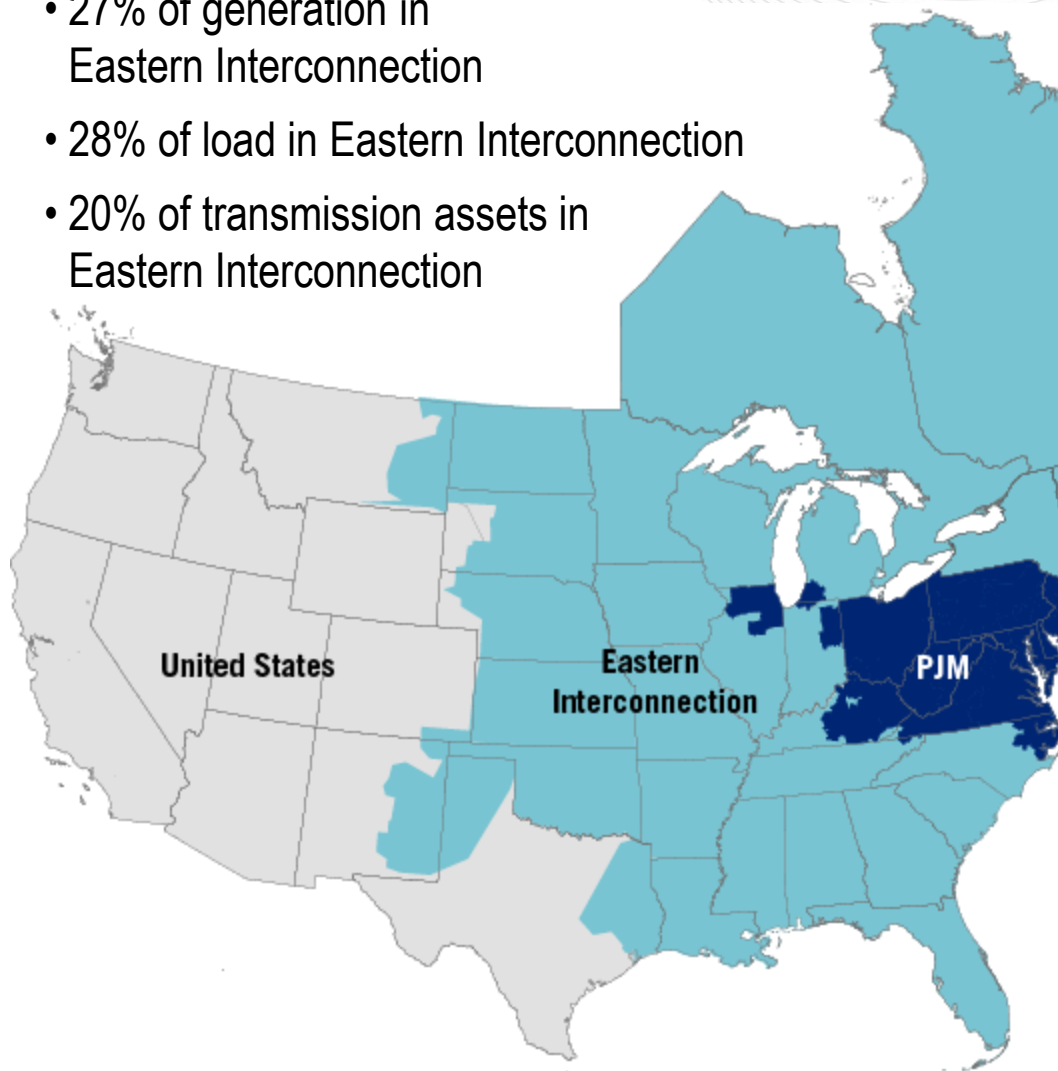


# Demand Response in PJM: Past Successes and the Murky Legal Future of Demand Response...

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- 27% of generation in Eastern Interconnection
- 28% of load in Eastern Interconnection
- 20% of transmission assets in Eastern Interconnection



## KEY STATISTICS

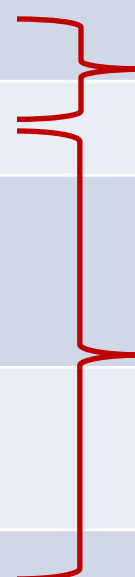
PJM member companies	900+
millions of people served	61
peak load in megawatts	165,492
MW of generating capacity	183,604
miles of transmission lines	62,556
2013 GWh of annual energy generation sources	791,089
square miles of territory area served	243,417
externally facing tie lines	13 states + DC 191


**21% of U.S. GDP  
produced in PJM**

As of 4/1/2014

# PJM Opportunity by Wholesale Service

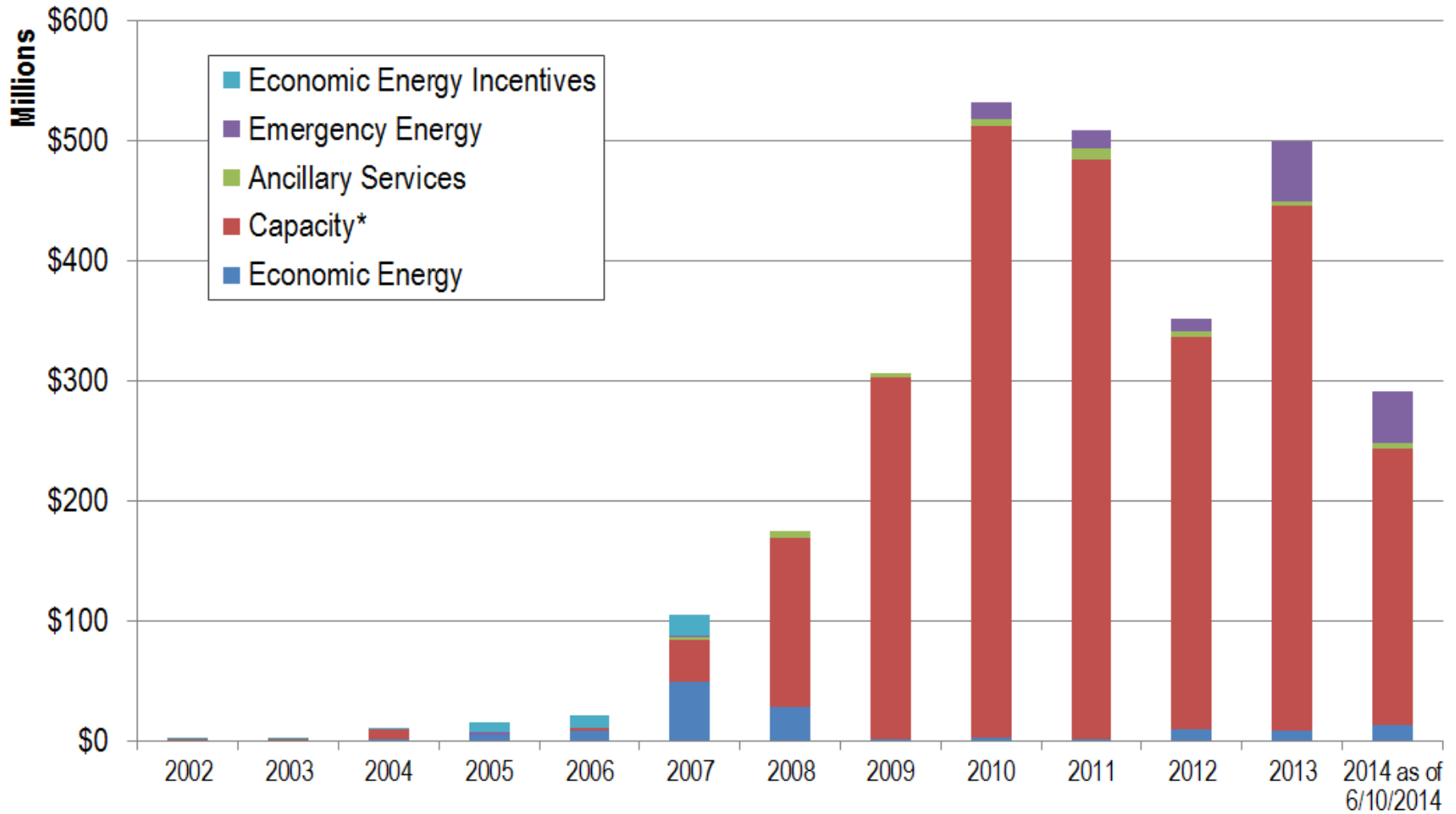
Wholesale Service	Demand Side Response	Energy Efficiency	Price Responsive Demand
Capacity	Yes	Yes	yes
Energy	Yes		
Day Ahead Scheduling Reserves (30 min)	Yes		
Synchronized Reserves (10 min)	Yes		
Regulation	Yes		

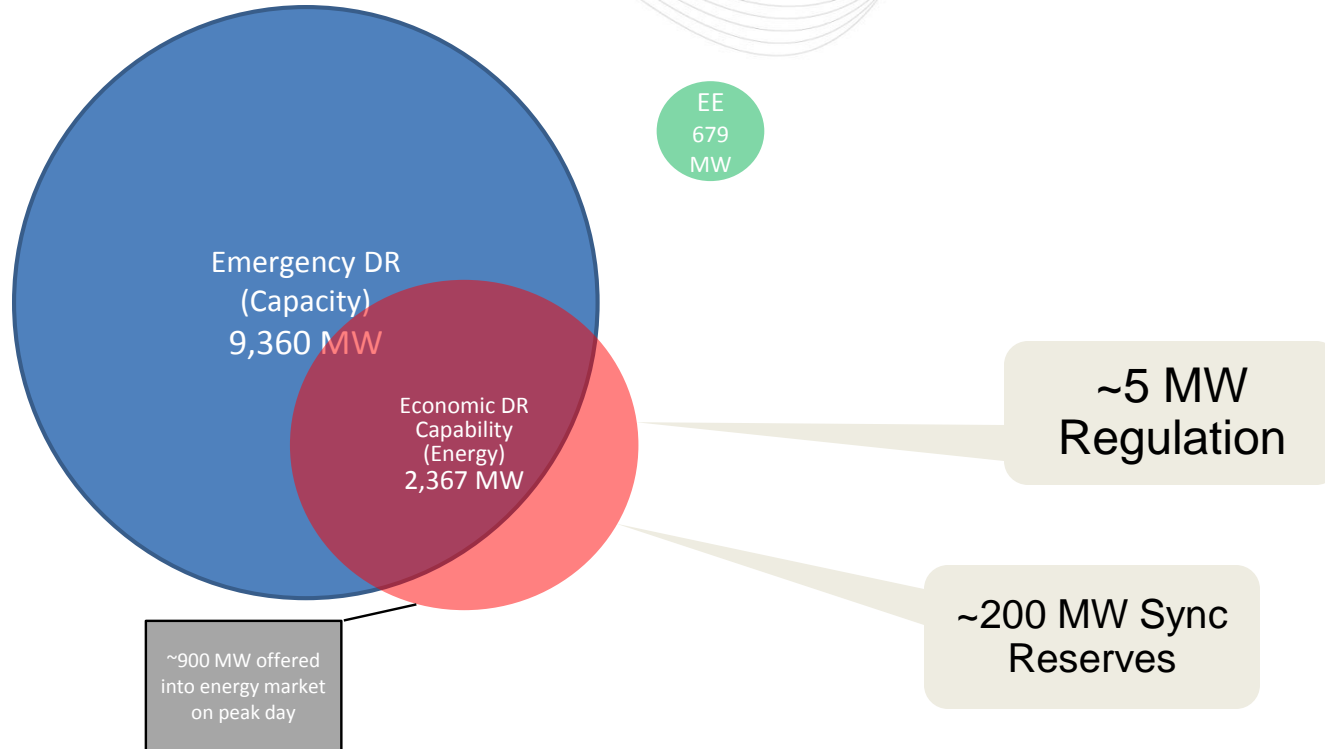

**Load Management**


**Economic resource**

*Customer may participate as Emergency and Economic DSR and as EE*

# DR Revenue by Year by Wholesale Service





*Represents over 1 million end use customers (~14,000 C&I) across PJM*

- **Load Management (Emergency and Pre-Emergency)**
  - Capacity resource responsible to reduce load when PJM needs it during an emergency
    - Limited DR, Extended Summer DR or Annual DR
    - Load reduction required within 30 minutes unless physical limitation (then allowed up to 2 hours for notification)
    - Annual Test required if DR not called during an emergency
    - Penalties for non-performance
  - Offer into auction up to 3 years in advance



- Energy Efficiency Resource (*still fairly new in PJM*)
  - Infrastructure investment where efficiency is greater than current codes and standards.
    - Lighting
    - HVAC
    - Building thermal envelope (insulation, windows, doors, etc.)
  - Offer into auction up to 3 years in advance
  - Receive revenue from capacity market for 4 years
    - Based on demand reduction during peak
  - Must have EE measurement and verification plan approved to participate



- Economic Resource

- Energy market – participate based on economic price signal

- Day ahead market – offer into market similar to generation
    - Real time market

- PJM dispatch – based on hourly availability, strike price, minimum downtime and shutdown cost.

- Ancillary Services

- Synchronized Reserves
    - Day Ahead Scheduling reserves
    - Regulation



*Economic load reduction are based on specific actions taken by resource & should not represent normal operations at the facility. Normally scheduled plant shutdowns do not qualify as PJM economic demand response.*



- Day ahead scheduling reserves (30 minute supplemental reserves)
  - Must reduce net load within 30 minutes if dispatched by PJM
  - Hourly market price (DAMCP)
    - Jan – Sept 2011 average (\$1.04 mwh)
  - Minimal participation to date based on economics
- Synchronized Reserves (10 minute spinning reserves)
  - Reduce load during reserve shortage, must reduce net load within 10 minutes.
  - Hourly market price (SRMCP)
    - Jan – Sept 2011 average (Mid Atlantic = \$12.00 mwh, RFC non-Mid Atlantic = \$0.05 mwh)
  - Active participation from ~120 different resources
- Regulation – real time load change (increase and decrease) based on real time system conditions
  - Hourly market price (RMCP)
    - Jan – Sept 2011 average (\$17.03 mwh)
  - 2 resources began participation in December 2012



0.1 MW required to participate

Publically posted information about system conditions and prices cleared in PJM markets available



PJM posts a monthly report of Demand Response activity in PJM Markets (link provided below)

<http://www.pjm.com/~media/markets-ops/dsr/2014-dsr-activity-report-20140618.ashx>

- US Court of Appeals Finds FERC has no jurisdiction over demand response
- Finds its not a wholesale sale of electricity
- Finds it does not legally “affect rates, terms and conditions”



- Demand response clears outside the market?
- Demand response simply as a load reduction reflected in the load forecast?
- Demand response simply as a load reduction reflected in the load forecast?
- Verifiable and controllable demand response receives a capacity credit?
- Future of aggregation?
- Demand response tied to CO2 reduction state plans?



## LET'S TALK...

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