

The 25 year life cycle cost analysis presented in Appendix B of the TLC Feasibility Study is the most accurate means we have of comparing the 25 year life cycle costs of the Cogeneration System (Option 1) to the Conventional System (Option 2). However, the study fails to account for onsite power generation when calculating the costs of the Conventional System. Since onsite power generation capability will be required, the Present Worth of the Conventional System must be modified by adding to it the cost of onsite power generation equipment (generators) in order for us to compare the true costs of the two systems.

DUPLICATE OF TLC FEASIBILITY STUDY				Previous Update			Updated for 08.26.15 Meeting		
				HIGHLIGHTED NUMBERS REVISED			HIGHLIGHTED NUMBERS REVISED 08.26.15		
Appendix B - 25 Year Life Cycle Cost Analysis							HIGHLIGHTED NUMBERS REVISED 09.24.15		
							HIGHLIGHTED NUMBERS REVISED 09.29.15		
25 YEAR	Option 1	Option 2	Option 3	Option 1	Option 2	Option 3	Option 1	Option 2	Option 3
	Cogen	Non-Cogen	Non-Cogen With Ice	Cogen	Non-Cogen	Non-Cogen With Ice	Cogen	Non-Cogen	Non-Cogen With Ice
Present Worth of Construction									
Cogen Options= \$15,030,000	22,464,000			22,464,000			22,871,000		
Non-Cogen Options= \$8,520,000		13,569,000	13,569,000		19,264,000	13,569,000		19,264,000	19,264,000
Present Worth of Ice Plant Construction									
\$3,242,400 (10,080 T-H, 3 Hr. Full Load Shift)	-	-	3,242,400	-	-	3,242,400	-	-	5,327,333
Present Worth of Energy Costs P/A=11.65									
Cogen Options=\$145,693	1,697,325			1,697,325			26,058,721		
Non-Cogen Option=\$1,949,574 (Ice Savings=\$100/TH)		22,712,540	21,704,540		22,712,540	21,704,540		43,038,689	35,139,988
Present Worth of Maintenance P/A=11.65									
Cogen Options=\$967,406	11,270,280			11,270,280			6,203,625		
Non-Cogen Option=\$180,000		2,097,000	2,100,000		2,097,000	2,100,000		1,141,700	2,100,000
Present Worth of Replacing Ice Tanks P/A=0.1842									
Cogen Option=\$0	-			-			-		
Non-Cogen Option=\$1,008,000		-	185,675		-	185,675		-	185,675
Present Worth of Replacing Chillers P/A=0.1842									
Cogen Option=\$4,655,00	875,451			875,451			875,451		
Non-Cogen Option=\$3,600,000		663,120	663,120		663,120	663,120		663,120	663,120
Present Worth of Replacing Generators P/A=0.1842									
Cogen Option=\$1,200,000	221,040			221,040			221,040		
Non-Cogen Option=\$0		-	-		-	-		-	-
Present Worth of Replacing Towers P/A=0.1842									
Cogen Option=\$847,500	156,110			156,110			156,110		
Non-Cogen Option=\$900,000		165,780	165,780		165,780	165,780		165,780	165,780
Present Worth of Replacing Pumps P/A=0.1842									
Cogen Option=\$339,000	62,444			62,444			62,444		
Non-Cogen Option=\$360,000		66,312	66,312		66,312	66,312		66,312	66,312
Total Life Cycle Cost	36,746,650	39,273,752	41,696,827	36,746,650	44,968,752	41,696,827	56,448,391	64,339,601	62,912,208
Difference favoring option 1 over Option 2 =	2,527,102			8,222,102			7,891,211		

Maintenance Costs			
	Chiller Annual	Generator Annual	Total
Cogen	\$136,500	\$396,000	\$532,500
* Non-Coge	\$98,000	\$0	\$98,000

* Non-Cogen Assumes Negligible Annual Maintenance Cost for Generator.

	Base Load Cooling Costs (Assume Absorber is Free Cooling) 500 tons X 2 Chillers - Consumption + Demand Charges	\$/kWh	kWh Costs	Annual Standby Power Fees	Annual Standby Power Usage Costs	Duke Monthly Equipment Rental	Total Annual
Cogen	\$0	\$0.050	\$1,839,600	\$180,000	\$120,000	\$97,200	\$2,236,800
Non-Cogen	\$419,820	\$0.089	\$3,274,488	\$0	\$0	\$0	\$3,694,308
							\$1,457,508 Difference
	2.1 MW Generator (kV Hours)	kWh per Generator X2					
kWh	2100	8760	18396000	36792000			

Ice Plant Energy Cost Reduction Estimate

4000 Ton Peak x 0.5 kW per ton x \$10 per kW x 12 months demand charges = \$240000
 2000 Ton Ave Load x 0.5kW per ton x 24 hours per day x 365 days per year x \$0.05 per kWh savings = \$438,000

Total estimated electric cost savings by shifting chiller plant usage to off-peak = \$678,000 per year

Non-Cogen Costs - Savings = Estimated Annual Ice Plant Electric Costs
 \$3,016,308

Design-Build Team modified 25 Year Life Cycle Cost Analysis

*This modified analysis is necessary because the feasibility study did NOT include construction costs for generators in its economic analysis of

25 YEAR

				COGEN	NON-COGEN
Present worth of construction per Feasibility Study				22,464,000	13,569,000
Present worth of construction of generators that were NOT included in the feasibility study economic analysis				0	5,695,000
Modified Total Present Worth of Construction (for use below)				22,464,000	19,264,000

Modified Total Present Worth of Construction (see above)				22,464,000	19,264,000
Present worth of energy costs				1,697,325	22,712,540
Present worth of maintenance				11,270,260	2,097,000
Present worth of replacing chillers				857,451	663,120
Present worth of replacing generators				221,040	0
present worth of replacing towers				156,110	165,780
Present worth of replacing pumps				62,444	66,312
MODIFIED TOTAL LIFE CYCLE COST				36,728,630	44,968,752

Design-Build Team modified 25 Year Life Cycle Cost Analysis

the conventional option.

SAVINGS SEEN BY SELECTING COGEN
(8,895,000)
5,695,000
(3,200,000)

(3,200,000)
21,015,215
(9,173,260)
(194,331)
(221,040)
9,670
3,868
8,240,122