Opportunity Cost

• A mitigated energy offer for a generating resource reflects the short-run marginal cost of production for the resource.
• The short-run marginal cost may include opportunity cost associated with producing incremental generation now at the expense of producing incremental generation in more valuable hours.
  • Exogenous operational limits can cause opportunity costs
    o Exogenous:
      – External environmental limits
  • Endogenous limits are not a valid source of marginal opportunity cost (means of exercising market power):
    – Decision to fill oil tank halfway
    – Decision to not buy gas, limited to oil
    – Discharge unit in offpeak hour
Opportunity Cost

• If resource owner has control over the limitation or the lost eliminates the opportunity cost.
  o Raises questions of market power
  o Eligible to set price? Circular result.

• Marginal Opportunity Cost in cost offer presumes PJM has dispatch and operational control in optimization period.
  o PJM can commit/dispatch uneconomically absent the marginal LOC adder.

• Rational for marginal opportunity cost eliminated if PJM cannot dispatch/commit
  o PJM cannot commit
  o Charge/Discharge/Continuous
  o Control over Max and Min
  o No outages unless broken
Opportunity Cost

• LOC calculations require a good price estimates
  • Hourly vs. 5 minute
    – Hourly difficult
      • If easy virtual bids would never lose money
    – 5 minute reaction with 5 minute settlement,
      • Very short horizon, very small (zero) opportunity cost
      • Hourly offer change is not compatible: No OC
    – State of charge
  • 5 minute price response (peaks and valley) vs hourly price response
    – Multiple peaks and valleys in day.
    – Offer locked for hour, no OC within the time block.
Opportunity Cost

- Variable discharge rate complicates/undermines calculation
  - Discharge/Charge full capability in 1 hour, 4 hours, or 10 hours? Needs to be fixed.
Opportunity Cost

• State of Charge Information Essential
  • Fully charged coming into the operational day
    o no charging opportunity without discharge
    o No cost (if OC is calculated within an operational day)
      – If cost based on prior day, then inventory method hinted at generally
    o Owner control over charge state undermines opportunity cost