Discussion on bid cost recovery and variable energy resource settlement modifications

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What are the consequences of wrong DEBs for VERs?

… Depends on the use

- Local Market Power Mitigation
  - Possible exercise of market power if overstated
  - Possible discouragement of investment if understated
  - Rare (small resources in gen pockets)
- BCR: Residual Imbalance Energy / Persistence Deviation Metric
  - Possible overpayment (underpayment) of BCR if too high (too low/too negative)
    - Using zero (or likely LMP-based DEB) would increase BCR
    - When need to curtail, could drag up to 7 periods (earning bid) before PDM catches and mitigates to LMP (or to DEB if lower)
  - Less rare
- PJM monitor: important for getting prices, MPM right
  - NYISO – never mitigated

What is the VER owner's marginal cost?

- Predominantly foregone policy subsidies / PPA payments
  - Result in negative DEBs
  - Are they *verifiable, transparent, market-based?*

- Examples:
  1. Federal Production Tax Credit (depends on vintage). 2013-14:
     - Wind, geothermal, closed loop biofuels: $23/MWh
     - MSW, landfill gas, open loop biofuels, hydro upgrade: $11/MWh
  2. RECs
     - Transparent markets for RECs outside California: $0-$70/MWh (next page)
     - TRECs in California: essentially valueless
       - This might change as publics enter market to meet 33% goal

NREL, Status & Trends in the US Voluntary Green Power Market (2013 Data)

www.nrel.gov/docs/fy15osti/63052.pdf

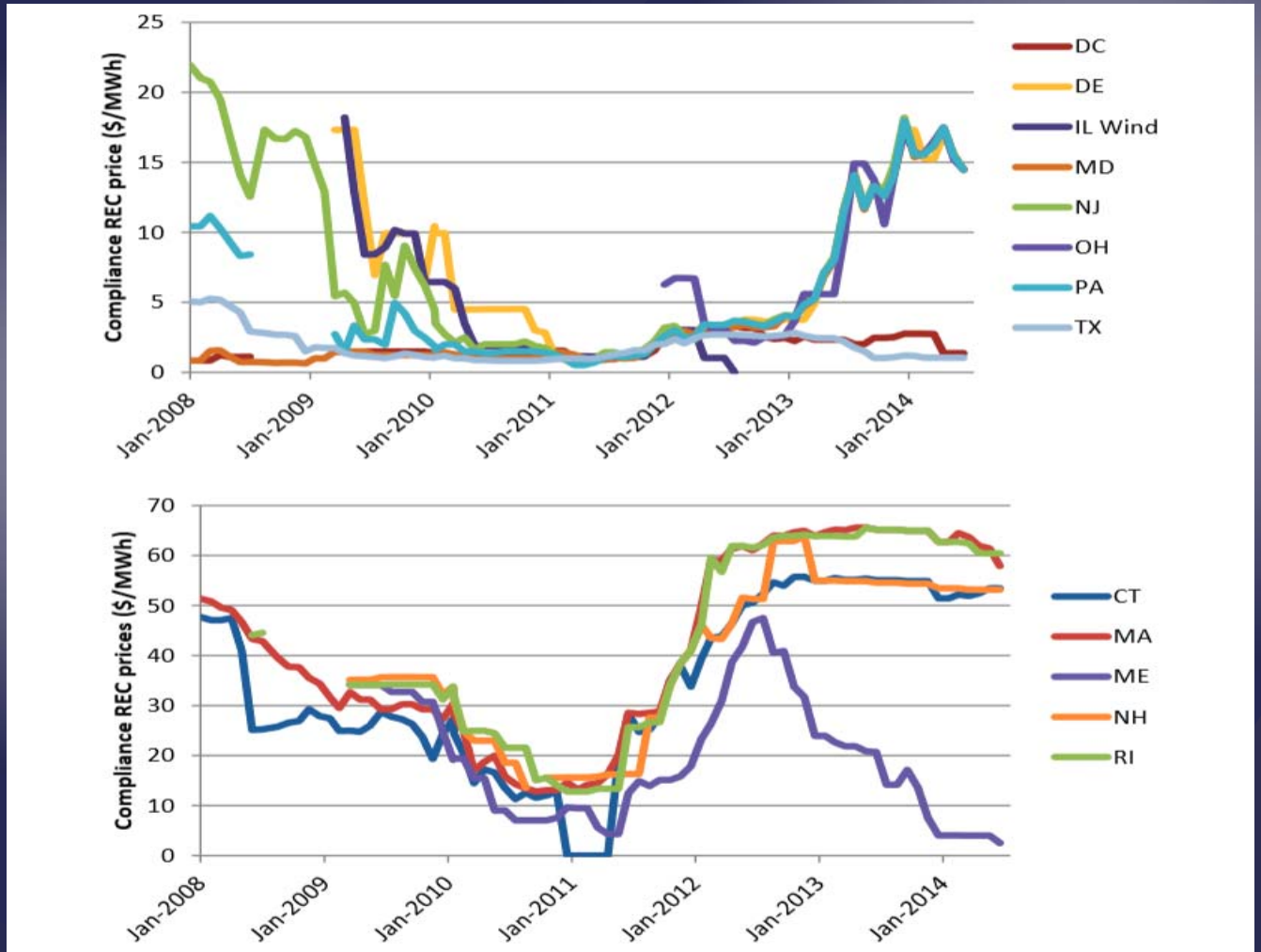


Figure 11. Compliance market (Tier 1) REC prices, January 2008–July 2014

What is the VER owner's marginal cost? (*Cont.*)

2. RECs, *Cont.*
   - California eligible customer/aggregator can get "Renewable Attribute Adder" with the Net Surplus Compensation Rate
     - Most recent WECC average renewable premium
     - 10/1/2013: $16.45/MWh

3. Prices embodied in PPAs
   - Should reflect long run energy revenue minus capital cost of marginal energy sources
     - Models show this may be $30-50/MWh in west (e.g., Perez, Sauma, Munoz & Hobbs, The Effect of Interregional Trading of RECs in the WECC, Working Paper , 2015)
     - Not transparent, not easily verified, not market-wide
     - Indices of recent transactions?
   - Capped by Alternative Compliance Payments ($10-$100 in WECC)

What are marginal costs from *society's* perspective?

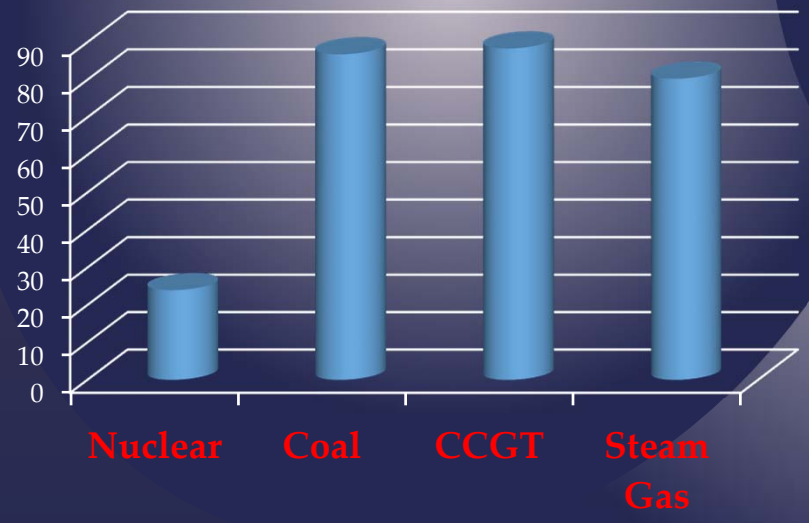
- For existing facilities, PTC, RECs are transfer payments, not a real social cost. So "social" DEB = $0/MWh?
- But under present policy, if RPS is binding, then REC price is indeed social value of renewable energy
  - If you curtail 1 MWh now, an additional MWH will have to be generated sometime in the future at a cost
- A further "but": If present RPS policy is reformed to improve economic & environmental efficiency, then social cost AND VER owner's cost → $0/MWh
  - Proposed reform: pay subsidy for curtailed energy
  - Rationale: forcing renewable energy into system when P<0 increases system cost and, often, emissions
    - win-win if maintain subsidy for curtailed energy

Simulated economic & environmental cost of negative Wind bids

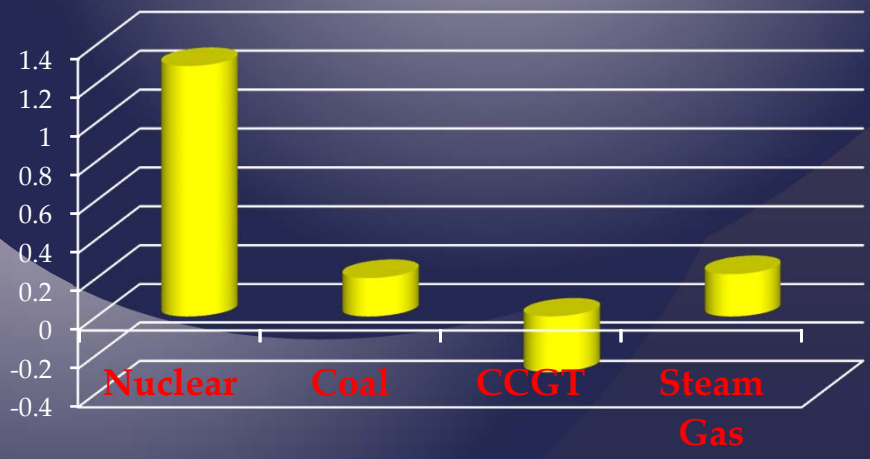
(Deng, Hobbs, Renson, What is the Cost of Negative Bidding by Wind? A Unit Commitment Analysis of Cost and Emissions, IEEE TPWRS, 10.1109/TPWRS.2014.2356514 , 2015)

If decrease wind bid from $0 to -$300/MWh in unit commitment, then cost and, usually, emissions increase

ΔCost/ΔWind ($/MWh)



ΔCO2 /ΔWind (ton/MWh)



Four different generation mixes (dominant generation source)

Conclusions

1. DEB<0 justifiable as this is a true (cash flow) impact on the owner
   - Federal subsidies (PTC) verifiable
   - California subsidies difficult to verify, untransparent
     - Use California TREC prices if they become valuable in future, and are traded in transparent market
   - Elsewhere:
     - PJM uses PTC and REC prices (Manual 15, §9.3)
     - NYISO also (in theory) but no one actually does (despite -$150/MWh bids)
     - Potomac Economics recommends use of contract costs if armlength & in competitive markets
2. ISO should attempt to approach results of competitive markets in which participants reveal their private costs
   - Am not arguing for use of "social cost"-based DEB rather than owner cost
   - Am arguing for RPS policy that would have better cost & emissions outcomes
3. Storage: dominant cost likely opportunity cost, not foregone subsidy
   - PJM also has DEB for regulation storage (rolling average cost of energy consumed) (Manual 15, §11.8)