

# OMS Commissioners & Staff User's Guide to the Midwest ISO

*Resource Adequacy, Mandatory Capacity Requirements, Auctions*

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For the Montana PSC Commissioners & Staff

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Chair Resources WG



# Resource Adequacy Agenda

- Historical Basis for Pool Capacity at Peak Loads
- Present Resource Adequacy (RA) Construct
- Midwest ISO Enhanced RA Proposal
  - Planning Zones,
  - Capacity Compliance,
  - Auctions
- Discussion



# Original Power Pools

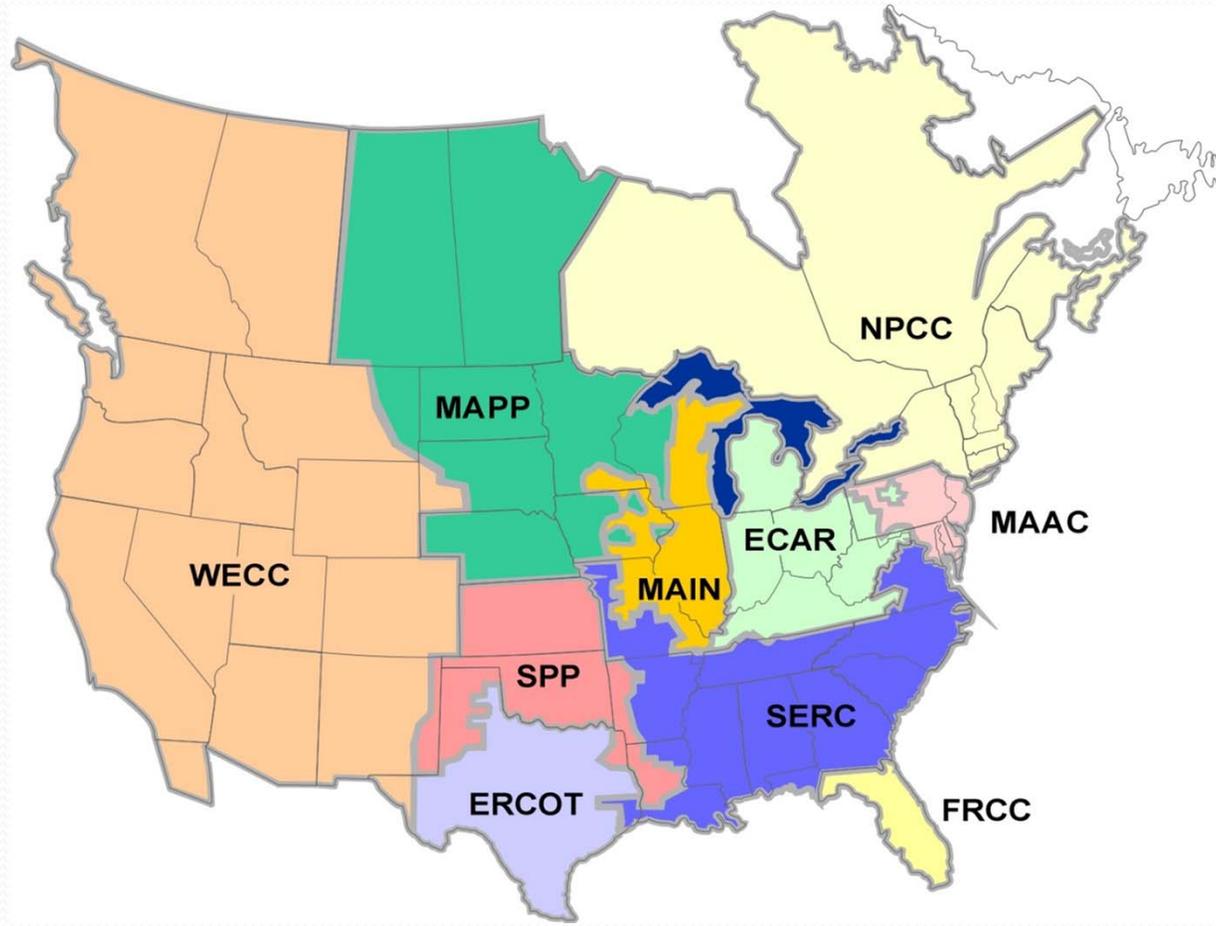
- First Pool – PJM – 1920's
  - Pennsylvania – New Jersey – Maryland closely connected with high voltage transmission
  - Share power for maintenance scheduling and backup capacity at peak loads
- Mid-America Power Pool – MAPP
  - 1950's – same reasons as others
- Mid-America Interconnect Network
  - After 1963 Northeast Blackout and before NERC



# North American Reliability Council

- The Northeast Blackout of 1963 ultimately caused the formation of the regional reliability councils which were voluntary
- Guides set for planning, design, and operation of high voltage transmission system and generation interconnections
- The 1960's planning pools were approximately 40,000 MW for the multi-state areas connection with 345 kV

# Former Reliability Councils



# Reserve Planning

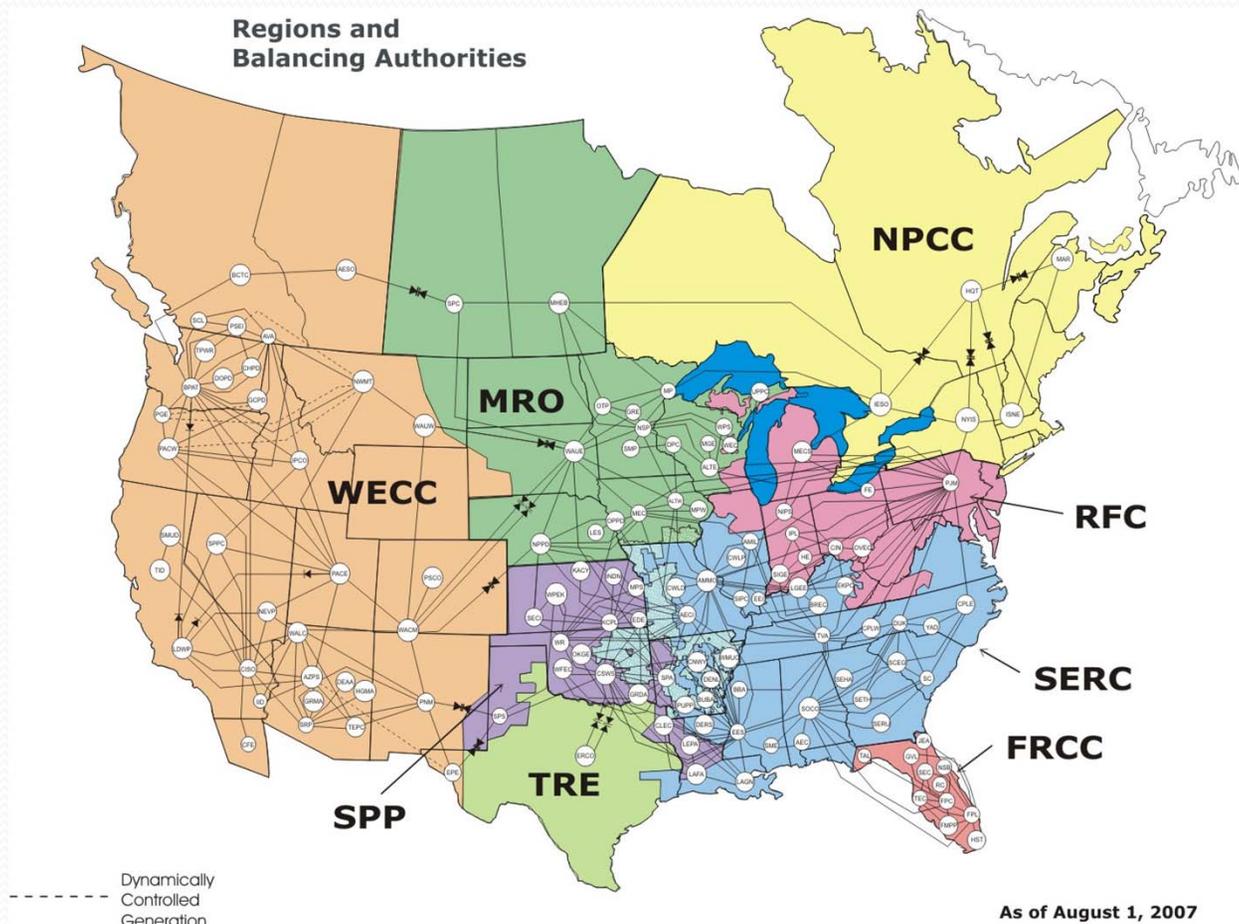
- MAPP had Loss of Load Expectation (LOLE) of 1 day in 10 years and that equated to approximately 15% reserve for peak days
  - MAPP enforcement was after peak day – shorts under 15% paid longs over 15%
- MAIN also had 1 in 10 LOLE. It calculated reserves each forward year and several years out. The reserve was also approximately 15% - Varied to 18% long term and down to 13% short term
- ECAR – had a daily operating reserve of 4% - which equated to a system reserve over 13% when considering scheduled maintenance off peak



# Energy Policy Act 2005

- After the 2003 Northeast Blackout, the EPA 2005 mandates reliability standards and no longer voluntary
- Many standards being developed and review by FERC for final approval
- Significant Monetary Penalties for failure
- New regional formations

# New Reliability Entities & Balancing Authorities in 2007

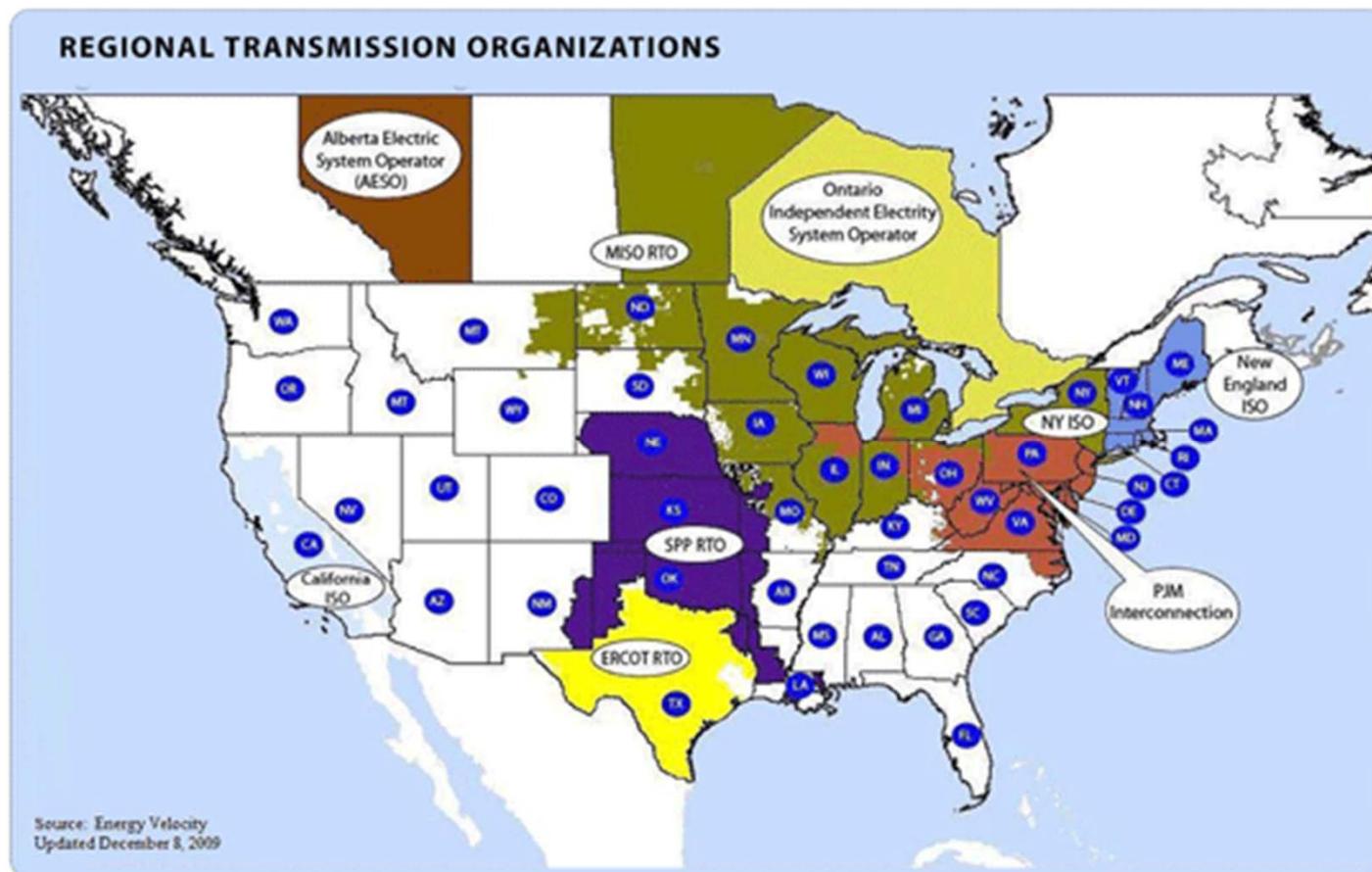




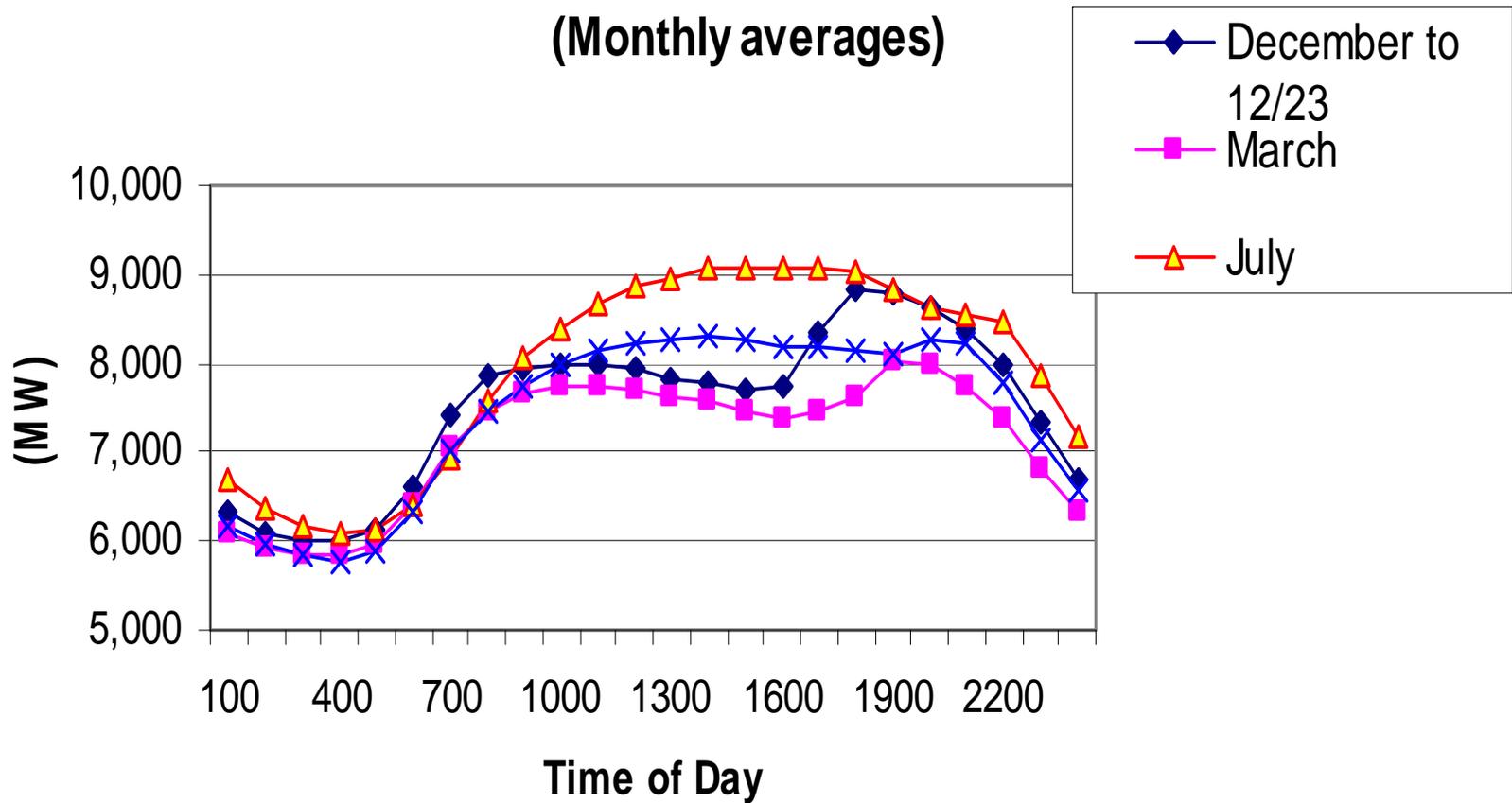
# Resource Adequacy – Midwest ISO Footprint

- Mid-America Reliability Organization (MRO)
  - 1 in 10 LOLE – not yet approved by FERC
- Reliability*First* Corp (RFC)
  - 1 in 10 LOLE before FERC – being contested by some
- Southeast Electric Reliability Council (SERC) now SERC Reliability Corporation
  - Daily reserves and yearly assessments

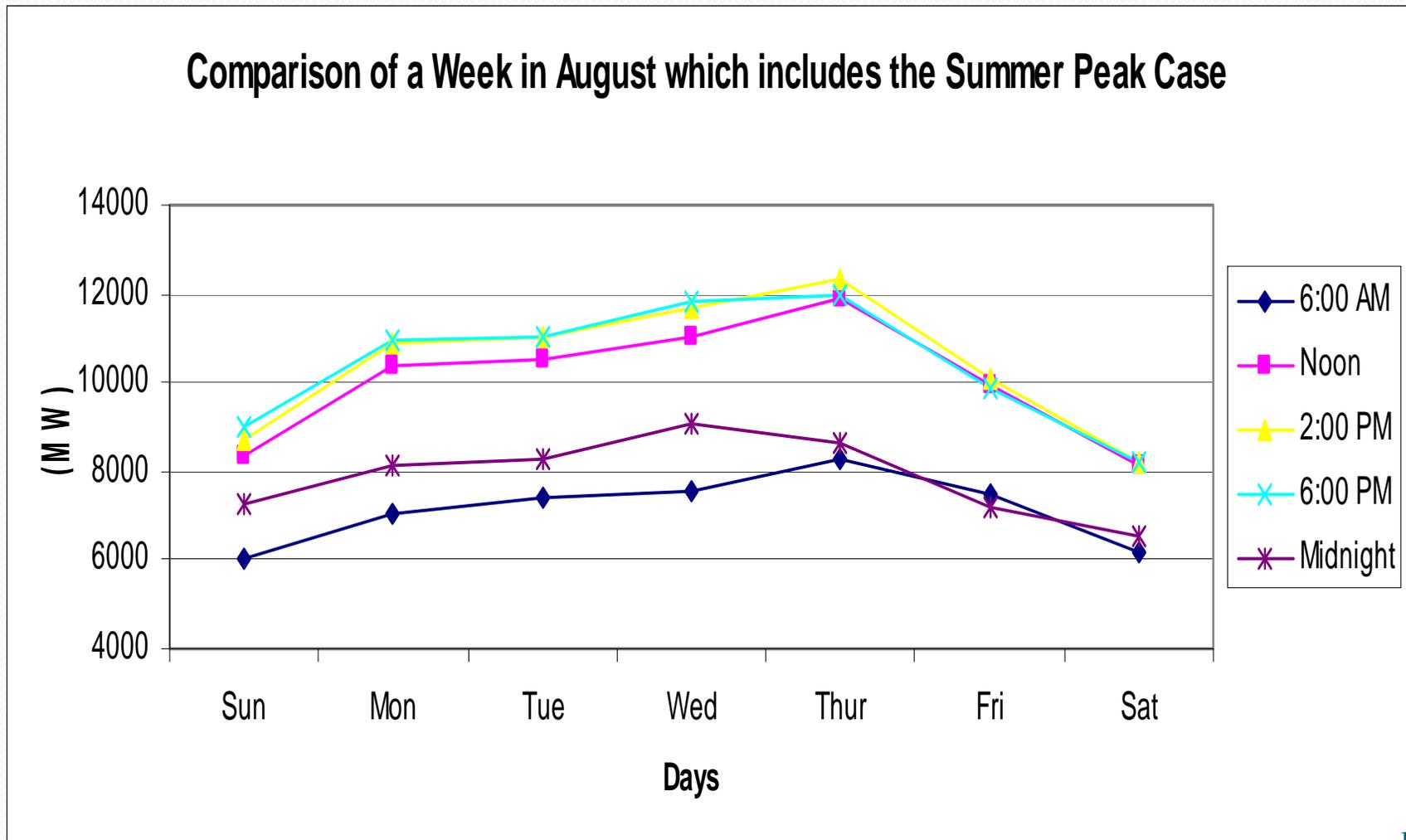
# Midwest ISO Regional Reliability Coordinator and other voluntary RTOs



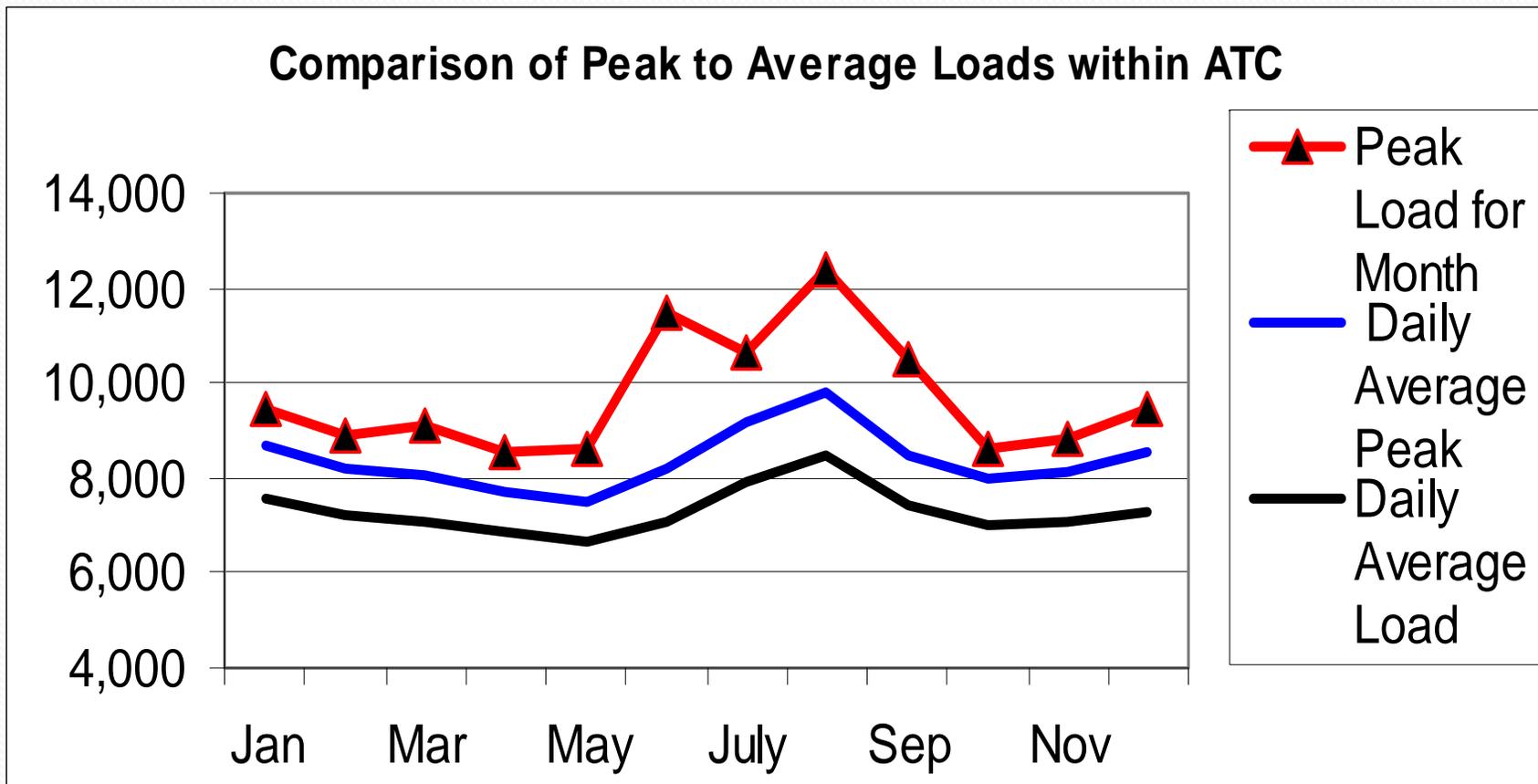
## Hourly Load Comparison (Monthly averages)



# Days of Week & Hour

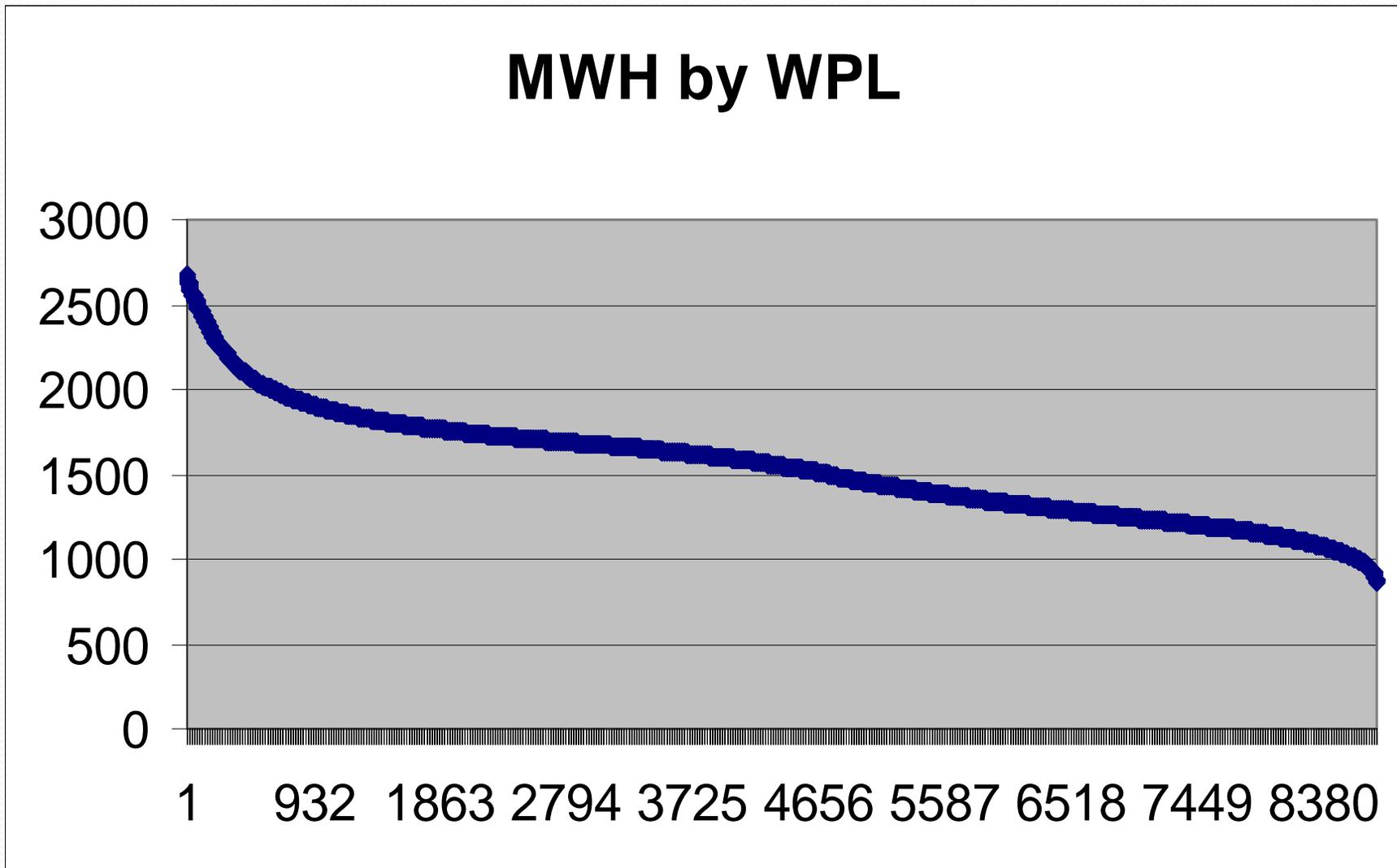


# Monthly and Daily Peaks

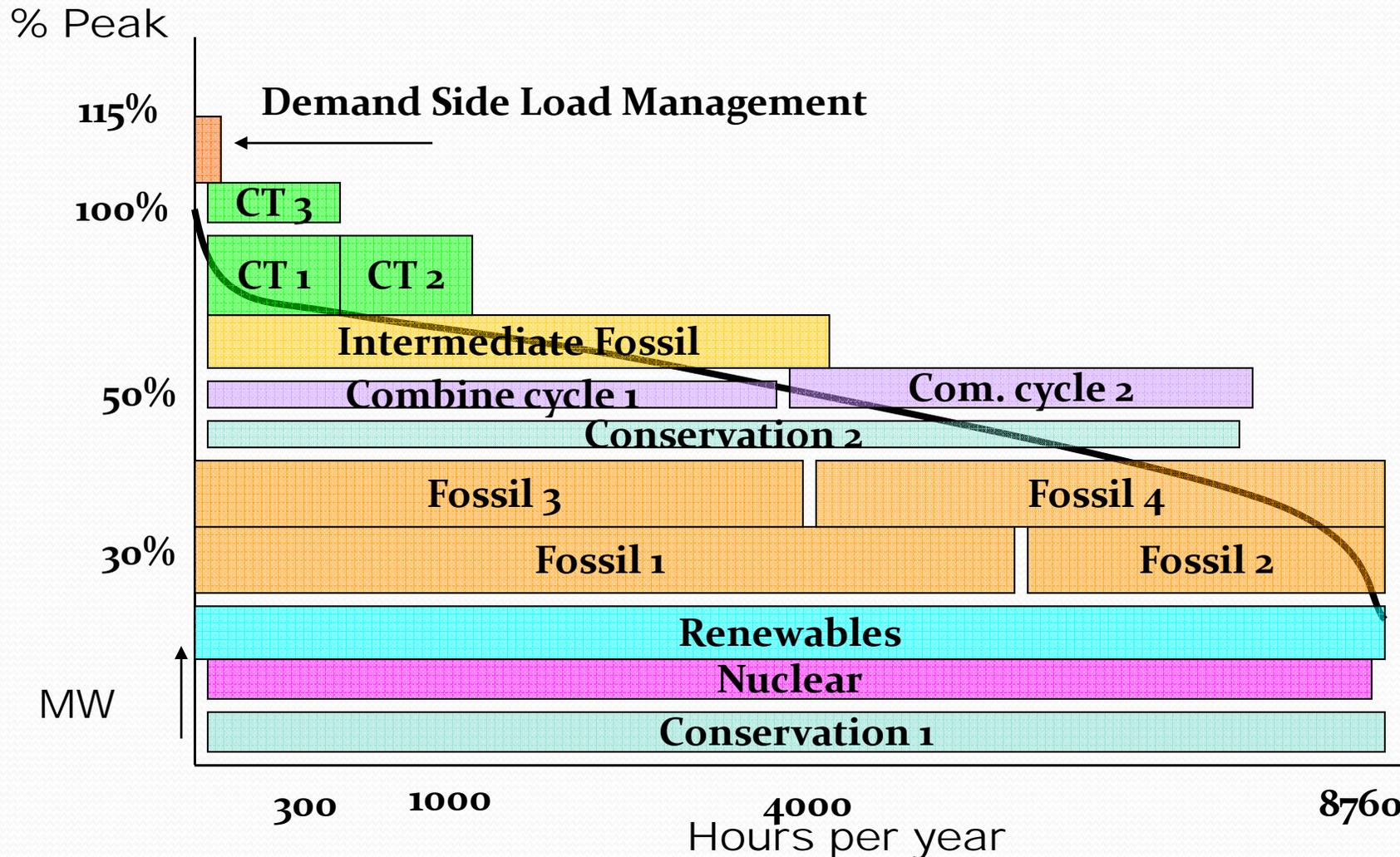


# Annual Load Duration Curve

## MWH by WPL



# How Do You Serve the Energy (MWh) for the Year?



# Midwest ISO Peak Annual LOLE Translation to Reserve Levels

- The Midwest ISO uses the 1 in 10 LOLE and converts the probability into a regional planning reserve and allocates it to Load Serving Entities on an equalized share and based on one's past resources' performance
- The June 2011 to May 2012 Planning Year
  - System Generation – Planning Reserve Margin 17.6%
  - LSE PRM with system diversity – 12.06%
  - LSE unforced capacity planning (UCAP) reserve credit – 3.81%



# Current Midwest ISO Module E

- Based on 1 planning year forward
- Compliance is only 30 days to accommodate retail choice switching suppliers
- A multiplier of Cost of New Entry (CONE) assessed if not filed before the month
- To prevent under forecasting, a check is made on past peak days and adjusted for weather, etc. Standing report to regulators of monthly status and any possible non-compliance
- Demand Side programs now have consistent qualifications of performance
- Self Supply with Voluntary Auction option for compliance with the Planning Reserve Credits (PRCs)

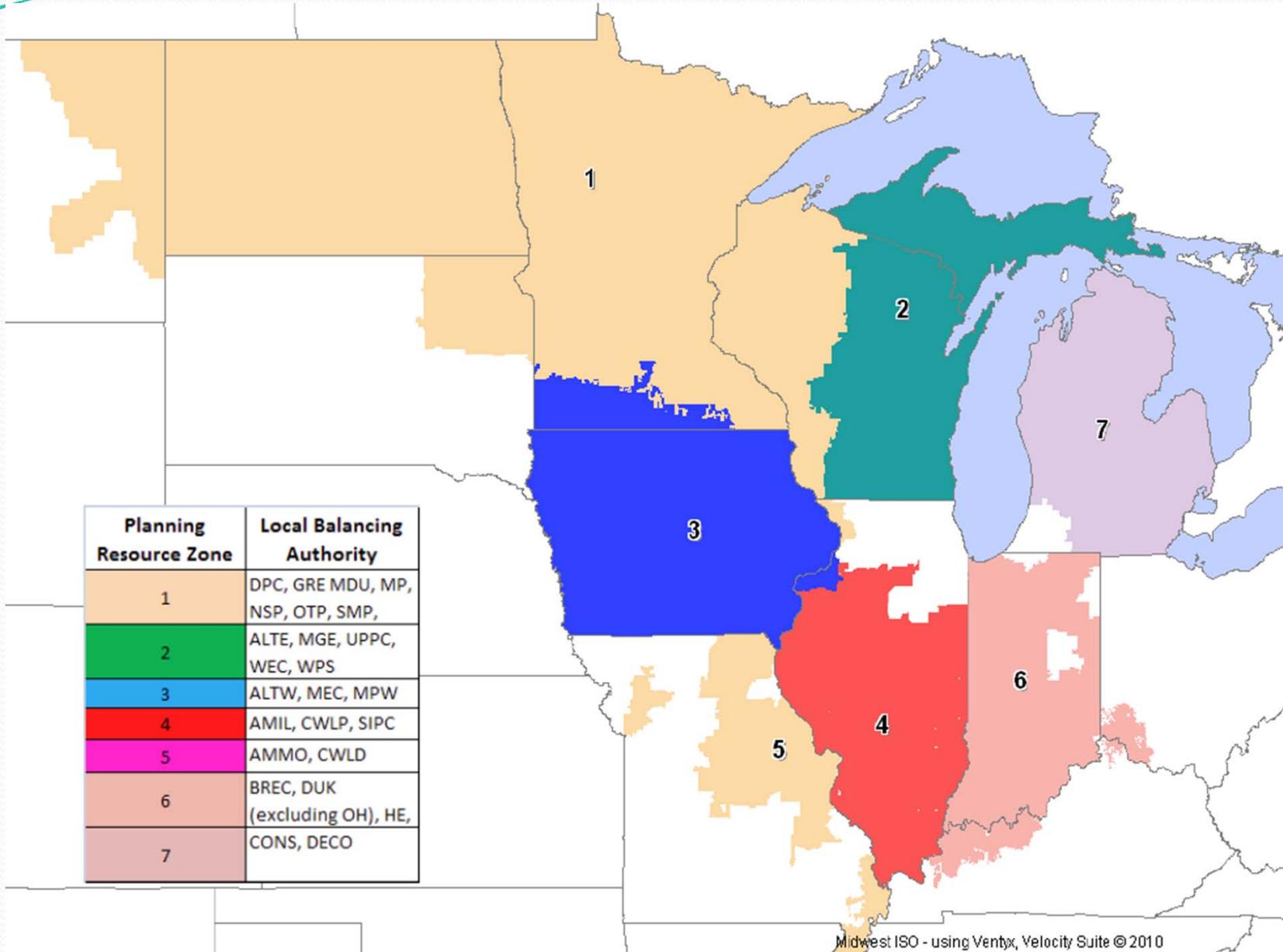
## Midwest ISO Proposal to Ensure Resource Adequacy

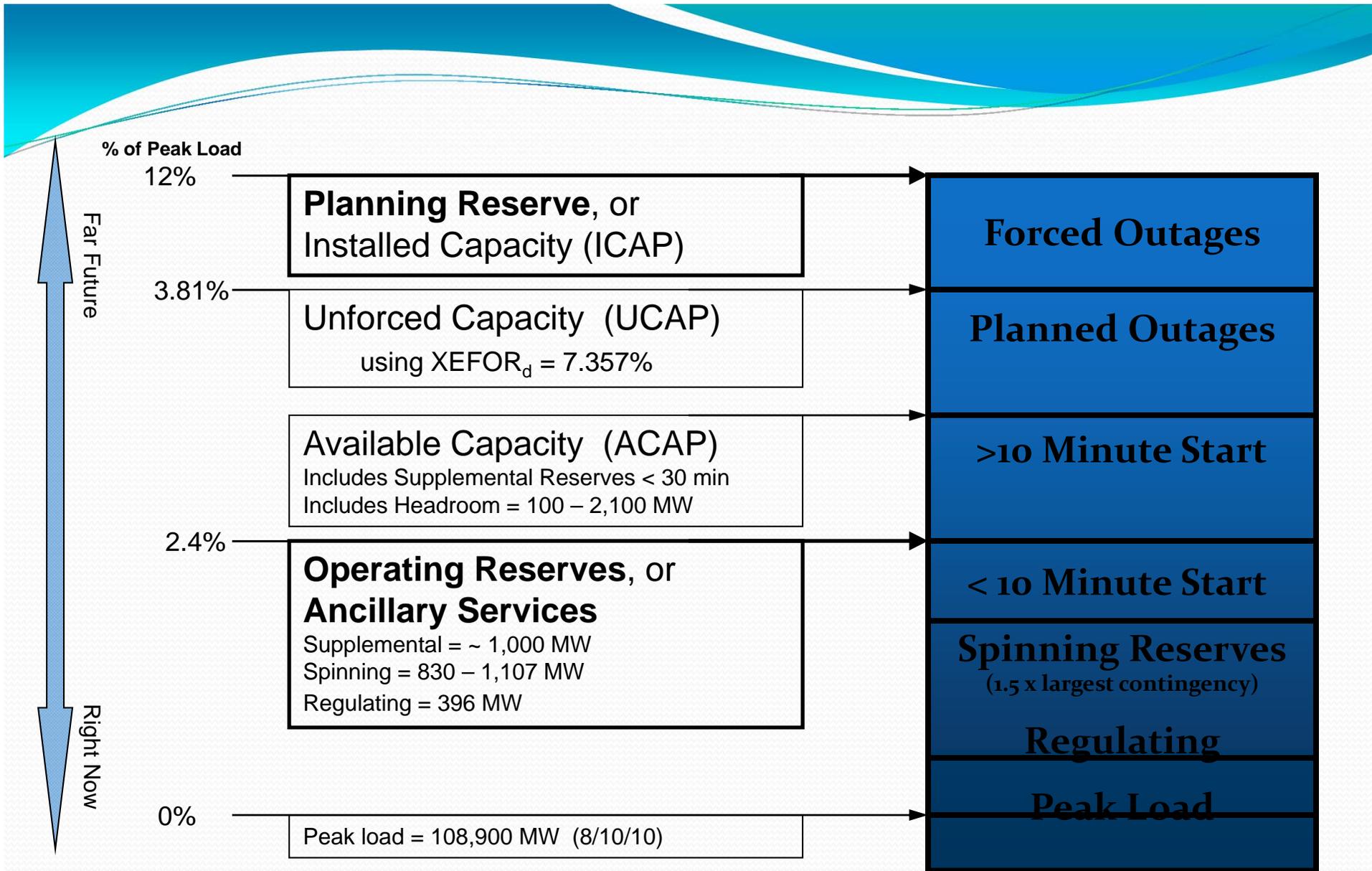
	Current 2011-2012	Proposed 2013-2014
<ul style="list-style-type: none"> <li>• Adequacy Requirement Met (for each Load Serving Entity (“LSE”))</li> </ul>	Monthly	Annually
<ul style="list-style-type: none"> <li>• Future Period Requirement (subject to ongoing stakeholder discussion)</li> </ul>	1 Month	1 Year
<ul style="list-style-type: none"> <li>• Resource Deliverability Assessment</li> </ul>	Footprint-wide	Zonal
<ul style="list-style-type: none"> <li>• Auction:               <ul style="list-style-type: none"> <li>• Periodicity</li> <li>• Participation</li> <li>• Ability to Self-Schedule</li> </ul> </li> </ul>	Monthly Resources Yes	Annually Resources & loads Yes
<ul style="list-style-type: none"> <li>• Adequacy requirement follows load (as load shifts in retail choice states)</li> </ul>	No	Yes



# FERC & the RA Enhancements

- **June 8 2010 FERC rejected the MISO's the planning forward period with no local zone pricing differentials with adequate transmission for delivery.**
- **Final State (Planning Year 2013-2014 and Beyond) -the key components of the final Resource Adequacy construct are similar to centralized resource planning:**
  - **Forward Resource Adequacy Process Years 2-3 Compliance? Voluntary?**
  - **Years 5-10 Planning** (qualification of resources , assessment of facilities to support and facilitate bilateral transactions, generation interconnection and integrated transmission service)
  - **Establish Planning Reserve Requirements** System Planning Reserve Margin (States retain jurisdictional authority to set)
  - **Zonal definitions** based on planning studies and relatively fixe
  - **Import and Export** Limits determined by transfer capability and not just energy market congestion
  - **Load Forecasting** Annual Coincident Peak Demand Forecasts by LSE and EDC
  - **Demand Side** - Recognize resources approved through State IRP processes





# Vertical Reliability Targets

## Explanation and Options

### Explanation

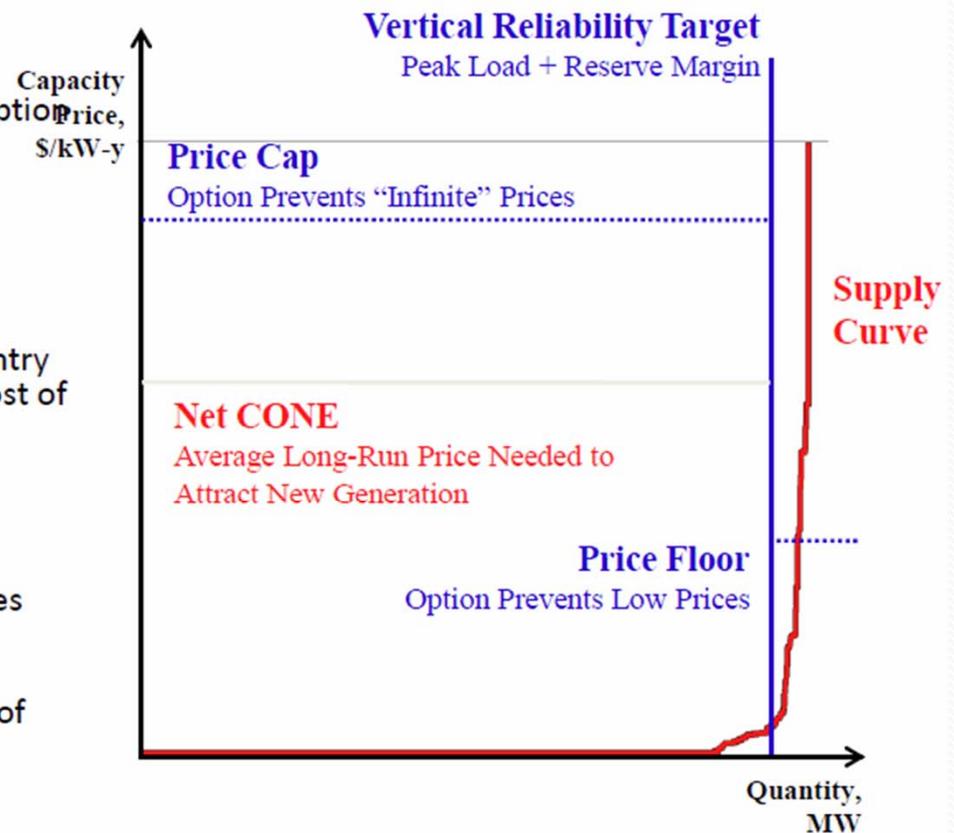
- Set at the reliability requirement (peak load + reserve margin)
- On its face, this is the simplest and least controversial option
- There are complications, however, with extreme price sensitivity, and price collars to provide more certainty

### Price Caps

- Prevent “infinite” prices with shortfall
- Must be substantially higher than the net cost of new entry (CONE) to attract new capacity when needed (i.e. the cost of a new plant minus energy and A/S margins)
- Usually 1.5 to 2 times Net CONE

### • Price Floor in ISO-NE

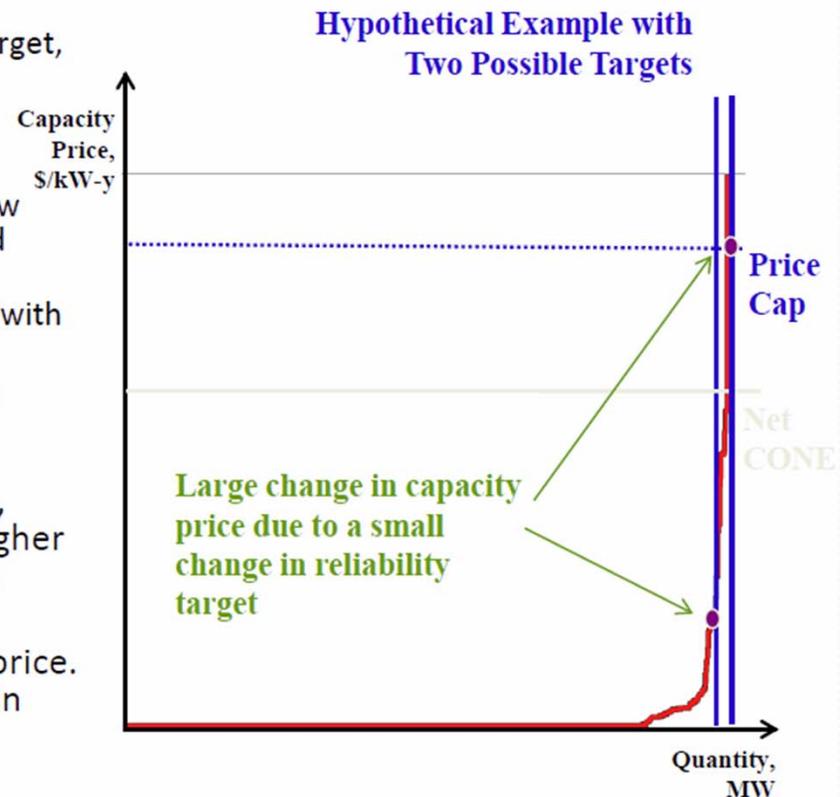
- Floor is used to balance limited upside and prevent prices from falling to zero
- Floor price of 0.6 times CONE supported 5,500 MW of surplus capacity. Payments are prorated (17% *in excess of* peak load + reserve margin)
- Soon to be eliminated



## Vertical Reliability Targets

# “Knife Edge” Problem

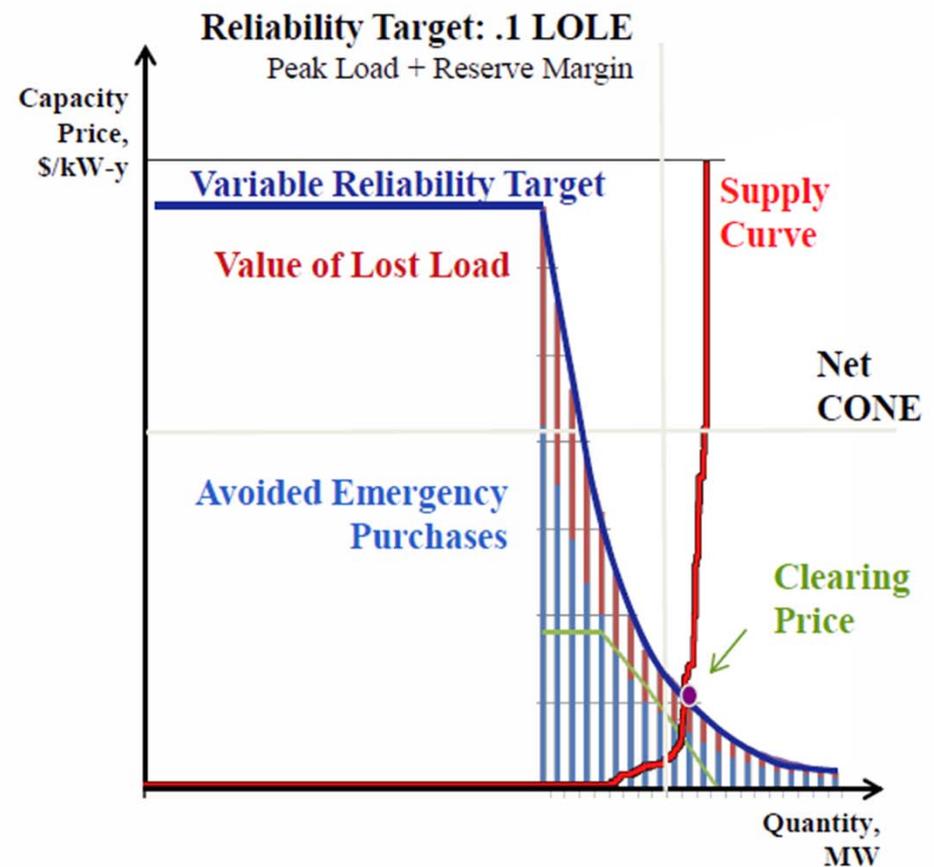
- Small changes in supply or reliability target can mean the difference between very high or very low prices
  - ❖ Example shows a small change in the reliability target,
  - ❖ Result is a price jump from far below Net CONE, up to the price cap
- Caused by steep (inelastic) supply curve
  - ❖ Nearly all existing supply offers zero, but most new capacity will offer very high, or not at all if no lead time
  - ❖ *Worse in prompt auctions* where resources exist (with sunk costs) or not, with no lead time to enter
  - ❖ Supply curve is more gradual in forward auctions, when new capacity has not yet made investment decisions
- “Knife edge” causes volatility in capacity prices, creating investor risk premium, and possibly higher long-run system costs. But maybe lower risk to consumers.
- “Lumpiness”: building one plant can crash the price. Maybe not MISO-wide, but possibly a concern in small zones.
- Market power issues?



‘knife edge’ problem does not exist under extreme surplus or shortage conditions

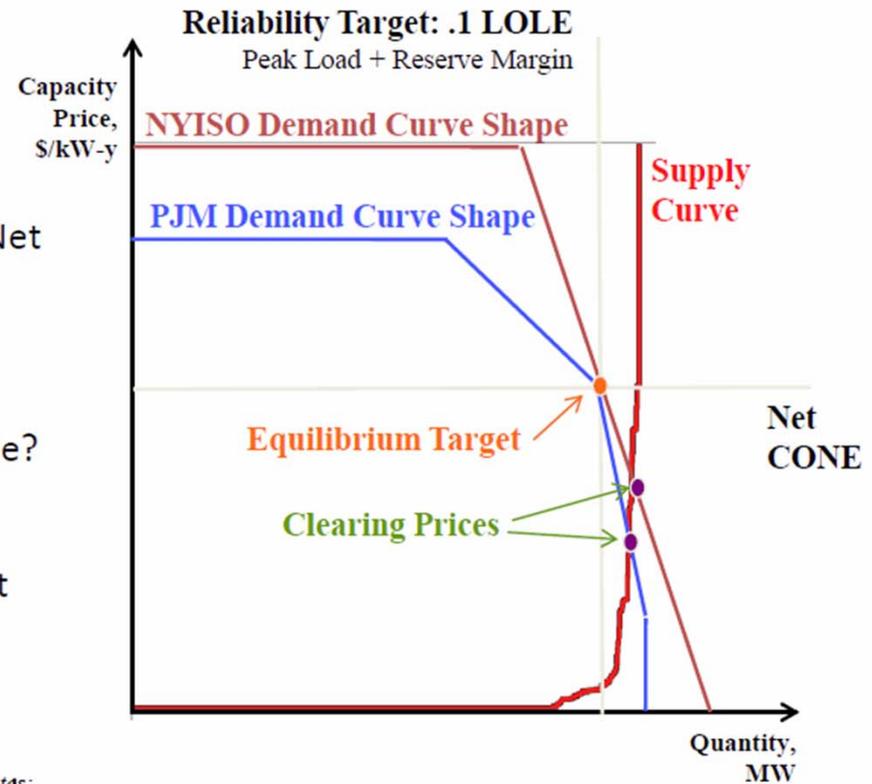
# Variable Reliability Targets

- The approach is to construct a curve based on the incremental value of capacity to customers, considering:
  - ❖ Value of Lost Load (VOLL) avoided by adding capacity
  - ❖ High-price emergency purchases avoided
  - ❖ Other energy and system cost impacts passed on to customers
- Would be used in synch with the VOLL calculation for the price caps established in Midwest ISO Energy & OR markets
- More accurately represents customer value of capacity, but departs from traditional 1-in-10 reliability standard



## Variable Reliability Targets

- The approach used in PJM and NYISO is to construct a curve around an *estimated* target long-term equilibrium point:
  - ❖ **Price** at Net CONE
  - ❖ **Quantity** at/near 0.1 LOLE
- Net CONE calculation is contentious
  - ❖ The “reference resource” for calculating Net CONE should be the technology with the lowest long-term net cost. Choice of reference resource is critical. DR? CT?
  - ❖ What is the overnight cost?
  - ❖ What is the appropriate capital charge rate?
  - ❖ What forecast or historic energy and A/S revenues to use for the offset?
  - ❖ Long-run prices will move toward true Net CONE regardless of the administrative parameter, but possibly not at the target quantity
- Other parameters including kinks, steepness, and cap level are also debated



Notes:

Curve shapes are not to scale, they are exaggerated to illustrate major features.

PJM curve does not go exactly through the “target” price as shown above, instead it is offset by a -2.5% short-term resource procurement target and a +1% adjustment.