

PJM's Energy Storage Initiatives

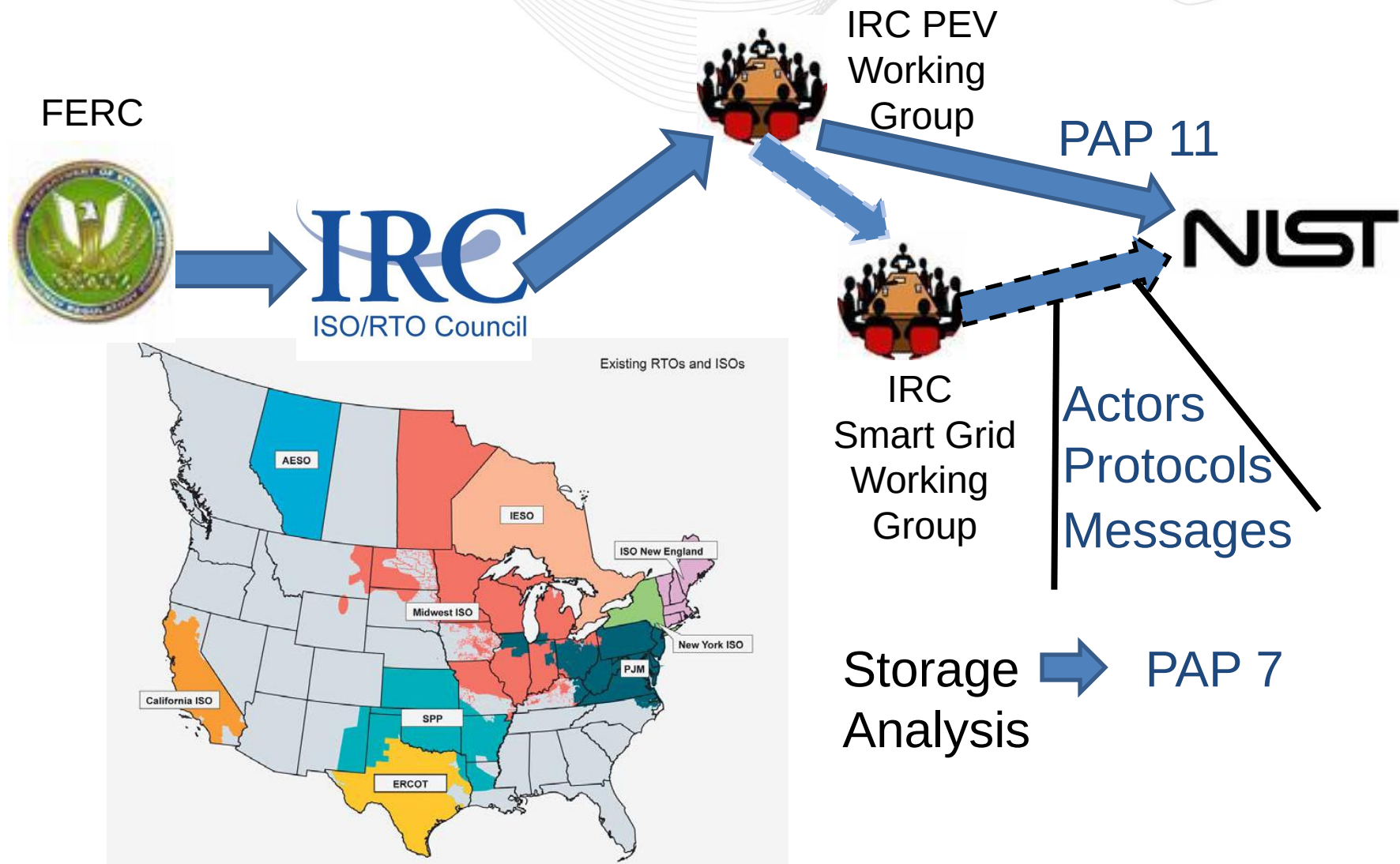
EUCI Electricity Storage Conference

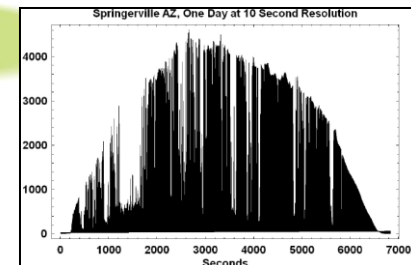
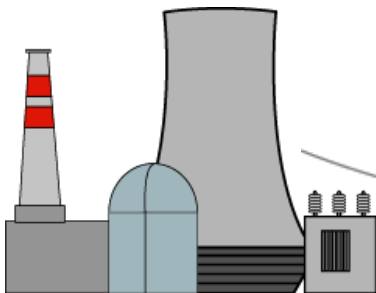
Joe Callis

Sr. Business Solutions Engineer

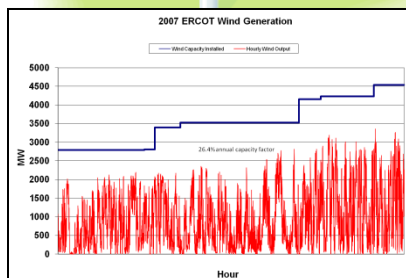
PJM Interconnection

January 24, 2011



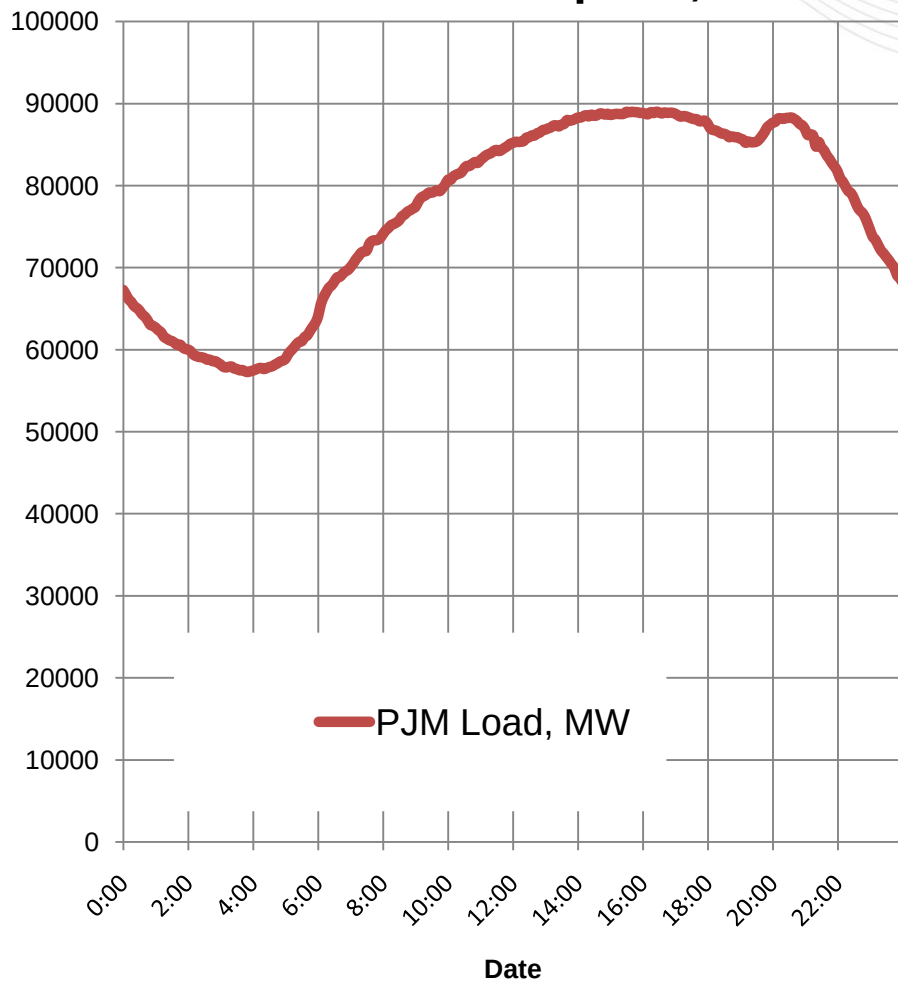


- If you like nuclear ...
- If you like wind...
- If you like solar...

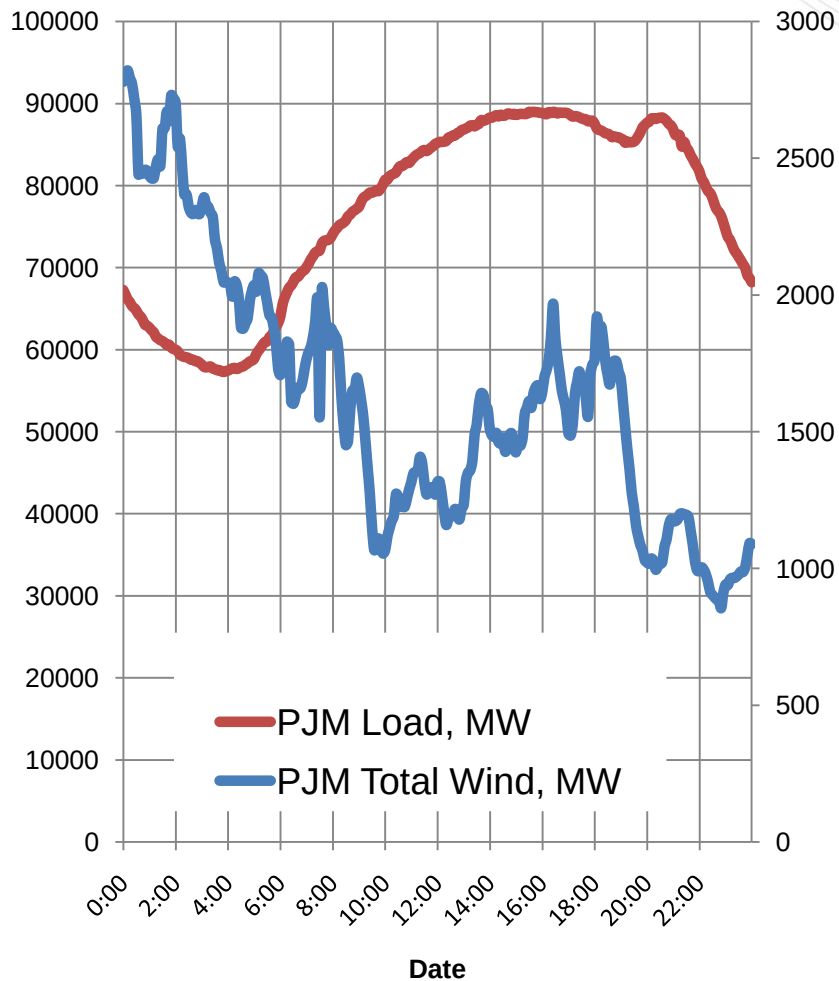


You have to love Storage

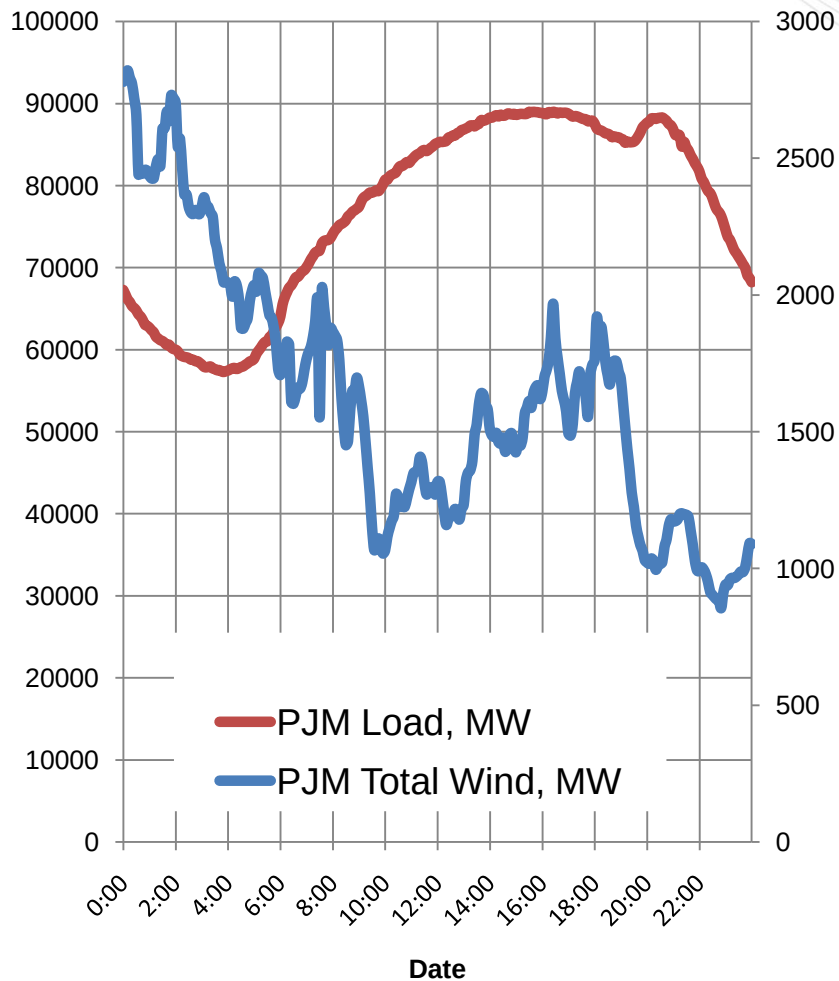
PJM Load on April 7, 2010



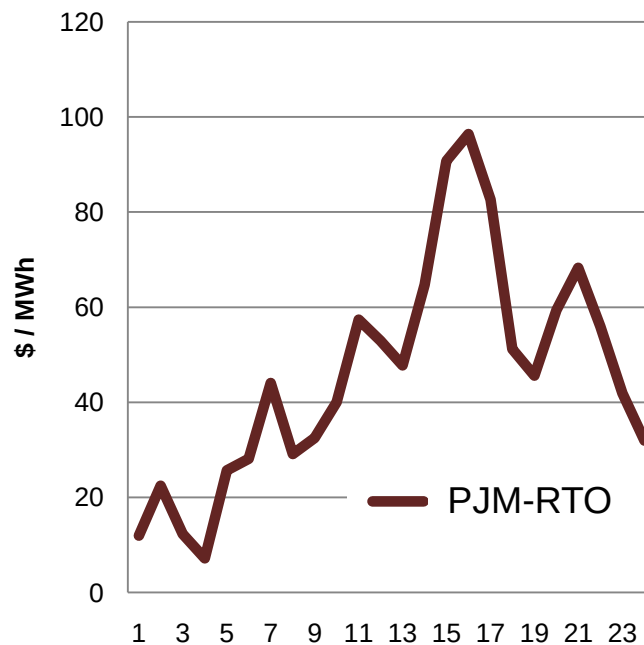
PJM Load and Total Wind on April 7, 2010



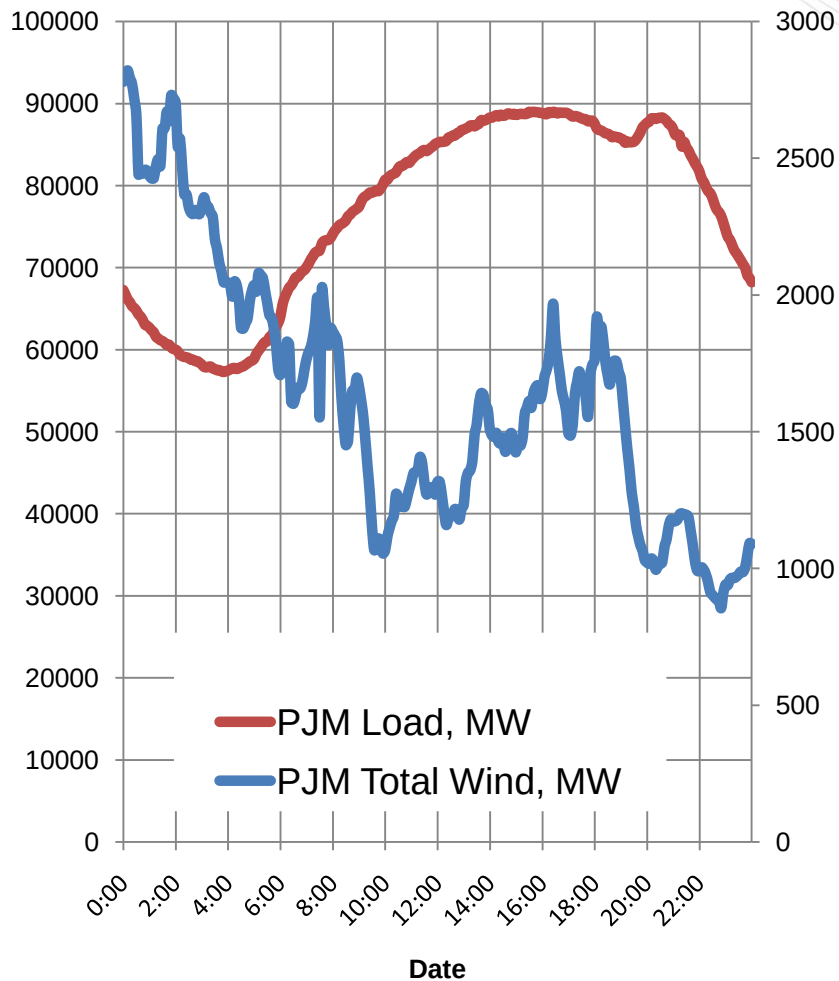
PJM Load and Total Wind on April 7, 2010



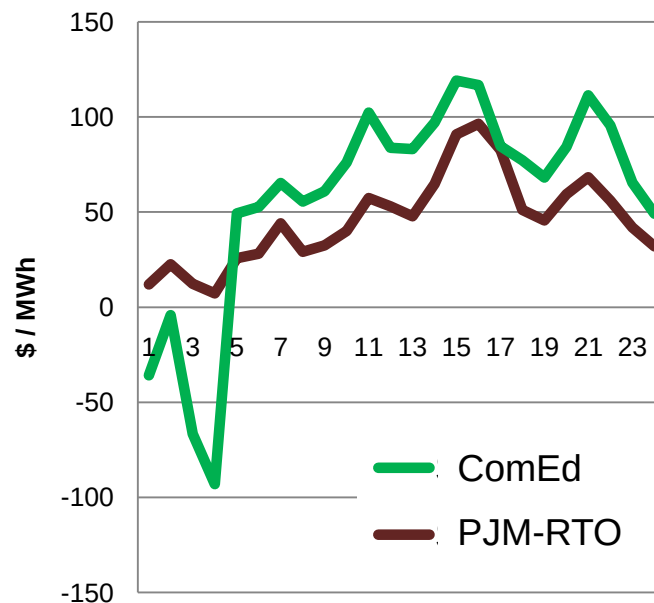
Locational Marginal Prices April 7, 2010

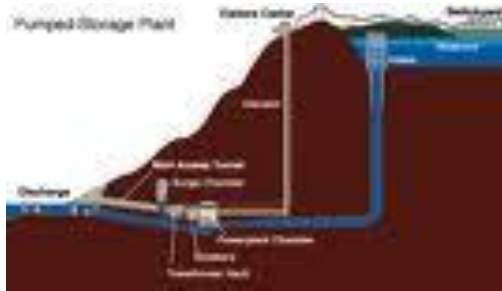


PJM Load and Total Wind on April 7, 2010

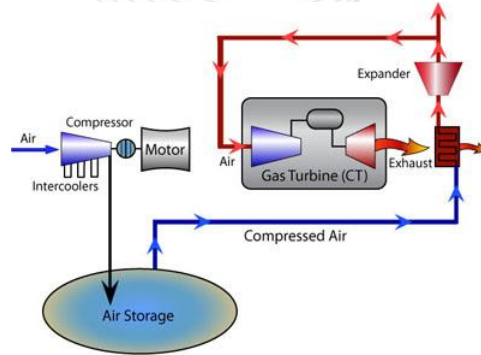


Locational Marginal Prices April 7, 2010





Pumped Hydro



Compressed Air



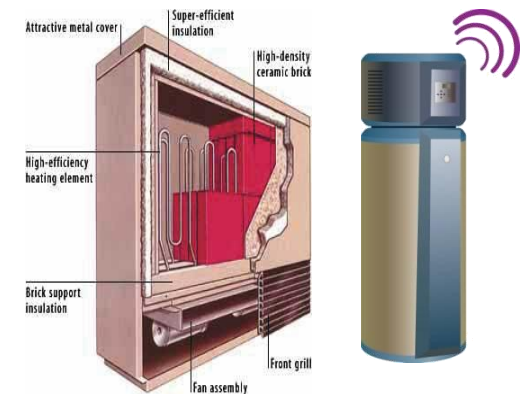
Flywheels



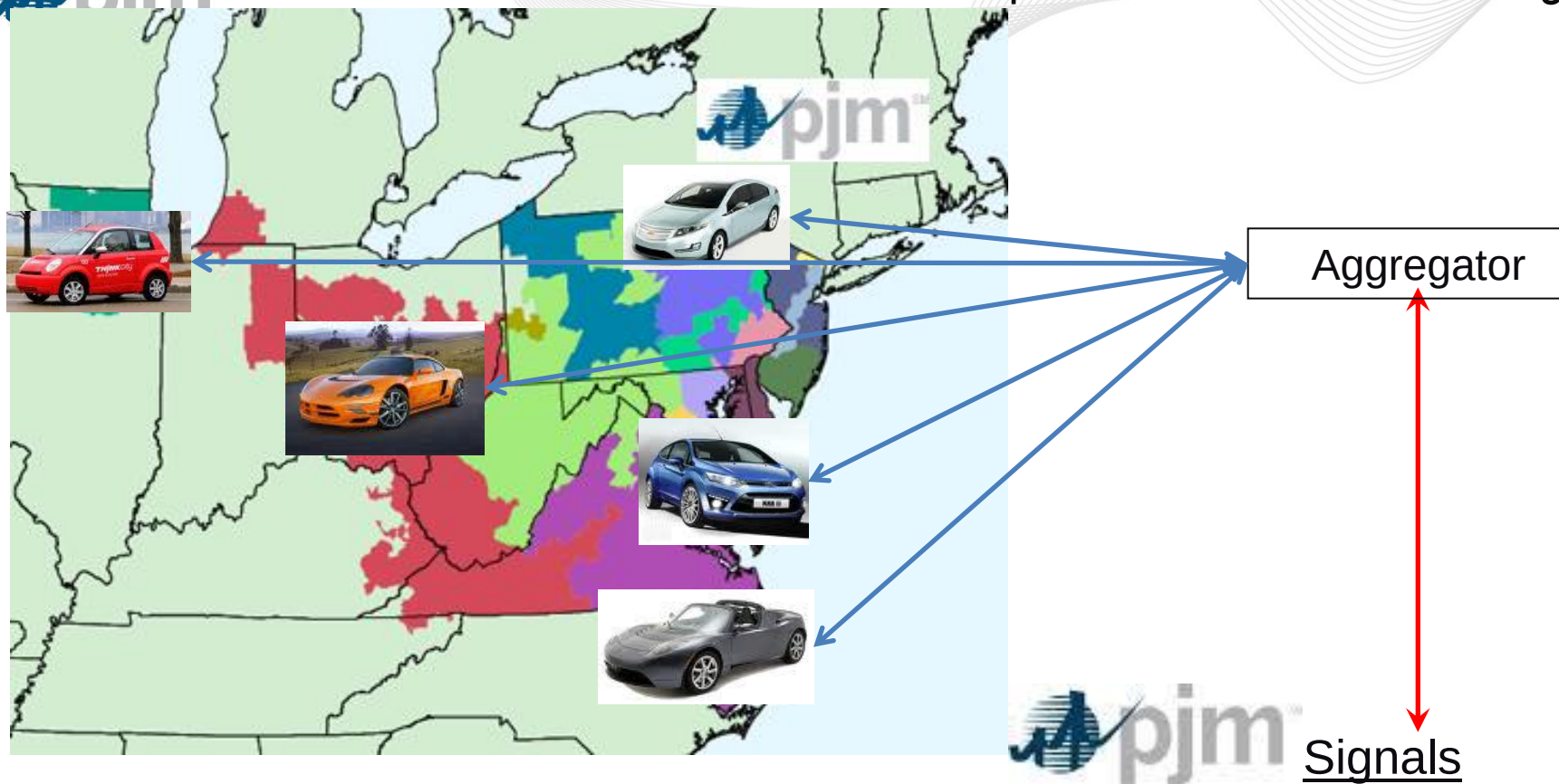
Stationary Battery



Mobile Batteries

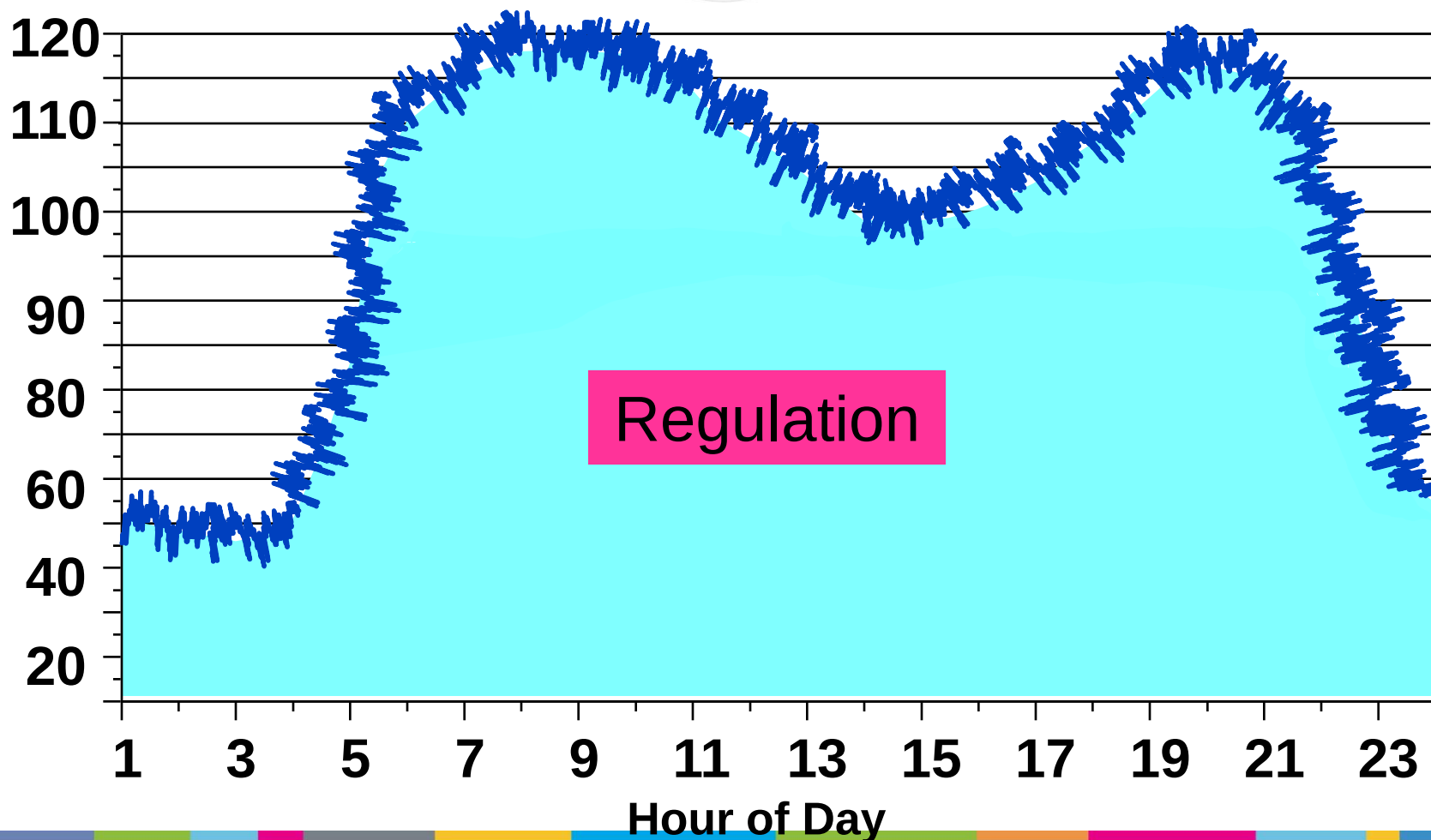


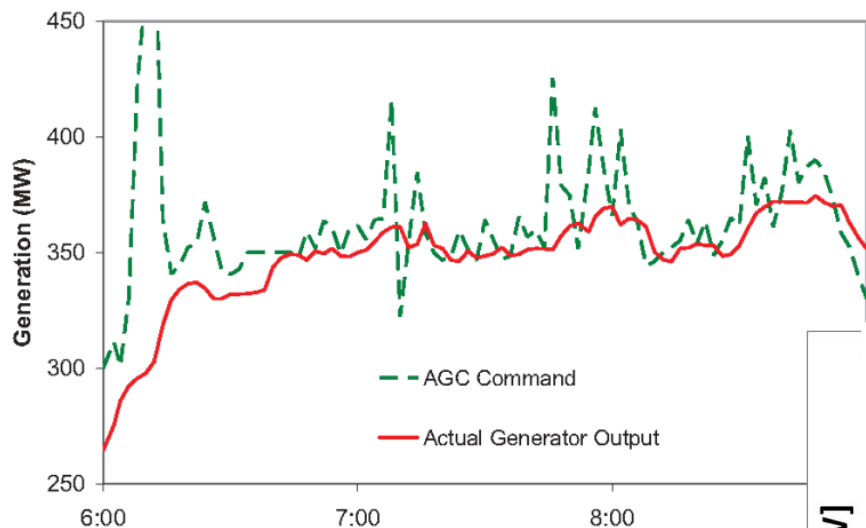
Thermal Storage



- Ancillary Services Signals
- Price Signals
- Generation Mix
- Reliability Control
- Load Curtailment

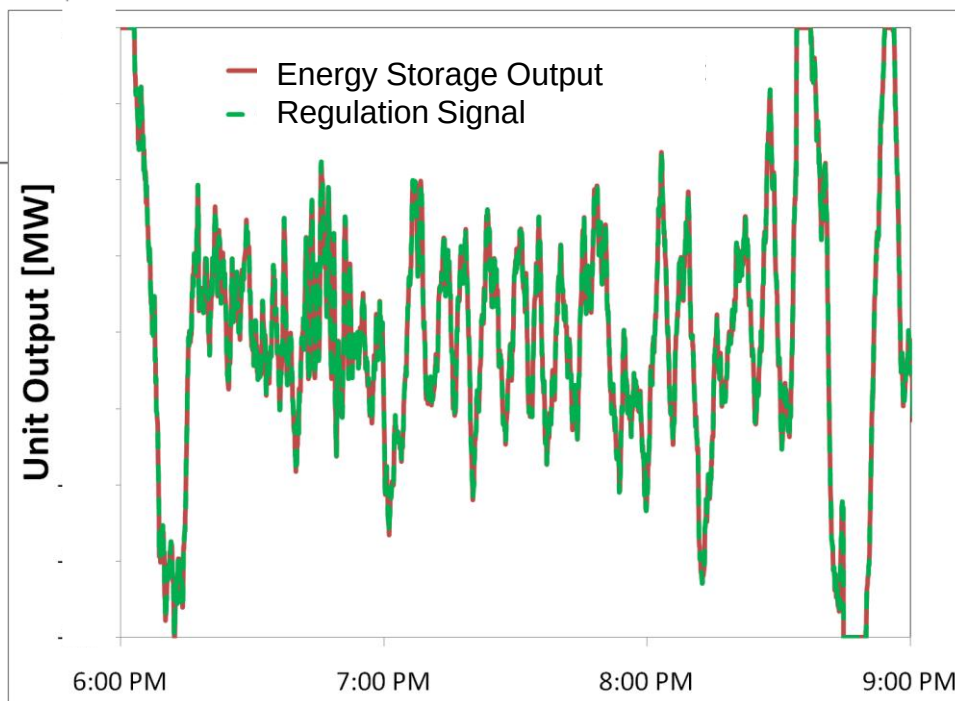
Load in GW



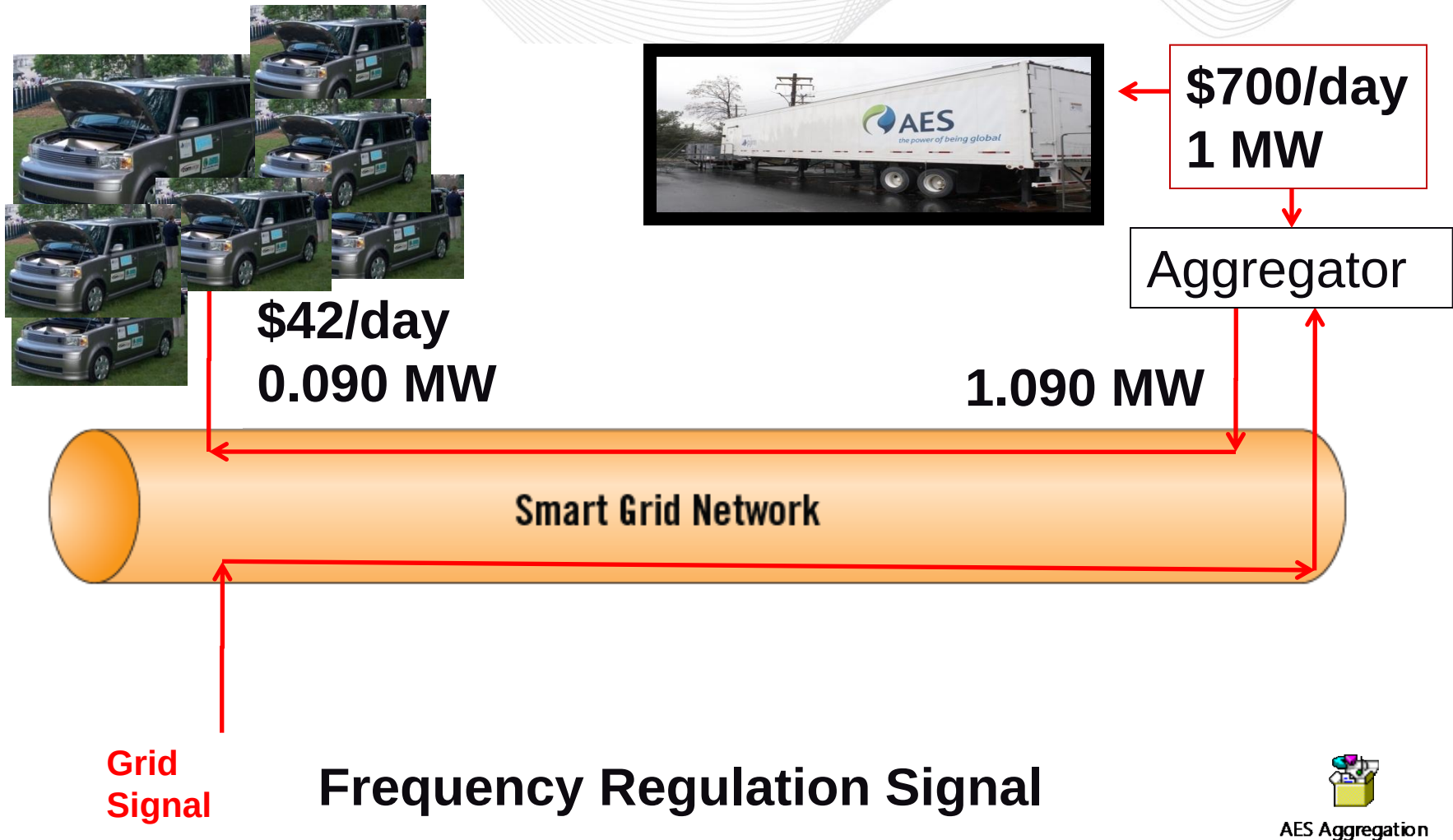


Energy Storage
(batteries / flywheels)
accurately following a
regulation command
signal

A fossil power plant
following a regulation
command signal



Frequency Regulation — Financial Incentives





PJM Pilot Projects



