Reserve Margin and Capacity Markets

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Outline

- Reserve margin definition,
- ERCOT capacity additions,
- Capacity adequacy concerns,
- ERCOT reserve margin,
- ERCOT energy only market,
- Capacity market.
Reserve margin definition

- Aka “planning reserve margin.”
- For peak conditions in future season:
  - Given forecast of load,
  - Given forecast of generation additions (e.g., under construction or with firm commitments to begin construction),
  - Given forecast of retirements,
- What is: (generation capacity – peak load)/peak load?
Reserve margin definition

- Typically, estimate of reserve margin decreases into future because demand grows, whereas not all future generation additions have been announced yet.

- In ERCOT, also adjustment of “capacity” for likely wind production on peak.

- Can also calculate reserve margin “after the fact.”

- ERCOT reserve margin historically “required” to be around 13%, but without strong theoretical justification.
ERCOT Capacity Expansion (+) and Retirement (-) by Fuel Type [MW]

- Coal (+) and (-)
- GAS-CC (+) and (-)
- GAS-CT (+) and (-)
- Wind (+)

Most additions combined cycle
Considerable wind added
Capacity adequacy concerns.

- After 2003, most new generation additions have been wind:
  - West Texas wind mostly generates off-peak,
  - Wind capacity does not contribute much to meeting peak demand:
    - “ERCOT Capacity” on next slide shows estimate of contribution of wind to meeting demand at peak,
    - Reserve calculation is “after the fact.”

- Extreme temperatures in 2011 resulted in record peak demand.

- Current concerns as to whether generation capacity will be adequate in future.
ERCOT energy-only market.

- In ERCOT, primary remuneration from centralized market is from sale of energy (and ancillary services).

- Offer caps are high, with anticipation that during “scarcity” or near to scarcity conditions, prices will rise to reflect something like demand willingness-to-pay:
  - Well above variable costs,
  - “Scarcity rents” provide incentives for new generation construction.
ERCOT energy-only market.

- If demand actively participates then, in principle, market moves towards “optimal” reserve margin that balances costs with benefits.

- ERCOT energy-only market is unique in the US.

- In practice:
  - Demand-side is not very active,
  - Proxies to willingness-to-pay are approximate at best, and
  - Prices are not currently high enough to bring forth new capacity.
Capacity market.

- Most Eastern US markets (NY, NE, PJM) have an additional mechanism to bring forth capacity:
  - Auction where forecast needs for capacity are purchased in the one to several years ahead timeframe.

- Requires:
  - Commitment to purchase this capacity whether forecast turns out correct or not,
  - Capacity to charge to load serving entities,
  - Mechanism for load serving entities to trade out of obligations.