







Generation Technology Comparison

August 10, 2009

Current Large Scale (>50 MW) Generation Options CPS Energy is evaluating.
 CPS Energy evaluates options based on their ability to meet targeted generation requirements and/or renewable goals.
 Major considerations in our analyses are expected overall costs, risks, environmental impacts, and sustainability.

	TRADITIONAL OPTIONS			RENEWABLE OPTIONS	
	 NUCLEAR	 COAL CONVENTIONAL (NO CCS)	 GAS (COMBINED CYCLE)	 WIND	 SOLAR¹ (TROUGH W/STORAGE)
Typical Project Size (MW)	2,700	750	595	50-150	25-100
Targeted Generation	Baseload	Baseload	Baseload/Intermediate	Variable	Variable
Construction Time (Yrs)	9	5	3	2	4
Total Cost with Financing (Million\$/MW)	4.8	3.2	0.9	2.5	11.4
Fuel Cost (\$/MMBtu)	0.80	2.40	8.60	0.00	0.00
Capacity Factor (%)	85	85	50	34	41
Annual Operations Cost (\$/MW)	129,000	66,000	30,000	40,000	126,000
Cost of Electricity (cent/kWh)	8.5	10.5	10.5	12.5	21.0
Emissions	none	high (CO ₂) others controllable	medium	none	none
Water Consumption	high	high	low to medium	none	high
Advantages	<ul style="list-style-type: none"> Low, stable fuel costs; No emissions 	<ul style="list-style-type: none"> Generally low cost, domestic fuel source; Mature, reliable technology 	<ul style="list-style-type: none"> Short lead times with low capital and operating costs 	<ul style="list-style-type: none"> Renewable resource with no fuel cost, emissions cost, or water use 	<ul style="list-style-type: none"> Renewable resource with no fuel or emissions cost; Generation profile supports peak load requirements
Key Issues/Disadvantages	<ul style="list-style-type: none"> No long term national strategy for fuel disposal; Public concerns about safety; Long development time and high development cost 	<ul style="list-style-type: none"> High CO₂ emission levels Other emissions costly to control CO₂ regulation will significantly increase cost 	<ul style="list-style-type: none"> Moderate CO₂ levels Volatile fuel prices 	<ul style="list-style-type: none"> Best potential development remotely located; High transmission cost; Variable resource that requires backup generation; Potential grid issues; Storage* 	<ul style="list-style-type: none"> High development cost; Best potential development remotely located; High transmission cost; Variable resource that requires backup generation; Potential grid issues; Storage*

Cost projections are general estimates using information from contracted consultants, the Electric Power Research Institute, the Energy Information Administration, and internal CPS Energy forecasts and studies. Some estimates are rounded.

Project and site specific details will vary costs, sometimes greatly.

Cost projections are routinely updated to reflect current information and assumptions.

¹ Higher uncertainties in technologies with none to limited history in Texas.

No Federal incentives included in estimate.

Consideration for backup power included in estimates.

N/A indicates not available.

Definitions

Baseload - Generation to meet minimum load requirements. Units are designed to run regularly, maximizing capacity factors and minimizing cycling.

Intermediate - Generation with minimal cycling cost designed to meet varying load requirements

Peak/Backup - Generation that cycles and starts up in minimal time at minimum cost to meet peak demand or unforeseen shortages.

Variable - Generation Output that can be profiled, but is uncontrollable. Backup resources are needed to ensure reliability.

Heat Rate - A measure of Power Plant efficiency determined by dividing the heat content input (Btu) by the electric generation output (kWh).

Cost of Electricity - Cost of electricity at the point of delivery from the generation source. Cost does not include transmission costs.

Capacity Factor (CF) - Generation Output as a percentage of capacity over a period of time (Annual CF = Annual MWH / (8760 * Rated Capacity)).

CCS - Carbon Capture and Sequestration.

*Could increase capacity factors and reduce backup requirements, but is costly and currently unproven