Generation Technology Comparison

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Current Large Scale 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)	COAL: ADVANCED (WITH CCS) [1]	GAS (COMBINED CYCLE)	GAS (PEAKERS)	WIND	SOLAR [1] (TROUGH W/STORAGE)	BIOMASS [1]	GEOTHERMAL [1]
Typical Project Size (MW)	2,700	750	525	595	150-250	50-150	25-100	50-100	< 50
Targeted Generation	Baseload	Baseload	Baseload	Baseload/Intermediate	Peak/Backup	Variable	Variable	Baseload	Baseload
Construction Time (Yrs)	9	5	6	3	3	2	4	5	N/A
Total Cost with Financing (Million$/MW)	4.8	3.2	5.8	0.9	1.1	2.5	11.4	3.8	7.2
Fuel Cost ($/MMBtu)	0.80	2.40	2.40	8.60	8.60	0.00	0.00	2.50	0.00
Capacity Factor (%)	85	85	85	50	20	34	41	85	95
Annual Operations Cost ($/MW)	129,000	66,000	71,000	30,000	18,000	40,000	126,000	33,000	177,000
Cost of Electricity (cent/kWh)	8.5	10.5	12.5	10.5	16.5	12.5	21.0	10.0	10.0
Emissions	none	high (CO_2) others controllable	low	medium	medium	none	none	low-medium	none-low
Water Use	high	high	high	low to medium	low to medium	none	high	high	low
Advantages	• Low, stable fuel costs; • No emissions	• Generally low cost, domestic fuel source; • Mature, reliable technology	• Generally low cost, domestic fuel source; • Minimal emissions	• Short lead times with low capital and operating costs	• Short lead times with low capital and operating costs; • Can cycle at minimal cost and start up in minimal time to meet varying loads and provide backup generation	• Renewable resource with no fuel cost, emissions cost, or water use	• Renewable resource with no fuel or emissions cost; • Generation profile supports peak load requirements	• Renewable resource that is dispatchable • Flexible consumption options including co-firing, blending, or gasifying	• Renewable resource that can provide base load generation at high capacity factors • Oil and gas history in Texas provides unique opportunities
Key Issues/Disadvantages	• No long term national strategy for fuel disposal; • Public concerns about safety; • Long development time and high development cost.	• High CO_2 emission levels • Other emissions costly to control • CO_2 regulation will significantly increase cost	• Immature technologies with limited demonstrations • High capital cost • Integrating CO2 controls limits overall plant generation efficiency	• Moderate CO_2 levels • Volatile fuel prices	• Volatile fuel prices • Low capacity factors	• Best potential development remotely located; • High transmission cost; • Variable resource that requires backup generation; • Potential grid issues; • Storage*	• High development cost; • Best potential development remotely located; • High transmission cost; • Variable resource that requires backup generation; • Potential grid issues; • Storage*	• Fuel availability limits project size; • Sites need to be close to fuel source to keep cost competitive • Long term fuel sustainability uncertain	• No commercial developments in Texas • High research, exploration and development costs • Potential risk in production sustainability • Has taken a back seat to wind and solar from legislators • Economics greatly vary from site to site

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.
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*