

1 **Reference: Schedule B, Page 2: LED Street Lighting Replacement (\$5,453,000)**

2  
3 **Q. Please provide an updated financial analysis on the acceleration of the**  
4 **installation of the LED street lights.**

5  
6 A. Newfoundland Power's proposed expenditures for the *LED Street Lighting Replacement*  
7 project for 2023 represent the third year of a six-year plan to replace all High-Pressure  
8 Sodium ("HPS") street lights with LED street lights (the "Plan").<sup>1</sup> This approach results  
9 in the replacement of approximately 10,000 HPS street lights each year with LED street  
10 lights.

11  
12 The large-scale replacement of HPS street lights with LED street lights is consistent with  
13 the provision of least cost reliable service and was initially approved by the Board as  
14 part of Newfoundland Power's *2021 Capital Budget Application*.<sup>2</sup> It is also consistent  
15 with Canadian utility practice.<sup>3</sup> Customers benefit from LED street lighting through  
16 lower customer rates, improved service reliability, and better lighting quality.<sup>4</sup>

17  
18 Prior to the implementation of the Plan, Newfoundland Power was replacing HPS street  
19 lights when they failed and could no longer be maintained.<sup>5</sup> With this approach,  
20 approximately 1,700, or 3%, of Newfoundland Power's HPS street lights were replaced  
21 each year. Continuing with this approach would have required over 30 years for all  
22 customers to realize the full benefit of LED street lighting service.<sup>6</sup>

23  
24 Consistent with the Plan, Newfoundland Power commenced accelerating the  
25 replacement of HPS street lights with LED street lights in 2021 by installing LED street  
26 lights in response to outages of HPS street lights.<sup>7</sup> This approach will result in all  
27 customers realizing the full benefit of the LED street lighting service by 2026. Aligning  
28 the timing and location of LED street light installations with HPS street light maintenance  
29 eliminates operating costs associated with HPS street lights and ensures fairness in  
30 customers' access to the lower rates provided by the LED service option.<sup>8</sup>

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1 The *LED Street Lighting Replacement Plan* was filed in Volume I of Newfoundland Power's *2021 Capital Budget Application*.

2 See Order No. P.U. 5 (2020), page 14, lines 4-9.

3 See Newfoundland Power's *2021 Capital Budget Application, Volume I, LED Street Lighting Replacement Plan, Appendix A - Survey of Canadian Utility Practice*.

4 Lower customer rates result from the reduced maintenance and energy costs associated with LED street lights, which more than offset the upfront capital costs. See Newfoundland Power's *2021 Capital Budget Application, Volume I, LED Street Lighting Replacement Plan, Section 2.1 Customer Benefits of LED Street Lights*.

5 The most common form of HPS maintenance was simply to replace a HPS bulb that had reached the end of its service life after approximately six years.

6 Prior to the Plan commencing, Newfoundland Power had 60,478 HPS street lights in service.  $60,478 \div 1,700$  annual replacements = approximately 36 years.

7 HPS street lights typically require maintenance every six years to replace a HPS street light bulb.

8 Section 3(a)(i) of the *Electrical Power Control Act, 1994* requires that rates to be charged to customers should be reasonable and not unjustly discriminatory. LED street lights provide lower customer rates in comparison to HPS street lights. Aligning the installation of LED street lights with Newfoundland Power's maintenance program for HPS street lights ensures fairness among customers in accessing the lower rates.

1 Attachment A provides an updated financial analysis on the replacement of the  
 2 remaining HPS street lights in service with LED street lights over the four-year period  
 3 2023 to 2026.<sup>9</sup>  
 4

5 Table 1 provides a summary of the updated financial analysis on the replacement of the  
 6 remaining HPS street lights in service with LED street lights over the four-year period  
 7 2023 to 2026.

Table 1 NPV Result (2023-2055) (\$000s)							
	Capital Expenditures	Retirement	Taxes and Net Salvage	Maintenance Costs	Avoided Electricity Costs	Total Cost	NPV
Alternative 1 End of Life HPS Fixture	\$26,027	\$8,458	\$6,932	\$29,251	-\$22,582	\$48,086	\$26,303
Alternative 2 Replacement Program	\$26,430	\$7,720	\$6,864	\$17,875	-\$39,915	\$18,974	\$21,991
Difference	\$403	-\$738	-\$68	-\$11,376	-\$17,333	-\$29,112	-\$4,312

8 Continuing with the replacement of all remaining HPS street lights with LED street lights  
 9 by the end of 2026 will reduce overall cost to customers by approximately \$29.1 million.  
 10 When calculated on an NPV basis, continuation of the Plan reduces costs to customers  
 11 by approximately \$4.3 million.

<sup>9</sup> Based on 10,000 replacements being replaced in 2021 and 2022, approximately 40,000 HPS street lights will remain in service at the beginning of 2023.

# **ATTACHMENT A:**

## **LED Street Lighting Replacement Plan – Updated NPV Analysis**

**Table 1**  
**Net Present Value Analysis**  
**Alternative 1: HPS End of Service Life**

Year	HPS	Capital		Taxes and	Maintenance	Avoided	Net Present	Cumulative	
	Beginning of Year	Expenditures (\$)	Retirement (\$)	Net Salvage (\$)	Costs (\$)	Electricity Costs (\$)			Total Cost (\$)
2023	40,044	674,810	161,472	168,093	1,297,378	(42,566)	2,259,186	2,259,186	2,259,186
2024	38,824	681,438	168,100	170,757	1,269,638	(90,425)	2,199,508	2,078,745	4,337,932
2025	37,604	685,984	172,646	172,585	1,241,026	(103,649)	2,168,592	1,936,999	6,274,930
2026	36,384	690,787	177,449	174,515	1,212,359	(126,681)	2,128,430	1,796,746	8,071,676
2027	35,164	695,727	182,390	176,501	1,182,412	(165,289)	2,071,741	1,652,869	9,724,545
2028	33,944	700,833	187,495	178,554	1,151,012	(207,860)	2,010,033	1,515,591	11,240,135
2029	32,724	706,088	192,750	180,667	1,118,486	(259,044)	1,938,947	1,381,721	12,621,857
2030	31,504	711,413	198,075	182,807	1,084,051	(308,137)	1,868,208	1,258,217	13,880,073
2031	30,284	716,866	203,528	184,999	1,047,729	(361,847)	1,791,275	1,140,166	15,020,240
2032	29,064	722,398	209,061	187,223	1,009,774	(426,634)	1,701,822	1,023,755	16,043,994
2033	27,844	728,026	214,688	189,486	1,136,603	(342,020)	1,926,782	1,095,444	17,139,438
2034	26,624	735,045	220,416	192,048	1,097,563	(376,256)	1,868,815	1,004,152	18,143,590
2035	25,404	742,164	226,243	194,650	1,056,951	(422,790)	1,797,217	912,661	19,056,252
2036	24,184	749,427	232,215	197,310	1,014,645	(458,190)	1,735,407	832,887	19,889,139
2037	22,964	756,777	238,274	200,005	970,043	(504,305)	1,660,795	753,315	20,642,453
2038	21,744	764,253	244,459	202,751	923,879	(561,276)	1,574,067	674,776	21,317,229
2039	20,524	771,845	250,727	205,537	875,657	(604,565)	1,499,200	607,395	21,924,624
2040	19,304	779,602	257,161	208,389	825,313	(661,306)	1,409,160	539,570	22,464,195
2041	18,084	787,471	263,706	211,287	773,241	(709,746)	1,325,959	479,837	22,944,031
2042	16,864	795,464	270,377	214,234	719,133	(759,562)	1,239,646	423,972	23,368,003
2043	15,644	803,582	277,171	217,231	659,808	(810,769)	1,347,024	435,402	23,803,405
2044	14,424	815,643	284,099	221,048	604,774	(863,412)	1,262,152	385,569	24,188,974
2045	13,204	827,825	291,148	224,914	547,602	(917,471)	1,174,017	338,954	24,527,928
2046	11,984	840,162	298,351	228,841	487,984	(973,071)	1,082,267	295,309	24,823,237
2047	10,764	852,657	305,713	232,832	426,567	(1,030,250)	987,519	254,662	25,077,899
2048	9,544	865,313	313,235	236,888	362,948	(1,089,042)	889,342	216,752	25,294,651
2049	8,324	878,133	320,923	241,010	299,703	(1,149,487)	787,282	181,343	25,475,993
2050	7,104	891,122	328,778	245,200	232,508	(1,211,623)	681,985	148,464	25,624,457
2051	5,884	904,282	336,804	249,458	164,301	(1,275,488)	576,358	116,686	25,761,143
2052	4,664	917,617	345,006	253,787	95,674	(1,341,123)	473,961	84,882	25,884,024
2053	3,444	931,130	353,386	258,188	26,253	(1,408,569)	383,388	53,600	26,036,624
2054	2,224	944,825	361,948	262,661	11,678	(1,477,867)	293,246	22,813	26,175,436
2055	1,004	958,707	370,696	267,210	4,292	(1,541,543)	203,361	12,106	26,302,543

**Table 2**  
**Net Present Value Analysis**  
**Alternative 2: LED Replacement Program**

Year	HPS	Capital		Taxes and	Maintenance	Avoided		Net Present Value (\$)	Cumulative Present Value (\$)
	Beginning of Year	Expenditures (\$)	Retirement (\$)	Net Salvage (\$)	Costs (\$)	Electricity Costs (\$)	Total Cost (\$)		
2023	40,044	5,453,000	1,325,000	1,362,378	0	(349,469)	7,790,908	7,790,908	7,790,908
2024	30,033	5,507,387	1,379,387	1,384,242	0	(742,388)	7,528,627	7,115,273	14,906,181
2025	20,022	5,544,690	1,416,690	1,399,237	0	(850,956)	7,509,661	6,707,672	21,613,853
2026	10,011	5,584,101	1,456,101	1,415,081	0	(1,040,046)	7,415,236	6,259,682	27,873,535
2027	0	57,563	57,563	23,140	0	(1,085,615)	(947,348)	(755,810)	27,117,725
2028	0	58,611	58,611	23,562	0	(1,137,684)	(996,901)	(751,676)	26,366,049
2029	0	59,685	59,685	23,993	0	(1,215,281)	(1,071,917)	(763,863)	25,602,186
2030	0	60,761	60,761	24,426	0	(1,264,899)	(1,118,951)	(753,601)	24,848,585
2031	0	61,855	61,855	24,866	0	(1,320,334)	(1,171,757)	(745,836)	24,102,748
2032	0	62,954	62,954	25,308	0	(1,401,062)	(1,249,846)	(751,862)	23,350,886
2033	0	64,061	64,061	25,752	1,353,656	(1,021,082)	486,449	276,563	23,627,449
2034	0	75,774	65,177	28,331	1,377,249	(1,029,683)	516,848	277,713	23,905,162
2035	0	87,497	66,303	30,914	1,401,040	(1,068,028)	517,726	262,911	24,168,073
2036	0	99,241	67,451	33,505	1,425,295	(1,074,778)	550,714	264,308	24,432,382
2037	0	110,990	68,604	36,098	0	(1,104,086)	(888,394)	(402,964)	24,029,418
2038	0	112,159	69,773	36,568	0	(1,152,013)	(933,513)	(400,181)	23,629,237
2039	0	113,592	70,945	37,092	0	(1,167,872)	(946,244)	(383,367)	23,245,869
2040	0	115,052	72,143	37,626	0	(1,206,511)	(981,690)	(375,891)	22,869,978
2041	0	116,522	73,353	38,165	0	(1,226,735)	(998,696)	(361,407)	22,508,571
2042	0	118,006	74,576	38,709	0	(1,247,196)	(1,015,905)	(347,450)	22,161,121
2043	0	119,243	75,813	39,206	1,601,991	(1,267,883)	568,370	183,716	22,344,837
2044	0	151,761	77,066	45,994	1,628,462	(1,288,833)	614,450	187,706	22,532,543
2045	0	184,290	78,331	52,787	1,655,185	(1,309,983)	660,610	190,727	22,723,269
2046	0	216,841	79,616	59,588	1,682,347	(1,331,480)	706,912	192,889	22,916,158
2047	0	249,412	80,923	66,397	0	(1,353,330)	(956,598)	(246,688)	22,669,471
2048	0	250,740	82,250	66,931	0	(1,375,538)	(975,616)	(237,779)	22,431,692
2049	0	252,090	83,600	67,474	0	(1,398,111)	(994,947)	(229,176)	22,202,516
2050	0	253,462	84,972	68,025	0	(1,421,054)	(1,014,595)	(220,871)	21,981,645
2051	0	254,856	86,366	68,586	0	(1,444,374)	(1,034,565)	(212,853)	21,768,793
2052	0	256,274	87,784	69,156	0	(1,468,076)	(1,054,863)	(205,113)	21,563,680
2053	0	257,714	89,224	69,735	1,885,378	(1,492,168)	809,884	148,832	21,712,511
2054	0	259,178	90,689	70,323	1,916,318	(1,516,654)	819,854	142,392	21,854,903
2055	0	260,666	92,177	70,921	1,947,765	(1,541,543)	829,987	136,237	21,991,140

**Economic Evaluation**  
**Major Inputs and Assumptions**

- Capital Expenditures:** Capital expenditures include all equipment and installation costs. This includes capital expenditures associated with a 1% annual failure rate of LED fixtures.
- Retirement Costs:** Labour costs associated with fixture replacement are charged 50% to retirement and 50% to capital in accordance with the Company's Capitalization Policy.
- Taxes and Net Salvage:** Income tax and net salvage costs are associated with financing and the eventual retirement of street light assets. Net Salvage costs are as detailed in the Company's 2019 Depreciation Study.
- Maintenance Costs:** Maintenance costs for each alternative were estimated on a per-fixture basis, as described in Section 1.3 of the Plan – Appendix B.
- Avoided Electricity Costs:** Avoided electricity cost for 2023-2040 are based the marginal cost projections provided by Hydro in the summary report *Marginal Cost Study Update – 2021* dated March 7, 2022. Beyond 2041, marginal cost projections are escalated based on Conference Board of Canada GDP deflator, long term projection dated January 22, 2022.
- Discount Rate:** A discount rate of 5.81% is used based upon a 3.608% cost of debt, an 8.50% cost of equity, and the Company's existing capital structure of 55% debt and 45% equity.
- Net Present Value:** The calculated net present value of each alternative is shown in 2023 dollars for the period 2023 to 2055, the year in which all HPS street lights would have reached the end of their service life and have been removed from service.
- Escalation Factors:** Operating costs are escalated based on the Conference Board of Canada GDP Deflator, long term forecast dated January 22, 2022.
- Cumulative NPV:** The cumulative net present value for the particular year is the sum of the present value for the year and the preceding years in 2023 dollars.
- Supporting Documents:** Newfoundland and Labrador Hydro's *Marginal Cost Study Update - 2021 Summary Report*, March 7, 2022, Appendix A, filed in the response to Request for Information TC-IC-NLH-001, Attachment 1, *Electrification, Conservation and Demand Management Plan: 2021-2025*.