4	Lightning	300	1013
5	Defective Equipment	8164	23135
6	Adverse/Weather	696	1607

7	Adverse Environment	7	14
8	Human Element	1	5
9	Foreign Interference	468	3874

1

Table 29 – OEB App 2-G SAIFI SAIDI Results

Index	Includes outages caused by loss of supply					Excludes outages caused by loss of supply				
	2012	2013	2014	2015	2016	2012	2013	2014	2015	2016
SAIDI	4.785	9.454	6.390	6.914	5.969	0.826	2.644	3.394	0.879	2.414
SAIFI	1.431	1.526	1.703	2.296	1.675	0.337	0.654	0.828	0.369	0.627
5 Year Historical Average										
SAIDI					6.702					2.031
SAIFI					1.726					0.563

- 2 WPI has not had any major events during the years displayed in table 29, therefore no events
- 3 have been required to be excluded in the above results table.

1 **APPENDIX**

2 LIST OF APPENDICES

3

N/A

N/A

4