

Can CSP be Baseload?

ASES Solar 2010 Forum, May 2010



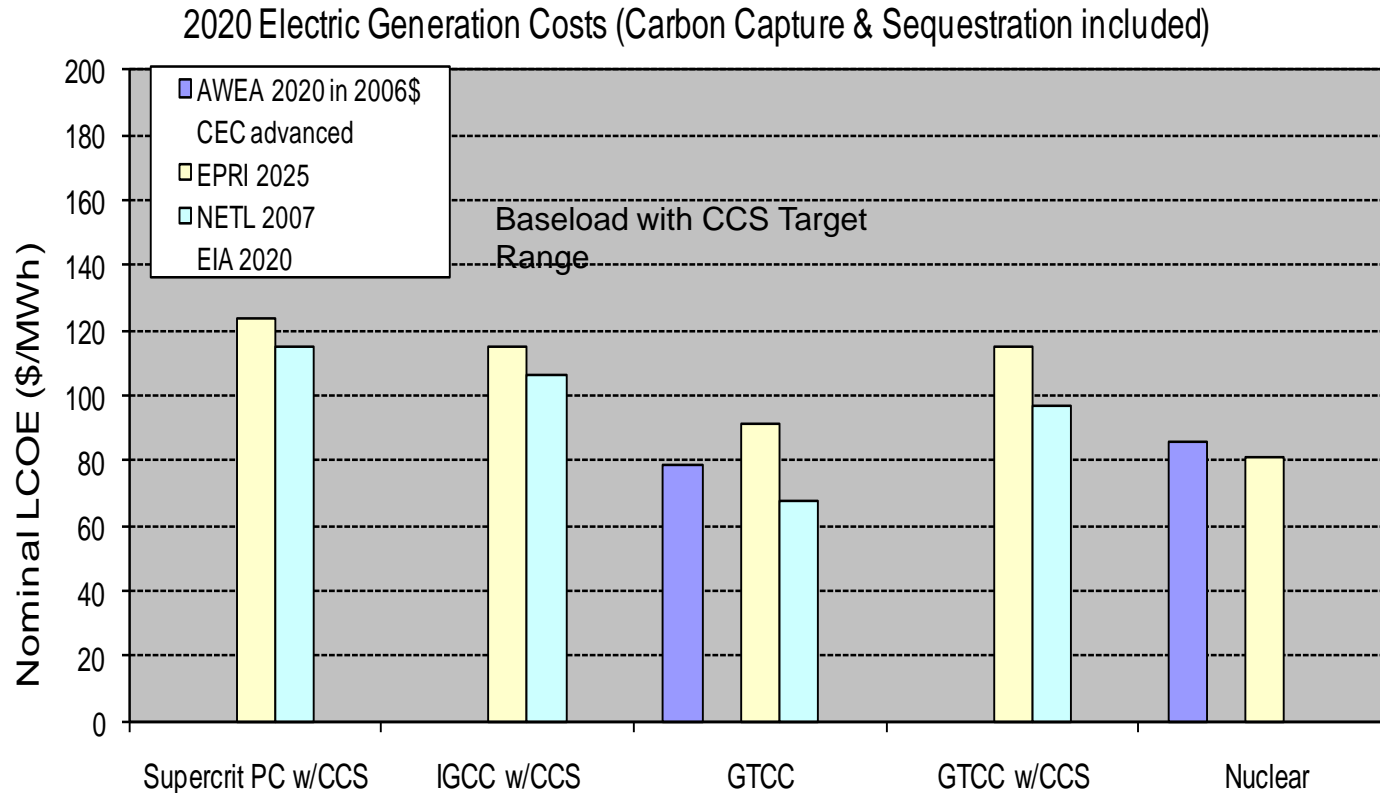
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Discussion

- What is the price target for CSP systems operating at baseload?
- Analysis of cost trends for CSP as function of capacity factor

Cost Target for 2020 “carbon constrained” baseload market

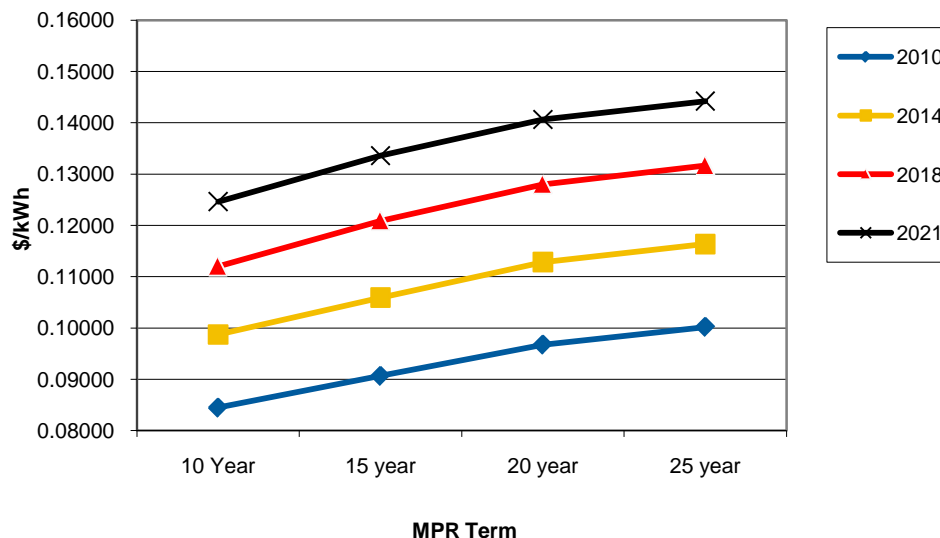


2020 baseload market LCOE = \$95 to \$125/MWh

California 2009 Market Price Referent as Proxy for Baseload System Costs

- MPR is based on dry-cooled GTCC operating at 92% capacity factor (includes \$37/ton “CO₂ adder”)
- Developer’s “bid price” is compared against MPR for any given project
- Bid price is a weighted PPA price based on anticipated annual hourly generation profile and time of delivery values for given California IOU

Impact of Different Project Start Dates on Baseload MPR
Ref. – CEC 2009 MPR Model



SCE TOD Factors		
Month	Period	Factor
Summer (June-Sept)	On-Peak	3.13
	Mid-Peak	1.35
	Off-Peak	0.75
Winter (Oct-May)	On-Peak	1.00
	Off-Peak	0.83
	Super Off-Peak	0.61

Solar Advisor Model (SAM)*

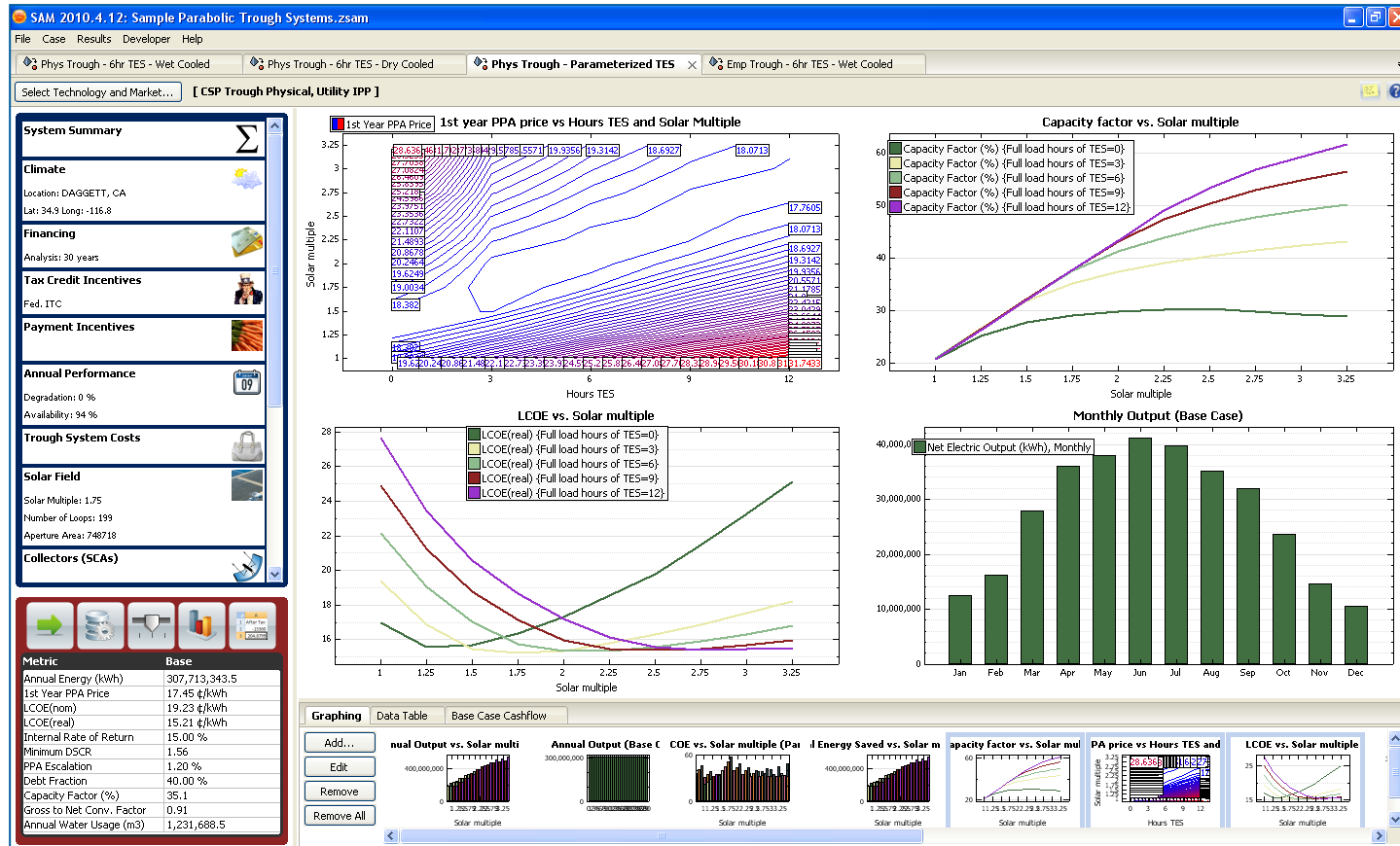
*Download at <http://www.nrel.gov/analysis/sam>

- Models solar performance, cost, finance, and incentives

- Performance models include CSP (trough, tower, dish/Stirling), and PV technologies

- Financial models compute LCOE for utility (IPP), commercial, or residential markets

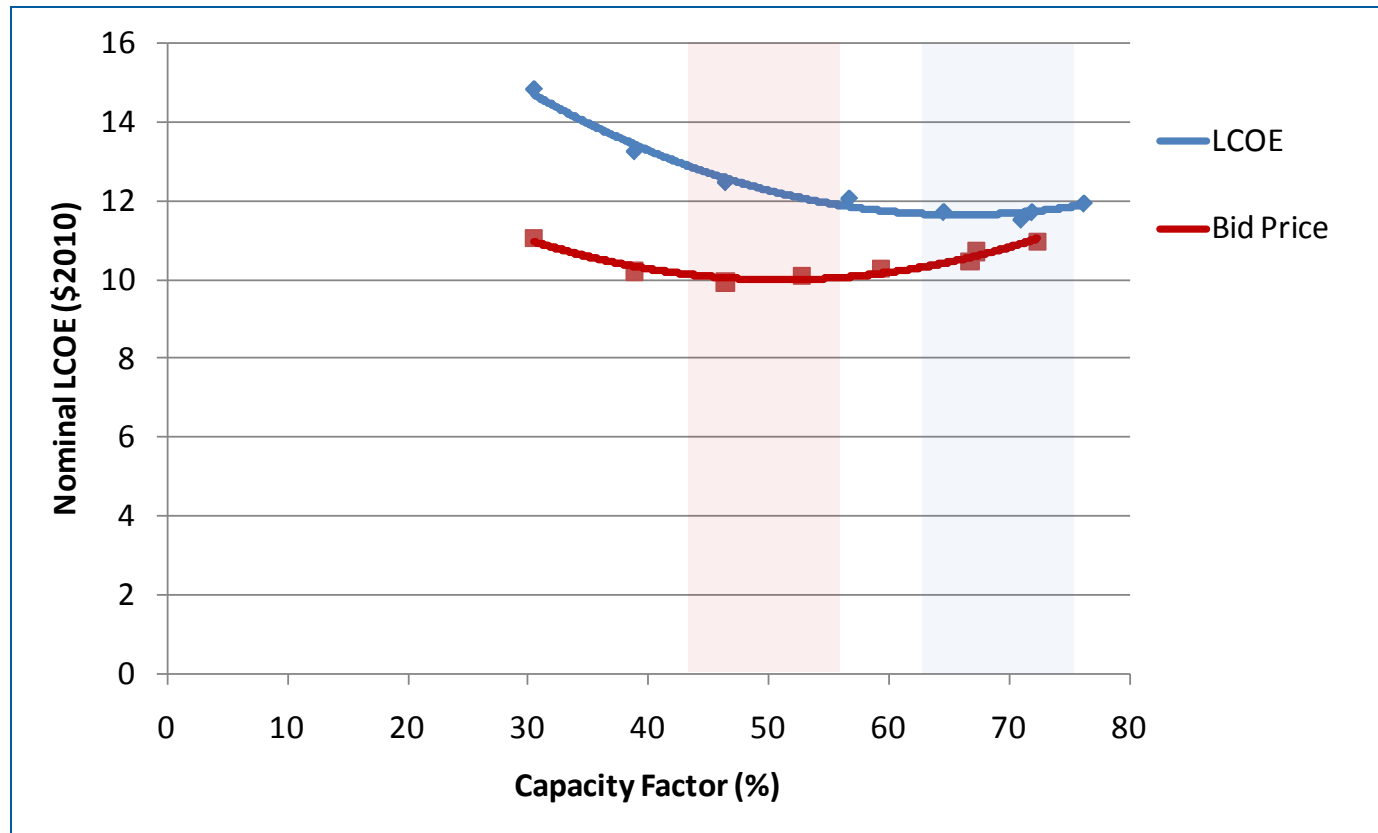
- Internal update includes ability to calculate TOD weighted bid-price



Results: SAM Parametric Analysis (128 simulations)

Future Tower with Molten Salt TES

- Minimum LCOE realized at capacity factor of $\approx 70\%$
- Minimum bid price at capacity factor of $\approx 50\%$
- Bid price at or near MPR for full range of capacity factors



Summary

- Carbon-constrained baseload cost target is in the range of \$.10-.12/kwh based on NREL and MPR analyses
- Future CSP systems can achieve LCOEs that meet this cost target
- Utilities are likely to place more economic value on CSP systems operating at intermediate load capacity factors