

Undertaking #6 at page 203, lines 22-25 to page 204, line 1

To provide the levelized cost of capacity of a single 20-megawatt thermal plant 2019 dollars using the forecast applied for in the '17-'18 GRA with all assumptions. [At page 202, lines 14 to 17, Ms. Sabo clarified that the 2017-2018 GRA reference is to paragraph #470 of Board Order 2018-10.]

Yukon Energy Response:

Paragraph 466 of Appendix A to Board Order 2018-10: Reasons for Decision regarding YEC's 2017/18 GRA references 20 MW diesel plant project at Takhini with an estimated capital cost at \$62.2 million. This cost estimate was based on YEC's 2016 Resource Plan and estimated in 2016\$. This differs somewhat from the Board reference in paragraph 470; the difference between this reference (\$20.0 million + \$38.3 million = \$58.3 million) and \$62.2 million is certain planning and permitting costs and is explained in paragraph 466 of the Order.

The non-fuel O&M cost estimate in the 2016 Resource Plan for this diesel plant option was at \$1.190 million/year, also in 2016\$. Therefore, the attached LCOC calculation is prepared based on 2016\$ and then adjusted to 2019\$ based on 2%/year inflation [the attached tables also provide an estimate in 2024\$].

YEC retained the inflation rate at 2% and used YEC's weighted average cost of capital (WACC) at 4.77% which is based on 2017/18 GRA approved ROE at 8.70% and interest rate of 2.15% for incremental new long-term debt.¹

There are two tables attached (an excel version is also provided as an attachment):

- Table 1 provides the levelized cost of capacity (LCOC) for the 20 MW plant at Takhini [without property tax].
- Table 2 provides the LCOC for the same plant option in Whitehorse which is assumed to include a property tax. The property tax is based on an estimate (2019\$) of \$27,000/MW as the variance between fixed O&M cost at \$91,000/MW with property tax and \$64,000/MW without property tax assumed in the LCOC calculations provided in Exhibit B-16. Therefore, the total annual fixed O&M cost (2016\$) for the Whitehorse 20 MW plant is \$1.699 million [\$1.190 million plus \$0.509 million for estimated property tax (2016\$) based on \$25,443 x 20 MW].

The following table summarizes the LCOCs for the 20 MW plant, with and without property tax, in 2016\$, 2019\$ and 2024\$.

¹ This is slightly lower than the WACC used for the LCOC calculations in Exhibit B-16 which was at 4.79% based on YEC's 2021 GRA Application as originally filed.

	Without Property Tax	With Property Tax
20 MW Diesel Plant LCOC, \$/MW		
2016\$	\$189,118	\$214,561
2019\$	\$200,693	\$227,693
2024\$	\$221,582	\$251,392

Table 2. LCOC Calculation for 20 MW Diesel Plant based on Cost Estimate in YEC's 2017/18 GRA [with property tax]

			Weighted Average Cost of Capital [2017/18 GRA]	4.77%
			Winter MW	
Capital (\$000)	2016	\$62,200	Inflation Rate	2%
			Real Weighted Average Cost of Capital	2.72%
Fixed O&M [incl. property tax]	2016	\$1,699	Life Cycle Cost (\$000's)	106,734
		\$000/yr	Project LCOC (\$/MW) at 2016\$	\$214,561
Life		40 years	Project LCOC (\$/MW) at 2019\$	\$227,693
			Project LCOC (\$/MW) at 2024\$	\$251,392

Year	20 MW Diesel Plant [with property tax]				
	Year-End Balance	Depr	Return	O&M	Total
	\$000	\$000	\$000	\$000	\$000
2016	60,645	1,555	2,930	1,699	6,184
2017	59,090	1,555	2,856	1,733	6,144
2018	57,535	1,555	2,782	1,767	6,104
2019	55,980	1,555	2,707	1,803	6,065
2020	54,425	1,555	2,633	1,839	6,027
2021	52,870	1,555	2,559	1,876	5,990
2022	51,315	1,555	2,485	1,913	5,953
2023	49,760	1,555	2,411	1,951	5,917
2024	48,205	1,555	2,336	1,990	5,882
2025	46,650	1,555	2,262	2,030	5,848
2026	45,095	1,555	2,188	2,071	5,814
2027	43,540	1,555	2,114	2,112	5,781
2028	41,985	1,555	2,040	2,155	5,749
2029	40,430	1,555	1,966	2,198	5,718
2030	38,875	1,555	1,891	2,242	5,688
2031	37,320	1,555	1,817	2,286	5,659
2032	35,765	1,555	1,743	2,332	5,630
2033	34,210	1,555	1,669	2,379	5,603
2034	32,655	1,555	1,595	2,426	5,576
2035	31,100	1,555	1,521	2,475	5,550
2036	29,545	1,555	1,446	2,524	5,526
2037	27,990	1,555	1,372	2,575	5,502
2038	26,435	1,555	1,298	2,626	5,479
2039	24,880	1,555	1,224	2,679	5,458
2040	23,325	1,555	1,150	2,733	5,437
2041	21,770	1,555	1,076	2,787	5,418
2042	20,215	1,555	1,001	2,843	5,399
2043	18,660	1,555	927	2,900	5,382
2044	17,105	1,555	853	2,958	5,366
2045	15,550	1,555	779	3,017	5,351
2046	13,995	1,555	705	3,077	5,337
2047	12,440	1,555	630	3,139	5,324
2048	10,885	1,555	556	3,202	5,313
2049	9,330	1,555	482	3,266	5,303
2050	7,775	1,555	408	3,331	5,294
2051	6,220	1,555	334	3,398	5,286
2052	4,665	1,555	260	3,465	5,280
2053	3,110	1,555	185	3,535	5,275
2054	1,555	1,555	111	3,605	5,272
2055	0	1,555	37	3,678	5,270
NPV		28,858	35,620	42,255	106,734

Year from In-service	Annual Winter Capacity MW, 20
1	20.00
2	20.00
3	20.00
4	20.00
5	20.00
6	20.00
7	20.00
8	20.00
9	20.00
10	20.00
11	20.00
12	20.00
13	20.00
14	20.00
15	20.00
16	20.00
17	20.00
18	20.00
19	20.00
20	20.00
21	20.00
22	20.00
23	20.00
24	20.00
25	20.00
26	20.00
27	20.00
28	20.00
29	20.00
30	20.00
31	20.00
32	20.00
33	20.00
34	20.00
35	20.00
36	20.00
37	20.00
38	20.00
39	20.00
40	20.00

Notes:

- The undertaking requested to calculate levelized cost of capacity (LCOC) for new 20 MW diesel plant based on information available from the YEC's 2017/18 GRA, specifically, information noted in the YUB Order 2018-10. Paragraph 466 of Appendix A to Board Order 2018-10: Reasons for Decision references 20 MW diesel plant at Takhini with capital cost at \$62.2 million. This cost estimate is based on YEC's 2016 Resource Plan in 2016\$.
- The non-fuel O&M cost for 20 MW diesel plant at Takhini was at \$1.190 million/year as per 2016 Resource Plan. The property tax is added based (2019\$)-on \$27,000/MW as the variance between fixed O&M cost at \$91,000/MW with property tax and \$64,000/MW without property tax provided in Exhibit B-16. Therefore, with adjustment for inflation (the added costs in 2016\$ for the property tax are \$25,443/MW), the total annual fixed O&M cost (2016\$) is \$1.699 million.
- The YEC weighted average cost of capital (WACC) at 4.77% is based on YEC 2017/18 GRA approved ROE at 8.70% and interest rate of 2.15% for new incremental long-term debt.