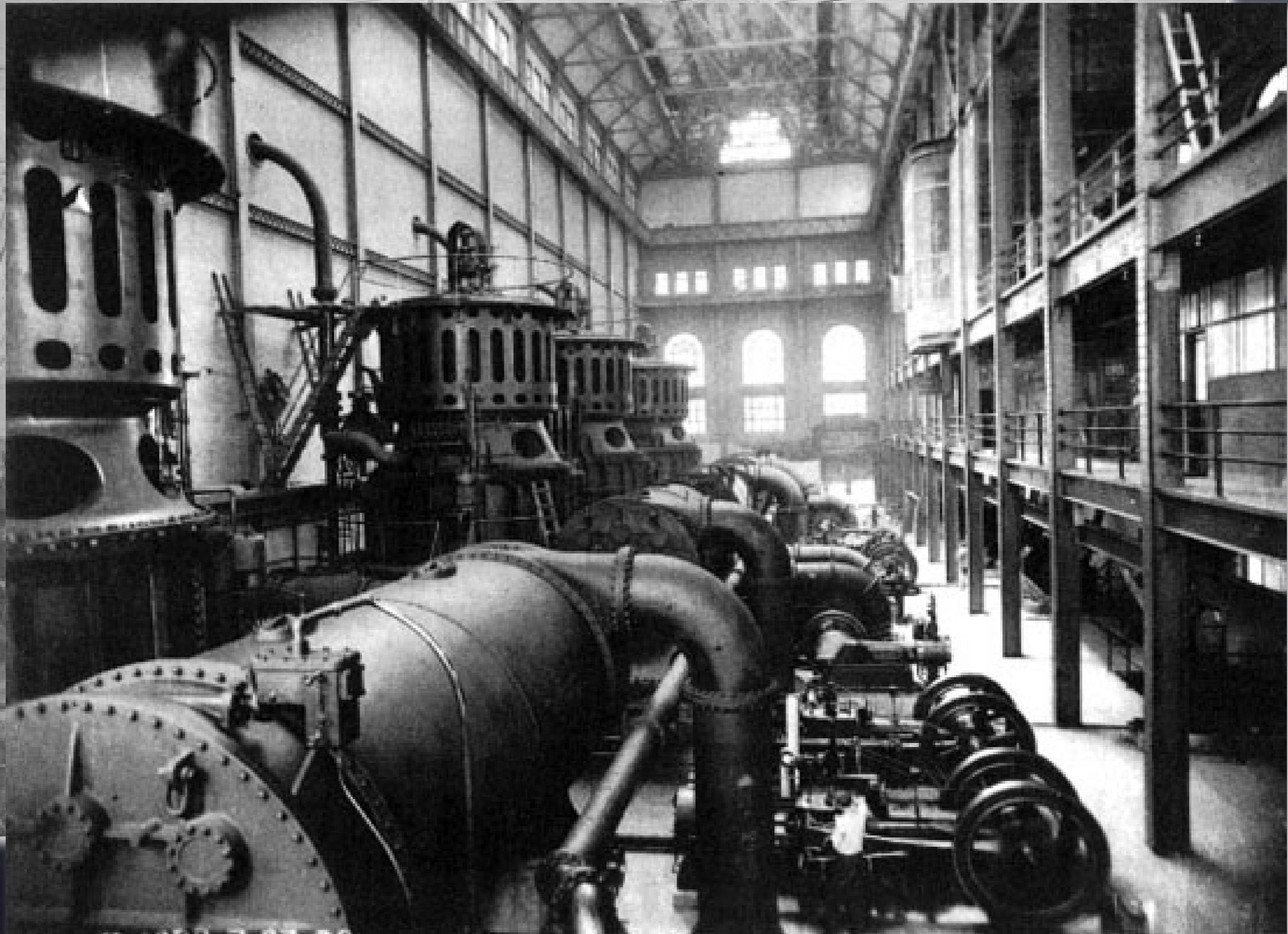


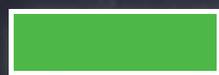
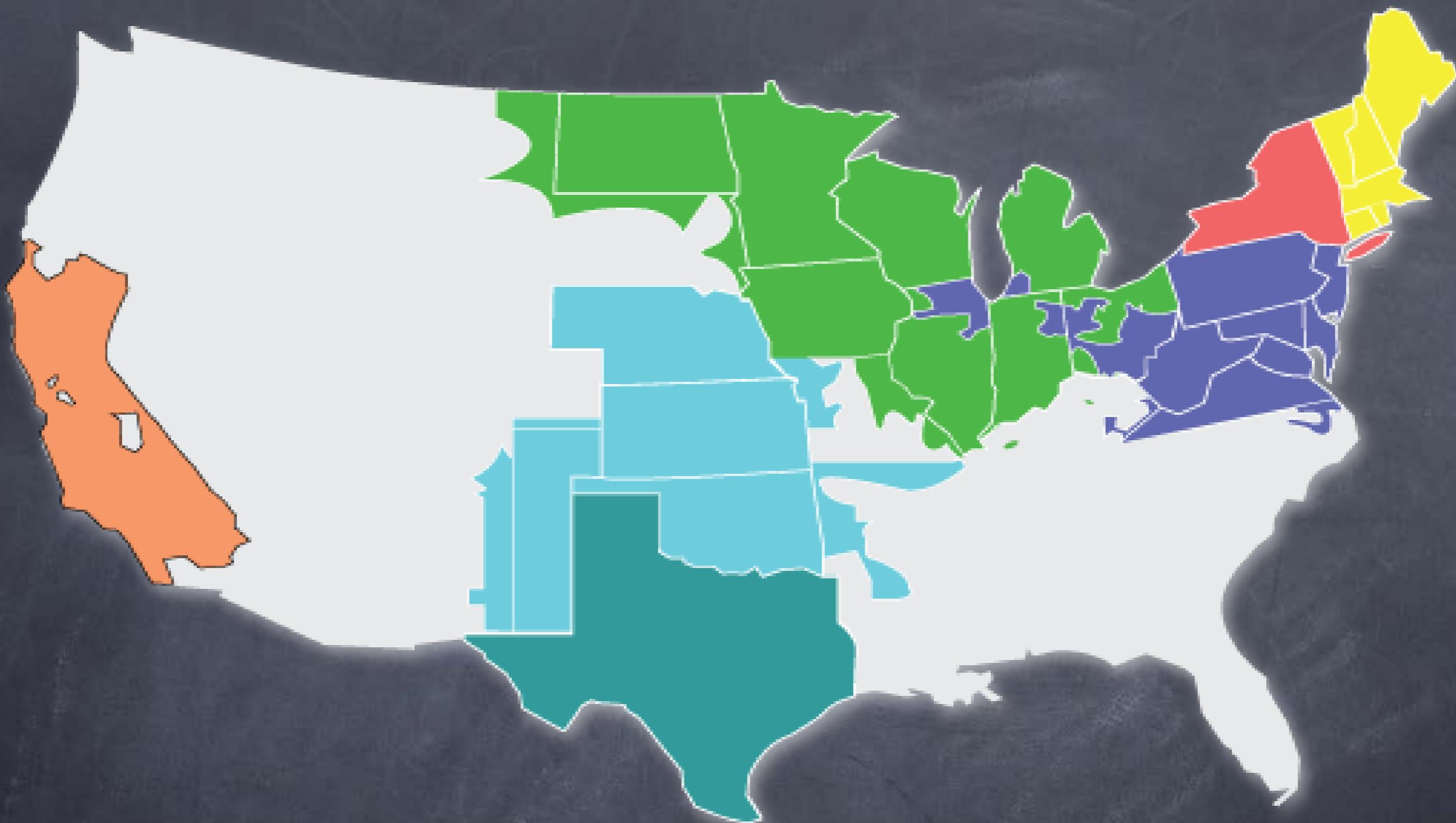
Marshall University

The Smart Responsive Grid

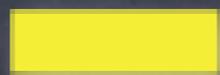
March 5, 2013

Jon Wellingshoff
Chairman
Federal Energy Regulatory Commission

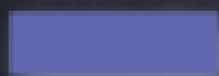




Midwest ISO



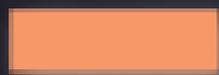
ISO New England



PJM Interconnection



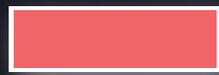
Southwest Power Pool



California ISO



Electric Reliability Council of Texas



New York ISO

SCADA: System Control and Distribution Automation of G,T& D

to improve system efficiency and performance and provide resilience to failure.

AMI: Advanced Meter Infrastructure automates the meter read process, increases the frequency of reads to at least hourly, and possibly communicates two-way between utility and meter for demand response (DR) services.

LAN: Local Area Networks within buildings communications (powerline or wireless) between devices managing software process (in-home dedicated server, utility managed off-site, or Internet).

Consumer display device: (kitchen, thermostat) or multi-purpose display (TV, computer, phone).

What does the Smart Grid have to do with

What Does Smart Grid Have To Do With Demand Response and Energy Efficiency?

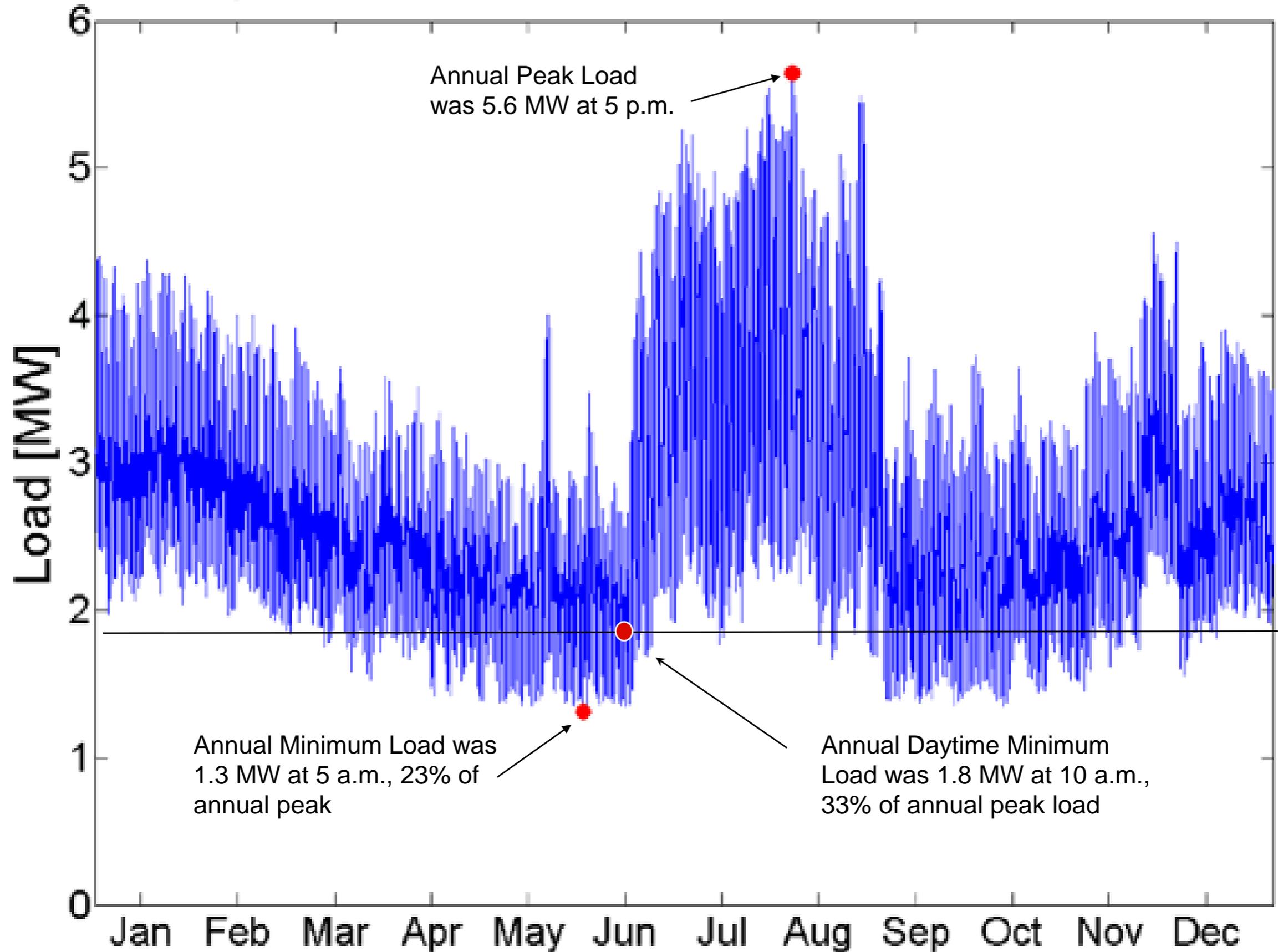
Potentially, three strategies:

Utility control of peak building energy use,

Time-differentiated dynamic electricity pricing, and

More frequent and granular energy consumption data to support operational improvements and behavior change.

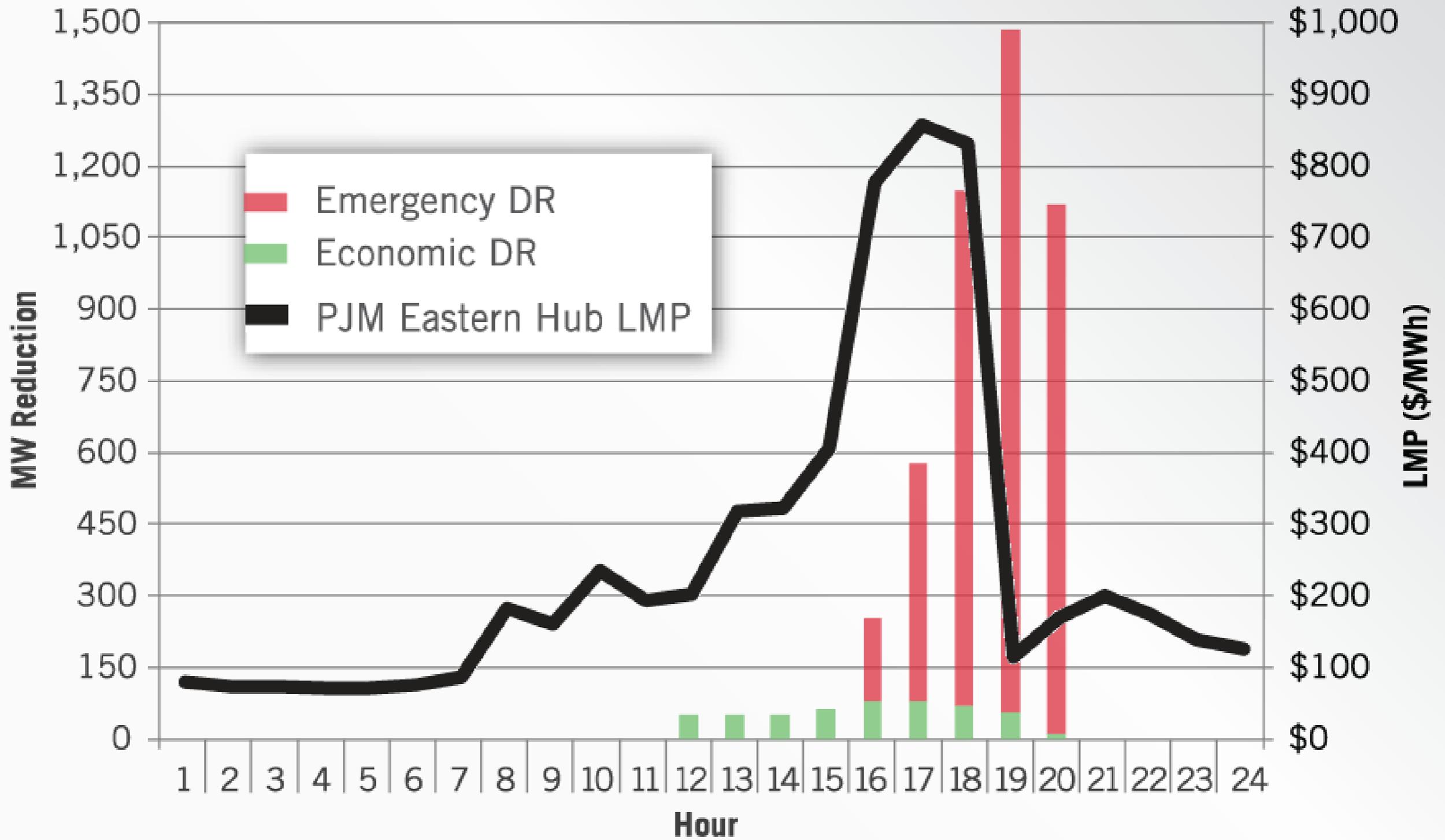
Sample Commercial/Residential Load Profile, 2008



FERC: The benefits of demand response are:

- ⑩ Lower demand/lower price**
- ⑩ Flatten load profile reducing costly generation**
- ⑩ Reduces generator market power**
- ⑩ Enhanced reliability**
- ⑩ Supports renewable power**

DR in PJM on May 31, 2011



FERC Assessment of DR Potential – prepared in 2009 – 10 year scenarios

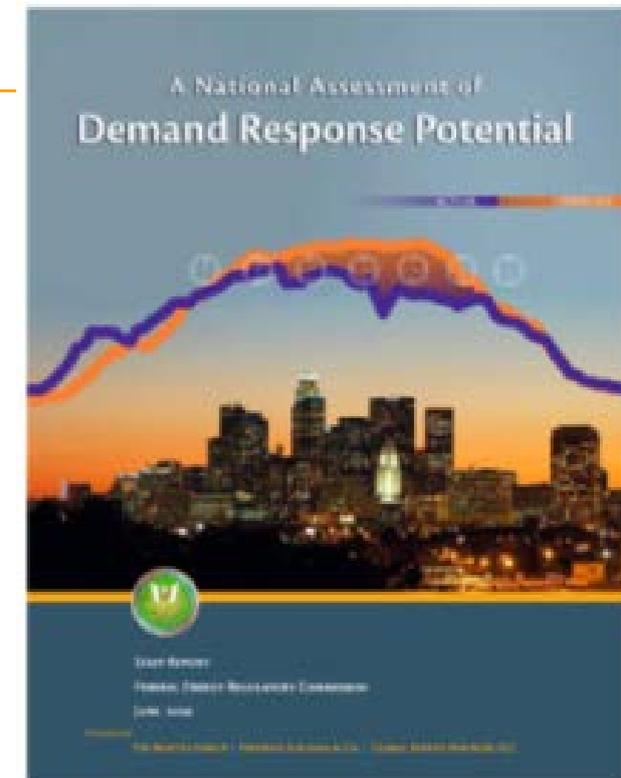
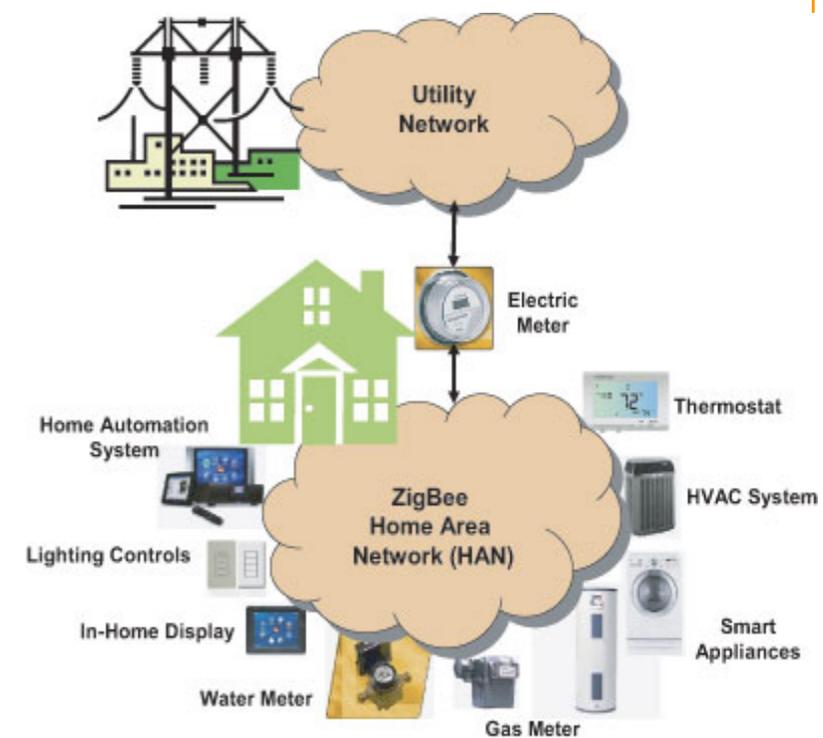
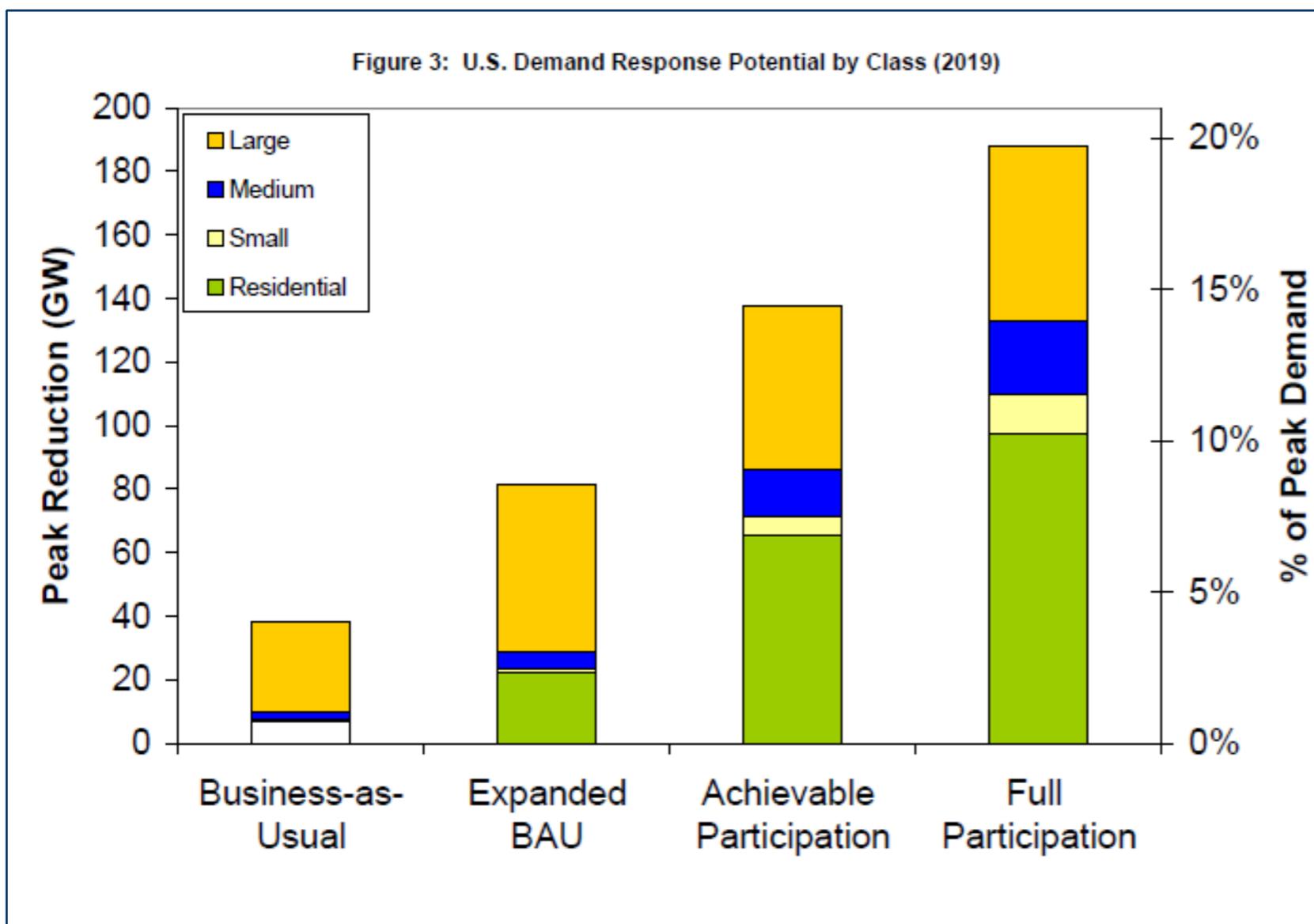
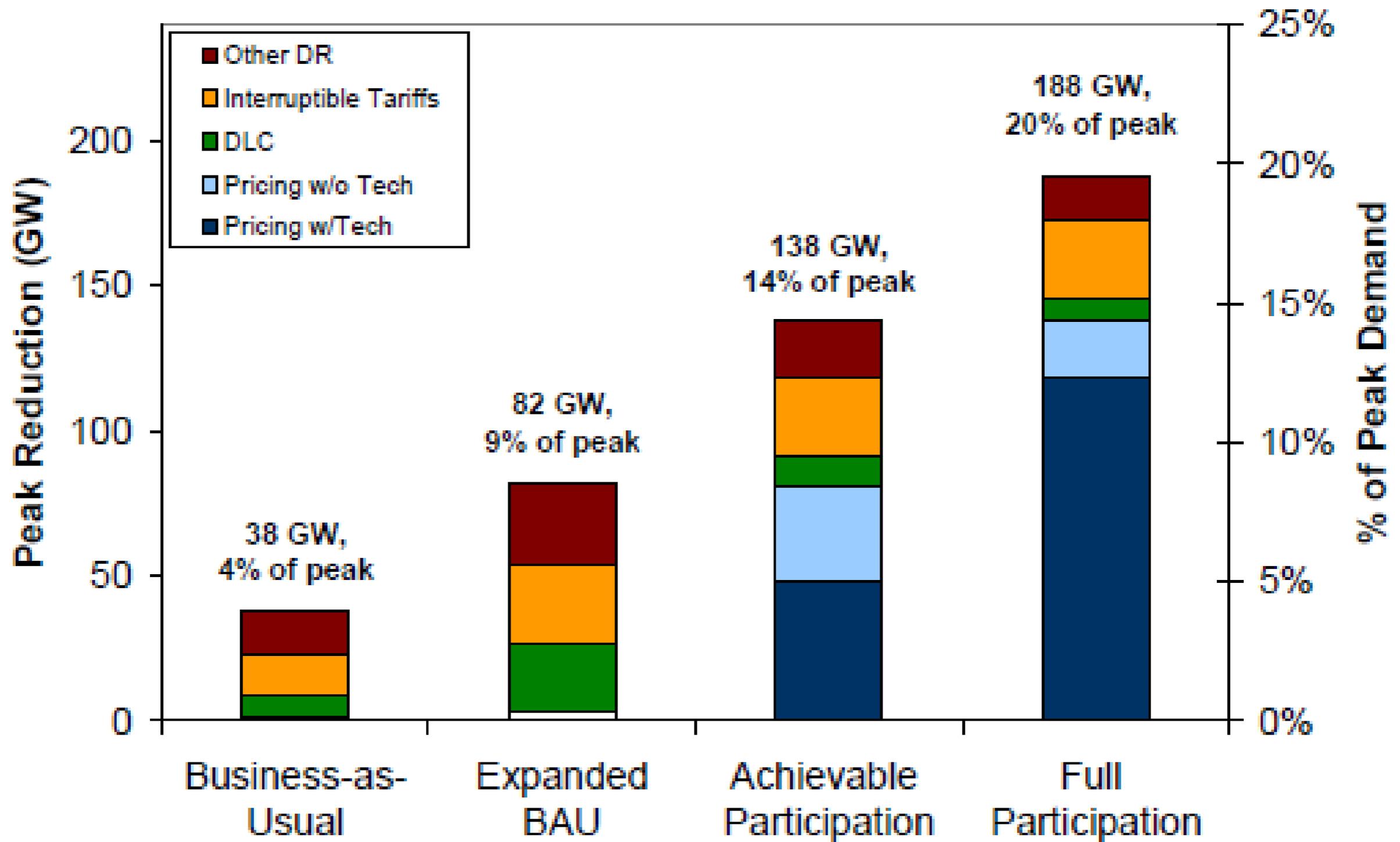


Figure 3: U.S. Demand Response Potential by Class (2019)

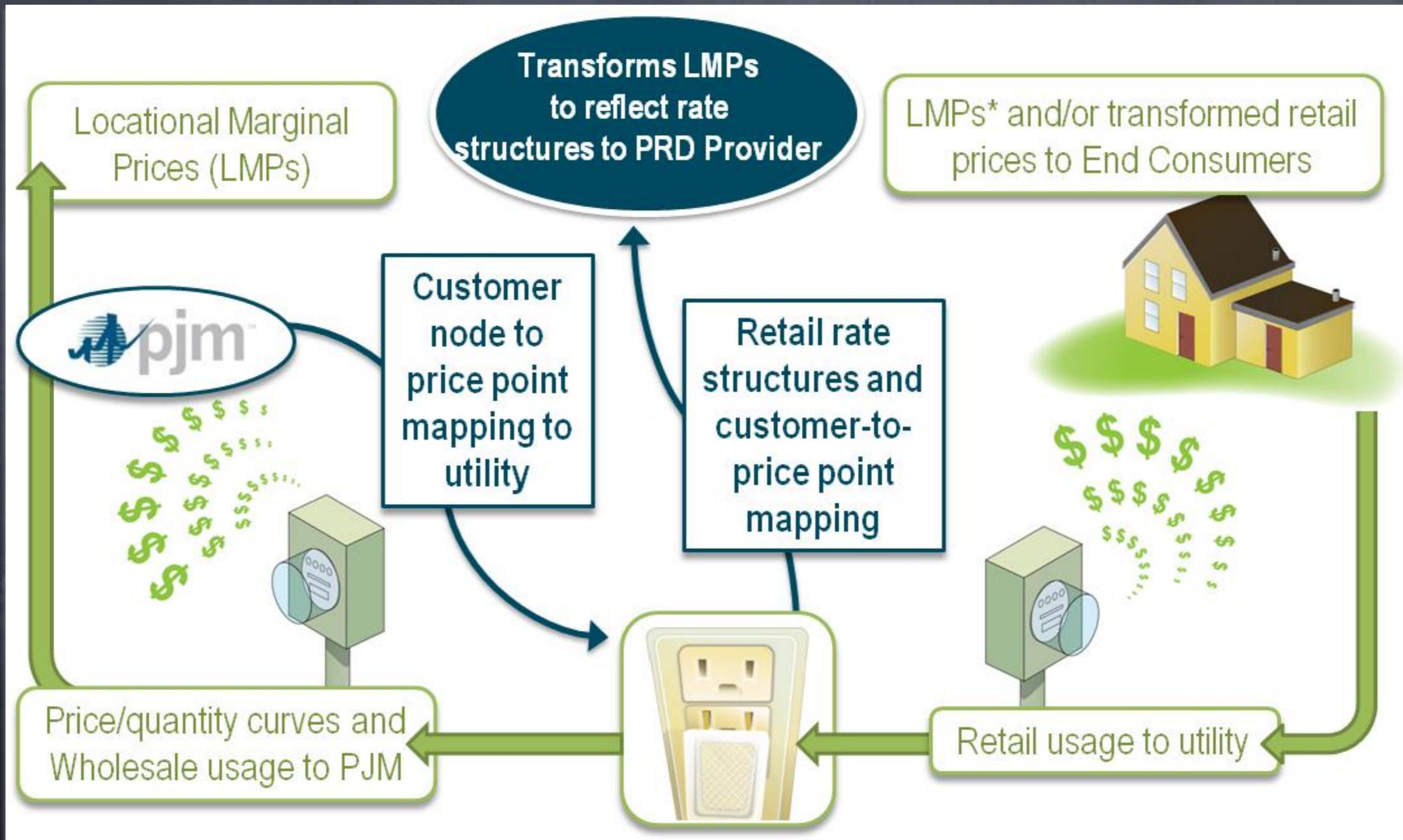


2009 FERC Assessment of DR Potential

Figure 2: U.S Demand Response Potential by Program Type (2019)



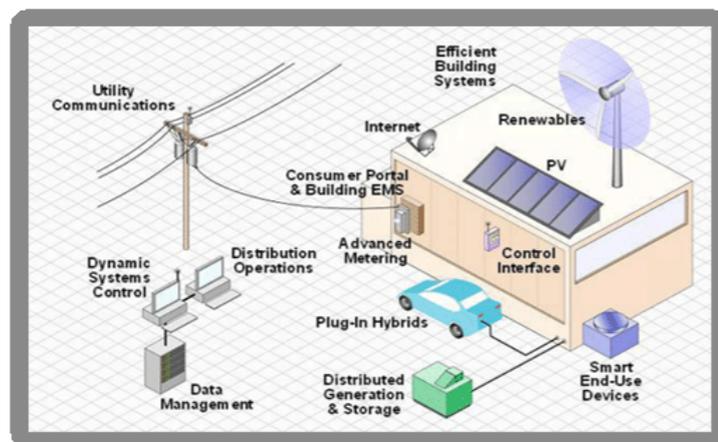
PRD Feedback Loop



Demand Response

Utility-controlled or Consumer-controlled?

- ⑩ **Who will deliver DR?**
 - *regulated utilities or firms competing in markets?*
- ⑩ **Who will control the “smarts”:**
 - *utility or consumer, or both?*
 - *Curtailment or Dynamic Pricing?*
- ⑩ **And how do choices impact:**
 - *energy, carbon, system integrity*
 - *likelihood that innovative business models will get to scale?*



• "You're not coming by to put this on my house, period."

t meter, locks up old meter



Mark Dieteman's meter isn't going anywhere.

• "I am against it. It's an infringement on our rights and our liberties."

FERC:

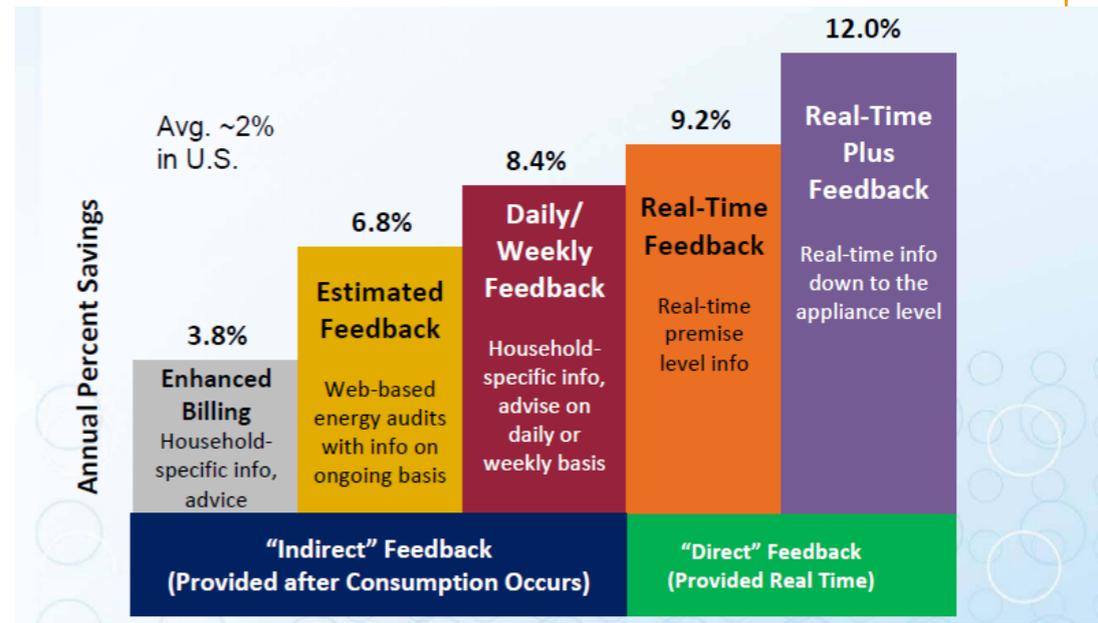
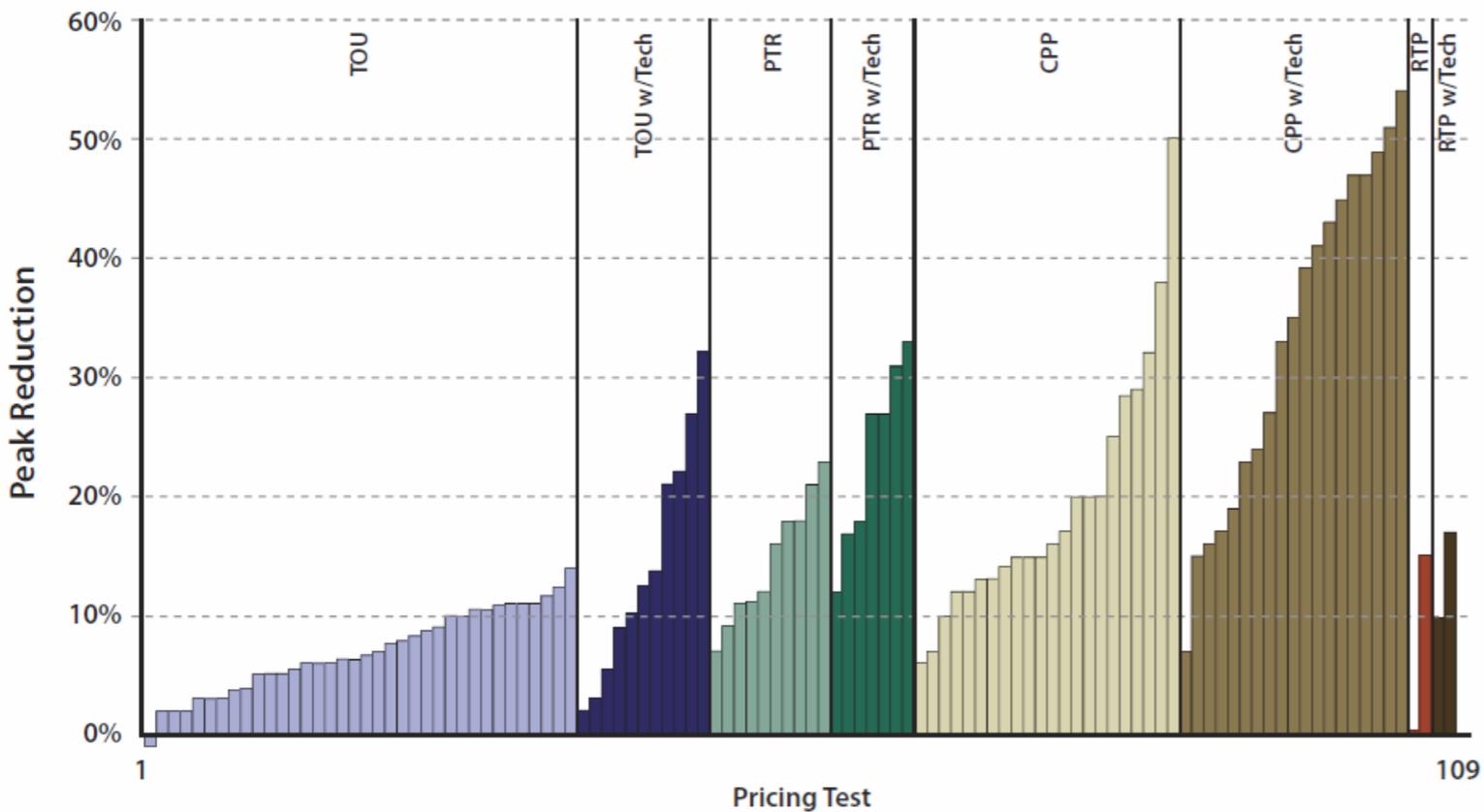
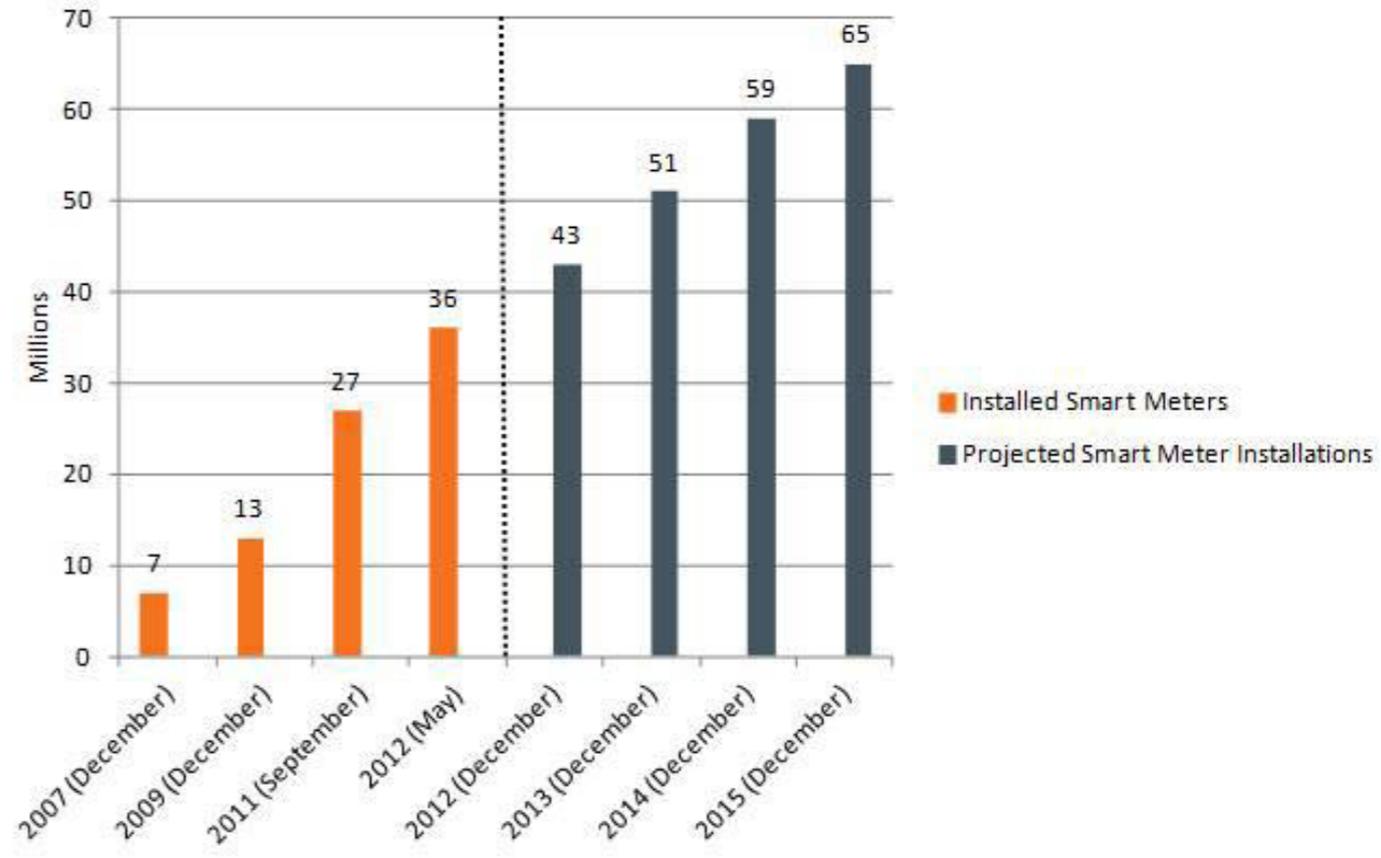
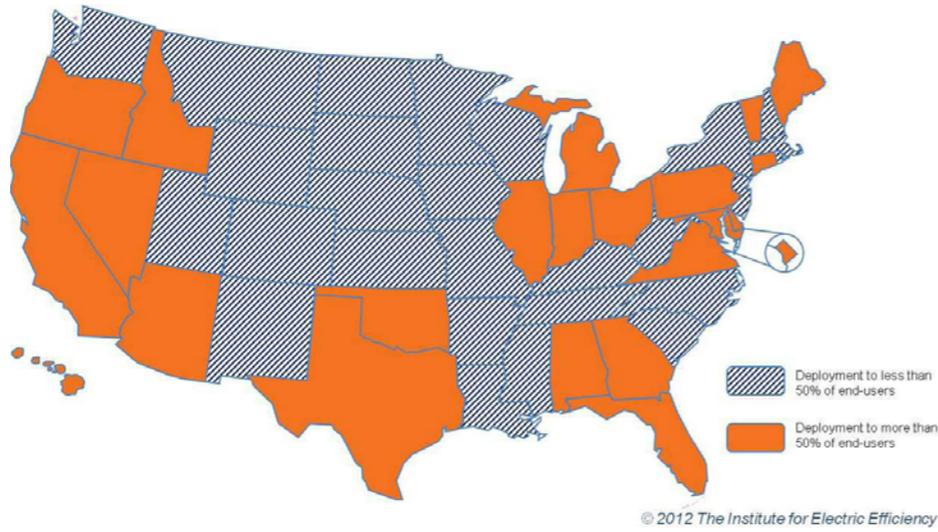
Challenges to getting to “smart response grid”:

- ⑩ **Full compensation to customers for smart response implementation**
- ⑩ **Generators don't want to pay this compensation**
- ⑩ **Must improve risk management and be integral to, rather than disruptive to, customer business/lifestyle**
- ⑩ **Need implementation tools and must demonstrate benefits**
- ⑩ **Need right tariffs in place to encourage investment**

Conclusion:

- ⑩ **Consumers should be allowed to participate in wholesale markets to get money back from participating in stabilizing the grid.**
- ⑩ ***FERC Order 745***

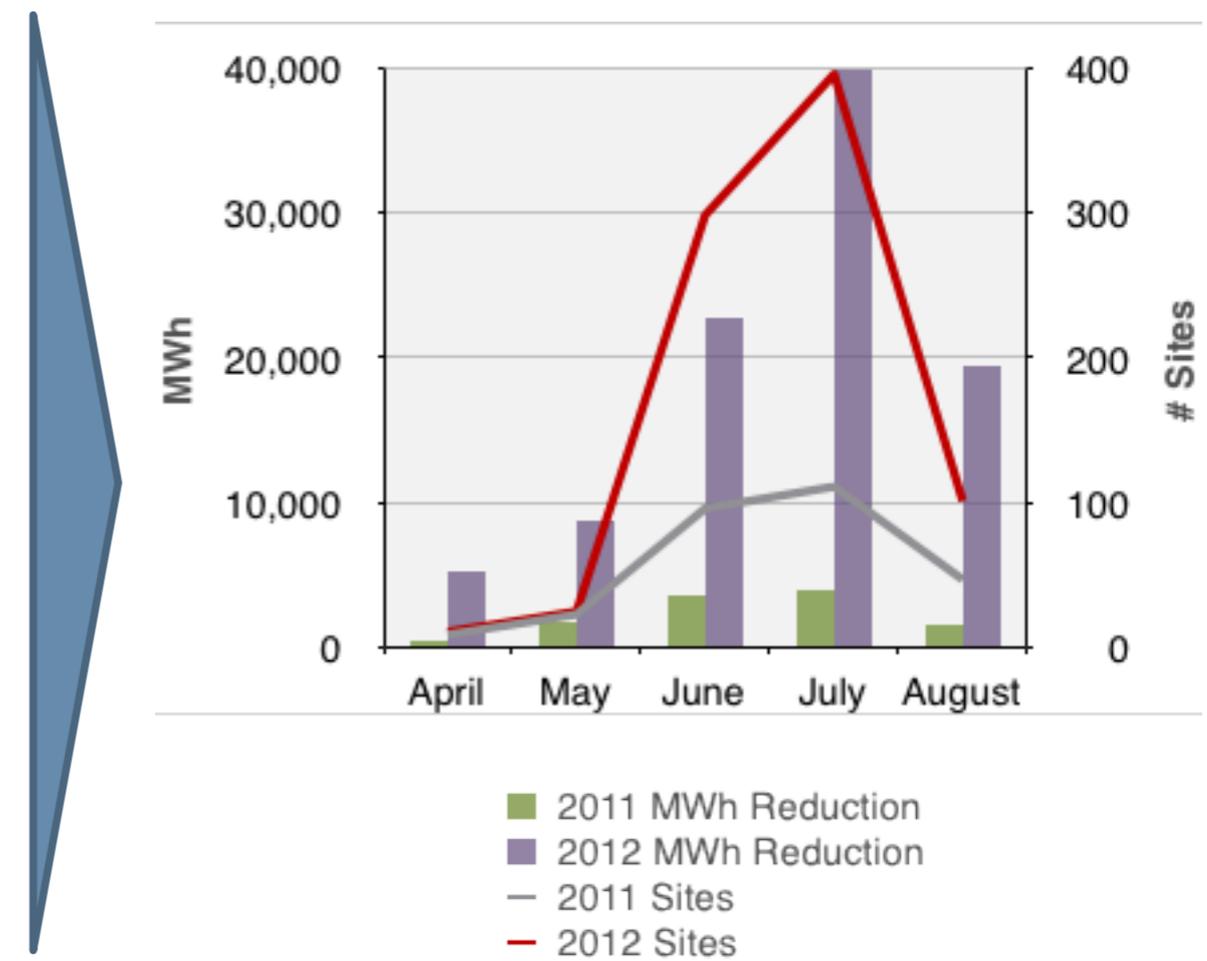
AMI –progress but little dynamic pricing, still 40 mm Itron drive-by households



Only PJM and ISO-NE have implemented Order 745 thus far:

ISO	Implementation Status
PJM	Fully integrated DR can clear in DA/RT markets and set LMP
ISO-NE	“Transition Period” – DA only, 7am-6pm M-F, DR cannot set LMP Full integration planned for 2016
NYSIO	Compliance filing pending FERC approval
CAISO	Compliance filing pending FERC action CAISO re-submitted on Sept. 26 explaining its first filing, which was rejected CAISO and the CPUC have filed for rehearing of Order 745 at the DC Circuit Court of Appeals
MISO	Third compliance filing pending FERC approval Discrepancy related to cost allocation across zones
	Compliance filing pending FERC approval

PJM economic MWh reductions have increased more than 800% from 2011 to 2012



FERC Order 745: Some Questions

- ⑩ What is the right balance of state/ federal authority of wholesale and retail DR?
- ⑩ Why are some ISOs reluctant to implement 745? How will FERC intervene?
- ⑩ What is the impact of Low energy prices? Is FERC considering further incentives for economic DR participants, such as payments above LMP?
- ⑩ How does FERC respond to the concern that the savings that result from economic DR will be mitigated through higher capacity prices?

Rapid Expansion of Distributed Generation"





Sandy and the Grid



Is the Grid 2.0 potentially more resilient and self-healing?

Is a Smart Grid related to a Smart City?

With climate change, are we considering more underground infrastructure?

How much will Grid 2.0 cost? Who will pay for it?



