Rapidly Evolving Energy Policy

AUenergy Symposium

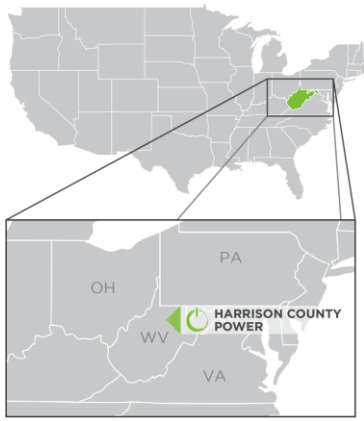
October 12, 2018

ENERGY SOLUTIONS
CONSORTIUM, LLC.

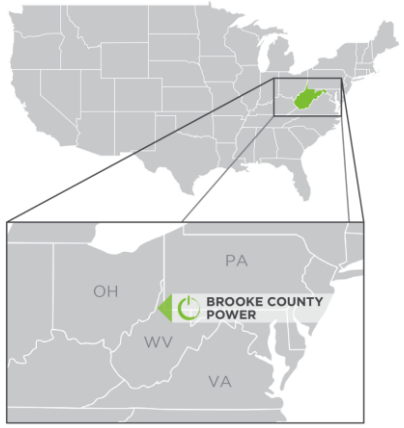
Energy Solutions Consortium, LLC

Natural Gas Power Plant Developer

ESC Harrison County Power – 610 MW (~$600 Million)



ESC Brooke County Power – 830 MW (~$800Million)



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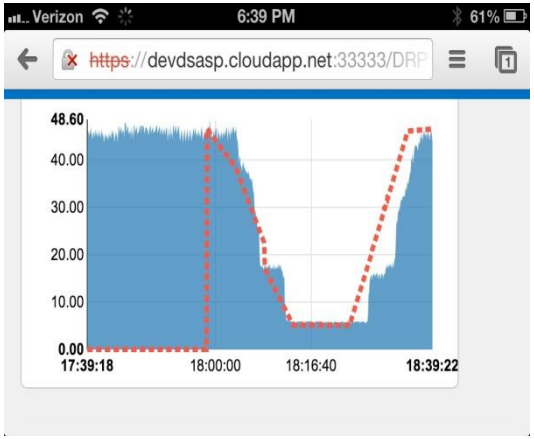
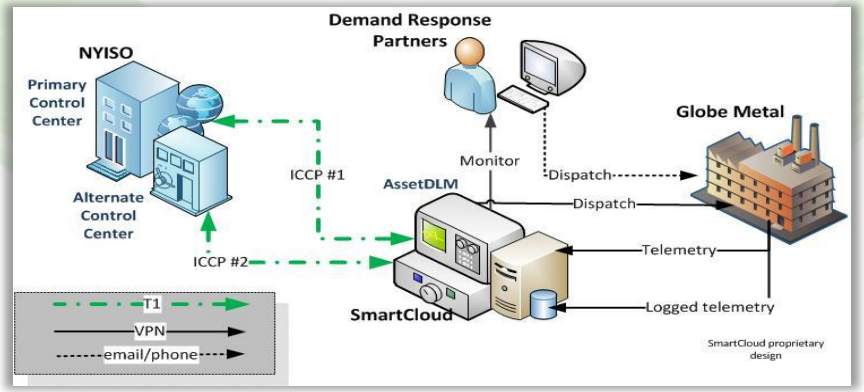
Demand Response Partners, Inc.

Demand Side Management/Smart Grid Company

Demand Response Partners, Inc.

Sold to private equity firm H.I.G. Capital in 2015





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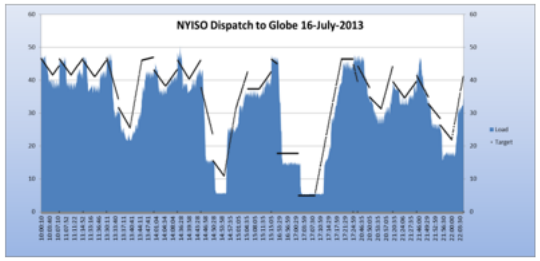
Demand Response

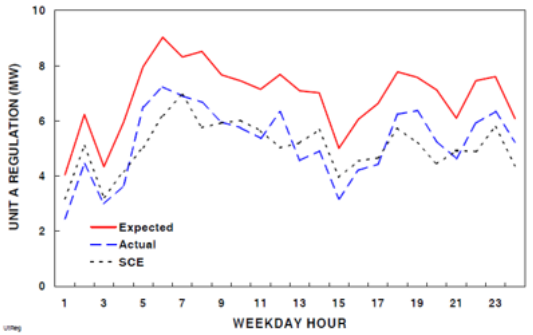
Fast Acting Balancing Resource

- As the grid transitions to more distributed and intermittent renewable resources fast moving balancing services are needed to keep supply and demand in balance.
- Demand response is an important and cost effective resource to provide these services.

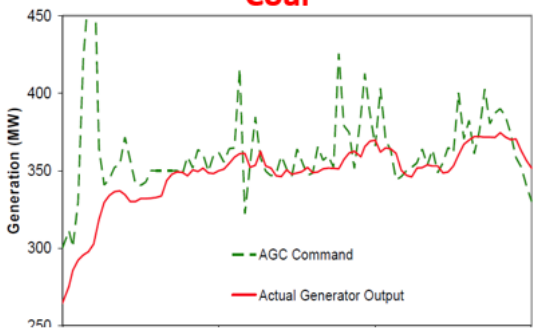
DR – Synchronized Reserve



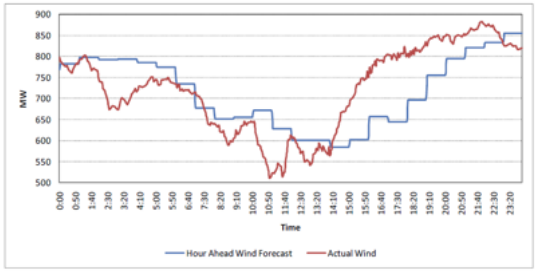
Natural Gas



Coal



Wind



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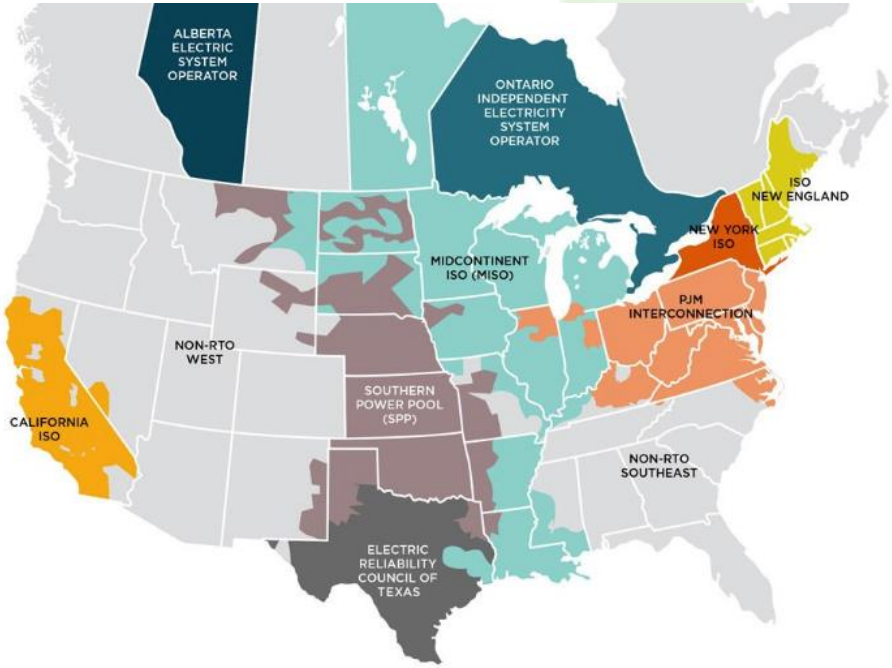
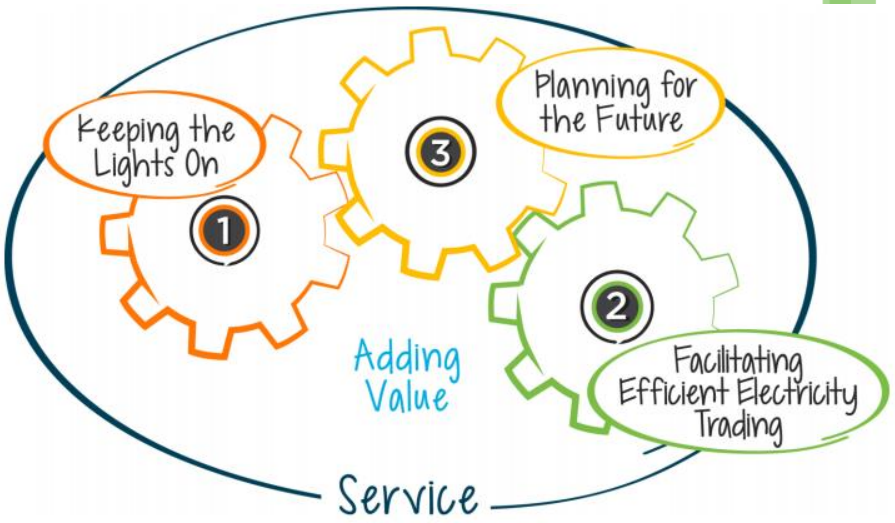
Wholesale System Operators

RTOs/ISOs – Focus on 3 Things



Regional Transmission Organizations (RTO)
Independent System Operators (ISO)



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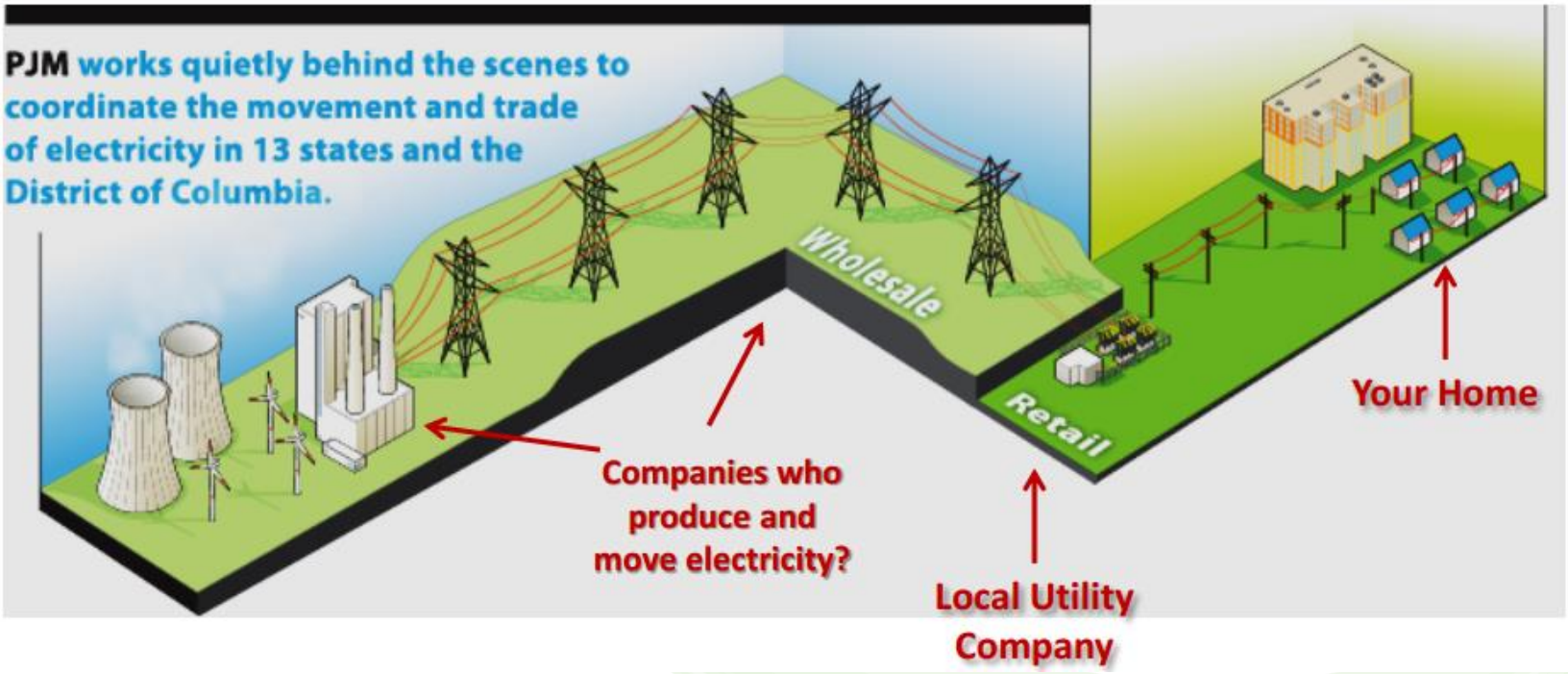
Power Price Components

3 Components of Retail Power Price



(1) Power Generation Price

(2) High Voltage Transmission Price

(3) Low Voltage Distribution Price

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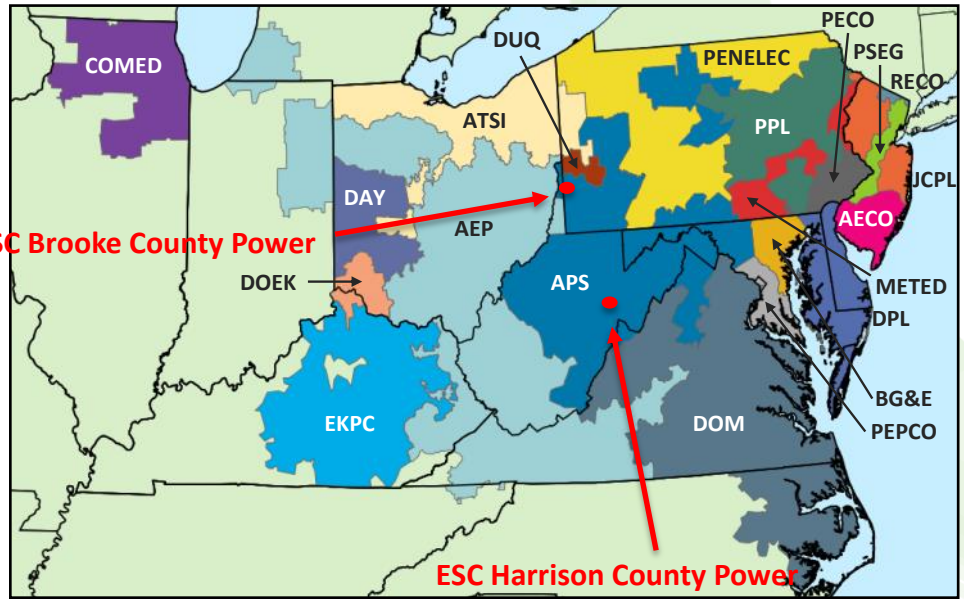
PJM Grid Overview

PJM Interconnection is the regional transmission organization (RTO) responsible for the continuous monitoring, control, and reliable operation of the transmission grid within its market area (see map below). PJM manages the operation of the transmission system by procuring energy, capacity, and ancillary services on behalf of the load serving entities. PJM provides these functions through the use of market-based products including day-ahead markets, real-time markets, financial transmission rights, installed capacity markets, synchronized reserves and regulation services.

PJM Zone Map



21% of US GDP Produced in PJM

Installed Capacity	► 171 GW (1,304 Generation Sources)
Peak Load	► 165,492
Geographical Area	► Over 243,400 square miles ► Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, District of Columbia
Transmission System	► 81,736 miles of transmission
Population Served	► ~61 million
Members	► +960 members
Regulators	► FERC & individual state Commissions
History	► Originally PJM Power Pool in 1927 ► RTO since 2001

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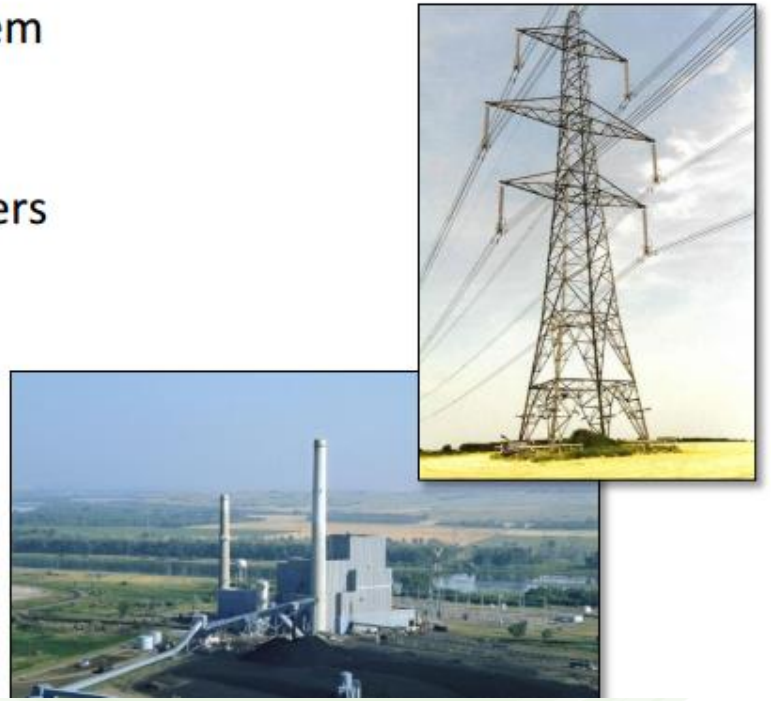
PJM Interconnection

How is PJM Different from the Local Utility?

PJM does:

- Direct operation of the transmission system
- Remain profit neutral
- Maintain independence from PJM members
- Coordinate maintenance of grid facilities



PJM Interconnection

How is PJM Different from the Local Utility?

PJM does not:

- Own any transmission or generation assets
- Function as a publicly traded company
- Take ownership of the energy on the system
- Perform the actual maintenance on generators or transmission systems
- Serve, directly, any end use (retail) customers

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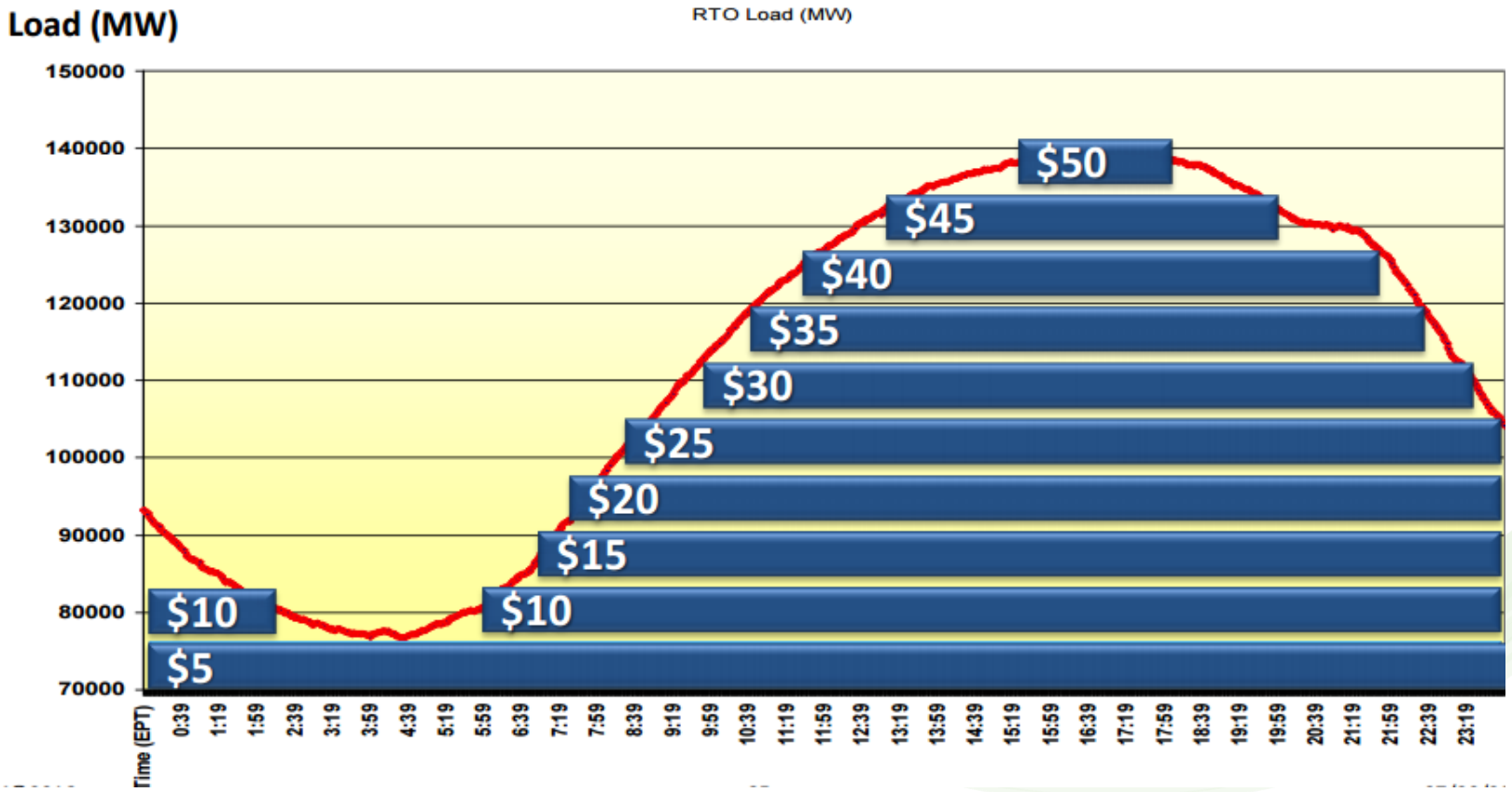
PJM Interconnection

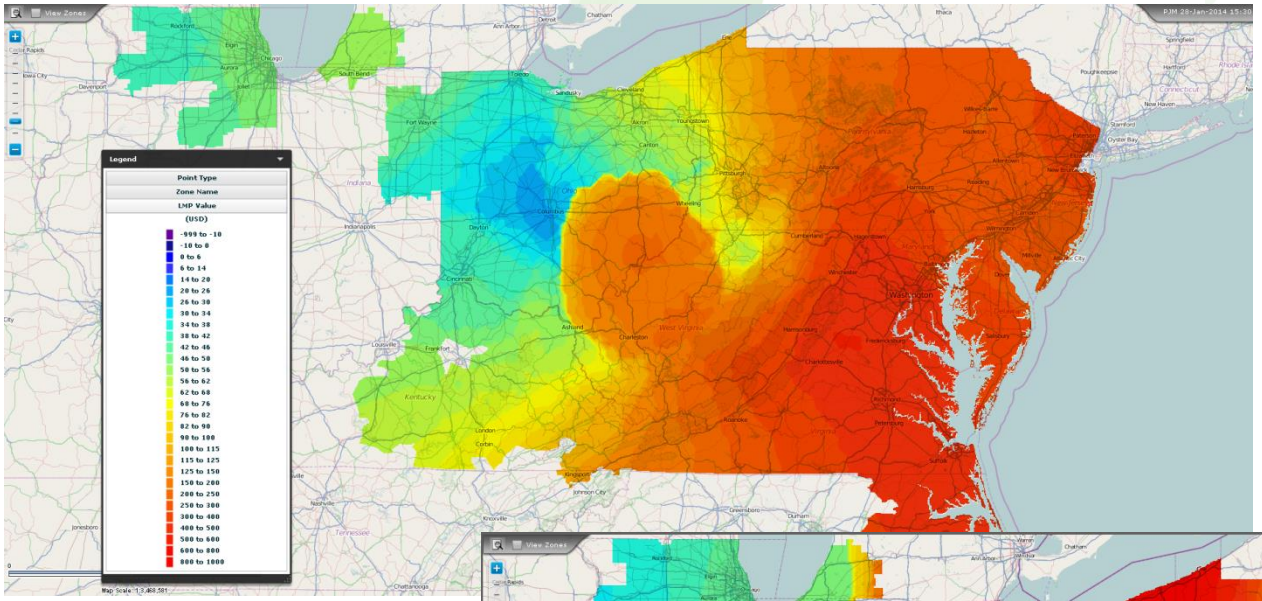
Energy Market – Day Ahead – Price Formation Process

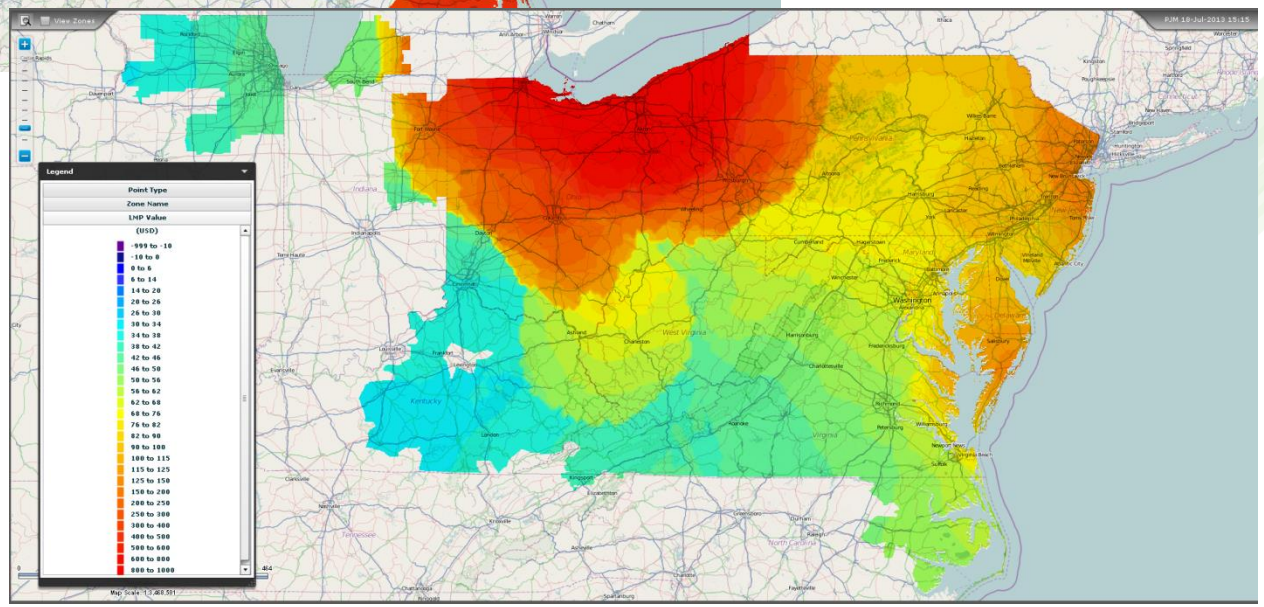
Resources Scheduled to Meet Demand



PJM Interconnection

Energy Market – Real Time – Price Formation Process





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New York State

Reforming the Energy Vision – REV

Goals:

- 50% of electricity will come from renewable sources
- 1,500 MW of energy storage by 2030
- 2,400 MW of offshore wind by 2030
- 3GW of solar by 2023
- Cut greenhouse gas emissions 80% by 2050
- Make energy more affordable for all New Yorkers
- Support the growth of clean energy innovation
- Empower New Yorkers to make more informed energy choices
- Improve New York's existing energy infrastructure
- Create new jobs and business opportunities
- Protect New York's natural resources
- Build a more resilient energy system
- Support cleaner transportation
- Grow New York's energy efficiency

Challenge – executing on these goals without exploding costs

Energy Policy

Rapidly Changing

- Transitioning to a renewable energy future
- Rapidly evolving technology and cost to deploy
- Massive changes to policy and the way systems are operated
- Policy Considerations: Wholesale - Federal (FERC) vs. Retail - State (Public Service Commissions) Mismatch
- Policy driven subsidies distort market signals:
  - Wind/Solar – Renewable Energy Credits
  - Nuclear – Zero Emission Credits
  - Coal – Resiliency (DOE Subsidy??)
- No clear path to a uniform policy
- Capital markets watching closely