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Best Practices in Resource Adequacy

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Market Designs for Resource Adequacy

Type of <u>Centralized</u> Capacity Market	<u>Without</u> Resource Adequacy Requirement		<u>With</u> Resource Adequacy Requirement	
	Energy-Only Markets	**w/ Capacity Payments or PPAs**	**Short-term**	**Forward**
None	ERCOT, AESO, Australia's NEM, NordPool, Great Britain	Argentina, Chile, Colombia, Peru, Spain, South Korea, Ontario	SPP, former power pools (NYPP, PJM, NEPOOL)	CAISO
Voluntary			Midwest ISO	
Mandatory			NYISO, former PJM, Australia's SWIS	PJM, ISO-NE, Brazil

Examples of "Energy-Only" Markets

- U.K. pool, ERCOT, and Alberta are examples of "energy-only" markets that work reasonably well today
  - But concerns exist in both U.K and ERCOT about whether capacity shortages can actually be avoided over next 3-5 years
- Many energy-only markets "work" because they started out with excess capacity
  - Ability to ensure the "right" level of resource adequacy untested
  - A number of academic studies find that "energy only" will produce too little reliability and too much volatility
- Significant out-of-market interventions in most so-called "energy-only" markets
  - Reliability-must-run contracts, capacity payments, long-term PPAs
  - Government ownership of existing or new generation
  - Regulated cost recovery in non-restructured states
  - Explicit or implicit planning reserve margin requirements

Myths Around "Energy-Only" Markets

Myth	Reality
♦ "Energy-only" markets can have planning reserve requirements	♦ Imposing any resource adequacy requirement creates a capacity market (at least bilaterally)
♦ Energy-only markets avoid costly capacity payments	♦ Same costs to achieve the same reliability. Energy-only markets require periodic price spikes high enough to pay for capacity
♦ Energy-only markets avoid regulated solutions such as resource adequacy standards	♦ Real-world energy-only markets all require significant market intervention (e.g., regulated scarcity pricing) Out-of-market payments are common (reliability must run, government-owned generation, backstop procurement, regulated cost recovery)

Conditions for Workable Energy-Only Markets

- Abandon resource adequacy requirements; uncertainty about actually achieved level of reliability is acceptable politically
- Periodic severe price spikes and curtailments are acceptable
  - California power crisis levels every 5 to 10 years?
  - Market-based or effective administrative scarcity pricing that allows prices up to VOLL ($10,000/MWh?)
- Customers can be curtailed based on reliability level purchased (to avoid common-good/free-rider problem)
- Customers understand how much reliability they need
- Competitive energy markets that limit market power
  - Low concentration of generation; limited transmission constraints
  - Substantial amounts of price-responsive demand
  - Light-handed energy-market mitigation to avoid “missing money” problem

Why Resource Adequacy Standards?

- Resource adequacy standards offer several attractive benefits
  - Ensure adequate reliability, prevent curtailments
  - Address common good/free ridership problem
  - Reduce price volatility and investment risk premiums
  - Mitigate market power in spot energy markets
- Do reserve requirements distort markets?
  - Yes, but similar to requirements imposed in other markets
  - Examples: vehicle safety standards, building codes, appliance efficiency requirements
- Will RAS be able to fade away as demand response grows?
  - Not entirely, because DR (creating additional "non-firm" service) does not eliminate the need for reliability of serving residual ("firm") load
  - Only if customers can choose to purchase higher reliability for their firm residual load (and the ISO can curtail others)

Setting Resource Adequacy Levels

- Current RA levels typically based on 1-day-in-10-year standard
  - Not updated for change in end-use applications in decades
  - Often do not consider magnitude of curtailments (MWh lost)
  - Not updated as control areas grow
  - Does not consider transmission and distribution reliability
- Determining the “right” level of RA should consider
  - Cost of incremental capacity
  - Value of additional reliability
  - Benefits of reduced price volatility (lower investment risk premium, customer value, and policy value)
  - Increased competition in short-term energy markets

Implications and Best Practices for RAS

- Imposing resource adequacy requirements means:
  - Creation of capacity market (at least bilateral)
  - Existing and new resources have equivalent capacity value
- Best-practice design elements for any market with resource adequacy requirements include:
  - Scarcity pricing in energy and ancillary services markets
  - Integrate DR resources (dispatchable, price responsive, efficiency)
  - Locational requirements in import-constrained locations
  - Setting the right level of resource adequacy
- Advantages of other design elements depend on market structure
  - Short-term vs. forward resource adequacy requirements
  - Enforcement and backstop procurement
  - Standardized capacity products
  - Voluntary or mandatory centralized market for residual capacity

Short-Term versus Forward RAS

Advantages of Short-Term

- Simpler, lower implementation costs
- Lower risk of inadvertent errors (e.g., peak load forecast) and ex-post challenges
- Allows for more flexibility in regulated planning processes of states and local jurisdictions

Examples: SPP, former power pools, some Canadian markets; Some regions with centralized capacity markets (NYISO, MISO, former PJM, Australian SWIS)

Advantages of Forward

- Reduces capacity price volatility and investment risk premium
- Facilitates entry by (and financing of) unregulated new plants and cap adds
- Increases competition from new resources, mitigates market power
- If inadequate reserves are discovered, there is sufficient time for backstop procurement (in markets without regulated resource planning)

Examples: CAISO; Some regions with centralized capacity markets (PJM, ISO-NE, Brazil)

Bilateral-Only vs. Centralized Capacity Markets

Advantages of Bilateral-Only

- Simpler, lower implementation costs
- Lower risk of design flaws; design parameters have less impact on market prices
- Lower political risks because capacity costs are less visible
- Allows for more flexibility in regulated planning processes of states and local jurisdictions

Examples: all markets with planning reserve requirements but no centralized capacity markets (SPP, former power pools, some Canadian markets, CAISO)

Advantages of Centralized

- Increases price transparency; lowers risks and transactions costs, particularly in markets with many small suppliers
- Supports retail competition by facilitating transactions to address load migration
- Facilitates integration of DR resources
- Provides transparent, market-based backstop procurement mechanism by system operator
- Facilitates monitoring and mitigation of market power

Examples: MISO, NYISO, Australia's SWIS, PJM, ISO-NE, Brazil

Voluntary vs. Mandatory Capacity Markets

Advantages of Voluntary

- Administrative parameters have less impact on centralized and bilateral market prices
- Allows for more flexibility in regulated planning processes of states and local jurisdictions

Examples: MISO

Advantages of Mandatory

- Improves liquidity and transparency
- Facilitates market-based backstop procurement
- Better addresses load migration, particularly in markets with forward RAS and retail choice
- Allows for more comprehensive market monitoring and mitigation of market power

Examples: PJM, ISO-NE, NYISO, Brazil

What Works and Doesn't in Forward Capacity Markets

Working

- Attracted and retained large amounts of capacity, even at market prices lower than net CONE
    - PJM's RPM attracted/retained a net of 7,210 MW of capacity in sixth auction alone, after a net capacity addition/retention of more than 14,000 MW in the first five auctions
    - ISO-NE's FCM attracted 900 MW capacity in the 1st auction, and 3,134 MW of new capacity in the 2nd auction
- RPM and FCM have attracted large amounts of low-cost demand response

Continuing Challenges

- Local reliability; continued reliance on RMRs in some markets
- Treatment of planned transmission
- Buyer market power
- Contentious administrative determinations (load forecasting, reliability targets, Net CONE)
- Tension in accommodating short lead-time resources (mostly DR) and long lead-time projects (baseload generation, transmission)
- New market design elements (e.g., scarcity pricing, price responsive DR)
- Perceptions ("not yet reliable") and transition issues ("rate shock")

Additional Reading

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