

- Albert Einstein

# **REWARDING EFFICIENCY: Clean Energy** *via* resilient and sustainable Combined Heating & Power (CHP) system

Combined Heat & Power (CHP) options for \_\_\_\_\_

Cut cost of energy & water
Cut Greenhouse Gas Emissions (GHG)
Increase resiliency = (redundancy, availability)

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# *Inside-the-fence* CHP project Executive Summary

\_\_\_\_\_ site offers an economically attractive (i.e. *financeable*), technically robust, environmentally friendly, load-scalable &supply-resilient opportunity for an efficient natural gas Combined Heat & Power (CHP) project.

Options to improve Return on Invested Capital (ROIC) include the 10% Investment Tax Credit (ITC), avoided/reduced investment on thermal & electrical infrastructure, 3<sup>rd</sup> party financing, project leverage etc... The project also creates an option for C-credits *plus* potential to reduce site water intensity (not in this scope).

A Project Execution Plan (PEP) will layout the critical path to tighten an anticipated 10-to-16 months schedule from Limited Notice to Proceed (LNTP) to Commercial Operations Date (COD).

Project risks can be mitigated with a robust PEP and early milestones should include co-ordination with local utility, soliciting community support & engagement with local permitting authorities.

\_\_\_\_can <u>significantly</u> boost CHP project economics by selling heat (i.e. hot water) to Industrial Facility (IF) on the north. External energy sale demonstrates ingenuity & community spirit, increases sustainability *and* supply side resiliency of the IF.

Screen shot of site

Sell CHP waste heat to Industrial Facility; boost CHP efficiency *and* secure highmargin incremental revenue

Close up Screen shot of CHP location

Install CHP at \_\_\_\_plant



### BASE CASE economic summary: 10-year CHP project horizon

COMMON INPUT's	UNIT	VALUE	COMMENT
FUTURE baseline site Load	% load increase	50%	2020 base
Natural Gas at "Burner tip"	\$/MMBtu, HHV	\$2.76	site data
All-in Grid power price	c/KWh	7.6	site data
CHP project financing			
CHP Project horizon (max 20-yrs)	years	10	
Equity:Debt Ratio	%	100%	assumed
Debt Term	years	12	assumed
Cost of Debt	%	<b>7</b> %	assumed
Pre-CHP Package Boiler			
Displaced package boiler efficiency	% HHV	83%	site data
Package Boiler: Variable Charge/cost	cents/MMBtu <sub>th</sub>	125	assumed

Sized & modeled 3-alternate CHP configurations

CHP saves site energy expense (power + fuel), reduces emissions and increases supply side resiliency.

Comparable emissions reductions & efficiencies across all CHP configurations

- 2 x Reciprocating Engine CHP has lowest first cost.
- 1 x Gas Turbine CHP has highest lifetime savings.

No conflict between wallet & conscience!

		NO CHP	Recip. Engine	Gas Turbine	Gas Turbin
<b>CHP Prime Mover</b>		-	JMS420	OPRA16	Centaur4
CHP Configuration	Gri	d + Birs only	2 x JMS420	2 x OPRA16	1 x Centaur4
*Pjt. Inv. w/10% ITC	\$MM	-	\$5.9	\$9.9	\$9.2
	\$/KW <sub>e</sub>	-	\$2,051	\$2,828	\$2,91
of which Equity reqd.	\$MM	-	\$5.9	\$9.9	\$9.
**Equity-Multiple of Inve	stment (MOI)	-	1.1	0.8	1.2
***Site Energy Expense					
Year 1	\$MM	\$3.0	\$2.2	\$2.2	\$2.0
Year 10	\$MM	\$31	\$24	\$23	\$20
Cum. %redn. 10 yrs	% reduction	0%	-22%	-26%	-34
Emissions					
From grid power	mt CO <sub>2</sub>	22,184	4,641	1,652	3,24
From fuel to Blrs	mt CO <sub>2</sub>	10,264	6,987	360	69
From fuel to CHP	mt CO <sub>2</sub>	-	11,004	21,434	19,39
TOTAL site emissions	mt CO <sub>2</sub>	32,448	22,633	23,446	23,34
Emissions reduction	% change	0%	-30%	-28%	-28
CHP technical					
CHP capacity	$KW_e$	-	2,858	3,500	3,159
CHP efficiency	% HHV	-	61.3%	60.4%	63.4
Thermal Utilization	%		63%	64%	77
Annual Energy supply to s	ite				
Fuel to Blrs	MMBtu	193,164	131,494	6,769	13,16
Fuel to CHP	MMBtu	<u>-</u>	207,094	403,375	365,00
TOTAL Fuel (CHP + Birs)	MMBtu	193,164	338,587	410,144	378,160
Elec. From grid	MWh	28,093	5,877	2,093	4,110
Elec. From CHP	MWh	-	22,215	26,000	23,98
TOTAL Elec. (CHP + grid)	MWh	28,093	28,093	28,093	28,093

<sup>\*</sup>Pjt Inv. w/10%ITC = CHP only investment less 10% ITC. Excludes credit for avoided CapEx for blrs, elec. Infra. Etc..

<sup>\*\*</sup> Equity MOI = (Cumulative project cash / Equity only investment)

<sup>\*\*\*</sup>power + fuel + O&M + Debt. Service



# CHP Operations & Maintenance proforma: vendor quotes + reasonable assumptions

	INFLATION	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
	Equipment / Maintenance assets Labor /staff	% 1.59 % 2.59		1.5% 2.5%	1.5% 2.5%	1.5% 2.5%	1.5% 2.5%	1.5% 2.5%	1.5% 2.5%	1.5% 2.5%	1.5% 2.5%	1.5% 2.5%	1.5% 2.5%	1.5% 2.5%	1.5% 2.5%	1.5% 2.5%	1.5% 2.5%	1.5% 2.5%	1.5% 2.5%	1.5% 2.5%	1.5% 2.5%	
А	# MAINTENANCE \$/fired hour/unit Maint/ys	S \$0	\$0	\$0	\$0	\$0	ŚO	\$0	\$0	\$0	SO.	\$0	\$0	\$0	ŚO	\$0	\$0	\$0	\$0	\$0	\$0	
	RE HRSG - \$0.00	\$ \$0	\$0 \$0	\$0	\$0 \$0	\$0 \$0	\$0 \$0	\$0	\$0	\$0 \$0	\$0	\$0	\$0	\$0 \$0	\$0 \$0	\$0 \$0	\$0 \$0	\$0	\$0	\$0	\$0	
	Gas Compressor - \$0.00	\$ \$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
	Reciprocating Engine \$27.68 \$460,706	\$ \$460,706 \$ \$ \$0	\$467,617 \$0	\$474,631 SO	\$481,750 S0	\$488,976 \$0	\$496,311 \$0	\$503,756	\$511,312 \$0	\$518,982	\$526,767 \$0	\$534,668	\$542,688 \$0	\$550,828 \$0	\$559,091 \$0	\$567,477 \$0	\$575,989 \$0	\$584,629	\$593,399	\$602,300 \$0	\$611,334 \$0	
	Reciprocating Engine MAJOR OVERHAUL at 60000 Optg Hrs  RE-HRSG/HRU - \$15,000	\$ \$15,000	\$15,225	\$15,453	\$15,685	\$15,920	\$16,159	\$0 \$16,402	\$16,648	\$989,060 \$16,897	\$0 \$17,151	\$0 \$17,408	\$17,669	\$17,934	\$18,203	\$18,476	\$18,753	\$1,114,169	\$0 \$19,320	\$19,610	\$19,904	
	Other - \$5,000	\$ \$5,000	\$5,075	\$5,151	\$5,228	\$5,307	\$5,386	\$5,467	\$5,549	\$5,632	\$5,717	\$5,803	\$5,890	\$5,978	\$6,068	\$6,159	\$6,251	\$6,345	\$6,440	\$6,537	\$6,635	
	SUB-TOTAL # MAINTENANCE	\$ \$480,706	\$487,917	\$495,235	\$502,664	\$510,204	\$517,857	\$525,625	\$533,509	\$1,530,572	\$549,634	\$557,879	\$566,247	\$574,741	\$583,362	\$592,112	\$600,994	\$1,724,178	\$619,159	\$628,446	\$637,873	
В	# CONSUMABLES																					
	Emissons Control System (ECS) chemicals \$20,000	\$ \$20,000 \$10,000	\$20,300 \$10,150	\$20,605 \$10,302	\$20,914 \$10,457	\$21,227 \$10,614	\$21,546 \$10,773	\$21,869 \$10,934	\$22,197 \$11,098	\$22,530 \$11,265	\$22,868 \$11,434	\$23,211 \$11,605	\$23,559 \$11,779	\$23,912 \$11,956	\$24,271 \$12,136	\$24,635 \$12,318	\$25,005 \$12,502	\$25,380 \$12,690	\$25,760 \$12,880	\$26,147 \$13,073	\$26,539 \$13,270	
	SUB-TOTAL # CONSUMABLES \$10,000	\$10,000	\$10,150	\$10,302	\$10,457	\$10,614	\$10,773	\$10,934	\$11,098	\$11,265	\$11,434	\$11,605	\$11,779	\$11,956	\$12,136	\$12,318	\$12,502	\$12,690	\$12,880	\$13,073	\$13,270	_
		2022	2023	2024	2025	2026	2027	2028	2020	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	
c	# OPERATIONS % reqd. \$/hr UNIT \$/yi		1	2	3	4	5	6	2029 7	8	9	10	11	12	13	14	15	16	17	18	19	9
	1 Energy systems manager 25% \$60 124,800 3 Operators 10% \$40 83,200	\$ \$31,200	\$31,980 \$25.584	\$32,780 \$26.224	\$33,599 \$26.879	\$34,439 \$27.551	\$35,300 \$28.240	\$36,182 \$28,946	\$37,087 \$29.670	\$38,014 \$30,411	\$38,965 \$31.172	\$39,939 \$31,951	\$40,937 \$32,750	\$41,961 \$33,568	\$43,010 \$34,408	\$44,085 \$35,268	\$45,187 \$36.150	\$46,317 \$37.053	\$47,474 \$37.980	\$48,661 \$38.929	\$49,878	
	3 Operators 10% \$40 83,200 3 Maintenance 10% \$50 104,000	\$ \$24,960 \$ \$31,200	\$25,584	\$26,224	\$26,879	\$27,551	\$28,240	\$28,946	\$29,670	\$30,411	\$31,172	\$39,939	\$40,937	\$41,961	\$43,010	\$44,085	\$45,187	\$37,053 \$46,317	\$47,474	\$48,661	\$39,902 \$49,878	
	1 Admin. Asst. 25% \$25 52,000	\$ \$13,000	\$13,325	\$13,658	\$14,000	\$14,350	\$14,708	\$15,076	\$15,453	\$15,839	\$16,235	\$16,641	\$17,057	\$17,484	\$17,921	\$18,369	\$18,828	\$19,299	\$19,781	\$20,276	\$20,782	
	0 other 0% \$20 41,600 SUB-TOTAL # OPERATIONS	\$ \$0 \$ \$100,360	\$0 \$102,869	\$0 \$105.441	\$0 \$108.077	\$0 \$110.779	\$0 \$113.548	\$0 \$116.387	\$0 \$119,297	\$0 \$122,279	\$0 \$125.336	\$0 \$128,469	\$0 \$131.681	\$0 \$134,973	\$0 \$138.347	\$0 \$141.806	\$0 \$145.351	\$0 \$148.985	\$0 \$152,710	\$0 \$156.527	\$0 \$160.441	
с	TOTAL O&M	\$ \$611,066	\$621,236	\$631,583	\$642,111	\$652,823	\$663,723	\$674,815	, .	\$1,686,646	,	\$721,164	\$733,267	\$745,582	\$758,116	\$770,871	,	\$1,911,233	\$810,509	\$824,194	\$838,122	
	OPERATIONS & MAINTENANCE EXPENSE CHP as 1 x Ce	ntaur40 2022 0	2023 1	2024 2	2025 3	2026 4	2027 5	2028 6	2029 7	2030 8	2031 9	2032 10	2033 11	2034 12	2035 13	2036 14	2037 15	2038 16	2039 17	2040 18	2041 19	
	INFLATION Equipment / Maintenance assets	% 1.59	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	6
	Labor /staff	% 2.59		2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	
А	# MAINTENANCE \$/fired hour/unit Maint/yı																					
	Gas Turbine \$32.00 \$266,304	\$ \$266,304	\$270,299	\$274,353	\$278,468	\$282,645	\$286,885	\$291,188	\$295,556	\$299,989	\$304,489	\$309,057	\$313,693	\$318,398	\$323,174	\$328,021	\$332,942	\$337,936	\$343,005	\$348,150	\$353,372	
	GT-HRSG - \$15,000  Gas Compressor - \$5,000	\$ \$15,000 \$ \$5,000	\$15,225 \$5.075	\$15,453 \$5,151	\$15,685 \$5.228	\$15,920 \$5,307	\$16,159 \$5,386	\$16,402 \$5,467	\$16,648 \$5.549	\$16,897 \$5.632	\$17,151 \$5,717	\$17,408 \$5,803	\$17,669	\$17,934 \$5.978	\$18,203 \$6,068	\$18,476 \$6.159	\$18,753 \$6.251	\$19,035 \$6,345	\$19,320 \$6,440	\$19,610 \$6,537	\$19,904 \$6,635	
	Gas Compressor - \$5,000 Reciprocating Engine - \$0.00	\$ \$5,000	\$5,075	\$5,151 \$0	\$5,228 \$0	\$5,307	\$5,386 \$0	\$5,467	\$5,549 \$0	\$5,632 \$0	\$5,/17	\$5,803	\$5,890	\$5,978	\$6,068	\$6,159 \$0	\$6,251 \$0	\$6,345 \$0	\$6,440	\$6,537	\$6,635	
	Gas Turbine MAJOR OVERHAUL at 35000 Optg Hrs	\$ 50	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0 <b>"</b>	\$0	\$0	\$0	\$0	\$0	\$0	
	RE-HRSG/HRU - \$0.00 Other - \$5.000	\$ \$0 \$ \$5,000	\$0 \$5,075	\$0 \$5,151	\$0	\$0	\$0 \$5.386	\$0 \$5,467	\$0 \$5.549	\$0 \$5,632	\$0 \$5,717	\$0	\$0	\$0 \$5.978	\$0 \$6,068	\$0	\$0	\$0	\$0	\$0	\$0 \$6,635	
	SUB-TOTAL # MAINTENANCE - \$5,000	\$ \$291,304	\$295,674	\$5,151	\$5,228 \$304,610	\$309,179	\$313,817	\$318,524	\$323,302	\$328,152	\$333,074	\$5,803 <b>\$338,070</b>	\$343,141	\$348,288	\$353,513	\$6,159 \$358,815	\$6,251 \$364,198	\$369,661	\$375,205	\$6,537 \$380,834	\$386,546	
В	# CONSUMABLES Emissons Control System (ECS) chemicals \$20,000 Other - misc \$10,000	\$ \$20,000 \$10,000	\$20,300 \$10,150	\$20,605 \$10,302	\$20,914 \$10,457	\$21,227 \$10,614	\$21,546 \$10,773	\$21,869 \$10,934	\$22,197 \$11,098	\$22,530 \$11,265	\$22,868 \$11,434	\$23,211 \$11,605	\$23,559 \$11,779	\$23,912 \$11,956	\$24,271 \$12,136	\$24,635 \$12,318	\$25,005 \$12,502	\$25,380 \$12,690	\$25,760 \$12,880	\$26,147 \$13,073	\$26,539 \$13,270	
	SUB-TOTAL # CONSUMABLES	\$30,000	\$30,450	\$30,907	\$31,370	\$31,841	\$32,319	\$32,803	\$33,295	\$33,795	\$34,302	\$34,816	\$35,338	\$35,869	\$36,407	\$36,953	\$37,507	\$38,070	\$38,641	\$39,220	\$39,809	
c	# OPERATIONS % reqd. \$/hr UNIT \$/yi	2023	2023	2024	2025	2026 4	2027 5	2028 6	2029 7	2030 8	2031 9	2032 10	2033 11	2034 12	2035 13	2036 14	2037 15	2038 16	2039 17	2040 18	2041 19	
	1 Energy systems manager 25% \$60 124,800	\$ \$31,200	\$31,980	\$32,780	\$33,599	\$34,439	\$35,300	\$36,182	\$37,087	\$38,014	\$38,965	\$39,939	\$40,937	\$41,961	\$43,010	\$44,085	\$45,187	\$46,317	\$47,474	\$48,661	\$49,878	
	3 Operators 10% \$40 83,200 3 Maintenance 10% \$50 104,000	\$ \$24,960 \$ \$31,200	\$25,584 \$31,980	\$26,224 \$32,780	\$26,879 \$33,599	\$27,551 \$34,439	\$28,240 \$35,300	\$28,946 \$36,182	\$29,670 \$37,087	\$30,411 \$38.014	\$31,172 \$38.965	\$31,951 \$39,939	\$32,750 \$40,937	\$33,568 \$41,961	\$34,408 \$43,010	\$35,268 \$44.085	\$36,150 \$45,187	\$37,053 \$46.317	\$37,980 \$47,474	\$38,929 \$48.661	\$39,902 \$49,878	
	3 Maintenance 10% \$50 104,000 1 Admin, Asst. 25% \$25 52,000	\$ \$31,200 \$ \$13,000	\$31,980	\$32,780	\$14,000	\$14,350	\$35,300	\$36,182 \$15,076	\$15,453	\$15,839	\$16,235	\$16,641	\$40,937	\$41,961 \$17,484	\$43,010	\$18,369	\$45,187	\$46,317	\$47,474	\$48,661	\$49,878	
	0 other 0% \$20 41,600	\$ \$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
-	SUB-TOTAL # OPERATIONS	\$ \$100,360	\$102,869	\$105,441	\$108,077	\$110,779	\$113,548	\$116,387	\$119,297	\$122,279	\$125,336	\$128,469	\$131,681	\$134,973	\$138,347	\$141,806	\$145,351	\$148,985	\$152,710	\$156,527	\$160,441	
	TOTAL O&M	\$ \$421,664	\$428,993	\$436,456	\$444,057	\$451,799	\$459,684	\$467,715	\$475,894	\$484,225	\$492,712	\$501,356	\$510,161	\$519,130	\$528,267	\$537,574	\$547,056	\$556,715	\$566,556	\$576,581	\$586,795	
c								, .														_
с	OPERATIONS & MAINTENANCE EXPENSE CHP as 2 x Of	PRA16 2022 0	2023 1	2024 2	2025 3	2026 4	2027 5	2028 6	2029 7	2030 8	2031 9	2032 10	2033 11	2034 12	2035 13	2036 14	2037 15	2038 16	2039 17	2040 18	2041 19	
c	OPERATIONS & MAINTENANCE EXPENSE CHP as 2 x Of INFLATION Equipment / Maintenance assets Labor /staff	PRA16 2022 0 % 1.59 % 2.59	1.5%	2024 2 1.5% 2.5%	2025 3 1.5% 2.5%		2027 5 1.5% 2.5%		2029 7 1.5% 2.5%	2030 8 1.5% 2.5%	2031 9 1.5% 2.5%											6
c A	INFLATION Equipment / Maintenance assets Labor /staff # MAINTENANCE \$/fired hour/unit Maint/yn	% 1.59 % 2.59	1.5% 2.5%	1.5% 2.5%	1.5% 2.5%	2026 4 1.5% 2.5%	1.5% 2.5%	2028 6 1.5% 2.5%	7 1.5% 2.5%	1.5% 2.5%	9 1.5% 2.5%	10 1.5% 2.5%	11 1.5% 2.5%	12 1.5% 2.5%	13 1.5% 2.5%	1.5% 2.5%	1.5% 2.5%	1.5% 2.5%	1.5% 2.5%	18 1.5% 2.5%	19 1.5% 2.5%	6
C A	INFLATION Equipment / Maintenance assets Labor / Staff  # MAINTENANCE	% 1.59 % 2.59 - \$ \$594,804	1.5% 2.5% \$603,726	1.5% 2.5% \$612,782	3 1.5% 2.5% \$621,974	2026 4 1.5% 2.5% \$631,303	5 1.5% 2.5% \$640,773	2028 6 1.5% 2.5% \$650,384	7 1.5% 2.5% \$660,140	1.5% 2.5% \$670,042	9 1.5% 2.5% \$680,093	10 1.5% 2.5% \$690,294	11 1.5% 2.5% \$700,649	12 1.5% 2.5% \$711,158	13 1.5% 2.5% \$721,826	1.5% 2.5% \$732,653	1.5% 2.5% \$743,643	1.5% 2.5% \$754,798	1.5% 2.5% \$766,120	1.5% 2.5% \$777,611	19 1.5% 2.5% \$789,276	6
c A	INFLATION	\$ \$594,804 \$ \$15,000	1.5% 2.5% \$603,726 \$15,225	2 1.5% 2.5% \$612,782 \$15,453	3 1.5% 2.5% \$621,974 \$15,685	2026 4 1.5% 2.5% \$631,303 \$15,920	5 1.5% 2.5% \$640,773 \$16,159	2028 6 1.5% 2.5% \$650,384 \$16,402	7 1.5% 2.5% \$660,140 \$16,648	1.5% 2.5% \$670,042 \$16,897	9 1.5% 2.5% \$680,093 \$17,151	10 1.5% 2.5% \$690,294 \$17,408	11 1.5% 2.5% \$700,649 \$17,669	12 1.5% 2.5% \$711,158 \$17,934	13 1.5% 2.5% \$721,826 \$18,203	1.5% 2.5% \$732,653 \$18,476	1.5% 2.5% \$743,643 \$18,753	1.5% 2.5% \$754,798 \$19,035	17 1.5% 2.5% \$766,120 \$19,320	1.5% 2.5% \$777,611 \$19,610	19 1.5% 2.5% \$789,276 \$19,904	6
c A	INFLATION   Equipment / Maintrenance assets	\$ \$594,804 \$ \$15,000	1.5% 2.5% \$603,726	1.5% 2.5% \$612,782	3 1.5% 2.5% \$621,974	2026 4 1.5% 2.5% \$631,303	5 1.5% 2.5% \$640,773	2028 6 1.5% 2.5% \$650,384	7 1.5% 2.5% \$660,140	1.5% 2.5% \$670,042	9 1.5% 2.5% \$680,093	10 1.5% 2.5% \$690,294 \$17,408 \$5,803 \$0	11 1.5% 2.5% \$700,649	12 1.5% 2.5% \$711,158	13 1.5% 2.5% \$721,826	1.5% 2.5% \$732,653	1.5% 2.5% \$743,643	1.5% 2.5% \$754,798	1.5% 2.5% \$766,120	1.5% 2.5% \$777,611	19 1.5% 2.5% \$789,276	666
c A	NFIATION	\$ 1.59 % 2.59 \$ \$594,804 \$ \$15,000 \$ \$5,000 \$ \$ \$5	1.5% 2.5% \$603,726 \$15,225 \$5,075 \$0 \$0	2 1.5% 2.5% \$612,782 \$15,453 \$5,151 \$0 \$0	\$ 1.5% 2.5% \$621,974 \$15,685 \$5,228 \$0 \$0	2026 4 1.5% 2.5% \$631,303 \$15,920 \$5,307 \$0 \$0	\$ 1.5% 2.5% \$640,773 \$16,159 \$5,386 \$0 \$0	2028 6 1.5% 2.5% \$650,384 \$16,402 \$5,467 \$0 \$0	7 1.5% 2.5% \$660,140 \$16,648 \$5,549 \$0 \$0	\$ 1.5% 2.5% \$670,042 \$16,897 \$5,632 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	9 1.5% 2.5% \$680,093 \$17,151 \$5,717 \$0 \$0	10 1.5% 2.5% \$690,294 \$17,408 \$5,803 \$0 \$0	11 1.5% 2.5% \$700,649 \$17,669 \$5,890 \$0 \$0	12 1.5% 2.5% \$711,158 \$17,934 \$5,978 \$0 \$0	13 1.5% 2.5% \$721,826 \$18,203 \$6,068 \$0 \$0	14 1.5% 2.5% \$732,653 \$18,476 \$6,159 \$0 \$0	1.5% 2.5% \$743,643 \$18,753 \$6,251 \$0 \$0	1.5% 2.5% \$754,798 \$19,035 \$6,345 \$0 \$0	17 1.5% 2.5% \$766,120 \$19,320 \$6,440 \$0 \$0	1.5% 2.5% \$777,611 \$19,610 \$6,537 \$0 \$0	19 1.5% 2.5% \$789,276 \$19,904 \$6,635 \$0 \$0	666
C A	INFLATION   Equipment / Maintrenance assets	\$ 1.59 % 2.59 \$ \$594,804 \$ \$15,000 \$ \$5,000 \$ \$00 \$ \$00 \$00	\$603,726 \$15,225 \$5,075 \$0	\$612,782 \$15,453 \$5,151 \$0	3 1.5% 2.5% \$621,974 \$15,685 \$5,228 \$0	2026 4 1.5% 2.5% \$631,303 \$15,920 \$5,307 \$0	\$640,773 \$16,159 \$5,386 \$0_	2028 6 1.5% 2.5% \$650,384 \$16,402 \$5,467 \$0_	7 1.5% 2.5% \$660,140 \$16,648 \$5,549 \$0 \$0 \$0	\$670,042 \$16,897 \$5,632 \$0	\$680,093 \$17,151 \$5,717 \$0	10 1.5% 2.5% \$690,294 \$17,408 \$5,803 \$0	11 1.5% 2.5% \$700,649 \$17,669 \$5,890 \$0 \$0 \$0	12 1.5% 2.5% \$711,158 \$17,934 \$5,978 \$0_	13 1.5% 2.5% \$721,826 \$18,203 \$6,068 \$0	14 1.5% 2.5% \$732,653 \$18,476 \$6,159 \$0	1.5% 2.5% \$743,643 \$18,753 \$6,251 \$0 \$0	1.5% 2.5% \$754,798 \$19,035 \$6,345 \$0	17 1.5% 2.5% \$766,120 \$19,320 \$6,440 \$0	18 1.5% 2.5% \$777,611 \$19,610 \$6,537 \$0	19 1.5% 2.5% \$789,276 \$19,904 \$6,635 \$0	666
A	INFLATION	\$ 1.59 % 2.59 \$ \$594,804 \$ \$15,000 \$ \$5,000 \$ \$ \$5	\$603,726 \$15,225 \$5,075 \$0 \$0	2 1.5% 2.5% \$612,782 \$15,453 \$5,151 \$0 \$0 \$0	\$621,974 \$15,685 \$5,228 \$0 \$0	2026 4 1.5% 2.5% \$631,303 \$15,920 \$5,307 \$0 \$0 \$0	\$ 1.5% 2.5% \$640,773 \$16,159 \$5,386 \$0 \$0 \$0	2028 6 1.5% 2.5% \$650,384 \$16,402 \$5,467 \$0 \$0 \$0 \$0	7 1.5% 2.5% \$660,140 \$16,648 \$5,549 \$0 \$0	\$ 1.5% 2.5% \$670,042 \$16,897 \$5,632 \$0 \$0 \$0	9 1.5% 2.5% \$680,093 \$17,151 \$5,717 \$0 \$0 \$5,717	\$690,294 \$17,408 \$5,803 \$0 \$0 \$0	11 1.5% 2.5% \$700,649 \$17,669 \$5,890 \$0 \$0	12 1.5% 2.5% \$711,158 \$17,934 \$5,978 \$0 \$0 \$0	13 1.5% 2.5% \$721,826 \$18,203 \$6,068 \$0 \$0 \$0	1.5% 2.5% \$732,653 \$18,476 \$6,159 \$0 \$0	1.5% 2.5% \$743,643 \$18,753 \$6,251 \$0 \$0	1.5% 2.5% \$754,798 \$19,035 \$6,345 \$0 \$0	17 1.5% 2.5% \$766,120 \$19,320 \$6,440 \$0 \$0 \$0	18 1.5% 2.5% \$777,611 \$19,610 \$6,537 \$0 \$0 \$0	19 1.5% 2.5% \$789,276 \$19,904 \$6,635 \$0 \$0	6 6
A B	INFLATION	\$ 1.59 % 2.59 \$ \$594,804 \$ 5 \$15,000 \$ \$ \$5,000 \$ \$ \$5,000 \$ \$ \$5,000 \$ \$ \$5,000 \$ \$ \$619,804	1 1.5% 2.5% \$603,726 \$15,225 \$5,075 \$0 \$0 \$5,075 \$629,101	2 1.5% 2.5% \$612,782 \$15,453 \$5,151 \$0 \$0 \$5,151 \$638,538	3 1.5% 2.5% \$621,974 \$15,685 \$5,228 \$0 \$0 \$5,228 \$648,116	2026 4 1.5% 2.5% \$631,303 \$15,920 \$5,307 \$0 \$0 \$5,307 \$5,307	5 1.5% 2.5% \$640,773 \$16,159 \$5,386 \$0 \$0 \$0 \$5,386 \$667,705	2028 6 1.5% 2.5% \$650,384 \$16,402 \$5,467 \$0 \$0 \$5,467 \$677,721	7 1.5% 2.5% \$660,140 \$16,648 \$5,549 \$0 \$0 \$5,549 \$687,886	\$ 1.5% 2.5% \$670,042 \$16,897 \$5,632 \$0 \$0 \$5,632 \$698,205	9 1.5% 2.5% \$680,093 \$17,151 \$5,717 \$0 \$0 \$5,717 \$708,678	10 1.5% 2.5% \$690,294 \$17,408 \$5,803 \$0 \$0 \$0 \$5,803 \$5719,308	11 1.5% 2.5% \$700,649 \$17,669 \$5,890 \$0 \$0 \$0 \$5,890 \$5,890 \$730,097	12 1.5% 2.5% 5711,158 517,934 55,978 50 50 50 55,978 5741,049	13 1.5% 2.5% \$721,826 \$18,203 \$6,068 \$0 \$0 \$6,068 \$752,165	14 1.5% 2.5% \$732,653 \$18,476 \$6,159 \$0 \$0 \$0 \$5,159 \$763,447	15 1.5% 2.5% \$743,643 \$18,753 \$6,251 \$0 \$0 \$50 \$50 \$774,899	16 1.5% 2.5% \$754,798 \$19,035 \$6,345 \$0 \$0 \$5 \$5,345 \$786,522	17 1.5% 2.5% \$766,120 \$19,320 \$6,440 \$0 \$0 \$0 \$5,50 \$5,440 \$798,320	18 1.5% 2.5% \$777,611 \$19,610 \$6,537 \$0 \$0 \$6,537 \$10,500 \$6,537 \$810,295	19 1.5% 2.5% \$789,276 \$19,904 \$6,635 \$0 \$0 \$6,635 \$822,449	9
A B	INFLATION	\$ 1.59 % 2.59 \$ \$594,804 \$ \$15,000 \$ \$5,000 \$ \$5,000 \$ \$5,000 \$ \$5,000 \$ \$5,000 \$ \$5,000 \$ \$5,000 \$ \$5,000 \$ \$5,000 \$ \$5,000 \$ \$5,000 \$ \$5,000	1 1.5% 2.5% \$603,726 \$15,225 \$5,075 \$0 \$0 \$5,075 \$629,101	2 1.5% 2.5% \$612,782 \$15,453 \$5,151 \$0 \$0 \$5 \$5,151 \$638,538	3 1.5% 2.5% \$621,974 \$15,685 \$5,228 \$0 \$0 \$5 \$5,228 \$648,116	2026 4 1.5% 2.5% \$631,303 \$15,920 \$5,307 \$0 \$5,307 \$5,307 \$5,307 \$5,307	5 1.5% 2.5% \$640,773 \$16,159 \$5,386 \$0 \$0 \$0 \$5,386 \$667,705	2028 6 1.5% 2.5% \$650,384 \$16,402 \$5,467 \$0 \$0 \$5,467 \$677,721	7 1.5% 2.5% \$660,140 \$16,648 \$5,549 \$0 \$0 \$0 \$5,549 \$687,886	8 1.5% 2.5% \$670,042 \$16,897 \$5,632 \$0 \$0 \$5,632 \$698,205	9 1.5% 2.5% \$680,093 \$17,151 \$5,717 \$0 \$0 \$5,717 \$708,678	10 1.5% 2.5% \$690,294 \$17,408 \$5,803 \$0 \$0 \$0 \$5,803 \$719,308	11 1.5% 2.5% \$700,649 \$17,669 \$5,890 \$0 \$0 \$5,890 \$730,097	12 1.5% 2.5% 5711,158 \$17,934 \$5,978 \$0 \$0 \$0 \$5,978 \$741,049	13 1.5% 2.5% 5721,826 518,203 56,068 50 50 50 56,068 \$752,165	14 1.5% 2.5% \$732,653 \$18,476 \$6,159 \$0 \$0 \$0 \$5,159 \$763,447	15 1.5% 2.5% \$743,643 \$18,753 \$6,251 \$0 \$0 \$5 \$5 \$774,899	16 1.5% 2.5% \$754,798 \$19,035 \$6,345 \$0 \$0 \$5,345 \$786,522	17 1.5% 2.5% \$766,120 \$19,320 \$6,440 \$0 \$0 \$0 \$5,440 \$798,320	18 1.5% 2.5% \$777,611 \$19,610 \$6,537 \$0 \$0 \$5,537 \$810,295	19 1.5% 2.5% \$789,276 \$19,904 \$6,635 \$0 \$0 \$6,635 \$822,449	9
A B	INFLATION	\$ 1.59 % 2.59 \$ \$594,804 \$ 5 \$15,000 \$ \$ \$5,000 \$ \$ \$5,000 \$ \$ \$5,000 \$ \$ \$5,000 \$ \$ \$619,804	1 1.5% 2.5% \$603,726 \$15,225 \$5,075 \$0 \$0 \$5,075 \$629,101	2 1.5% 2.5% \$612,782 \$15,453 \$5,151 \$0 \$0 \$5,151 \$638,538	3 1.5% 2.5% \$621,974 \$15,685 \$5,228 \$0 \$0 \$5,228 \$648,116	2026 4 1.5% 2.5% \$631,303 \$15,920 \$5,307 \$0 \$0 \$5,307 \$5,307	5 1.5% 2.5% \$640,773 \$16,159 \$5,386 \$0 \$0 \$0 \$5,386 \$667,705	2028 6 1.5% 2.5% \$650,384 \$16,402 \$5,467 \$0 \$0 \$5,467 \$677,721	7 1.5% 2.5% \$660,140 \$16,648 \$5,549 \$0 \$0 \$5,549 \$687,886	\$ 1.5% 2.5% \$670,042 \$16,897 \$5,632 \$0 \$0 \$5,632 \$698,205	9 1.5% 2.5% \$680,093 \$17,151 \$5,717 \$0 \$0 \$5,717 \$708,678	10 1.5% 2.5% \$690,294 \$17,408 \$5,803 \$0 \$0 \$0 \$5,803 \$5719,308	11 1.5% 2.5% \$700,649 \$17,669 \$5,890 \$0 \$0 \$0 \$5,890 \$5,890 \$730,097	12 1.5% 2.5% 5711,158 517,934 55,978 50 50 50 55,978 5741,049	13 1.5% 2.5% \$721,826 \$18,203 \$6,068 \$0 \$0 \$6,068 \$752,165	14 1.5% 2.5% \$732,653 \$18,476 \$6,159 \$0 \$0 \$0 \$5,159 \$763,447	15 1.5% 2.5% \$743,643 \$18,753 \$6,251 \$0 \$0 \$50 \$50 \$774,899	16 1.5% 2.5% \$754,798 \$19,035 \$6,345 \$0 \$0 \$5 \$5,345 \$786,522	17 1.5% 2.5% \$766,120 \$19,320 \$6,440 \$0 \$0 \$0 \$5,50 \$5,440 \$798,320	18 1.5% 2.5% \$777,611 \$19,610 \$6,537 \$0 \$0 \$6,537 \$10,500 \$6,537 \$810,295	19 1.5% 2.5% \$789,276 \$19,904 \$6,635 \$0 \$0 \$6,635 \$822,449	9
A B	INFLATION	\$\frac{1.59}{\pi}\$\$\frac{1.59}{5}\$\$\frac{5.94,804}{5}\$\$\frac{5}{5}\$\$\frac{5.94,804}{5}\$\$\frac{5}{5}\$\$\frac{5.90}{5}\$\$\frac{5}{5}\$\$\frac{5.90}{5}\$\$\frac{5}{5}\$\$\frac{5.90}{5}\$\$\frac{5.90}{5}\$\$\frac{5.90}{5}\$\$\frac{5.90}{5}\$\$\frac{5.90}{5}\$\$\frac{5.90}{5}\$\frac{5.90}{5}\$\$\frac{5.90}{5}\$\$\frac{5.90}{5}\$\$\frac{5.90}{5}\$\fra	\$603,726 \$15,225 \$5,075 \$0 \$5,075 \$60 \$5,075 \$629,101	2 1.5% 2.5% \$612,782 \$15,453 \$5,151 \$0 \$0 \$5,151 \$638,538	3 1.5% 2.5% 5621,974 \$15,685 \$5,228 \$0 \$0 \$5,228 \$648,116	2026 4 1.5% 2.5% \$631,303 \$15,920 \$5,307 \$0 \$5,307 \$657,837	\$640,773 \$16,159 \$5,386 \$0 \$0 \$5,386 \$667,705	2028 6 1.5% 2.5% \$650,384 \$16,402 \$5,467 \$0 \$0 \$5,467 \$677,721	7 1.5% 2.5% \$660,140 \$16,648 \$5,549 \$0 \$0 \$5,549 \$687,886	\$ 1.5% 2.5% \$670,042 \$16,897 \$5,632 \$0 \$0 \$5,632 \$698,205	9 1.5% 2.5% \$680,093 \$17,151 \$5,717 \$0 \$0 \$5,717 \$708,678	10 1.5% 2.5% \$690,294 \$17,408 \$5,803 \$0 \$0 \$5,803 \$719,308	11 1.5% 2.5% \$700,649 \$17,669 \$5,890 \$0 \$0 \$5,890 \$730,097	12 1.5% 2.5% \$711,158 \$17,934 \$5,978 \$0 \$0 \$5,978 \$741,049 \$23,912 \$11,956	13 1.5% 2.5% \$721,826 \$18,203 \$6,068 \$0 \$0 \$5,068 \$752,165	14 1.5% 2.5% 5732,653 518,476 56,159 50 50 50,50 56,159 5763,447 524,635 512,318	15 1.5% 2.5% 5743,643 518,753 56,251 50 50 56,251 5774,899	15% 2.5% 5754,798 \$19,035 \$6,345 \$0 \$0 \$50 \$56,345 \$5786,522 \$25,380 \$12,690	17 1.5% 2.5% 5766,120 \$19,320 \$6,440 \$0 \$0 \$5,50 \$6,440 \$798,320	18 1.5% 2.5% 5777,611 \$19,610 \$6,537 \$0 \$0 \$6,537 \$10,295 \$810,295	19 1.5% 2.5% \$789,276 \$19,904 \$6,635 \$0 \$0 \$5,635 \$822,449	9
A B	INFLATION	\$ 1.59 \$ 2.59 \$ 5594,800 \$ 5 550,000 \$ 5 55,000 \$ 5 55,000 \$ 5 55,000 \$ 5 55,000 \$ 5 50,	1 1.5% 2.5% \$603,726 \$15,225 \$5,075 \$0 \$0 \$5,075 \$629,101 \$20,300 \$10,150 \$30,450 2023 1	2 1.5% 2.5% 5612,782 515,453 55,151 50 50 50 55,151 5638,538 520,605 510,302 2024 2024	3 1.5% 2.5% \$621,974 \$15,685 \$5,228 \$0 \$0 \$5,228 \$648,116 \$20,914 \$10,457 \$31,370	2026 4 1.5% 2.5% \$631,303 \$15,307 \$5,307 \$5,307 \$5,307 \$657,837 \$10,614 \$31,841 2026	5 1.5% 2.5% 5640,773 516,159 55,386 50 50 50 50 53,886 5667,705 521,546 510,773 532,319 2027 5	2028 6 1.5% 2.5% \$650,384 \$15,467 \$0 \$0 \$5,467 \$677,721 \$21,869 \$10,934 \$32,803 2028 6	7 1.5% 2.5% \$660,140 \$16,648 \$5,549 \$0 \$0 \$5,549 \$687,886 \$22,197 \$11,098 \$33,295 2029 7	8 1.5% 2.5% \$670,042 \$16,897 \$5,632 \$0 \$0 \$5,632 \$698,205 \$11,265 \$33,795 2030 8	9 1.5% 2.5% 5680,093 517,151 55,717 50 5,707 50 5,717 50,507 50,5	10 1.5% 2.5% \$690,294 \$17,408 \$5,803 \$0 \$0 \$5,803 \$719,308 \$23,211 \$11,605 \$34,816 2032 10	11 1.5% 2.5% \$700,649 \$17,669 \$5,890 \$0 \$5,890 \$730,097 \$23,559 \$11,779 \$35,338	12 1.5% 2.5% 5711,158 517,934 55,978 50 50 50 59,978 5741,049 \$23,912 \$11,956 \$35,869 2034 12	13 1.5% 2.5% \$721,826 \$18,203 \$6,068 \$0 \$0 \$6,068 \$752,165 \$24,271 \$12,136 \$36,407 2035 13	14 1.5% 2.5% 5732,653 518,476 56,159 50 50 50 50,56,159 5763,447 524,635 512,318 536,953	15 1.5% 2.5% \$743,643 \$18,753 \$6,251 \$0 \$0 \$0,50 \$6,251 \$774,899 \$25,005 \$12,502 \$37,507 2037 15	16 1.5% 2.5% \$19,035 \$6,345 \$0 \$0 \$6,345 \$786,522 \$25,380 \$12,690 \$38,070	17 1.5% 2.5% \$766,120 \$19,320 \$6,440 \$0 \$0,56,440 \$798,320 \$12,880 \$38,641 2039	18 1.5% 2.5% 5777,611 519,610 56,537 50 50 50 50,537 \$810,295 526,147 \$13,073 \$39,220 2040 18	19 1.5% 2.5% \$789,276 \$19,904 \$6,635 \$0 \$0,56,635 \$822,449 \$26,539 \$13,270 \$39,809 2041 19	9
A B	INSTATION   Equipment / Maintenance assets   Labor / staff	\$ 1.59 \$ 2.59 \$ 5594,804 \$ 5 515,000 \$ 5 55,500 \$ 5 5 50 \$ 5 5 50 \$ 5 5 50 \$ 5 5 50 \$ 5 5 50 \$ 5 5 50 \$ 5 5 50 \$ 5 5 50 \$ 5 5 50 \$ 5 5 50 \$ 5 5 50 \$ 5 5 50 \$ 5 5 50 \$ 5 5 50 \$ 5 5 50 \$ 5 5 50 \$ 5 5 5 50 \$ 5 5 5 50 \$ 5 5 5 50 \$ 5 5 5 50 \$ 5 5 5 5 50 \$ 5 5 5 5 5 5 5 \$ 5 5 5 5 5 5 \$ 5 5 5 5	1 1.5% 2.5% \$603,726 \$15,225 \$5,075 \$0 \$5,075 \$629,101 \$20,300 \$10,150 \$20,300 \$20,300 \$30,450	2 1.5% 2.5% 5612,782 515,453 55,151 50 50 5,5151 5638,538 520,605 510,302 2024 2 532,780	3 1.5% 2.5% 5621,974 515,685 55,228 50 50 55,228 548,116 520,914 510,457 531,370 2025 3 533,599	2026 4 1.5% 2.5% \$631,303 \$15,920 \$5,307 \$0 \$5,307 \$0 \$5,307 \$0 \$5,307 \$0 \$5,307 \$0 \$5,307 \$0 \$5,307 \$0 \$5,307 \$0 \$5,307 \$0 \$5,307 \$0 \$5,307 \$0 \$5,307 \$0 \$5,307 \$0 \$5,307 \$0 \$5,307 \$0 \$5,307 \$0 \$5,307 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	\$ 1.5% 2.5% \$640,773 \$16,159 \$5,386 \$0 \$0 \$5,386 \$667,705 \$21,546 \$10,773 \$32,319 2027 \$535,300	2028 6 1.5% 2.5% \$650,384 \$16,402 \$5,467 \$0 \$0 \$5,467 \$677,721 \$21,869 \$10,934 \$32,803 2028 6 \$36,182	7 1.5% 2.5% 5660,140 \$16,648 \$5,549 \$0 \$0 \$5,549 \$687,886 \$22,197 \$11,098 \$33,295 2029 7 \$37,087	8 1.5% 2.5% \$670,042 \$16,897 \$5,632 \$0 \$0 \$5,632 \$698,205 \$22,530 \$11,265 \$33,795 2030 8\$38,014	9 1.5% 2.5% 5680,093 517,151 55,717 50 50 55,717 5708,678 522,868 511,434 534,302 2031 9 538,965	10 1.5% 2.5% \$690,294 \$17,408 \$5,803 \$0 \$0 \$5,803 \$719,308 \$23,211 \$11,605 \$34,816 2032 10 \$39,939	11 1.5% 2.5% \$700,649 \$17,669 \$5,890 \$0 \$5,890 \$5,890 \$730,097 \$23,559 \$11,779 \$35,338 2033 1540,937	12 1.5% 2.5% 5711,158 517,934 55,978 50 50 50,55,978 5741,049 523,912 511,956 535,869 2034 241,961	13 1.5% 2.5% 5721,826 \$18,203 \$6,068 \$0 \$6,068 \$752,165 \$24,271 \$12,136 \$36,407 2035 343,010	14 1.5% 2.5% 5732,653 518,476 56,159 50 50 50,56,159 5763,447 524,635 512,318 536,953 2036 44,085	15 1.5% 2.5% 5743,643 \$18,753 \$6,251 \$0 \$0 \$5,251 \$774,899 \$25,005 \$12,502 \$37,507 2037 \$545,187	16 1.5% 2.5%  \$754,798 \$19,035 \$6,345 \$0 \$0 \$5,345 \$5,80 \$12,690 \$38,070 2038 \$46,317	17 1.5% 2.5%  \$766,120 \$19,320 \$6,440 \$6,40 \$798,320 \$788,320 \$25,760 \$12,880 \$38,641 2039 \$47,474	18 1.5% 2.5% 5777,611 \$19,610 \$6,537 \$6,537 \$5 \$0 \$0 \$5 \$5 \$5 \$5 \$5 \$5 \$5 \$5 \$5 \$5 \$5 \$5 \$5	19 1.5% 2.5%  \$789,276 \$19,904 \$6,635 \$0 \$0 \$5,635 \$822,449  \$26,539 \$13,270 \$39,809 2041 \$49,878	9
B C	INFLATION	\$ 1.59 \$ 2.59 \$ 5 5594,804 \$ 5 5 550,000 \$ 5 5 550,000 \$ 5 5 550,000 \$ 5 5 550,000 \$ 5 5 50,000	1 1.5% 2.5% 5603,726 515,225 5.075 50 50 50 50 50 50 50 50 50 50 50 50 50	2 1.5% 2.5% \$612,782 \$15,453 \$5,151 \$0 \$0 \$5,151 \$638,538 \$20,605 \$10,302 \$22,780 \$20,780 \$20,780 \$20,780 \$20,780 \$20,780 \$20,780 \$20,780 \$20,	3 1.5% 2.5% \$621,974 \$15,685 \$5,228 \$0 \$0 \$5,228 \$648,116 \$548,116 \$20,914 \$10,457 \$31,370 2025 23 3 \$33,599 \$26,879 \$33,599	2026 4 1.5% 2.5% \$631,303 \$15,920 \$5,307 \$0 \$5,307 \$0 \$5,307 \$0 \$5,307 \$1,0614 \$31,841 2026 4 \$34,439 \$27,751	\$ 1.5% 2.5% \$ 2.5% \$ 5.386 \$ 50 \$ 5.386 \$ 567,705 \$ \$ 21,546 \$ 10,773 \$ 32,319 \$ 2027 \$ 535,300 \$ 528,240 \$ 528,240	2028 6 1.5% 2.5% \$650,384 \$16,402 \$5,467 \$0 \$5,467 \$5,467 \$10,934 \$10,934 \$32,803 2028 \$36,182 \$28,946 \$36,182 \$36,182	7 1.5% 2.5% 5660,140 \$16,648 \$5,549 \$0 \$0 \$5,549 \$0 \$5,549 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10	\$1.5% 2.5% \$670,042 \$16,897 \$5,632 \$0 \$5,632 \$698,205 \$22,530 \$11,265 \$33,795 2030 \$38,014 \$30,411 \$38,014	9 1.5% 2.5% \$680,093 \$17,151 \$5,717 \$0 \$0 \$5,717 \$708,678 \$22,868 \$11,434 \$34,302 2031 9 \$38,965 \$31,172 \$38,965	10 1.5% 2.5% \$690,294 \$17,408 \$5,803 \$0 \$0 \$5,803 \$719,308 \$23,211 \$11,605 \$34,816 2032 10 \$39,939 \$31,951 \$39,939 \$31,951 \$39,939	11 1.5% 2.5% \$700,649 \$17,669 \$5,890 \$0 \$0 \$5,890 \$0 \$5,890 \$0 \$5,890 \$10 \$5,890 \$10 \$10,799 \$11,779 \$33,338 2033 11 \$40,937 \$32,750 \$40,937 \$340,937	12 1.5% 2.5% 5711,158 517,934 55,978 50 50 50,50 535,978 5741,049 523,912 511,956 535,869 2034 122 541,961 533,568 541,961 533,568	13 1.5% 2.5% 5721,826 518,203 56,068 50 50 50 50,068 5752,165 524,271 512,136 536,407 2035 13 \$43,010 534,408 \$43,010	14 1.5% 2.5% 5732,653 518,476 50,159 50 50 50,56,159 5763,447 524,635 512,318 536,953 2036 134 544,085 535,268	15 1.5% 2.5% 2.5% 5743,643 518,753 56,251 50 50 56,251 5774,899 525,005 512,502 537,507 2037 15 545,187 536,150 545,187 545,187	16 1.5% 2.5% \$754,798 \$19,035 \$6,345 \$0 \$0 \$5,345 \$786,522 \$25,380 \$12,690 2038 16 \$46,317 \$37,053 \$46,317	17 1.5% 2.5% 5766,120 519,320 50,440 50 50 50,540 57,780 512,880 538,641 2039 17 547,474 537,980 547,474	18 1.5% 2.5% 5777,611 \$19,610 \$6,537 \$0 \$0 \$0 \$6,537 \$810,295 \$26,147 \$13,073 \$39,220 2040 18 \$48,661 \$38,929 \$48,661	19 1.5% 2.5% 5789,276 519,904 56,635 50 50 50 56,635 5822,449 226,539 513,270 239,809 241 19 549,878 539,902 549,878	1199
B C	INFLATION	\$ 1.59 \$ 2.59 \$ 5.594,800 \$ 5 515,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5 5,000 \$ 5 5 5 5 5,000 \$ 5 5 5 5 5,000 \$ 5 5 5 5 5,000 \$ 5 5 5 5 5 5,000 \$ 5 5 5 5 5 5,000 \$ 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	1 1.5% 2.5% 5603,726 515,225 55,075 50 50 55,075 5629,101 20,330,450 20,330,450 20,331,325 31,380 513,325	2 1.5% 2.5% 5612,782 515,453 55,151 50 50 50 55,151 \$638,538 \$20,605 \$10,309 2024 2 \$32,780 \$26,224	3 1.5% 2.5% 5621,974 515,685 55,228 50 50 50 55,228 \$648,116 520,914 510,457 \$31,370 2025 3 533,599 \$26,879	2026 4 1.5% 2.5% 5631,303 515,920 55,307 50 5 50 5 53,07 510,614 531,841 2026 4 534,439 514,350	5 1.5% 2.5% \$640,773 \$16,159 \$5,386 \$60 \$5,386 \$667,705 \$21,546 \$10,773 \$32,319 2027 \$535,300 \$228,240 \$353,300 \$14,708	2028 6 1.5% 2.5% \$650,384 \$16,402 \$5,467 \$0 \$0 \$5 \$677,721 \$21,869 \$10,934 \$32,803 2028 6 \$36,182 \$238,946	7 1.5% 2.5% \$660,140 \$16,648 \$55,549 \$0 \$0 \$5,549 \$0 \$5,549 \$10,98 \$11,098 \$33,295 2029 7 \$37,087 \$29,670 \$37,087 \$15,453	\$1.5% 2.5% \$670,042 \$16,897 \$5,632 \$0 \$0 \$5,632 \$0 \$5,632 \$5,632 \$10 \$11,265 \$33,795 2030 8 \$38,014 \$30,14	9 1.5% 2.5% 5680,093 \$17,151 \$5,717 \$0 \$0 \$5,5717 \$708,678 \$22,868 \$11,434 \$34,302 2031 9 \$38,965 \$31,252 \$31,252 \$38,965 \$16,235 \$31,252 \$31,252 \$31,252 \$31,252 \$31,252 \$33,965 \$316,235 \$3	10 1.5% 2.5% \$690,294 \$17,408 \$5,803 \$0 \$5,803 \$70 \$5,803 \$719,308 \$719,308 \$23,211 \$11,605 \$34,816 2032 10 \$39,939 \$31,951 \$39,939 \$31,654	111 1.5% 2.5% 5700,649 517,669 55,890 50 50 55,890 510,797 533,338 2033 111 540,937 532,750 540,937 517,057	12 1.5% 2.5% 5711,158 517,934 55,978 50 50 55,978 50 535,978 50 535,978 50 535,978 50 535,978 50 535,978 50 50 50 50 50 50 50 50 50 50	13 1.5% 2.5% 5721,826 518,203 56,068 50 50 56,068 5752,165 524,271 512,136 536,407 2035 13 543,010 537,921	14 1.5% 2.5% 5732,653 518,476 56,159 50 50 50,50 50 50,50 50,50 50,50 50,50 50,50 50,50 50,50 50,50 50,50 50,50 50,50 50,50 50,50 50,50 50,50 50,50 50,50 50,50 50,50 50 50,50 50 50 50,50 50 50 50 50 50 50 50 50 50 50 50 50 5	15 1.5% 2.5% 5743,643 518,753 56,251 50 50 50 50,551 \$774,899 525,005 512,502 537,507 2037 15 545,187 536,150	16 1.5% 2.5% \$754,798 \$19,035 \$6,345 \$0 \$5 \$5 \$5,545 \$786,522 \$25,380 \$12,690 2038 16 \$46,317 \$37,053 \$46,317 \$19,053	17 1.5% 2.5% 5766,120 519,320 56,440 50 50 5,56,440 \$798,320 \$798,320 525,760 512,880 538,641 2039 17 \$47,474 \$37,980	18 1.5% 2.5% 5777,611 \$19,610 \$6,537 \$0 \$0 \$0,50 \$5,537 \$810,295  \$26,147 \$13,073 \$39,073 \$2040 \$18 \$48,661 \$38,929 \$48,661 \$20,276	19 1.5% 2.5% \$789,276 \$19,904 \$6,635 \$0 \$0,56,635 \$822,449 \$26,539 \$13,270 \$39,809 2041 19 \$49,878 \$39,902	11199
В С	INFLATION	\$ 1.59 \$ 5594,804 \$ 5 5594,804 \$ 5 515,000 \$ 5 55,500 \$ 5 55,500 \$ 5 55,500 \$ 5 55,500 \$ 5 55,500 \$ 5 55,500 \$ 5 55,500 \$ 5 55,500 \$ 5 55,500 \$ 5 55,500 \$ 5 55,500 \$ 5 55,500 \$ 5 55,500 \$ 5 55,500 \$ 5 51,000 \$	1 1.5% 2.5% 5603,726 515,225 55,075 50,075 529,101 531,980 525,584 531,980 513,225 53,225	2 1.5% 2.5% 5612,782 515,453 55,151 50 50 50 50 50 50 50,55,151 5638,538 510,302 530,907 2024 2 52,780 526,224 527,780 531,658 50 50 50 50 50 50 50 50 50 50 50 50 50	3 1.5% 2.5% 5621,974 515,685 55,228 50 0 50 0 55,228 5648,116 520,914 510,457 531,370 2025 3 3 533,599 546,000 50 0	2026 4 1.5% 2.5% 5631,303 515,920 55,307 55,307 55,307 55,307 55,307 51,227 510,614 2026 4 31,841 2026 534,439 527,551 534,439 514,350 50 50	5 1.5% 2.5% 5640,773 516,159 55,386 50 50 50 55,386 5667,705 521,546 510,773 532,319 2027 5 5 535,300 528,240 50 528,240 535,300 535,3	2028 6 1.5% 2.5% \$650,384 \$16,402 \$5,467 \$0 \$5,467 \$0 \$5,467 \$10,934 \$21,869 \$10,934 \$32,803 2028 6 536,182 \$28,946 \$36,182 \$28,946 \$36,182 \$3	7 1.5% 2.5% 5660,140 516,648 55,549 50 50 50 55,549 511,098 533,295 2029 7 537,087 529,670 537,087 529,670 537,087 537	\$1.5% 2.5% \$670,042 \$16,897 \$5,632 \$0 \$0 \$5,632 \$698,205 \$22,530 \$11,265 \$33,795 2030 8 \$38,014 \$30,414 \$15,839 \$0	9 1.5% 2.5% 5680,093 517,151 55,717 50 50 50 55,717 5708,678 522,868 511,434 534,302 2031 9 538,965 531,173 538,965 53	10 1.5% 2.5% \$690,294 \$17,408 \$5,803 \$0 \$0 \$5,803 \$719,308 \$23,211 \$11,605 \$34,816 2032 10 \$39,939 \$31,951 \$39,939 \$16,641 \$0	11 1.5% 2.5% \$700,649 \$17,669 \$5,890 \$0 \$0 \$5,890 \$5,890 \$730,097 \$11,779 \$35,338 2033 11 \$40,937 \$32,759 \$10,7057 \$50	12 1.5% 2.5% 5711,158 517,934 55,978 50 50 50 50,50 533,869 2034 12 541,961 533,569 241,961 533,569 541,961 531,569 541,961 531,569 541,961 531,569 541,961 541	13 1.5% 2.5% \$721,826 \$18,203 \$6,068 \$0 \$0 \$5,068 \$752,165 \$24,271 \$12,136 \$36,407 2035 13 \$43,010 \$34,408 \$43,010 \$17,921 \$0	14 1.5% 2.5% 5732,653 518,476 56,159 50 50 50 50 50 50 5763,447 524,635 512,318 536,953 2036 134 544,085 535,268 544,085 535,268 544,085 545,085 545,085 546,0	15 1.5% 2.5% 5743,643 518,753 56,251 50 50 50 50 50 50 50 50 512,502 537,507 2037 2037 545,187 545,187 518,288 50 50 511,872 511,872 511,872 511,872 511,872 511,872 511,872 511,872 511,872 511,872 511,872 511,872 511,872 511,872 512,872 513,613 514,872 514,872 515	16 1.5% 2.5% \$754,798 \$19,035 \$6,345 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$	17 1.5% 2.5% 5766,120 519,320 50,50 50 50 50 50 50 50 512,880 512,880 538,641 239 17 547,474 537,980 547,474 519,781 50	18 1.5% 2.5% 5777,611 519,610 56,537 50 50 50 50 50 50 50 50 526,147 513,073 539,220 2040 18 548,661 538,929 548,661 520,276	19 1.5% 2.5% 5789,276 519,904 56,635 50 50 50 56,635 \$822,449 2041 19 549,878 \$39,902 549,878 \$20,782	11199
В С	INFLATION	\$ 1.59 \$ 2.59 \$ 5.594,800 \$ 5 515,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5,000 \$ 5 5 5 5 5,000 \$ 5 5 5 5 5,000 \$ 5 5 5 5 5,000 \$ 5 5 5 5 5,000 \$ 5 5 5 5 5 5,000 \$ 5 5 5 5 5 5,000 \$ 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	1 1.5% 2.5% 5603,726 515,225 55,075 50 50 55,075 5629,101 20,330,450 20,330,450 20,331,325 31,380 513,325	2 1.5% 2.5% \$612,782 \$15,453 \$5,151 \$0 \$0 \$5,151 \$638,538 \$20,605 \$10,302 \$22,780 \$20,780 \$20,780 \$20,780 \$20,780 \$20,780 \$20,780 \$20,780 \$20,	3 1.5% 2.5% \$621,974 \$15,685 \$5,228 \$0 \$0 \$5,228 \$648,116 \$548,116 \$20,914 \$10,457 \$31,370 2025 23 3 \$33,599 \$26,879 \$33,599	2026 4 1.5% 2.5% 5631,303 515,920 55,307 50 5 50 5 53,07 510,614 531,841 2026 4 534,439 514,350	5 1.5% 2.5% \$640,773 \$16,159 \$5,386 \$60 \$5,386 \$667,705 \$21,546 \$10,773 \$32,319 2027 \$5 \$35,386 \$32,319	2028 6 1.5% 2.5% \$650,384 \$16,402 \$5,467 \$0 \$5,467 \$5,467 \$10,934 \$10,934 \$32,803 2028 \$36,182 \$28,946 \$36,182 \$36,182	7 1.5% 2.5% \$660,140 \$16,648 \$55,549 \$0 \$0 \$5,549 \$0 \$5,549 \$10,98 \$11,098 \$33,295 2029 7 \$37,087 \$29,670 \$37,087 \$15,453	\$1.5% 2.5% \$670,042 \$16,897 \$5,632 \$0 \$5,632 \$698,205 \$22,530 \$11,265 \$33,795 2030 \$38,014 \$30,411 \$38,014	9 1.5% 2.5% 5680,093 517,151 55,717 50 50 50 55,717 5708,678 522,868 511,434 534,302 2031 9 538,965 531,173 538,965 53	10 1.5% 2.5% \$690,294 \$17,408 \$5,803 \$0 \$5,803 \$70 \$5,803 \$719,308 \$719,308 \$23,211 \$11,605 \$34,816 2032 10 \$39,939 \$31,951 \$39,939 \$31,654	111 1.5% 2.5% 5700,649 517,669 55,890 50 50 55,890 510,797 533,338 2033 111 540,937 532,750 540,937 517,057	12 1.5% 2.5% 5711,158 517,934 55,978 50 50 55,978 50 535,978 50 535,978 50 535,978 50 535,978 50 535,978 50 50 50 50 50 50 50 50 50 50	13 1.5% 2.5% 5721,826 518,203 56,068 50 50 56,068 5752,165 524,271 512,136 536,407 2035 13 543,010 537,921	14 1.5% 2.5% 5732,653 518,476 50,159 50 50 50,56,159 5763,447 524,635 512,318 536,953 2036 134 544,085 535,268	15 1.5% 2.5% 2.5% 5743,643 518,753 56,251 50 50 56,251 5774,899 525,005 512,502 537,507 2037 15 545,187 536,150 545,187 545,187	16 1.5% 2.5% \$754,798 \$19,035 \$6,345 \$0 \$5 \$5 \$5,545 \$786,522 \$25,380 \$12,690 2038 16 \$46,317 \$37,053 \$46,317 \$19,053	17 1.5% 2.5% 5766,120 519,320 50,440 50 50 50,540 57,780 512,880 538,641 2039 17 547,474 537,980 547,474	18 1.5% 2.5% 5777,611 \$19,610 \$6,537 \$0 \$0 \$0,50 \$5,537 \$810,295  \$26,147 \$13,073 \$39,073 \$2040 \$18 \$48,661 \$38,929 \$48,661 \$20,276	19 1.5% 2.5% 5789,276 519,904 56,635 50 50 50 56,635 5822,449 226,539 513,270 239,809 241 19 549,878 539,902 549,878	1199

#### **INPUTS:**

#### Inflation rate

Maintenance expense major equipment

- Preventive maintenance
- Major overhauls covered by
  - vendor LTSA (gas turbines) or
  - scheduled expense (engine)

#### Operations staff:

- number needed
- % of time required
- wage/salary

Room to negotiate & significantly reduce maintenance expense, especially for the reciprocating engine CHP; savings directly accrue to operations cash flow



# CHP proforma Discounted Cash Flow (DCF) model; financials <u>directly linked</u> to technical

			2022	2023	2024 2	2025	2026	2027	2028	2029 <b>7</b>	2030	2031	2032 10	2033	2034 12	2035 13	2036 14	2037 15	2038 16	2039 17	2040 18	2041 19	2042
	INFLATION																						
	Natural Gas at burner tip	%		0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5
	Grid power price	%		0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5
	Pkge Blrs only: O&M Variable charge	%		1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.
	HOST ENERGY LOADS  Capacity Factor:	Power %		64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5
	Power	peak MW,	4.951	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5
		MWh	28,093	28,093	28,093	28,093	28,093	28,093	28,093	28,093	28,093	28,093	28,093	28,093	28,093	28,093	28,093	28,093	28,093	28,093	28,093	28,093	28,09
	Capacity Factor: T			47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7
	Thermal Energy PEAK	MMBtu <sub>th</sub> / Hr	38.388	38.4	38.4	38.4	38.4	38.4	38.4	38.4 160.326	38.4	38.4	38.4 160.326	38.4	38.4	38.4 160.326	38.4 160.326	38.4 160.326	38.4	38.4 160.326	38.4 160.326	38.4	38
	Host's Power:Heat Ratio	MMBtu <sub>th</sub>	160,326	160,326 0.60	160,326 0.60	160,326 0.60	160,326 0.60	160,326 0.60	160,326 0.60	0.60	160,326 0.60	160,326 0.60	0.60	160,326 0.60	160,326 0.60	0.60	0.60	0.60	160,326 0.60	0.60	0.60	160,326 0.60	160,32
	Host's Power:Heat Katio			0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.6
No CHP	Nat Gas to Boiler	HHV MMBtu,,		46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	4
No CHP	Nat Gas to Boiler	HHV MMBtu		193,164	193,164	193,164	193,164	193,164	193,164	193,164	193,164	193,164	193,164	193,164	193,164	193,164	193,164	193,164	193,164	193,164	193,164	193,164	193,16
No CHP	CO2 EMISSIONS																						
	CO2 from grid power CO2 from fuel to boilers	mt CO <sub>2</sub>	22,184 10,264	22,184 10,264	22,184 10,264	22,184 10,264	22,184 10,264	22,184 10,264	22,184 10,264	22,184 10,264	22,184 10,264	22,184 10,264	22,184 10,264	22,184 10,264	22,184 10,264	22,184 10,264	22,184 10,264	22,184 10,264	22,184 10,264	22,184 10,264	22,184 10,264	22,184 10,264	22,184
	CO2 from fuel to CHP	mt CO <sub>2</sub>	10,264	10,264	10,264	10,264	10,264	10,264	10,264	10,264	10,264	10,264	10,264	10,264	10,264	10,264	10,264	10,264	10,264	10,264	10,264	10,264	10,26
	NO-CHP: Total CO2 emissions	mt CO <sub>2</sub>	32,448	32,448	32,448	32,448	32,448	32,448	32,448	32,448	32,448	32,448	32,448	32,448	32,448	32,448	32,448	32,448	32,448	32,448	32,448	32,448	32.44
				,	,	,	,	,	,	,	,		,	,	,	,	,	,		,	,	,	,
	UNIT CHARGES																						
No CHP	Grid Power Price	c/KWh	7.6	7.6	7.7	7.7	7.8	7.8	7.8	7.9	7.9	7.9	8.0	8.0	8.1	8.1	8.1	8.2	8.2	8.3	8.3	8.4	8.
No CHP	Grid Power Price	\$/MWh \$/MMBtu, HHV	\$76.0 \$2.76	\$76.4 \$2.77	\$76.8 \$2.79	\$77.1 \$2.80	\$77.5 \$2.82	\$77.9 \$2.83	\$78.3 \$2.84	\$78.7 \$2.86	\$79.1 \$2.87	\$79.5 \$2.89	\$79.9 \$2.90	\$80.3 \$2.92	\$80.7 \$2.93	\$81.1 \$2.94	\$81.5 \$2.96	\$81.9 \$2.97	\$82.3 \$2.99	\$82.7 \$3.00	\$83.1	\$83.6 \$3.03	\$84.
	Natural Gas at burner tip	5/MMBtu, HHV	\$2.76	\$2.77	\$2.79	\$2.80	52.82	52.83	52.84	\$2.86	\$2.87	\$2.89	\$2.90	\$2.92	\$2.93	>2.94	\$2.96	\$2.97	\$2.99	\$3.00	>3.02	\$3.03	\$3.0
No CHP	Boilers: Operations & Maintenance (O&I	M)																					
No CHP	Boilers: Fixed Charge	\$MM	\$0.10	\$0.10	\$0.10	\$0.10	\$0.10	\$0.10	\$0.10	\$0.10	\$0.10	\$0.10	\$0.10	\$0.10	\$0.10	\$0.10	\$0.10	\$0.10	\$0.10	\$0.10	\$0.10	\$0.10	\$0.10
No CHP	Boilers: Variable Charge	\$MM		\$0.20	\$0.20	\$0.21	\$0.21	\$0.21	\$0.21	\$0.21	\$0.22	\$0.22	\$0.22	\$0.22	\$0.23	\$0.23	\$0.23	\$0.23	\$0.23	\$0.24	\$0.24	\$0.24	\$0.24
No CHP	Boilers:Total O&M Cost	\$MM		\$0.30	\$0.30	\$0.31	\$0.31	\$0.31	\$0.31	\$0.31	\$0.32	\$0.32	\$0.32	\$0.32	\$0.33	\$0.33	\$0.33	\$0.33	\$0.33	\$0.34	\$0.34	\$0.34	\$0.34
	Boilers:Total O&M Cost	\$/MMBtu		\$1.89	\$1.90	\$1.91	\$1.92	\$1.94	\$1.95	\$1.96	\$1.98	\$1.99	\$2.00	\$2.02	\$2.03	\$2.05	\$2.06	\$2.07	\$2.09	\$2.10	\$2.12	\$2.13	\$2.15
	METRICS for RE-CHP																						
w/RE-CHP	Full-Load Optg Hrs	Hrs		8,322	8,322	8,322	8,322	8,322	8,322	8,322	8,322	8,322	8,322	8,322	8,322	8,322	8,322	8,322	8,322	8,322	8,322	8,322	8,322
w/RE-CHP	CHP peak power PEAK	MW <sub>e</sub>	_	2.86	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.5
w/RE-CHP	CHP electricity supplied	MWh	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215
	Avg. CHP thermal Energy sold	MMBtu/Hr		6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.
	Annual CHP thermal Energy sold	MMBtu	51,186	51,186	51,186	51,186	51,186	51,186	51,186	51,186	51,186	51,186	51,186	51,186	51,186	51,186	51,186	51,186	51,186	51,186	51,186	51,186	51,186
	Avg. Fuel to CHP Engines	HHV MMBtu/Hr											8.7	8.7	8.7								8.
									0.7	0.7								0.7	0.7	0.7	0.7		
	Annual Fuel to CHP Engines		Reconcile 207.094	8.7 207.094	8.7 207.094	8.7 207.094	8.7 207.094	8.7 207.094	8.7 207.094	8.7 207.094	8.7 207.094	8.7 207.094				8.7 207.094	8.7 207.094	8.7 207.094	8.7 207.094	8.7 207.094	8.7 207.094	8.7 207.094	
	Annual Fuel to CHP Engines	HHV MMBtu	207,094	207,094	8.7 207,094	8.7 207,094	8.7 207,094	8.7 207,094	8.7 207,094	8.7 207,094	8.7 207,094	8.7 207,094	207,094	207,094	207,094	8.7 207,094	8.7 207,094	8.7 207,094	8.7 207,094	8.7 207,094	8.7 207,094	8.7 207,094	
	Annual Fuel to CHP Engines  RE-CHP: Fraction of Host load supplied																						
	RE-CHP: Fraction of Host load supplied % Electricity from RE-CHP	HHV MMBtu % from CHP		207,094 79.1%	207,094 79.1%	207,094 79.1%	207,094 79.1%	207,094 79.1%	207,094 79.1%	207,094 79.1%	79.1%	79.1%	207,094 79.1%	79.1%	79.1%	79.1%	79.1%	79.1%	207,094 79.1%	207,094 79.1%	207,094 79.1%	207,094 79.1%	79.11
	RE-CHP: Fraction of Host load supplied	HHV MMBtu		207,094	207,094	207,094	207,094	207,094	207,094	207,094	207,094	207,094	207,094	207,094	207,094	207,094	207,094	207,094	207,094	207,094	207,094	207,094	79.19 31.99
with the	RE-CHP: Fraction of Host load supplied % Electricity from RE-CHP % Thermal Energy from RE-CHP	% from CHP		207,094 79.1% 31.9%	207,094 79.1% 31.9%	79.1% 31.9%	207,094 79.1% 31.9%	207,094 79.1% 31.9%	79.1% 31.9%	207,094 79.1% 31.9%	207,094 79.1% 31.9%	207,094 79.1% 31.9%	207,094 79.1% 31.9%	207,094 79.1% 31.9%	207,094 79.1% 31.9%	207,094 79.1% 31.9%	207,094 79.1% 31.9%	207,094 79.1% 31.9%	207,094 79.1% 31.9%	207,094 79.1% 31.9%	79.1% 31.9%	79.1% 31.9%	79.15 31.95
w/RE-CHP w/RF-CHP	RE-CHP: Fraction of Host load supplied % Electricity from RE-CHP % Thermal Energy from RE-CHP CHP Efficiency	% from CHP % from CHP % from CHP		207,094 79.1% 31.9% 61%	79.1% 31.9% 61%	79.1% 31.9% 61%	207,094 79.1% 31.9% 61%	207,094 79.1% 31.9% 61%	207,094 79.1% 31.9% 61%	207,094 79.1% 31.9% 61%	207,094 79.1% 31.9% 61%	79.1% 31.9% 61%	207,094 79.1% 31.9% 61%	207,094 79.1% 31.9% 61%	79.1% 31.9% 61%	79.1% 31.9%	207,094 79.1% 31.9% 61%	207,094 79.1% 31.9% 61%	207,094 79.1% 31.9% 61%	207,094 79.1% 31.9% 61%	207,094 79.1% 31.9% 61%	79.1% 31.9% 61%	79.15 31.95
w/RE-CHP w/RE-CHP w/RE-CHP	RE-CHP: Fraction of Host load supplied % Electricity from RE-CHP % Thermal Energy from RE-CHP CHP Efficiency CHP Heat Rate	% from CHP		207,094 79.1% 31.9%	207,094 79.1% 31.9%	79.1% 31.9%	207,094 79.1% 31.9%	207,094 79.1% 31.9%	79.1% 31.9%	207,094 79.1% 31.9%	207,094 79.1% 31.9%	207,094 79.1% 31.9%	207,094 79.1% 31.9%	207,094 79.1% 31.9%	207,094 79.1% 31.9%	207,094 79.1% 31.9%	207,094 79.1% 31.9%	207,094 79.1% 31.9%	207,094 79.1% 31.9%	207,094 79.1% 31.9%	79.1% 31.9%	79.1% 31.9%	79.15 31.95 615
w/RE-CHP	RE-CHP: Fraction of Host load supplied % Electricity from RE-CHP % Thermal Energy from RE-CHP CHP Efficiency CHP Heat Rate	HHV MMBtu % from CHP % from CHP % HHV HHV MMBtu/MWh		207,094 79.1% 31.9% 61% 6.8	79.1% 31.9% 61% 6.8	79.1% 31.9% 61% 6.8	79.1% 31.9% 61% 6.8	79.1% 31.9% 61% 6.8	79.1% 31.9% 61% 6.8	79.1% 31.9% 61% 6.8	79.1% 31.9% 61% 6.8	79.1% 31.9% 61% 6.8	79.1% 31.9% 61% 6.8	79.1% 31.9% 61% 6.8	79.1% 31.9% 61% 6.8	79.1% 31.9% 61% 6.8	79.1% 31.9% 61% 6.8	79.1% 31.9% 61% 6.8	79.1% 31.9% 61% 6.8	79.1% 31.9% 61% 6.8	79.1% 31.9% 61% 6.8	79.1% 31.9% 61% 6.8	79.15 31.95 615
w/RE-CHP	RE-CHP: Fraction of Host lood supplied % Electricity from RE-CHP % Thermal Energy from RE-CHP CHP Efficiency CHP Heat Rate CHP Thermal Energy Rate HHP Operations & Maintenance (O&M)	HHV MMBtu % from CHP % from CHP % HHV HHV MMBtu/MWh V MMBtu/MMBtu <sub>th</sub>	207,094	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.11 31.91 611 63
w/RE-CHP w/RE-CHP	RE-CHP-Fraction of Host load supplied % Electricity from RE-CHP % Thermal Energy from RE-CHP CHP Efficiency CHP Heat Rate CHP Thermal Energy Rate HHY Operations & Maintenance (O&M)	HHV MMBtu % from CHP % from CHP % HHV HHV MMBtu/MWh V MMBtu/MMBtu <sub>th</sub>		79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.11 31.91 611 6.2 \$0.85
w/RE-CHP w/RE-CHP	RE-CHP: Fraction of Host lood supplied % Electricity from RE-CHP % Thermal Energy from RE-CHP CHP Efficiency CHP Heat Rate CHP Thermal Energy Rate HHP Operations & Maintenance (O&M)	HHV MMBtu % from CHP % from CHP % HHV HHV MMBtu/MWh V MMBtu/MMBtu <sub>th</sub>	207,094	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1: 31.9: 61: 6. 2.
w/RE-CHP w/RE-CHP w/RE-CHP	RE-CHP Fraction of Host lood supplied & Electricity from RE-CHP % Thermal Energy from RE-CHP CHP Efficiency CHP Hoter Rate CHP Thermal Energy Rate HHC Operations & Maintenance (O&M) Total O&M CST Total O&M CST	HHV MMBtu % from CHP % from CHP % HHV HHV MMBtu/MWh V MMBtu/MMBtu <sub>th</sub>	207,094	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	207,094 79.19
w/RE-CHP w/RE-CHP w/RE-CHP	RE-CHP: Fraction of Host load supplied % Electricity from RE-CHP % Thermal Intergy from RE-CHP CHP Host Rate CHP Host Rate CHP Host Rate CHP Total GBM Cost Total GBM Cost Total GBM Cost RE-CHP RE-CHP Host Rate CHP RE-CHP RE-CH	HHV MMBtu % from CHP % from CHP % HHV HHV MMBtu/MWh V MMBtu/MMBtu <sub>th</sub>	207,094	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.62 \$27.96	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9 \$0.65 \$29.39	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9 \$1.69 \$75.92	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9 \$0.72 \$32.46	79.1% 31.9% 61% 6.8 2.9 \$0.73 \$33.01	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9 \$0.82 \$37.10	79.1% 31.9% 61% 6.8 2.9	79.11 31.91 611 63.21 \$0.85 \$38.37
w/RE-CHP w/RE-CHP w/RE-CHP	RE-CHP Fraction of Host lood supplied & Electricity from RE-CHP % Thermal Energy from RE-CHP CHP Efficiency CHP Hoter Rate CHP Thermal Energy Rate HHC Operations & Maintenance (O&M) Total O&M CST Total O&M CST	HHV MM8tu % from CHP % from CHP % HHV HHV MM8tu/MWh V MM8tu/MM8tu <sub>is</sub> SMM S/MWh	207,094	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9 \$0.63 \$28.43	79.1% 31.9% 61% 6.8 2.9 \$0.64 \$28.90	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9 \$0.66 \$29.88	79.1% 31.9% 61% 6.8 2.9 \$0.67 \$30.38	79.1% 31.9% 61% 6.8 2.9 \$0.69 \$30.88	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9 \$0.71 \$31.93	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9 \$0.75 \$33.56	79.1% 31.9% 61% 6.8 2.9 \$0.76 \$34.13	79.1% 31.9% 61% 6.8 2.9 \$0.77 \$34.70	79.1% 31.9% 61% 6.8 2.9 \$0.78 \$35.28	79.1% 31.9% 61% 6.8 2.9 \$1.91 \$86.03	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.81 \$36.48	79.1% 31.9% 61% 6.8 2.9	79.1% 31.9% 61% 6.8 2.9 \$0.84	79.11 31.91 611 62 50.85 \$38.37
w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP	RE-CIP- Fraction of Host load supplied % Electricity from RE-CIP % Thermal Energy from RE-CHP CIP- Hielant RO-CIP- Ro-CIP- Rout Cost of Power Fuel Cost of Power Fuel Cost of Thermal Energy	HHV MMBtu % from CHP % from CHP % HHV HHV MMBtu/MWh V MMBtu/MMBtu <sub>in</sub> \$MM \$/MWh \$/MWh \$/MWh	207,094	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.62 \$27.96	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.63 \$28.43 \$18.9 \$8.2	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.64 \$28.90 \$19.0 \$8.2	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.65 \$29.39  \$19.1 \$8.3	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.66 \$29.88	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.67 \$30.38	79.1% 31.9% 61% 6.8 2.9 \$0.69 \$30.88	79.1% 31.9% 61% 6.8 2.9 \$1.69 \$75.92	207,094 79.1% 31.9% 6.8 2.9 \$0.71 \$31.93	207,094  79.1% 31.9% 6.8 2.9  \$0.72 \$32.46  \$19.7 \$8.5	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.73 \$33.01 \$19.8 \$8.6	79.1% 31.9% 61% 6.8 2.9 \$0.75 \$33.56	207,094 79.1% 31.9% 6.8 2.9 \$0.76 \$34.13	207,094  79.1% 31.9% 6.8 2.9  \$0.77 \$34.70  \$20.1 \$8.7	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.78 \$35.28  \$20.2 \$8.7	207,094  79.1% 31.9% 61% 6.8 2.9  \$1.91 \$86.03	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.81 \$36.48 \$20.4 \$8.8	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.82 \$37.10 \$20.5 \$8.9	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.84 \$37.73	207,094  79.11 31.91 611 62.21  \$0.85 \$38.37 \$20.7 \$9.0
w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP	RE-CHP Fraction of Host lood supplied % Electricity from RE-CHP % Thermal Energy from RE-CHP CHP Efficiency CHP Host Rate CHP Thermal Energy Rate HHC Operations & Maintenance (O&M) Total O&M Cost Total O&M Cost RE-CHP Field Cost of Power	HHV MMBtu % from CHP % from CHP % from CHP HHV MMBtu/MWh V MMBtu/MMBtu <sub>th</sub> S/MWh S/MWh S/MWh S/MWh S/MMBtu <sub>th</sub>	207,094	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.62 \$27.96  \$18.8 \$8.2 2.1	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.63 \$28.43 \$18.9 \$8.2 2.1	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.64 \$28.90 \$19.0 \$8.2 2.1	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.65 \$29.39  \$19.1 \$8.3 2.1	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.66 \$29.88  \$19.2 \$8.3 2.1	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.67 \$30.38  \$19.3 \$8.4 2.1	79.1% 31.9% 61% 6.8 2.9 \$0.69 \$30.88	79.1% 31.9% 61% 6.8 2.9 \$1.69 \$75.92 \$19.5 \$8.4	79.1% 31.9% 61% 6.8 2.9 \$0.71 \$31.93	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.72 \$32.46  \$19.7 \$8.5 2.1	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.73 \$33.01  \$19.8 \$8.6 2.1	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.75 \$33.56  \$19.9 \$8.6 2.1	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.76 \$34.13  \$20.0 \$8.7 2.1	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.77 \$34.70  \$20.1 \$8.7	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.78 \$35.28  \$20.2 \$8.7 2.1	207,094  79.1% 31.9% 61% 6.8 2.9  \$1.91 \$86.03  \$20.3 \$8.8  2.1	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.81 \$36.48  \$20.4 \$8.8 2.1	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.82 \$37.10  \$20.5 \$8.9	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.84 \$37.73  \$20.6 \$8.9	207,094  79.11 31.91 611 6.2  \$0.85 \$38.37  \$20.7 \$9.0
w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP	RE-CIP- Fraction of Host load supplied % Electricity from RE-CIP % Thermal Energy from RE-CHP CIP- Hielant RO-CIP- Ro-CIP- Rout Cost of Power Fuel Cost of Power Fuel Cost of Thermal Energy	HHV MMBtu % from CHP % from CHP % HHV HHV MMBtu/MWh V MMBtu/MMBtu <sub>in</sub> \$MM \$/MWh \$/MWh \$/MWh	207,094	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.62 \$27.96	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.63 \$28.43 \$18.9 \$8.2	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.64 \$28.90 \$19.0 \$8.2	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.65 \$29.39  \$19.1 \$8.3	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.66 \$29.88	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.67 \$30.38	79.1% 31.9% 61% 6.8 2.9 \$0.69 \$30.88	79.1% 31.9% 61% 6.8 2.9 \$1.69 \$75.92	207,094 79.1% 31.9% 6.8 2.9 \$0.71 \$31.93	207,094  79.1% 31.9% 6.8 2.9  \$0.72 \$32.46  \$19.7 \$8.5	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.73 \$33.01 \$19.8 \$8.6	79.1% 31.9% 61% 6.8 2.9 \$0.75 \$33.56	207,094 79.1% 31.9% 6.8 2.9 \$0.76 \$34.13	207,094  79.1% 31.9% 6.8 2.9  \$0.77 \$34.70  \$20.1 \$8.7	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.78 \$35.28  \$20.2 \$8.7	207,094  79.1% 31.9% 61% 6.8 2.9  \$1.91 \$86.03	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.81 \$36.48 \$20.4 \$8.8	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.82 \$37.10 \$20.5 \$8.9	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.84 \$37.73	207,094 79.11 31.91 61: 6. 2. \$0.85 \$38.37 \$20.3
w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP	RE-CHP: Fraction of Host load supplied % Electricity from RE-CHP % Thermal Energy from RE-CHP CHP Befficiency CHP Heart Rate CHP Thermal Energy Rate HHP Operations & Musternance (O&M) Total O&M Cost Total O&M Cost RE-CHP Fuel Cost of Power Grid electricity	HHV MMBtu % from CHP % from CHP % from CHP HHV MMBtu/MWh S/MWh S/MWh S/MWh S/MWh S/MMBtu <sub>th</sub> MW <sub>c</sub> MW <sub>c</sub> MW <sub>c</sub>	207,094	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.62 \$27.96  \$18.8 \$8.2 2.1 5,877	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.63 \$28.43 \$18.9 \$8.2 2.1 5,877	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.64 \$28.90 \$19.0 \$8.2 2.1 5,877	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.65 \$29.39  \$19.1 \$8.3 2.1 5,877	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.66 \$29.88  \$19.2 \$8.3 2.1 5,877	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.67 \$30.38  \$19.3 \$8.4 2.1 5,877	79.1% 31.9% 61% 6.8 2.9 \$0.69 \$30.88 \$19.4 \$8.4 2.1 5,877	207,094  79.1% 31.9% 61% 6.8 2.9  \$1.69 \$75.92  \$19.5 \$8.4 2.1 5,877	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.71 \$31.93  \$19.6 \$8.5 2.1 5,877	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.72 \$32.46  \$19.7 \$8.5 2.1 5,877	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.73 \$33.01  \$19.8 \$8.6 2.1 5,877	79.1% 31.9% 61% 6.8 2.9 \$0.75 \$33.56 \$19.9 \$8.6 2.1 5,877	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.76 \$34.13  \$20.0 \$8.7 2.1 5,877	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.77 \$34.70  \$20.1 \$8.7 2.1 5,877	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.78 \$35.28  \$20.2 \$8.7 2.1 5,877	207,094  79.1% 31.9% 61% 6.8 2.9  \$1.91 \$86.03  \$20.3 \$28.8 2.1 5,877	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.81 \$36.48  \$2.0.4 \$8.8 2.1 5,877	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.82 \$37.10  \$20.5 \$8.9 2.1 5,877	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.84 \$37.73  \$20.6 \$8.9 2.1 5,877	207,094  79.11 31.91 611 63 22  \$0.85 \$38.37  \$20.7 \$9.0
w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP	RE-CHP Frection of Host load supplied % Electricity from RE-CHP W Thermal Energy from RE-CHP CHP Efficiency CHP Heat Rate CHP Thermal Energy Rate HHP Operations & Maintenance (O&M) Total O&M Cost Total O&M Cost RE-CHP Fuel Cost of Power Fuel Cost of Thermal Energy Peak drip Dower Grid electricity Grid electricity	HHV MMBtu % from CHP % from CHP % from CHP % HHV HHV MMBtu/MWh V MMBtu/MMBtu <sub>M</sub> \$/MWh \$/MW	207,094	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.62 \$27.96  \$18.8 \$8.2 2.1 5,877 \$0.45	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.63 \$28.43 \$18.9 \$8.2 2.1 5,877 \$0.45	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.64 \$28.90 \$19.0 \$8.2 2.1 5,877 \$0.45	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.65 \$29.39  \$19.1 \$8.3 2.1 5,877 \$0.46	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.66 \$29.88  \$19.2 \$8.3 2.1 5,877 \$0.46	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.67 \$30.38  \$19.3 \$8.4 2.1 5,877 \$0.46	79.1% 31.9% 61% 6.8 2.9 \$0.69 \$30.88 \$19.4 \$8.4 2.1 5,877 \$0.46	79.1% 31.9% 61% 6.8 2.9 \$1.69 \$75.92 \$19.5 \$8.4 2.1 5,877 \$0.46	79.1% 31.9% 61% 6.8 2.9 \$0.71 \$31.93 \$19.6 \$8.5 2.1 5,877 \$0.47	79.1% 31.9% 61% 6.8 2.9 \$0.72 \$32.46 \$19.7 \$8.5 2.1 5.877 \$0.47	79.1% 31.9% 61% 6.8 2.9 \$0.73 \$33.01 \$19.8 \$8.6 2.1 5,877 \$0.47	79.1% 31.9% 61% 6.8 2.9 \$0.75 \$33.56 \$19.9 \$8.6 2.1 5,877 \$0.47	79.1% 31.9% 61% 6.8 2.9 \$0.76 \$34.13 \$20.0 \$8.7 2.1 5,877 \$0.48	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.77 \$34.70  \$20.1 \$8.7 2.1 5,877 \$0.48	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.78 \$35.28  \$20.2 \$8.7 2.1 5,877 \$0.48	207,094  79.1% 31.9% 61% 6.8 2.9  \$1.91 \$86.03  \$20.3 \$8.8 2.1 5,877 \$0.48	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.81 \$36.48  \$20.4 \$8.8 2.1 5,877 \$0.49	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.82 \$37.10  \$20.5 \$8.9 2.1 5,877 \$0.49	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.84 \$37.73  \$20.6 \$8.9 2.1 5,877 \$0.49	207,094 79.1: 31.9: 61: 6. 2. \$0.8: \$38.3: \$20.3: \$9.6: 2. \$0.85 \$38.3:
w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP	RE-CHP: Fraction of Host lood supplied % Electricity from RE-CHP % Thermal Energy from RE-CHP CHP Heart Rate CHP Heart Rate CHP Thermal Energy Rate HH7 Operations & Maintenance (O&M) Total O&M Cost Total O&M Cost RE-CHP Fuel Cost of Power Fuel Cost of Power Fuel Cost of Power Fuel Cost of Power Grid electricity Grid electricity Grid electricity Grid electricity Grid electricity University Fuel Standard Varings	HHV MMBtu  % from CHP % from CHP % FHV HHV MMBtu_MWh > SMM S/MWh	207,094	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.62 \$27.96  \$18.8 \$8.2 2.1 5.877 \$0.45 \$0.04	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.63 \$28.43 \$18.9 \$8.2 2.1 5,877 \$0.45 \$0.05	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.64 \$28.90 \$19.0 \$8.2 2.1 5,877 \$0.45 \$0.05	79.1% 31.9% 61% 6.8 2.9 \$0.65 \$29.39 \$19.1 \$8.3 2.1 5,877 \$0.46 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.66 \$29.88  \$19.2 \$8.3 2.1 5,877	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.67 \$30.38  \$19.3 \$8.4 2.1 5,877	79.1% 31.9% 61% 6.8 2.9 \$0.69 \$30.88 \$19.4 \$8.4 2.1 5,877 \$0.46 \$0.05	79.1% 31.9% 61% 6.8 2.9 \$1.69 \$75.92 \$19.5 \$8.4 2.1 5,877 \$0.46 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.71 \$31.93  \$19.6 \$8.5  2.1 5,877  \$0.47 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.72 \$32.46  \$19.7 \$8.5 2.1 5,877	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.73 \$33.01  \$19.8 \$8.6  2.1 5,877 \$0.05	79.1% 31.9% 61% 6.8 2.9 \$0.75 \$33.56 \$19.9 \$8.6 2.1 5,877 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.76 \$34.13  \$20.0 \$8.7 2.1 5,877	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.77 \$34.70  \$20.1 \$8.7 2.1 5,877	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.78 \$35.28  \$20.2 \$8.7  2.1 5,877  \$0.48 \$0.05	207,094  79.1% 31.9% 618 6.8 2.9  \$1.91 \$86.03  \$20.3 \$8.8  2.1 5,877  \$0.48 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.81 \$36.48  \$2.0.4 \$8.8 2.1 5,877 \$0.49 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.82 \$37.10  \$20.5 \$8.9 2.1 5,877	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.84 \$37.73  \$20.6 \$8.9 2.1 5,877	207,094 79.11 31.91 611 6.3 2.1 \$0.85 \$38.37 \$20.7 \$9.0 2.5,877 \$0.49 \$0.05
w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP	RE-CHP Frection of Host load supplied % Electricity from RE-CHP W Thermal Energy from RE-CHP CHP Efficiency CHP Heat Rate CHP Thermal Energy Rate HHP Operations & Maintenance (O&M) Total O&M Cost Total O&M Cost RE-CHP Fuel Cost of Power Fuel Cost of Thermal Energy Peak drip Dower Grid electricity Grid electricity	HHV MMBtu % from CHP % from CHP % from CHP % HHV HHV MMBtu/MWh V MMBtu/MMBtu <sub>M</sub> \$/MWh \$/MW	207,094	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.62 \$27.96  \$18.8 \$8.2 2.1 5,877 \$0.45	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.63 \$28.43 \$18.9 \$8.2 2.1 5,877 \$0.45	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.64 \$28.90 \$19.0 \$8.2 2.1 5,877 \$0.45	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.65 \$29.39  \$19.1 \$8.3 2.1 5,877 \$0.46	79.1% 31.9% 61% 6.8 2.9 \$0.66 \$29.88 \$19.2 \$8.3 2.1 5,877 \$0.46 \$0.05	79.1% 31.9% 61% 6.8 2.9 \$0.67 \$30.38 \$19.3 \$8.4 2.1 5,877 \$0.46 \$0.05	79.1% 31.9% 61% 6.8 2.9 \$0.69 \$30.88 \$19.4 \$8.4 2.1 5,877 \$0.46	79.1% 31.9% 61% 6.8 2.9 \$1.69 \$75.92 \$19.5 \$8.4 2.1 5,877 \$0.46	79.1% 31.9% 61% 6.8 2.9 \$0.71 \$31.93 \$19.6 \$8.5 2.1 5,877 \$0.47	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.72 \$32.46  \$19.7 \$8.5  2.1 5,877  \$0.47 \$0.05	79.1% 31.9% 61% 6.8 2.9 \$0.73 \$33.01 \$19.8 \$8.6 2.1 5,877 \$0.47	79.1% 31.9% 61% 6.8 2.9 \$0.75 \$33.56 \$19.9 \$8.6 2.1 5,877 \$0.47	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.76 \$34.13  \$20.0 \$8.7  2.1 5,877  \$0.48 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.77 \$34.70  \$20.1 \$8.7  2.1 5,877  \$0.48 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.78 \$35.28  \$20.2 \$8.7 2.1 5,877 \$0.48	207,094  79.1% 31.9% 61% 6.8 2.9  \$1.91 \$86.03  \$20.3 \$8.8 2.1 5,877 \$0.48	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.81 \$36.48  \$20.4 \$8.8 2.1 5,877 \$0.49	207,094  79.1% 31.9% 618 6.8 2.9  \$0.82 \$37.10  \$20.5 \$8.9  2.1 5,877 \$0.49 \$0.05	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.84 \$37.73 \$20.6 \$8.9 2.1 5.877 \$0.49 \$0.05	207,094  79.19 31.99 619 63 2.5  \$0.85 \$38.37  \$20.7 \$9.0
w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP w/RE-CHP	RE-CHP: Fraction of Host lood supplied % Electricity from RE-CHP % Thermal Energy from RE-CHP CHP Heart Rate CHP Heart Rate CHP Thermal Energy Rate HH7 Operations & Maintenance (O&M) Total O&M Cost Total O&M Cost RE-CHP Fuel Cost of Power Fuel Cost of Power Fuel Cost of Power Fuel Cost of Power Grid electricity Grid electricity Grid electricity Grid electricity Grid electricity University Fuel Standard Varings	HHV MMBtu  % from CHP % from CHP % FHV HHV MMBtu_MWh > SMM S/MWh	207,094	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.62 \$27.96  \$18.8 \$8.2 2.1 5.877 \$0.45 \$0.04	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.63 \$28.43 \$18.9 \$8.2 2.1 5,877 \$0.45 \$0.05	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.64 \$28.90 \$19.0 \$8.2 2.1 5,877 \$0.45 \$0.05	79.1% 31.9% 61% 6.8 2.9 \$0.65 \$29.39 \$19.1 \$8.3 2.1 5,877 \$0.46 \$0.05	79.1% 31.9% 61% 6.8 2.9 \$0.66 \$29.88 \$19.2 \$8.3 2.1 5,877 \$0.46 \$0.05	79.1% 31.9% 61% 6.8 2.9 \$0.67 \$30.38 \$19.3 \$8.4 2.1 5,877 \$0.46 \$0.05	79.1% 31.9% 61% 6.8 2.9 \$0.69 \$30.88 \$19.4 \$8.4 2.1 5,877 \$0.46 \$0.05	79.1% 31.9% 61% 6.8 2.9 \$1.69 \$75.92 \$19.5 \$8.4 2.1 5,877 \$0.46 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.71 \$31.93  \$19.6 \$8.5  2.1 5,877  \$0.47 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.72 \$32.46  \$19.7 \$8.5  2.1 5,877  \$0.47 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.73 \$33.01  \$19.8 \$8.6  2.1 5,877 \$0.05	79.1% 31.9% 61% 6.8 2.9 \$0.75 \$33.56 \$19.9 \$8.6 2.1 5,877 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.76 \$34.13  \$20.0 \$8.7  2.1 5,877  \$0.48 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.77 \$34.70  \$20.1 \$8.7  2.1 5,877  \$0.48 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.78 \$35.28  \$20.2 \$8.7  2.1 5,877  \$0.48 \$0.05	207,094  79.1% 31.9% 618 6.8 2.9  \$1.91 \$86.03  \$20.3 \$8.8  2.1 5,877  \$0.48 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.81 \$36.48  \$2.0.4 \$8.8 2.1 5,877 \$0.49 \$0.05	207,094  79.1% 31.9% 618 6.8 2.9  \$0.82 \$37.10  \$20.5 \$8.9  2.1 5,877 \$0.49 \$0.05	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.84 \$37.73 \$20.6 \$8.9 2.1 5,877 \$0.49 \$0.05	207,094  79.19 31.99 619 63.29 \$0.85 \$38.37 \$20.7 \$9.0 2.1 5,877 \$0.49 \$0.05
w/RE-CHP	RE-CHP: Fraction of Host lood supplied % Electricity from RE-CHP % Thermal Energy from RE-CHP CHP Befficiency CHP Heart Rate CHP Thermal Energy Rate HH7 Operations & Maintenance (O&M) Total O&M Cost Total O&M Cost Total O&M Cost Power Fuel Cost of Power Fuel Cost of Power Fuel Cost of Power Grid electricity Grid electricity Grid electricity Grid electricity CHP Standby Charges Total cost of Grid power Package Boiler Thermal Energy	HHV MMEDU  5 From CHP 55 From CHP 57 From	207,094	207,094 79.1% 31.9% 61% 6.88 2.9 \$0.62 \$27.96 \$18.8 \$8.2 2.1 5,877 \$0.45 \$0.04	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.63 \$28.43 \$18.9 \$8.2 2.1 5,877 \$0.45 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.64 \$28.90 \$19.0 \$8.2 2.1 5,877 \$0.45 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.65 \$29.39  \$19.1 \$8.3 2.1 5,877 \$0.46 \$0.05 \$0.50	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.66 \$29.88  \$19.2 \$8.3 2.1 5,877 \$0.46 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.67 \$30.38  \$19.3 \$8.4 2.1 5,877 \$0.46 \$0.05	79.1% 31.9% 61% 6.8 2.9 \$0.69 \$30.88 \$19.4 \$8.4 2.1 5,877 \$0.46 \$0.05 \$0.51	207,094  79.1% 31.9% 61% 6.8 2.9  \$1.69 \$75.92  \$19.5 \$8.4 2.1 5,877 \$0.46 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.71 \$31.93  \$19.6 \$8.5 2.1 5,877  \$0.47 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.72 \$32.46  \$19.7 \$8.5 2.1 5,877 \$0.05 \$0.52	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.73 \$33.01  \$19.8 \$8.6  2.1 5,877 \$0.05  \$0.52	79.1% 31.9% 61% 6.8 2.9 50.75 533.56 \$19.9 \$8.6 2.1 5,877 \$0.05 \$0.52	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.76 \$34.13  \$20.0 \$8.7 2.1 5,877 \$0.48 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.77 \$34.70  \$20.1 \$8.7  2.1 5,877  50.48 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.78 \$35.28  \$20.2 \$8.7 2.1 5,877 \$0.48 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$1.91 \$86.03  \$20.3 \$8.8 2.1 5,877 \$0.48 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.81 \$36.48  \$2.0.4 \$8.8 2.1 5.877 \$0.49 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.82 \$37.10  \$20.5 \$8.9 2.1 5,877 \$0.49 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.84 \$37.73  \$20.6 \$8.9 2.1 5.877 \$0.49 \$0.05	79.11 31.91 615 2.2 50.85 538.37 520.7 59.0 2 5.877 50.49 50.54
w/RE-CHP	RE-CHP- Frection of Host load supplied % Electricity from RE-CHP  **Thermal Energy from RE-CHP  CHP Efficiency  CHP Heart Rate  CHP Thermal Energy Rate  HHP  Operations & Maintenance (O&M)  Total O&M Cost  RE-CHP  Fuel Cost of Power  Fuel Cost of Fower  Fuel Cost of Thermal Energy  Peak Grid power  Grid electricity  Grid electricity  Grid electricity  Grid electricity  Grid down of Grid power  Package Boiler Thermal Energy  Package Boiler Thermal Energy	HeV MMBtu  % From CHP	207,094	207,094 79.1% 31.9% 61% 6.88 2.9 \$0.62 \$27.96 \$18.8 \$8.2 2.1 5.877 \$0.45 \$0.04 \$0.49	207,094  79.1% 31.9% 61% 6.88 2.9  \$0.63 \$28.43  \$18.9 \$8.2 2.1 5,877 \$0.45 \$0.05	207,094  79,1% 31,9% 61% 6.8 2.9  \$0.64 \$28.90  \$19.0 \$8.2 2.1 5,877 \$0.45 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.65 \$29.39  \$19.1 \$8.3 2.1 5,877 \$0.46 \$0.05 \$0.50	207,094  79,1% 31,9% 61% 6.8 2.9  \$0.66 \$29,88  \$19,2 \$8,3 2.1 5,877 \$0.46 \$0.05 \$0.50	207,094  79,1% 31,9% 61% 6.8 2.9  \$0.67 \$30.38  \$19,3 \$8.4 2.1 5,877 \$0.46 \$0.05 \$0.51	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.69 \$30.88  \$19.4 \$8.4 2.1 5,877 \$0.46 \$0.05 \$0.51	207,094  79.1% 31.9% 61% 6.8 2.9  \$1.69 \$75.92  \$19.5 \$8.4 2.1 5,877 \$0.46 \$0.05 \$0.51	79.1% 31.9% 61% 6.88 2.9 50.71 531.93 59.85 2.1 5,877 50.05 50.51	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.72 \$32.46  \$19.7 \$8.5 2.1 5,877 \$0.47 \$0.05 \$0.52	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.73 \$33.01  \$19.8 \$8.6 2.1 5,877 \$0.47 \$0.05 \$0.52	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.75 \$33.56  \$19.9 \$8.6 2.1 5,877 \$0.05 \$0.52	79.1% 31.9% 61% 6.88 2.9 \$0.76 \$34.13 \$20.0 \$8.7 \$0.48 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.77 \$34.70  \$20.1 \$8.77  2.11 5,877  50.48 \$0.05  \$0.53	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.78 \$35.28  \$20.2 \$8.7 2.1 5,877 \$0.48 \$0.05 \$0.53	207,094  79,1% 31,9% 61% 6.8 2.9  \$1,91 \$86.03  \$2.0.3 \$8.8 2.1 5,877 \$0.48 \$0.05  \$0.53	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.81 \$36.48  \$2.0.4 \$8.8 2.1 5,877 \$0.49 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.82 \$37.10  \$20.5 \$8.9 2.1 5,877 \$0.49 \$0.05	207,094  79,1% 31,9% 61% 6.8 2.9  \$0.84 \$37.73  \$20.6 \$8.9 2.1 5,877 \$0.49 \$0.05	207,09- 79.1 31.9 61 6. 2. \$0.8: \$38.3: \$20.: \$9.4 \$0.5.87 \$0.5-1
w/RE-CHP	RE-CHP: Fraction of Host load supplied % Electricity from RE-CHP % Thermal Energy from RE-CHP CHP Beffichery CHP Heart Rate CHP Thermal Energy Rate HHP Operations & Maintenance (O&M) Total O&M Cost Total O&M Cost Total O&M Cost Power Fuel Cost of Power Fuel Cost of Power Fuel Cost of Power Grid electricity Grid electricity Grid electricity Grid electricity CHP Standby Charges Total cost of Grid power Package Boiler Thermal Energy Glivered Natural gas to Boiler	HHV MMBtu  \$ From CHP \$ From CHP \$ From CHP \$ From CHP  S From CHP  S From CHP  S From CHP  S HHV  SHAW  SHW  S HHV  S HHV  S HHV  S HHV  S HWH  S HW	207,094	207,094  79.1% 31.9% 61% 6.88 2.9  \$0.62 \$27.96  \$18.8 \$8.2 2.1 5,877 \$0.45 \$0.04 \$0.49	207,094 79.1% 31.9% 61% 6.88 2.9 \$0.63 \$28.43 \$18.9 \$8.2 2.1 5,877 \$0.45 \$0.05 \$0.50	207,094 79,1% 31,9% 61% 6.88 2.9 \$0.64 \$28,90 \$19,0 \$8.2 2.1 5,877 \$0.45 \$0.05 \$0.50	207,094  79.1% 31.9% 618 6.8 2.9  \$0.65 \$29.39  \$19.1 \$8.3 2.1 \$8.77 \$0.46 \$0.05 \$0.50	207,094 79.1% 31.9% 61% 6.88 2.9 \$0.66 \$29.88 \$19.2 \$8.3 2.1 \$,877 \$0.46 \$0.05 \$0.50	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.67 \$30.38  \$19.3 \$8.4 2.1 5,877 \$0.46 \$0.05 \$0.51	207,094 79.1% 31.9% 61% 6.88 2.9 \$0.69 \$30.88 \$19.4 \$8.4 2.1 5.877 \$0.46 \$0.05 \$0.51	79.1% 31.9% 61% 6.8 2.9 51.69 575.92 51.95 58.4 2.1 5.877 5.0.46 50.05 50.51	79.1% 31.9% 61% 6.8 2.9 50.71 531.93 519.6 58.5 2.1 5,877 50.07 50.5 50.51	79.1% 31.9% 61% 6.8 2.9 50.72 532.46 519.7 58.5 2.1 5,877 50.05 50.52	79.1% 31.9% 61% 6.8 2.9 50.73 533.01 519.8 58.6 50.52 109,140 131,494	79.1% 31.9% 61% 6.8 2.9 \$0.75 \$33.56 2.1 5,877 \$0.47 \$0.55 \$0.55	79.1% 31.9% 61% 6.8 2.9 50.76 534.13 520.0 58.7 2.1 5,877 50.48 50.55 50.52	79.1% 31.9% 61% 6.8 2.9 50.77 534.70 2.1 5,877 5.0.48 50.05 50.53	79.1% 31.9% 61% 6.8 2.9 50.78 535.28 520.2 58.7 5.0.78 5.0.75 5.0.75 5.0.73	79.1% 31.9% 61.1% 6.8 2.9 \$1.91 \$86.03 \$2.3 \$2.3 \$0.05 \$0.55 \$0.53	207,094 79,1% 31.9% 61% 6.88 2.9 \$0.81 \$36.48 \$2.0.4 \$8.8 2.1 5,877 \$0.49 \$0.05 \$0.53	79.1% 31.9% 61.1% 6.8 2.9 \$0.82 \$37.10 \$2.5 \$5.87 \$0.49 \$0.05 \$0.54	207,094 79,1% 31,9% 61% 6.88 2.9 \$0.84 \$37,73 \$20.6 \$8.9 2.1 5,877 \$0.49 \$0.05 \$0.54	207,09 79.1 31.9 61 66 2 50.8 \$38.3 \$20. \$9. \$0.4 \$0.0 \$0.5
w/RE-CHP	RE-CHP- Frection of Host load supplied % Electricity from RE-CHP  **Thermal Energy from RE-CHP  CHP Efficiency  CHP Heart Rate  CHP Thermal Energy Rate  HHP  Operations & Maintenance (O&M)  Total O&M Cost  RE-CHP  Fuel Cost of Power  Fuel Cost of Fower  Fuel Cost of Thermal Energy  Peak Grid power  Grid electricity  Grid electricity  Grid electricity  Grid electricity  Grid down of Grid power  Package Boiler Thermal Energy  Package Boiler Thermal Energy	HeV MMBtu  % From CHP	207,094	207,094 79.1% 31.9% 61% 6.88 2.9 \$0.62 \$27.96 \$18.8 \$8.2 2.1 5.877 \$0.45 \$0.04 \$0.49	207,094  79.1% 31.9% 61% 6.88 2.9  \$0.63 \$28.43  \$18.9 \$8.2 2.1 5,877 \$0.45 \$0.05	207,094  79,1% 31,9% 61% 6.8 2.9  \$0.64 \$28.90  \$19.0 \$8.2 2.1 5,877 \$0.45 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.65 \$29.39  \$19.1 \$8.3 2.1 5,877 \$0.46 \$0.05 \$0.50	207,094  79,1% 31,9% 61% 6.8 2.9  \$0.66 \$29,88  \$19,2 \$8,3 2.1 5,877 \$0.46 \$0.05 \$0.50	207,094  79,1% 31,9% 61% 6.8 2.9  \$0.67 \$30.38  \$19,3 \$8.4 2.1 5,877 \$0.46 \$0.05 \$0.51	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.69 \$30.88  \$19.4 \$8.4 2.1 5,877 \$0.46 \$0.05 \$0.51	207,094  79.1% 31.9% 61% 6.8 2.9  \$1.69 \$75.92  \$19.5 \$8.4 2.1 5,877 \$0.46 \$0.05 \$0.51	79.1% 31.9% 61% 6.88 2.9 50.71 531.93 59.85 2.1 5,877 50.05 50.51	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.72 \$32.46  \$19.7 \$8.5 2.1 5,877 \$0.47 \$0.05 \$0.52	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.73 \$33.01  \$19.8 \$8.6 2.1 5,877 \$0.47 \$0.05 \$0.52	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.75 \$33.56  \$19.9 \$8.6 2.1 5,877 \$0.05 \$0.52	79.1% 31.9% 61% 6.88 2.9 \$0.76 \$34.13 \$20.0 \$8.7 \$0.48 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.77 \$34.70  \$20.1 \$8.77  2.11 5,877  50.48 \$0.05  \$0.53	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.78 \$35.28  \$20.2 \$8.7 2.1 5,877 \$0.48 \$0.05 \$0.53	207,094  79,1% 31,9% 61% 6.8 2.9  \$1,91 \$86.03  \$2.0.3 \$8.8 2.1 5,877 \$0.48 \$0.05  \$0.53	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.81 \$36.48  \$2.0.4 \$8.8 2.1 5,877 \$0.49 \$0.05	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.82 \$37.10  \$20.5 \$8.9 2.1 5,877 \$0.49 \$0.05	207,094  79,1% 31,9% 61% 6.8 2.9  \$0.84 \$37.73  \$20.6 \$8.9 2.1 5,877 \$0.49 \$0.05	207,09 79.1 31.9 611 62 2 50.88.3 \$20.0 \$9.0 50.5 109,141 131,49
W/RE-CHP	RE CHP: Fraction of Host load supplied % Electricity from RE CHP  CHP Efficiency CHP Host Rate CHP CHP There Reserved CHP Host Rate CHP Thormal Energy Rate  HHY Operations & Maintenance (O&M) Total O&M Cost Total O&M Cost  RE-CHP Fuel Cost of Power Fuel Cost of Hormal Energy Fuel Cost of Hormal Energy Grid electricity Grid electricity Grid electricity CHP Standby Charges Total cost of Grid power  Package Soiler Thermal Energy Children Ratural gas to Boiler Natural gas to Boiler	HeV MMBtu  % From CHP	207,094	207,094 79,1% 31,9% 61% 62,9 \$0,62 \$2,99 \$18,8 \$8,2 2,1 5,8,77 \$0,45 \$0,45 \$0,49 \$0,49 \$0,36 \$0,36	207,094 79.1% 31.9% 618 2.9 50.63 528.43 518.9 58.2 2.1 5.877 50.45 50.50 50.50 109.140 131,494 50.37	207,094 79.1% 31.9% 618 6.8 2.9 50.64 528.90 519.0 58.2 2.1 5.877 50.45 50.50 50.50 109,140 131,494 50.37	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.85 \$229.39 \$19.1 \$8.3 2.1 5.877 \$0.46 \$0.05 \$0.05 \$0.05 \$0.05 \$0.05 \$0.05	79.1% 31.9% 618 2.9 50.66 529.88 2.1 5.877 50.46 50.05 50.50 50.50 50.50 50.37	79.1% 31.9% 618 2.9 50.67 530.38 2.9 50.67 50.51 109.140 50.51 50.51 50.51	79.1% 31.9% 618 2.9 50.69 530.88 2.1 5.877 5.046 50.05 50.51 109.140 131,494 50.38	79.1% 31.9% 51.69 575.92 51.69 50.05 50.51 109,140 131,494 50.38	79.1% 31.9% 11.9% 2.9 50.71 531.93 51.9.6 58.5 2.1 5,877 50.05 50.51 109,140 50.38	79.1% 31.9% 61% 6.8 2.9 50.72 532.46 519.7 58.5 2.1 5,877 50.05 50.52	79.1% 31.9% 618 2.9 50.73 533.01 58.6 6.8 2.9 50.73 533.01 58.77 50.47 50.05 50.52 50.52 50.52	79.1% 31.9% 61% 6.8 2.9 50.75 533.56 2.1 5,877 50.05 50.55 50.52	79.1% 31.9% 61% 6.8 2.9 50.76 53.4.13 520.0 58.7 2.1 5,877 5.0.48 50.05 50.52	79.1% 31.9% 61% 6.8 2.9 50.77 534.70 520.1 58.7 2.1 5.877 5.048 5.055 5.053	79.1% 31.9% 61% 6.8 2.9 50.78 535.28 535.28 520.2 58.77 5.048 5.055 5.055 5.055 5.055 5.055 5.055 5.055	207,094 79.1% 31.9% 61% 6.8 2.9 \$1.91 \$86.03 \$2.03 \$8.8 2.1 5.877 5.0.48 \$0.05 \$0.05 \$0.05 \$0.05 \$0.05	207,094 79.1% 31.9% 61% 6.8 2.9 50.81 536.48 2.1 5,877 50.49 109,140 131,494 50.40	207,094 79.1% 31.9% 618 6.8 2.9 \$0.82 \$37.10 \$20.5 \$8.9 2.1 5.877 \$0.49 \$50.55 \$0.54	207,094 79.1% 31.9% 618 6.8 2.9 50.84 \$33.73 \$20.6 \$8.9 2.1 5.8,77 50.49 50.54 50.54	79.1 31.9 61 62 50.8 538.3 \$20 59 2 5.87 50.4 50.5
w/RE-CHP	RE-CHP: Fraction of Host load supplied % Electricity from RE-CHP % Thermal Energy from RE-CHP CHP Beffichery CHP Heart Rate CHP Thermal Energy Rate HHP Operations & Maintenance (O&M) Total O&M Cost Total O&M Cost Total O&M Cost Power Fuel Cost of Power Fuel Cost of Power Fuel Cost of Power Grid electricity Grid electricity Grid electricity Grid electricity CHP Standby Charges Total cost of Grid power Package Boiler Thermal Energy Glivered Natural gas to Boiler	HHV MMBtu  \$ From CHP \$ From CHP \$ From CHP \$ From CHP  S From CHP  S From CHP  S From CHP  S HHV  SHAW  SHW  S HHV  S HHV  S HHV  S HHV  S HWH  S HW	207,094	207,094  79.1% 31.9% 61% 6.88 2.9  \$0.62 \$27.96  \$18.8 \$8.2 2.1 5,877 \$0.45 \$0.04 \$0.49	207,094 79.1% 31.9% 61% 6.88 2.9 \$0.63 \$28.43 \$18.9 \$8.2 2.1 5,877 \$0.45 \$0.05 \$0.50	207,094 79,1% 31,9% 61% 6.88 2.9 \$0.64 \$28,90 \$19,0 \$8.2 2.1 5,877 \$0.45 \$0.05 \$0.50	207,094  79.1% 31.9% 618 6.8 2.9  \$0.65 \$29.39  \$19.1 \$8.3 2.1 \$8.77 \$0.46 \$0.05 \$0.50	207,094 79.1% 31.9% 61% 6.88 2.9 \$0.66 \$29.88 \$19.2 \$8.3 2.1 \$,877 \$0.46 \$0.05 \$0.50	207,094  79.1% 31.9% 61% 6.8 2.9  \$0.67 \$30.38  \$19.3 \$8.4 2.1 5,877 \$0.46 \$0.05 \$0.51	207,094 79.1% 31.9% 61% 6.88 2.9 \$0.69 \$30.88 \$19.4 \$8.4 2.1 5.877 \$0.46 \$0.05 \$0.51	79.1% 31.9% 61% 6.8 2.9 51.69 575.92 51.95 58.4 2.1 5.877 5.0.46 50.05 50.51	79.1% 31.9% 61% 6.8 2.9 50.71 531.93 519.6 58.5 2.1 5,877 50.07 50.5 50.51	79.1% 31.9% 61% 6.8 2.9 50.72 532.46 519.7 58.5 2.1 5,877 50.05 50.52	79.1% 31.9% 61% 6.8 2.9 50.73 533.01 519.8 58.6 50.52 109,140 131,494	79.1% 31.9% 61% 6.8 2.9 \$0.75 \$33.56 2.1 5,877 \$0.47 \$0.55 \$0.55	79.1% 31.9% 61% 6.8 2.9 50.76 534.13 520.0 58.7 2.1 5,877 50.48 50.55 50.52	79.1% 31.9% 61% 6.8 2.9 50.77 534.70 2.1 5,877 5.0.48 50.05 50.53	79.1% 31.9% 61% 6.8 2.9 50.78 535.28 520.2 58.7 5.0.78 5.0.75 5.0.75 5.0.73	79.1% 31.9% 61.1% 6.8 2.9 \$1.91 \$86.03 \$2.3 \$2.3 \$0.05 \$0.55 \$0.53	207,094 79,1% 31.9% 61% 6.8 2.9 \$0.81 \$36.48 \$2.0.4 \$8.8 2.1 5,877 \$0.49 \$0.05 \$0.53	79.1% 31.9% 61.1% 6.8 2.9 \$0.82 \$37.10 \$2.5 \$5.87 \$0.49 \$0.05 \$0.54	207,094 79,1% 31,9% 61% 6.88 2.9 \$0.84 \$37,73 \$20.6 \$8.9 2.1 5,877 \$0.49 \$0.05 \$0.54	79.1 31.9 61 6. 2 50.8: 538.3: 520 59.1 50.0: 50.5: 109,144 131,49 50.4:
w/RE-CHP	RE CHP: Fraction of Host load supplied % Electricity from RE CHP  CHP Efficiency CHP Host Rate CHP CHP There Reserved CHP Host Rate CHP Thormal Energy Rate  HHY Operations & Maintenance (O&M) Total O&M Cost Total O&M Cost  RE-CHP Fuel Cost of Power Fuel Cost of Hormal Energy Fuel Cost of Hormal Energy Grid electricity Grid electricity Grid electricity CHP Standby Charges Total cost of Grid power  Package Soiler Thermal Energy Children Ratural gas to Boiler Natural gas to Boiler	HeV MMBtu  % From CHP	207,094	207,094 79,1% 31,9% 61% 62,9 \$0,62 \$2,99 \$18,8 \$8,2 2,1 5,8,77 \$0,45 \$0,45 \$0,49 \$0,49 \$0,36 \$0,36	207,094 79.1% 31.9% 618 2.9 50.63 528.43 518.9 58.2 2.1 5.877 50.45 50.50 50.50 109.140 131,494 50.37	207,094 79.1% 31.9% 618 6.8 2.9 50.64 528.90 519.0 58.2 2.1 5.877 50.45 50.50 50.50 109,140 131,494 50.37	207,094 79.1% 31.9% 61% 6.8 2.9 \$0.85 \$229.39 \$19.1 \$8.3 2.1 5.877 \$0.46 \$0.05 \$0.05 \$0.05 \$0.05 \$0.05	79.1% 31.9% 618 2.9 50.66 529.88 2.1 5.877 50.46 50.05 50.50 50.50 50.50 50.37	79.1% 31.9% 618 2.9 50.67 530.38 2.9 50.67 50.51 109.140 50.51 50.51 50.51	79.1% 31.9% 618 2.9 50.69 530.88 2.1 5.877 5.046 50.05 50.51 109.140 131,494 50.38	79.1% 31.9% 51.69 575.92 51.69 50.05 50.51 109,140 131,494 50.38	79.1% 31.9% 11.9% 2.9 50.71 531.93 51.9.6 58.5 2.1 5,877 50.05 50.51 109,140 50.38	79.1% 31.9% 61% 6.8 2.9 50.72 532.46 519.7 58.5 2.1 5,877 50.05 50.52	79.1% 31.9% 618 2.9 50.73 533.01 58.6 6.8 2.9 50.73 533.01 58.77 50.47 50.05 50.52 50.52 50.52	79.1% 31.9% 61% 6.8 2.9 50.75 533.56 2.1 5,877 50.05 50.55 50.52	79.1% 31.9% 61% 6.8 2.9 50.76 53.4.13 520.0 58.7 2.1 5,877 5.0.48 50.05 50.52	79.1% 31.9% 61% 6.8 2.9 50.77 534.70 \$20.1 \$8.7 2.1 5.87, 5.048 5.055 5.053	79.1% 31.9% 61% 6.8 2.9 50.78 535.28 535.28 520.2 58.7 2.1 5.877 50.48 50.55 50.53 50.53	207,094 79.1% 31.9% 61% 6.8 2.9 \$1.91 \$86.03 \$2.03 \$8.8 2.1 5.877 5.0.48 \$0.05 \$0.05 \$0.05 \$0.05 \$0.05	207,094 79.1% 31.9% 61% 6.8 2.9 50.81 536.48 2.1 5,877 50.49 109,140 131,494 50.40	207,094 79.1% 31.9% 618 6.8 2.9 \$0.82 \$37.10 \$20.5 \$8.9 2.1 5.877 \$0.49 \$50.54 \$0.54 \$50.40	207,094 79.1% 31.9% 618 6.8 2.9 50.84 \$33.73 \$20.6 \$8.9 2.1 5.877 5.0.49 109,140 131,494 50.40	79.1 31.9 61 6. 2 50.8: 538.3: 520 59.1 50.0: 50.5: 109,144 131,49 50.4:
w/RE-CHP	RE CHP: Fraction of Host load supplied % Electricity from RE CHP  ST Internal Energy from RE CHP  CHP Efficiency CHP Heart Rate CHP Thermal Energy Rate  HHY  Operations & Maintenance (O&M) Total O&M Cost  Total O&M Cost  RE-CHP Fuel Cost of Power Fuel Cost of Power Grid electricity Grid electricity Grid electricity Grid electricity Grid electricity CHP Standby Charges Total cost of Grid power  Package Boiler Thermal Energy Thermal Energy delivered Natural gas to Boiler  Natural gas to Boiler  TOTIAL Fuel Burned (CHP-Bir)  CO2 EMISSIONS	HeRV MMBtu  % From CHP % HERV MMBtu_/MMBtu_ S/MWh \$/MWh \$/MW	307,994 SO 61	207,094 79.1% 79.1% 19.1% 6.8.8 2.9 50.62 527.96 518.8 58.2 2.1 5.877 50.45 50.49 50.49 50.49 338,587	207,094 79.1% 79.1% 6.8 2.9 50.63 528.43 518.9 58.2 2.1 5.877 50.45 50.50 109,140 131,494 50.37 338,587	207,094 79.1% 79.1% 6.8 2.9 50.64 528.90 58.2 2.1 5.877 50.45 50.50 109,140 131,494 50.37 338,587	207,094 79.1% 79.1% 61% 6.8 2.9 50.65 529.39 519.1 58.3 2.1 5.877 50.46 50.05 50.05 50.30 313,494 50.37 338,587	207,094 79.1% 79.1% 61% 6.8 2.9 50.66 529.88 519.2 58.3 2.1 5.877 50.46 50.05 50.05 50.30 109,140 131,494 50.37 338,587	207,094 79.1% 79.1% 61% 6.8 2.9 50.67 530.38 58.4 2.1 5.877 50.46 50.05 50.51 109,140 131,494 50.37 338,587	79.1% 79.1% 61% 6.8 2.9 50.69 530.88 519.4 \$8.4 2.1 5.877 50.05 50.05 50.05 50.31 83.494 50.38 338,587	79.1% 79.1% 61% 6.8 2.9 51.69 575.92 51.69 575.92 51.69 575.92 58.4 2.1 5.877 50.05 50.05 50.05 50.51	79.1% 31.9% 61% 6.8 2.9 50.71 531.93 519.6 58.5 50.71 50.05 50.51 109,140 131,494 50.38 50.38	79.1% 79.1% 61% 6.8 2.9 50.72 532.46 519.7 58.5 2.1 5.877 50.07 50.52 50.52	79.1% 79.1% 61% 6.8 2.9 50.73 533.01 519.8 58.6 2.1 5.877 50.075 50.52 50.52	79.1% 79.1% 61% 6.8 2.9 50.75 533.56 519.9 \$8.6 2.1 5.877 50.05 50.52 50.52 50.52 50.53	79.1% 31.9% 61% 6.8 2.9 50.76 534.13 520.0 58.7 50.48 50.05 50.52	297,094 79.1% 79.1% 61% 6.8 2.9 50.77 534.70 520.1 58.7 2.1 5.877 5.04.8 50.05 50.53 109,140 131,494 50.39 338,587	79.1% 79.1% 61% 6.8 2.9 50.78 535.28 520.2 58.7 5.0.5 50.5 50.5 50.5 31.494 50.39 338,587	207,094 79.1% 79.1% 79.1% 61% 6.8 2.9 \$1.91 \$86.03 \$2.03 \$5.87 \$5.05 \$5.05 \$5.05 \$3.38,887	207,094 79.1% 79.1% 6.8 2.9 50.81 536.48 2.1 5,877 50.49 50.55 50.53	207,094 79.1% 79.1% 79.1% 6.8 2.9 \$0.82 \$37.10 \$2.05 \$8.9 2.1 5,877 \$0.49 \$0.50 \$5.54 \$0.54 313,494 \$0.40 338,587	207,094 79.1% 79.1% 6.8 2.9 50.84 \$37.73 2.1 5.877 50.64 \$4.9 50.55 109.140 131,494 50.40 338,587	79.1: 31.9: 611 6. 2. \$0.8: \$38.3: \$20.1. 2. 5.877 5.0.4: \$0.4: 338,58:
w/RE-CHP	RE-CHP: Fraction of Host load supplied % Electricity from RE-CHP W. Thermal Renery from RE-CHP CHP Befficiency CHP Host Rate CHP CHP Host Rate CHP Total C&M Cost Power Fuel Cost of Power Fuel Cost of Power God electricity CHP Standby Charges Total Cost of Grid power God electricity CHP Standby Charges Total Cost of Grid power Cost Power Total Cost Of Grid power Cost Power Total Cost Of Cost Power Total Cost Oscillators Oscillat	HeVY MMBILL  % From CHP % HAVY MMBILL_/MMBILL_/MMBILL_/ SMMM \$/MWIN \$/MWIN \$/MWIN \$MMM \$MMMBILL_ HEV MMBILL_ HEV MMBILL_ HEVY MMBILL_ HE	307,994 50.61 50.61 10%	207,094 79.1% 31.9% 61%,68 2.9 50.62 52.796 53.88 58.2 2.17 5.004 50.49 109,140 338,587 3,718	207,094 79.1% 31.9% 61% 6.8 2.9 50.63 528.43 518.9 58.2 2.17 50.05 50.30 50.30 109,140 1109,140 338,587	207,094 79.1% 3.19% 61% 6.8 2.9 50.64 512.90 58.2 2.1 5.0.65 50.05 50.05 109,140 131,494 50.37 338,587	207,094 79.1% 31.9% 61% 6.88 2.9 50.65 529.39 519.1 58.3 2.1 5.87.7 5.87.7 50.46 50.05 50.50 109,140 131,494 50.37 338,587	207,094 79.1% 31.9% 61% 6.88 2.9 50.66 529.88 519.2 58.3 2.1 5.87 5.87 5.87 5.0.46 50.05 50.50 109,140 131,494 50.37 338,587	207,094 79.1% 31.9% 61% 6.8 2.9 50.67 530.38 58.4 2.1 5.0.46 50.05 50.51 109,140 131,494 50.37 338,587	207,094 79.1% 31.9% 61% 6.8 2.9 50.69 530.88 519.4 58.4 2.11 50.46 50.05 50.51 109,140 131,494 50.38 338,587	79.1% 31.9% 61% 6.8 2.9 51.69 575.92 51.95 58.4 2.1 5,877 50.46 50.05 50.51	79.1% 31.9% 61% 6.8 2.9 50.71 531.93 519.6 58.5 2.1 5,877 50.47 50.05 50.51	79.1% 31.9% 61% 6.8 2.9 50.72 532.46 51.9.7 58.5 2.1 5,877 50.47 50.05 50.52	79.1% 31.9% 61% 6.8 2.9 50.73 533.01 519.8 58.6 2.1 5,877 50.05 50.52	79.1% 31.9% 61% 6.8 2.9 50.75 533.56 2.1 5,877 50.47 50.05 50.52	79.1% 31.9% 61% 6.8 2.9 50.76 534.13 520.0 58.7 2.1 5,877 50.48 50.05 50.52	79.1% 31.9% 61% 6.8 2.9 50.77 534.70 5.877 50.48 50.05 50.53 109,140 131,494 50.39 338,587	79.1% 31.9% 61% 6.8 2.9 50.78 535.28 530.2 58.7 50.48 50.05 50.53 109,140 131,494 50.39 338,587	207,094 79.1% 31.9% 61% 6.8 2.9 \$1.91 \$86.03 \$2.03 \$2.03 \$5.88 2.1 5.877 \$0.48 \$50.05 \$0.53 109,140 131,494 \$0.39 338,587	207,094 79.1% 31.9% 61% 6.8 2.9 50.81 536.48 520.4 58.8 50.49 50.05 50.53 109,140 338,587	207,094 79.1% 31.9% 6.8 2.9 \$0.82 \$37.10 \$2.05 \$2.05 \$5.89 2.1 5.877 \$0.49 \$50.05 \$0.54 \$0.40 338,587	207,094 79.1% 31.9% 61% 6.8 2.9 50.84 537.73 520.6 58.9 50.05 50.54 109,140 338,587	207,094 79.19 31.99 619 649 649 649 659 650 650 650 750 750 750 750 750 750 750 750 750 7
W/RE-CHP	RE CHP: Fraction of Host load supplied % Electricity from RE CHP  ST Internal Energy from RE CHP  CHP Efficiency CHP Heart Rate CHP Thermal Energy Rate  HHY  Operations & Maintenance (O&M) Total O&M Cost  Total O&M Cost  RE-CHP Fuel Cost of Power Fuel Cost of Power Grid electricity Grid electricity Grid electricity Grid electricity Grid electricity CHP Standby Charges Total cost of Grid power  Package Boiler Thermal Energy Thermal Energy delivered Natural gas to Boiler  Natural gas to Boiler  TOTIAL Fuel Burned (CHP-Bir)  CO2 EMISSIONS	HeRV MMBtu  % From CHP % SHAW HAW MMBtu_/MMBtu_  \$ MMM \$ / MWBtu_/MMBtu_  \$ / MWB  \$ / MWBtu_ MWB  \$ MWB	307,994 SO 61	207,094 79.1% 79.1% 19.1% 6.8.8 2.9 50.62 527.96 518.8 58.2 2.1 5.877 50.45 50.49 50.49 50.49 338,587	207,094 79.1% 79.1% 6.8 2.9 50.63 528.43 518.9 58.2 2.1 5.877 50.45 50.50 109,140 131,494 50.37 338,587	207,094 79.1% 79.1% 6.8 2.9 50.64 528.90 58.2 2.1 5.877 50.45 50.50 109,140 131,494 50.37 338,587	207,094 79.1% 79.1% 61% 6.8 2.9 50.65 529.39 519.1 58.3 2.1 5.877 50.46 50.05 50.05 50.30 313,494 50.37 338,587	207,094 79.1% 79.1% 61% 6.8 2.9 50.66 529.88 519.2 58.3 2.1 5.877 50.46 50.05 50.05 50.30 109,140 131,494 50.37 338,587	207,094 79.1% 79.1% 61% 6.8 2.9 50.67 530.38 58.4 2.1 5.877 50.46 50.05 50.51 109,140 131,494 50.37 338,587	79.1% 79.1% 61% 6.8 2.9 50.69 530.88 519.4 \$8.4 2.1 5.877 50.05 50.05 50.05 50.31 83.494 50.38 338,587	79.1% 79.1% 61% 6.8 2.9 51.69 575.92 51.69 575.92 51.69 575.92 58.4 2.1 5.877 50.05 50.05 50.05 50.51	79.1% 31.9% 61% 6.8 2.9 50.71 531.93 519.6 58.5 50.71 50.05 50.51 109,140 131,494 50.38 50.38	79.1% 79.1% 61% 6.8 2.9 50.72 532.46 519.7 58.5 2.1 5.877 50.07 50.52 50.52	79.1% 79.1% 61% 6.8 2.9 50.73 533.01 519.8 58.6 2.1 5.877 50.075 50.52 50.52	79.1% 79.1% 61% 6.8 2.9 50.75 533.56 519.9 \$8.6 2.1 5.877 50.05 50.52 50.52 50.52 50.53	79.1% 31.9% 61% 6.8 2.9 50.76 534.13 520.0 58.7 50.48 50.05 50.52	297,094 79.1% 79.1% 61% 6.8 2.9 50.77 534.70 520.1 58.7 2.1 5.877 5.04.8 50.05 50.53 109,140 131,494 50.39 338,587	79.1% 79.1% 61% 6.8 2.9 50.78 535.28 520.2 58.7 2.1 5.877 50.58 50.53 50.53 50.53 338,587	207,094 79.1% 79.1% 79.1% 61% 6.8 2.9 \$1.91 \$86.03 \$2.03 \$5.87 \$5.05 \$5.05 \$5.05 \$3.38,887	207,094 79.1% 79.1% 6.8 2.9 50.81 536.48 2.1 5,877 50.49 50.55 50.53	207,094 79.1% 79.1% 79.1% 6.8 2.9 50.82 537.10 520.5 58.9 2.1 5,877 50.54 109,140 131,494 5,040 338,587	207,094 79.1% 79.1% 6.8 2.9 50.84 \$37.73 2.1 5.877 50.69 50.55 109.140 131,494 50.40 338,587	79.19 31.99 611 64.6 50.85 538.37 59.0 2.1 5.877 50.05 50.54

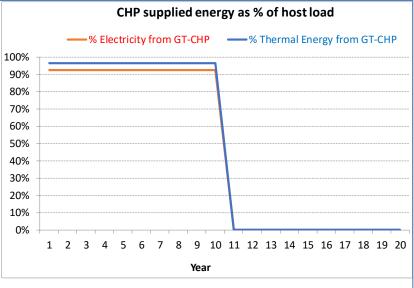
	METRICS for RE-CHP																							
v/RE-CHP	Full-Load Optg Hrs  CHP peak power PEAK	Hrs MW <sub>e</sub>			8,322 2.86	8,322 2.9	8,322 2.9	8,322 2.9	8,322 2.9	8,322 2.9	8,322 2.9	8,322 2.9	8,322 2.9	8,322 2.9	8,322 2.9	8,322 2.9	8,322 2.9	8,322 2.9	8,322 2.9	8,322 2.9	8,322 2.9	8,322 2.9	8,322 2.9	8,3
v/RE-CHP	CHP electricity supplied	MWh		22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,215	22,2
	Avg. CHP thermal Energy sold Annual CHP thermal Energy sold	MMBtu/Hr MMBtu		51,186	6.2 51,186	6.2 51,186	6.2 51,186	6.2 51,186	6.2 51,186	6.2 51,186	6.2 51,186	6.2 51,186	6.2 51,186	6.2 51,186	6.2 51,186	6.2 51,186	6.2 51,186	6.2 51,186	6.2 51,186	6.2 51,186	6.2 51,186	6.2 51,186	6.2 51,186	51,
	Avg. Fuel to CHP Engines Annual Fuel to CHP Engines	HHV MMBtu/Hr		concile	8.7 207.094	8.7 207.094	8.7	8.7	8.7 207.094	8.7	8.7 207.094	8.7 207.094	8.7 207.094	8.7 207.094	8.7	8.7 207.094	8.7 207.094	8.7 207.094	8.7 207.094	8.7 207.094	8.7 207.094	8.7 207.094	8.7 207.094	207,0
	RE-CHP: Fraction of Host load supplied	HAN MIMIDLU	<u> </u>	207,054	207,094	207,034	207,094	207,054	207,034	207,054	207,054	207,054	207,034	207,054	207,054	207,054	207,034	207,094	207,094	207,094	207,034	207,054	207,054	207,0
	% Electricity from RE-CHP	% from CHP			79.1%	79.1%	79.1%	79.1%	79.1%	79.1%	79.1%	79.1%	79.1%	79.1%	79.1%	79.1%	79.1%	79.1%	79.1%	79.1%	79.1%	79.1%	79.1%	79
	% Thermal Energy from RE-CHP	% from CHP			31.9%	31.9%	31.9%	31.9%	31.9%	31.9%	31.9%	31.9%	31.9%	31.9%	31.9%	31.9%	31.9%	31.9%	31.9%	31.9%	31.9%	31.9%	31.9%	3
w/RE-CHP	CHP Efficiency	% HHV			61%	61%	61%	61%	61%	61%	61%	61%	61%	61%	61%	61%	61%	61%	61%	61%	61%	61%	61%	
v/RE-CHP v/RE-CHP		HHV MMBtu/MWh IV MMBtu/MMBtu <sub>th</sub>			6.8 2.9	6.8 2.9	6.8 2.9	6.8 2.9	6.8 2.9	6.8 2.9	6.8 2.9	6.8 2.9	6.8 2.9	6.8 2.9	6.8 2.9	6.8 2.9	6.8 2.9	6.8 2.9	6.8 2.9	6.8 2.9	6.8 2.9	6.8 2.9	6.8 2.9	
v/RE-CHP	Operations & Maintenance (O&M)																							
	Total O&M Cost Total O&M Cost	\$MM \$/MWh		\$0.61	\$0.62 \$27.96	\$0.63 \$28.43	\$0.64 \$28.90	\$0.65 \$29.39	\$0.66 \$29.88	\$0.67 \$30.38	\$0.69 \$30.88	\$1.69 \$75.92	\$0.71 \$31.93	\$0.72 \$32.46	\$0.73 \$33.01	\$0.75 \$33.56	\$0.76 \$34.13	\$0.77 \$34.70	\$0.78 \$35.28	\$1.91 \$86.03	\$0.81 \$36.48	\$0.82 \$37.10	\$0.84 \$37.73	\$3
w/RE-CHP	RE-CHP Fuel Cost of Power	\$/MWh			\$18.8	\$18.9	\$19.0	\$19.1	\$19.2	\$19.3	\$19.4	\$19.5	\$19.6	\$19.7	\$19.8	\$19.9	\$20.0	\$20.1	\$20.2	\$20.3	\$20.4	\$20.5	\$20.6	\$2
w/RE-CHP	Fuel Cost of Thermal Energy	\$/MMBtu <sub>th</sub>			\$8.2	\$8.2	\$8.2	\$8.3	\$8.3	\$8.4	\$8.4	\$8.4	\$8.5	\$8.5	\$8.6	\$8.6	\$8.7	\$8.7	\$8.7	\$8.8	\$8.8	\$8.9	\$8.9	
w/RE-CHP w/RE-CHP	Peak Grid power Grid electricity	MW <sub>e</sub> MWh			2.1 5,877	2.1 5,877	2.1 5,877	2.1 5,877	2.1 5,877	2.1 5,877	2.1 5,877	2.1 5,877	2.1 5,877	2.1 5,877	2.1 5,877	2.1 5,877	2.1 5,877	2.1 5,877	2.1 5,877	2.1 5,877	2.1 5,877	2.1 5,877	2.1 5,877	5,
w/RE-CHP	Grid electricity	SMM			\$0.45	\$0.45	50.45	50.46	\$0.46	\$0.46	\$0.46	\$0.46	\$0.47	\$0.47	\$0.47	\$0.47	\$0.48	\$0.48	\$0.48	\$0.48	\$0.49	\$0.49	\$0.49	9
w/RE-CHP w/RE-CHP	Grid electricity CHP Standby Charges	\$MM \$MM	10%		\$0.45	\$0.45	\$0.45	\$0.46	\$0.46	\$0.46	\$0.46	\$0.46	\$0.47	\$0.47	\$0.47	\$0.47	\$0.48	\$0.48	\$0.48	\$0.48	\$0.49	\$0.49	\$0.49	Şi Şi
w/RE-CHP	Total cost of Grid power	SMM		_	\$0.49	\$0.50	\$0.50	\$0.50	\$0.50	\$0.51	\$0.51	\$0.51	\$0.51	\$0.52	\$0.52	\$0.52	\$0.52	\$0.53	\$0.53	\$0.53	\$0.53	\$0.54	\$0.54	\$
w/RE-CHP	Package Boiler Thermal Energy																							
w/RE-CHP	Thermal Energy delivered	MMBtu <sub>th</sub>			109,140 131,494	109,140	109,140 131,494	109,140 131,494	109,140 131,494	109,140 131,494	109,140 131,494	109,140 131,494	109,140 131,494	109,140 131,494	109,140 131,494	109,140 131,494	109,140 131,494	109,140 131,494	109,140 131,494	109,140 131,494	109,140 131,494	109,140 131,494	109,140	109,
w/RE-CHP w/RE-CHP	Natural gas to Boiler Natural gas to Boiler	HHV MMBtu SMM			131,494 \$0.36	131,494 \$0.37	131,494 \$0.37	131,494 \$0.37	131,494 \$0.37	131,494 \$0.37	131,494 \$0.38	131,494 \$0.38	131,494 \$0.38	131,494 \$0.38	131,494 \$0.38	131,494 \$0.39	131,494 \$0.39	131,494 \$0.39	131,494 \$0.39	131,494 \$0.39	131,494 \$0.40	131,494 \$0.40	131,494 \$0.40	131, \$0
	TOTAL Fuel Burned (CHP+Blr)	HHV MMBtu			338,587	338,587	338,587	338,587	338,587	338,587	338,587	338,587	338,587	338,587	338,587	338,587	338,587	338,587	338,587	338,587	338,587	338,587	338,587	338,
w/RE-CHP	CO2 EMISSIONS CO2 from grid power	mt CO <sub>2</sub>		3,718	3,718	3,718	3,718	3,718	3,718	3,718	3,718	3,718	3,718	3,718	3,718	3,718	3,718	3,718	3,718	3,718	3,718	3,718	3,718	3,
	CO2 from fuel to boilers	mt CO <sub>2</sub>		6,815	6,815	6,815	6,815	6,815	6,815	6,815	6,815	6,815	6,815	6,815	6,815	6,815	6,815	6,815	6,815	6,815	6,815	6,815	6,815	6,
	CO2 from fuel to CHP	mt CO <sub>2</sub>		11,583	11,583	11,583	11,583	11,583	11,583	11,583	11,583	11,583	11,583	11,583	11,583	11,583	11,583	11,583	11,583	11,583	11,583	11,583	11,583	11,
	w/RE-CHP: Total CO2 emissions	mt CO <sub>2</sub>		22,116	22,116	22,116	22,116	22,116	22,116	22,116	22,116	22,116	22,116	22,116	22,116	22,116	22,116	22,116	22,116	22,116	22,116	22,116	22,116	22,
	FINANCIALS			2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	
No CHP	BASE CASE: NO CHP	Year SMM	_	2022	1	2	3	4	2027	2028 6	7	8	9	10	11	12	13	2036 14	15	2038	17	18	19	
		Year SMM SMM	_		2023 1 \$2.15 \$0.6		2025 3 \$2.17 \$0.6	2026 4 \$2.18 \$0.6				2030 8 \$2.22 \$0.6						2036		2038				\$:
No CHP	BASE CASE: NO CHP Cost of Grid Power Cost of Bir natural gas Cost of Bir O&M	SMM SMM SMM	_		\$2.15 \$0.6 \$0.3	\$2.16 \$0.6 \$0.3	\$2.17 \$0.6 \$0.3	\$2.18 \$0.6 \$0.3	2027 5 \$2.19 \$0.6 \$0.3	2028 6 \$2.20 \$0.6 \$0.3	\$2.21 \$0.6 \$0.3	\$2.22 \$0.6 \$0.3	\$2.23 \$0.6 \$0.3	\$2.24 \$0.6 \$0.3	\$2.26 \$0.6 \$0.3	\$2.27 \$0.6 \$0.3	\$2.28 \$0.6 \$0.3	2036 14 \$2.29 \$0.6 \$0.3	\$2.30 \$0.6 \$0.3	2038 16 \$2.31 \$0.6 \$0.3	\$2.32 \$0.6 \$0.3	\$2.34 \$0.6 \$0.3	\$2.35 \$0.6 \$0.3	\$
No CHP No CHP	BASE CASE: NO CHP Cost of Grid Power Cost of Bir natural gas	SMM SMM	_		\$2.15 \$0.6	\$2.16 \$0.6	\$2.17 \$0.6	\$2.18 \$0.6	2027 5 \$2.19 \$0.6	2028 6 \$2.20 \$0.6	\$2.21 \$0.6	\$2.22 \$0.6	\$2.23 \$0.6	\$2.24 \$0.6	\$2.26 \$0.6	\$2.27 \$0.6	\$2.28 \$0.6	2036 14 \$2.29 \$0.6	\$2.30 \$0.6	2038 16 \$2.31 \$0.6	\$2.32 \$0.6	\$2.34 \$0.6	\$2.35 \$0.6	\$
No CHP No CHP No CHP	BASE CASE: NO CHP Cost of Grid Power Cost of Bir natural gas Cost of Bir O&M	SMM SMM SMM	_		\$2.15 \$0.6 \$0.3	\$2.16 \$0.6 \$0.3	\$2.17 \$0.6 \$0.3	\$2.18 \$0.6 \$0.3	2027 5 \$2.19 \$0.6 \$0.3	2028 6 \$2.20 \$0.6 \$0.3	\$2.21 \$0.6 \$0.3	\$2.22 \$0.6 \$0.3	\$2.23 \$0.6 \$0.3	\$2.24 \$0.6 \$0.3	\$2.26 \$0.6 \$0.3	\$2.27 \$0.6 \$0.3	\$2.28 \$0.6 \$0.3	2036 14 \$2.29 \$0.6 \$0.3	\$2.30 \$0.6 \$0.3	2038 16 \$2.31 \$0.6 \$0.3	\$2.32 \$0.6 \$0.3	\$2.34 \$0.6 \$0.3	\$2.35 \$0.6 \$0.3	\$.
	BASE CASE: NO CHP Cost of Grid Power Cost of Bit natural gas Cost of Bit nOBM Total non-CHP Energy Cost  RE-CHP Cost of Grid Power	SMM SMM SMM SMM	_		\$2.15 \$0.6 \$0.3 \$3.0	\$2.16 \$0.6 \$0.3 \$3.1	\$2.17 \$0.6 \$0.3 \$3.1	\$2.18 \$0.6 \$0.3 \$3.1	2027 5 \$2.19 \$0.6 \$0.3 \$3.1	2028 6 \$2.20 \$0.6 \$0.3 \$3.1	\$2.21 \$0.6 \$0.3 \$3.1	\$2.22 \$0.6 \$0.3 \$3.1	\$2.23 \$0.6 \$0.3 \$3.2	\$2.24 \$0.6 \$0.3 \$3.2	\$2.26 \$0.6 \$0.3 \$3.2	\$2.27 \$0.6 \$0.3 \$3.2	\$2.28 \$0.6 \$0.3 \$3.2	2036 14 \$2.29 \$0.6 \$0.3 \$3.2	\$2.30 \$0.6 \$0.3 \$3.3	2038 16 \$2.31 \$0.6 \$0.3 \$3.3	\$2.32 \$0.6 \$0.3 \$3.3	\$2.34 \$0.6 \$0.3 \$3.3	\$2.35 \$0.6 \$0.3 \$3.3	\$3
No CHP No CHP No CHP w/RE-CHP w/RE-CHP w/RE-CHP	BASE CASE: NO CHP Cost of Grid Power Cost of Grid Power Cost of Bir natural gas Cost of Bir O CBM Total non-CHP Energy Cost  RE-CHP Cost of Grid Power Grid Power Standby Charges Total cost of Grid power Total cost of Grid power	SMM SMM SMM SMM SMM SMM	_		\$2.15 \$0.6 \$0.3 \$3.0 \$0.4 \$0.0 \$0.5	\$2.16 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	\$2.17 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	\$2.18 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	2027 \$ \$2.19 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0	2028 6 \$2.20 \$0.6 \$0.3 \$3.1 \$0.5 \$0.5	\$2.21 \$0.6 \$0.3 \$3.1 \$0.5 \$0.5 \$0.0	\$ \$2.22 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	9 \$2.23 \$0.6 \$0.3 \$3.2 \$0.5 \$0.5	\$2.24 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5	\$2.26 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5	\$2.27 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0	\$2.28 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0	2036 14 \$2.29 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0	\$2.30 \$0.6 \$0.3 \$3.3 \$0.5 \$0.5 \$0.0	2038 16 \$2.31 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5	\$2.32 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5	\$2.34 \$0.6 \$0.3 \$3.3 \$0.5 \$0.5	\$2.35 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5	\$
No CHP No CHP W/RE-CHP W/RE-CHP W/RE-CHP	RASE CASE: NO CLIP Cost of Gird Power Cost of Bir natural gas Cost of Bir O'BAM Total non CLIP Energy Cost  RE-CHIP Cost of Gird Power Gird power Standby Charges Total cost of Gird power Cost of Bir natural gas Cost of Bir natural gas	SMM SMM SMM SMM SMM SMM SMM	_		\$2.15 \$0.6 \$0.3 \$3.0 \$0.4 \$0.0 \$0.5	\$2.16 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	\$2.17 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	\$2.18 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	2027 5 \$2.19 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	2028 6 \$2.20 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	\$2.21 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	\$2.22 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	\$2.23 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5	\$2.24 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5	\$2.26 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5	\$2.27 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5	\$2.28 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5	2036 14 \$2.29 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5	\$2.30 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5	2038 16 \$2.31 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5	\$2.32 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5	\$2.34 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5	\$2.35 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5	\$
No CHP No CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP	RASE CASE: NO CIP Cost of Girl Power Cost of Bir natural gas Cost of Bir No City Total non-City Engry Cost  RE-CIP Cost of Girl Power Girl Jower Standby Charges Total cost of Girl power Cost of Girl Power Cost of Girl Power Cost of Bir natural gas Cost of Bir natural gas Cost of Bir natural gas	SMM SMM SMM SMM SMM SMM SMM SMM	_		\$2.15 \$0.6 \$0.3 \$3.0 \$0.4 \$0.0 \$0.5 \$0.4 \$0.0	\$2.16 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	\$2.17 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	\$2.18 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	2027 5 \$2.19 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	2028 6 52.20 50.6 50.3 \$3.1 \$0.5 \$0.0 \$0.5	\$2.21 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	\$2.22 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	\$2.23 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.0	\$2.24 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5	\$2.26 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5	\$2.27 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5	\$2.28 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5	2036 14 \$2.29 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5	\$2.30 \$0.6 \$0.3 \$3.3 \$0.5 \$0.5 \$0.5 \$0.5	2038 16 \$2.31 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5	\$2.32 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5	\$2.34 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5	\$2.35 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5	s. :
No CHP No CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP	RASE CASE: NO CLIP Cost of Gird Power Cost of Bir natural gas Cost of Bir O'BAM Total non CLIP Energy Cost  RE-CHIP Cost of Gird Power Gird power Standby Charges Total cost of Gird power Cost of Bir natural gas Cost of Bir natural gas	SMM SMM SMM SMM SMM SMM SMM	_		\$2.15 \$0.6 \$0.3 \$3.0 \$0.4 \$0.0 \$0.5	\$2.16 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	\$2.17 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	\$2.18 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	2027 5 \$2.19 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	2028 6 \$2.20 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	\$2.21 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	\$2.22 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5	\$2.23 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5	\$2.24 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5	\$2.26 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5	\$2.27 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5	\$2.28 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5	2036 14 \$2.29 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5	\$2.30 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5	2038 16 \$2.31 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5	\$2.32 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5	\$2.34 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5	\$2.35 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5	\$
to CHP to CHP to CHP v/RE-CHP	RASE CASE: NO CIP Cost of Girl Power Cost of Bir natural gas Cost of Bir No Civil Total non-Cit P Energy Cost  RE-CIP Cost of Girl Power Girl gower Standby Charges Total cost of Girl power Cost of Bir natural gas Fuel Total: not of Girl power Cost of Bir natural gas Fuel Total: natural gas GAM: Bir CollP  GAM: RE-CIP	SAMM SAMM SAMM SAMM SAMM SAMM SAMM SAMM	_		\$2.15 \$0.6 \$0.3 \$3.0 \$0.4 \$0.0 \$0.5 \$0.4 \$0.6 \$1.0	\$2.16 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.6 \$1.0 \$0.139 \$0.6	\$2.17 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.6 \$1.0 \$0.6	\$2.18 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.6 \$1.0 \$0.142 \$0.7	2027 \$ 52.19 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.4 \$0.6 \$1.0 \$0.4 \$0.6 \$1.0	\$2.20 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.6 \$1.0	\$2.21 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.0	\$0.5 \$0.5 \$0.5 \$0.7 \$1.0 \$0.148 \$1.7	\$2.23 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.0 \$0.149 \$0.7	\$0.5 \$0.5 \$0.0 \$0.5 \$0.0 \$0.5 \$0.0 \$0.5 \$0.7 \$1.0	\$2.26 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.7 \$1.0 \$0.152 \$0.7	\$2.27 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.1 \$0.154 \$0.7	\$2.28 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.1 \$0.155 \$0.8	2036 14 \$2.29 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.157 \$0.8	\$2.30 \$0.6 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.158 \$0.8	2038 16 \$2.31 \$0.6 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.0 \$0.5 \$0.0 \$0.7 \$1.1	\$2.32 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.162 \$0.8	\$2.34 \$0.6 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.163 \$0.8	\$2.35 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.165 \$0.8	\$0
No CHP No CHP No CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP	RASE CASE: NO CIP Cost of Girl Power Cost of Bir natural gas Cost of Bir No Civil Cost Total non-Cit P Energy Cost  RECHP Cost of Girl Power Girl power Standby Charges Total cost of Girl power Cost of Bir natural gas Cost of Bir natural gas D&M: Bollers O&M: BOLlers O&M: BECHP O&M: Total	SAMA SAMA SAMA SAMA SAMA SAMA SAMA SAMA	_		\$2.15 \$0.6 \$0.3 \$3.0 \$0.4 \$0.0 \$0.5 \$0.4 \$0.6 \$1.0 \$0.138 \$0.6 \$0.8	\$2.16 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.6 \$1.0 \$0.139 \$0.6 \$0.8	\$2.17 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.6 \$1.0 \$0.141 \$0.6 \$0.8	\$2.18 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.6 \$1.0 \$0.142 \$0.7 \$0.8	2027 5 \$2.19 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.6 \$1.0 \$0.7 \$0.8	2028 6 \$2.20 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.0 \$0.6 \$1.0	\$2.21 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.7 \$1.0 \$0.7 \$0.8	\$0.5 \$0.5 \$0.0 \$0.5 \$0.0 \$0.5 \$0.7 \$1.0 \$0.148 \$1.7	\$2.23 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.7 \$1.0 \$0.149 \$0.7 \$0.9	\$0.5 \$0.5 \$0.5 \$0.5 \$0.5 \$0.5 \$0.5 \$0.5	\$2.26 \$0.6 \$0.3 \$3.2 \$0.5 \$0.5 \$0.5 \$0.7 \$1.0 \$0.152 \$0.7 \$0.9	\$2.27 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.1 \$0.154 \$0.7	\$2.28 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.155 \$0.8 \$0.9	2036 14 52.29 50.5 50.3 \$3.2 \$0.5 50.0 \$0.5 \$0.7 \$1.1 \$0.157 \$0.8 \$0.9	\$2.30 \$0.6 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.158 \$0.9	2038 16 \$2.31 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.160 \$1.9	\$2.32 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.162 \$0.8	\$2.34 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.163 \$0.8	\$2.35 \$0.6 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.165 \$0.8 \$1.0	\$0
No CHP No CHP No CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP	RASE CASE: NO CHP Cost of Girl Power Cost of Bir natural gas Cost of Bir No Chi Total non-CHP Energy Cost  RE-CHP Cost of Girl Power Girl gower Standby Changes Total cost of Girl power Cost of Bir natural gas Total Cost of Bir natural gas Cost of Bir natural gas Cost of Bir natural gas Total RE-CHP COSM. RE-CHP COSM. Total Total RE-CHP Fuel-Optic Cost	SAMM SAMM SAMM SAMM SAMM SAMM SAMM SAMM	_		\$2.15 \$0.6 \$0.3 \$3.0 \$0.4 \$0.0 \$0.5 \$0.4 \$0.6 \$1.0	\$2.16 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.6 \$1.0 \$0.139 \$0.6	\$2.17 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.6 \$1.0 \$0.6	\$2.18 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.6 \$1.0 \$0.142 \$0.7	2027 \$ 52.19 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.4 \$0.6 \$1.0 \$0.4 \$0.6 \$1.0	\$2.20 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.6 \$1.0	\$2.21 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.0	\$0.5 \$0.5 \$0.5 \$0.7 \$1.0 \$0.148 \$1.7	\$2.23 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.0 \$0.149 \$0.7	\$0.5 \$0.5 \$0.0 \$0.5 \$0.0 \$0.5 \$0.0 \$0.5 \$0.7 \$1.0	\$2.26 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.7 \$1.0 \$0.152 \$0.7	\$2.27 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.1 \$0.154 \$0.7	\$2.28 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.1 \$0.155 \$0.8	2036 14 \$2.29 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.157 \$0.8	\$2.30 \$0.6 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.158 \$0.8	2038 16 \$2.31 \$0.6 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.0 \$0.5 \$0.0 \$0.7 \$1.1	\$2.32 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.162 \$0.8	\$2.34 \$0.6 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.163 \$0.8	\$2.35 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.165 \$0.8	\$0
No CHP No CHP No CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP	RASE CASE: NO CHP Cost of Gird Power Cost of the natural gas Cost of the natural gas Cost of the Young Cost of the Young Cost of the Young Cost of Gird Power Cost of Bir natural gas Cost of Rif natural gas Cost of Rif natural gas Cost of Rif natural gas OBM: Boilers OBM: Boilers OBM: Total Total RE-CHP Fuel+Optix Cost RE-CHP Fuel+Optix Cost	SAMA SAMA SAMA SAMA SAMA SAMA SAMA SAMA			\$2.15 \$0.6 \$0.3 \$3.0 \$0.4 \$0.0 \$0.5 \$0.4 \$0.6 \$1.0 \$0.138 \$0.6 \$0.8	2 \$2.16 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.4 \$0.4 \$0.6 \$1.0 \$0.139 \$0.6 \$0.8	3 \$2.17 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.0 \$0.4 \$0.4 \$0.6 \$1.0 \$0.6 \$0.8	\$2.18 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.4 \$0.4 \$0.6 \$1.0 \$0.142 \$0.7 \$0.8	2027 \$ 2.19 \$0.6 \$0.3 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.0 \$0.143 \$0.7 \$0.7 \$0.7 \$0.7	2028 6 52.20 50.6 50.3 53.1 50.5 50.0 50.5 50.4 50.6 51.0 50.145 50.7 50.8	7 \$2.21 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.0 \$0.146 \$0.7 \$0.8	\$ \$2.22 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.0 \$0.148 \$1.7 \$1.8	9 \$2.23 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.0 \$0.149 \$0.7 \$0.9	\$2.24 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.0 \$0.151 \$0.7 \$0.9	\$2.26 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.0 \$0.152 \$0.7 \$0.9	\$2.27 \$0.6 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.1 \$0.154 \$0.7 \$0.9 \$2.5	\$2.28 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.1 \$0.155 \$0.8 \$0.9	2036 14 52.29 50.6 50.3 53.2 50.5 50.0 50.5 50.7 50.7 50.7 50.7 50.7	\$2.30 \$0.6 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.1 \$0.158 \$0.8 \$0.9	2038 16 52.31 50.6 50.3 53.3 50.5 50.0 50.5 50.1 50.1 50.1 50.1 50.1	\$2.32 \$0.6 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.162 \$0.8 \$1.0	\$2.34 \$0.66 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.163 \$0.8 \$1.0	\$2.35 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.0 \$0.7 \$1.1 \$0.165 \$0.8 \$1.0	\$0
No CHP No CHP No CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP	RASE CASE: NO CHP Cost of Girl Power Cost of Bir natural gas Cost of Bir No Chi Total non-CHP Energy Cost  RE-CHP Cost of Girl Power Girl gower Standby Changes Total cost of Girl power Cost of Bir natural gas Total Cost of Bir natural gas Cost of Bir natural gas Cost of Bir natural gas Total RE-CHP COSM. RE-CHP COSM. Total Total RE-CHP Fuel-Optic Cost	SAMAN	_		\$2.15 \$0.6 \$0.3 \$0.3 \$3.0 \$0.4 \$0.0 \$0.5 \$0.4 \$0.6 \$1.0 \$0.138 \$0.6 \$0.3 \$0.8	\$2.16 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.6 \$1.0 \$0.139 \$0.6 \$0.8	\$2.17 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.6 \$1.0 \$0.141 \$0.6 \$0.8	\$2.18 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.4 \$0.6 \$1.0 \$0.142 \$0.7 \$0.8 \$2.3	2027 5 \$2.19 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.6 \$1.0 \$0.7 \$0.8	2028 6 \$2.20 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.0 \$0.6 \$1.0	7 \$2.21 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.0 \$0.146 \$0.7 \$0.8 \$2.4	\$0.5 \$0.5 \$0.0 \$0.5 \$0.0 \$0.5 \$0.7 \$1.0 \$0.148 \$1.7	\$2.23 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.7 \$1.0 \$0.149 \$0.7 \$0.9	\$0.5 \$0.5 \$0.5 \$0.5 \$0.5 \$0.5 \$0.5 \$0.5	\$2.26 \$0.6 \$0.3 \$3.2 \$0.5 \$0.5 \$0.5 \$0.7 \$1.0 \$0.152 \$0.7 \$0.9	\$2.27 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.1 \$0.154 \$0.7	\$2.28 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.155 \$0.8 \$0.9	2036 14 52.29 50.5 50.3 \$3.2 \$0.5 50.0 \$0.5 \$0.7 \$1.1 \$0.157 \$0.8 \$0.9	\$2.30 \$0.6 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.158 \$0.9	2038 166 53.31 50.60 50.50 50.	\$2.32 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.162 \$0.8	\$2.34 \$0.6 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.163 \$0.8	\$2.35 \$0.6 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.165 \$0.8 \$1.0 \$2.6	\$0
No CHP No CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP	RASE CASE: NO CHP Cost of Gird Power Cost of Bir natural gas Cost of Bir natural gas Cost of Bir OMA Total non-CMP Energy Cost  RE-CUP Cost of Gird Power Gird power Standby Charges Total cost of Gird power Cost of Bir natural gas Cost of Mi natural gas Cost of Mi natural gas Cost of Mi natural gas OMM: Boilers OMM: Boilers Total RE-CMP Fuell-Optix Cost RE-CMP Fuels Service Principal Interest Total RE-CMP Fuell-Optix Cost RE-CMP Debt Service Principal Interest Total Reyment	SAMAN	_		\$2.15 \$0.6 \$0.3 \$3.0 \$0.4 \$0.0 \$0.5 \$0.4 \$0.6 \$1.0 \$0.6 \$0.8 \$0.8 \$0.6 \$0.00 \$0.00 \$0.00	2 \$2.16 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.4 \$0.6 \$1.0 \$0.139 \$0.6 \$0.8 \$2.3	\$ \$2.17 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.4 \$0.6 \$1.0 \$0.8 \$2.3 \$0.00 \$0.00 \$0.00	\$2.18 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.4 \$0.6 \$1.0 \$0.7 \$0.8 \$2.3 \$0.00 \$0.00 \$0.00	2027 5 52.19 50.6 50.3 53.1 50.5 50.0 50.5 50.0 50.4 50.6 51.0 50.8 50.8 50.8 50.8 50.8 50.8 50.8 50	2028 6 6 51.20 50.6 50.3 53.1 50.5 50.0 50.5 50.0 50.5 50.0 50.4 50.7 50.8 50.8 50.3 50.3 50.3 50.3 50.3 50.3 50.3 50.3	7 \$2.21 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.0 \$0.146 \$0.7 \$0.8 \$2.4 \$0.00 \$0.	\$ \$2.22 \$0.6 \$0.3 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.0 \$0.148 \$1.7 \$1.8 \$3.4 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00	9 \$2.23 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.0 \$0.7 \$0.9 \$2.4	\$2.24 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.0 \$0.151 \$0.7 \$0.9 \$2.4	\$2.26 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.0 \$0.152 \$0.7 \$0.9 \$2.5	\$2.27 \$0.6 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.1 \$0.154 \$0.7 \$0.9 \$2.5	\$2.28 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.1 \$0.155 \$0.8 \$0.9 \$2.5	2036 14 52.29 50.6 50.3 53.2 50.5 50.0 50.5 50.7 50.157 50.8 50.9 50.9 50.9 50.00 50.00 50.00	\$2.30 \$0.6 \$0.6 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.1 \$0.158 \$0.8 \$0.9 \$0.9 \$0.00 \$0.00 \$0.00	2018 8 52.31 50.6 50.3 50.3 50.5 50.0 50.5 50.1 50.1 50.1 50.1 50.1	\$2.32 \$0.6 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.162 \$0.8 \$1.0 \$2.6	\$2.34 \$0.65 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.163 \$0.8 \$1.0 \$2.6	\$2.35 \$0.6 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.1 \$0.165 \$0.8 \$1.0 \$2.6	\$0
No CHP No CHP No CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP	RASE CASE: NO CHP Cost of Girl Power Cost of Bir natural gas Cost of Bir No Chi Total non-CHP Energy Cost  RE-CHP Cost of Girl Power Girl gower Standby Charges Total cost of Gird Power Cost of Girl Power Cost of Bir natural gas Cost of Bir natural gas Cost of Bir natural gas OAM: Birl Cost of Bir natural gas OAM: RE-CHP OAM: Total Total RE-CHP Fuel-Opts Cost RE-CHP Puel-Opts Cost RE-CHP Puel-Opts Cost Total Payment Total RE-CHP Cost [Fuel-Opts-Debt Service	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	_		\$2.15 \$0.6 \$0.3 \$3.0 \$0.4 \$0.0 \$0.5 \$0.4 \$0.6 \$1.0 \$0.6 \$0.8 \$0.8 \$2.2	2 \$2.16 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.6 \$1.0 \$0.6 \$0.8 \$2.3	3 \$2.17 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.6 \$1.0 \$0.6 \$0.8 \$2.3	\$2.18 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.6 \$1.0 \$0.142 \$0.7 \$0.8 \$2.3	2027 \$ 2.19 \$0.6 \$0.3 \$3.1 \$0.5 \$0.5 \$0.5 \$0.5 \$0.6 \$0.6 \$0.7 \$0.8	2028 6 5 2.20 50.6 50.3 50.3 50.5 50.5 50.5 50.5 50.5 50.6 51.0 50.4 50.6 51.0 50.4 50.6 50.5 50.5 50.5 50.5 50.5 50.5 50.5	7 \$2.21 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.7 \$1.0 \$0.7 \$0.8 \$2.4	\$ \$2.22 \$0.6 \$0.3 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.0 \$0.00 \$0.00 \$3.4	9 \$2.23 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.7 \$1.0 \$0.7 \$0.7 \$0.9 \$2.4	\$2.24 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.0 \$0.5 \$0.7 \$1.0 \$0.75 \$0.9 \$2.4	\$2.26 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.0 \$0.5 \$0.7 \$1.0 \$0.152 \$0.7 \$0.9 \$2.5	\$2.27 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.154 \$0.7 \$0.9 \$2.5	\$2.28 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.155 \$0.8 \$0.9 \$2.5	2036 14 \$1.29 \$0.6 \$0.3 \$3.2 \$0.5 \$0.5 \$0.5 \$0.7 \$1.1 \$0.15 \$0.5 \$0.7 \$0.7 \$0.7 \$0.7 \$0.7 \$0.7 \$0.7 \$0.7	\$2.30 \$0.6 \$0.3 \$0.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.158 \$0.8 \$0.9 \$2.5	2038 16 52.31 50.6 50.3 50.3 50.0 50.00 53.7	\$2.32 \$0.6 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.162 \$0.8 \$1.0 \$2.6	\$2.34 \$0.65 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.163 \$0.8 \$1.0 \$2.6	\$2.35 \$0.6 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.165 \$0.8 \$1.0 \$2.6	\$0.000 \$1
No CHP No CHP No CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP W/RE-CHP	RASE CASE: NO CHP Cost of Gird Power Cost of Bir natural gas Cost of Bir natural gas Cost of Bir OMA Total non-CMP Energy Cost  RE-CUP Cost of Gird Power Gird power Standby Charges Total cost of Gird power Cost of Bir natural gas Cost of Mi natural gas Cost of Mi natural gas Cost of Mi natural gas OMM: Boilers OMM: Boilers Total RE-CMP Fuell-Optix Cost RE-CMP Fuels Service Principal Interest Total RE-CMP Fuell-Optix Cost RE-CMP Debt Service Principal Interest Total Reyment	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	_		\$2.15 \$0.6 \$0.3 \$3.0 \$0.4 \$0.0 \$0.5 \$0.4 \$0.6 \$1.0 \$0.6 \$0.8 \$0.8 \$0.6 \$0.00 \$0.00 \$0.00	2 \$2.16 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.4 \$0.6 \$1.0 \$0.139 \$0.6 \$0.8 \$2.3	\$ \$2.17 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.4 \$0.6 \$1.0 \$0.8 \$2.3 \$0.00 \$0.00 \$0.00	\$2.18 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.4 \$0.6 \$1.0 \$0.7 \$0.8 \$2.3 \$0.00 \$0.00 \$0.00	2027 5 52.19 50.6 50.3 53.1 50.5 50.0 50.5 50.0 50.4 50.6 51.0 50.8 50.8 50.8 50.8 50.8 50.8 50.8 50	2028 6 6 51.20 50.6 50.3 53.1 50.5 50.0 50.5 50.0 50.5 50.0 50.4 50.7 50.8 50.8 50.3 50.3 50.3 50.3 50.3 50.3 50.3 50.3	7 \$2.21 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.0 \$0.146 \$0.7 \$0.8 \$2.4 \$0.00 \$0.00 \$0.00 \$0.00	\$ \$2.22 \$0.6 \$0.3 \$0.6 \$0.3 \$3.1 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.0 \$0.148 \$1.7 \$1.8 \$3.4 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00	9 \$2.23 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.0 \$0.7 \$0.9 \$2.4	\$2.24 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.0 \$0.151 \$0.7 \$0.9 \$2.4	\$2.26 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.0 \$0.152 \$0.7 \$0.9 \$2.5	\$2.27 \$0.6 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.1 \$0.154 \$0.7 \$0.9 \$2.5	\$2.28 \$0.6 \$0.3 \$3.2 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.1 \$0.155 \$0.8 \$0.9 \$2.5	2036 14 52.29 50.6 50.3 53.2 50.5 50.0 50.5 50.7 50.157 50.8 50.9 50.9 50.9 50.00 50.00 50.00	\$2.30 \$0.6 \$0.6 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.1 \$0.158 \$0.8 \$0.9 \$0.9 \$0.00 \$0.00 \$0.00	2018 8 52.31 50.6 50.3 50.3 50.5 50.0 50.5 50.1 50.1 50.1 50.1 50.1	\$2.32 \$0.6 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.162 \$0.8 \$1.0 \$2.6	\$2.34 \$0.65 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.7 \$1.1 \$0.163 \$0.8 \$1.0 \$2.6	\$2.35 \$0.6 \$0.3 \$3.3 \$3.3 \$0.5 \$0.0 \$0.5 \$0.4 \$0.7 \$1.1 \$0.165 \$0.8 \$1.0 \$2.6	\$0

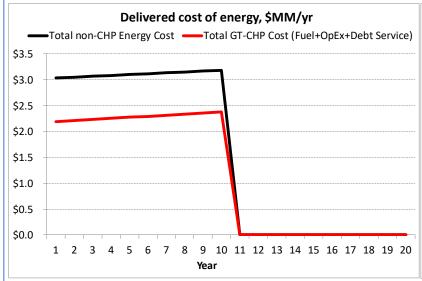
#### CHP BASE CASE: 2 x OPRA GT

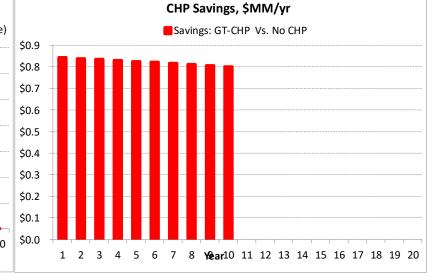
# Good electrical fit, average thermal fit; economics hurt by high CapEx and OpEx. Lower thermal utilization

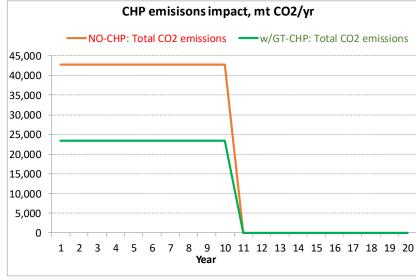
INPUT	UNIT	VALUE	COMMENT
Natural Gas at "Burner tip"	\$/MMBtu, HHV	\$2.76	assumed
All-in Grid power price	c/KWh	7.6	assumed
CHP full-load availability	%	97%	assumed
W/CHP, Grid Standby Charges	% of value of CHP pwr	10%	assumed
OPRA Gas Turbine (GT) CHP			OPRA16
Project term	years	10	
GT-CHP Project Investment	\$/KW <sub>e</sub>	\$2,828	CapEx estimate
# of GT-CHP systems		2	as configured
Iso Power	KW <sub>e</sub>	1,750	3500 KWe CHP capa
CHP project financing	Rewarding Efficiency Technology, Execution, Financing, Ops & Maint.		
Equity:Debt Ratio	%	100%	assumed
Debt Term	years	12	assumed
Cost of Debt	%	7%	assumed
Pre-CHP Package Boiler			
Displaced package boiler efficiency	% HHV	83%	site data
Package Boiler: Variable Charge/cost	$cents/MMBtu_{th}$	125	typical

		OUTPUT	UNIT	VALUE	VALUE	Difference
				No CHP	GT-CHP	
	Project Fi	inancing Structure				
	100%	Equity	\$MM	-	\$9.9	
	0%	Debt	\$MM	-	\$0.0	
	100%	CHP only Investment incl. 1	LO% ITC \$MM	-	\$9.9	
	Site Ener	gy Expense in Year 1				
	Grid Pw	r + fuel + OpEx + Debt Service	\$MM	\$3.0	\$2.2	\$0.8
it	Site Ener	gy Expense over Project term	10 years			
	Grid Pw	r + fuel + OpEx + Debt Service	\$MM	\$31.1	\$22.9	\$8.2
	Multiple	e of Investment on Equity		-	0.8	
	HHV The	rmodynamic Metrics				
	Efficien	су	%	-	60%	
	Electrica	al Heat Rate	MMBtu/MWh	-	8.9	
	Therma	l Energy Rate	$MMBtu/MMBtu_{th}$	-	1.5	
	CHP The	ermal Utilization	%	-	64%	







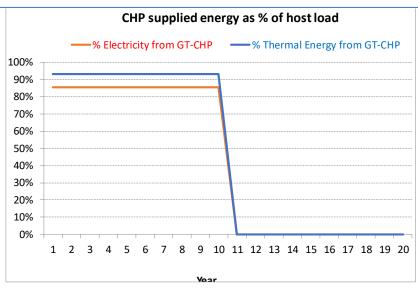


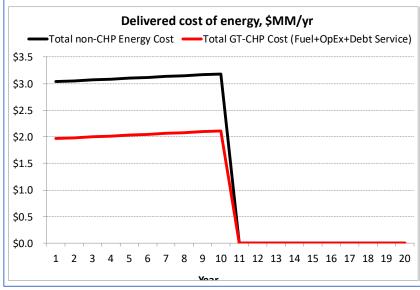
#### CHP BASE CASE: 1 x Centaur 40 GT

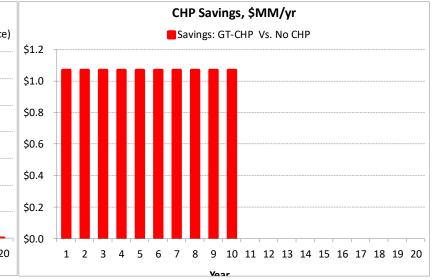
## Good technical fit; economics hurt by high CapEx and assumed high grid standby charge. Higher thermal utilization

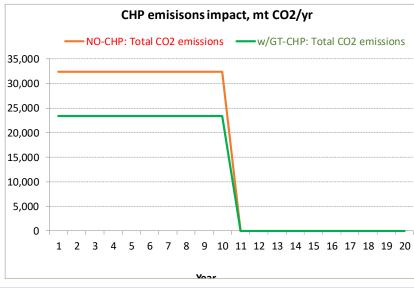
INPUT	UNIT	VALUE	COMMENT
Natural Gas at "Burner tip"	\$/MMBtu, HHV	\$2.76	assumed
All-in Grid power price	c/KWh	7.6	assumed
CHP full-load availability	%	95%	assumed
W/CHP, Grid Standby Charges % c	of value of CHP pwr	20%	assumed
OPRA Gas Turbine (GT) CHP			Centaur40
Project term	years	10	
GT-CHP Project Investment	\$/KW <sub>e</sub>	\$2,918	CapEx estimate
# of GT-CHP systems		1	as configured
Iso Power	KW <sub>e</sub>	3,159	3159 KWe CHP capa
CHP project financing Technic	rding Efficiency ology, Execution, cing. Ops & Maint.		
Equity:Debt Ratio	%	100%	assumed
Debt Term	years	12	assumed
Cost of Debt	%	7%	assumed
Pre-CHP Package Boiler			
Displaced package boiler efficiency	% HHV	83%	site data
Package Boiler: Variable Charge/cost	$cents/MMBtu_{th}$	125	typical

	OUTPUT	UNIT	VALUE	VALUE	Difference
			No CHP	GT-CHP	
Project Fin	nancing Structure				
100%	Equity	\$MM	-	\$9.2	
0%	Debt	\$MM	-	\$0.0	
100%	CHP only Investment incl. 10	% ITC \$MM	-	\$9.2	
Site Energ	y Expense in Year 1				
Grid Pwr	+ fuel + OpEx + Debt Service	\$MM	\$3.0	\$2.0	\$1.1
Site Energ	y Expense over Project term 1	0 years			
Grid Pwr	+ fuel + OpEx + Debt Service	\$MM	\$31.1	\$20.4	\$10.7
Multiple	of Investment on Equity		-	1.2	
HHV Therr	modynamic Metrics				
Efficiency	/	%	-	63%	
Electrical	Heat Rate	MMBtu/MWh	-	8.3	
Thermal	Energy Rate	$MMBtu/MMBtu_{th}$	-	1.3	
CHP The	rmal Utilization	%	-	77%	







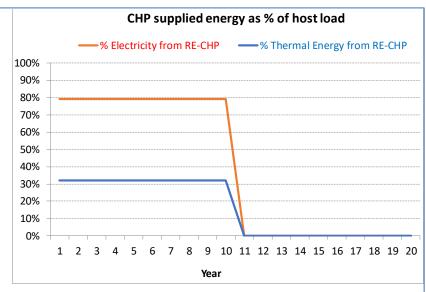


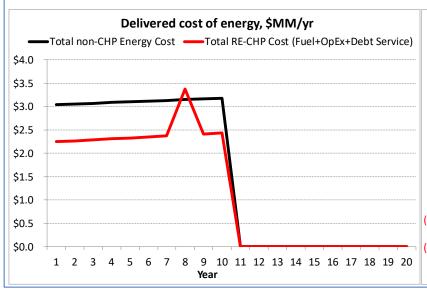
#### CHP BASE CASE: 2 x JMS420 RE

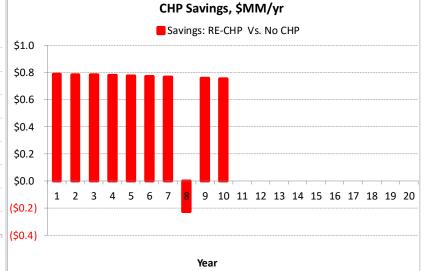
Good electrical fit; average thermal fit. Economics helped by low CapEx but hurt by high OpEx including 60,000 major overhauls ("spiky"). CHP efficiency low due to wasted low-grade thermal energy (hot water). Lower thermal utilization

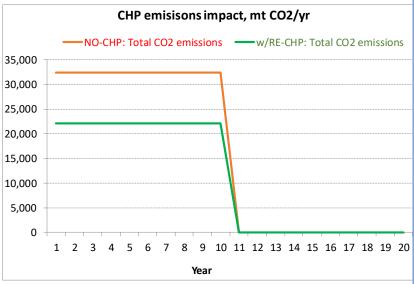
INPUT	UNIT	VALUE	COMMENT
Natural Gas at "Burner tip"	\$/MMBtu, HHV	\$2.76	assumed
All-in Grid power price	c/KWh	7.6	assumed
CHP full-load availability	%	95%	assumed
W/CHP, Grid Standby Charges	% of value of CHP pwr	10%	assumed
Reciprocating Internal Combust	ion Engine (RE) CHP		<u>JMS420</u>
Project term	years	10	
RE-CHP Project Investment	\$/KW <sub>e</sub>	\$2,051	CapEx estimate
# of RE-CHP systems		2	as configured
Iso Power	KW <sub>e</sub>	1,429	2858 KWe CHP capac
CHP project financing	Rewarding Efficiency Technology, Execution, Financing, Ops & Maint.		
Equity:Debt Ratio	%	100%	assumed
Debt Term	years	12	assumed
Cost of Debt	%	7%	assumed
Pre-CHP Package Boiler			
Displaced package boiler efficien	cy % HHV	83%	site data
Package Boiler: Variable Charge/	cost cents/MMBtu <sub>th</sub>	125	typical

ſ		OUTPUT	UNIT	VALUE	VALUE	Difference
f				No CHP	RE-CHP	
Ī	Project F	inancing Structure				
	100%	Equity	\$MM	-	\$5.9	
	0%	Debt	\$MM	-	\$0.0	
Ī	100%	CHP only Investment incl. 1	.0% ITC \$MM	-	\$5.9	
	Cita Fuan	om. Formarias in Vacua 1				
		gy Expense in Year 1				
	Grid Pw	vr + fuel + OpEx + Debt Service	\$MM	\$3.0	\$2.2	\$0.8
cit	Site Ener	gy Expense over Project term	10 years			
	Grid Pw	vr + fuel + OpEx + Debt Service	\$MM	\$31.1	\$24.4	\$6.7
	Multipl	e of Investment on Equity		-	1.1	
	HHV The	rmodynamic Metrics				
	Efficien	су	%	-	61%	
	Electric	al Heat Rate	MMBtu/MWh	-	6.8	
	Therma	al Energy Rate	$MMBtu/MMBtu_{th}$	-	2.9	
	CHP Th	ermal Utilization	%	-	63%	











# Alternate scenario: Base Case (100% equity) and CHP project horizon 15-years & 20-years

COMMON INPUT's	UNIT	VALUE	COMMENT
FUTURE baseline site Load	% load increase	50%	2020 base
Natural Gas at "Burner tip"	\$/MMBtu, HHV	\$2.76	site data
All-in Grid power price	c/KWh	7.6	site data
CHP project financing			
CHP Project horizon (max 20-yrs)	years	15	
Equity:Debt Ratio	%	100%	assumed
Debt Term	years	10	assumed
Cost of Debt	%	7%	assumed
Pre-CHP Package Boiler			
Displaced package boiler efficiency	% HHV	83%	site data
Package Boiler: Variable Charge/cost	cents/MMBtu <sub>th</sub>	125	assumed

		NO CHP	Recip. Engine	Gas Turbine	Gas Turbin
CHP Prime Mover		-	JMS420	OPRA16	Centaur4
CHP Configuration	Gri	d + Birs only	2 x JMS420	2 x OPRA16	1 x Centaur4
*Pjt. Inv. w/10% ITC	\$MM	-	\$5.9	\$9.9	\$9.2
	\$/KW <sub>e</sub>	-	\$2,051	\$2,828	\$2,91
of which Equity reqd.	\$MM	-	\$5.9	\$9.9	\$9.
**Equity-Multiple of Inve	stment (MOI)	-	1.8	1.2	1.7
***Site Energy Expense					
Year 1	\$MM	\$3.0	\$2.2	\$2.2	\$2.
Year 15	\$MM	\$47	\$37	\$35	\$3
Cum. %redn. 15 yrs	% reduction	0%	-22%	-26%	-34
Emissions					
From grid power	mt CO <sub>2</sub>	22,184	4,641	1,652	3,24
From fuel to Blrs	mt CO <sub>2</sub>	10,264	6,987	360	69
From fuel to CHP	mt CO <sub>2</sub>	-	11,004	21,434	19,39
TOTAL site emissions	mt CO <sub>2</sub>	32,448	22,633	23,446	23,34
Emissions reduction	% change	0%	-30%	-28%	-28
CHP technical					
CHP capacity	KW <sub>e</sub>	-	2,858	3,500	3,15
CHP efficiency	% HHV	-	61.3%	60.4%	63.4
Thermal Utilization	%		63%	64%	77
Annual Energy supply to	site				
Fuel to Blrs	MMBtu	193,164	131,494	6,769	13,16
Fuel to CHP	MMBtu		207,094	403,375	365,00
TOTAL Fuel (CHP + Birs)	MMBtu	193,164	338,587	410,144	378,16
Elec. From grid	MWh	28,093	5,877	2,093	4,11
Elec. From CHP	MWh	=	22,215	26,000	23,98
TOTAL Elec. (CHP + grid)	MWh	28,093	28,093	28,093	28,09

COMMON INPUT's	UNIT	VALUE	COMMENT
FUTURE baseline site Load	% load increase	50%	2020 base
Natural Gas at "Burner tip"	\$/MMBtu, HHV	\$2.76	site data
All-in Grid power price	c/KWh	7.6	site data
CHP project financing			
CHP Project horizon (max 20-yrs)	years	20	
Equity:Debt Ratio	%	100%	assumed
Debt Term	years	10	assumed
Cost of Debt	%	7%	assumed
Pre-CHP Package Boiler			
Displaced package boiler efficiency	% HHV	83%	site data
Package Boiler: Variable Charge/cost	$cents/MMBtu_{th}$	125	assumed

		NO CHP	Recip. Engine	Gas Turbine	Gas Turbir
CHP Prime Mover		-	JMS420	OPRA16	Centaur
CHP Configuration	Gri	id + Blrs only	2 x JMS420	2 x OPRA16	1 x Centaur
*Pjt. Inv. w/10% ITC	\$MM	-	\$5.9	\$9.9	\$9.
	\$/KW <sub>e</sub>	-	\$2,051	\$2,828	\$2,91
of which Equity reqd.	\$MM	-	\$5.9	\$9.9	\$9
**Equity-Multiple of Inve	stment (MOI)	-	2.2	1.6	2
***Site Energy Expense					
Year 1	\$MM	\$3.0	\$2.2	\$2.2	\$2
Year 20	\$MM	\$64	\$51	\$48	\$4
Cum. %redn. 20 yrs	% reduction	0%	-20%	-25%	-33
Emissions					
From grid power	mt CO <sub>2</sub>	22,184	4,641	1,652	3,2
From fuel to Blrs	mt CO <sub>2</sub>	10,264	6,987	360	6
From fuel to CHP	mt CO <sub>2</sub>	=	11,004	21,434	19,3
TOTAL site emissions	mt CO <sub>2</sub>	32,448	22,633	23,446	23,34
Emissions reduction	% change	0%	-30%	-28%	-2
CHP technical					
CHP capacity	$KW_e$	-	2,858	3,500	3,1
CHP efficiency	% HHV	-	61.3%	60.4%	63.4
Thermal Utilization	%		63%	64%	7
Annual Energy supply to s	site				
Fuel to Blrs	MMBtu	193,164	131,494	6,769	13,10
Fuel to CHP	MMBtu	<u>-</u>	207,094	403,375	365,0
TOTAL Fuel (CHP + Blrs)	MMBtu	193,164	338,587	410,144	378,1
Elec. From grid	MWh	28,093	5,877	2,093	4,1
Elec. From CHP	MWh	-	22,215	26,000	23,9
TOTAL Elec. (CHP + grid)	MWh	28,093	28,093	28,093	28,09



# Alternate scenario: base case (100% equity) with 25% and 75% future site load increases

COMMON INPUT's			UNIT	VALUE	COMMENT	=,	
FUTURE baseline site Load		%	load increase	25%	2020 base		
Natural Gas at "Burner tip'	1	\$/	/MMBtu, HHV	\$2.76	site data		
All-in Grid power price			c/KWh	7.6	site data		
CHP project financing							
CHP Project horizon (max 2	20-yrs)		years	10			
Equity:Debt Ratio			%	100%	assumed		
Debt Term			years	10	assumed		
Cost of Debt			%	7%	assumed		
Pre-CHP Package Boiler							
Displaced package boiler	efficiency		% HHV	83%	site data		
Package Boiler: Variable	Charge/cost	Ce	ents/MMBtu <sub>th</sub>	125	assumed		
		NO CHP		Recip. Engine		Gas Turbine	Gas Turbir
CHP Prime Mover		-		JMS420		OPRA16	Centaur
CHP Configuration		Grid + Blrs only		2 x JMS420		2 x OPRA16	1 x Centaur
ciii coiiiiguiatioii		Grid : Dira Griffy		2 X 31V13-720		2 X OI IVAIO	1 x centaur
*Pjt. Inv. w/10% ITC	\$MM	-		\$5.9		\$9.9	\$9
,	\$/KW <sub>e</sub>	-		\$2,051		\$2,828	\$2,91
of which Equity regd.	\$MM	_		\$5.9		\$9.9	\$9
**Equity-Multiple of Inv		1) -		1.0		0.6	1.
***Site Energy Expense	(	,					
Year 1	\$MM	\$2.5		\$1.8		\$1.9	\$1
Year 10	\$MM	\$26		\$20		\$20	\$1
Cum. %redn. 10 yrs	% reduction	0%		-23%		-22%	-34
Emissions							
From grid power	mt CO <sub>2</sub>	18,487		1,891		632	1,28
From fuel to Blrs	mt CO <sub>2</sub>	8,553		5,576		280	53
From fuel to CHP	mt CO <sub>2</sub>	-		10,445		19,093	18,05
TOTAL site emissions	mt CO <sub>2</sub>	27,040	-	17,912		20,005	19,87
Emissions reduction	% change	0%		-34%		-26%	-26
CHP technical	_						
CHP capacity	KW <sub>e</sub>	-		2,858		3,500	3,15
CHP efficiency	% HHV	-		60.2%		57.4%	58.7
Thermal Utilization	%			61%		61%	7:
Annual Energy supply to	site						
Fuel to Blrs	MMBtu	160,970		104,937		5,264	10,10
Fuel to CHP	MMBtu	-		196,563		359,330	339,75
TOTAL Fuel (CHP + Birs)	MMBtu	160,970	-	301,500		364,594	349,85
Elec. From grid	MWh	23,411		2,395		801	1,62
Elec. From CHP	MWh	,		21,016		22,610	21,78

COMMON INPUT's			UNIT	VALUE	COMMENT	_	
FUTURE baseline site Load		%	load increase	75%	2020 base	•	
Natural Gas at "Burner tip"		\$/	MMBtu, HHV	\$2.76	site data		
All-in Grid power price			c/KWh	7.6	site data		
CHP project financing							
CHP Project horizon (max 2	!0-yrs)		years	10			
Equity:Debt Ratio			%	100%	assumed		
Debt Term			years	10	assumed		
Cost of Debt			%	7%	assumed		
Pre-CHP Package Boiler							
Displaced package boiler	efficiency		% HHV	83%	site data		
Package Boiler: Variable (	Charge/cost	ce	ents/MMBtu <sub>th</sub>	125	assumed		
		NO CHP		Recip. Engine		Gas Turbine	Gas Turbine
<b>CHP Prime Mover</b>		-		JMS420		OPRA16	Centaur40
CHP Configuration		Grid + Blrs only		2 x JMS420		2 x OPRA16	1 x Centaur40
*Pjt. Inv. w/10% ITC	\$MM	-		\$5.9		\$9.9	\$9.2
	\$/KW <sub>e</sub>	-		\$2,051		\$2,828	\$2,918
of which Equity reqd.	\$MM	_		\$5.9		\$9.9	\$9.2
**Equity-Multiple of Inve	estment (MOI	) -		1.2		1.0	1.2
***Site Energy Expense							
Year 1	\$MM	\$3.5		\$2.7		\$2.5	\$2.4
Year 10	\$MM	\$36		\$29		\$26	\$25
Cum. %redn. 10 yrs	% reduction	0%		-19%		-27%	-32%
Emissions							
From grid power	mt CO <sub>2</sub>	25,882		7,961		4,161	6,320
From fuel to Blrs	mt CO <sub>2</sub>	11,975		8,483		441	1,194
From fuel to CHP	mt CO <sub>2</sub>	-		11,224		22,522	19,870
TOTAL site emissions	mt CO <sub>2</sub>	37,856	•	27,668		27,124	27,384
Emissions reduction	% change	0%		-27%		-28%	-28%
CHP technical							
CHP capacity	$KW_e$	-		2,858		3,500	3,159
CHP efficiency	% HHV	-		62.5%		64.7%	67.6%
Thermal Utilization	%			66%		70%	85%
Annual Energy supply to	site						
Fuel to Blrs	MMBtu	225,358		159,644		8,296	22,472
Fuel to CHP	MMBtu	<u> </u>		211,233		423,852	373,952
TOTAL Fuel (CHP + Birs)	MMBtu	225,358	•	370,877		432,149	396,424
Elec. From grid	MWh	32,775		10,081		5,269	8,003
Elec. From CHP	MWh	· -		22,693		27,506	24,772
TOTAL Elec. (CHP + grid		32,775	•	32,775		32,775	32,775



# Alternate scenario: financial leverage (25% equity) boosts MOI. CHP: 10-years and 20-years

TOTAL Elec. (CHP + grid) MWh

28,093

COMMON INPUT's			UNIT	VALUE	COMMENT	_	
FUTURE baseline site Load		% lo	ad increase	50%	2020 base		
Natural Gas at "Burner tip		\$/M	MBtu, HHV	\$2.76	site data		
All-in Grid power price			c/KWh	7.6	site data		
CHP project financing							
CHP Project horizon (max	20-yrs)		years	10			
Equity:Debt Ratio			%	25%	assumed		
Debt Term			years	7	assumed		
Cost of Debt			%	7%	assumed		
Pre-CHP Package Boiler							
Displaced package boiler	efficiency		% HHV	83%	site data		
Package Boiler: Variable	Charge/cost	cent	ts/MMBtu <sub>th</sub>	125	assumed		
		NO CHP	R	ecip. Engine		Gas Turbine	Gas Turbin
CHP Prime Mover		IVO CHE	, ,	JMS420		OPRA16	Centaur4
CHP Configuration		Grid + Blrs only		2 x JMS420		2 x OPRA16	1 x Centaur
CHF Configuration		Gliu + Bils Olliy		2 X JIVI3420		2 X OFRA10	1 x Centaur
*Pjt. Inv. w/10% ITC	\$MM	_		\$5.9		\$9.9	\$9.7
, , , , ,	\$/KW <sub>e</sub>	-		\$2,051		\$2,828	\$2,91
of which Equity reqd.	\$MM	-		\$1.5		\$2.5	\$2.
**Equity-Multiple of Inv	estment (MOI	) -		0.7		(0.6)	0.7
***Site Energy Expense							
Year 1	\$MM	\$3.0		\$3.1		\$3.6	\$3.
Year 10	\$MM	\$31		\$30		\$32	\$2
Cum. %redn. 10 yrs	% reduction	0%		-3%		5%	-6
Emissions							
From grid power	mt CO <sub>2</sub>	22,184		4,641		1,652	3,24
From fuel to Blrs	mt CO <sub>2</sub>	10,264		6,987		360	69
From fuel to CHP	mt CO <sub>2</sub>	-		11,004		21,434	19,39
TOTAL site emissions	mt CO <sub>2</sub>	32,448	_	22,633		23,446	23,34
Emissions reduction	% change	0%		-30%		-28%	-28
CHP technical							
CHP capacity	$KW_e$	-		2,858		3,500	3,15
CHP efficiency	% HHV	-		61.3%		60.4%	63.4
Thermal Utilization	%			63%		64%	77
Annual Energy supply to	site						
Fuel to Blrs	MMBtu	193,164		131,494		6,769	13,16
Fuel to CHP	MMBtu	-		207,094		403,375	365,00
			_			410,144	378,16
TOTAL Fuel (CHP + Blrs	) MMBtu	193,164		338,587		410,144	0,0,20
•							
TOTAL Fuel (CHP + Blrs  Elec. From grid  Elec. From CHP	MWh MWh	<b>193,164</b> 28,093		5,877 22,215		2,093 26,000	4,11 <sup>1</sup> 23,98

COMMON INPUT's			UNIT	VALUE	COMMENT		
FUTURE baseline site Load		% lo	ad increase	50%	2020 base	-	
Natural Gas at "Burner tip"		\$/M	MBtu, HHV	\$2.76	site data		
All-in Grid power price			c/KWh	7.6	site data		
CHP project financing							
CHP Project horizon (max 20	O-yrs)		years	20			
Equity:Debt Ratio			%	25%	assumed		
Debt Term			years	7	assumed		
Cost of Debt			%	7%	assumed		
Pre-CHP Package Boiler							
Displaced package boiler e	fficiency		% HHV	83%	site data		
Package Boiler: Variable C	harge/cost	cent	s/MMBtu <sub>th</sub>	125	assumed		
		NO CHP		Recip. Engine		Gas Turbine	Gas Turbine
CHP Prime Mover		-		JMS420		OPRA16	Centaur40
CHP Configuration		Grid + Blrs only		2 x JMS420		2 x OPRA16	1 x Centaur40
*Pjt. Inv. w/10% ITC	\$MM	-		\$5.9		\$9.9	\$9.2
	\$/KW <sub>e</sub>	-		\$2,051		\$2,828	\$2,918
of which Equity reqd.	\$MM	-		\$1.5		\$2.5	\$2.3
**Equity-Multiple of Inve	stment (MOI	) -		4.8		2.5	5.4
***Site Energy Expense							
Year 1	\$MM	\$3.0		\$3.1		\$3.6	\$3.3
Year 20	\$MM	\$64		\$57		\$58	\$51
Cum. %redn. 20 yrs	% reduction	0%		-11%		-10%	-19%
Emissions							
From grid power	mt CO <sub>2</sub>	22,184		4,641		1,652	3,246
From fuel to Blrs	mt CO <sub>2</sub>	10,264		6,987		360	699
From fuel to CHP	mt CO <sub>2</sub>	-		11,004		21,434	19,395
TOTAL site emissions	mt CO <sub>2</sub>	32,448	•	22,633		23,446	23,340
Emissions reduction	% change	0%		-30%		-28%	-28%
CHP technical							
CHP capacity	$KW_e$	-		2,858		3,500	3,159
CHP efficiency	% HHV	-		61.3%		60.4%	63.4%
Thermal Utilization	%			63%		64%	77%
Annual Energy supply to s	ite						
Fuel to Blrs	MMBtu	193,164		131,494		6,769	13,161
Fuel to CHP	MMBtu	-	_	207,094		403,375	365,005
TOTAL Fuel (CHP + Blrs)	MMBtu	193,164	•	338,587		410,144	378,166
Elec. From grid	MWh	28,093		5,877		2,093	4,110
Elec. From CHP	MWh	-		22,215		26,000	23,982

28,093

28,093

28,093



# Other scenarios? Eg: higher grid price increases MOI; leverage & CHP years <u>turbocharge</u> MOI.

TOTAL Elec. (CHP + grid) MWh

COMMON INPUT's			UNIT	VALUE	COMMENT	<u>.</u>	
FUTURE baseline site Load		% lc	ad increase	50%	2020 base		
Natural Gas at "Burner tip	"	\$/M	MBtu, HHV	\$2.76	site data		
All-in Grid power price			c/KWh	10.0	site data		
CHP project financing							
CHP Project horizon (max	20-yrs)		years	10			
Equity:Debt Ratio			%	100%	assumed		
Debt Term			years	7	assumed		
Cost of Debt			%	7%	assumed		
Pre-CHP Package Boiler							
Displaced package boiler	efficiency		% HHV	83%	site data		
Package Boiler: Variable	Charge/cost	cent	s/MMBtu <sub>th</sub>	125	assumed		
_		NO CHP	F	Recip. Engine		Gas Turbine	Gas Turbin
CHP Prime Mover		_		JMS420		OPRA16	Centaur
CHP Configuration		Grid + Blrs only		2 x JMS420		2 x OPRA16	1 x Centaur
*	4			4		4	4.0
*Pjt. Inv. w/10% ITC	\$MM	-		\$5.9		\$9.9	\$9.
	\$/KW <sub>e</sub>	-		\$2,051		\$2,828	\$2,91
of which Equity reqd.	\$MM	-		\$5.9		\$9.9	\$9.
**Equity-Multiple of Inv	estment (MO	-		2.1		1.5	1.
***Site Energy Expense							
Year 1	\$MM	\$3.7		\$2.4		\$2.2	\$2.
Year 10	\$MM	\$38		\$26		\$23	\$2
Cum. %redn. 10 yrs	% reduction	0%		-32%		-38%	-43
Emissions							
From grid power	mt CO <sub>2</sub>	22,184		4,641		1,652	3,24
From fuel to Blrs	mt CO <sub>2</sub>	10,264		6,987		360	69
From fuel to CHP	mt CO <sub>2</sub>	-		11,004		21,434	19,39
TOTAL site emissions	mt CO <sub>2</sub>	32,448	_	22,633		23,446	23,34
Emissions reduction	% change	0%		-30%		-28%	-28
CHP capacity	V\\/			2,858		3,500	3,15
CHP capacity CHP efficiency	KW <sub>e</sub> % HHV	-		61.3%		60.4%	63.4
Thermal Utilization	% ппv %	-		63%		64%	77
Annual Energy supply to				03/0		04/0	//
Fuel to Blrs	MMBtu	193,164		131,494		6,769	13,16
Fuel to CHP	MMBtu			207,094		403,375	365,00
TOTAL Fuel (CHP + Birs)		193,164	_	338,587		410,144	378,16
Elea Essas esid	8.43.4/b	28.002		F 077		2.002	
Elec. From grid	MWh MWh	28,093		5,877		2,093	4,11 23,98
Elec. From CHP				22,215		26,000	

COMMON INPUT's			UNIT	VALUE	COMMENT		
FUTURE baseline site Load		%	load increase	50%	2020 base	•	
Natural Gas at "Burner tip"			MMBtu, HHV	\$2.76	site data		
All-in Grid power price			c/KWh	10.0	site data		
CHP project financing			,				
CHP Project horizon (max 2	0-yrs)		years	20			
	, .		•				
Equity:Debt Ratio			%	25%	assumed		
Debt Term			years	7	assumed		
Cost of Debt			%	7%	assumed		
Pre-CHP Package Boiler							
Displaced package boiler e	efficiency		% HHV	83%	site data		
Package Boiler: Variable C	harge/cost	ce	nts/MMBtu <sub>th</sub>	125	assumed		
		NO CHP		Recip. Engine		Gas Turbine	Gas Turbine
CHP Prime Mover		-		JMS420		OPRA16	Centaur40
CHP Configuration		Grid + Blrs only		2 x JMS420		2 x OPRA16	1 x Centaur40
*Pjt. Inv. w/10% ITC	\$MM	-		\$5.9		\$9.9	\$9.2
	\$/KW <sub>e</sub>	-		\$2,051		\$2,828	\$2,918
of which Equity reqd.	\$MM	-		\$1.5		\$2.5	\$2.3
**Equity-Multiple of Inve	stment (MO	-		12.3		7.8	10.5
***Site Energy Expense							
Year 1	\$MM	\$3.7		\$3.2		\$3.6	\$3.4
Year 20	\$MM	\$78		\$60		\$59	\$54
Cum. %redn. 20 yrs	% reduction	0%		-23%		-25%	-31%
Emissions							
From grid power	mt CO <sub>2</sub>	22,184		4,641		1,652	3,246
From fuel to Blrs	mt CO <sub>2</sub>	10,264		6,987		360	699
From fuel to CHP	mt CO <sub>2</sub>	-	_	11,004		21,434	19,395
TOTAL site emissions	mt CO <sub>2</sub>	32,448		22,633		23,446	23,340
Emissions reduction	% change	0%		-30%		-28%	-28%
CHP technical							
CHP capacity	$KW_e$	-		2,858		3,500	3,159
CHP efficiency	% HHV	-		61.3%		60.4%	63.4%
Thermal Utilization	%			63%		64%	77%
Annual Energy supply to	site						
Fuel to Blrs	MMBtu	193,164		131,494		6,769	13,161
Fuel to CHP	MMBtu		. <u>-</u>	207,094		403,375	365,005
TOTAL Fuel (CHP + Blrs)	MMBtu	193,164	-	338,587		410,144	378,166
Elec. From grid	MWh	28,093		5,877		2,093	4,110
Elec. From CHP	MWh	<u>-</u>	-	22,215		26,000	23,982
TOTAL Floo (CHD L guid)	D/IM/h	39.003		20.002		38 003	38 003

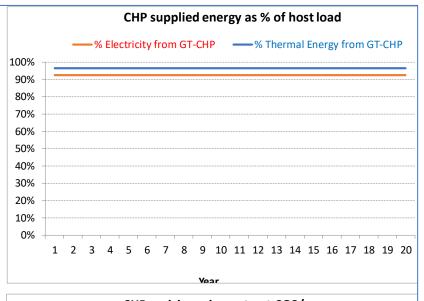


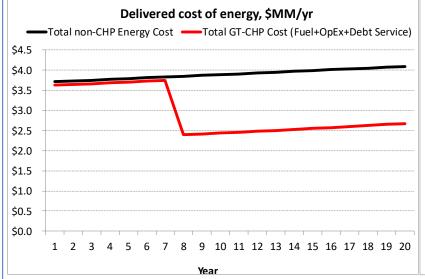
# 2 x OPRA GT ideal upside: leverage (25% equity), high grid power (10 cents/KWh) and CHP 20-years

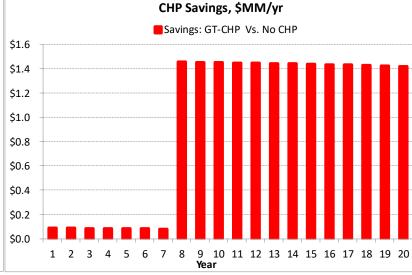
### Good electrical fit, average thermal fit; economics hurt by high CapEx and OpEx. Lower thermal utilization

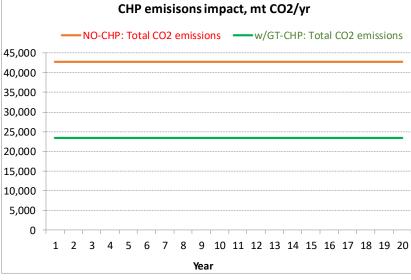
	IT	COMMEN	VALUE	UNIT		INPUT
	-	assumed	\$2.76	\$/MMBtu, HHV	nt "Burner tip"	Natural Gas at "Burner
Project Fir	•	assumed	10.0	c/KWh	wer price	All-in Grid power price
25%		assumed	97%	%	availability	CHP full-load availabili
75%		assumed	10%	of value of CHP pwr	Standby Charges	W/CHP, Grid Standby
100%		OPRA16			rbine (GT) CHP	OPRA Gas Turbine (GT
	•		20	years		Project term
Site Energ	mate	CapEx esti	\$2,828	\$/KW <sub>e</sub>	ct Investment	GT-CHP Project Investi
Grid Pwr	red	as configu	2		systems	# of GT-CHP systems
Site Energ	CHP capacit	3500 KWe	1,750	KW <sub>e</sub>		lso Power
Grid Pwr				warding Efficiency chnology, Execution, lancing, Ops & Maint,	inancing	CHP project financing
Multiple		assumed	25%	%		Equity:Debt Ratio
		assumed	7	years	The state of the s	Debt Term
HHV Theri		assumed	7%	%	t	Cost of Debt
Efficience						
Electrica					rage Boiler	Pre-CHP Package Boile
Thermal	-	site data	83%	% HHV	kage boiler efficiency	Displaced package boil
CHP The		typical	125	cents/MMBtu <sub>th</sub>	er: Variable Charge/cost	Package Boiler: Variab

	OUTPUT		UNIT	VALUE	VALUE	Difference
				No CHP	GT-CHP	
Project	Financing Structure					
25%	Equity		\$MM	-	\$2.5	
75%	Debt		\$MM	-	\$7.4	
100%	CHP only Investment in	cl. 10% ITC	\$MM	-	\$9.9	
Site Ene	rgy Expense in Year 1					
Grid P	Grid Pwr + fuel + OpEx + Debt Service			\$3.7	\$3.6	\$0.1
Site Ene	rgy Expense over Project te	erm 20 years				
Grid P	wr + fuel + OpEx + Debt Serv	rice	\$MM	\$78.0	\$58.7	\$19.3
Multip	ole of Investment on Equity			-	7.8	
HHV The	ermodynamic Metrics					
Efficier	ncy		%	-	60%	
Electri	cal Heat Rate	MMB	tu/MWh	-	8.9	
Therm	al Energy Rate	MMBtu/I	MMBtu <sub>th</sub>	-	1.5	
CHP Th	hermal Utilization		%	-	64%	









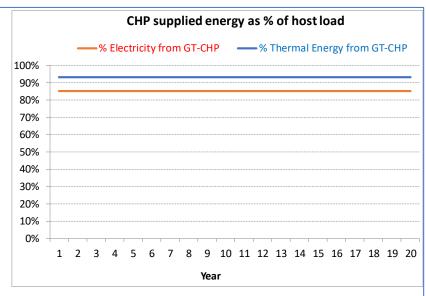


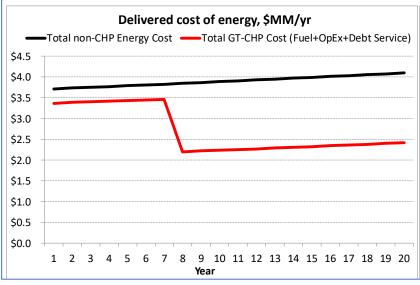
# 1 x Centaur40 GT ideal upside: leverage (25% equity), high grid power (10 cents/KWh) and CHP 20-years

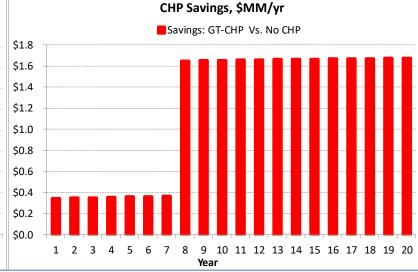
### Good technical fit; economics hurt by high CapEx and assumed high grid standby charge. Higher thermal utilization

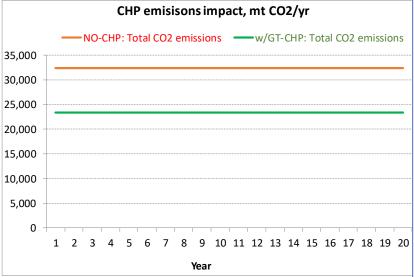
INPUT	UNIT	VALUE	COMMENT
Natural Gas at "Burner tip"	\$/MMBtu, HHV	\$2.76	assumed
All-in Grid power price	c/KWh	10.0	assumed
CHP full-load availability	%	95%	assumed
W/CHP, Grid Standby Charges	% of value of CHP pwr	20%	assumed
OPRA Gas Turbine (GT) CHP			Centaur40
Project term	years	20	
GT-CHP Project Investment	\$/KW <sub>e</sub>	\$2,918	CapEx estimate
# of GT-CHP systems		1	as configured
Iso Power	KW <sub>e</sub>	3,159	3159 KWe CHP capac
CHP project financing	Rewarding Efficiency Technology, Execution,		
Equity:Debt Ratio	%	25%	assumed
Debt Term	years	7	assumed
Cost of Debt	%	7%	assumed
Pre-CHP Package Boiler			
Displaced package boiler efficier	cy % HHV	83%	site data
Package Boiler: Variable Charge,	cost cents/MMBtu <sub>th</sub>	125	typical

	OUTPUT	UNIT	VALUE	VALUE	Difference				
			No CHP	GT-CHP					
Project F	inancing Structure								
25%	Equity	\$MM	-	\$2.3					
75%	Debt	\$MM	-	\$6.9					
100%	CHP only Investment incl. 10%	ITC \$MM	-	\$9.2					
Site Energy Expense in Year 1									
Grid Pv	wr + fuel + OpEx + Debt Service	\$MM	\$3.7	\$3.4	\$0.3				
Site Ener	rgy Expense over Project term 20	<u>years</u>							
Grid Pv	wr + fuel + OpEx + Debt Service	\$MM	\$78.0	\$54.0	\$24.1				
Multip	le of Investment on Equity		-	10.5					
HHV The	rmodynamic Metrics								
Efficien	су	%	-	63%					
Electric	cal Heat Rate	MMBtu/MWh	-	8.3					
Therma	al Energy Rate	MMBtu/MMBtu <sub>th</sub>	-	1.3					
CHP Th	ermal Utilization	%	-	77%					









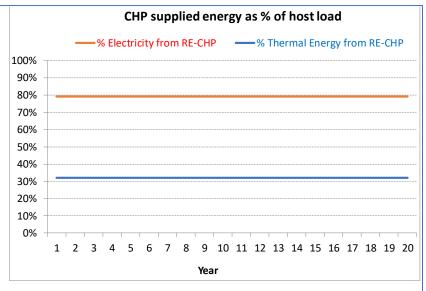


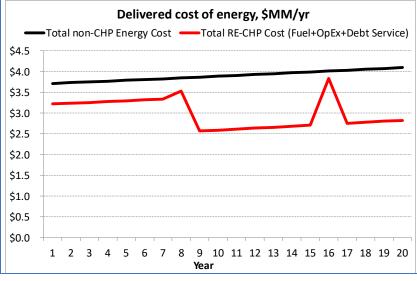
# 2 x JMS420 RE ideal upside: leverage (25% equity), high grid power (10 cents/KWh) and CHP 20-years

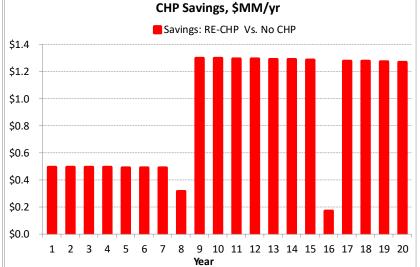
Good electrical fit; average thermal fit. Economics helped by low CapEx but hurt by high OpEx including 60,000 major overhauls ("spiky"). CHP efficiency low due to wasted low-grade thermal energy (hot water). Lower thermal utilization

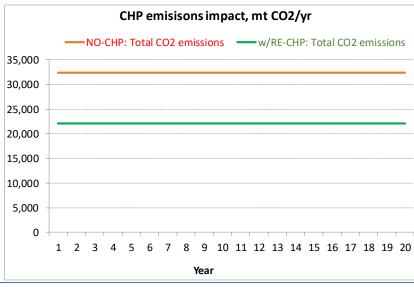
INPUT	UNIT	VALUE	COMMENT	
Natural Gas at "Burner tip"	\$/MMBtu, HHV	\$2.76	assumed	
All-in Grid power price	c/KWh	10.0	assumed	Pr
CHP full-load availability	%	95%	assumed	25
W/CHP, Grid Standby Charges %	of value of CHP pwr	10%	assumed	75
<b>Reciprocating Internal Combustion Engin</b>	e (RE) CHP		<u>JMS420</u>	10
Project term	years	20		
RE-CHP Project Investment	\$/KW <sub>e</sub>	\$2,051	CapEx estimate	Sit
# of RE-CHP systems		2	as configured	(
Iso Power	KW <sub>e</sub>	1,429	2858 KWe CHP capacit	Sit
CHP project financing	warding Efficiency hnology, Execution, ancing, Ops & Maint.			(
Equity:Debt Ratio	%	25%	assumed	1
Debt Term	years	7	assumed	
Cost of Debt	%	7%	assumed	Н
				ı
Pre-CHP Package Boiler				ı
Displaced package boiler efficiency	% HHV	83%	site data	-
Package Boiler: Variable Charge/cost	cents/MMBtu <sub>th</sub>	125	typical	

	OUTPUT	UNIT	VALUE	VALUE	Difference
			No CHP	RE-CHP	
Project I	Financing Structure				
25%	5% Equity		-	\$1.5	
75%	Debt	\$MM	-	\$4.4	
100%	CHP only Investment incl. 109	% ITC \$MM	-	\$5.9	
Site Ene	rgy Expense in Year 1				
Grid P	wr + fuel + OpEx + Debt Service	\$MM	\$3.7	\$3.2	\$0.5
Site Ene	rgy Expense over Project term 20	<u>years</u>			
Grid P	wr + fuel + OpEx + Debt Service	\$MM	\$78.0	\$60.0	\$18.1
Multip	le of Investment on Equity		-	12.3	
HHV The	ermodynamic Metrics				
Efficier	ncy	%	-	61%	
Electri	cal Heat Rate	MMBtu/MWh	-	6.8	
Therm	al Energy Rate	$MMBtu/MMBtu_{th}$	-	2.9	
CHP Th	nermal Utilization	%	-	63%	



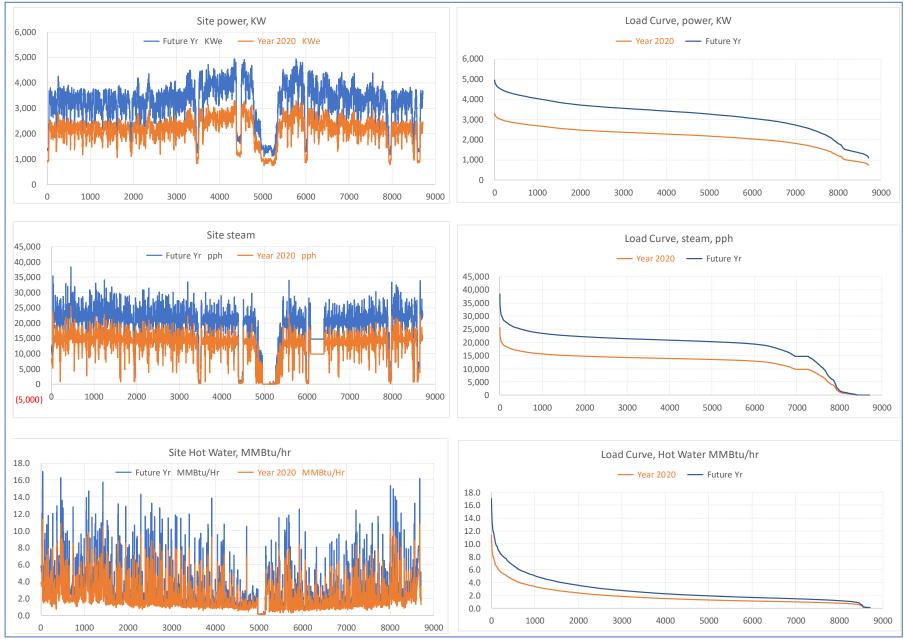






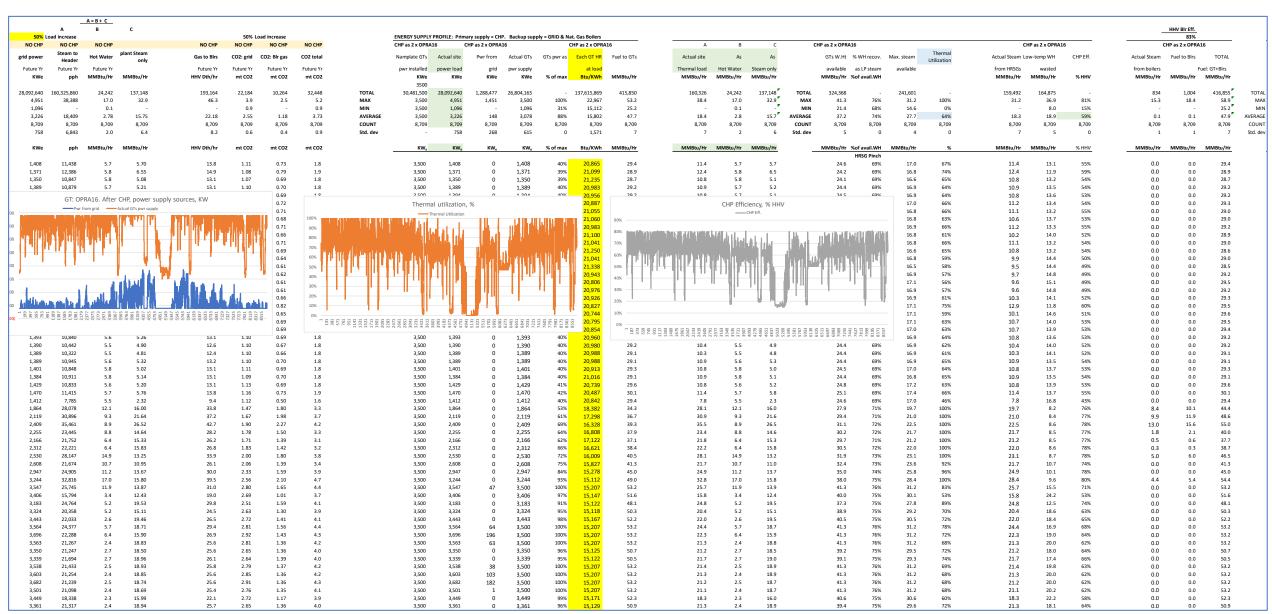


# Technical Observation: power & thermal loads correlated. Future yr loads 50% > Year 2020 loads





# CHP sizing & prime mover selection: Match hourly load (power & thermal energy) to supply



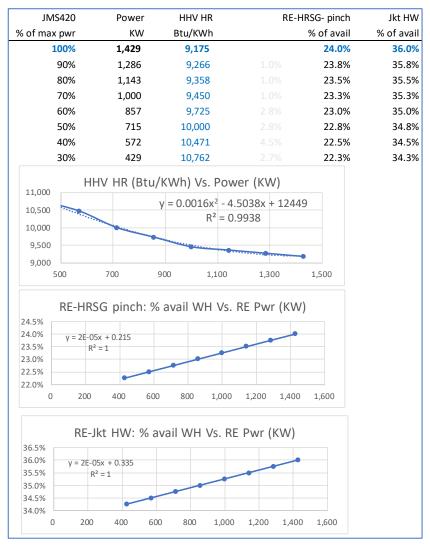


# Prime mover (GT, RE) ambient temperature performance curves

Heat Rate Vs. power <u>and</u> Vs % Waste Heat Recovered vs. power estimated from vendor data at ambient conditions. Winter electrical overperformance balances summer electrical underperformance (especially fir GTs)

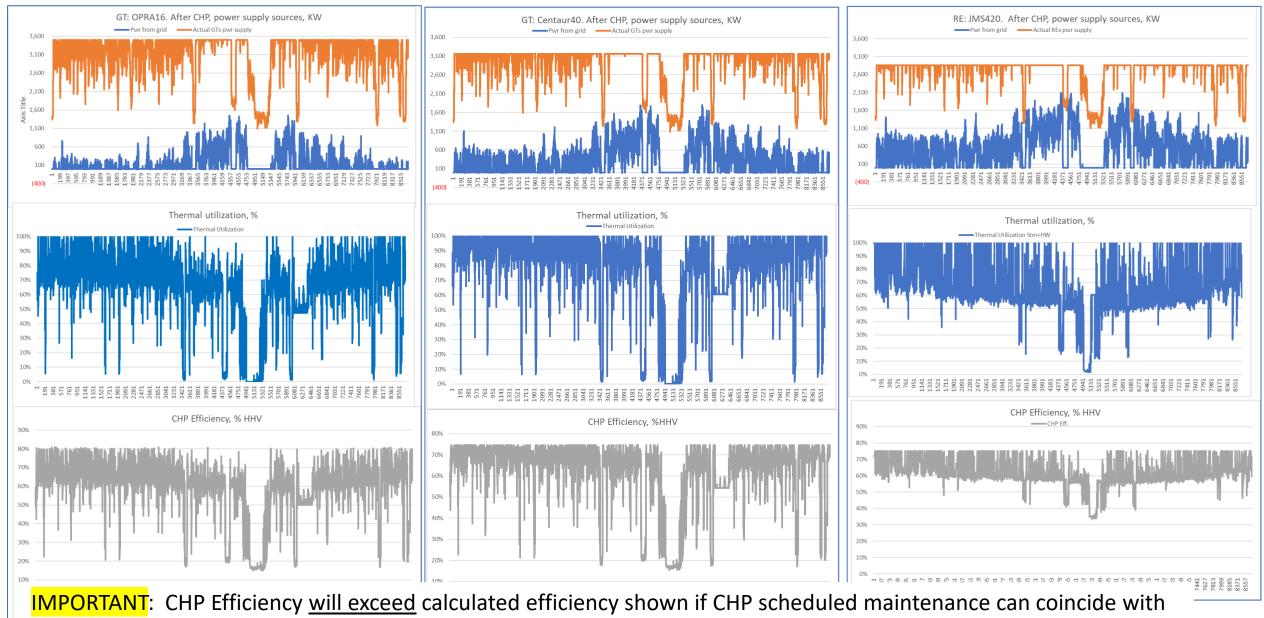
OPF	RA16	Power	HHV HR	Н	IRSG- pinch
6 of max	pwr	KW	Btu/KWh		% of avail
1	.00%	1,750	15,002		75%
	90%	1,575	15,302		74%
	80%	1,400	15,752		73%
	70%	1,225	16,352		72%
	60%	1,050	17,403		71%
	50%	875	18,603		70%
	40%	700	20,658		69%
	30%	525	23,628		68%
10,000	y = 0.0	067x <sup>2</sup> - 21.853			
		$R^2 = 0.9929$	9		
0	500 7	$R^2 = 0.9929$	1,100 1,300	1,500 1,700	1,900
5		700 900	1,100 1,300	1,500 1,700 ST Pwer (KW)	1,900
76%	HRSG	900 900 pinch: % av	1,100 1,300	<u> </u>	1,900
5		900 900 pinch: % av	1,100 1,300	<u> </u>	1,900
76% 74%	HRSG y = 6E-05	900 900 pinch: % av	1,100 1,300	<u> </u>	1,900
76% 74% 72%	HRSG y = 6E-05	900 900 pinch: % av	1,100 1,300	<u> </u>	1,900
76% 74% 72% 70%	HRSG y = 6E-05	900 900 pinch: % av	1,100 1,300	<u> </u>	1,900

Centa	ur40	Power	HHV HR	ŀ	HRSG- pinc
6 of max	c pwr	KW	Btu/KWh	%	of avail W
1	L00%	3,159	14,695		52.99
	90%	2,843	15,050		51.89
	80%	2,527	15,542		52.49
	70%	2,211	16,457		53.09
	60%	1,895	17,726		53.69
	50%	1,580	19,398		54.19
	40%	1,264	21,250		55.19
	30%	948	23,300		59.79
10,000	V = 0.00				
0	y = 0.00	$R^2 = 0.9996$	5		
0				00 3,000	3,500
0	500 1	$R^2 = 0.9996$	5	<u>,                                      </u>	,
65.0%	500 1	$R^2 = 0.9996$	2,000 2,5 vail WH Vs. GT	<u>,                                      </u>	)
65.0%	500 1	$R^2 = 0.9996$	2,000 2,5 vail WH Vs. GT	Γ Pwer (KW)	)
65.0%	500 1	R <sup>2</sup> = 0.9996 1,000 1,500 pinch: % av	2,000 2,5 vail WH Vs. GT	Γ Pwer (KW)	)





# Technical characteristics: ponder CHP efficiency, wasted heat and power capacity



plant annual 2-weeks shutdown; hence excluding period of low load and hence low CHP efficiency



# Selection metrics? Change in fuel, capacity, GHG reduction, CapEx (next few slides)

										_							
	COMMENT		UNIT		INPUT		COMMENT		UNIT		INPUT		COMMENT		UNIT		INPUT
	2020 base year		load increase	%	FUTURE baseline site Load		2020 base year		6 load increase		FUTURE baseline site Load		2020 base year		% load increase	9	FUTURE baseline site Load
	JMS420		# REs		CHP Configuration		Centaur40		# GTs		CHP Configuration		OPRA16		# GTs		CHP Configuration
capacity	2858 KWe CHP		$KW_e$		Each RE nominal power	apacity	3159 KWe CHP (		KW <sub>e</sub>		Each GT power at site cdns	capacity	3500 KWe CHP		$KW_e$		Each GT nominal power
		95%	%		RE-CHP annual availability			95%	%	/	GT-CHP annual availability			97%	%		GT-CHP annual availability
% change	Change	w/CHP	No CHP	UNIT	OUTPUT - ANNUAL	% change	Change	w/CHP	No CHP	L UNIT	OUTPUT - ANNUAL	% change	Change	w/CHP	No CHP	UNIT	OUTPUT - ANNUAL
		5,877	28,093	MWh	Elec. from Grid			4,110	28,093	d MWh	Elec. from Grid			2,093	28,093	MWh	Elec. from Grid
		22,215	0	MWh	Elec. from CHP			23,982	0	P MWh	Elec. from CHP			26,000	0	MWh	Elec. from CHP
0%	0	28,093	28,093	MWh	TOT. Elec.	0%	0	28,093	28,093	MWh	TOT. Elec.	0%	0	28,093	28,093	MWh	TOT. Elec.
		109,140	160,326	MMBtu	Thermal from Birs			10,923	160,326	s MMBtu	Thermal from Blrs			5,618	160,326	MMBtu	Thermal from Birs
		51,186	0	MMBtu	CHP Thermal (HRSG, Jkt HW)			149,403	0	) MMBtu	CHP Thermal (HRSG)			154,707	0	MMBtu	CHP Thermal (HRSG)
0%	0	160,326	160,326	MMBtu	TOT. Thermal supply	0%	0	160,326	160,326	/ MMBtu	TOT. Thermal supply	0%	0	160,326	160,326	MMBtu	TOT. Thermal supply
		131,494	193,164	MMBtu	Fuel to Birs			13,161	193,164	s MMBtu	Fuel to Blrs			6,769	193,164	MMBtu	Fuel to Blrs
		207,094	0	MMBtu	Fuel to CHP			365,005	0	P MMBtu	Fuel to CHP			403,375	0	MMBtu	Fuel to CHP
75%	145,424	338,587	193,164	MMBtu	TOT. Fuel	96%	185,002	378,166	193,164	l MMBtu	TOT. Fuel	112%	216,980	410,144	193,164	MMBtu	TOT. Fuel
		4,641	22,184	MT CO <sub>2</sub>	CO2 Emissions: grid			3,246	22,184	-	CO2 Emissions: grid			1,652	•	MT CO <sub>2</sub>	CO2 Emissions: grid
		17,991	10,264	MT CO <sub>2</sub>	CO2 Emissions: fuel			20,094	10,264		CO2 Emissions: fuel			21,794	10,264	MT CO <sub>2</sub>	CO2 Emissions: fuel
-30%	(9,816)	22,633	32,448	MT CO <sub>2</sub>	CO2 TOTAL emissions	-28%	(9,108)	23,340	32,448	s MT CO <sub>2</sub>	CO2 TOTAL emissions	-28%	(9,002)	23,446	32,448	MT CO <sub>2</sub>	CO2 TOTAL emissions
		61%		% HHV	Overall CHP Efficiency			63%		/ % HHV	Overall CHP Efficiency			60%		% HHV	Overall CHP Efficiency
		63%		%	CHP Thermal Utilization			77%		n %	CHP Thermal Utilization			64%		%	CHP Thermal Utilization
				tenance	Full-scope main					intenance	Full-scope mai					itenance	Full-scope main
			COMMENT	2 x JMS420	INPUTS				COMMENT	1 x Centaur40	INPUTS				COMMENT	2 x OPRA16	INPUTS
			_	8,322	Fired Hrs/yr					8,322	Fired Hrs/yr					8,497	Fired Hrs/yr
			per vendor	\$27.68	\$/fired.hr			Kevin Jensen	5-18-2021 ca	\$32.00	\$/fired.hr				Internal Est.	\$35.00	\$/fired.hr
				2 x JMS420	RESULTS					1 x Centaur40	RESULTS					2 x OPRA16	RESULTS
				22,215	MWh/yr					23,982	MWh/yr					26,000	MWh/yr
				\$20.7	\$/MWh					\$11.1	\$/MWh					\$22.9	\$/MWh
				2.07	cents/KWh					1.11	cents/KWh					2.29	cents/KWh
				\$460,706	\$K/yr					\$266,304	\$K/yr					\$594,804	\$K/yr

Above maintenance figures <u>exclude</u> additional expense for non-CHP equipment maintenance, consumables and staff <u>IMPORTANT</u>: CHP Efficiency <u>will exceed</u> calculated efficiency shown if CHP scheduled maintenance can coincide with plant annual 2-weeks shutdown; hence excluding period of low load and hence low CHP efficiency



# CHP configuration: 2 x Gas Turbine as OPRA16; slightly increased CHP availability

				Unit Cost	Quantity		COMMENT
Cost metric	On/Off			\$MM		\$MM	
		A. Equipment					
\$1,000	1	Gas Turbine	2 x OPRA16	\$1.75	2	\$3.50	OPRA GT, Elec (Switchgear, MCC, breakers), utility tie-
44%		GT-HRSG		\$0.77	2	\$1.54	in, Gas Compressor, No DA, HRSG (no duct-burner)
18%		Gas Compressor		\$0.32	2	\$0.63	
\$600	0	Reciprocating Engine		<del>\$0.00</del>	2	<del>\$0.00</del>	
25%		RE-HRSG/HRU		<del>\$0.00</del>	2	<del>\$0.00</del>	
		Other		\$0.00	1	\$0.00	
		Sub-total		\$2.84		\$5.67	
		B. Balance of Plant (BOP)					
35%		Civil, Mech, Electrical, I&C	etc	\$0.99	1	\$0.99	SJ est.; edit after FEL3
14%		Eqpmt x'port to site, unload	d & siting	\$0.40	1	\$0.40	SJ est.; edit after FEL3
		Other		\$0.00	1	\$0.00	
		Sub-total		\$1.39		\$1.39	
		C. Indirect ("Soft") costs					
20%		Engg, PM/CM		\$0.84	1	\$0.84	ST budgetary; edit after FEL3
8%		Legal/Env. & permitting		\$0.34	1	\$0.34	SJ est.; edit after FEL3
3%		Bonding, Insurance		\$0.13	1	\$0.13	SJ est.; edit after FEL3
30%		Financing, Wkg Cpts, Devp.	Fee etc	\$1.27	1	\$1.27	SJ est.; edit after FEL3
		Other		\$0.00	1	\$0.00	
		Sub-total		\$2.58		\$2.58	
20%		D. Contingency		\$1.36	1	\$1.36	missing scope items
		E. CHP ONLY INVESTMENT		\$8.16		\$11.00	\$3142 /KW
	1	F. 10% Investment Tax Cred	it (ITC)			(\$1.10)	ITC applies to CHP investment
		G. CHP ONLY INVESTM	MENT including 1	.0% ITC		\$9.90	\$2828 /KW
Cost SMM	0n/0ff	NON CUR CAREY ADDs 9 OF	EECETC			Ć NA NA	COMMENT
\$2.00	On/Off 0	NON-CHP CAPEX ADDs & OF Site upgrade: electrical infras				\$MM \$0.00	COMMENT
\$1.00	0	New package boiler	בוו עננעו כ			\$0.00 \$0.00	
\$0.90	0	Diesel b/u (Gen-set, fuel tank	c numn skid)			\$0.00	Host to add / delete specific non-CHP CapEx line item
\$0.35	0	Onsite propane fuel tank + fu				\$0.00	per host analysis of resiliency (redunancy + availability
\$0.00	0	other	aci puilip akiu			\$0.00	required
\$0.00	0	Other				\$0.00	
Ģ0.00		H. SUB-TOTAL				\$0.00	\$0 /KW
		· - · · ·				φ3.00	,

	INPUT		UNIT	VALUE	COMMENT	
FUTURE	baseline site Load	9	6 load increase	50%	2020 base year	
(	CHP Configuration		# GTs	2	OPRA16	
Each (	GT nominal power		$KW_e$	1,750	3500 KWe CHP o	apacity
GT-CHP	annual availability		%	97%		
OL	JTPUT - ANNUAL	UNIT	No CHP	w/CHP	Change	% change
	Elec. from Grid	MWh	28,093	2,093		
	Elec. from CHP	MWh	0	26,000		
	TOT. Elec.	MWh	28,093	28,093	0	0%
	Thermal from Blrs	MMBtu	160,326	5,618		
СН	IP Thermal (HRSG)	MMBtu	0	154,707		
T01	T. Thermal supply	MMBtu	160,326	160,326	0	0%
	Fuel to Blrs	MMBtu	193,164	6,769		
	Fuel to CHP	MMBtu	0	403,375		
	TOT. Fuel	MMBtu	193,164	410,144	216,980	112%
C	O2 Emissions: grid	MT CO <sub>2</sub>	22,184	1,652		
CO	O2 Emissions: fuel	MT CO <sub>2</sub>	10,264	21,794		
CO2	TOTAL emissions	MT CO <sub>2</sub>	32,448	23,446	(9,002)	-28%
Over	all CHP Efficiency	% HHV		60%		
1	nermal Utilization	%		64%		
	Full-scope maint	tenance				
	INPUTS	2 x OPRA16	COMMENT			
	Fired Hrs/yr	8,497				
	\$/fired.hr	\$35.00	Internal Est.			
	RESULTS	2 x OPRA16				
	MWh/yr	26,000				
	\$/MWh	\$22.9				
	cents/KWh	2.29				
	\$K/yr	\$594,804				

Several small GT choices available and OPRA16 is indicative selection only



# CHP configuration: 1 x Gas Turbine as Centaur40

				Unit Cost	Quantity	Extd. Cost	COMMENT
Cost metric	On/Off			\$MM		\$MM	
		A. Equipment					
\$917	1	Gas Turbine	1 x Centaur40	\$2.90	1	\$2.90	C40 GT, Elec (Switchgear, MCC, breakers), utility tie-in,
45%		GT-HRSG		\$1.30	1	\$1.30	Gas Compressor, No DA, HRSG (no duct-burner)
23%		Gas Compressor		\$0.67	1	\$0.67	, , , , , , , , , , , , , , , , , , ,
\$600	0	Reciprocating Engine		<del>\$0.00</del>	<del>1</del>	<del>\$0.00</del>	
25%		RE-HRSG/HRU		<del>\$0.00</del>	<b>1</b>	<del>\$0.00</del>	
		Other		\$0.00	1	\$0.00	
		Sub-total		\$4.87		\$4.87	
		B. Balance of Plant (BOP)					
20%		Civil, Mech, Electrical, I&C e	etc	\$0.97	1	\$0.97	ST budgetary; edit after FEL3
8%		Eqpmt x'port to site, unload	d & siting	\$0.39	1	\$0.39	ST budgetary; edit after FEL3
		Other		\$0.00	1	\$0.00	
		Sub-total		\$1.36		\$1.36	
		C. Indirect ("Soft") costs					
10%		Engg, PM/CM		\$0.62	1	\$0.62	ST budgetary; edit after FEL3
5%		Legal/Env. & permitting		\$0.31	1	\$0.31	SJ est.; edit after FEL3
2%		Bonding, Insurance		\$0.12	1	\$0.12	SJ est.; edit after FEL3
20%		Financing, Wkg Cpts, Devp.	Fee etc	\$1.25	1	\$1.25	SJ est.; edit after FEL3
		Other		\$0.00	1	\$0.00	
		Sub-total		\$2.30		\$2.30	
20%		D. Contingency		\$1.71	1	\$1.71	missing scope items
		E. CHP ONLY INVESTMENT		\$10.24		\$10.24	\$3242 /KW
	1	F. 10% Investment Tax Credi	t (ITC)			(\$1.02)	ITC applies to CHP investment
		G. CHP ONLY INVESTM	IENT including 1	.0% ITC		\$9.22	\$2918 /KW
Cost, \$MM	On/Off	NON-CHP CAPEX ADDs & OF	ECFTC			\$MM	COMMENT
\$2.00	0	Site upgrade: electrical infras				\$0.00	COMMENT
\$1.00	0	New package boiler				\$0.00	
\$0.90	0	Diesel b/u (Gen-set, fuel tank	. pump skid)			\$0.00	Host to add / delete specific non-CHP CapEx line item
\$0.35	0	Onsite propane fuel tank + fu				\$0.00	per host analysis of resiliency (redunancy + availability
\$0.00	0	other	1 - P			\$0.00	required
\$0.00	0	Other				\$0.00	
· · ·		H. SUB-TOTAL				\$0.00	\$0 /KW
		I. OVERALL PROJECT INVEST	MENT			\$9.22	\$2918 /KW

	COMMENT	VALUE	UNIT		INPUT
	2020 base year	50%	6 load increase	%	FUTURE baseline site Load
	Centaur40	1	# GTs		CHP Configuration
capacity	3159 KWe CHP	3,159	$KW_e$		Each GT power at site cdns
		95%	%		GT-CHP annual availability
% change	Change	w/CHP	No CHP	UNIT	OUTPUT - ANNUAL
		4,110	28,093	MWh	Elec. from Grid
		23,982	0	MWh	Elec. from CHP
09	0	28,093	28,093	MWh	TOT. Elec.
		10,923	160,326	MMBtu	Thermal from Birs
		149,403	0	MMBtu	CHP Thermal (HRSG)
09	0	160,326	160,326	MMBtu	TOT. Thermal supply
		13,161	193,164	MMBtu	Fuel to Blrs
		365,005	0	MMBtu	Fuel to CHP
96%	185,002	378,166	193,164	MMBtu	TOT. Fuel
		3,246	22,184	MT CO <sub>2</sub>	CO2 Emissions: grid
		20,094	10,264	MT CO <sub>2</sub>	CO2 Emissions: fuel
-289	(9,108)	23,340	32,448	MT CO <sub>2</sub>	CO2 TOTAL emissions
		63%		% HHV	Overall CHP Efficiency
		77%		%	CHP Thermal Utilization
				tenance	Full-scope main
			COMMENT	1 x Centaur40	INPUTS
				8,322	Fired Hrs/yr
		I/Kevin Jensen	5-18-2021 ca	\$32.00	\$/fired.hr
				1 x Centaur40	RESULTS
				23,982	MWh/yr
				\$11.1	\$/MWh
				1.11	cents/KWh
				\$266,304	\$K/yr

Several small GT choices available and Centaur40 is indicative selection only



# CHP configuration: 2 x Reciprocating Engine as JMS420 / 1429 KW

Cost metric	On/Off		\$MM		\$MM	
		A. Equipment				
\$750	0	<del>Gas Turbine</del>	<del>\$0.00</del>	2	<del>\$0.00</del>	
25%		<del>RE-HRSG</del>	<del>\$0.00</del>	2	<del>\$0.00</del>	
0%		Gas Compressor	\$0.00	2	\$0.00	Enclosure, Fuel gas train, LV alternator, Gen. Circ. Brkr
\$1,025	1	Reciprocating Engine 2 x JMS420	\$1.46	2	\$2.93	HW HXs, HRSG, , SCR system, SCADA system, deliv. To
0%		RE-HRSG/HRU	\$0.00	2	\$0.00	site, Installation assistance, commissioning & FAT,
		Other	\$0.00	1	\$0.00	O&M manual & dwgs etc
		Sub-total	\$1.46		\$2.93	
		B. Balance of Plant (BOP)				
50%		Civil, Mech, Electrical, I&C etc	\$0.73	1	\$0.73	SJ est.; edit after FEL3
20%		Eqpmt x'port to site, unload & siting	\$0.29	1	\$0.29	SJ est.; edit after FEL3
		other	\$0.00	1	\$0.00	
		Sub-total	\$1.03		\$1.03	
		C. Indirect ("Soft") costs				
25%		Engg, PM/CM	\$0.62	1	\$0.62	SJ est.; edit after FEL3
10%		Legal/Env. & permitting	\$0.25	1	\$0.25	SJ est.; edit after FEL3
4%		Bonding, Insurance	\$0.10	1	\$0.10	SJ est.; edit after FEL3
30%		Financing, Wkg Cptl, Devp. Fee etc	\$0.75	1	\$0.75	SJ est.; edit after FEL3
		Other	\$0.00	1	\$0.00	
		Sub-total	\$1.72		\$1.72	
20%		D. Contingency	\$0.84	1	\$0.84	missing scope items
		E. CHP ONLY INVESTMENT	\$5.05		\$6.51	\$2279 /KW
	1	F. 10% Investment Tax Credit (ITC)			(\$0.65)	ITC applies to CHP investment
		G. CHP ONLY INVESTMENT including 1	.0% ITC		\$5.86	\$2051 /KW
Cost, \$MM	On/Off	NON-CHP CAPEX ADDs & OFFSETS			\$MM	COMMENT
\$2.00	0	Site upgrade: electrical infrastructure			\$0.00	
\$1.00	0	New package boiler			\$0.00	
\$0.90	0	Diesel b/u (Gen-set, fuel tank, pump skid)			\$0.00	Host to add / delete specific non-CHP CapEx line item:
\$0.35	0	Onsite propane fuel tank + fuel pump skid			\$0.00	per host analysis of resiliency (redunancy + availability
\$0.00	0	other			\$0.00	required
\$0.00	0	Other			\$0.00	
		H. SUB-TOTAL			\$0.00	\$0 /KW

	INPUT		UNIT	VALUE	COMMENT	
Γ	FUTURE baseline site Load	9	6 load increase	50%	2020 base year	
	CHP Configuration		# REs	2	JMS420	
	Each RE nominal power		KW <sub>e</sub>	1,429	2858 KWe CHP (	apacity
	RE-CHP annual availability		%	95%		
L	OUTPUT - ANNUAL	UNIT	No CHP	w/CHP	Change	% change
	Elec. from Grid	MWh	28,093	5,877		
L	Elec. from CHP	MWh	0	22,215		
	TOT. Elec.	MWh	28,093	28,093	0	0%
	Thermal from Blrs	MMBtu	160,326	109,140		
L	CHP Thermal (HRSG, Jkt HW)	MMBtu	0	51,186		
	TOT. Thermal supply	MMBtu	160,326	160,326	0	0%
	- 11					
	Fuel to Blrs	MMBtu	193,164	131,494		
L	Fuel to CHP	MMBtu	0	207,094		
	TOT. Fuel	MMBtu	193,164	338,587	145,424	75%
	CO2 Emissions: grid	MT CO <sub>2</sub>	22,184	4,641		
	CO2 Emissions: fuel	MT CO <sub>2</sub>	10,264	17,991		
	CO2 TOTAL emissions	MT CO <sub>2</sub>	32,448	22,633	(9,816)	-30%
	Overall CHP Efficiency	% HHV		61%		
	CHP Thermal Utilization	%		63%		
	- "					
	Full-scope maint		CONANAENT			
	INPUTS	2 x JMS420	COMMENT			
	Fired Hrs/yr	8,322				
	\$/fired.hr	\$27.68	per vendor			
	RESULTS	2 x JMS420				
	MWh/yr	22,215				
	\$/MWh	\$20.7				
	cents/KWh	2.07				
	\$K/yr	\$460,706				
Ц	4.41.	ψ .cc,. σο				

Several RE choices available (eg: CAT, MAN, Progen (EMD series)etc.....) and JMS420 is indicative selection only

# PENWADEW Researche Efficiency Technology, Burdien, Francisco, Ops & Maint

#### **NEXT STEPS**

Present investment proposal to Management; include Project Execution Plan (PEP), key Risks & mitigants, recommend a project financing structure (eg: on-balance sheet, 3<sup>rd</sup> party financing, other)

If approved, i.e. Limited Notice to Proceed (LNTP),

- Assemble Project team
- Issue RFP to equipment vendors; select engineering firm, owners engineer
- Update financial model; add after-tax cash flows
- Engage local utility (power & gas), community
- Meet with local permitting entities, assess permit pathway & start negotiating permit.
- Improve project economics by:
  - Explore selling waste heat to Ind. Facility to the north (especially for 2 x RE and 2 x GT cases)
  - Apply for grants & incentives at www.dsireusa.org
  - If available, finance project using PACE funds (very long-duration & low-interest). Repayments are a tax-deductible add-on to site property tax bill.
  - Negotiate volumetric discount on natural gas delivery charge
  - Factor beneficial economics of avoided investments on electrical infrastructure & thermal (boilers)
  - Explore monetizing greenhouse gas emissions (GHG) reductions

**<u>Deliverable & milestone</u>**: Final Notice to Proceed (FNTP); begin Equipment procurement, engineering & construction



# Stage Gate Process: Front End Loaded (FEL)

FEL STAGE	FEL1: Business Assessment	FEL2: Alternatives Selection. Conceptual Engineering	FEL3: Scope Definition.  Basic Engineering	FEL4: Engineering, Procurement & Construction Management (EPCM).  Detailed Engineering+	FEL5: Commissioning & Operations & Evaluation		
PURPOSE	Identify projects aligned with business objectives	Select preferred process & technology options	Complete scope definiton: validate business premises, ensure project execution with a degree of certainty	Implement Project Execution Plan (PEP)	Meet design nameplate; evaluate against business objectives		
OBJECTIVES	Define business premises	Validate business premises	Finalize scope of work, schedule and cost	Complete Detailed Engineering	Achieve nameplate production		
	Define project objectives	Analyze alternate process & technology options; select best alternative	Value engineering for cost reduction	Secure required permits			
	List assumptions - technical & commerical	Develop Process scope of work	Mitigation of risks & uncertainties	Create equipment procurement plan			
	Identify risks & state mitigants	Process Flow Diagram with Heat & Mass Balance (PFD + HMB)	Project Execution Plan (PEP)	Mobilize construction resources - project / construction manager, prime contractor & subcontractors			
	Preliminary economics	Utilities availability ("gap analysis")	Gather project team	EHS management			
	Justify & prioritize projects	Identify uncertainties & risks	Secure project funding	Checkout & commissioning			
DELIVERABLES	FEL 1 deliverables check list	FEL 2 deliverables check list	FEL 3 deliverables check list	Commissioned project			
	Abstract / objectives statement	Basic economic model	Major equipment list & specifications with firm quotes	Purchase & receive equipment & bulk materials, manage construction to support PEP	Collect operating data		
	Resource assignment	PFD + HMB, basic plot plan	Finalize plot plan	Manage change orders	Capture formal lessons learned		
	Project manager	Permitting requirements & strategy	Issue for design: P&ID, control lists, electrical 1-line diagrams				
	Project Engineer	O&M strategy	Conduct HAZOP review	Final HAZOP review	Capture process improvements for future projects		
	Other	EHS requirements & strategy	EHS requirements & strategy Project Execution Plan (PEP) with Work				
		Technical risk assessment	BreakDown Structure (WBS) & sub- contracting plan		Prepare for project close-out		
		Major equipment list and key vendors					
	CapEx: Order of magnitude. ± 50%	CapEx: Conceptual estimate +35% -20%	CapEx: quasi-investment grade estimate +15% -5%				
	O&M, G&A: Order of magnitude. ± 50% O&M, G&A: conceptual estimate. ±		O&M, G&A: estimate ± 15%				
	FEL2 plan with milestone schedule	FEL3 plan with milestone schedule	Detailed construction schedule				
COSTS	\$1,000 <= co\$t <=\$5,000	0.3% <= \$ TIC <= 1.0%	0.7% <= \$ TIC <= 3.0%	3.0% <= \$ Engineering <= 15.0% rest for Procurement & construction	Funded from O&M,G&A budget		
FUNDING SOURCE	Owner expensed	Owner expensed	Owner expensed or capitalized	Capitalized			
DURATION	1 <= days <=5	2 <= weeks <=12	6 <= weeks <=18	6 <= months <=24			
GLOSSARY O&M, GA	Operations & maintenance, General & Administra	itive	TIC	Total Installed Cost			
PFD+ HMB	Process Flow Diagram + Heat & Mass Balance		HAZOP	Hazard & Operability Analysis			



# Example emissions calculation for permitting & sizing the Emissions Control System (ECS)

NPUT	UNIT	VALUE	VALUE	VALUE	OUTPUT		UNIT	VALUE	VALUE	VALUE		VALUE	VALUE	VALUE	
		Gas Turbine	HRSG-DB	Pkge Blr								Exit Stack	Exit Stack	Exit Stack	
xhaust Pollutants					Exhaust Pol	lutants		Gas Turbine	HRSG-DB	CHP total	Poll. Ctrl	HRSG	Pkge Blr	TOTAL SITE	
NO <sub>x</sub>	ppmv	308	33	33	NOx	7.5557849	lb/MMBtu HHV	1.138	0.041	1.179	80% SCR	0.236	0.041	0.277	
CO	ppmv	23	10	30	CO	0.3434448	lb/MMBtu HHV	0.052	0.008	0.059	80% COR	0.012	0.023	0.035	
UHC	ppmv	5	5	5	UHC		lb/MMBtu HHV	0.006	0.002	0.009	-	0.009	0.002	0.011	
PM <sub>2.5</sub>	ppmv	7	7	7	PM2.5		lb/MMBtu HHV	0.014	0.005	0.019	-	0.019	0.005	0.024	
6O2 after GT, hrsg-DB, Blr stack	%	15.0%	3.5%	3.5%	%O2 after G	Γ, hrsg-DB, E	Blr stack								
ollutant Properies - Molar Weight					Exhaust Pol	lutants		Gas Turbine	HRSG-DB	CHP total	Poll. Ctrl	HRSG	Pkge Blr	TOTAL SITE	
NOx	lb/lb-mol	46			NOx		lb/hr	58.2	4.1	62.3	80% SCR	12.5	0.5	13	
СО	lb/lb-mol	28			СО		lb/hr	2.6	0.7	3.4	80% COR	0.7	0.3	1	
UHC	lb/lb-mol	16	assumed C	H4	UHC		lb/hr	0.3	0.2	0.5	-	0.5	0.0	1	
PM2.5	lb/lb-mol	25	assumed		PM2.5		lb/hr	0.7	0.5	1.2	-	1.2	0.1	1	
lue Gas properties					Exhaust Pol	lutants		Gas Turbine	HRSG-DB	CHP total	Poll. Ctrl	HRSG	Pkge Blr	TOTAL SITE	
Molar Volume	dscf / lb-mol	379.7	1-atm & 60f	=	NOx		tons/yr	247.3	17.2	264.5	80% SCR	52.9	2.1	55	OK- NOx 27 % below li
Fd Factor	dscf / MMBtu	8,608	NG:1050 Bt	u/scf @60F	со		tons/yr	11.2	3.2	14.4	80% COR	2.9	1.1	4	OK- CO 84 % below lin
CHP: Effectiveness of Pollution Cont	trol component				UHC		tons/yr	1.4	0.9	2.3	-	2.3	0.1	2	OK- UHC 76 % below
SCR only in CHP		80%	assumed		PM2.5		tons/yr	3.1	2.0	5.0	-	5.0	0.2	5	OK- PM2.5 47 % below
COR only in CHP		80%	assumed												
NPUT	UNIT	VALUE	COMMENT		OUTPUT		UNIT	VALUE	VALUE			VALUE	VALUE	VALUE	
of GT- CHP's		1	1 x XYZ CH	IP				Gas Turbine	HRSG-DB			CHP TOTAL	Pkge Blr	TOTAL SITE	
ach GT power	MW <sub>e</sub>	3.5	XYZ		Fuel input		HHV MMBtu/Hr	51	98			149	12	161	
each GT Heat Rate	LHV MMBtu/MWWh	13.3	XYZ				HHV MMBtu/yr	434,631	833,043			1,267,674	99,629	1,367,303	
ntire Site Steam load	Kpph	125	site data		Steam output		Kpph	19	97			116	9	125	
kgr Blr Efficiency	% LHV	86%	site data				MM lb/yr	160	824			984	78	1,062	
Vater-to-Steam Enthalpy Gain	MMBtu/Klb	1.1	enter DA, e	xit Blr											
vailability (GT-CHP & Pkge Blr)	%	97%	354 days/yı	r	Check: Unfire	ed Steam	Klb/MWhr				OK	5.4			
igh DF Recov. Factor	% unf. WH Recov.	60%	f(pinch, psi	g, F)	Check: Stear	n Rate	HHV MMBtu/ Klb					1.29			
B Marginal Efficiency	% LHV	99%	typical												
Current Permit allowable Emissions															
NOx	tons/yr	75	Assumed		Evano	lo 0:	+	ring F	12 f	or no	rm itt	inc 0	666	o dofin	ition
СО	tons/yr	25	Assumed		Examp	ie ou	itput du	iring Fl	<b>L3</b> 10	or be	THILL	ing &	scop	e defir	iition
UHC	tons/yr	10	Assumed												
PM2.5	tons/yr	10	Assumed												



# Questions?

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