ENERGY REGULATORS REGIONAL ASSOCIATION

www.ERRAnet.org

Generation Capacity Mechanisms and Resource Adequacy Planning

Jennifer Heintz
Public Service Commission of the State of Missouri

February 7, 2013

Abu Dhabi, UAE

ENERGY REGULATORS REGIONAL ASSOCIATION

Electricity Markets in the U.S. and Canada

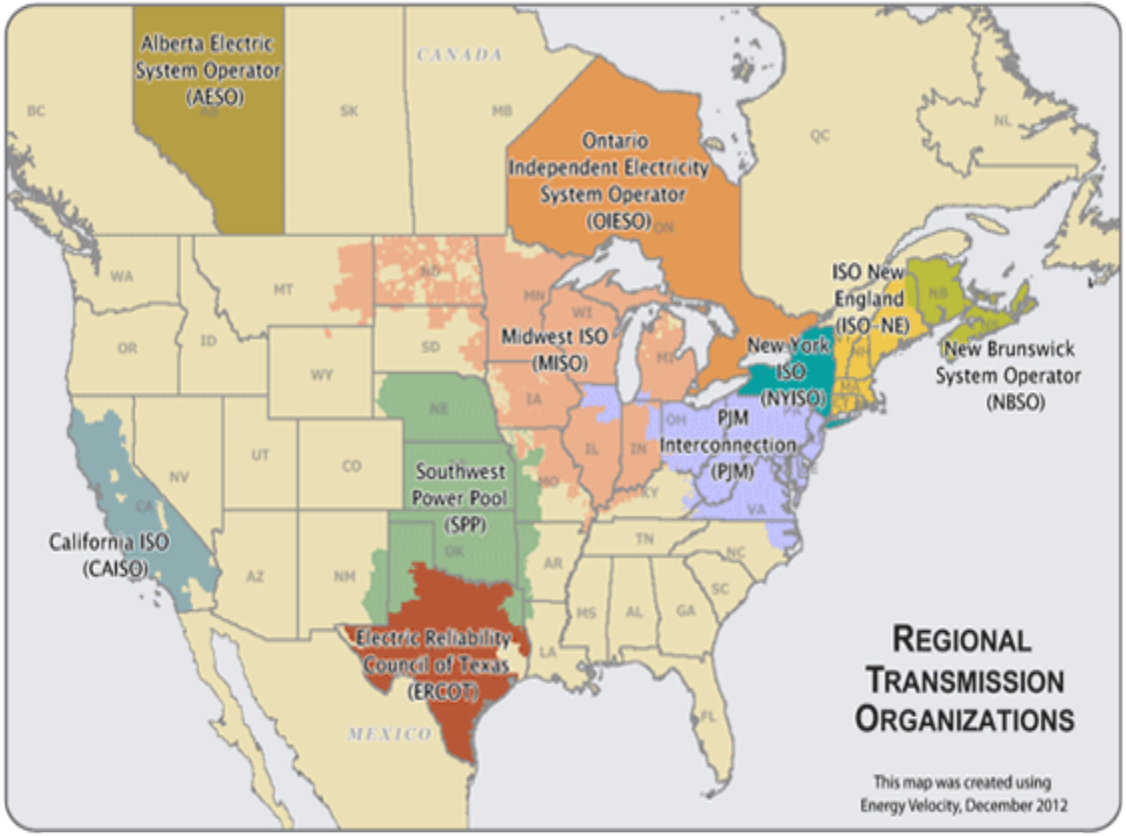
www.ERRAnet.org

- In the United States and Canada, there are several regional electric grids.
- Most eastern and mid-western states belong to Regional Transmission Organizations (RTOs).
- RTOs are regulated by the Federal Energy Regulatory Commission (FERC).
- Missouri utilities belong to either MISO (Midwest Independent System Operators) or the SPP (Southwest Power Pool).

ENERGY REGULATORS REGIONAL ASSOCIATION

FERC RTO/ISO Map

www.ERRAnet.org



Capacity Markets

- In some regions of the United States, capacity markets have been established.
- Capacity markets can help ensure the reliability of the supply of electricity in the event of both planned and unplanned circumstances.
- Capacity markets provide additional incentives for owners of generation capacity and demand-response providers.
- Providers are paid on a kilowatt per year basis.
- http://www.enernoc.com/our-resources/term-pages/705-what-is-a-capacity-market

Capacity Markets

- Generation capacity markets are more common in restructured states where ownership elements are structurally separated.
- Generation capacity markets are less common in vertically-integrated states where the generation, transmission, and distribution are all owned by the same utility.
- The Southwest Power Pool (SPP) does not have a structured generation capacity market.

Capacity Markets

- Utilities have the ability to move from one RTO to an adjoining RTO.
- Some utilities may have incentives to move from an RTO without a generation capacity market to an RTO with a capacity market. (Ex: utilities from the eastern part of the MISO system moving into PJM)
- Generally a utility leaving an RTO has to pay an exit fee.

Capacity Markets

- Proponents of generation capacity markets argue that existing revenues are insufficient to encourage generators to build new capacity or to ensure that existing capacity will stay in the market.
- Proponents also argue that an additional payment will encourage new market entrants and will encourage existing generators to stay in the market or to expand.

Capacity Markets

- Three eastern RTOs have developed some kind of capacity market mechanism:
  - PJM (Pennsylvania Jersey Massachusetts)
  - New York ISO (Independent System Operator)
  - ISO New England

Capacity Markets

- Common features of resource procurement mechanisms:

1. Entities serving end-users (retail customers) must have sufficient capacity to reliably serve those end-users
2. Methodology to determine reserve margins and future capacity needs for the RTO and sub-regions within the RTO
3. A means of soliciting qualified supply resources to meet future capacity needs

Capacity Markets

- Common features of resource procurement mechanisms, cont.:

4. A benchmark for judging the cost of new capacity
5. A means of creating a demand curve
6. An auction or other mechanism to choose resources and set a price for capacity

PJM Capacity Market

- PJM has the “Reliability Pricing Model”
  - The RPM has a locational (sub-regional) capacity mechanism
  - 3-year capacity obligation
  - Auctions began in 2007
  - Prices were determined using an offer-based supply curve and simulated downward-sloping demand curve (Variable Resource Requirement or VRR)

PJM Capacity Market

- PJM auctions:
  - Base Residual Auctions: these auctions procure resource commitments for delivery three years in the future
  - Incremental Auctions:
    - 20 months prior to delivery year (procurement of replacement capacity for unfulfilled commitments)
    - 10 months prior to delivery year (more capacity can be procured if delivery year peak load forecast has increased since the base auction)
    - 3 months prior to delivery year (procurement of replacement capacity for unfulfilled commitments)

PJM Capacity Market

- PJM auctions, cont.:
  - Load Serving Entities (LSEs) must participate in the auctions
  - LSEs can self-supply, but their resources must be offered in the base auctions
  - Base auctions are an opportunity to purchase capacity beyond what the LSE can self-supply
  - The Fixed Resource Requirement (FRR) allow LSEs to meet fixed capacity obligations
  - Market clearing price paid for all resources committed in the auction
  - Performance-based penalties

PJM Capacity Market

- PJM has established a Minimum Offer Price Rule (MOPR):
  - Meant to discourage efforts to depress market clearing prices by submitting offers that are not competitive
  - A “conduct screen” is used to determine if a bid is too low to be competitive
  - Non-conforming bids are subject to mitigation
  - Resources are re-priced at threshold levels

PJM Capacity Market

- Resources exempt from PJM's Minimum Offer Price Rule:
- Nuclear
- Coal
- Integrated gasification combined cycle (IGCC)
- Hydroelectric
- Wind
- Solar
  - These resources can offer a price below established thresholds

PJM Capacity Market

- The Independent Market Monitor (IMM) monitors for supplier market power.
- IMM has identified structural problems.
- IMM has not identified any exercise of market power.
- Effective competition requires appropriate checks on both sides of the market to prevent distortion on either side.
- FERC addressed only buyer market power in its April 2011 Minimum Offer Price Rule.

PJM Capacity Market

- See the IPU White Paper by Dr. Rose for a diagrammatic analysis of the PJM Capacity Market.

PJM Capacity Markets

- See the data about PJM in the FERC handout:
  - Average Bilateral Prices
  - Daily Average of PJM Day-Ahead Prices
  - Eastern Daily Index Day-Ahead On-Peak Prices
  - Implied Heat Rates at Eastern Trading Points-Weekly Averages
  - Weekly Generation Output- Mid Atlantic
  - Weekly Generation Output-Central Industrial Region
  - PJM Capacity Prices
  - PJM West Electric Forward Price Curves and Implied Heat Rates

MISO Resource Adequacy Mechanism

- MISO implemented a resource adequacy mechanism in 2009. It has three main components:

1. A Planning Reserve Margin (PRM) for the entire footprint.
2. Standardized resource qualifications.
3. Facilitation of LSE compliance requirements.

MISO Resource Adequacy Mechanism

- MISO has created a voluntary one-year capacity mechanism with self-schedule and opt-out provisions.
  - Still relies on state processes for resource planning, load forecasting, demand response, and energy efficiency investment decisions
  - Reserve margin needs have decreased from 15.4% to 11.3% in 2012

MISO Resource Adequacy Mechanism

- In June 2012, FERC accepted these elements of MISO's resource adequacy enhancements:
  - Annual resource adequacy requirements and voluntary planning resource auction
  - Seven local resource zones with local clearing
  - Opt-out provision allowing participants to submit a fixed resource adequacy plan, allowing utilities to opt out of the yearly auction
  - Deficiency charge for entities that are short on capacity (based on the cost of new entry)

MISO Resource Adequacy Mechanism

- FERC-approved elements of MISO resource adequacy mechanism, cont.
  - Use of energy efficiency resources to supply capacity
  - Two-year transition to honor agreements for zone-to-zone transfers
  - Tracking retail load to assign capacity obligations to retail suppliers with a new default methodology in retail choice areas

- See the data about MISO in the FERC handout:
- Midwest Annual Average Bilateral Prices
- Daily Average of MISO Day-Ahead Prices-All hours
- MISO/PJM Index Day-Ahead On-Peak Prices
- Eastern Daily Index Day-Ahead On-Peak Prices
- Midwestern Daily Index Day-Ahead On-Peak Prices
- Eastern Daily Index Day-Ahead On-Peak Prices

- MISO date, cont.:
- Implied Heat Rates at MISO and PJM Hubs-Weekly Averages
- Weekly Generation Output-Central Industrial Region
- Weekly Generation Output-West Central

Sources

- An Examination of RTO Capacity Markets
  - IPU Working Paper No. 2011-c
  - Kenneth Rose, Ph.D
  - http://ipu.msu.edu/research/pdfs/Working-Paper-Rose-Capacity-Markets.pdf
  - www.pjm.com
  - https://www.midwestiso.org/Library/Repository/Communication%20Material/Power%20Up/ResourceAdequacy.pdf
  - http://www.ferc.gov/market-oversight/mkt-electric/pjm/2013/01-2013-elec-pjm-archive.pdf
  - http://www.ferc.gov/market-oversight/mkt-electric/midwest/2013/01-2013-elec-mw-archive.pdf

Thank You