

1 Q. Reference: Labrador Interconnected System Network Additions Policy, Summary Report,
2 Page 7, Lines 1-5.

3

4 Please provide a reasonably foreseeable scenario, along with the applicable calculations, in
5 which the calculated reliability benefits associated with a new interconnection or
6 transmission upgrade reach or exceed the capital cost.

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9 A. None of the projects studied in the “Labrador Interconnected System Transmission
10 Expansion Study” would have reliability benefits that would reach or exceed the capital
11 cost. For this to be the case, a project would need to have a relatively low capital cost and a
12 very high reliability benefit. A theoretical example of such a scenario is illustrated in Figure
13 1 and discussed below.

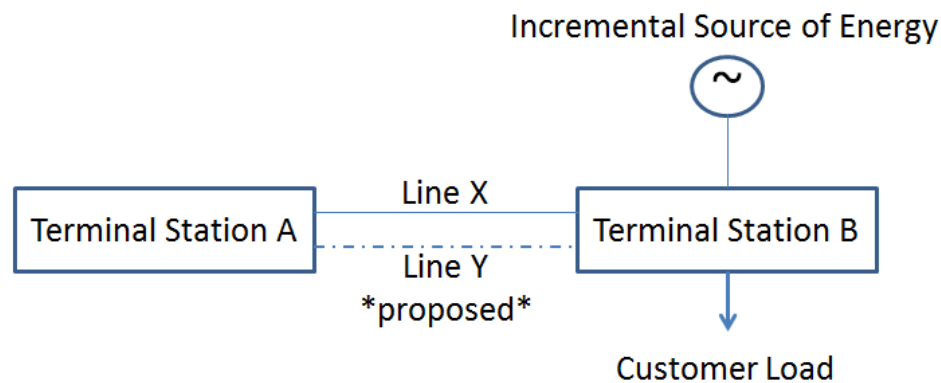


Figure 1: Theoretical Transmission System for EUE Calculation

14 Assumptions:

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- Transmission Line X is expected to be unavailable for 1% of the year;

- 1 • Proposed Capital Upgrade: Construction of Transmission Line Y to run in parallel
2 with X;
3
- 4 • Transmission Line X and Y would be expected to be unavailable for 0.1% of the
5 year;
6
- 7 • The value of unserved energy is \$150 per MWh;
8
- 9 • The capital cost associated with the construction of Transmission Line Y is \$6.0
10 million;
11
- 12 • The annual energy consumption of the customer load on Terminal Station B is
13 300,000 MWh and increasing by 2% each year; and
14
- 15 • 6.5% discount rate.
16

17 Expected Unserved Energy (“EUE”) is calculated using the following formula:

$$EUE_x = \sum_{n=0}^i (U_n * E_{Tot})$$

Where:

EUE_x = The total expected unserved energy for year x

U_n = The unavailability of component ‘n’

E_{Tot} = The total annual energy requirement for the system

i = Total number of system components that could reduce system capacity

18 Table 1 includes a summary of the reliability benefit calculation for the construction of
19 Transmission Line Y. The cumulative present value (“CPV”) of the annual reliability benefits
20 equates to \$6.5 million over 25 years. This is calculated by summing the net present values
21 (“NPV”) of the reliability benefits each year as shown in Table 1. Therefore, under this
22 scenario, the calculated reliability benefits associated with second line exceed the capital

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- 1 cost (\$6.0 million). In conclusion, a significant improvement in unavailability and/or a high
 2 incremental cost of energy could cause CPV of reliability benefits to exceed the capital cost.

Table 1: Calculated Reliability Benefit

Year	Before Capital Upgrade				After Capital Upgrade				Reliability Benefits (\$)		
	Unavailability Transmission Line X (%)	Total Energy Requirement (MWh)	Value of Unserved Energy (\$/MWh)	Annual EUE (\$)	Unavailability Transmission Line X & Y (%)	Total Energy Requirement (MWh)	Value of Unserved Energy (\$/MWh)	Annual EUE (\$)	Annual	NPV	CPV
2019	1	300,000	150	\$450,000	0.1	300,000	150	\$45,000	\$405,000	\$405,000	\$405,000
2020	1	306,000	150	\$459,000	0.1	306,000	150	\$45,900	\$413,100	\$387,887	\$792,887
2021	1	312,120	150	\$468,180	0.1	312,120	150	\$46,818	\$421,362	\$371,498	\$1,164,385
2022	1	318,362	150	\$477,544	0.1	318,362	150	\$47,754	\$429,789	\$355,801	\$1,520,186
2023	1	324,730	150	\$487,094	0.1	324,730	150	\$48,709	\$438,385	\$340,767	\$1,860,952
2024	1	331,224	150	\$496,836	0.1	331,224	150	\$49,684	\$447,153	\$326,368	\$2,187,321
2025	1	337,849	150	\$506,773	0.1	337,849	150	\$50,677	\$456,096	\$312,578	\$2,499,899
2026	1	344,606	150	\$516,909	0.1	344,606	150	\$51,691	\$465,218	\$299,370	\$2,799,269
2027	1	351,498	150	\$527,247	0.1	351,498	150	\$52,725	\$474,522	\$286,721	\$3,085,990
2028	1	358,528	150	\$537,792	0.1	358,528	150	\$53,779	\$484,012	\$274,606	\$3,360,596
2029	1	365,698	150	\$548,547	0.1	365,698	150	\$54,855	\$493,693	\$263,003	\$3,623,599
2030	1	373,012	150	\$559,518	0.1	373,012	150	\$55,952	\$503,567	\$251,890	\$3,875,489
2031	1	380,473	150	\$570,709	0.1	380,473	150	\$57,071	\$513,638	\$241,247	\$4,116,736
2032	1	388,082	150	\$582,123	0.1	388,082	150	\$58,212	\$523,911	\$231,053	\$4,347,790
2033	1	395,844	150	\$593,765	0.1	395,844	150	\$59,377	\$534,389	\$221,291	\$4,569,080
2034	1	403,761	150	\$605,641	0.1	403,761	150	\$60,564	\$545,077	\$211,940	\$4,781,021
2035	1	411,836	150	\$617,754	0.1	411,836	150	\$61,775	\$555,978	\$202,985	\$4,984,006
2036	1	420,072	150	\$630,109	0.1	420,072	150	\$63,011	\$567,098	\$194,408	\$5,178,414
2037	1	428,474	150	\$642,711	0.1	428,474	150	\$64,271	\$578,440	\$186,194	\$5,364,608
2038	1	437,043	150	\$655,565	0.1	437,043	150	\$65,557	\$590,009	\$178,326	\$5,542,934
2039	1	445,784	150	\$668,676	0.1	445,784	150	\$66,868	\$601,809	\$170,792	\$5,713,726
2040	1	454,700	150	\$682,050	0.1	454,700	150	\$68,205	\$613,845	\$163,575	\$5,877,301
2041	1	463,794	150	\$695,691	0.1	463,794	150	\$69,569	\$626,122	\$156,663	\$6,033,964
2042	1	473,070	150	\$709,605	0.1	473,070	150	\$70,960	\$638,644	\$150,044	\$6,184,008
2043	1	482,531	150	\$723,797	0.1	482,531	150	\$72,380	\$651,417	\$143,704	\$6,327,712
2044	1	492,182	150	\$738,273	0.1	492,182	150	\$73,827	\$664,445	\$137,632	\$6,465,343