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3.1 Gander Twillingate Transmission System Planning Study

- Page 21. Newfoundland Power states "An NPV analysis of the viable Q. alternatives presented in section 3.1 was completed to determine customer revenue requirements associated with each alternative over the life cycle of the required capital assets."
 - a) Please provide the NPV analysis in a table showing every year in the study period as well as a graphical representation over the life of the study period.
 - b) Did Newfoundland Power include the cost of the replacement GAN-T2 power transformer (\$4,185,000) within the NPV analysis conducted for the New Transmission Line from Lewisporte to Boyd's Cove project? If not, please explain. If yes, why is there a separate project for it (i.e., GAN-T2 Power Transformer Replacement project)?
 - c) If the GAN-T2 power transformer has not been included, how would the results contained within Table 9, as well as the corresponding tables illustrating the various sensitivity analyses, be impacted if the capital costs associated with GAN-T2 were included?
 - d) If the resultant NPV analysis, with the inclusion of the GAN-T2 costs, shows this project as not being the least cost option, or for some other reason this project was not approved, how would Newfoundland Power's plans for the rebuilds of transmission lines 142L and 114L be impacted, if at all?
- a) See Attachment A. Α.
 - b) The cost of replacement of system power transformer GAN-T2 is included within the NPV analysis conducted as part of report 3.1 Gander-Twillingate Transmission System Planning Study (the "Study").

The Study recommends numerous capital expenditures totaling \$35.8 million between 2025 and 2027 across various asset classes, including: \$20.8 million for the New Transmission Line from Lewisporte to Boyd's Cove project; \$4.2 million for the Gander Substation Power Transformer Replacement project; as well as \$10.8 million for other related projects recommended to commence in 2026 to facilitate completion of the proposed transmission system reconfiguration to the Gander – Twillingate area.¹

Newfoundland Power is currently seeking approval for the two projects recommended to commence in 2025 as per the Study: (1) the New Transmission Line from Lewisporte to Boyd's Cove; and (2) the Gander Substation Power Transformer Replacement.

See Newfoundland Power's 2025 Capital Budget Application, report 3.1 Gander-Twillingate Transmission System Planning Study, page 26, Table 15, for a list of proposed expenditures between 2025 and 2027.

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With respect to there being a separate project report for the *Gander Substation Power Transformer Replacement* project, Newfoundland Power acknowledges that this report could have been filed as an appendix to the Study. However, due to the Company's standard practice of filing asset-based engineering reports as part of its Capital Budget Applications, as well as the level of detail provided for the condition of GAN-T2, it was decided to provide this information as part of Newfoundland Power's standardized *Substation Power Transformer Replacements* report.

c) The results provided in Newfoundland Power's 2025 Capital Budget Application, report 3.1 Gander – Twillingate Transmission System Planning Study, page 22, Table 9, are based on the total planned project expenditures from 2025 to 2027, as well as foreseeable expenditures in the 2030 to 2036 period, across all asset classes. These expenditures include those associated with the Gander Substation Power Transformer Replacement project.

See the response for part a) for a detailed breakdown of all costs associated with the results of the NPV analyses provided in Table 9.

d) As per the response in part c), the NPV analyses conducted as part of the Study included costs associated with the *Gander Substation Power Transformer Replacement* project, and remains least-cost.

If expenditures recommended as part of the Study were not approved, the transmission-level undervoltage condition would still have to be mitigated, and Transmission Line 108 and system power transformer GAN-T2 would still need to be replaced. The next best alternative that could ensure adequate transmission voltages to the area would require converting Transmission Line 142L to 138 kV and constructing an extension to Boyd's Cove Substation, which is Alternative 1 in the Study and is not least-cost. Also, if Alternative 1 was chosen instead, transmission lines 142L and 114L would still have to be rebuilt in the 2030 to 2036 timeframe.

ATTACHMENT A:

Detailed NPV Analysis of Gander - Twillingate Transmission System Planning Study

Table 1 provides the Present Worth Analysis of Alternative 1 from 2025 to 2084.

Table 1: Present Worth Analysis of Alternative 1 ¹									
Year	Transmission 51.9 yrs	Substation 48.5 yrs	Distribution 52.9 yrs	Capital	Operating	Net	Present Worth	Cumulative Present Value	
	8% CCA	46.5 y/s 8% CCA	32.9 y/s 8% CCA	Revenue Requirement	Costs ²	Benefit	Benefit	Benefit	
2025	2,200,000	20,000	0	210,340	452,667	-663,007	-663,007	-663,007	
2026	8,200,000	4,400,000	0	1,423,191	424,185	-1,847,376	-1,732,186	-2,395,192	
2027	16,900,000	4,800,000	0	3,592,659	408,507	-4,001,166	-3,517,749	-5,912,942	
2028	0	0	0	3,761,135	418,537	-4,179,673	-3,445,559	-9,358,501	
2029	0	0	0	3,644,212	421,064	-4,065,276	-3,142,293	-12,500,793	
2030	0	0	0	3,532,235	419,373	-3,951,608	-2,863,977	-15,364,771	
2031	0	0	0	3,424,808	418,655	-3,843,463	-2,611,906	-17,976,677	
2032	0	0	0	3,321,567	427,505	-3,749,072	-2,388,899	-20,365,575	
2033	27,386,698	1,841,123	0	6,004,706	425,202	-6,429,908	-3,841,651	-24,207,226	
2034	0	0	0	6,217,382	435,122	-6,652,504	-3,726,811	-27,934,037	
2035	0	0	0	6,026,550	437,590	-6,464,139	-3,395,487	-31,329,525	
2036	0	0	0	5,843,006	441,516	-6,284,522	-3,095,300	-34,424,825	
2037	0	0	0	5,666,166	444,712	-6,110,879	-2,822,106	-37,246,931	
2038	0	0	0	5,495,495	452,672	-5,948,167	-2,575,681	-39,822,612	
2039	0	0	0	5,330,499	458.051	-5,788,550	-2,350,270	-42,172,882	
2040	0	0	0	5,170,724	464,880	-5,635,603	-2,145,495	-44,318,377	
2041	0	0	0	5,015,751	485,806	-5,501,557	-1,963,866	-46,282,243	
2042	0	0	0	4,865,198	492,162	-5,357,360	-1,793,148	-48,075,391	
2042	0	0	0	4,718,710	500,924	-4,718,710	-1,480,907	-49,556,299	
2043	0	0	0	4,575,963	509,872	-4,575,963	-1,346,561	-50,902,860	
2044	0	0	0		518,987	-4,436,656	-1,224,161	-52,127,021	
2045	0	0	0	4,436,656	528,234				
				4,300,515	,	-4,300,515	-1,112,609	-53,239,630	
2047	0	0	0	4,167,287	537,646	-4,167,287	-1,010,915	-54,250,544	
2048	0		0	4,036,738	547,226	-4,036,738	-918,186	-55,168,730	
2049	0	0	0	3,908,654	556,976	-3,908,654	-833,617	-56,002,347	
2050	0	0	0	3,782,838	566,901	-3,782,838	-756,478	-56,758,825	
2051	0	0	0	3,659,108	577,002	-3,659,108	-686,109	-57,444,934	
2052	0	0	0	3,537,298	587,283	-3,537,298	-621,911	-58,066,845	
2053	0	0	0	3,417,254	597,747	-3,417,254	-563,343	-58,630,188	
2054	0	0	0	3,298,834	608,398	-3,298,834	-509,912	-59,140,101	
2055	0	0	0	3,181,910	619,238	-3,181,910	-461,171	-59,601,272	
2056	0	0	0	3,066,360	630,272	-3,066,360	-416,712	-60,017,985	
2057	0	0	0	2,952,076	641,502	-2,952,076	-376,166	-60,394,151	
2058	0	0	0	2,838,955	652,932	-2,838,955	-339,196	-60,733,346	
2059	0	0	0	2,726,906	664,566	-2,726,906	-305,493	-61,038,839	
2060	0	0	0	2,615,841	676,407	-2,615,841	-274,778	-61,313,617	
2061	0	0	0	2,505,683	688,459	-2,505,683	-246,794	-61,560,411	
2062	0	0	0	2,396,359	700,726	-2,396,359	-221,309	-61,781,721	
2063	0	0	0	2,287,801	713,212	-2,287,801	-198,110	-61,979,830	
2064	0	0	0	2,179,950	725,920	-2,179,950	-177,000	-62,156,830	
2065	0	0	0	2,072,748	738,854	-2,072,748	-157,802	-62,314,632	
2066	0	0	0	1,966,143	752,019	-1,966,143	-140,352	-62,454,984	
2067	0	0	0	1,860,088	765,419	-1,860,088	-124,502	-62,579,487	
2068	0	0	0	1,754,538	779,057	-1,754,538	-110,115	-62,689,601	
2069	0	0	0	1,649,453	792,938	-1,649,453	-97,065	-62,786,666	
2070	0	0	0	1,544,797	807,067	-1,544,797	-85,238	-62,871,904	
2071	0	0	0	1,440,534	821,447	-1,440,534	-74,529	-62,946,433	
2072	0	0	0	1,336,633	836,084	-1,336,633	-64,841	-63,011,274	
2073	0	0	0	1,233,882	850,981	-1,233,882	-56,124	-63,067,399	
2074	0	0	0	1,309,114	866,144	-1,309,114	-55,834	-63,123,232	

For the capital costs for each alternative, see Tables 5, 6 and 7 in Newfoundland Power's 2025 Capital Budget Application, report 3.1 Gander—Twillingate Transmission System Planning Study. The capital costs in those tables for 2025 to 2027 are the forecast costs in those years to complete the capital work based on detailed engineering assessments, and 2026 and 2027 costs consider inflationary increases from 2025. The total Future Rebuilds (2030-2036) estimates in those tables are shown in 2025 dollars. In the NPV analysis, the rebuild figures are detailed by year and reflect the forecast cost to complete the capital work in that year, which would incorporate forecast inflationary cost increases from 2025 using the GDP deflator.

Operating costs are based on the estimated costs of losses per alternative based on modeled peak losses and the historical loss factor of the Gander – Twillingate area. Projected maintenance costs are excluded, but are expected to be the lowest for Alternative 2 based on the road-side configuration of the newly proposed transmission line.

PUB-NP-032 (1st Revision) Attachment A

Requests for Information

NP 2025 Capital Budget Application

2075	0	0	0	1,166,098	881,577	-1,166,098	-46,633	-63,169,865
2076	0	0	0	994,987	897,285	-994,987	-37,309	-63,207,174
2077	0	0	0	1,392,725	913,272	-1,392,725	-48,967	-63,256,141
2078	0	0	0	1,987,823	929,545	-1,987,823	-65,532	-63,321,673
2079	0	0	0	428,071	946,108	-428,071	-13,232	-63,334,905
2080	0	0	0	382,178	962,966	-382,178	-11,077	-63,345,982
2081	0	0	0	411,741	980,124	-411,741	-11,190	-63,357,171
2082	0	0	0	267,057	997,588	-267,057	-6,805	-63,363,977
2083	0	0	0	224,149	1,015,363	-224,149	-5,356	-63,369,332
2084	0	0	0	2,455,997	1,033,454	-2,455,997	-55,022	-63,424,354

NP 2025 Capital Budget Application

Table 2 provides the Present Worth Analysis of Alternative 2 from 2025 to 2084.

Vest					Analysis of	AICCITIACIV			
2026 9.300,000	Year	51.9 yrs	48.5 yrs	52.9 yrs	Revenue			Worth	Cumulativ Present Value Benefit
2027	2025	1,900,000	20,000	0	181,913	414,982	-596,895	-596,895	-596,895
2027	2026	9.300.000	4.400.000	0	1,495,951		-1.884.822	-1.767.297	-2,364,192
2028 0 0 0 3.660,077 383,694 4,063,777 -3,350,014 9,914 2030 0 0 0 3.566,597 386,010 -3,951,910 -2,938,227 1-5,92 2031 0 0 0 0 3.466,559 384,660 3.364,019 -2,738,327 1-5,92 2032 0 0 0 0 3.260,889 391,915 364,2804 -2,237,185 1-19,84 2032 0 0 0 3.260,889 391,915 364,2804 -2,237,185 1-19,84 2033 2.6,811,347 0 0 0 3.698,873 46,012,64 1-1,272,185 1-19,84 2034 0 0 0 3.698,875 46,012,64 1-1,272,185 1-1,274,555 1-1,274									-5,799,040
2099 0 0 0 0 3,565,897 38,600 3,365,100 7,205,4663 12,227 2031 0 0 0 0 3,351,675 38,1802 3,735,477 12,588,522 17,526 2032 0 0 0 0 3,351,675 38,1802 3,735,477 12,588,522 17,526 2033 0 0 0 0 3,351,675 38,1802 3,735,477 12,588,522 17,526 2034 0 0 0 3,200,889 391,975 1,364,2804 1,464,621 12,444 2035 0 0 0 0 3,200,889 391,975 1,364,2804 1,464,621 12,445 2036 0 0 0 0 0 0 3,777,607 394,023 1,610,2643 1,464,621 12,445 2037 0 0 0 0 0 0 3,777,607 441,044 1,479,425 1,350,798 1,220,205 2038 0 0 0 0 0 0 0 3,777,607 441,044 1,479,425 1,350,798 1,220,205 2039 0 0 0 0 0 3,777,607 441,044 1,479,425 1,350,798 1,350,205 2039 0 0 0 0 0 3,747,607 441,044 1,479,425 1,350,798 1,350,205 2040 0 0 0 0 0,508,889 405,431 1,548,416 1,246,404,48 3,424,240 2040 0 0 0 0 0,49,701,71 451,211 1,521,888 1,203,225 1,460,240 2041 0 0 0 0 0 4,677,809 465,175 1,500,491 1,686,861 4,465,400 2040 0 0 0 0 4,677,809 465,175 1,500,491 1,686,861 4,465,400 2041 0 0 0 0 4,677,809 465,175 1,500,491 1,686,861 4,475,500 2044 0 0 0 0 0 4,677,809 465,175 1,500,491 1,686,861 4,475,500 2044 0 0 0 0 0 4,677,809 465,175 1,500,491 1,686,861 4,475,500 2044 0 0 0 0 0 4,677,809 465,175 1,500,491 1,686,861 4,475,500 2044 0 0 0 0 0 4,677,809 465,175 1,500,491 1,686,861 4,475,500 2044 0 0 0 0 0 4,478,509 465,123 1,476,464 4,475,500 2044 0 0 0 0 0 4,478,509 465,123 1,476,464 1,475,500 2044 0 0 0 0 0 4,478,509 465,123 1,476,464 1,475,500 2044 0 0 0 0 0 4,478,509 465,233 1,476,464 1,475,500 2044 0 0 0 0 0 4,478,509 465,233 1,476,464 1,475,500 2044 0 0 0 0 0 4,478,509 465,233 1,476,464 1,475,500 2044 0 0 0 0 0 4,478,509 465,233 1,476,464 1,475,500 2044 0 0 0 0 0 4,478,509 465,233 1,476,464 1,475,500 2045 0 0 0 0 0 4,478,509 4,475,500 4,475,500 4,475,500 4,475,500 2046 0 0 0 0 0 4,478,509 4,475,500 4,475,									
2030									
2031 0 0 0 3.3516.05 383,802 -3,735,477 -2,538,522 -17,522 2032 0 0 0 0 3.250,889 39,195 3,646,221 -12,185 198,88 2033 26,813,37 0 0 0 5,797,720 39,93 -10,102,643 -3,646,121 -22,45 2035 0 0 0 0 5,898,475 404,177 -6,302,612 -3,530,788 -22,020 2035 0 0 0 0 5,747,832 406,429 -4,124,261 -1,216,956 -30,24 2035 0 0 0 0 5,747,832 406,429 -4,124,261 -2,216,956 -30,24 2037 0 0 0 5,747,832 406,429 -4,124,261 -2,216,956 -30,24 2037 0 0 0 5,747,832 406,429 -4,124,261 -2,767,378 -3,137 2037 0 0 0 5,747,868 420,427 -5,655,406 -2,444,0248 -38,282 2039 0 0 0 0 5,274,968 420,427 -5,655,406 -2,444,0248 -38,282 2039 0 0 0 0 5,038,860 425,433 -5,464,113 -2,226,662 -40,57 2040 0 0 0 0 4,907,33 43,776 5,339,088 -2,032,601 -42,542 2041 0 0 0 0 4,476,033 40,776 5,339,088 -2,032,601 -42,542 2044 0 0 0 0 4,476,033 40,776 5,339,088 -2,032,601 -42,542 2044 0 0 0 0 4,478,039 46,715 -5,776,685 -1,665,642 2044 0 0 0 0 4,478,039 46,715 -5,776,685 -1,665,644 2044 0 0 0 0 4,478,039 46,715 -2,717,685 -1,665,644 2044 0 0 0 0 0 4,478,039 46,715 -2,717,685 -1,665,644 2044 0 0 0 0 0 4,478,039 46,715 -2,717,685 -1,665,644 2044 0 0 0 0 0 4,211,77 48,220 -2,441,77 -1,166,664 -4,99 2046 0 0 0 0 0 3,366,141 493,300 -3,966,141 -95,664 -1,566 2049 0 0 0 0 3,370,331 517,314 -3,710,313 -791,465 -1,566 2049 0 0 0 0 3,370,331 517,314 -3,710,313 -791,467 52,336 2050 0 0 0 0 3,370,331 517,314 -3,710,313 -791,467 52,336 2050 0 0 0 0 3,370,331 517,314 -3,710,313 -791,467 52,336 2050 0 0 0 0 3,370,331 517,314 -3,710,313 -791,467 52,336 2050 0 0 0 0 3,370,331 517,314 -3,710,313 -791,467 52,336 2050 0 0 0 0 3,370,331 517,314 -3,710,313 -791,467 52,336 2050 0 0 0 0 3,370,331 517,314 -3,710,313 -791,467 52,336 2050 0 0 0 0 3,370,331 517,314 -3,710,313 -791,467 52,336 2050 0 0 0 0 3,370,331 517,344 -3,700,313 -791,467 52,338 2050 0 0 0 0 0 3,370,331 517,344 -3,700,313 -791,467 52,338 2050 0 0 0 0 0 3,370,331 517,344 -3,700,313 -791,467 52,338 2050 0 0 0 0 0 0 3,370,331 517,344 -3,700,313 -791,467 52,338 2050 0 0 0 0 0 0 3,370,331 517,344 -3,700,313 -791,467 52,348 2050									-12,203,71
2023	2030	0	0	0	3,456,559	384,460	-3,841,019	-2,783,827	-14,987,54
2022 0 0 0 3,250,889 391,915 3,662,890 2,221,185 1938 (2023 323 5,1024 3).666,612 2,224,85	2031	0	0	0	3,351,675	383,802	-3,735,477	-2,538,522	-17,526,06
2033	2032	0	0	0	3.250.889	391.915		-2.321.185	-19,847,25
2034 0 0 0 5,898,475 404,157 45,302,612 1,530,798 22,002 2035 0 0 0 0 5,578,322 406,437 45,161 1,212,695 30,202 2036 0 0 0 0 5,578,697 410,076 5,595,135 2,625,275 33,77 2037 0 0 0 5,578,697 410,076 5,595,135 2,625,275 33,77 2038 0 0 0 0 5,578,697 410,076 5,595,135 2,625,275 33,77 2039 0 0 0 0 5,578,697 410,076 5,595,135 2,625,378 3,588,897 2039 0 0 0 0 5,598,809 420,437 5,665,406 2,440,248 38,282 2040 0 0 0 0 4,970,373 431,776 5,339,088 2,022,611 42,55 2040 0 0 0 0 4,700,473 451,271 5,271,685 1,860,392 444,44 2042 0 0 0 0 4,700,473 451,271 5,271,685 1,860,392 444,44 2042 0 0 0 0 4,671,800 45,711 5,574,85 1,1698,612 46,10 2044 0 0 0 0 4,478,593 465,233 4,478,593 1,405,664 44,573 2044 0 0 0 0 4,478,593 465,233 4,478,593 1,405,664 44,573 2044 0 0 0 0 4,478,593 465,233 4,478,593 1,405,666 44,573 2044 0 0 0 0 4,478,593 465,233 4,478,593 1,405,666 44,573 2046 0 0 0 0 4,478,571 48,000 4,478,593 1,405,666 44,573 2046 0 0 0 0 4,271,771 48,000 4,478,593 1,405,666 44,573 2046 0 0 0 0 4,271,771 48,000 4,478,593 1,405,666 4,575,793 2046 0 0 0 0 3,395,614 493,500 3,395,614 5,566,60 4,575,793 2048 0 0 0 0 3,395,614 493,500 3,395,614 5,566,60 5,560 2040 0 0 0 3,378,437 5,734 4,776,437 5,774,457,577 1,776,200 4,578,500 2048 0 0 0 0 3,378,437 5,734 4,776,437 5,774,457,577 1,777,457,577 1,777,457,577 1,777,457,577 1,777,457,577 1,777,457,577,457,577 1,777,457,577 1,777,457,577 1,777,457,577 1,777,457,577,457,577 1,777,457,577 1,777,457,577 1,777,457,577 1,777,457,577,457,577 1,777,457,577 1,777,457,577,457,577 1,777,457,577,457,577,457,577 1,777,457,577,457,45									-23,493,37
2025									
2036 0									
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2049	2047	0	0	0	3,956,141	499,360	-3,956,141	-959,694	-51,967,79
2049 0 0 0 0 3,710,831 517,314 -3,710,831 -791,26 -33,63 2050 0 0 0 0 3,591,476 526,531 -3,591,476 718,210 -54,34 2051 0 0 0 0 3,591,476 526,531 -3,591,476 718,210 -54,34 2051 0 0 0 0 3,374,088 535,913 -3,474,088 -651,415 -55,00 2052 0 0 0 0 0 3,384,596 555,181 -3,244,996 -334,880 -56,12 2054 0 0 0 0 0 3,244,596 555,181 -3,244,996 -334,880 -56,12 2054 0 0 0 0 0 3,132,214 565,073 -3,132,214 -484,157 -56,61 2055 0 0 0 0 0 3,021,240 575,142 -3,021,240 -437,884 -55,04 2056 0 0 0 0 0 3,021,240 575,142 -3,021,240 -437,884 -55,04 2056 0 0 0 0 0 2,911,563 585,390 -2,911,563 -395,576 -57,44 2057 0 0 0 0 2,803,079 595,820 -2,803,079 -357,181 -57,80 2058 0 0 0 0 0 2,695,692 606,436 -2,695,692 -322,079 -58,12 2059 0 0 0 0 0 2,593,314 617,242 -2,593,314 -290,078 -58,41 2060 0 0 0 0 2,483,865 628,240 -2,483,865 -260,914 -58,67 2061 0 0 0 0 0 2,275,461 650,827 -2,275,461 -210,144 -59,11 2063 0 0 0 0 0 2,275,461 650,827 -2,275,461 -210,144 -59,11 2063 0 0 0 0 0 2,275,461 650,827 -2,275,461 -188,115 -93,0 2064 0 0 0 0 0 2,275,461 650,827 -2,275,461 -188,115 -93,0 2064 0 0 0 0 0 1,968,147 686,240 -1,968,147 -149,838 -59,62 2066 0 0 0 0 0 1,968,147 686,240 -1,968,147 -149,838 -59,62 2067 0 0 0 0 1,968,147 686,240 -1,968,147 -149,838 -59,62 2069 0 0 0 0 0 1,665,924 723,580 -1,665,924 -104,553 -59,93 2069 0 0 0 0 0 1,666,704 749,595 -146,6704 -80,929 -60,15 2070 0 0 0 0 1,466,704 749,595 -146,6704 -80,929 -60,15 2071 0 0 0 0 1,466,704 749,595 -146,6704 -53,389 -60,38 2075 0 0 0 0 0 1,404,4701 863,325 -1,414,401 -4,5919 -60,52 2077 0 0 0 0 0 1,404,4701 863,325 -1,404,470 -6,662 -00,60 2082 0 0 0 0 0 2,144,470 92,6549 -20,414 -6,662 -00,60 2082 0 0 0 0 0 0 2,144,470 92,6549 -20,414 -6,662 -00,60 2083 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2048	0	0	0	3.832.324	508.258	-3.832.324	-871.691	-52,839,48
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2077 0 0 0 1,408,426 848,238 -1,408,426 -49,519 -60,52 2078 0 0 0 1,434,701 863,352 -1,434,701 -47,297 -60,57 2079 0 0 0 489,896 878,735 -489,896 -15,143 -60,57 2080 0 0 0 345,703 894,392 -345,703 -10,020 -60,59 2081 0 0 0 303,532 910,329 -303,532 -8,249 -60,60 2082 0 0 0 261,447 26,549 -261,447 -6,662 -60,60 2083 0 0 0 219,440 943,058 -219,440 -5,243 -60,61									-60,475,22
2078 0 0 0 1,434,701 863,352 -1,434,701 -47,297 -60,57 2079 0 0 0 489,896 878,735 -489,896 -15,143 -60,58 2080 0 0 0 345,703 894,392 -345,703 -10,020 -60,59 2081 0 0 0 303,532 910,329 -303,532 -8,249 -60,60 2082 0 0 0 261,447 926,549 -261,447 -6,662 -60,61 2083 0 0 0 219,440 943,058 -219,440 -5,243 -60,61									
2079 0 0 0 489,896 878,735 -489,896 -15,143 -60,58 2080 0 0 0 345,703 894,392 -345,703 -10,020 -60,59 2081 0 0 0 303,532 910,329 -303,532 -8,249 -60,60 2082 0 0 0 261,447 926,549 -261,447 -6,662 -60,61 2083 0 0 0 219,440 943,058 -219,440 -5,243 -60,61								-49,519	
2080 0 0 0 345,703 894,392 -345,703 -10,020 -60,59 2081 0 0 0 303,532 910,329 -303,532 -8,249 -60,60 2082 0 0 0 26,447 226,549 -261,447 -6,662 -60,61 2083 0 0 0 219,440 943,058 -219,440 -5,243 -60,61								-4/,29/	-60,572,03
2081 0 0 0 303,532 910,329 -303,532 -8,249 -60,60 2082 0 0 0 261,447 926,549 -261,447 -6,662 -60,61 2083 0 0 0 219,440 943,058 -219,440 -5,243 -60,61	2079	0	0	0	489,896	878,735	-489,896	-15,143	-60,587,18
2081 0 0 0 303,532 910,329 -303,532 -8,249 -60,60 2082 0 0 0 261,447 926,549 -261,447 -6,662 -60,61 2083 0 0 0 219,440 943,058 -219,440 -5,243 -60,61	2080	0	0	0	345,703	894,392	-345,703	-10,020	-60,597,20
2082 0 0 0 261,447 926,549 -261,447 -6,662 -60,67 2083 0 0 0 219,440 943,058 -219,440 -5,243 -60,61									-60,605,44
2083 0 0 0 219,440 943,058 -219,440 -5,243 -60,61									-60,612,11
2084 0 0 0 2,404,400 959,861 -2,404,400 -53,866 -60,67	∠ ∪83								-60,617,35 -60,671,22

See Footnote 1.

Operating costs are based on the estimated costs of losses per alternative based on modeled peak losses and the historical loss factor of the Gander - Twillingate area. Projected maintenance costs are excluded, but are expected to be the lowest for Alternative 2 based on the road-side configuration of the newly proposed transmission line.

Table 3 provides the Present Worth Analysis of Alternative 2 from 2025 to 2084.

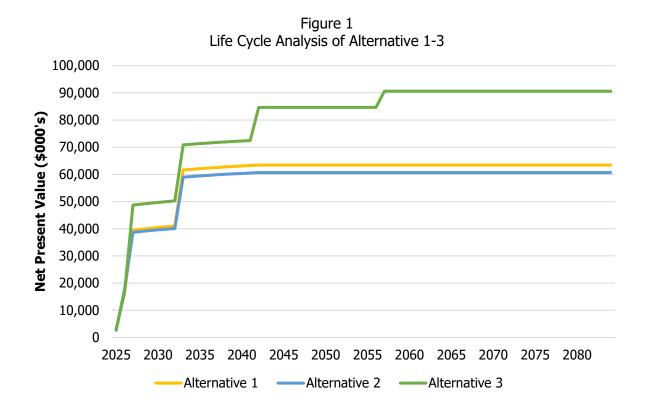
		110	SCIIL VVOI LII	Analysis of	Alternativ	e 3°		
Year	Transmission 51.9 yrs 8% CCA	Substation 48.5 yrs 8% CCA	Distribution 52.9 yrs 8% CCA	Capital Revenue Requirement	Operating Costs ⁶	Net Benefit	Present Worth Benefit	Cumulat. Presen Value Benefi
2025	2,200,000	20.000	0	210.340	452,667	-663.007	-663.007	-663,00
2026	8,200,000	3,900,000	0	1,376,219	424,185	-1,800,404	-1,688,143	-2,351,14
2027	8,100,000	23,300,000	0	4,445,110	408,507	-4,853,617	-4,267,208	-6,618,35
2028	0	0	0	4,699,489	418,537	-5,118,026	-4,219,101	-10,837,4
2029	0	0	0	4,553,964	421,064	-4,975,028	-3,845,494	-14,682,9
2030	0	0	0	4,414,684	419,373	-4,834,058	-3,503,544	-18,186,4
2031	0	0	0	4,281,150	418,655	-4,699,806	-3,193,852	-21,380,3
2032	0	0	0	4,152,902	427,505	-4,580,407	-2,918,623	-24,298,9
2033	27,386,698	1,841,123	0	6,812,045	425,202	-7,237,247	-4,324,008	-28,622,9
2034	0	0	0	7,001,657	435,122	-7,436,779	-4,166,171	
								-32,789,1
2035	0	0	0	6,788,616	437,590	-7,226,206	-3,795,786	-36,584,9
2036	0	0	0	6,583,652	441,516	-7,025,168	-3,460,089	-40,045,0
2037	0	0	0	6,386,117	444,712	-6,830,829	-3,154,591	-43,199,6
2038	0	0	0	6,195,417	452,672	-6,648,089	-2,878,761	-46,078,3
2039	0	0	0	6,011,005	458,051	-6,469,057	-2,626,570	-48,704,9
2040	0	0	0					
				5,832,379	464,880	-6,297,259	-2,397,390	-51,102,33
2041	0	0	0	5,659,075	485,806	-6,144,881	-2,193,511	-53,295,8
2042	0	31,007,545	0	8,419,059	492,162	-8,911,221	-2,982,652	-56,278,50
2043	0	0	0	8,560,304	500,924	-8,560,304	-2,686,542	-58,965,0
2044	0	0	0	8,299,137	509,872	-8,299,137	-2,442,174	-61,407,2
2045	0	0	0	8,046,334	518,987	-8,046,334	-2,220,142	-63,627,3
2046	0	0	0	7,801,224	528,234	-7,801,224	-2,018,295	-65,645,6
2047	0	0	0	7,563,193	537,646	-7,563,193	-1,834,705	-67,480,3
2048	0	0	0	7,331,673	547,226	-7,331,673	-1,667,644	-69,148,0
2049	0	0	0	7,106,145	556,976	-7,106,145	-1,515,561	-70,663,5
2050	0	0	0	6,886,129	566,901	-6,886,129	-1,377,062	-72,040,6
2051	0	0	0	6,671,183	577,002	-6,671,183	-1,250,894	-73,291,5.
2052	0	0	0	6,460,903	587,283	-6,460,903	-1,135,926	-74,427,4
2053	0	0	0	6,254,915	597,747	-6,254,915	-1,031,139	-75,458,5
2054	0	0	0	6,052,875	608,398	-6,052,875	-935,614	-76,394,2
2055	0	0	0	5,854,468	619,238	-5,854,468	-848,519	-77,242,7
2056	0	0	0	5,659,404	630,272	-5,659,404	-769,102	-78,011,8
2057	0	40,416,358	0	9,284,384	641,502	-9,284,384	-1,183,057	-79,194,8
2058	0	0	0	9,492,963	652,932	-9,492,963	-1,134,210	-80,329,0
2059	0	0	0	9,174,224	664,566	-9,174,224	-1,027,780	-81,356,8
2060	0	0	0	8,863,810	676,407	-8,863,810	-931,087	-82,287,9
2061	0	0	0	8,561,055	688,459	-8,561,055	-843,211	-83,131,10
2062	0	0	0	8,265,346	700,726	-8,265,346	-763,325	-83,894,4
2063	0	0	0	7,976,120	713,212	-7,976,120	-690,683	-84,585,1
	-	-	0					
2064	0	0		7,692,857	725,920	-7,692,857	-624,617	-85,209,7
2065	0	0	0	7,415,081	738,854	-7,415,081	-564,523	-85,774,3
2066	0	0	0	7,142,353	752,019	-7,142,353	-509,854	-86,284,1
2067	0	0	0	6,874,269	765,419	-6,874,269	-460,119	-86,744,2
2068	0	0	0	6,610,457	779,057	-6,610,457	-414,872	-87,159,1
2069	0	0	0	6,350,576	792,938	-6,350,576	-373,710	-87,532,8
2070	0	0	0	6,094,311	807,067	-6,094,311	-336,268	-87,869,1
2071	0	0	0	5,841,373	821,447	-5,841,373	-302,215	-88,171,3
2072	0	0	0	5,591,496	836,084	-5,591,496	-271,249	-88,442,6
2073	0	0	0	5,345,251	850,981	-5,345,251	-243,135	-88,685,7
2074	0	0	0	5,258,868	866,144	-5,258,868	-224,290	-88,910,0
2075	0	0	0	5,758,548	881,577	-5,758,548	-230,287	-89,140,3
2076	0	0	0	4,457,442	897,285	-4,457,442	-167,141	-89,307,4
2077	0	0	0	4,746,216	913,272	-4,746,216	-166,872	-89,474,3
2078	0	0	0	4,503,845	929,545	-4,503,845	-148,477	-89,622,8
2079	0	0	0	3,612,674	946,108	-3,612,674	-111,672	-89,734,4
2080	0	0	0	3,448,502	962,966	-3,448,502	-99,950	-89,834,4
2081	0	0	0	3,361,042	980,124	-3,361,042	-91,341	-89,925,7
2082	0	0	0	3,100,491	997,588	-3,100,491	-79,006	-90,004,7
2083	0	0	0	2,942,777	1,015,363	-2,942,777	-70,312	-90,075,0
2084	0	0	0	5,060,797	1,033,454	-5,060,797	-113,378	-90,188,4

⁵ See Footnote 1.

Operating costs are based on the estimated costs of losses per alternative based on modeled peak losses and the historical loss factor of the Gander – Twillingate area. Projected maintenance costs are excluded, but are expected to be the lowest for Alternative 2 based on the road-side configuration of the newly proposed transmission line.

As shown in Table 3, the final installation of a battery system would occur in 2057 with a suspect end-of-life in 2072. Therefore, Alternative 3 would have a shorter life-cycle than Alternatives 1 and 2. Adding an additional battery system in a future year to extend the life-cycle of Alternative 3 was omitted as its total NPV is higher as-is.⁷

Figure 1 shows a graphical representation of the results of Tables 1 to 3.



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Due to uncertainties surrounding the future costs of utility-scale battery systems, the analysis conducted in Table 3 is based on projected 2025 costs as provided by *Cost Projections for Utility-Scale Battery Storage: 2023 Update,* by Cole et al. While the authors of this report propose a normalized reduction in costs from 2025 to 2040, Newfoundland and Labrador Hydro's latest *Battery Energy Storage System Report* showed that battery costs increased in 2023 compared to 2022. For completeness, the NPV analysis in Table 3 was re-calculated assuming the normalized cost reductions as provided by Cole et al., which yields a revised NPV for Alternative 3 of \$80.7 million.