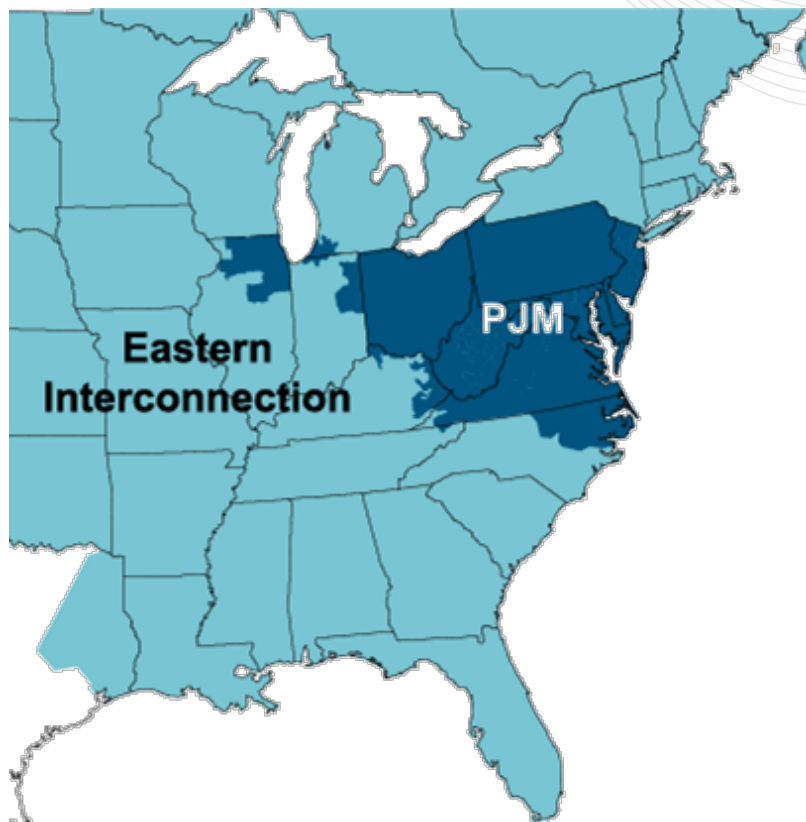


Demand Response Challenges and Counter Measures

Terry Boston
President & CEO
PJM Interconnection
PNNL/NREL/University of Dublin
Energy System Integration
Feb. 18-19, 2014



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

KEY STATISTICS

Member companies	860+
Millions of people served	61
Peak load in megawatts	163,848
MWs of generating capacity	185,600
Miles of transmission lines	59,750
GWh of annual energy	832,331
Generation sources	1,365
Square miles of territory	214,000
States served	13 + DC

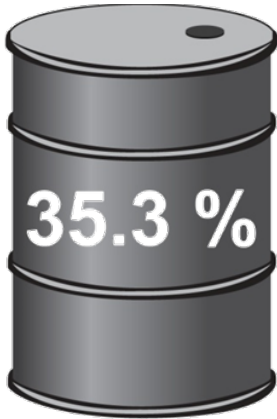
As of 1/1/2014

- Electricity Demand Uncertainty
- Extreme Weather
- World's Largest Fuel Switch
- Natural Gas Interoperability
- **Integration of Intermittent and Demand Side Resources**
- Man-Made and Natural Disasters



Each Challenge is Also an Opportunity

Adapted from: EPRI

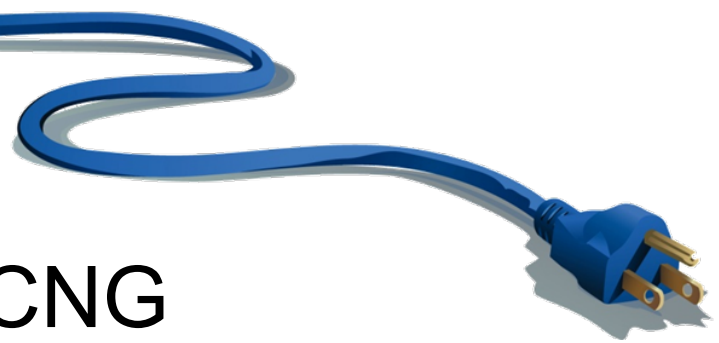


35.3 % of U.S. Energy use is oil



8.8 of 10 Americans commute using cars

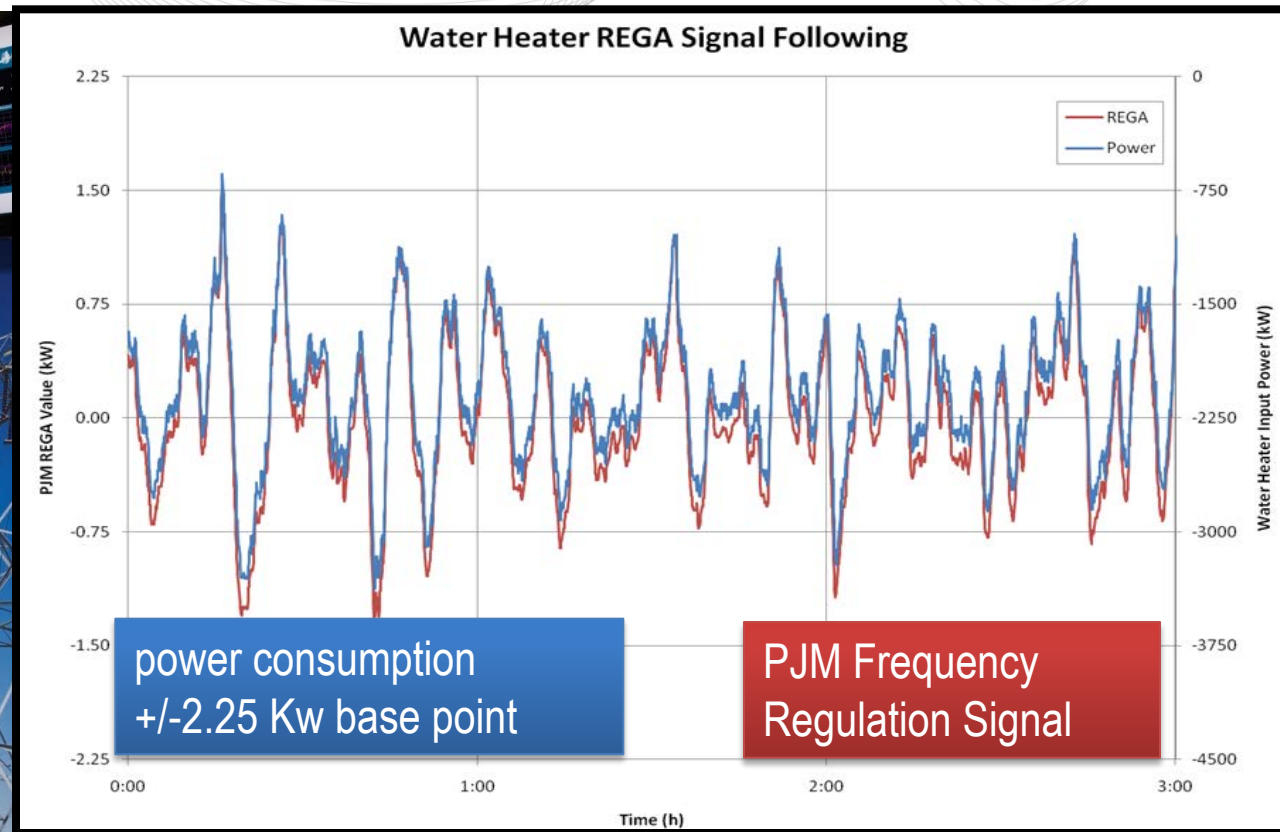
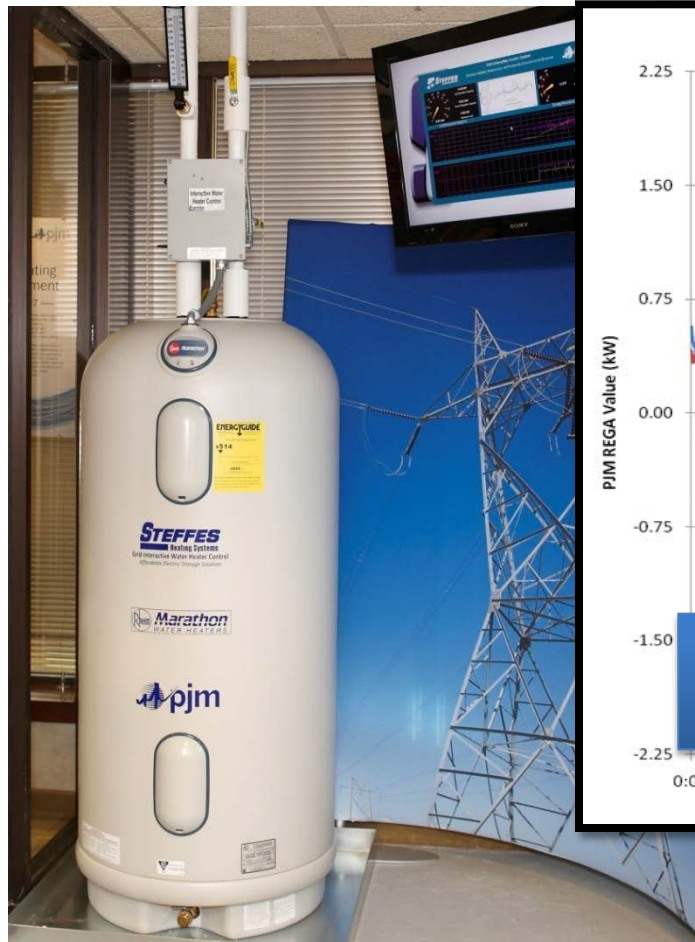
Wind and shale gas
can power PHEVs and CNG



15 cars * 18 kW/car = 270 kW



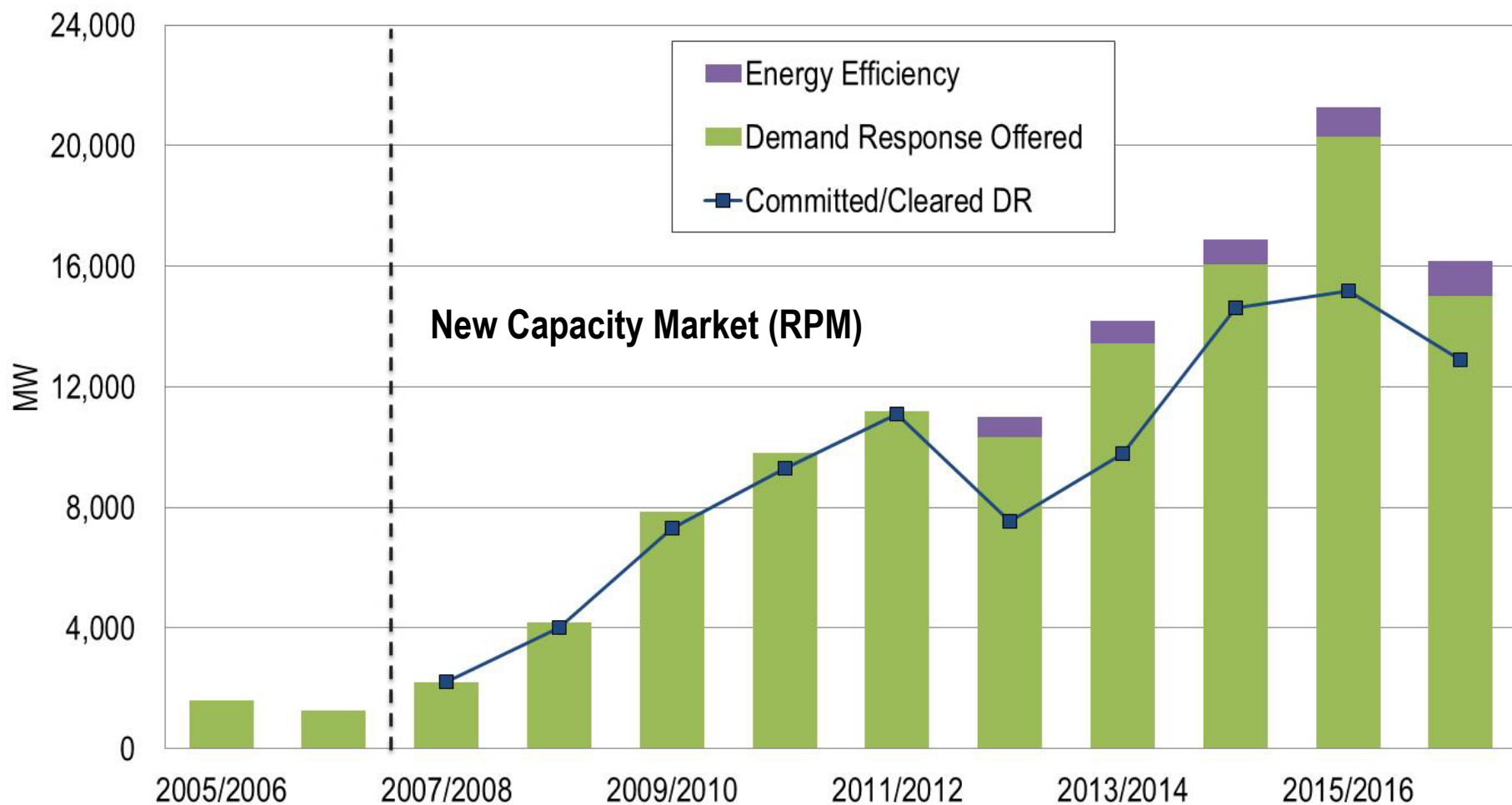
- Fast response frequency regulation
- Operating in PJM's Regulation Market
- Electrifying 2% of PJM's light-duty "fleet" would double storage capacity in the region



Jan.14, 2011 Midnight to 3:00 a.m.

105-gallon electric storage water heater (26 kWh) demonstrates minimization of cost while responding to the PJM wholesale price signal and the PJM frequency regulation signal.

Capacity Market Enables Demand Resources



Capacity Market Enables Demand Resources

