

LCOE and LACE

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LCOE

- A measure of Cost.
- Considerations?
 - Capital cost, cost of capital/financial structure, interest during construction, commodity material costs, etc.?
 - Fuel cost; Resource availability and quality; Site issues; etc.?
 - Capacity factor realized, etc.?
 - Transmission; interconnection costs; integration costs?
 - Operations?
 - Dispatchable? Ramp rates?
 - Reserves?
 - Other costs?
 - Water consumption?
 - Environmental impacts—land, water, atmosphere, climate, biosphere?
 - Etc.

It is complicated: technologies have different constraints and serve different purposes. LCOE is a first term in an approximation of cost.... Perhaps add an error term/bar and specify particular role/purpose of the technology?



LACE

- A measure of Value
- Regulated utilities
- Deregulated markets
 - Market operations model needed NEMS, ReEDS, GridView, (SCUC/SCED), etc.?
 - Resolution of model: temporal, spatial, system?
 - Operation of system?
 - Value depends on time of day/week/season, location, system, weather, etc.?
 - Price taker/setter?
 - Fuel cost; Resource availability and quality; Site issues; etc.?
 - Variable O&M, etc.?
 - Transmission?
 - LMPs?
 - Other values/costs:
 - (Energy, capacity), but also T&D deferrals, loss savings, ancillary services, portfolio hedge value, voltage support, grid security (if enabled), etc.?
 - Investment decision process?

It is <u>complicated</u>: LACE will have many different values depending on local circumstances. It is a first term in an approximation of value.... Would an error term/bar be sufficient?







Historical AEO Natural Gas Price Forecasts vs. Actual NG Prices (Average Lower 48 Wellhead Prices)

0

orecasts 03 to 08 Trending upward

with in initial years

with declines

2017

2019

2015

Sources: EIA Annual Energy Outlooks



Cambridge Energy Research Associates Power Plant Cost Index



Storms and Power System Interruptions



Renewable Electricity Futures study



- RE generation from technologies that are commercially available today, in combination with a more flexible electric system, is more than adequate to supply 80% of total U.S. electricity generation in 2050—while meeting electricity demand on an hourly basis in every region of the country.
- The abundance and diversity of U.S. renewable energy resources can support multiple combinations
 of renewable technologies to achieve high levels of renewable electricity use, and result in deep
 reductions in electric sector greenhouse gas emissions and water use.
- The direct incremental cost associated with high renewable generation is comparable to published cost estimates of other clean energy scenarios. Improvement in the cost and performance of renewable technologies is the most impactful lever for reducing this incremental cost.

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