

March 1, 2019

The Board of Commissioners of Public Utilities  
Prince Charles Building  
120 Torbay Road, P.O. Box 21040  
St. John's, NL A1A 5B2

**Attention: Ms. Cheryl Blundon**  
**Director Corporate Services & Board Secretary**

Dear Ms. Blundon:

**Re: 2018 Capital Expenditures and Carryover Report**

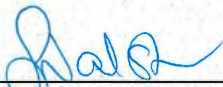
Enclosed please find one original and eight copies of Newfoundland and Labrador Hydro's ("Hydro") 2018 Capital Expenditures and Carryover Report (the "Report") for the year ending December 31, 2018.

This Report is filed pursuant to Board Order No. P.U. 43(2017) and provides information on Hydro's Capital Expenditures for all projects proposed in the 2018 Capital Budget Application, approved by the Board Order. The Report also provides information on Capital Expenditures related to additional Supplemental Capital Budgets approved by the Board as noted within the Report. As per the Capital Budget Application Guidelines (Policy No. 1900.6 – October 2007), this Report provides details and explanations regarding the variances between budgeted and actual expenditures for any project that has an expenditure within the 2018 calendar year. It also provides a listing of funds carried over to future years, and specific details regarding the execution of the Remove Safety Hazards project and various In-Service Failures projects.

Should you have any questions, please contact the undersigned.

Yours truly,

**NEWFOUNDLAND AND LABRADOR HYDRO**



Shirley A. Walsh  
Senior Legal Counsel – Regulatory  
SAW/sk

Encl.

cc: Gerard Hayes, Newfoundland Power



Capital Expenditures and Carryover Report  
For the Year Ending December 31, 2018

March 1, 2019

*A Report to the Board of Commissioners of Public Utilities*





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1 **1.0 Capital Expenditure Overview**

2 During 2018, Newfoundland and Labrador Hydro (“Hydro”) invested \$157.0 million for the  
3 execution of capital projects to contribute to the provision of safe, reliable, and least-cost  
4 electricity to customers. The expenditures include new transmission infrastructure, with  
5 \$10.9 million for the close-out activities for TL 267 between Bay d’Espoir Terminal Station and  
6 Western Avalon Terminal Station and \$12.0 million to complete TL 266 between Soldiers Pond  
7 Terminal Station and Hardwoods Terminal Station. Sustaining capital for Terminal Station  
8 infrastructure totalled \$33.1 million, including \$15.2 million in the Upgrade Circuit Breakers  
9 project and \$10.5 million in the Terminal Station Refurbishment and Modernization (2017-  
10 2018) project. Expenditures to maintain the Hydraulic Generation equipment and infrastructure  
11 across the province totaled \$23.8 million, including \$8.6 million to replace site facilities in Bay  
12 d’Espoir and \$5.9 million for year one in the Hydraulic Generation Refurbishment and  
13 Modernization (2018-2019) project. The Thermal Generation equipment and infrastructure at  
14 Holyrood required expenditures totalling \$13.0 million, with the most material expenditure of  
15 \$3.9 million in the Condition Assessment and Miscellaneous Upgrades project. Gas Turbines  
16 required \$13.7 million in expenditures, the bulk of which (\$9.8 million) was for the accelerated  
17 Holyrood Gas Turbine Hot Gas Path Level 2 Inspection and Overhaul. This report includes details  
18 about the capital expenditures and reportable variances for 2018 and project carryovers to  
19 2019. The variance in actual expenditures compared to budget in Hydro’s overall capital  
20 program for 2018 was \$56.1 million (26.3%). Additional information regarding analysis of the  
21 variance is included in Section 5.0.

22

23 **2.0 Capital Expenditures and Variance Summary**

24 Table 1 provides a summary of Hydro’s Capital Expenditures by Year for the period 2013-2018  
25 for all capital projects that were active in 2018, and Table 2 provides a breakdown of the  
26 summary by asset type.

**Table 1: 2018 Capital Expenditures by Year (\$000)**

Summary	Capital Budget <sup>1</sup>										Actual Expenditure and Forecast										Variance			
	A					B	C	D (B+C)		E	F (A+C+E)		G					H	I	J	K (G+H+I+J)		K-F	H-D
	2013	2014	2015	2016	2017	Carryover to 2018	Original 2018	Revised 2018	2019 and Beyond		Total	2013	2014	2015	2016	2017	2018	2019 and Beyond	Carryover to 2019	Total	Project Variance	Annual Variance		
2018 Projects							90,270.2	90,270.2	58,135.9	148,406.1						71,692.5	53,528.2	22,217.3	147,438.0	(968.1)	(18,577.7)			
2017 Projects					30,801.8	10,529.1	45,572.6	56,101.7	3,767.2	80,141.6					19,758.5	31,934.9	3,767.2	6,382.5	61,843.1	(18,298.5)	(24,166.8)			
2016 Projects				22,893.1	43,682.6	12,953.9	34,899.2	47,853.1	17,714.1	119,189.0				18,714.6	36,587.8	42,251.1	20,759.1	2,293.4	120,606.0	1,417.0	(5,602.0)			
2015 Projects			389.6	868.5	245.1	305.1	0.0	305.1	0.0	1,503.2			534.2	474.1	436.5	580.6	0.0	331.2	2,356.6	853.4	275.5			
2014 Projects		211.5	4,431.4	76,322.7	195,454.0	1,069.8	17,418.3	18,488.1	0.0	293,837.9		211.5	2,046.4	59,337.7	213,754.2	10,592.0	0.0	1,716.2	287,658.0	(6,179.9)	(7,896.1)			
2013 Projects	593.2	552.8	538.4	1,511.7	471.9	31.9	0.0	31.9	0.0	3,668.0	240.3	699.0	755.5	1,190.3	711.0	(66.0)	0.0	0.0	3,530.1	(137.9)	(97.9)			
<b>Grand Total</b>	<b>593.2</b>	<b>764.3</b>	<b>5,359.4</b>	<b>101,596.0</b>	<b>270,655.4</b>	<b>24,889.8</b>	<b>188,160.3</b>	<b>213,050.1</b>	<b>79,617.2</b>	<b>646,745.8</b>	<b>240.3</b>	<b>910.5</b>	<b>3,336.1</b>	<b>79,716.7</b>	<b>271,248.0</b>	<b>156,985.1</b>	<b>78,054.5</b>	<b>32,940.6</b>	<b>623,431.8</b>	<b>(23,314.0)</b>	<b>(56,065.0)</b>			

2018 Capital Budget Approved by Board Order No. P.U. 43 (2017) and P.U. 5 (2018)	181,193.7
New Project Approved by Board Order No. 11 (2017)	327.3
New Project Approved by Board Order No. 1 (2018)	748.4
New Project Approved by Board Order No. 1 (2018)	(748.4)
New Project Approved by Board Order No. 6 (2018)	719.4
New Project Approved by Board Order No. 6 (2018)	(50.4)
New Project Approved by Board Order No. 19 (2018)	1,000.0
New Project Approved by Board Order No. 23 (2018)	1,120.6
New Project Approved by Board Order No. 25 (2018)	2,560.5
New Project Approved by Board Order No. 33 (2018)	195.5
New Project Approved by Board Order No. 33 (2018)	(195.5)
New Project Approved by Board Order No. 34 (2018)	195.4
New Project Approved by Board Order No. 38 (2018)	712.3
2018 New Projects under \$50,000 Approved by Hydro	381.5
Total Approved Capital Budget Before Carryovers	188,160.3
Carryover Projects 2017 to 2018	24,889.8
<b>Total Approved Capital Budget</b>	<b>213,050.1</b>

<sup>1</sup> Annual budgets previous to 2018 pertain to projects that have expenditures in 2018.



**Table 2: Total Capital Variance Summary (\$000) by Asset Type<sup>1</sup>**

Asset Type	Board Approved Budget	Total Project Expenditures and Forecast	Variance
Hydraulic	52,680	49,021	(3,659)
Thermal	18,341	20,699	2,359
Gas Turbines	27,353	25,022	(2,331)
Terminal Stations	126,120	115,248	(10,872)
Transmission	326,860	319,578	(7,282)
Distribution	20,465	18,434	(2,031)
Rural Generation	31,235	30,279	(956)
Properties	4,262	3,464	(798)
Metering	3,408	3,645	237
Rural Systems Tools and Equipment	2,297	2,207	(90)
Information Systems	3,058	2,292	(766)
Telecontrol	6,449	6,126	(323)
Transportation	4,821	5,065	244
Administrative	1,314	1,194	(120)
Allowance for Unforeseen	2,000	4,743	2,743
Supplemental Projects	15,700	16,100	400
Projects Approved for less than \$50,000	383	315	(67)
<b>Total Capital Budget</b>	<b>646,746</b>	<b>623,432</b>	<b>(23,314)</b>

<sup>1</sup> The Total Capital includes all projects initiated between 2013 and 2018 that had 2018 expenditures. This includes projects completed in 2018 and those that continue through 2019 and beyond. Please refer to Table 1.

1 **3.0 Capital Expenditures by Category**

2 The following tables provide Hydro's Capital Expenditures by category including:

- 3 • Hydraulic Generation;
- 4 • Thermal Generation;
- 5 • Gas Turbine Generation;
- 6 • Terminal Stations;
- 7 • Transmission;
- 8 • Distribution;
- 9 • Rural Generation;
- 10 • Properties;
- 11 • Metering;
- 12 • Tools and Equipment;
- 13 • Information Systems;
- 14 • Telecontrol projects;
- 15 • Transportation;
- 16 • Administration;
- 17 • Allowance for Unforeseen Items;
- 18 • Supplemental Capital projects; and
- 19 • Projects less than \$50,000.

**Table 3: 2018 Capital Expenditures: Hydraulic Generation (\$'000)**

Hydraulic Generation Projects	Capital Budget								Actual Expenditure and Forecast						Variance				
	A			B	C	D (B+C)		E	F (A+C+E)	G			H	I	J	K (G+H+I+J)	K-F	H-D	
	2015	2016	2017	Carryover to 2018	Original 2018	Revised 2018	2019 and Beyond	Total	2015	2016	2017	2018	2019 and Beyond	Carryover to 2019	Total	Project Variance	Annual Variance	Notes	
<b>2018 Projects</b>																			
Install Remote Operation of Salmon Spillway - Bay d'Espoir	-	-	-	-	645.9	645.9	1,862.5	2,508.4	-	-	-	885.4	1,862.5	(239.5)	2,508.4	-	239.5	1	
Refurbish Backfill on Penstock #1 - Bay d'Espoir	-	-	-	-	1,630.4	1,630.4	-	1,630.4	-	-	-	63.2	-	1,567.2	1,630.4	-	(1,567.2)	2	
Hydraulic In-Service Failures	-	-	-	-	1,251.1	1,251.1	-	1,251.1	-	-	-	452.3	-	-	452.3	(798.8)	(798.8)	3	
Energy Efficiency Improvements - Various Sites	-	-	-	-	276.2	276.2	168.9	445.1	-	-	-	209.8	168.9	66.4	445.1	-	(66.4)		
Hydraulic Generation Refurbishment and Modernization - Various Sites	-	-	-	-	10,325.4	10,325.4	4,283.1	14,608.5	-	-	-	5,856.3	4,283.1	2,578.7	12,718.1	(1,890.4)	(4,469.1)	4	
Purchase Tools and Equipment Less than \$50,000	-	-	-	-	235.2	235.2	-	235.2	-	-	-	255.6	-	-	255.6	20.4	20.4		
<b>2017 Projects</b>																			
Install Asset Health Monitoring System - Upper Salmon	-	-	438.0	223.1	203.4	426.5	-	641.4	-	-	214.9	141.5	-	-	356.4	(285.0)	(285.0)	5	
Refurbish Main Generator Breaker - Upper Salmon	-	-	271.1	147.9	-	147.9	-	271.1	-	-	123.2	121.8	-	-	245.0	(26.1)	(26.1)		
Water System Replacements - Bay d'Espoir and Cat Arm	-	-	265.5	88.8	2,288.3	2,377.1	-	2,553.8	-	-	176.7	1,520.7	-	-	1,697.4	(856.4)	(856.4)	6	
Refurbish Powerhouse Station Services - Bay d'Espoir	-	-	413.2	370.2	2,473.3	2,843.5	1,460.6	4,347.1	-	-	43.0	1,003.5	1,460.6	1,840.0	4,347.1	-	(1,840.0)	7	
Replace Exciter Controls Units 1 to 6 - Bay d'Espoir	-	-	119.2	(63.5)	921.2	857.7	2,306.6	3,347.0	-	-	182.7	628.9	2,306.6	9.3	3,127.5	(219.5)	(228.8)	8	
Upgrade Ventilation in Powerhouse 1 and 2 - Bay d'Espoir	-	-	134.1	22.3	863.8	886.1	-	997.9	-	-	111.8	573.8	-	-	685.6	(312.3)	(312.3)	9	
Purchase Capital Spares - Hydraulic	-	-	487.4	362.2	-	362.2	-	487.4	-	-	325.2	304.4	-	-	629.6	142.2	(57.8)	10	
Replace Slip Rings Units 1-6 - Bay d'Espoir	-	-	312.6	210.2	159.7	369.9	-	472.3	-	-	102.4	17.2	-	352.7	472.3	-	(352.7)	11	
Refurbish Sump Level System for Powerhouse 2 - Bay d'Espoir	-	-	38.7	28.1	264.5	292.6	-	303.2	-	-	10.6	220.1	-	-	230.7	(72.5)	(72.5)		
Install Wind Monitoring Station North Salmon Dam SD-2 - Bay d'Espoir	-	-	165.5	113.2	-	113.2	-	165.5	-	-	52.3	114.9	-	-	167.2	1.7	1.7		
Control Structure Refurbishments	-	-	1,735.3	743.9	452.9	1,196.8	-	2,188.2	-	-	991.4	709.3	-	144.1	1,844.8	(343.4)	(487.5)	12	
<b>2016 Projects</b>																			
Refurbish Station Water System - Upper Salmon	-	96.6	197.6	94.9	-	94.9	-	294.2	-	38.3	161.0	80.5	-	-	279.8	(14.4)	(14.4)		
Upgrade Work - Cat Arm	-	558.3	1,353.0	910.3	-	910.3	-	1,911.3	-	240.4	760.6	1,376.3	-	30.3	2,407.6	496.3	466.0	13	
Rehabilitate Shoreline Protection - Cat Arm	-	112.2	1,030.7	977.2	-	977.2	-	1,142.9	-	104.7	61.0	89.2	-	888.0	1,142.9	-	(888.0)	14	
Replace Site Facilities - Bay d'Espoir	-	928.3	4,736.3	3,162.6	6,316.7	9,479.3	-	11,981.3	-	270.4	2,231.6	8,574.9	-	904.4	11,981.3	-	(904.4)		
Replace Spherical By-Pass Valves Units 1 and 2 - Bay d'Espoir	-	183.6	167.9	144.9	-	144.9	-	351.5	-	154.8	51.8	192.0	-	-	398.6	47.1	47.1		
<b>2015 Projects</b>																			
Replace Pump House and Associated Equipment - Bay d'Espoir	22.7	522.5	-	253.6	-	253.6	-	545.2	137.0	128.6	26.0	373.9	-	331.2	996.7	451.5	120.3	15	
<b>Total Hydraulic Generation Projects</b>	<b>22.7</b>	<b>2,401.5</b>	<b>11,866.1</b>	<b>7,789.9</b>	<b>28,308.0</b>	<b>36,097.9</b>	<b>10,081.7</b>	<b>52,680.0</b>	<b>137.0</b>	<b>937.2</b>	<b>5,626.2</b>	<b>23,765.5</b>	<b>10,081.7</b>	<b>8,472.8</b>	<b>49,020.4</b>	<b>(3,659.6)</b>	<b>(12,332.4)</b>		

**Table 4: 2018 Capital Expenditures: Thermal Generation (\$000)**

Thermal Generation Projects	Capital Budget								Actual Expenditure and Forecast							Variance				
	A			B	C	D (B+C)		E	F (A+C+E)	G			H	I	J	K (G+H+I+J)		K-F	H-D	
	2015	2016	2017	Carryover to 2018	Original 2018	Revised 2018	2019 and Beyond	Total	2015	2016	2017	2018	2019 and Beyond	Carryover to 2019	Total	Project Variance	Annual Variance	Notes		
<u>2018 Projects</u>																				
Thermal In-Service Failures	-	-	-	-	1,250.0	1,250.0	-	1,250.0	-	-	-	2,699.9	-	-	2,699.9	1,449.9	1,449.9	16		
Overhaul Pumps - Holyrood	-	-	-	-	438.3	438.3	-	438.3	-	-	-	302.7	-	-	302.7	(135.6)	(135.6)	17		
Condition Assessment and Miscellaneous Upgrades - Holyrood	-	-	-	-	2,749.6	2,749.6	-	2,749.6	-	-	-	3,906.9	-	-	3,906.9	1,157.3	1,157.3	18		
Overhaul Unit 1 Generator - Holyrood	-	-	-	-	1,005.0	1,005.0	-	1,005.0	-	-	-	1,060.6	-	-	1,060.6	55.6	55.6			
Overhaul Unit 1 Turbine Valves - Holyrood	-	-	-	-	2,485.7	2,485.7	-	2,485.7	-	-	-	2,247.7	-	-	2,247.7	(238.0)	(238.0)			
Upgrade Cranes and Hoists - Holyrood	-	-	-	-	80.3	80.3	300.3	380.6	-	-	-	38.6	300.3	41.7	380.6	-	(41.7)			
Install Raw Water Line - Holyrood	-	-	-	-	1,252.6	1,252.6	-	1,252.6	-	-	-	1,528.5	-	-	1,528.5	275.9	275.9	19		
Install Fire Detection in Outbuildings - Holyrood	-	-	-	-	198.6	198.6	-	198.6	-	-	-	70.4	-	128.2	198.6	-	(128.2)	20		
Purchase Tools and Equipment Less than \$50,000	-	-	-	-	16.5	16.5	-	16.5	-	-	-	16.5	-	-	16.5	-	-			
<u>2017 Projects</u>																				
Upgrade Holyrood Access Road - Holyrood	-	-	579.3	-	583.4	583.4	-	1,162.7	-	-	825.7	-	-	-	825.7	(337.0)	(583.4)	21		
Upgrade Underground Plant Drainage System - Holyrood	-	-	923.1	(10.7)		(10.7)	-	923.1	-	-	1,825.2	65.6	-	-	1,890.8	967.7	76.3	22		
<u>2016 Projects</u>																				
Upgrade Powerhouse Building Envelope - Holyrood	-	2,723.8	2,969.9	1,076	784.1	1,859.7	-	6,477.8	-	2,239.9	2,378.2	1,022.7	-	-	5,640.8	(837.0)	(837.0)	23		
<b>Total Thermal Generation Projects</b>	-	<b>2,723.8</b>	<b>4,472.3</b>	<b>1,064.9</b>	<b>10,844.1</b>	<b>11,909.0</b>	<b>300.3</b>	<b>18,340.5</b>	-	<b>2,239.9</b>	<b>5,029.1</b>	<b>12,960.1</b>	<b>300.3</b>	<b>169.9</b>	<b>20,699.3</b>	<b>2,358.8</b>	<b>1,051.1</b>			

**Table 5: 2018 Capital Expenditures: Gas Turbine Generation (\$000)**

Gas Turbine Generation Projects	Capital Budget							Actual Expenditure and Forecast							Variance			
	A			B	C	D (B+C)	E	F (A+C+E)	G			H	I	J	K (G+H+I+J)	K-F	H-D	
	2015	2016	2017	Carryover to 2018	Original 2018	Revised 2018	2019 and Beyond	Total	2015	2016	2017	2018	2019 and Beyond	Carryover to 2019	Total	Project Variance	Annual Variance	Notes
<u>2018 Projects</u>																		
Purchase Capital Spares - Gas Turbines	-	-	-	-	626.9	626.9	-	626.9	-	-	-	534.7	-	-	534.7	(92.2)	(92.2)	
Gas Turbine Equipment Replacement and Refurbishment - Hardwoods and Stephenville	-	-	-	-	997.9	997.9	429.3	1,427.2	-	-	-	371.3	429.3	480.2	1,280.8	(146.4)	(626.6)	24
Increase Fuel and Water Treatment System Capacity - Holyrood Gas Turbine	-	-	-	-	8,829.9	8,829.9	3,012.7	11,842.6	-	-	-	2,583.8	3,012.7	6,093.1	11,689.6	(153.0)	(6,246.1)	25
Turbine Hot Gas Path Level 2 Inspection and Overhaul - Holyrood Gas Turbine	-	-	-	-	6,538.8	6,538.8	4,607.7	11,146.5	-	-	-	9,770.7	-	682.9	10,453.6	(692.9)	3,231.9	26
<u>2017 Projects</u>																		
Gas Turbine Life Extension - Stephenville	-	-	847.5	24.1	505.7	529.8	-	1,353.2	-	-	342.2	251.7	-	-	593.9	(759.3)	(278.1)	27
Gas Turbine Life Extension - Hardwoods	-	-	675.3	28.3	281.4	309.7	-	956.7	-	-	273.6	195.6	-	-	469.2	(487.5)	(114.1)	28
<b>Total Gas Turbine Generation Projects</b>	-	-	<b>1,522.8</b>	<b>52.4</b>	<b>17,780.6</b>	<b>17,833.0</b>	<b>8,049.7</b>	<b>27,353.1</b>	-	-	<b>615.8</b>	<b>13,707.8</b>	<b>3,442.0</b>	<b>7,256.2</b>	<b>25,021.8</b>	<b>(2,331.3)</b>	<b>(4,125.2)</b>	

**Table 6: 2018 Capital Expenditures: Terminal Stations (\$000)**

Terminal Stations Projects	Capital Budget										Actual Expenditure and Forecast										Variance		
	A					B	C	D (B+C)		E	F (A+C+E)	G					H	I	J	K (G+H+I+J)	K-F	H-D	
	2013	2014	2015	2016	2017	Carryover to 2018	Original 2018	Revised 2018	2019 and Beyond	Total	2013	2014	2015	2016	2017	2018	2019 and Beyond	Carryover to 2019	Total	Project Variance	Annual Variance	Notes	
<b>2018 Projects</b>																							
Terminal Station In-Service Failures	-	-	-	-	-	-	1,000.0	1,000.0	-	1,000.0	-	-	-	-	-	2,268.8	-	-	2,268.8	1,268.8	1,268.8	29	
Upgrade Aluminum Support Structures - Holyrood	-	-	-	-	-	-	287.6	287.6	-	287.6	-	-	-	-	-	143.1	-	-	143.1	(144.5)	(144.5)	30	
Replace Transformer T1 - Buchans	-	-	-	-	-	-	249.0	249.0	2,086.1	2,335.1	-	-	-	-	-	99.0	2,086.1	150.0	2,335.1	-	(150.0)	31	
Install Breaker Bypass Switch - Howley	-	-	-	-	-	-	83.1	83.1	-	83.1	-	-	-	-	-	-	-	-	-	(83.1)	(83.1)		
Implement Terminal Station Flood Mitigation - Springdale	-	-	-	-	-	-	186.2	186.2	787.8	974.0	-	-	-	-	-	135.8	787.8	50.4	974.0	-	(50.4)	32	
Purchase Mobile DC Power Systems	-	-	-	-	-	-	270.9	270.9	695.6	966.5	-	-	-	-	-	41.9	695.6	229.0	966.5	-	(229.0)	32	
Terminal Station Refurbishment and Modernization - Various Sites	-	-	-	-	-	-	8,170.6	8,170.6	18,625.1	26,795.7	-	-	-	-	-	1,983.8	18,625.1	5,839.7	26,448.6	(347.1)	(6,186.8)	33	
<b>2017 Projects</b>																							
Upgrade Corner Brook Frequency Converter - Corner Brook	-	-	-	-	194.6	152.4	2,749.2	2,901.6	-	2,943.8	-	-	-	-	42.2	(42.2)	-	-	0.0	(2,943.8)	(2,943.8)	34	
Replace 66 kV Station Service Feed - Holyrood	-	-	-	-	62.8	(17.9)	1,198.6	1,180.7	-	1,261.4	-	-	-	-	80.7	235.0	-	945.7	1,261.4	0.0	(945.7)	35	
Replace Substation - Holyrood	-	-	-	-	439.4	324.0	758.6	1,082.6	-	1,198.0	-	-	-	-	115.4	369.7	-	313.1	798.2	(399.8)	(712.9)	36	
Replace Power Transformers - Oxen Pond	-	-	-	-	297.5	188.4	850.1	1,038.5	-	1,147.6	-	-	-	-	109.1	539.1	-	-	648.2	(499.4)	(499.4)	37	
Terminal Station Refurbishment and Modernization - Various Sites	-	-	-	-	10,831.3	3,138.3	16,550.8	19,689.1	-	27,382.1	-	-	-	-	5,852.1	10,464.4	-	2,327.7	18,644.2	(8,737.9)	(9,224.7)	38	
<b>2016 Projects</b>																							
Upgrade Circuit Breakers - Various Sites	-	-	-	6,969.1	10,808.7	3,300.5	15,408.6	18,709.1	17,714.1	50,900.5	-	-	-	5,599.5	8,877.8	15,184.2	20,759.1	479.9	50,900.5	(0.0)	(3,524.9)	39	
Replace Protective Relays - Various Sites	-	-	-	700.6	1,156.4	267.5	-	267.5	-	1,857.0	-	-	-	1,425.8	1,134.5	754.4	-	-	3,314.7	1,457.7	486.9	40	
Replace Disconnect Switches - Various Sites	-	-	-	646.9	1,320.9	771.2	-	771.2	-	1,967.8	-	-	-	131.7	1,064.9	225.0	-	-	1,421.6	(546.2)	(546.2)	41	
Upgrade Data Alarm Systems - Various Sites	-	-	-	74.4	234.1	142.8	-	142.8	-	308.5	-	-	-	49.7	116.0	144.6	-	(1.8)	308.5	0.0	1.8		
Install Breaker Failure Protection - Various Sites	-	-	-	65.7	211.3	22.2	-	22.2	-	277.0	-	-	-	81.8	382.4	234.7	-	(7.4)	691.5	414.5	212.5	42	
Install Fire Protection in 230 kV Stations - Bay d'Espoir	-	-	-	200.0	566.0	681.7	-	681.7	-	766.0	-	-	-	91.4	100.7	400.8	-	-	592.9	(173.1)	(280.9)	43	
<b>2013 Projects</b>																							
Replace Instrument Transformers - Various Sites	593.2	552.8	538.4	1,511.7	471.9	31.9	-	31.9	-	3,668.0	240.3	699.0	755.5	1,190.3	711.0	(66.0)	-	-	3,530.1	(137.9)	(97.9)		
<b>Total Terminal Stations Projects</b>	<b>593.2</b>	<b>552.8</b>	<b>538.4</b>	<b>10,168.4</b>	<b>26,594.9</b>	<b>9,003.0</b>	<b>47,763.3</b>	<b>56,766.3</b>	<b>39,908.7</b>	<b>126,119.7</b>	<b>240.3</b>	<b>699.0</b>	<b>755.5</b>	<b>8,570.2</b>	<b>18,586.9</b>	<b>33,116.1</b>	<b>42,953.7</b>	<b>10,326.3</b>	<b>115,248.0</b>	<b>(10,871.7)</b>	<b>(23,650.2)</b>		

**Table 7: 2018 Capital Expenditures: Transmission (\$000)**

Transmission Projects	Capital Budget						Actual Expenditure and Forecast							Variance							
	A			B	C	D (B+C)	E	F (A+C+E)	G			H	I	J	K (G+H+I+J)	K-F	H-D				
	2014	2015	2016	2017	Carryover to 2018	Original 2018	Revised 2018	2019 and Beyond	Total	2014	2015	2016	2017	2018	2019 and Beyond	Carryover to 2019	Total	Project Variance	Annual Variance	Notes	
<b>2018 Projects</b>																					
Wood Pole Line Management Program - Various Sites	-	-	-	-	-	3,532.9	3,532.9	-	3,532.9	-	-	-	-	3,185.6	-	-	3,185.6	(347.3)	(347.3)	44	
<b>2017 Projects</b>																					
Transmission Line Upgrades - TL212 and TL218	-	-	-	1,378.2	1,091.1	1,133.3	2,224.4	-	2,511.5	-	-	-	287.1	1,440.6	-	-	1,727.7	(783.8)	(783.8)	45	
Replace Insulators - TL227	-	-	-	145.6	128.9	271.3	400.2	-	416.9	-	-	-	16.7	282.7	-	-	299.4	(117.5)	(117.5)	46	
<b>2016 Projects</b>																					
Construct 230 kV Transmission Line - Soldiers Pond to Hardwoods	-	-	3,699.0	10,985.4	(27.8)	11,876.5	11,848.7	-	26,560.9	-	-	3,501.6	11,210.6	11,995.0	-	-	26,707.2	146.3	146.3		
<b>2014 Projects</b>																					
Refurbish Anchors and Footings TL202 and TL206 - Bay d'Espoir to Sunnyside	211.5	28.4	1,038.4	901.6	1,829.8	-	1,829.8	-	2,179.9	211.5	28.2	19.9	90.5	(350.1)	-	-	0.0	(2,179.9)	(2,179.9)	47	
230 kV Transmission Line - Bay d'Espoir to Western Avalon	-	4,403.0	75,284.3	194,552.4	(760.0)	17,418.3	16,658.3	-	291,658.0	-	2,018.2	59,317.8	213,663.7	10,942.1	-	1,716.2	287,658.0	(4,000.0)	(5,716.2)	48	
<b>Total Transmission Projects</b>	<b>211.5</b>	<b>4,431.4</b>	<b>80,021.7</b>	<b>207,963.2</b>	<b>2,262.0</b>	<b>34,232.3</b>	<b>36,494.3</b>	<b>-</b>	<b>326,860.1</b>	<b>211.5</b>	<b>2,046.4</b>	<b>62,839.3</b>	<b>225,268.6</b>	<b>27,495.9</b>	<b>-</b>	<b>1,716.2</b>	<b>319,577.9</b>	<b>(7,282.2)</b>	<b>(8,998.4)</b>		

**Table 8: 2018 Capital Expenditures: Distribution (\$000)**

Distribution Projects	Capital Budget								Actual Expenditure and Forecast							Variance			
	A			B	C	D (B+C)		E	F (A+C+E)	G			H	I	J	K (G+H+I+J)	K-F	H-D	
	2015	2016	2017	Carryover to 2018	Original 2018	Revised 2018	2019 and Beyond		Total	2015	2016	2017	2018	2019 and Carryover to 2019		Total	Project Variance	Annual Variance	Notes
<b>2018 Projects</b>																			
Provide Service Extensions - All Service Areas	-	-	-	-	4,642.0	4,642.0	-	4,642.0	-	-	-	3,709.1	-	-	3,709.1	(932.9)	(932.9)	49	
Provide Service Extensions - All Service Areas - CIAC	-	-	-	-	(122.0)	(122.0)	-	(122.0)	-	-	-	(88.9)	-	-	(88.9)	33.1	33.1		
Upgrade Distribution Systems - All Service Areas	-	-	-	-	3,711.0	3,711.0	-	3,711.0	-	-	-	3,230.6	-	-	3,230.6	(480.4)	(480.4)	50	
Upgrade Distribution Systems - All Service Areas - CIAC	-	-	-	-	(61.0)	(61.0)	-	(61.0)	-	-	-	(25.0)	-	-	(25.0)	36.0	36.0		
Distribution System Upgrades - Various Sites	-	-	-	-	383.8	383.8	2,771.2	3,155.0	-	-	-	193.6	2,771.2	190.2	3,155.0	-	(190.2)	51	
Install Recloser Remote Control - English Harbour West and Barchoix	-	-	-	-	63.7	63.7	275.0	338.7	-	-	-	13.8	275.0	49.9	338.7	-	(49.9)		
Additions for Load Growth - Happy Valley	-	-	-	-	505.0	505.0	-	505.0	-	-	-	222.5	-	-	222.5	(282.5)	(282.5)	52	
<b>2017 Projects</b>																			
Distribution Upgrades - Various Sites	-	-	64.2	(14.5)	1,130.9	1,116.4	-	1,195.1	-	-	78.7	915.3	-	-	994.0	(201.1)	(201.1)	53	
Install Recloser Remote Control - Bottom Waters	-	-	47.1	(16.8)	418.6	401.8	-	465.7	-	-	63.9	425.3	-	-	489.2	23.5	23.5		
<b>2016 Projects</b>																			
Upgrade Distribution Systems - Various Sites	-	285.6	6,350.3	911.0	-	911.0	-	6,635.9	-	361.8	5,363.1	683.2	-	-	6,408.1	(227.8)	(227.8)	54	
<b>Total Distribution Projects</b>	-	<b>285.6</b>	<b>6,461.6</b>	<b>879.7</b>	<b>10,672.0</b>	<b>11,551.7</b>	<b>3,046.2</b>	<b>20,465.4</b>	-	<b>361.8</b>	<b>5,505.7</b>	<b>9,279.5</b>	<b>3,046.2</b>	<b>240.1</b>	<b>18,433.3</b>	<b>(2,032.1)</b>	<b>(2,272.2)</b>		



**Table 9: 2018 Capital Expenditures: Rural Generation (\$000)**

Rural Generation Projects	Budget						Actual Expenditure and Forecast						Variance					
	A			B	C	D (B+C)	E	F (A+C+E)	G			H	I	J	K (G+H+I+J)	K-F	H-D	
	2015	2016	2017	Carryover to 2018	Original 2018	Revised 2018	2019 and Beyond	Total	2015	2016	2017	2018	2019 and Beyond	Carryover to 2019	Total	Project Variance	Annual Variance	Notes
<u>2018 Projects</u>																		
Overhaul Diesel Units - Various Sites	-	-	-	-	2,852.4	2,852.4	-	2,852.4	-	-	-	2,029.0	-	-	2,029.0	(823.4)	(823.4)	55
Diesel Plant Engine Cooling System Upgrades - Various Sites	-	-	-	-	638.4	638.4	671.6	1,310.0	-	-	-	149.3	671.6	489.1	1,310.0	-	(489.1)	56
Additions for Load Growth - Makkovik and Rigolet	-	-	-	-	730.1	730.1	-	730.1	-	-	-	302.0	-	-	302.0	(428.1)	(428.1)	57
Upgrade Ventilation - Cartwright	-	-	-	-	465.7	465.7	-	465.7	-	-	-	46.5	-	419.2	465.7	-	(419.2)	58
Diesel Plant Fire Protection - Postville	-	-	-	-	505.6	505.6	336.4	842.0	-	-	-	37.2	336.4	468.4	842.0	-	(468.4)	59
Inspect Fuel Storage Tanks - Black Tickle	-	-	-	-	818.7	818.7	-	818.7	-	-	-	481.7	-	337.0	818.7	-	(337.0)	60
Install Sub-Surface Drainage System - Paradise River	-	-	-	-	524.9	524.9	-	524.9	-	-	-	721.6	-	-	721.6	196.7	196.7	61
Replace Secondary Containment System Liner - Nain	-	-	-	-	1,639.2	1,639.2	1,450.4	3,089.6	-	-	-	672.5	1,450.4	2,471.7	4,594.6	1,505.0	(966.7)	62
Diesel Genset Replacements - Makkovik	-	-	-	-	604.1	604.1	8,296.1	8,900.2	-	-	-	1,585.1	8,296.1	(981.0)	8,900.2	-	981.0	63
Replace Automation Equipment - St. Anthony	-	-	-	-	307.4	307.4	1,565.9	1,873.3	-	-	-	127.2	1,565.9	180.2	1,873.3	-	(180.2)	64
Replace Human Machine Interface - St. Lewis	-	-	-	-	280.8	280.8	-	280.8	-	-	-	242.5	-	-	242.5	(38.3)	(38.3)	
<u>2017 Projects</u>																		
Diesel Plant Engine Auxiliary Upgrades - Various Sites	-	-	790.6	145.9	416.3	562.2	-	1,206.9	-	-	644.7	481.9	-	-	1,126.6	(80.3)	(80.3)	
Replace Automation Equipment - Mary's Harbour	-	-	120.3	32.9	1,021.7	1,054.6	-	1,142.0	-	-	87.4	960.4	-	-	1,047.8	(94.2)	(94.2)	
Diesel Genset Replacements - Port Hope Simpson and Charlottetown	-	-	658.8	445.2	5,148.0	5,593.2	-	5,806.8	-	-	213.6	3,973.8	-	-	4,187.4	(1,619.4)	(1,619.4)	65
<u>2016 Projects</u>																		
Upgrade Human Machine Interface - Various Sites	-	114.0	320.0	73.0	-	73.0	-	434.0	-	125.3	235.7	96.9	-	-	457.9	23.9	23.9	
<u>2015 Projects</u>																		
Replace Programmable Logic Controllers - Various Sites	366.9	346.0	245.1	51.5	-	51.5	-	958.0	397.2	345.5	410.5	206.7	-	-	1,359.9	401.9	155.2	66
<b>Total Rural Generation Projects</b>	<b>366.9</b>	<b>460.0</b>	<b>2,134.8</b>	<b>748.5</b>	<b>15,953.3</b>	<b>16,701.8</b>	<b>12,320.4</b>	<b>31,235.4</b>	<b>397.2</b>	<b>470.8</b>	<b>1,591.9</b>	<b>12,114.3</b>	<b>12,320.4</b>	<b>3,384.6</b>	<b>30,279.2</b>	<b>(956.1)</b>	<b>(4,587.5)</b>	

**Table 10: 2018 Capital Expenditures: Properties (\$000)**

Properties Projects	Capital Budget								Actual Expenditure and Forecast						Variance				
	A			B	C	D (B+C)		E	F (A+C+E)	G			H	I	J	K (G+H+I+J)	K-F	H-D	
	2015	2016	2017	Carryover to 2018	Original 2018	Revised 2018	2019 and Beyond		Total	2015	2016	2017	2018	2019 and Beyond	Carryover to 2019	Total	Project Variance	Annual Variance	Notes
<u>2018 Projects</u>																			
Upgrade Office Facilities and Control Buildings - Various	-	-	-	-	1,180.6	1,180.6	-	1,180.6	-	-	-	955.8	-	-	955.8	(224.8)	(224.8)	67	
Line Depot Condition Assessment and Refurbishment - Various	-	-	-	-	1,233.0	1,233.0	-	1,233.0	-	-	-	1,005.6	-	-	1,005.6	(227.4)	(227.4)	68	
Install Fall Protection Equipment - Various	-	-	-	-	46.7	46.7	-	46.7	-	-	-	40.1	-	-	40.1	(6.6)	(6.6)		
Install Energy Efficiency Lighting in Diesel Plants - Various	-	-	-	-	104.0	104.0	241.2	345.2	-	-	-	68.0	241.2	36.0	345.2	-	(36.0)		
<u>2017 Projects</u>																			
Construct New Facilities - Various Sites	-	-	422.0	184.2	1,034.1	1,218.3	-	1,456.1	-	-	237.8	429.8	-	449.9	1,117.5	(338.6)	(788.5)	69	
<b>Total Properties Projects</b>	-	-	<b>422.0</b>	<b>184.2</b>	<b>3,598.4</b>	<b>3,782.6</b>	<b>241.2</b>	<b>4,261.6</b>	-	-	<b>237.8</b>	<b>2,499.3</b>	<b>241.2</b>	<b>485.9</b>	<b>3,464.2</b>	<b>(797.4)</b>	<b>(1,283.3)</b>		

**Table 11: 2018 Capital Expenditures: Metering (\$000)**

Metering Projects	Capital Budget						Actual Expenditure and Forecast						Variance					
	A			B	C	D (B+C)	E	F (A+C+E)	G			H	I	J	K (G+H+I+J)	K-F	H-D	
	2015	2016	2017	Carryover to 2018	Original 2018	Revised 2018	2019 and Beyond	Total	2015	2016	2017	2018	2019 and Beyond	Carryover to 2019	Total	Project Variance	Annual Variance	Notes
<u>2018 Projects</u>																		
Install Automated Meter Reading - Bottom Waters	-	-	-	-	75.2	75.2	-	75.2	-	-	-	-	-	-	-	(75.2)	(75.2)	
Purchase Metering and Metering Equipment - Various Sites	-	-	-	-	198.5	198.5	-	198.5	-	-	-	236.6	-	-	236.6	38.1	38.1	
<u>2017 Projects</u>																		
Install Automated Meter Reading - Happy Valley	-	-	78.6	(105.2)	1,891.6	1,786.4	-	1,970.2	-	-	183.8	1,606.7	-	-	1,790.5	(179.7)	(179.7)	70
Purchase New Meter Calibration Test Console - Hydro Place	-	-	196.9	212.7	-	212.7	-	196.9	-	-	0.1	209.2	-	-	209.3	12.4	(3.5)	
<u>2016 Projects</u>																		
Install Automated Meter Reading - Labrador West	-	433.8	533.4	(3.2)	-	(3.2)	-	967.2	-	130.4	1,232.8	45.1	-	-	1,408.3	441.1	48.3	71
<b>Total Metering Projects</b>	-	<b>433.8</b>	<b>808.9</b>	<b>104.3</b>	<b>2,165.3</b>	<b>2,269.6</b>	-	<b>3,408.0</b>	-	<b>130.4</b>	<b>1,416.8</b>	<b>2,097.6</b>	-	-	<b>3,644.8</b>	<b>236.8</b>	<b>(172.0)</b>	

**Table 12: 2018 Capital Expenditures: Tools and Equipment (\$000)**

Tools and Equipment	Capital Budget								Actual Expenditure and Forecast						Variance			
	A		B	C	D (B+C)	E	F (A+C+E)		G		H	I	J	K (G+H+I+J)	K-F	H-D		
	2015	2016	2017	Carryover to 2018	Original 2018	Revised 2018	2019 and Beyond		2015	2016	2017	2018	2019 and Beyond	Carryover to 2019	Total	Project Variance	Annual Variance	Notes
<u>2018 Projects</u>																		
Replace Light Duty Mobile Equipment - Various Sites	-	-	-	-	429.0	429.0	-	429.0	-	-	-	416.6	-	-	416.6	(12.4)	(12.4)	
Replace Front End Loader Unit No. 9628	-	-	-	-	170.2	170.2	-	170.2	-	-	-	168.7	-	-	168.7	(1.5)	(1.5)	
Replace Off-Road Track Vehicles - Bishop's Falls and Bay d'Espoir	-	-	-	-	213.7	213.7	986.3	1,200.0	-	-	-	249.5	986.3	(35.8)	1,200.0	-	35.8	
Tools and Equipment Less than \$50,000	-	-	-	-	497.7	497.7	-	497.7	-	-	-	422.1	-	-	422.1	(75.6)	(75.6)	
<b>Total Tools and Equipment Projects</b>	-	-	-	-	<b>1,310.6</b>	<b>1,310.6</b>	<b>986.3</b>	<b>2,296.9</b>	-	-	-	<b>1,256.9</b>	<b>986.3</b>	<b>(35.8)</b>	<b>2,207.4</b>	<b>(89.5)</b>	<b>(53.7)</b>	

**Table 13: 2018 Capital Expenditures: Information Systems (\$000)**

Information Systems Projects	Capital Budget								Actual Expenditure and Forecast						Variance			
	A			B	C	D (B+C)	E	F (A+C+E)	G			H	I	J	K (G+H+I+J)	K-F	H-D	
	2015	2016	2017	Carryover to 2018	Original 2018	Revised 2018	2019 and Beyond	Total	2015	2016	2017	2018	2019 and Beyond	Carryover to 2019	Total	Project Variance	Annual Variance	Notes
<b>2018 Projects</b>																		
Upgrade Software Applications - Hydro Place	-	-	-	-	114.7	114.7	-	114.7	-	-	-	68.9	-	-	68.9	(45.8)	(45.8)	
Refresh Security Software - Hydro Place	-	-	-	-	62.2	62.2	-	62.2	-	-	-	63.2	-	-	63.2	1.0	1.0	
Perform Minor Enhancements - Hydro Place	-	-	-	-	49.4	49.4	-	49.4	-	-	-	43.3	-	-	43.3	(6.1)	(6.1)	
Replace Personal Computers - Hydro Place	-	-	-	-	493.0	493.0	-	493.0	-	-	-	94.5	-	-	94.5	(398.5)	(398.5)	72
Upgrade Core IT Infrastructure - Hydro Place	-	-	-	-	352.4	352.4	-	352.4	-	-	-	453.8	-	-	453.8	101.4	101.4	73
Replace Peripheral Infrastructure - Hydro Place	-	-	-	-	258.4	258.4	-	258.4	-	-	-	260.1	-	-	260.1	1.7	1.7	
Upgrade Energy Management System - Hydro Place	-	-	-	-	336.8	336.8	-	336.8	-	-	-	-	-	-	-	(336.8)	(336.8)	74
<b>2016 Projects</b>																		
Upgrade Microsoft Office - Hydro Place	-	683.7	953.4	20.1	957.3	977.4	-	2,594.4	-	656.9	960.0	822.3	-	-	2,439.2	(155.2)	(155.1)	75
Cost Recoveries	-	(317.1)	(442.2)	(9.0)	(444.0)	(453.0)	-	(1,203.3)	-	(304.8)	(445.5)	(380.7)	-	-	(1,131.0)	72.3	72.3	
<b>Total Information Systems Projects</b>	-	<b>366.6</b>	<b>511.2</b>	<b>11.1</b>	<b>2,180.2</b>	<b>2,191.3</b>	-	<b>3,058.0</b>	-	<b>352.1</b>	<b>514.5</b>	<b>1,425.4</b>	-	-	<b>2,292.0</b>	<b>(766.0)</b>	<b>(765.9)</b>	

**Table 14: 2018 Capital Expenditures: Telecontrol (\$000)**

Telecontrol Projects	Capital Budget								Actual Expenditure and Forecast						Variance			
	A		B	C	D (B+C)		E	F (A+C+E)	G		H	I	J	K (G+H+I+J)	K-F	H-D		
	2015	2016	2017	Carryover to 2018	Original 2018	Revised 2018	2019 and Beyond	Total	2015	2016	2017	2018	2019 and Beyond	Carryover to 2019	Total	Project Variance	Annual Variance	Notes
<b>2018 Projects</b>																		
Replace PBX Phone Systems - Various	-	-	-	-	91.7	91.7	1,150.6	1,242.3	-	-	-	134.9	1,150.6	(43.2)	1,242.3	-	43.2	
Replace MDR 6000 Microwave Radio - Various	-	-	-	-	64.0	64.0	1,137.0	1,201.0	-	-	-	81.5	1,137.0	(17.5)	1,201.0	-	17.5	
Replace Teleprotection - TL261	-	-	-	-	57.6	57.6	459.8	517.4	-	-	-	60.1	459.8	(2.5)	517.4	-	2.5	
Replace Network Communications Equipment - Various	-	-	-	-	199.5	199.5	-	199.5	-	-	-	239.1	-	-	239.1	39.6	39.6	
Upgrade Site Facilities - Various	-	-	-	-	49.0	49.0	-	49.0	-	-	-	46.8	-	-	46.8	(2.2)	(2.2)	
Replace Radomes - Various	-	-	-	-	360.3	360.3	-	360.3	-	-	-	331.1	-	-	331.1	(29.2)	(29.2)	
Replace RTUs - Various	-	-	-	-	118.3	118.3	-	118.3	-	-	-	108.5	-	-	108.5	(9.8)	(9.8)	
Replace Air Conditioners - Various	-	-	-	-	74.4	74.4	-	74.4	-	-	-	75.5	-	-	75.5	1.1	1.1	
Replace Battery Banks and Chargers - Various	-	-	-	-	382.1	382.1	555.8	937.9	-	-	-	231.3	555.8	150.8	937.9	-	(150.8)	76
Purchase Tools and Equipment less than \$50,000	-	-	-	-	46.0	46.0	-	46.0	-	-	-	30.7	-	-	30.7	(15.3)	(15.3)	
<b>2017 Projects</b>																		
Replace Battery Banks and Chargers - Various Sites (2017-2018)	-	-	379.3	(4.3)	566.2	561.9	-	945.5	-	-	217.6	555.1	-	-	772.7	(172.8)	(6.8)	77
Upgrade Telecontrol Facilities - Mary March Hill and Blue Grass Hill	-	-	91.2	(32.1)	665.9	633.8	-	757.1	-	-	123.3	500.0	-	-	623.3	(133.8)	(133.8)	78
<b>Total Telecontrol Projects</b>	-	-	<b>470.5</b>	<b>(36.4)</b>	<b>2,675.0</b>	<b>2,638.6</b>	<b>3,303.2</b>	<b>6,448.7</b>	-	-	<b>340.9</b>	<b>2,394.6</b>	<b>3,303.2</b>	<b>88</b>	<b>6,126.3</b>	<b>(322.4)</b>	<b>(244.0)</b>	

**Table 15: 2018 Capital Expenditures: Transportation and Administrative (\$000)**

Transportation	Capital Budget								Actual Expenditure and Forecast							Variance		
	A			B	C	D (B+C)	E	F (A+C+E)	G			H	I	J	K (G+H+I+J)	K-F	H-D	
	2015	2016	2017	Carryover to 2018	Original 2018	Revised 2018	2019 and Beyond	Total	2015	2016	2017	2018	2019 and Beyond	Carryover to 2019	Total	Project Variance	Annual Variance	Notes
<u>2018 Projects</u>																		
Replace Vehicles and Aerial Devices - Various Sites	-	-	-	-	1,667.2	1,667.2	753.7	2,420.9	-	-	-	1,165.1	753.7	502.1	2,420.9	-	(502.1)	79
<u>2017 Projects</u>																		
Replace Vehicles and Aerial Devices - Various Sites	-	-	2,001.4	725.6	398.8	1,124.4	-	2,400.2	-	-	1,275.8	1,368.1	-	-	2,643.9	243.7	243.7	80
<b>Total Transportation Projects</b>	-	-	2,001.4	725.6	2,066.0	2,791.6	753.7	4,821.1	-	-	1,275.8	2,533.2	753.7	502.1	5,064.8	243.7	(258.4)	
Administrative	Capital Budget								Actual Expenditure and Forecast							Variance		
	A			B	C	D (B+C)	E	F (A+C+E)	G			H	I	J	K (G+H+I+J)	K-F	H-D	
	2015	2016	2017	Carryover to 2018	Original 2018	Revised 2018	2019 and Beyond	Total	2015	2016	2017	2018	2019 and Beyond	Carryover to 2019	Total	Project Variance	Annual Variance	Notes
<u>2018 Projects</u>																		
Remove Safety Hazards - Various	-	-	-	-	199.4	199.4	-	199.4	-	-	-	166.3	-	-	166.3	(33.1)	(33.1)	
Upgrade Exterior of Building - Hydro Place	-	-	-	-	260.2	260.2	405.7	665.9	-	-	-	232.6	405.7	27.6	665.9	-	(27.6)	
Replace Washroom Fixtures - Hydro Place	-	-	-	-	49.5	49.5	-	49.5	-	-	-	50.3	-	-	50.3	0.8	0.8	
Security Improvements - Hydro Place	-	-	-	-	45.5	45.5	-	45.5	-	-	-	8.5	-	-	8.5	(37.0)	(37.0)	
Purchase Office Equipment	-	-	-	-	90.0	90.0	-	90.0	-	-	-	26.3	-	-	26.3	(63.7)	(63.7)	
<u>2016 Projects</u>																		
Replace Air Conditioning Units 8 and 14 - Hydro Place	-	34.6	229.5	19.5	-	19.5	-	264.1	-	31.0	213.6	31.8	-	-	276.4	12.3	12.3	
<b>Total Administrative Projects</b>	-	34.6	229.5	19.5	644.6	664.1	405.7	1,314.4	-	31.0	213.6	515.8	405.7	27.6	1,193.7	(120.7)	(148.3)	

**Table 16: 2018 Capital Expenditures: Allowance for Unforeseen Items, Supplemental Capital Projects, and Projects less than \$50,000 (\$000)**

Allowance For Unforeseen	Capital Budget								Actual Expenditure and Forecast						Variance			
	A			B	C	D (B+C)	E	F (A+C+E)	G			H	I	J	K (G+H+I+J)	K-F	H-D	
	2015	2016	2017	Carryover to 2018	Original 2018	Revised 2018	2019 and Beyond	Total	2015	2016	2017	2018	2019 and Beyond	Carryover to 2019	Total	Project Variance	Annual Variance	Notes
<b>2018 Projects</b>																		
Allowance for Unforeseen Items	-	-	-	-	1,000.0	1,000.0	-	1,000.0	-	-	-	-	-	-	-	(1,000.0)	(1,000.0)	81
Penstock #3 Refurbishment - Bay d'Espoir	-	-	-	-	-	-	-	-	-	-	-	4,743.2	-	-	4,743.2	4,743.2	4,743.2	81
Allowance for Unforeseen - Top Up P.U. 19 (2018)	-	-	-	-	1,000.0	1,000.0	-	1,000.0	-	-	-	-	-	-	-	(1,000.0)	(1,000.0)	81
Replace Engine #2051 - Rigolet	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<b>Total Allowance For Unforeseen</b>	-	-	-	-	<b>2,000.0</b>	<b>2,000.0</b>	-	<b>2,000.0</b>	-	-	-	<b>4,743.2</b>	-	-	<b>4,743.2</b>	<b>2,743.2</b>	<b>2,743.2</b>	

Supplemental Projects	Capital Budget								Actual Expenditure and Forecast						Variance			
	A			B	C	D (B+C)	E	F (A+C+E)	G			H	I	J	K (G+H+I+J)	K-F	H-D	
	2015	2016	2017	Carryover to 2018	Original 2018	Revised 2018	2019 and Beyond	Total	2015	2016	2017	2018	2019 and Beyond	Carryover to 2019	Total	Project Variance	Annual Variance	Notes
<b>2018 Projects</b>																		
Provide Service to Western Regional Service Baord's Waste Transfer Site - Hampden	-	-	-	-	748.4	748.4	-	748.4	-	-	-	644.5	-	-	644.5	(103.9)	(103.9)	82
Provide Service to Western Regional Service Baord's Waste Transfer Site - Hampden - CIAC	-	-	-	-	(748.4)	(748.4)	-	(748.4)	-	-	-	(644.5)	-	-	(644.5)	103.9	103.9	82
Perform Voltage Conversion of the Distribution Feeder VA26 - Labrador City	-	-	-	-	719.4	719.4	-	719.4	-	-	-	705.1	-	-	705.1	(14.3)	(14.3)	
Perform Voltage Conversion of the Distribution Feeder VA26 - Labrador City - CIAC	-	-	-	-	(50.4)	(50.4)	-	(50.4)	-	-	-	-	-	-	0.0	50.4	50.4	
Penstock Condition Assessments - Bay d'Espoir	-	-	-	-	1,120.6	1,120.6	-	1,120.6	-	-	-	1,682.5	-	223.8	1,906.3	785.7	561.9	83
Improve Boiler Capacity - Holyrood	-	-	-	-	2,560.5	2,560.5	-	2,560.5	-	-	-	1,665.9	-	-	1,665.9	(894.6)	(894.6)	84
Mary's Harbour Hydro Integration	-	-	-	-	195.5	195.5	-	195.5	-	-	-	49.2	-	146.3	195.5	-	(146.3)	85
Mary's Harbour Hydro Integration - CIAC	-	-	-	-	(195.5)	(195.5)	-	(195.5)	-	-	-	-	-	(195.5)	(195.5)	-	195.5	85
Gang Switch - Happy Valley-Goose Bay	-	-	-	-	195.4	195.4	-	195.4	-	-	-	85.2	-	-	85.2	(110.2)	(110.2)	86
TL226 and TL239 Reroute	-	-	-	-	712.3	712.3	220.1	932.4	-	-	-	579.8	220.1	132.5	932.4	-	(132.5)	87
<b>2017 Projects</b>																		
Terminal Station Upgrades - Wabush	-	-	2,585.2	1,644.5	327.3	1,971.8	-	2,912.5	-	-	940.7	1,021.4	-	-	1,962.1	(950.4)	(950.4)	88
Reliability Improvements - Holyrood	-	-	2,610.0	16.7	-	16.7	-	2,610.0	-	-	3,586.6	297.3	-	-	3,883.9	1,273.9	280.6	89
<b>2016 Projects</b>																		
Purchase of 12 MW Diesel Generation - Holyrood	-	4,700.0	-	418.9	-	418.9	-	4,700.0	-	3,784.0	497.1	678.2	-	-	4,959.3	259.3	259.3	90
<b>Total Supplemental Projects Approved by PUB</b>	-	<b>4,700.0</b>	<b>5,195.2</b>	<b>2,080.1</b>	<b>5,585.1</b>	<b>7,665.2</b>	<b>220.1</b>	<b>15,700.4</b>	-	<b>3,784.0</b>	<b>5,024.4</b>	<b>6,764.6</b>	<b>220.1</b>	<b>307.1</b>	<b>16,100.2</b>	<b>399.8</b>	<b>(900.6)</b>	

Projects Less than \$50,000	Capital Budget								Actual Expenditure and Forecast						Variance			
	A			B	C	D (B+C)	E	F (A+C+E)	G			H	I	J	K (G+H+I+J)	K-F	H-D	
	2015	2016	2017	Carryover to 2018	Original 2018	Revised 2018	2019 and Beyond	Total	2015	2016	2017	2018	2019 and Beyond	Carryover to 2019	Total	Project Variance	Annual Variance	Notes
<b>2018 Projects</b>																		
Replace Alternator Bearing - Stephenville Gas Turbine	-	-	-	-	47.9	47.9	-	47.9	-	-	-	48.7	-	-	48.7	0.8	0.8	
Back-up Control Center Cooling Upgrade - Holyrood	-	-	-	-	49.0	49.0	-	49.0	-	-	-	41.5	-	-	41.5	(7.5)	(7.5)	
Stage 2 Emergency Diesel Generator Refurbishment - Holyrood	-	-	-	-	49.5	49.5	-	49.5	-	-	-	9.3	-	-	9.3	(40.2)	(40.2)	
Penstock 3 Laser Scanning - Bay d'Espoir	-	-	-	-	46.3	46.3	-	46.3	-	-	-	31.3	-	-	31.3	(15.0)	(15.0)	
Penstock 3 Press Transducer - Bay d'Espoir	-	-	-	-	29.5	29.5	-	29.5	-	-	-	45.1	-	-	45.1	15.6	15.6	
Parking Lot Access Improvements - Hydro Place	-	-	-	-	47.4	47.4	-	47.4	-	-	-	41.5	-	-	41.5	(5.9)	(5.9)	
Replace Heat Sensors Tanks - Holyrood	-	-	-	-	49.8	49.8	-	49.8	-	-	-	48.1	-	-	48.1	(1.7)	(1.7)	
Main Breaker Replacement-HYP	-	-	-	-	18.4	18.4	-	18.4	-	-	-	17.5	-	-	17.5	(0.9)	(0.9)	
<b>2017 Projects</b>																		
Replace Tracks for V7601 Groomer - Bay d'Espoir	-	-	1.0	1.0	43.7	44.7	-	44.7	-	-	-	32.3	-	-	32.3	(12.4)	(12.4)	
<b>Total Projects Less than \$50,000</b>	-	-	<b>1.0</b>	<b>1.0</b>	<b>381.5</b>	<b>382.5</b>	-	<b>382.5</b>	-	-	-	<b>315.3</b>	-	-	<b>315.3</b>	<b>(67.2)</b>	<b>(67.2)</b>	



1 **4.0 Variance Explanations (Greater than \$100,000 and 10% Variance from**  
2 **Budget)**

3 The projects discussed in the following section have 2018 variances (project total or annual as  
4 indicated) of more than 10% and \$100,000 when comparing the approved budget to the 2018  
5 expenditures, whether it is a single- or multi-year project. The projects are ordered and  
6 numbered based upon the order and number they appear in the preceding set of tables.

7  
8 **4.1 Hydraulic Generation Projects (Table 3)**

9 **1. Install Remote Operation of Salmon Spillway: Bay d’Espoir**

10 **Annual Variance (\$000)**

11 Budget: 645.9                      Expenditures: 885.4                      Variance: 239.5

12  
13 This is a two-year project (2018–2019) that commenced in 2018. The variance in 2018  
14 expenditures is attributed to the advancement of a portion of the 2019 planned  
15 activities into 2018. This project remains on schedule with no change to the overall  
16 scope, budget, or completion date.

17  
18 **2. Refurbish Backfill on Penstock #1: Bay d’Espoir**

19 **Annual Variance (\$000)**

20 Budget: 1,630.4                      Expenditures: 63.2                      Variance: (1,567.2)

21  
22 This is a one-year project that commenced in 2018 and has carried over into 2019. An  
23 engineering consultant’s report concerning Bay d’Espoir Penstock 1 failure  
24 recommended suspending this work on the backfill until a long-term solution for the  
25 penstock is selected. The long-term solution is not expected to be available until March  
26 2019. This project’s justification, budget, and schedule will be re-evaluated at that time.

1 **3. Hydraulic In-Service Failures**

2 **Project Variance (\$000)**

3 Budget: 1,251.1                      Expenditures: 452.3                      Variance: (798.8)

4  
5 This was a one-year project completed in 2018. The budget for the project was based on  
6 prediction of the magnitude of in-service failures using historical data and engineering  
7 judgement. The 2018 project variance is attributed to the actual number of failures  
8 incurred. A detailed list of work executed under this project is found in Section 9.0.

9

10 **4. Hydraulic Generation Refurbishment and Modernization: Various Sites**

11 **Annual Variance (\$000)**

12 Budget: 10,325.4                      Expenditures: 5,856.3                      Variance: (4,469.1)

13

14 **Project Variance (\$000)**

15 Budget: 14,608.5                      Expenditures & Forecast: 12,718.1                      Variance: (1,890.4)

16

17 This is a two-year project (2018–2019) that commenced in 2018. The variance in 2018  
18 expenditures is primarily attributed to a rescheduling of a portion of the planned work  
19 to 2019 for the following projects:

- 20 • Internal and external refurbishment of Bay d’Espoir Surge Tank 1. It was  
21 determined during project planning that the available generation outage  
22 duration in 2018 was inadequate to complete the entire scope. The external tank  
23 work was completed in 2018 and the internal tank work has been rescheduled to  
24 2019.
- 25 • Refurbishment at Hinds Lake Control Structure and Bay d’Espoir Intake 1  
26 Structure. A change in contracting strategy resulted in a portion of the  
27 engineering, procurement and construction activity originally planned for 2018  
28 to be rescheduled to 2019.

- 1           • Bay d’Espoir Unit 2 Turbine Overhaul. The variance in 2018 expenditures is also  
2           attributed to a reduced volume of work than that originally estimated for Bay  
3           d’Espoir Unit 2 Turbine Overhaul. Upon disassembly of the Unit 2, it was found  
4           that the discharge wear ring could be refurbished in-place, rather than replaced.

5  
6 **5. Install Asset Health Monitoring System: Upper Salmon**

7 **Annual Variance (\$000)**

8 Budget: 426.5                      Expenditures: 141.5                      Variance: (285.0)

9  
10 **Project Variance (\$000)**

11 Budget: 641.4                      Expenditures: 356.4                      Variance: (285.0)

12  
13 This was a two-year project (2017–2018) that was completed in 2018. The construction  
14 activities for this project were estimated based on having the construction completed by  
15 contractors. Hydro was able to leverage an opportunity to execute the activities using  
16 internal operations and maintenance resources, resulting in overall project expenditures  
17 less than budget.

18  
19 **6. Water System Replacements: Bay d’Espoir and Cat Arm**

20 **Annual Variance (\$000)**

21 Budget: 2,377.1                      Expenditures: 1,520.7                      Variance: (856.4)

22  
23 **Project Variance (\$000)**

24 Budget: 2,553.8                      Expenditures: 1,697.4                      Variance: (856.4)

25  
26 This was a two-year project (2017–2018) that was completed in 2018. The variance in  
27 2018 and total project expenditures is attributed to the implementation of a more cost-  
28 effective construction strategy for this project through the implementation of three-  
29 dimensional laser scanning that was not previously considered. Three-dimensional laser

1 scanning was used as a design tool, allowing piping sections to be prefabricated off-site  
2 and reducing the overall installation costs during unit outages.

3  
4 **7. Refurbish Powerhouse Station Services: Bay d’Espoir**

5 **Annual Variance (\$000)**

6 Budget: 2,843.5                      Expenditures: 1,003.5                      Variance: (1,840.0)

7  
8 This is a three-year project (2017–2019) that commenced in 2017. The variance in 2018  
9 expenditures is attributed to a portion of the procurement and construction activity that  
10 was originally planned for 2018 now expected in 2019. The engineering for this project  
11 was delayed in 2017 and partially recovered in 2018, however the long lead time to  
12 procure materials did align with the 2018 planned generation outages. There is no  
13 change to the overall project scope, budget, or completion date.

14  
15 **8. Replace Exciter Controls Units 1 to 6: Bay d’Espoir**

16 **Annual Variance (\$000)**

17 Budget: 857.7                      Expenditures: 628.9                      Variance: (228.8)

18  
19 This is a three-year project (2017–2019) that commenced in 2017. The variance in 2018  
20 expenditures is attributed to less than estimated engineering costs. The planned scope  
21 of work for 2018 is complete. The project remains on schedule with no change to the  
22 overall project scope, budget, or completion date.

23  
24 **9. Upgrade Ventilation in Powerhouse 1 and 2: Bay d’Espoir**

25 **Annual Variance (\$000)**

26 Budget: 886.1                      Expenditures: 573.8                      Variance: (312.3)

27  
28 **Project Variance (\$000)**

29 Budget: 997.9                      Expenditures: 685.6                      Variance: (312.3)

1 This was a two-year project (2017–2018) that was completed in 2018. The variance in  
2 2018 and total project expenditure is attributed to cancellation of a portion of the  
3 project scope. During design development, it was determined that the planned  
4 generator heat recovery and distribution system for Bay d’Espoir Powerhouse 1,  
5 consisting of sheet metal ductwork from the top of each generating unit to the lower  
6 levels of the powerhouse, would be prone to damage each time the unit is  
7 disassembled, resulting in high repair costs over the life of the asset. Therefore, the heat  
8 recovery and distribution system scope was cancelled. The other project scope, to  
9 replace roof ventilators and upgrade ventilation louvers in Bay d’Espoir Powerhouses 1  
10 and 2, was completed as planned.

11  
12 **10. Purchase Capital Spares: Hydraulic**

13 **Project Variance (\$000)**

14 Budget: 487.4                      Expenditures: 629.6                      Variance: 142.2

15  
16 This was a planned one-year project that commenced in 2017 and was carried over and  
17 completed in 2018. The variance in total project expenditures is attributed to the  
18 addition of the procurement of a spare set of generator bearing coolers for the Hinds  
19 Lake Unit to the project scope. As stated in the “2017 Capital Expenditures and  
20 Carryover Report,” Hydro experienced failures of generator bearing coolers in Hinds  
21 Lake and determined that spare coolers were required in the event of additional failures  
22 in the 2017–2018 winter season.

23  
24 **11. Replace Slip Rings Units 1 to 6: Bay d’Espoir**

25 **Annual Variance (\$000)**

26 Budget: 369.9                      Expenditures: 17.2                      Variance: (352.7)

27  
28 This is a two-year project (2017–2018) that commenced in 2017 and has been carried  
29 over into 2019. The rescheduling of the 2018 construction to 2019 resulted in the

1 variance in 2018 expenditures. The project scope is to replace slip rings on six units at  
2 Bay d'Espoir. Two were installed in 2017. Three were not installed in 2018 based on a  
3 condition assessment during the unit outages, and were initially considered for  
4 cancellation. Upon disassembly of Unit 2 (the fourth installation planned for 2018), it  
5 was determined that actual dimensions varied from drawings and the new slip ring  
6 could not be installed. It was also identified that there was accelerated brush wear on  
7 Unit 2. This new information resulted in a reassessment of the decision to not replace  
8 the other three slip rings planned for 2018 and led to reinstatement of the original  
9 recommendation to install the new slip rings. Given that the 2018 outages had already  
10 been completed, the remaining slip rings will be installed in 2019.

11  
12 **12. Control Structure Refurbishments**

13 **Annual Variance (\$000)**

14 Budget: 1,196.8                      Expenditures: 709.3                      Variance: (487.5)

15  
16 **Project Variance (\$000)**

17 Budget: 2,188.2                      Expenditures & Forecast: 1,844.8                      Variance: (343.4)

18  
19 This is a two-year project (2017–2018) that commenced in 2017 and has carried over  
20 into 2019. The project scope includes refurbishment work at four water control  
21 structures. The work was completed at three of the locations (North Salmon Spillway  
22 Structure, Granite Canal Intake Structure, and Ebbegunbaeg Control Structure);  
23 however, the work for Burnt Dam has been rescheduled to 2019 due to a delay in  
24 completing the engineering design.

1 **13. Upgrade Work: Cat Arm**

2 **Annual Variance (\$000)**

3 Budget: 910.3                      Expenditures: 1,376.3                      Variance: 466.0

4

5 **Project Variance (\$000)**

6 Budget: 1,911.3                      Expenditures & Forecast: 2,407.6                      Variance: 496.3

7

8 This is a two-year project (2016–2017) that commenced in 2016 and has been carried  
9 over into 2019. One aspect of the project scope is the purchase and installation of two  
10 deflector servomotors. These servomotors have a long lead time and could not be  
11 ordered until an existing servomotor of the same design was installed, tested, and  
12 proven to meet the performance specifications. The existing servomotor was installed in  
13 September 2018 and determined to meet the performance specifications. The new  
14 servomotors have been ordered and will be received and installed in 2019.

15

16 Another aspect of the project scope was to refurbish the spherical valve control system.  
17 A portion of the variance in 2018 and in total project expenditures is associated with this  
18 scope. In particular, it is attributed to increased material requirements identified during  
19 detailed engineering design. As well, there were cost increases as a result of a change in  
20 construction strategy from the original plan of internal labour to use of contractor due  
21 to unavailability of internal resources. This scope was completed in 2018.

22

23 **14. Rehabilitate Shoreline Protection: Cat Arm**

24 **Annual Variance (\$000)**

25 Budget: 977.2                      Expenditures: 89.2                      Variance: (888.0)

26

27 This is a two-year project (2016–2017) that commenced in 2016 and carried over into  
28 2019. During project planning, it was determined that there is risk of rock fall from the  
29 adjacent cliff into the construction zone. The identification of the necessity for risk

1 mitigation to ensure a safe work site resulted in a pause on the project to estimate the  
2 associated cost and, if necessary, re-evaluate the project alternatives. A site survey was  
3 completed in September 2018 and a cost estimate for mitigation of the safety hazard  
4 was completed in December 2018. These costs will be used in 2019 to update the  
5 project estimate and re-evaluate the cost benefit analysis of project alternatives prior to  
6 proceeding any further.

7  
8 **15. Replace Pump House and Associated Equipment: Bay d'Espoir**

9 **Annual Variance (\$000)**

10 Budget: 253.6                      Expenditures: 373.9                      Variance: 120.3

11  
12 **Project Variance (\$000)**

13 Budget: 545.2                      Expenditures & Forecast: 996.7                      Variance: 451.5

14  
15 This is a two-year project (2015–2016) that has carried over into 2019. The variance in  
16 2018 and total project expenditures is attributed to higher than expected construction  
17 costs. Construction was originally tendered in 2016, but was not awarded since  
18 tendered prices were significantly higher than the budget. A reassessment of the design  
19 and execution strategy was undertaken, but did not result in any anticipated significant  
20 savings. Replacement of the pump house became critical after damage sustained from  
21 flooding during Hurricane Matthew in 2016. The work was retendered and construction  
22 began in the summer of 2018. Delivery of the prefabricated pump house building was  
23 late in 2018 resulting in carry over of the final construction activity to 2019.

24  
25 **4.2 Thermal Generation Projects (Table 4)**

26 **16. Thermal In-Service Failures**

27 **Project Variance (\$000)**

28 Budget: 1,250.0                      Expenditures: 2,699.9                      Variance: 1,449.9



1 This was a one-year project completed in 2018. The budget for the project was based on  
2 prediction of the magnitude of in-service failures using historical data and engineering  
3 judgement. The variance in project expenditures is attributed to the actual number of  
4 failures incurred. A detailed list of work executed under this project is found in Section  
5 10.0 of this report.

6  
7 **17. Overhaul Pumps: Holyrood**

8 **Project Variance (\$000)**

9 Budget: 438.3                      Expenditures: 302.7                      Variance: (135.6)

10  
11 This was a one-year project completed in 2018. The variance in project expenditures is  
12 attributed to lower than expected materials and contract labour costs.

13  
14 **18. Condition Assessment and Miscellaneous Upgrades: Holyrood**

15 **Project Variance (\$000)**

16 Budget: 2,749.6                      Expenditures: 3,906.9                      Variance: 1,157.3

17  
18 This was a one-year project completed in 2018. The variance in expenditures is  
19 attributed to higher than expected contract pricing for work on the boilers, stacks,  
20 marine terminal arms, and brush holders. Also, following disassembly of the Unit 3  
21 travelling screen, its condition was determined to be poorer than originally expected.  
22 This resulted in additional refurbishment requirements. As well, additional fuel storage  
23 tank inspections were required to meet the requirements of the *Storage and Handling*  
24 *of Gasoline and Associated Products Regulations, 2003*.

25  
26 **19. Install Raw Water Line: Holyrood**

27 **Project Variance (\$000)**

28 Budget: 1,252.6                      Expenditures: 1,528.5                      Variance: 275.9

1 This was a one-year project completed in 2018. The variance in expenditures is  
2 attributed to additional design requirements determined during detailed project  
3 planning and engineering, including: (i) the requirement for a higher grade of piping  
4 than originally estimated, (ii) the requirement to bury the piping to a greater depth than  
5 originally estimated, (iii) the requirement to install an intake at the Quarry Brook Dam,  
6 and (iv) the requirement to incorporate a powerhouse utilidor crossing into the design.  
7 The utilidor includes cables, piping, and a walkway that could not be relocated.  
8

9 **20. Install Fire Detection in Outbuildings: Holyrood**

10 **Annual Variance (\$000)**

11 Budget: 198.6                      Expenditures: 70.4                      Variance: (128.2)  
12

13 This is a one-year project that commenced in 2018 and carried over into 2019. The  
14 variance in 2018 expenditures is attributed to the rescheduling of a portion of the  
15 construction activity to 2019. The rescheduling was the result of difficulties experienced  
16 during installation of the overhead cables. The existing aerial enclosure was determined  
17 to be unsuitable for the type of cable being installed and requires modifications.  
18 Materials have been ordered for the necessary modifications and construction is  
19 expected to be completed in the first quarter of 2019.  
20

21 **21. Upgrade Holyrood Access Road: Holyrood**

22 **Annual Variance (\$000)**

23 Budget: 583.4                      Expenditures: 0.0                      Variance: (583.4)  
24

25 **Project Variance (\$000)**

26 Budget: 1,162.7                      Expenditures: 825.7                      Variance: (337.0)  
27

28 This was a two-year project (2017–2018) completed in 2017. Hydro tendered the  
29 construction work with optional pricing to complete all of the construction in the first

1 year. The optional pricing was favorable and Hydro proceeded with completion of the  
2 project in 2017. The variance in project expenditures is attributed to lower than  
3 estimated contract pricing as well as savings associated with completing the project in a  
4 single year.

5  
6 **22. Upgrade Underground Plant Drainage System: Holyrood**

7 **Project Variance (\$000)**

8 Budget: 923.1                      Expenditures: 1,890.8                      Variance: 967.7

9  
10 This was a one-year project that commenced in 2017 and was carried over and  
11 completed in 2018. The variance in overall project expenditure is attributed to the  
12 requirement to replace more piping than originally estimated (due to further  
13 deterioration of the piping from the time of the budget proposal), higher than expected  
14 contract tender prices, and the requirement for asbestos removal, which was not  
15 included in the original estimate.

16  
17 **23. Upgrade Powerhouse Building Envelope: Holyrood**

18 **Annual Variance (\$000)**

19 Budget: 1,859.7                      Expenditures: 1,022.7                      Variance: (837.0)

20  
21 **Project Variance (\$000)**

22 Budget: 6,477.8                      Expenditures: 5,640.8                      Variance: (837.0)

23  
24 This was a three-year project (2016–2018) that commenced in 2016 and was completed  
25 in 2018. The variance in project expenditure is attributed to lower than estimated  
26 engineering and construction costs.

1 **4.3 Gas Turbine Generation Projects (Table 5)**

2 **24. Gas Turbine Equipment Replacement and Refurbishment: Hardwoods and**

3 **Stephenville**

4 **Annual Variance (\$000)**

5 Budget: 997.9                      Expenditures: 371.3                      Variance: (626.6)

7 **Project Variance (\$000)**

8 Budget: 1,427.2                      Expenditures & Forecast: 1,280.8                      Variance: (146.4)

9  
10 This is a two-year project (2018–2019) that commenced in 2018. The variance in 2018  
11 expenditures is attributed to the rescheduling of the air intake refurbishment from 2018  
12 to 2019. This work was rescheduled to allow project management and engineering  
13 resources to focus on higher priority gas turbine work including the separate project to  
14 inspect and overhaul the hot gas path for Holyrood Gas Turbine, which was required to  
15 be advanced from 2019 to 2018. The other planned scope for 2018, to refurbish the  
16 exhaust stacks, was completed in 2018 as originally planned. The variance in overall  
17 project budget is attributed to lower than estimated tendered prices for the exhaust  
18 stack work.

20 **25. Increase Fuel and Water Treatment System Capacity: Holyrood Gas Turbine**

21 **Annual Variance (\$000)**

22 Budget: 8,829.9                      Expenditures: 2,583.8                      Variance: (6,246.1)

23  
24 This is a two-year project (2018–2019) that commenced in 2018. The variance in 2018  
25 expenditures is attributed to the rescheduling of the fuel tank construction from 2018 to  
26 2019. The rescheduling is due to longer than estimated time required to complete the  
27 detailed engineering. In 2018, the engineering was completed, steel was purchased,  
28 new tank dyke was constructed, and road relocation was completed. The tanks will be  
29 constructed in 2019 and are expected to be in service prior to the start of the 2019–

1 2020 winter operating season. The other project scope associated with the water  
2 treatment system is proceeding as originally planned, with construction planned for  
3 2019.

4  
5 **26. Turbine Hot Gas Path Level 2 Inspection and Overhaul: Holyrood Gas Turbine**

6 **Annual Variance (\$000)**

7 Budget: 6,538.8                      Expenditures: 9,770.7                      Variance: 3,231.9

8  
9 This is a two-year project (2018–2019) that commenced in 2018 and was substantially  
10 completed in 2018. Hydro reported to the Newfoundland and Labrador Board of  
11 Commissioners of Public Utilities (the “Board”) in a letter dated July 26, 2018, that the  
12 overhaul had to be advanced and completed in 2018 due to greater than anticipated use  
13 of the Holyrood gas turbine since its last inspection and overhaul. The variance in 2018  
14 expenditures is due to the advancement; however, the variance in overall project  
15 budget (less than the reportable criteria but discussed for context) is attributed to a  
16 reduction of project scope. Upon disassembly and inspection, it was determined that  
17 the interstage seals did not require replacement. The inspection and overhaul was  
18 completed and the unit was returned to service in the fourth quarter of 2018. Project  
19 close out activities are expected to conclude in the first quarter of 2019.

20 **27. Gas Turbine Life Extension: Stephenville**

21 **Annual Variance (\$000)**

22 Budget: 529.8                      Expenditures: 251.7                      Variance: (278.1)

23  
24 **Project Variance (\$000)**

25 Budget: 1,353.2                      Expenditures: 593.9                      Variance: (759.3)

26  
27 This was a two-year project (2017–2018) that was completed in 2018. The variance in  
28 both the 2018 expenditures and total project expenditures are attributed to the  
29 removal of a portion of the project scope. Due to the anticipated retirement of the

1 Hardwoods and Stephenville Gas Turbines, Hydro continues to assess any proposed  
2 capital expenditures for these units. After a comprehensive review of the project scope  
3 prior to project execution, Hydro removed the installation of closed circuit television  
4 cameras from the scope, and planned instrumentation upgrades were revised to include  
5 only those requiring immediate replacement, based on function testing and evaluation  
6 results. The replacement of lube oil filters was also removed from the scope based on  
7 updated condition assessment, expected remaining service life, and the availability of  
8 spare filters.

9  
10 **28. Gas Turbine Life Extension: Hardwoods**

11 **Annual Variance (\$000)**

12 Budget: 309.7                      Expenditures: 195.6                      Variance: (114.1)

13  
14 **Project Variance (\$000)**

15 Budget: 956.7                      Expenditures: 469.2                      Variance: (487.5)

16  
17 This was a two-year project (2017–2018) that was completed in 2018. The variance in  
18 both the 2018 expenditures and total project expenditures are attributed to the  
19 removal of a portion of the project scope. Due to the anticipated retirement of the  
20 Hardwoods and Stephenville Gas Turbines, Hydro continues to assess any proposed  
21 capital expenditures for these units. After a comprehensive review of the project scope  
22 prior to project execution, Hydro removed the installation of closed circuit television  
23 cameras from the scope, and planned instrumentation upgrades were revised to include  
24 only those requiring immediate replacement, based on function testing and evaluation  
25 results. The replacement of lube oil filters was also removed from the scope based on  
26 updated condition assessment, expected remaining service life, and the availability of  
27 spare filters.

1 **4.4 Terminal Stations Projects (Table 6)**

2 **29. Terminal Station In-Service Failures**

3 **Project Variance (\$000)**

4 Budget: 1,000.0                      Expenditures: 2,268.8                      Variance: 1,268.8

5  
6 This was a one-year project completed in 2018. The budget for the project was based on  
7 prediction of the magnitude of in-service failures using historical data and engineering  
8 judgement. The 2018 variance is attributed to the actual number of failures incurred. A  
9 detailed list of work executed under this project is found in Section 8.0 of this report.

10

11 **30. Upgrade Aluminum Support Structures: Holyrood**

12 **Project Variance (\$000)**

13 Budget: 287.6                      Expenditures: 143.1                      Variance: (144.5)

14  
15 This was a one-year project completed in 2018. The variance in project expenditures is  
16 attributed to cost savings measures identified during project planning and engineering.  
17 Hydro was able to use existing temporary support structures from a previous project  
18 during construction of the permanent support structures, eliminating the need to  
19 fabricate additional temporary support structures. The project was executed in parallel  
20 with the Terminal Station Refurbishment and Modernization project, allowing Hydro to  
21 realize efficiencies for engineering, procurement and construction effort.

22

23 **31. Replace Transformer T1: Buchans**

24 **Annual Variance (\$000)**

25 Budget: 249.0                      Expenditures: 99.0                      Variance: (150.0)

26  
27 This is a two-year project (2018–2019) that commenced in 2018. The variance in 2018  
28 expenditures is attributed to a portion of the engineering and procurement activity

1 being rescheduled from late 2018 to early 2019. This delay is not expected to impact the  
2 overall project completion date or budget.

3  
4 **32. Purchase Mobile DC Power Systems**

5 **Annual Variance (\$000)**

6 Budget: 270.9                      Expenditures: 41.9                      Variance: (229.0)

7  
8 This is a two-year project (2018–2019) that commenced in 2018. The variance in 2018  
9 expenditures is attributed to the revised time frame for delivery of equipment originally  
10 expected in 2018, now expected in 2019. The project scope includes the procurement of  
11 three mobile DC power systems, one of which was originally expected to be received in  
12 2018. Hydro now expects to receive all three in 2019.

13  
14 **33. Terminal Station Refurbishment and Modernization: Various Sites**

15 **Annual Variance (\$000)**

16 Budget: 8,170.6                      Expenditures: 1,983.8                      Variance: (6,186.8)

17  
18 This is a two-year project (2018–2019) that commenced in 2018 and includes a number  
19 of consolidated program-type terminal station projects across several sites. The variance  
20 is primarily attributed to the rescheduling of various project scope items from 2018 to  
21 2019 due to outage duration constraints, resource constraints, delayed material  
22 procurement, and longer than anticipated material lead time deliveries. Items delayed  
23 from 2018 to 2019 include: (i) the transformer and generator protection upgrade at  
24 Upper Salmon, (ii) transformer bushing deliveries, (iii) disconnect deliveries, (iv) the  
25 installation of four disconnect switches and one breaker at Wabush, and (v) delayed  
26 instrument transformer material costs. The instrument transformers are available in  
27 Hydro’s inventory and will be attributed to the capital project as drawn from inventory  
28 in 2019, whereas the original budget assumed those costs would be in 2018.



1 **34. Upgrade Corner Brook Frequency Converter: Corner Brook**

2 **Annual Variance (\$000)**

3 Budget: 2,901.6                      Expenditures: (42.2)                      Variance: (2,943.8)

4

5 **Project Variance (\$000)**

6 Budget: 2,943.8                      Expenditures: 0.0                      Variance: (2,943.8)

7

8 This is a two-year project (2017–2018) that commenced in 2017, was placed on hold to  
9 confirm alignment with the customer, and subsequently was cancelled as a result of the  
10 sale of the Corner Brook Frequency Converter to Corner Brook Pulp and Paper Limited.  
11 The sale was approved by Board Order P.U. 26(2018) on August 9, 2018. Hydro reversed  
12 any costs incurred as a result of the front-end engineering, and design costs associated  
13 with the capital project at the time the project was cancelled.

14

15 **35. Replace 66 kV Station Service Feed: Holyrood**

16 **Annual Variance (\$000)**

17 Budget: 1,180.7                      Expenditures: 235.0                      Variance: (945.7)

18

19 This is a two-year project (2017–2018) that has carried over into 2019. The variance in  
20 2018 expenditure is attributed to the rescheduling of the construction activity to 2019.  
21 The rescheduling is the result of late procurement of the cables and associated  
22 components with long delivery times. The materials were not received in time for the  
23 planned generation outage in 2018.

1 **36. Replace Substation: Holyrood**

2 **Annual Variance (\$000)**

3 Budget: 1,082.6                      Expenditures: 369.7                      Variance: (712.9)

4

5 **Project Variance (\$000)**

6 Budget: 1,198.0                      Expenditures & Forecast: 798.2                      Variance: (399.8)

7

8 This is a two-year project (2017–2018) that has carried over into 2019. The variance in  
9 2018 expenditure is attributed to the rescheduling of the construction activity to 2019,  
10 following identification of a lower cost alternative for the project. The variance in total  
11 project expenditures and forecast is attributed to the planned implementation of that  
12 lower cost alternative. During project engineering, connection of a power supply from  
13 Newfoundland Power was identified as a viable alternative and the project was placed  
14 on pause. The alternative was estimated and determined to be the least-cost solution  
15 compared to the original project scope to construct a new substation. A new project  
16 scope and schedule was developed in coordination with Newfoundland Power, which  
17 includes construction activity in 2019. Hydro expects the project to be completed in 2019  
18 at the forecasted lower cost.

19

20 **37. Replace Power Transformers: Oxen Pond**

21 **Annual Variance (\$000)**

22 Budget: 1,038.5                      Expenditures: 539.1                      Variance: (499.4)

23

24 **Project Variance (\$000)**

25 Budget: 1,147.6                      Expenditures: 648.2                      Variance: (499.4)

26 This is a two-year project (2017–2018) that was completed in 2018. The variance in both  
27 2018 and total project expenditures are attributed to lower than estimated tender  
28 pricing for the transformers supply and installation.

1 **38. Terminal Station Refurbishment and Modernization: Various Sites**

2 **Annual Variance (\$000)**

3 Budget: 19,689.1                      Expenditures: 10,464.4                      Variance: (9,224.7)

4

5 **Project Variance (\$000)**

6 Budget: 27,382.1                      Expenditures & Forecast: 18,644.2                      Variance: (8,737.9)

7

8 This is a two-year project (2017–2018) that commenced in 2017 and has carried over to  
9 2019. The project includes a number of consolidated program-type terminal station  
10 projects across several sites. The variance in total project expenditures is primarily  
11 associated with the refurbishment or replacement of power transformers and  
12 disconnect switches. In particular, the variance is attributed to a portion of the work  
13 being executed for less than the budgeted cost and some scope reduction as new asset  
14 condition information became available. Bushing replacements for Holyrood T5 and T7  
15 and Bay d’Espoir T10 and transformer dehydrators for Happy Valley T3 and Oxen Pond  
16 T2 were removed from this project and will be executed as part of the 2019 Terminal  
17 Station Refurbishment and Modernization project, which has sufficient budget for this  
18 work.

19

20 The variance in 2018 expenditures is attributed to the scope reductions described  
21 above, as well as the carryover of the following project activity to the 2019 Terminal  
22 Station Refurbishment and Modernization project, which has sufficient budget for this  
23 work:

24

- 25 • Replacement of four disconnect switches at Western Avalon, Sunnyside, and  
26 Holyrood, due to system outage limitations;
- 27 • Construction activity for the breaker failure protection at Berry Hill and Peter’s  
28 Barren, due to a review of alternatives for the telecommunications requirements  
29 of the project;

- Grounding system upgrades at three terminal stations, due to more complex designs required to address exceptionally high ground potential rise at these locations;
- Final tie-in and commissioning of the protective relay replacements at Bay d’Espoir, due to unavailability of an outage in 2018; and
- Protective relay replacements at Holyrood, due to additional engineering requirements and an unforeseen condition with the transformer T7.

**39. Upgrade Circuit Breakers: Various Sites**

**Annual Variance (\$000)**

Budget: 18,709.1                      Expenditures: 15,184.2                      Variance: (3,524.9)

This is a five-year project (2016–2020) that commenced in 2016 and includes breaker replacements and refurbishments at a number of terminal station sites each year. The variance in 2018 expenditures is primarily attributed to rescheduling of various project scope items to other years within the project. This is primarily due to new condition information, changing priorities for system reliability, and balancing of the overall work plan. Four circuit breaker replacements planned for 2018 were rescheduled to 2019, including two at Western Avalon Terminal Station, one at Bay d’Espoir Terminal Station 1, and one at Wabush Terminal Station. The rescheduling of the breakers at Western Avalon and Bay d’Espoir was due to the impacts of other major system upgrade projects on both resources and overall site congestion. The rescheduling of the breaker at Wabush was a result of the technical and economic difficulty associated with finding an additional suitable outage window given the potential reliability impact on Iron Ore Company of Canada.

In Hydro’s 2019 Capital Budget Application, 10 circuit breakers were removed from the project scope, as reflected in the presented overall project budget. An updated assessment of these breakers concluded that replacement could be deferred until

1 2021/2022. Hydro will apply to replace these breakers in a subsequent application to  
2 the Board as part of the 2021 Capital Budget Application. The 10 breakers removed from  
3 scope were: Happy Valley 13-1, Bay d’Espoir B13T11, Massey Drive B3T3, Stephenville  
4 B2L405 and B2T3, Stony Brook B3L130, L05L31 and B3L22, and Buchans L28L32 and  
5 B1L28.

6  
7 **40. Replace Protective Replays: Various Sites**

8 **Annual Variance (\$000)**

9 Budget: 267.5                      Expenditures: 754.4                      Variance: 486.9

10  
11 **Project Variance (\$000)**

12 Budget: 1,857.0                      Expenditures: 3,314.7                      Variance: 1,457.7

13  
14 This is a two-year project (2016–2017) that commenced in 2016 and was carried over  
15 and completed in 2018. The variance in both 2018 and total project expenditures are  
16 attributed to higher than estimated engineering, procurement, and construction costs.  
17 During the design phase of the project, revisions to Hydro’s design standard for  
18 protective relays were required. The changes to the standard were made to address  
19 lessons learned from system events. The updated standard significantly impacted the  
20 overall design for these protection systems. This increased the engineering design effort  
21 on this project and resulted in increased procurement and construction costs due to the  
22 requirement for additional components to adhere to the new standard. Also  
23 contributing to the variance was additional engineering and contract costs resulting  
24 from discrepancies between design drawings and field conditions for the work in Bay  
25 d’Espoir. This resulted in a rescheduling of the work from the spring to the fall and a  
26 need to mobilize a different contractor for the work.

1 **41. Replace Disconnect Switches: Various Sites**

2 **Annual Variance (\$000)**

3 Budget: 771.2                      Expenditures: 225.0                      Variance: (546.2)

4

5 **Project Variance (\$000)**

6 Budget: 1,967.8                      Expenditures: 1,421.6                      Variance: (546.2)

7

8 This is a two-year project (2016–2017) that carried over and was completed in 2018. The  
9 variance in both 2018 and total project expenditures are attributed to lower than  
10 estimated construction costs. As well, one of the disconnect switches planned for  
11 replacement at Bay d’Espoir could not be completed due to unavailability of an outage  
12 to complete the work. This scope of work was removed from the project and will be  
13 executed in 2019 as part of the Terminal Station Refurbishment and Modernization  
14 project, which has sufficient budget for this work.

15

16 **42. Install Breaker Failure Protection: Various Sites**

17 **Annual Variance (\$000)**

18 Budget: 22.2                      Expenditures: 234.7                      Variance: 212.5

19

20 **Project Variance (\$000)**

21 Budget: 277.0                      Expenditures & Forecast: 691.5                      Variance: 414.5

22

23 This is a two-year project (2016–2017) that has carried over to 2019. The variance in  
24 both 2018 expenditure and total project expenditures and forecast are attributed to  
25 higher than estimated engineering, procurement and construction costs. During the  
26 design phase of the project, revisions to Hydro’s design standard for breaker failure  
27 protection were required. The changes to the standard were made to address lessons  
28 learned from system events. The updated standard significantly impacted the overall  
29 design for breaker failure protection. This increased the engineering design effort on

1 this project and resulted in increased procurement and construction costs due to the  
2 requirement for additional components to adhere to the new standard. A requirement  
3 for additional telecommunications cabling was identified for the work at Howley, Indian  
4 River, and Deer Lake and this work has been scheduled for 2019.

5  
6 **43. Install Fire Protection in 230 kV Stations: Bay d'Espoir**

7 **Annual Variance (\$000)**

8 Budget: 681.7                      Expenditures: 400.8                      Variance: (280.9)

9  
10 **Project Variance (\$000)**

11 Budget: 766.0                      Expenditures: 592.9                      Variance: (173.1)

12  
13 This was a two-year project (2016–2017) that carried over and was completed in 2018.  
14 The variance in 2018 and total project expenditures are attributed to the utilization of a  
15 less complex design for the fire protection system, which resulted in a reduction in  
16 contract costs.

17  
18 **4.5 Transmission Projects (Table 7)**

19 **44. Wood Pole Line Management Program: Various Sites**

20 **Project Variance (\$000)**

21 Budget: 3,532.9                      Expenditures: 3,185.6                      Variance: (347.3)

22  
23 This was a one-year project completed in 2018. The variance in expenditures was  
24 attributed to the unavailability of outages of TL 203. This resulted in the inability to  
25 complete pole replacements. The work will be completed under the 2019 Wood Pole  
26 Line Management Program.

1	<b>45. <u>Transmission Line Upgrades: TL 212 and TL 218</u></b>		
2	<b>Annual Variance (\$000)</b>		
3	Budget: 2,224.4	Expenditures: 1,440.6	Variance: (783.8)
4			
5	<b>Project Variance (\$000)</b>		
6	Budget: 2,511.5	Expenditures: 1,727.7	Variance: (783.8)
7			
8	This is a two-year project (2017–2018) that commenced in 2017 and was completed in		
9	2018. The variance in annual expenditure is attributed to lower than estimated		
10	procurement and construction costs.		
11			
12	<b>46. <u>Replace Insulators: TL 227</u></b>		
13	<b>Annual Variance (\$000)</b>		
14	Budget: 400.2	Expenditures: 282.7	Variance: (117.5)
15			
16	<b>Project Variance (\$000)</b>		
17	Budget: 416.9	Expenditures: 299.4	Variance: (117.5)
18			
19	This is a two-year project (2017–2018) that commenced in 2017 and was completed in		
20	2018. The variance in annual expenditure is attributed to lower than estimated		
21	construction costs.		
22			
23	<b>47. <u>Refurbish Anchors and Footings TL 202 and TL 206: Bay d’Espoir to Sunnyside</u></b>		
24	<b>Annual Variance (\$000)</b>		
25	Budget: 1,829.8	Expenditures: (350.1)	Variance: (2,179.9)
26			
27	<b>Project Variance (\$000)</b>		
28	Budget: 2,179.9	Expenditures: 0.00	Variance: (2,179.9)



1 This is a two-year project (2014–2015) that commenced in 2014 and was carried over  
2 into 2018 for execution during the construction of TL 267, taking advantage of the  
3 access required for TL 267. In 2018, a detailed reassessment of the approved work  
4 scope was completed. The anchors exhibited surface corrosion, but there was no  
5 apparent deep pitting or loss of structural integrity. Hydro will continue to monitor the  
6 anchors and foundations as part of its maintenance program. Hydro has concluded that  
7 the refurbishment work is not required and the project has been cancelled; however, a  
8 future capital project may be initiated if justified. Hydro reversed any costs incurred to  
9 date associated with the capital project at the time the project was cancelled.

10  
11 **48. 230 kV Transmission Line: Bay d’Espoir to Western Avalon**

12 **Annual Variance (\$000)**

13 Budget: 16,658.3                      Expenditures: 10,942.1                      Variance: (5,716.2)

14  
15 This is a five-year project (2014–2018) that commenced in 2014 and carried over into  
16 2019. The variance in funds in 2018 is attributed to a portion of the final line  
17 reclamation tasks being deferred to summer of 2019, including the removal of bridges  
18 and reclamation along the right of way. The deferral of the tasks is due to high water  
19 levels preventing the safe removal of the bridges in 2018. There is no change to the  
20 overall project scope or budget.

21  
22 **4.6 Distribution Projects (Table 8)**

23 **49. Provide Service Extensions: All Service Areas**

24 **Project Variance (\$000)**

25 Budget: 4,642.0                      Expenditures: 3,709.1                      Variance: (932.9)

26  
27 This is an annual budget that is based on data from past experience to provide service  
28 extensions to customers. The variance is due to less than forecasted distribution service  
29 extension requests.

1 **50. Upgrade Distribution Systems: All Service Areas**

2 **Project Variance (\$000)**

3 Budget: 3,711.0                      Expenditures: 3,230.6                      Variance: (480.4)

4  
5 This is an annual budget that is based on data from past experience to provide upgrades  
6 to the in-service distribution system. The variance is due to less than forecasted upgrade  
7 requirements.

8

9 **51. Distribution System Upgrades: Various Sites**

10 **Annual Variance (\$000)**

11 Budget: 383.8                      Expenditures: 193.6                      Variance: (190.2)

12  
13 This is a two-year project (2018–2019) that commenced in 2018. The variance in 2018  
14 expenditures is attributed to the deferral of material procurement that was not required  
15 until 2019. There is no change to the overall project scope or budget.

16

17 **52. Additions for Load Growth: Happy Valley**

18 **Project Variance (\$000)**

19 Budget: 505.0                      Expenditures: 222.5                      Variance: (282.5)

20

21 This was a one-year project completed in 2018. The variance in expenditures was  
22 attributed to the development of a new distribution standard for 300 A regulators that  
23 were utilized in this project. The new standard satisfied project requirements, which  
24 enabled the existing regulator structure to be reused, thus resulting in lower  
25 procurement and construction costs.

1 **53. Distribution Upgrades: Various Sites**

2 **Annual Variance (\$000)**

3 Budget: 1,116.4                      Expenditures: 915.3                      Variance: (201.1)

4

5 **Project Variance (\$000)**

6 Budget: 1,195.1                      Expenditures: 994.0                      Variance: (201.1)

7

8 This is a two-year project (2017–2018) that commenced in 2017 and was completed in  
9 2018. The variance in annual expenditure is attributed to lower than estimated  
10 construction and procurement costs.

11

12 **54. Upgrade Distribution Systems: Various Sites**

13 **Annual Variance (\$000)**

14 Budget: 911.0                      Expenditures: 683.2                      Variance: (227.8)

15

16 This is a two-year project (2016–2017) that commenced in 2016 and was carried over to  
17 and completed in 2018. The carryover was required to complete the replacement of the  
18 underground distribution system in Bay d’Espoir, which was delayed in 2017 due to late  
19 material delivery. The variance in annual expenditure is attributed to lower than  
20 estimated construction and procurement costs. The total project expenditure is within  
21 3% of the overall project budget.

22

23 **4.7 Rural Generation Projects (Table 9)**

24 **55. Overhaul Diesel Units: Various Sites**

25 **Project Variance (\$000)**

26 Budget: 2,852.4                      Expenditures: 2,029.0                      Variance: (823.4)

27

28 This was a one-year project completed in 2018. The project is part of an ongoing  
29 program to overhaul diesel engines to sustain reliability of diesel generating plants.

1 Project estimates are based on the projected number of engines that will reach the  
2 criteria for overhaul, and typical extent of refurbishment. The project variance is  
3 attributed to less refurbishment than typically required for some of the engines, which  
4 remained unknown until the engines were disassembled.

5  
6 **56. Diesel Plant Engine Cooling System Upgrades: Various Sites**

7 **Annual Variance (\$000)**

8 Budget: 638.4                      Expenditures: 149.3                      Variance: (489.1)

9  
10 This is a two-year project that commenced in 2018. The variance in 2018 expenditures is  
11 attributed to a rescheduling of the work to optimize internal labour scheduling and  
12 travel requirements. The construction at Port Hope Simpson was advanced and  
13 completed in 2018 in conjunction with the Diesel Genset Replacements Project at that  
14 location. The construction at Black Tickle was rescheduled to 2019.

15  
16 **57. Additions for Load Growth: Makkovik and Rigolet**

17 **Project Variance (\$000)**

18 Budget: 730.1                      Expenditures: 302.0                      Variance: (428.1)

19  
20 This was a one-year project completed in 2018. The variance in project expenditures is  
21 attributed to material and construction costs being less than originally estimated.

22  
23 **58. Upgrade Ventilation: Cartwright**

24 **Annual Variance (\$000)**

25 Budget: 465.7                      Expenditures: 46.5                      Variance: (419.2)

26  
27 This is a one-year project that commenced in 2018 and has been carried over into 2019.  
28 The variance in 2018 expenditures is attributed to rescheduling of the construction to  
29 2019. The public tendering process for this project resulted in only one bid and there

1 was insufficient budget to award. Hydro decided to combine the ventilation upgrades  
2 with the Diesel Genset Replacement project planned for Cartwright in 2019, which may  
3 result in some cost savings.  
4

5 **59. Diesel Plant Fire Protection: Postville**

6 **Annual Variance (\$000)**

7 Budget: 505.6                      Expenditures: 37.2                      Variance: (468.4)  
8

9 This is a two-year project (2018–2019) that commenced in 2018. The variance in 2018  
10 expenditures is attributed to rescheduling of the engineering to start in the fourth  
11 quarter of 2018 and continue into the first quarter of 2019.  
12

13 **60. Inspect Fuel Storage Tanks: Black Tickle**

14 **Annual Variance (\$000)**

15 Budget: 818.7                      Expenditures: 481.7                      Variance: (337.0)  
16

17 This is a one year project that commenced in 2018 and has been carried over into 2019.  
18 The internal inspections of two fuel storage tanks were completed in 2018 as planned.  
19 The inspection for one of the tanks revealed that minor refurbishment was required and  
20 this refurbishment was completed in 2018. The inspection of the second tank revealed  
21 that a complete tank bottom replacement was required. Materials were ordered and  
22 the tank bottom replacement has been scheduled for 2019. It is estimated that there is  
23 sufficient budget remaining in the project to complete the tank bottom replacement.  
24

25 **61. Install Sub-Surface Drainage System: Paradise River**

26 **Project Variance (\$000)**

27 Budget: 524.9                      Expenditures: 721.6                      Variance: 196.7

1 This was a one-year project completed in 2018. The variance in project expenditures is  
2 attributed to higher than estimated costs for the site construction work required to  
3 adequately address the potential environmental impacts.

4

5 **62. Replace Secondary Containment System Liner: Nain**

6 **Annual Variance (\$000)**

7 Budget: 1,639.2                      Expenditures: 672.5                      Variance: (966.7)

8

9 **Project Variance (\$000)**

10 Budget: 3,089.6                      Expenditures & Forecast: 4,594.6                      Variance: 1,505.0

11

12 This is a two-year project (2018–2019) that commenced in 2018. The planned scope was  
13 to relocate all four existing fuel storage tanks to facilitate replacement of the secondary  
14 containment system liner. A constructability review of the planned scope was  
15 completed early in the project design phase, identifying a risk to cost and schedule. The  
16 identified risk in the work required to move the tanks during liner replacement  
17 warranted consideration, given that three small tanks are 45 years old and had  
18 unknown refurbishment requirements. Instead of removing, refurbishing, and  
19 reinstalling the three old tanks, there was an alternative to remove the three tanks and  
20 construct a new vertical fuel storage tank. Both alternatives were studied and it was  
21 concluded that the estimated cost is not materially different, but the risk to project cost,  
22 schedule, and asset integrity was materially higher to move, refurbish, and reinstall the  
23 old tanks than the alternative to construct a new tank. A decision was made to proceed  
24 with the alternative to replace the tank.

25

26 The variance in project expenditures and forecast is due to higher than estimated cost  
27 for civil construction. With the completion of the geotechnical study and detailed  
28 design, it was determined that significantly more earthworks would be required to  
29 replace the dyke liner and provide the required foundation support for the tanks. This

1 additional work is required regardless of the decision between the replacement or  
2 refurbishment of the tanks. Additionally, publically tendered pricing for the construction  
3 was higher than estimated.

4  
5 The variance in 2018 expenditure is due to a change in the execution plan for the work.  
6 The original budget assumed site construction work would start in 2018. Due to the  
7 length of time required to consider the new alternative and complete the detailed  
8 engineering, as well as an unanticipated long delivery time for the steel plate, the  
9 execution plan was modified to perform all site construction work in 2019.

10  
11 **63. Diesel Genset Replacements: Makkovik**

12 **Annual Variance (\$000)**

13 Budget: 604.1                      Expenditures: 1,585.1                      Variance: 981.0

14  
15 This is a three-year project (2018–2020) that commenced in 2018. The annual variance  
16 is attributed to an advancement of a portion of the 2019 construction work into 2018.  
17 Given the short construction season at Makkovik, construction of the foundation and  
18 other civil work was advanced to decrease scope congestion in 2019, thus mitigating  
19 schedule risk.

20  
21 **64. Replace Automation Equipment: St. Anthony**

22 **Annual Variance (\$000)**

23 Budget: 307.4                      Expenditures: 127.2                      Variance: (180.2)

24  
25 This is a two-year project (2018–2019) that commenced in 2018. The variance in 2018  
26 expenditures is attributed to material delivery originally planned for 2018 that will now  
27 be delivered in 2019. This change in material delivery does not impact the overall  
28 project schedule.

1 **65. Diesel Genset Replacements: Port Hope Simpson and Charlottetown**

2 **Annual Variance (\$000)**

3 Budget: 5,593.2                      Expenditures: 3,973.8                      Variance: (1,619.4)

4  
5 **Project Variance (\$000)**

6 Budget: 5,806.8                      Expenditures: 4,187.4                      Variance: (1,619.4)

7  
8 This is a two-year project (2017–2018) that was completed in 2018. The variance in total  
9 project expenditures is attributed to lower than estimated engineering and construction  
10 costs.

11  
12 **66. Replace Programmable Logic Controllers: Various Sites**

13 **Annual Variance (\$000)**

14 Budget: 51.5                      Expenditures: 206.7                      Variance: 155.2

15  
16 **Project Variance (\$000)**

17 Budget: 958.0                      Expenditures: 1,359.9                      Variance: 401.9

18  
19 This is a three-year project (2015–2017) that carried over and was completed in 2018.  
20 The variance in project expenditures and 2018 expenditures are attributed to actual  
21 engineering and construction effort exceeding the original estimates prepared in 2014.

22  
23 **4.8 Properties Projects (Table 10)**

24 **67. Upgrade Office Facilities and Control Buildings: Various Sites**

25 **Project Variance (\$000)**

26 Budget: 1,180.6                      Expenditures: 955.8                      Variance: (224.8)

27  
28 This was a one-year project that was completed in 2018. The variance in project  
29 expenditures is attributed to the condition assessment and engineering for future



1 projects not being required as originally planned due to adjustments to the long term  
2 asset plan for office facilities and control buildings. All of the planned construction  
3 activity in this project was completed in 2018.

4  
5 **68. Line Depot Condition Assessment and Refurbishment Program: Various Sites**

6 **Project Variance (\$000)**

7 Budget: 1,233.0                      Expenditures: 1,005.6                      Variance: (227.4)

8  
9 This was a one year project that was completed in 2018. The variance in project  
10 expenditures is attributed to less engineering effort required than originally estimated.

11  
12 **69. Construct New Facilities: Various Sites**

13 **Annual Variance (\$000)**

14 Budget: 1,218.3                      Expenditures: 429.8                      Variance: (788.5)

15  
16 **Project Variance (\$000)**

17 Budget: 1,456.1                      Expenditures & Forecast: 1,117.5                      Variance: (338.6)

18  
19 This is a two-year project (2017–2018) that commenced in 2017 and has carried over to  
20 2019. The project scope consists of the construction of storage buildings at the  
21 Makkovik and Charlottetown Diesel Plants. The Charlottetown storage building was  
22 constructed in 2017. The Makkovik storage building construction has been rescheduled  
23 from 2018 to 2019, to be completed in conjunction with a diesel plant building and yard  
24 extension. The diesel plant building and yard extension is part of the scope of a separate  
25 project, approved in Board Order No. P.U. 43(2017), to replace a diesel generator set.  
26 Completing these projects together will optimize the use of available space on the  
27 property, reduce the risk of design conflicts, and possibly result in cost savings.

1 **4.9 Metering Projects (Table 11)**

2 **70. Install Automated Meter Reading: Happy Valley**

3 **Annual Variance (\$000)**

4 Budget: 1,786.4                      Expenditures: 1,606.7                      Variance: (179.7)

5

6 This was a two-year project (2017–2018) that was completed in 2018. The variance in  
7 project expenditures is attributed to cancellation of a portion of the scope. The project  
8 scope included the replacement of 519 three-phase meters, of which 319 were  
9 cancelled due to a discontinuation of the product by the vendor, which accounts for the  
10 bulk of the variance. The cancelled meters will be reviewed for possible inclusion in a  
11 future application using different technology. The other project scope items, including  
12 terminal station equipment and 4370 single-phase meters, were installed as planned.  
13 The total project expenditure is within 9% of the overall project budget.

14

15 **71. Install Automated Meter Reading: Labrador West**

16 **Project Variance (\$000)**

17 Budget: 967.2                      Expenditures: 1,408.3                      Variance: 441.1

18

19 This is a two-year project (2016–2017) that was carried over and completed in 2018. The  
20 variance in project expenditures is attributed to the requirement for additional terminal  
21 station equipment and higher than estimated unit pricing for the new automatic meter  
22 reading equipment. An updated project cost estimate and updated assumptions for  
23 project benefits were used to re-evaluate the project in 2017. The updated cost-benefit  
24 analysis confirmed that the project remained the least-cost alternative versus the status  
25 quo.

26

27 **4.10 Tools and Equipment Projects (Table 12)**

28 There are no reportable variances under Tools and Equipment Projects.

1 **4.11 Information Systems Projects (Table 13)**

2 **72. Replace Personal Computers: Hydro Place**

3 **Project Variance (\$000)**

4 Budget: 493.0                      Expenditures: 94.5                      Variance: (398.5)

5  
6 This was a one-year project completed in 2018. The Replace Personal Computers project  
7 was based on a replacement cycle of four years for laptops, five years for desktops and  
8 workstations, and six years for thin clients. As of 2018, an update to the Personal  
9 Computer Replacement Program was made to extend in-service life and Hydro has  
10 adopted a five to seven year computer life cycle utilizing extended warranties and run-  
11 to-failure modes. The expenditures for 2018 were reduced to reflect the extension to  
12 the replacement cycle.

13

14 **73. Upgrade Core IT Infrastructure: Hydro Place**

15 **Project Variance (\$000)**

16 Budget: 352.4                      Expenditures: 453.8                      Variance: 101.4

17  
18 This was a one-year project completed in 2018. In 2017, the Hydro became aware of a  
19 new concern with the security of the Energy Management System ("EMS") and  
20 Administrative services sharing common physical equipment. Upon review, it was  
21 determined that a logical separation between the EMS and the Administrative Core IT  
22 Servers, Storage, and Networks was required. The risk mitigation was to physically  
23 separate the two systems. Additional expenditure was necessary to meet this new  
24 security requirement.

25

26 **74. Upgrade Energy Management System: Hydro Place**

27 **Project Variance (\$000)**

28 Budget: 336.8                      Expenditures: 0.00                      Variance: (336.8)

1 This was a one-year project. In consultation with the EMS supplier during review of  
2 industry best practices of other utilities, it was identified that a bi-annual EMS upgrade  
3 would not increase risk and will reduce costs. Many similar clients already follow this  
4 upgrade schedule and had seen no negative consequences. Hydro has adopted this best  
5 practice, shifted to a bi-annual upgrade cycle in 2018, and cancelled the 2018 project.  
6 The EMS will be upgraded in 2019 and every two years thereafter.

7  
8 **75. Upgrade Microsoft Office: Hydro Place**

9 **Annual Variance (\$000)**

10 Budget: 977.4                      Expenditures: 822.3                      Variance: (155.1)

11  
12 This was a three-year project (2016–2018) that was completed in 2018. The final cost  
13 was lower than budgeted due to a reduction in software costs, fewer licenses required  
14 than were originally planned, and a reduction in consultant service requirements. The  
15 total project expenditure is within 6% of the overall project budget.

16  
17 **4.12 Telecontrol Projects (Table 14)**

18 **76. Replace Battery Banks and Chargers: Various**

19 **Annual Variance (\$000)**

20 Budget: 382.1                      Expenditures: 231.3                      Variance: (150.8)

21  
22 This is a two-year project (2018–2019) that commenced in 2018. The variance in 2018  
23 expenditures is attributed to lower than estimated construction and procurement costs.  
24 There is no change to the overall project scope or completion date.

25  
26 **77. Replace Battery Banks and Chargers: Various Sites (2017–2018)**

27 **Project Variance (\$000)**

28 Budget: 945.5                      Expenditures: 772.7                      Variance: (172.8)

1 This was a two-year project (2017–2018) that was completed in 2018. The variance in  
2 total project expenditures is attributed to lower than estimated construction and  
3 procurement costs and a reduction in scope. The replacement of battery chargers at  
4 Upper Salmon was removed from this project scope and will be executed as part of the  
5 2018-2019 Replace Battery Banks and Chargers project, which has sufficient budget for  
6 this work. This rescheduling was required due to lack of outage availability in 2018 to  
7 complete the construction. All other battery banks and chargers in this project were  
8 replaced as planned.

9  
10 **78. Upgrade Telecontrol Facilities: Mary March Hill and Blue Grass Hill**

11 **Annual Variance (\$000)**

12 Budget: 633.8                      Expenditures: 500.0                      Variance: (133.8)

13  
14 **Project Variance (\$000)**

15 Budget: 757.1                      Expenditures: 623.3                      Variance: (133.8)

16  
17 This was a two-year project (2017–2018) that was completed in 2018. The variance in  
18 2018 expenditures and total project expenditures is attributed to lower than estimated  
19 tendered pricing for the construction and procurement.

20  
21 **4.13 Transportation Projects (Table 15)**

22 **79. Replace Vehicles and Aerial Devices: Various Sites**

23 **Annual Variance (\$000)**

24 Budget: 1,667.2                      Expenditures: 1,165.1                      Variance: (502.1)

25  
26 This is a two-year project (2018–2019). Two units, with a value approximately equal to  
27 the total variance, were scheduled for delivery in 2018 but were delayed and are  
28 expected in 2019.

1 **80. Replace Vehicles and Aerial Devices: Various Sites**

2 **Annual Variance (\$000)**

3 Budget: 1,124.4                      Expenditures: 1,368.1                      Variance: 243.7

4

5 **Project Variance (\$000)**

6 Budget: 2,400.2                      Expenditures: 2,643.9                      Variance: 243.7

7

8 This is a two-year project (2017–2018) that was completed in 2018. Expenditures were  
9 higher than forecasted due to higher than estimated vehicle prices.

10

11 **4.14 Administrative Projects (Table 15)**

12 There are no reportable variances under Administrative Projects

13

14 **4.15 Allowance for Unforeseen Items (Table 16)**

15 **81. Allowance for Unforeseen Items**

16 **Project Variance (\$000)**

17 Budget: 1,000.0                      Expenditures: 4,743.2                      Variance: 3,743.2

18

19 The Allowance for Unforeseen Items is an annual allotment that permits Hydro to act  
20 expeditiously to deal with events affecting the electrical system that cannot wait for  
21 specific approval of the Board. One project, Penstock #3 Refurbishment - Bay d'Espoir,  
22 was executed using this account. The report on this item has been filed with the Board.  
23 Hydro received approval to restore the Allowance for Unforeseen Items account value  
24 to \$1 million, Board Order No. P.U. 19(2018). Although a failed Generator in Rigolet was  
25 initiated on December 20, 2018, no costs were attributed to the Allowance for  
26 Unforeseen Items funding in 2018, and the expenditures for the Rigolet engine will be  
27 captured in the 2019 allowance.

1 **4.16 Supplemental Projects (Table 16)**

2 **82. Provide Service to Western Regional Service Board's Waste Transfer Site: Hampden**

3 **Project Variance (\$000)**

4 Budget: 748.4                      Expenditures: 644.5                      Variance: (103.9)

5  
6 This was a one-year Contribution in aid of Construction ("CIAC") project completed in  
7 2018. The variance in annual expenditures, and CIAC recovery, is attributed to lower  
8 than estimated procurement and construction costs.

9  
10 **83. Penstock Condition Assessments: Bay d'Espoir**

11 **Annual Variance (\$000)**

12 Budget: 1,120.6                      Expenditures: 1,682.5                      Variance: 561.9

13  
14 **Project Variance (\$000)**

15 Budget: 1,120.6                      Expenditures & Forecast: 1,906.3                      Variance: 785.7

16  
17 This is a one-year supplemental capital project that was approved in 2018 and carried  
18 over into 2019. The requirement to complete unforeseen work on Penstock 3 (a  
19 separate project under the Allowance for Unforeseen Items) led to a revised generation  
20 outage schedule, which resulted in the field work for this project being completed later  
21 in the year than originally planned. The field work was completed and Hydro is  
22 collecting operational data through the fall and winter of 2018–2019. The engineering  
23 reports, which are the final deliverable of this project, will be produced in 2019. The  
24 variances in 2018 and total project expenditures are attributed to higher than expected  
25 contract tender prices for the field work completed in 2018.

26  
27 **84. Improve Boiler Capacity: Holyrood**

28 **Project Variance (\$000)**

29 Budget: 2,560.5                      Expenditures: 1,665.9                      Variance: (894.6)

1 This was a one-year supplemental project approved and completed in 2018. The  
2 variance in project expenditure is attributed to lower than expected construction costs.  
3 The estimate was based on a construction schedule utilizing double shifts, which was  
4 not required. Additionally, based on engineering recommendations provided by Babcock  
5 & Wilcox, the hot end basket liners did not need to be replaced. In Section 2.0 Project  
6 Description of the supplementary application for this project, it was stated:

7  
8 *Hydro proposes that any additional items, material in dollar value and that*  
9 *meets capitalization criteria, that require replacement and is related to the*  
10 *scope of work, will be replaced within this project's budget. Such additions will*  
11 *be communicated to the Board via the year end Capital Expenditures Variance*  
12 *report.*  
13

14 There were no additional scope items for this project.  
15

16 **85. Mary's Harbour Hydro Integration**

17 **Project Variance (\$000)**

18 Budget: 195.5                      Expenditures: 49.2                      Variance: (146.3)  
19

20 This is a one-year supplemental capital project approved in 2018 and carried over into  
21 2019. The variance in 2018 expenditures is attributed to a rescheduling of the  
22 commissioning activity to 2019 to align with Mary's Harbour Hydro's revised project  
23 schedule, which was delayed. The project cost is being fully recovered from Mary's  
24 Harbour Hydro.  
25

26 **86. Gang Switch: Happy Valley-Goose Bay**

27 **Project Variance (\$000)**

28 Budget: 195.4                      Expenditures: 85.2                      Variance: (110.2)  
29

30 This was a one-year supplemental project completed in 2018. The variance in annual  
31 expenditures is attributed to lower than estimated procurement costs of the switches.



1 **87. TL 226 and TL 239 Reroute**

2 **Annual Variance (\$000)**

3 Budget: 712.3                      Expenditures: 579.8                      Variance: (132.5)

4 This was a two-year (2018–2019) supplemental project commenced in 2018. The  
5 variance in expenditures was attributed to delays in the construction of TL 226 due to  
6 adverse weather conditions. The work will be completed in 2019 and there is no change  
7 to the overall project scope or budget.

8  
9 **88. Terminal Station Upgrades: Wabush**

10 **Annual Variance (\$000)**

11 Budget: 1,971.8                      Expenditures: 1,021.4                      Variance: (950.4)

12  
13 **Project Variance (\$000)**

14 Budget: 2,912.5                      Expenditures: 1,962.1                      Variance: (950.4)

15  
16 This is a two-year supplemental capital project (2017–2018) that was completed in  
17 2018. The variances in 2018 and total project expenditures are attributed to actual  
18 construction costs being less than estimated. The original estimate was based on using  
19 contractor forces but the work was able to be completed using internal resources,  
20 eliminating contract management costs and reducing travel cost.

21  
22 **89. Reliability Improvements: Holyrood**

23 **Annual Variance (\$000)**

24 Budget: 16.7                      Expenditures: 297.3                      Variance: 280.6

25  
26 **Project Variance (\$000)**

27 Budget: 2610.0                      Expenditures: 3,883.9                      Variance: 1,273.9

1 This was a one-year supplemental project approved in 2017 and carried over and  
2 completed in 2018. This project was substantially completed in 2017 with the exception  
3 of the condenser cooling water piping for Unit 1 which was rescheduled to 2018 due to  
4 a change in the generation outage schedule. The variance in project expenditure is  
5 attributed to new capital scope items identified during discovery and execution phases  
6 of the project in 2017. These items were reported in the Capital Expenditures and  
7 Carryover Report for the Year Ending December 31, 2017. No additional scope items  
8 were added in 2018.

9

10 **90. Purchase of 12 MW Diesel Generation: Holyrood**

11 **Annual Variance (\$000)**

12 Budget: 418.9                      Expenditures: 678.2                      Variance: 259.3

13

14 This was a two-year supplemental project approved in 2016 and carried over and  
15 completed in 2018. The variance in 2018 expenditure is attributed to higher than  
16 expected construction cost. The total project expenditure is within 6% of the overall  
17 project budget.

**5.0 Capital Budget versus Actual Expenditures 2009 – 2018**

Table 17 provides a summary of Hydro’s Capital Budget Variances for the years 2009-2018.

**Table 17: Capital Budgets/Expenditures 2009-2018**

Year	Budget (\$000)	Actual Expenditures (\$000)	Variance (\$000)	Variance (%)
2009	61,544	54,152	7,392	12.0
2010	63,297	55,553	7,744	12.2
2011	67,454	63,116	4,338	6.4
2012	93,840	77,252	16,588	17.7
2013	116,373	84,755	31,618	27.2
2014	280,601	204,728	75,873	27.0
2015	311,177	125,119	186,058	59.8
2016	350,601	203,941	146,660	41.8
2017	340,501	340,741	240	0.1
2018	213,050	156,985	56,065	26.3

In 2018, actual expenditures were below budget in Hydro’s overall capital program by \$56.1 million (26.3%), as shown in Table 17. The following six capital projects were the primary contributors to the variance. Had these projects been on budget, the overall actual expenditures would have been within 10% of budget.

- Variance 38: Terminal Station Refurbishment and Modernization - Various Sites (2017–2018) (-\$9.2 million)
- Variance 25: Increase Fuel and Water Treatment System Capacity - Holyrood Gas Turbine (-\$6.2 million)
- Variance 33: Terminal Station Refurbishment and Modernization - Various Sites (2018–2019) (-\$6.2 million)
- Variance 48: 230 kV Transmission Line: Bay d'Espoir to Western Avalon (-\$5.7 million)
- Variance 4: Hydraulic Generation Refurbishment and Modernization (2017–2018) (-\$4.5 million)
- Variance 39: Upgrade Circuit Breakers: Various Sites (-\$3.5 million)

1 Hydro completed an analysis for all 2018 projects that had an annual underspend, assessing the  
2 drivers. From this analysis, Hydro determined that:

3

- 4 • Approximately 53% of the variance is attributed to work carrying over to future years;
- 5 • Approximately 27% of the variance is attributed to work being completed for less than  
6 estimated; and
- 7 • Approximately 18% of the variance is attributed to scope changes, including cancelled  
8 projects, reduced scope, and less in-service failures than budgeted.

9

10 Five main drivers were identified for the under-expenditure:

11

- 12 • Estimates were higher than actuals for completed work. This accounted for  
13 approximately \$15 million (27%) of the overall under-expenditure. Several projects were  
14 over-estimated and, for many projects, contingency was estimated at 20% but was not  
15 utilized.
- 16 • Work could not be completed due to outages not being available or changed. This  
17 accounted for approximately \$8 million (15%) of the overall under-expenditure. Much of  
18 the capital program is dependent on equipment outages and those outages were not  
19 always possible in the durations required due to system constraints or competing  
20 outages. This mostly occurred for terminal station work, but a significant portion of  
21 scope for the refurbishment of a surge tank in Bay d’Espoir was also deferred due to  
22 outage duration.
- 23 • Resources constraints resulted in rescheduling work. This accounted for approximately  
24 \$8 million (13%) of the overall under-expenditure. The project with the largest carry  
25 over amount due to resource allocations was the Upgrade Circuit Breakers project. A  
26 number of circuit breaker replacements were rescheduled to future years due to the  
27 unavailability of resources.
- 28 • Schedule at the budget phase was underestimated. This accounted for approximately \$6  
29 million (11%) and was associated with a single project: Increase Fuel and Water

1 Treatment System Capacity - Holyrood Gas Turbine. The design, supply and installation  
2 of the new fuel storage tanks were budgeted to be completed in one year, but the work  
3 requires two years.

- 4 • Several projects were not required and were cancelled. This accounted for  
5 approximately \$5 million (9%), with two projects accounting for the majority of the \$5  
6 million. The Upgrade Corner Brook Frequency Converter project (with \$2.9 million  
7 budgeted for 2018) was cancelled due to the sale of the asset. The Refurbish Anchors  
8 and Footings TL 202 and TL 206 Project (with \$1.8 million budgeted for 2018) was  
9 cancelled as a condition assessment determined that the work was not required.

10  
11 Hydro is implementing a number of improvements that are expected to close the gap between  
12 budget and actual expenditures in future years.

- 13  
14 • Improve estimates of project contingency. The analysis of the last two years has shown  
15 that contingency has been high for many projects. For projects that closed in 2018, the  
16 overall contingency was estimated at 17.5% and only 9% was required. As a result of this  
17 analysis, Hydro will apply additional analysis and rigour to the amount of contingency  
18 estimated for projects, starting with the 2020 budget cycle.
- 19 • A more rigorous process for Project Managers, Lead Estimators, Discipline Managers,  
20 and Long-Term Asset Planners for budget review prior to finalizing project proposals.  
21 The process includes a review and sign-off of scope, schedule, estimates, and  
22 contingency amount. This process was trialed for the 2019 budget cycle, enhanced, and  
23 rolled out for full implementation for the 2020 budget cycle.
- 24 • Hydro has been taking steps for earlier, improved planning of the overall Integrated  
25 Annual Work Plan, with an aim to complete Integrated Annual Work Plans ahead of  
26 each annual Capital Budget Application. This will decrease the amount of carryover by  
27 ensuring that projects proposed are achievable from resource and outage availability  
28 perspectives. Advancement of the Integrated Annual Work Plan ahead of the Capital  
29 Budget Application is expected to be realized for the 2021 execution year, with some

1 benefits expected in 2019 and 2020. In 2019, a greater emphasis is being placed on  
2 outage planning, with a planner to be focused on overall planning of key generation  
3 outages. This enhanced resourcing will allow Hydro to identify and manage conflicts  
4 related to overlapping work permit requirements, limited accommodations, use of  
5 powerhouse cranes, and availability of construction power. The focus will also allow  
6 Hydro to more quickly understand and manage impacts when outage schedules change.

7

## 8 **6.0 Carryover Report**

9 Table 18 provides a summary listing of the carryovers for projects initiated between 2014 and  
10 2018.

*Capital Expenditures and Carryover Report  
For the Year Ending December 31, 2018*

**Table 18: 2018 Carryover Report for the Year Ending December 31, 2018 (\$000)**

Project Name	Board Approved Budget 2018	Revised Budget 2018	Total Actual Expenditures 2018	Carryover Amount	Original Completion Year
Upgrade Work - Cat Arm	0.0	1,406.5	1,376.2	30.3	2018
Rehabilitate Shoreline Protection - Cat Arm	0.0	977.2	89.2	888.0	2018
Replace Pump House and Associated Equipment - Bay d'Espoir	0.0	705.1	373.9	331.2	2018
Replace Site Facilities - Bay d'Espoir	6,316.7	9,479.2	8,574.8	904.4	2018
Replace Slip Rings Units 1-6 - Bay d'Espoir	159.7	369.9	17.2	352.7	2018
Control Structure Refurbishments	452.9	853.4	709.3	144.1	2018
Refurbish Backfill Penstock 1 - Bay d'Espoir	1,630.4	1,630.4	63.2	1,567.2	2018
Hydraulic Generation Refurbishment and Modernization - Various Sites (2018/19)	5,234.1	4,798.6	2,219.9	2,578.7	2019
Install Fire Detection in Outbuildings - Holyrood	198.6	198.6	70.4	128.2	2018
Upgrade Data Alarm Systems - Various Sites	0.0	142.7	144.5	(1.8)	2018
Install Breaker Failure Protection - Various Sites	0.0	227.3	234.7	(7.4)	2018
Terminal Station Refurbishment and Modernization Program - Various Sites (2017/18)	6,269.5	5,589.8	3,262.1	2,327.7	2018
Replace 66 kV Station Service Feed - Holyrood	1,198.6	1,180.7	235.0	945.7	2018
Replace Substation - Holyrood	758.6	682.8	369.7	313.1	2018
Construct New Facilities Various Sites	333.7	463.8	13.9	449.9	2018
230kV Transmission Line - Bay D'Espoir to Western Avalon	17,418.3	12,658.3	10,942.1	1,716.2	2018
Upgrade Ventilation - Cartwright	465.7	465.7	46.5	419.2	2018
Inspect Fuel Storage Tanks - Black Tickle	818.7	818.7	481.7	337.0	2018
Penstock Condition Assessments - Bay d'Espoir	0.0	1,906.3	1,682.5	223.8	2018
Mary's Harbour Hydro Intergration	0.0	195.5	49.2	146.3	2018
Mary's Harbour Hydro Intergration	0.0	(195.5)	0.0	(195.5)	2018
Replace PBX Phone Systems - Various	91.7	91.7	134.9	(43.2)	2019
Replace MDR 6000 Microwave Radio - Various	64.0	64.0	81.5	(17.5)	2019
Replace Teleprotection - TL261	57.6	57.6	60.1	(2.5)	2019
Replace Battery Banks and Chargers - Various	382.1	382.1	231.3	150.8	2019
Refurbish Powerhouse Station Services - Bay d'Espoir	2,473.3	2,843.5	1,003.5	1,840.0	2019
Replace Exciter Controls Units 1 to 6 - Bay d'Espoir	921.2	638.3	629.0	9.3	2020
Install Remote Operation of Salmon Spillway - Bay d'Espoir	645.9	645.9	885.4	(239.5)	2019
Energy Efficiency Improvements - Various	276.2	276.2	209.8	66.4	2019
Upgrade Cranes and Hoists - Holyrood	80.3	80.3	38.6	41.7	2019
Upgrade Circuit Breakers - Various Sites (2016-2020)	15,408.6	15,664.0	15,184.1	479.9	2020
Terminal Station Refurbishment and Modernization Program - Various Sites (2018/19)	7,441.8	7,441.8	1,602.1	5,839.7	2019
Replace Transformer T1 - Buchans	249.0	249.0	99.0	150.0	2019
Implement Terminal Station Flood Mitigation - Springdale	186.2	186.2	135.8	50.4	2019
Purchase Mobile DC Power Systems	270.9	270.9	41.9	229.0	2019
Gas Turbine Equipment Replacement and Refurbishment - Hardwoods and Stephenville	997.9	851.5	371.3	480.2	2019
Diesel Plant Engine Cooling System Upgrades - Various Sites	638.4	638.4	149.3	489.1	2019
Increase Fuel and Water Treatment System Capacity - Holyrood Gas Turbine	8,829.9	8,676.9	2,583.8	6,093.1	2019
Turbine Hot Gas Path Level 2 Inspection and Overhaul - Holyrood Gas Turbine	6,538.8	10,453.6	9,770.7	682.9	2019
Replace Vehicles and Aerial Devices - Various Sites	1,667.2	1,667.2	1,165.1	502.1	2019
Replace Off-Road Track Vehicles - Bishop Falls and Bay d'Espoir	213.7	213.7	249.5	(35.8)	2019
Distribution System Upgrades - Various Sites	383.8	383.8	193.6	190.2	2019
Install Recloser Remote Control - English Harbour West and Barchoix	63.7	63.7	13.8	49.9	2019
Diesel Plant Fire Protection - Postville	505.6	505.6	37.2	468.4	2019
Install Energy Efficiency Lighting in Diesel Plants - Various	104.0	104.0	68.0	36.0	2020
Replace Secondary Containment System Liner - Nain	1,639.2	3,144.2	672.5	2,471.7	2019
Diesel Genset Replacements - Makkovik	604.1	604.1	1,585.1	(981.0)	2020
Replace Automation Equipment - St. Anthony	307.4	307.4	127.2	180.2	2019
Upgrade Exterior of Building - Hydro Place	260.2	260.2	232.6	27.6	2019
TL226 and TL239 Reroute	0.0	712.3	579.8	132.5	2019
<b>Total 2018 Carryover Projects</b>	<b>92,558.2</b>	<b>102,033.1</b>	<b>69,092.5</b>	<b>32,940.6</b>	

1 **7.0 Safety Hazards**

2 In Board Order No. P.U. 38(2010) of the 2011 Capital Budget Application, the Board directed  
3 Hydro to include in Hydro's annual report on capital expenditures an explanation as to each  
4 project that was undertaken for the Remove Safety Hazards project, setting out the safety  
5 hazard that was identified, the location, the steps taken to address the issue and the amount of  
6 the expenditure. Table 19 outlines the projects undertaken in 2018.

7

8 **Total Approved Budget:       \$199,400**

9 **Total Expenditure:           \$166,300**



**Table 19: Safety Hazards**

Project Title and Location	Expenditure (\$000)	Safety Hazard Identified	Project Scope
Install H <sub>2</sub> S Monitoring System, Holyrood Thermal Generating Station	\$128.6	In July 2017, Holyrood experienced a release of Immediately Dangerous to Life or Health (“IDLH”) levels of hydrogen sulfide (H <sub>2</sub> S) gas from the Stage 2 Pumphouse, prompting emergency response and evacuation of the Holyrood site. The source of the H <sub>2</sub> S release was determined to be a combination of stagnant water due to a Unit 3 outage, biological sea material and consecutive days of warm temperatures. The pump houses did not have a monitoring system in place at the time of the incident; the release was detected as a result of a strong odor throughout site. Since H <sub>2</sub> S is a highly toxic gas, it is imperative to detect its presence immediately in order to evacuate personnel from the impacted area.	To address the hazard, an H <sub>2</sub> S Monitoring System was installed in Stage 1 and 2 pump houses, including H <sub>2</sub> S sensors and controllers to ensure appropriate detection of H <sub>2</sub> S gas. To enhance notification when the presence of H <sub>2</sub> S is detected, strobes and horns were installed inside and outside the pump houses.
Replace Shipping and Receiving Concrete Pad, Hydro Place	\$27.6	The concrete approach pad outside the shipping and receiving area of Hydro Place sunk below the surrounding asphalt, resulting in an unsafe condition for fork-lift operation.	To address the hazard, the concrete approach pad in front of the shipping and receiving area of Hydro Place was replaced.
Installation of Exciter Module Access Stairs, Hardwoods Gas Turbine	\$10.1	The exciter module at Hardwoods Gas Turbine was not easily accessible from both sides of the unit (Ends A and B) due to the main lube oil piping installed between the auxiliary module and the unit. To access the exciter module from End B, employees would have to walk around the auxiliary module. However, they frequently climbed over the main lube oil piping resulting in the potential for slips, trips and falls.	To address the hazard, a new staircase was installed on the End B side of the auxiliary module platform providing quick and safe access for personnel.

1 **8.0 Terminal Station In-Service Failures**

2 Hydro has committed to providing a summary of activities completed under the Terminal  
3 Station In-Service Failures project. Table 20 outlines 2018 expenditures undertaken by this  
4 project.

5

6 **Total Approved Budget:       \$1,000,000**

7 **Total Expenditure:            \$2,268,800**

**Table 20: Terminal Station In-Service Failures**

Project Title and Location	Expenditure (\$000)	Failure Identified	Project Scope
Replace Five 230 kV Instrument Transformers, Churchill Falls Terminal Station	\$895.3	Inspection of five instrument transformers in 2017 revealed that the transformers were leaking oil and required replacement: <ul style="list-style-type: none"> <li>• 230-21 A-Phase CT/PT</li> <li>• 230-21 B-Phase CT</li> <li>• 230-21 C-Phase CT</li> <li>• 230-22 A-Phase CT/PT</li> <li>• 230-23 A-Phase CT/PT</li> </ul>	Five new instrument transformers were ordered in 2017. They were received and installed in 2018, replacing the five leaking instrument transformers.
Purchase Spare Circuit Breakers for Standby Equipment Pool	\$489.2	Hydro reviewed standby equipment pool requirements for circuit breakers in its 195 terminal stations. With expected delivery periods for replacement circuit breakers ranging from 4-6 months, and to reduce downtime related to a circuit breaker failure, it was determined that one breaker for each of the following voltage ratings should be added to the standby equipment pool: 72.5 kV, 145 kV and 245 kV.	Three spare circuit breakers were purchased for the standby equipment pool: <ul style="list-style-type: none"> <li>• 72.5 kV circuit breaker</li> <li>• 145 kV circuit breaker</li> <li>• 245 kV circuit breaker</li> </ul>
Purchase Spare Disconnect Switches for Standby Equipment Pool	\$185.7	Hydro reviewed standby equipment pool requirements for disconnect switches in its 195 terminal stations. With expected delivery periods for replacement disconnect switches of approximately 48 weeks, and to reduce downtime related to disconnect switch failure, it was determined that one disconnect switch for each of the following voltage ratings should be added to the standby equipment pool: 72.5 kV, 145 kV and 245 kV, for both horizontal and vertical configurations.	Six spare disconnect switches were purchased for the standby equipment pool: <ul style="list-style-type: none"> <li>• 72.5 kV Vertical Mount</li> <li>• 72.5 kV Horizontal Mount</li> <li>• 145 kV Vertical Mount</li> <li>• 145 kV Horizontal Mount</li> <li>• 245 kV Vertical Mount</li> <li>• 245 kV Horizontal Mount</li> </ul>
Replace Breaker B7L38, Holyrood Terminal Station	\$141.5	On December 16, 2017, severe weather on the Avalon Peninsula resulted in the tripping of TL 242 (Soldiers Pond to Hardwoods), TL 265 (Holyrood to Soldiers Pond), Holyrood L2 (Station service feed to station service transformer SST-12 for the Holyrood Plant) and Holyrood bus B6 and B7 due to a bus lockout. Investigation on December 16, 2017 identified that breaker B7L38 had its line side bushings burned on all three phases as a result of Newfoundland	The breaker B7L38 was replaced with an available spare breaker.

<b>Project Title and Location</b>	<b>Expenditure (\$000)</b>	<b>Failure Identified</b>	<b>Project Scope</b>
		Power's breaker at Seal Cove not clearing the fault due to fuses blown in the trip circuit for the breaker. The damage was severe to Breaker B7L38's three line side bushings and the insulators and associated current transformers. Refurbishment of the breaker was ruled out due to the 16-18 week expected delivery time for parts from the original equipment manufacturer. A spare breaker was available in Hydro's inventory.	
Breaker B2L21 Overhaul, Peter's Barren Terminal Station	\$79.4	During inspections, Breaker B2L21 was identified as leaking sulfur hexafluoride (SF6) gas to the atmosphere. Overhaul of the breaker was required to prevent a flashover in the breaker and to minimize any loss of SF6 gas.	The breaker B2L21 was overhauled.
Replace X1 Bushing on Transformer T8, Wabush Terminal Station	\$75.8	Transformer T8 X1 bushing failed on August 16, 2018 resulting in a forced outage to transformer T8. The bushing failed due to a failed top terminal seal caused by corrosion of the bushing at a sealed joint. The failed bushing was unsuitable for repair due to the corrosion, and transformer T8 cannot operate without an X1 bushing, therefore the restoration of transformer T8 required the replacement of the X1 bushing.	The X1 Bushing on Transformer T8 was replaced.
Transformer T4 Tap Changer Overhaul, Hardwoods Terminal Station	\$64.9	Testing of the transformer T4 tap changer conducted in December 2017 revealed that there was a high risk of failure and an immediate overhaul of the tap changer diverter switch was required.	The transformer T4 tap changer was overhauled.
Replace Current Transformer on B9B10-1, Bay d'Espoir Terminal Station 2	\$45.0	An infrared scan revealed that the 230 kV Current Transformer on disconnect switch B9B10-1 B-Phase was excessively hot (100°C) at the primary connection terminals. This was determined to be due to galvanic corrosion on the copper-aluminum connection. Upon disassembly, the spacer dowels were found to be melted and a significant oil leak had developed. This condition required 230 kV breaker B9B10 to be taken out of service resulting in the primary ring bus open until the current transformer was replaced. Immediate replacement of the current transformer was required to restore	Bay d'Espoir Terminal Station 2 - The 230 kV Current Transformer on B9B10-1 B-Phase was replaced.

<b>Project Title and Location</b>	<b>Expenditure (\$000)</b>	<b>Failure Identified</b>	<b>Project Scope</b>
		system reliability.	
Replace B-Phase Current Transformer on Breaker 46-38, Wabush Terminal Station	\$39.7	During inspection, the current transformer on breaker 46-38 B-Phase was found to have an oil leak on the top head unit and it required immediate replacement.	The 46-38 B-Phase Current Transformer was replaced.
Replace Disconnect Switch B3T2-1, Stony Brook Terminal Station	\$36.7	Inspection revealed that Disconnect Switch B3T2-1 (138 kV) had damaged hinge side parts that rendered it inoperable on 2 phases. Replacement parts were not available for this breaker, which was 49 years old, and it required replacement.	A new disconnect switch was procured and installed to replace the failed disconnect switch B3T2-1.
Replace A-Phase Current Transformer on B1L32, Stony Brook Terminal Station	\$34.4	Inspection revealed that the A-Phase Current Transformer on B1L32 developed an oil leak internal to its junction box around the gland plate, which began leaking out through the box. The current transformer was de-energized to avoid any further oil loss and possible catastrophic failure. The leaking current transformer location had added safety concerns to personnel as it is located directly in front of the Control Building's main door and parking area. Immediate replacement was required to restore B1L32 and the ring bus to service.	The A-Phase Current Transformer on B1L32 was replaced.
Purchase Spare Station Service Voltage Transformer, Oxen Pond Terminal Station	\$29.1	It was determined that a spare station service voltage transformer was required after three new Station Service Voltage Transformers were installed in the Oxen Pond Terminal Station for a second station service supply.	A spare station service voltage transformer was purchased for the standby equipment pool.
Purchase Spare Motor Operator for Circuit Switcher for Western Avalon B1T1, B1T2 and Stephenville B1L09	\$28.6	In June 2018, circuit switcher B1T1 at Western Avalon was identified as non-operational. Further inspection found that a coupling from the motor going to the linkage that operates the opening and closing of the circuit switcher was broken. The original equipment manufacturer was able to repair the existing equipment; however, replacement parts are not available if future repairs are required. This identified the need to have a spare available in the standby equipment pool.	A spare motor operator was procured for the standby equipment pool.

<b>Project Title and Location</b>	<b>Expenditure (\$000)</b>	<b>Failure Identified</b>	<b>Project Scope</b>
Replace 125 VDC Battery Bank, Bear Cove Terminal Station	\$25.7	Discharge testing of the 125 Vdc battery bank revealed that multiple cells within the bank had dropped below the acceptable level of 1.75 volts per cell, and the battery bank required replacement.	A replacement 125 Vdc battery bank was procured and installed.
Replace Current/Voltage Transformer on TL205 B-Phase, Buchans Terminal Station	\$23.3	Hydro's Energy Control Center operators observed high and low voltage fluctuations in the secondary voltages followed by a protection failure alarm of the 230 kV B-Phase Current/Voltage Transformer on transmission line TL 205. TL 205 was removed from service and crews were dispatched to site. Upon arrival the work crew found oil leaking from the base of the unit. Immediate replacement with an available spare from inventory was required to put TL 205 back in service.	The failed current/voltage transformer was replaced with an available spare.
Replace Bus 2 C-Phase Current/Voltage Transformer, Sunnyside Terminal Station	\$20.2	During scheduled six-year maintenance on bus 2 Current/Voltage Transformers in the Sunnyside Terminal Station, the C-Phase Current/Voltage Transformer was found to have a severely corroded terminal block and accessories in its junction box. Upon removal of the terminal block for replacement, the secondary protective spark gap was found to be badly burnt and shorted out. The planned Doble Testing showed a 400-500% increase of its capacitor power factor. Doble Engineering was consulted and they recommended to not re-energize the Current/Voltage Transformer. As a result, immediate replacement was required to restore Bus 2 to service.	Bus 2 C-Phase Current/Voltage Transformer was replaced.
Replace Bus B1 Potential Transformer, Cow Head Terminal Station	\$17.9	An inspection in October 2017 identified deterioration of the bus B1 potential transformer due to corrosion, placing it at a high risk of failure, requiring immediate replacement. The potential transformer was manufactured in 2006 and was of a carbon steel design, whereas Hydro's current standard is for stainless steel or aluminum design.	The bus B1 Potential Transformer was replaced with a unit that meets Hydro's current standard (stainless steel/aluminum).
Replace Capacitor Bank 2 Overvoltage Relay, St. Anthony Airport Terminal Station	\$13.3	While performing scheduled preventive maintenance on March 28, 2018, capacitor bank overvoltage relay 59N was found to be inoperative and requiring replacement. This resulted in Capacitor Bank 2 being out of service until the relay could be replaced.	An overvoltage relay was procured and installed to replace the failed Capacitor Bank 2 overvoltage relay.

<b>Project Title and Location</b>	<b>Expenditure (\$000)</b>	<b>Failure Identified</b>	<b>Project Scope</b>
Replace 6.9 kV Fuse Holder and Fuses, Bottom Brook Terminal Station	\$13.2	During the activity to isolate equipment for work protection in June 2018, the 6.9 kV fuse for station service on transformer T3 failed and required replacement. No replacement fuses were available for this vintage, which resulted in the requirement to replace the entire fuse/fuse holder assembly.	The 6.9kV fuse and fuse holder was replaced.
Replace Neutral Overcurrent Relay on Transformer T1, Plum Point Terminal Station	\$5.8	On April 9, 2018, protective relaying locked out transformer T1 in response to a fault on Line 1 during blizzard conditions, which lead to a loss of electrical supply to approximately 4,867 customers fed via the Plum Point, Bear Cove, Roddickton, Main Brook, and St. Anthony Terminal Stations. Analysis of the event determined that the neutral overcurrent relay on transformer T1 had tripped for a feeder fault due to the failure of the induction disc to reset. Immediate replacement was required to prevent reoccurrence.	The neutral overcurrent relay on transformer T1 was replaced.
Replace Surge Arrestor H1 on Transformer T12, Bay d'Espoir Terminal Station 2	\$4.1	Doble Testing on the surge arresters for Transformer T12, revealed that the H1 surge arrester failed testing. A replacement arrester was required to ensure continued protection for transformer T12.	The surge arrester H1 on transformer T12 was replaced.

1 **9.0 Hydraulic Generation In-Service Failures**

2 Hydro has committed to providing a summary of activities completed under the Hydraulic  
3 Generation In-Service Failures project. Table 21 outlines 2018 expenditures undertaken by this  
4 project.

5

6 **Total Approved Budget:       \$1,251,100**

7 **Total Expenditure:           \$452,300**



**Table 21: Hydraulic Generation In-Service Failures**

Project Title and Location	Expenditure (\$,000)	Failure Identified	Project Scope
Replace Guide Bearing Assembly, Bay d'Espoir Unit 2	\$138.4	<p>The existing generator guide bearing assembly was installed in 2015. It was designed and fabricated by the original equipment manufacturer in order to reduce the misting issues experienced through the top oil pot housing covers and was of a modified design as compared to the original. During the overhaul and refurbishment of Unit 2, inspection damage was found on the journal, bearing, and other rotating components likely caused by the new bearing design.</p> <p>To eliminate the possibility of further damage to the journal, bearing, and other rotating components such as the thrust bearing, rotating ring, and spring beds, it was determined that the generator bearing should be converted back to original design. The original design is time proven and has operated successfully for decades.</p> <p>The misting issue that the new bearing design was installed to address will not affect unit performance since a capital program to add new seals to reduce misting is included within Hydro's five-year capital plan.</p>	The guide bearing was returned to original design using available spare parts.
Circuit Breaker Capital Spare, Hinds Lake	\$110.4	The planned scope for this project included the procurement of a spare circuit breaker for Hinds Lake to allow responsive action to failures.	The spare circuit breaker was procured.

<b>Project Title and Location</b>	<b>Expenditure (\$,000)</b>	<b>Failure Identified</b>	<b>Project Scope</b>
Replace Thrust Bearing Assembly, Bay d'Espoir Unit 2	\$99.8	<p>Upon inspection of the generator main bracket stationary parts, it was observed that the thrust bearing had undergone severe damage to the babbitt on two thrust pads as well as signs of damage on all other pads including perpendicular cracks and heat damage to the babbitt. The bearing was deemed unusable and required immediate replacement. As well, the damage to the thrust bearing scarred the rotating ring bearing surface, a surface that is required to be machine finished to ensure a low coefficient of friction while the unit is rotating.</p> <p>The spring beds were in use for over 20 years, were found to be heavily contaminated with babbitt, and have exhibited changes in length from the original equipment manufacturers (OEM's) drawings. These springs required replacement with the thrust pads and rotating ring to ensure this bearing surface is free from any contaminants and operating as intended as per OEM design.</p>	The thrust bearing assembly, including pads, spring beds and the rotating ring, were replaced.
Replace Sump Pump 1, Bay d'Espoir Powerhouse 1	\$42.8	The sump pump was observed to not be operating as intended with the level in the sump not decreasing when it was in operation. There was risk of powerhouse flooding, with the pump unable to move water at a rate equal to the potential inflow of water into the sump.	The sump pump was replaced.
Refurbish Culverts, Bear Brook, Bay d'Espoir	\$24.8	The road at the Bear Brook crossing, on the access road to the Bay d'Espoir Generating Station, deteriorated and was in an unacceptable condition for vehicular traffic. Material between the 1200 mm culverts had eroded away and no longer adequately supported the surface of the road.	The material around the culverts, including the bedding material, was replaced. Blast rock was installed to reduce erosion and berms were constructed to redirect water flows.
Procure a Replacement HVAC unit for the Control Room, Cat Arm	\$14.2	The control room air conditioning unit failed due to the loss of refrigerant. Copper tubing and fittings were corroded, which increased the possibility of accidental release when completing maintenance.	A replacement HVAC unit was procured. Installation will occur in 2019 when road conditions allow for a contractor to access site to install. Installation costs will be reported under the 2019 Hydraulic In-Service Failures project.

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<b>Project Title and Location</b>	<b>Expenditure (\$,000)</b>	<b>Failure Identified</b>	<b>Project Scope</b>
Purchase Station Service Transformer Capital Spare, Hinds Lake	\$12.9	The planned scope for this project included the procurement of a spare station service transformer for Hinds Lake to allow responsive action to failures.	A spare station service transformer was ordered and will be received in 2019. Material costs will be reported under the 2019 Hydraulic In-Service Failures project.
Replace High Pressure Pump, Hinds Lake	\$5.5	During start-up of the generating unit at Hinds Lake, it was discovered that the high pressure pump was unable to meet required pressure and thus the unit controls would not allow the unit to start.	An available spare pump was installed and a new spare was procured.
Purchase Excitation Transformer Capital Spare, Cat Arm	\$3.5	The planned scope for this project included the procurement of a spare excitation transformer for Cat Arm to allow responsive action to failures.	A spare excitation transformer was ordered and will be received in 2019. Material costs will be reported under the 2019 Hydraulic In-Service Failures project.

1 **10.0 Thermal Generation In-Service Failures**

2 Hydro has committed to providing a summary of activities completed under the Thermal  
3 Generation In-Service Failures project. Table 21 outlines 2018 expenditures undertaken by this  
4 project.

5

6 **Total Approved Budget:       \$1,250,000**

7 **Total Expenditure:           \$2,699,900**

**Table 22: Thermal Generation In-Service Failures**

Project Title and Location	Expenditure (\$,000)	Failure Identified	Project Scope
Hydraulic System, Holyrood Unit 1	\$597.7	Unit 1 tripped off line on November 3, 2018 as a result of turbine steam control valves closing without receiving the command from the control system to do so. An investigation concluded that hydraulic system contamination was the cause of the unit trip. Hydro proceeded to refurbish the hydraulic system on Unit 1.	The hydraulic system for the Unit 1 control valves was refurbished. This included replacement of servo valves, cleaning or replacement of hydraulic actuators, replacement of actuator seals, replacement of filters, cleaning of hydraulic fluid coolers, flushing of the entire system, and replacement of the hydraulic fluid.
Hydraulic System, Holyrood Unit 2	\$218.9	The Unit 2 hydraulic system is identical to that for Unit 1 and, while no failures had occurred, Hydro determined it was reasonable to expect that the system for Unit 2 was in the same contaminated condition as for Unit 1. The following issues supported the conclusion that the system was contaminated: (i) the control valve actuator was showing signs of seal deterioration, with smearing deposits noted on the shaft; and (ii) the right hand intercept valve did not fully stroke during on-line testing. Refurbishment was required to prevent a failure, which was likely to occur prior to or during the next winter operating season.	The hydraulic system for the Unit 2 control valves was refurbished. This included replacement of servo valves, cleaning or replacement of hydraulic actuators, replacement of actuator seals, replacement of filters, cleaning of hydraulic fluid coolers, flushing of the entire system, and replacement of the hydraulic fluid. It is noted that the Unit 2 refurbishment is lower cost than the Unit 1 refurbishment because it was completed in a planned rather than emergency manner.

Project Title and Location	Expenditure (\$,000)	Failure Identified	Project Scope
Boiler Stop Valve and Hydraulic Ram, Holyrood Unit 1	\$703.0	<p>Unit 1 turbine control valves began operating erratically on January 3, 2018. On January 5 to 6, 2018, an outage was taken to replace the servo and clean the hydraulic fluid and filters. This did not solve the problem and on January 20, 2018 erratic operation of the control valves became severe to the point where the unit was taken offline on a forced outage to address the issue. Further investigation revealed that the hydraulic ram for one of the control valves was deteriorated and required refurbishment. For the boiler stop valve, a technical representative for the original equipment manufacturer (“OEM”) identified that the internal seating surface was damaged, with excessive clearance between the body and the pressure seal ring. Upon review, and with consideration for the remaining life of Holyrood boilers, it was determined that the boiler stop valve could be eliminated from the system and replaced with a welded pipe spool.</p>	<p>The hydraulic ram for the turbine control valve was refurbished using parts from an available spare ram, and the spare ram was reconditioned and returned to inventory.</p> <p>The boiler stop valve was replaced with a welded pipe spool.</p>
Boiler Observation Ports, Vestibule Refractory and Steam Coil Air Heaters, Holyrood	\$341.2	<p>Units 1 and 2 observation ports in the boiler casing, consisting of special glass, metal frames, and refractory seals, were inspected and found to have refractory damage and therefore at an elevated risk of sudden failure. There are two ports for each unit.</p> <p>Unit 2 header vestibule refractory seals around the boiler tube penetrations were inspected and one of the five seals was found to have refractory damage. When this refractory fails, hot gas will enter the vestibules and can cause boiler gas leaks from the vestibule to the powerhouse, which is at a lower pressure. This could lead to health and safety concerns and could lead to a forced outage for repair.</p> <p>Two of the eight steam coil air heaters on Unit 3, which preheat the combustion air prior to the air entering the main air heaters, were found to be leaking steam and had to be isolated in the fall of 2017. All of the coils were inspected in 2018 and found to be in poor condition with damaged and fouled fins, affecting fan performance by increasing the pressure drop across them. Failures of additional loops were reasonably expected.</p>	<p>The observation ports on Units 1 and 2 were replaced.</p> <p>The header vestibule refractory seals were replaced on Unit 2.</p> <p>The eight steam coil air heaters were replaced.</p>

Project Title and Location	Expenditure (\$,000)	Failure Identified	Project Scope
Fuel Oil Return Line, Holyrood Marine Terminal	\$296.9	<p>The Holyrood Marine Terminal has an 18 inch fuel oil line used to off-load tankers and a separate four inch line to empty fuel oil from the 18 inch line following a tanker off-loading. There are approximately 157 barrels of fuel oil that would be released into the environment if a failure was to occur on the 18 inch line due to arctic sea ice in Holyrood Bay or tanker impact during fuel delivery at this location following a fuel delivery. A visual inspection of the Marine Terminal revealed that the 4 inch return line had lifted vertically off its pipe supports and moved axially towards the ocean by approximately 12 inches. A subsequent assessment of the line indicated that it had significant corrosion underneath the pipe insulation and measured wall thicknesses below the pipe original minimum wall thickness. In addition, the line was no longer resting on its supports and permanent damage was expected from excessive movement. Due to the urgent requirement to mitigate the risk of failure, Hydro decided to replace the line.</p>	<p>The four inch fuel oil return line was replaced, including the piping, supports, heat tracing and insulation.</p>
Variable Frequency Drive Fan Motor and Boiler Feed Pump Motor, Holyrood	\$84.2	<p>The Unit 1 West variable frequency drive fan motor exhibited high winding temperatures resulting in an alarm. Load on the unit was reduced to control the motor temperature, but the temperature continued to increase over time, indicating an imminent failure. The unit was removed from service for immediate replacement of the motor using an available spare motor.</p> <p>The Unit 2 West boiler feed pump motor had to be removed from service when the motor bearing failed. As a result, Unit 2 was de-rated to approximately 70 MW until the motor was replaced with the available spare motor.</p>	<p>The Unit 1 West variable frequency drive motor and the Unit 2 West boiler feed pump motor were replaced with available spares. The motors removed from service were refurbished and added to inventory as critical spares.</p>
East Cooling Water Pump Motor, Holyrood Unit 3	\$73.3	<p>The drive-end bearing on the Unit 3 East Cooling Water Pump (“CWP”) Motor was found to be exhibiting high vibration during the 2017/2018 winter operating season and was running hotter than normal. These observed conditions indicated that failure was imminent and that intervention was required before returning the unit to service for the winter season.</p>	<p>The Unit 3 East Cooling Water Pump Motor was removed, refurbished and returned to service.</p>

<b>Project Title and Location</b>	<b>Expenditure (\$,000)</b>	<b>Failure Identified</b>	<b>Project Scope</b>
West Cooling Water Pump Motor, Holyrood Unit 2	\$56.7	The Unit 2 West CWP Motor was tested on May 30, 2018 for winding resistance as part of routine maintenance. The test results indicated that the winding insulation had deteriorated to the point where on-line failure could be expected during the next operating season. To restore the motor from this incipient failure condition and ensure reliable operation going forward, it was necessary to have the windings restored.	The motor was replaced with an available spare motor. The motor removed from service was refurbished and added to inventory as a critical spare.
West Forced Draft Fan Motor, Holyrood Unit 2	\$53.2	The Unit 2 West Forced Draft (FD) Fan Motor was tested on May 29, 2018 for winding resistance as part of routine maintenance. The test results indicated that the winding insulation has deteriorated to the point where on-line failure could be expected during the next operating season. To restore the motor from this incipient failure condition and ensure reliable operation going forward, it is necessary to have the windings restored.	The motor was replaced with an available spare motor. The motor removed from service was refurbished and added to inventory as a critical spare.
Variable Frequency Drives, Holyrood Units 1 and 2	\$104.7	On March 5, 2018, a Unit 2 west Variable Frequency Drive (“VFD”) power cell failed and was replaced. The drive bypassed the failed cell and the unit did not trip in this instance. On March 19, 2018, the west VFD tripped on Unit 1. Another power cell had failed and was replaced with an available spare, and two cell control fuses had blown and were replaced with available spares. The fault log was downloaded from the VFD and sent it to the OEM for review and technical assistance. The OEM confirmed that the actions taken by the plant were appropriate.  On March 26, 2018, the east VFD tripped on Unit 1, with a failure similar to that which occurred on March 19, 2018. Power cells and fuses were replaced with available spares.	Failed VFD power cells and fuses were replaced with available spares.
Forced Draft Fan Bearing, Holyrood Unit 1	\$49.8	On June 17, 2018 the Unit 1 East FD fan inboard bearing liner failed, which led to a forced outage on Unit 1.	The inboard bearing liner was replaced with an available spare and the journal (the bearing surface section of the fan shaft) was refurbished.



<b>Project Title and Location</b>	<b>Expenditure (\$,000)</b>	<b>Failure Identified</b>	<b>Project Scope</b>
Turbine Control System (Mark V), Holyrood Unit 1	\$75.0	Online testing of the reheat valves for Units 1 and 2 revealed that components in the turbine control system has failed and required replacement. Upon completion of the replacement of the failed components, the reheat valves on both units tested successfully.	Failed components of the turbine control system were replaced, including two solenoids, fuses, circuit boards and ribbon cables on Unit 1 and the servomotors on both of the reheat valves on Unit 2.
Distributed Control System (“DCS”), Holyrood	\$32.7	Hydro received a Schneider Electric Customer Advisory detailing a manufacturing defect with the Schneider Electric FCP270 Control Processors (“FCP”). As outlined in the advisory, there was an incipient failure that needed to be corrected before entering into the 2018/2019 winter season to maintain reliability of this critical system. There were three options presented in Schneider Electric’s advisory. The option to receive pre-programmed, upgraded FCPs, was the most cost effective and least impactful to Holyrood’s operation.	All Schneider Electric FCP270 Control Processors (“FCP”) were replaced with factory-updated FCPs. This includes eight FCPs installed in Holyrood’s distributed control system and one in inventory.
Distributed Control System (“DCS”) Operator Station, Holyrood Unit 3	\$12.6	One of the Unit 3 DCS Operator Stations failed on May 4, 2018. The Basic Input/Output System (“BIOS”) of the machine was not identifying any hard drive and, therefore, the operating system was not booting. This may have been caused by a critical failure of the hard drive itself, the motherboard’s connection to it, or the power supply connection to the hard drive. The computer that failed is one of the oldest operator stations with obsolete hardware, and a motherboard problem would require full replacement of the operator station. For safe and reliable operation through the 2018/2019 winter operating season, all stations are required to be in service. Therefore, the replacement of the failed operator station was required. This operator station will be required post steam.	The Unit 3 DCS Operator Station was replaced.