

GWF Henrietta Combined Cycle Project

Capital Cost Estimate

Category	Item	Hours	Rate	Estimated Cost	Notes
Environmental Study/ Permitting				\$ 40,000	
Easements				\$ 50,000	
Water Purchase Agreement				\$ 50,000	
Legal				\$ 10,000	
Engineering		480	125	\$ 60,000	
Pump Station					
	Equipment Cost			\$ 100,000	
	Install			\$ 60,000	
Pipeline					
	Material cost			\$ 100,000	
	Install			\$ 400,000	
Tertiary Treatment Unit					
	Equipment Cost			\$ 1,980,000	Based on quote from Siemens
	Foundation			\$ 54,000	
	Installation			\$ 1,188,000	
	OEM T/A			\$ 38,000	\$200/hr for 3 man-weeks + 3x\$1000 flights + 15x\$100 per diem
	Training			\$ 9,500	\$200/hr for 1 man-week + \$1000 flight + 5x\$100 per diem
	Startup and Testing			\$ 19,000	\$200/hr for 2 man-weeks + 2x\$1000 flight + 10x\$100 per diem
Zero Liquid Discharge System					
	Equipment Cost			\$ 5,760,000	Based on quote from Siemens + 1.5M for Crystallizer and auxiliaries
	Foundation			\$ 90,000	
	Installation			\$ 3,456,000	
	OEM T/A			\$ 38,000	\$200/hr for 1 man-month + 4x\$1000 flights + 20x\$100 per diem
	Training			\$ 9,500	\$200/hr for 1 man-week + \$1000 flight + 5x\$100 per diem
	Startup and Testing			\$ 19,000	\$200/hr for 2 man-weeks + 2x\$1000 flight + 10x\$100 per diem
Total				\$ 13,531,000	

Operational Cost Estimate**Fixed O&M**

Labor - Operators	8760	52.5	\$	459,900	\$35/hr with 50% burden
Labor - Ops./Maint Supervisor	2080	75	\$	156,000	\$50/hr with 50% burden
Labor - Maintenance	4160	60	\$	249,600	\$40/hr with 50% burden
Environmental/Safety			\$	40,000	
Electricity			\$	392,500	estimated load of 700 kW for Tertiary treatment and ZLD
Fixed regular maintenance			\$	93,020	
Other					
Contingency			\$	208,653	
Subtotal			\$	1,599,673	

Variable O&M

Variable regular maintenance			\$	329,799	
Chemicals			\$	122,869	
Water					
Waste removal/disposal			\$	327,652	
Resin Bottle charge			\$	368,608	
Subtotal			\$	1,148,927	
Total Annual Cost			\$	2,748,601	

Equivalent Annual Cost

Cost of Capital		8%
Equivalent Annual Capital Cost	\$	2,113,875
Annual Operating Cost	\$	2,748,601
Total Equivalent Annual Cost	\$	4,862,475

Assume 9 years financing

Estimated Electricity Generated

Hours of operation per year	3500 hours
Generation Capacity	120 MW
Annual MWh generated	420,000 MWh

Cost per MWh Comparison

Cost per MWh for option	\$	11.58
Cost per MWh for Ion Exchange (no sewer)	\$	1.74
Estimated Cost per MWh total (recycled water option)	\$	13.32
Cost per MWh for base water	\$	0.86
Cost per MWh for Ion Exchange (Henrietta actual 2007)	\$	1.74
Total Cost per MWh (proposed option)	\$	2.60

Cost increase for recycled water \$ 10.72 per MWh

15% Allocation Scenario

Cost of Capital	8%
Cost of Land Option for 15% allocation scenario	\$ 694,056
Equivalent Annual Capital Cost	\$ 108,429
Cost per MWh for land option	\$ 0.26
Cost per MWh for base water	\$ 0.86
Cost per MWh for Ion Exchange	\$ 1.74
Total Cost per MWh (proposed option)	\$ 2.86

Cost increase for recycled water \$ 10.46 per MWh

Assumptions

- 1) Capital costs for tertiary treatment and ZLD were based on Siemens Water Technologies quote and discussions.
- 2) Operational Costs were based on conversations with operating plants utilizing recycled water as a major water source.
- 3) Operational Costs were scaled to account for differences in system size and operational conditions.
- 4) ZLD operational costs were used as a proxy for tertiary treatment operational costs based on conversations with Siemens and operating companies.
- 5) Cost estimates for water and Ion Exchange were based on actual costs from Henrietta Peaker and other GWF operating plants.
- 6) Assumed zero cost for recycled water.
- 7) Assumed 9 year financing and a cost of capital of 8%.
- 8) Assumed 3,500 hours of operation, based on historical California grid operational data for equivalent heat rate plants.
- 9) Assumed water right with purchased land option would also be subject to a 15% allocation during that scenario.