Resource Adequacy in Competitive Wholesale Markets: The U.S. Experience

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Obligatory Disclaimer

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## U.S. Electricity Regulation: Who is Responsible for What?

<table>
<thead>
<tr>
<th>Federal Regulation (FERC)</th>
<th>State Regulation (PUCs)</th>
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<tbody>
<tr>
<td>Wholesale sales of capacity and energy for resale in interstate commerce</td>
<td>Retail sales to end users</td>
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<td>Transmission of electricity in interstate commerce</td>
<td>Low-voltage distribution</td>
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<td>(Very) Limited transmission siting authority</td>
<td>Siting of power plants and transmission lines</td>
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<td>Permitting of hydro plants</td>
<td>Resource planning; <em>i.e.</em> the generation types (coal, natural gas, renewable) used by a utility to serve customers</td>
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<td>Otherwise, no generation planning or facility siting control</td>
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<td>Reliability of transmission grid</td>
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Historic Industry Structure

- Vertically-integrated monopolies with “bundled” cost-based rates
- Individual utilities plan and build generation, transmission and distribution to meet own load growth
- Some power pooling and wholesale sales between entities, but resource sharing not prevalent early on
- Almost no resources owned by non-utilities
Evolution to Competitive Markets

- Federal and state policy changes encourage greater electricity competition and development of “merchant” (non-utility) generation
  - Many states required utilities to unbundle and divest assets
- Regional Transmission Organizations and Independent System Operators (RTOs/ISOs) created
  - Organized wholesale energy markets with price caps
  - Originally required member utilities to provide sufficient capacity or pay a deficiency charge; operated voluntary balancing markets for capacity
U.S. Resource Adequacy Constructs

- RTO/ISO-run centralized capacity markets with a single market clearing price

- State regulators set requirements for utilities; RTO operates residual market(s)
  - California ISO, Midcontinent Independent System Operator

- Non-RTO/ISO regions: state regulated integrated resource planning
Why Centralized Capacity Markets?

- Resolve “missing money” problem and provide opportunity for fixed cost recovery
  - Energy market mitigation limits revenue opportunity
- Give RTO/ISO an administrative tool to assure resource adequacy/reliability needs are met with least cost mix of resources
- Establish transparent market signals for future investment
Challenge: Interaction with State and Local Policy Goals

- States concerned that market power mitigation conflicts with renewable energy goals
  - Offer floors (“Minimum Offer Price Rule”) prevent certain resources from bidding below cost to assure clearing; ensures out-of-market subsidies do not distort market outcomes
  - May prevent higher-cost renewables from clearing market and satisfying RA requirements

- RTOs/ISOs have taken a variety of approaches to addressing this potential conflict
  - Exemptions
  - Defining who is subject to offer floors
  - Resource-specific offer floors and unit-specific review
Challenge: Are we getting the “right” capacity resources?

- Originally procured a single product – MWs
  - No consideration of resource type; little consideration of transmission deliverability or location

- Evolved to include locational features to account for transmission limits and send location-specific price signals

- Today’s challenges: resource performance, fuel assurance, and resource characteristics
  - Poor performance of capacity resources, especially during tight system conditions
  - Risks of interruptible fuel supplies
  - Need for specific resource characteristics (e.g., fast ramping)

- All RA constructs face these challenges to some degree
Interregional Resource Adequacy

- Little resource planning across RTO/ISO regions or utility systems in non-RTO/ISO regions
- Each capacity construct has rules to allow external resources to participate
- Goal is to balance greater competition/economic efficiency against potential reliability impacts
- Considerations include:
  - Transmission availability and potential for curtailment by neighboring systems
  - Operator visibility and ability to dispatch
  - Impact of redispatch scenarios on deliverability
  - Application of market rules applied to internal resources (must-offer, etc.)
Thanks!

Questions?

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