



Future Capacity Resources, Retrofit Scheduling, and Transmission Reliability

Bipartisan Policy Commission
Workshop Series on Environmental Regulation
and Electric System Reliability
Workshop 3: Local, State, Regional, and Federal Solutions
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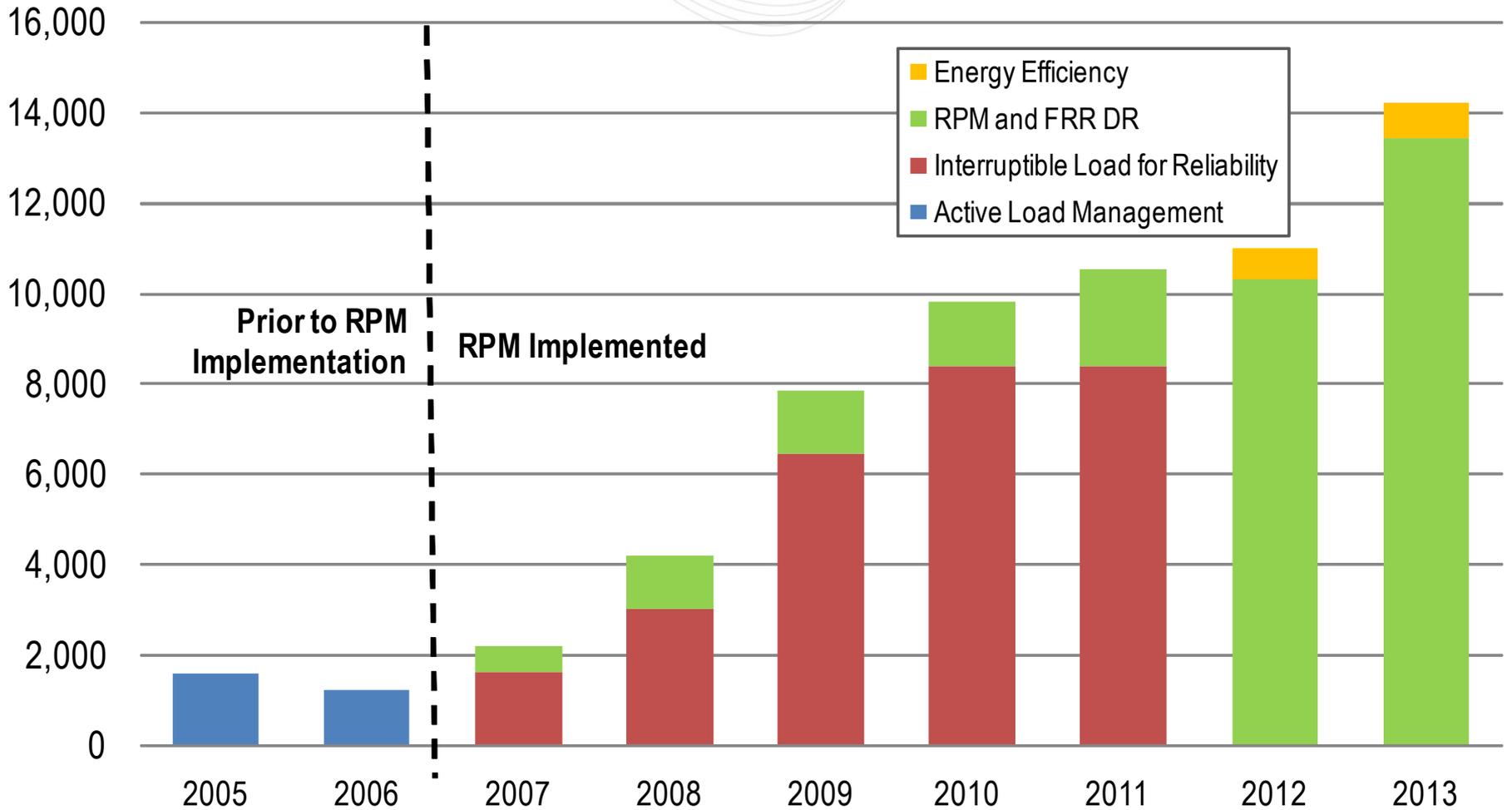
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- **Resource Adequacy:**
 - Ensuring enough capacity to ensure a loss of load expectation of 1 day in 10 years
- **Transmission Security:**
 - Ensuring that sufficient transmission is available to ensure capacity is deliverable to loads without violating transmission reliability criteria
- **Location of resources matters:**
 - Units deactivating may cause transmission related issues that require solutions
 - New entry and maintenance of existing resources should be incented where it is needed most

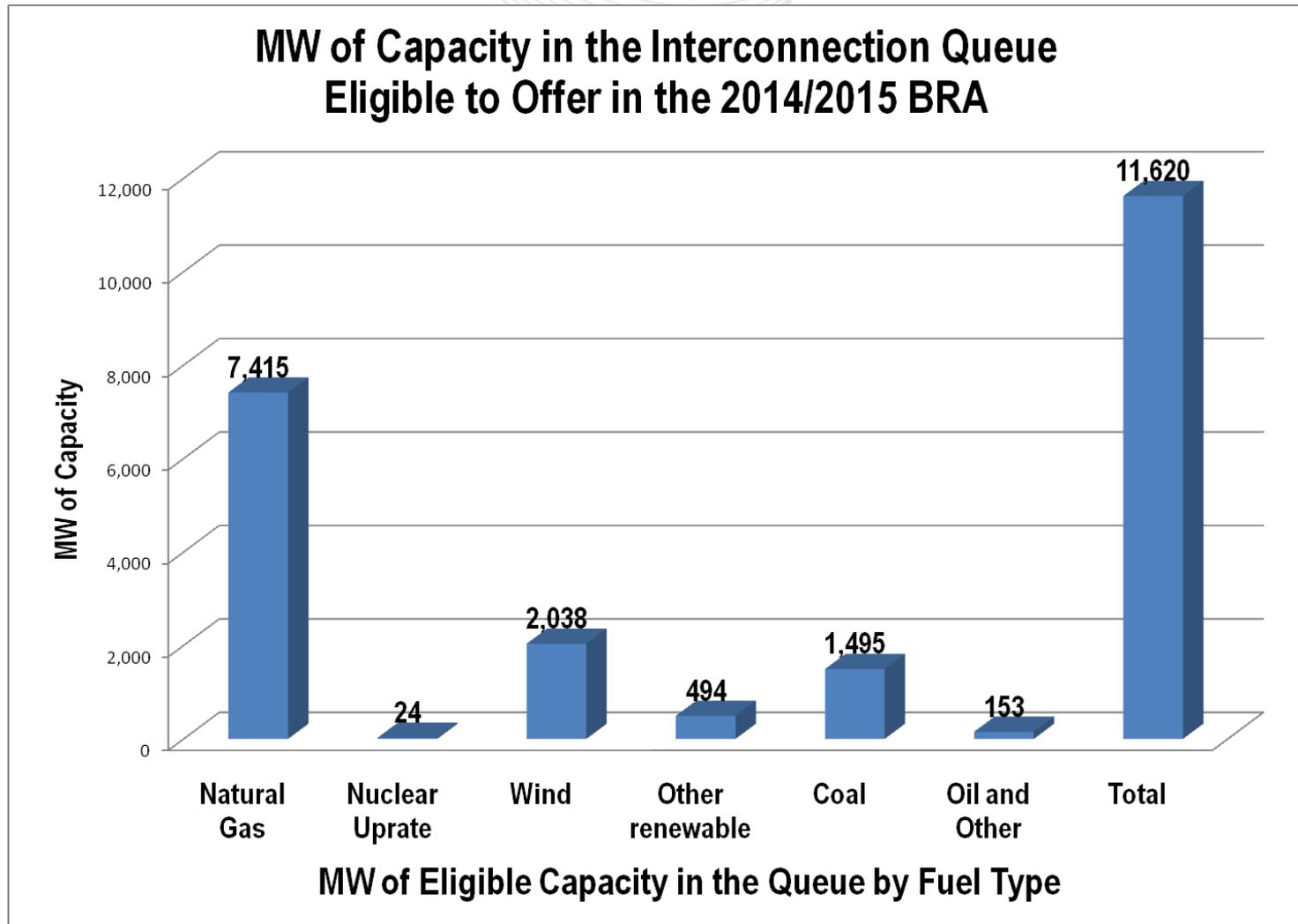
- Resource Adequacy:
 - Resources can only be attracted and maintained if there are deemed to be sufficient revenues to cover costs plus a return on investment
- Transmission Security and Location:
 - Price signals and corresponding revenue streams reflect locational needs due to transmission binding transmission constraints
- What units will likely require retrofits or are already bordering on uneconomic to operate?
 - How much will retrofits cost?
 - How many units will choose deactivation over retrofit?

- PJM cannot mandate new entry or prevent existing units from deactivating
 - PJM markets are designed to supply sufficient revenue opportunities to cover costs plus a return on investment in expectation
- RPM
 - 3-year forward capacity market designed to work in concert with energy market outcomes
 - Offers can include the costs of environmental retrofits
 - Offers are capped at avoidable costs (fixed costs including costs of needed investment) less expected net energy market revenues
 - Capacity beyond the installed reserve margin is purchased when cost-effective to do so

Offers of Demand-Side Resources as Capacity in PJM by Delivery Year

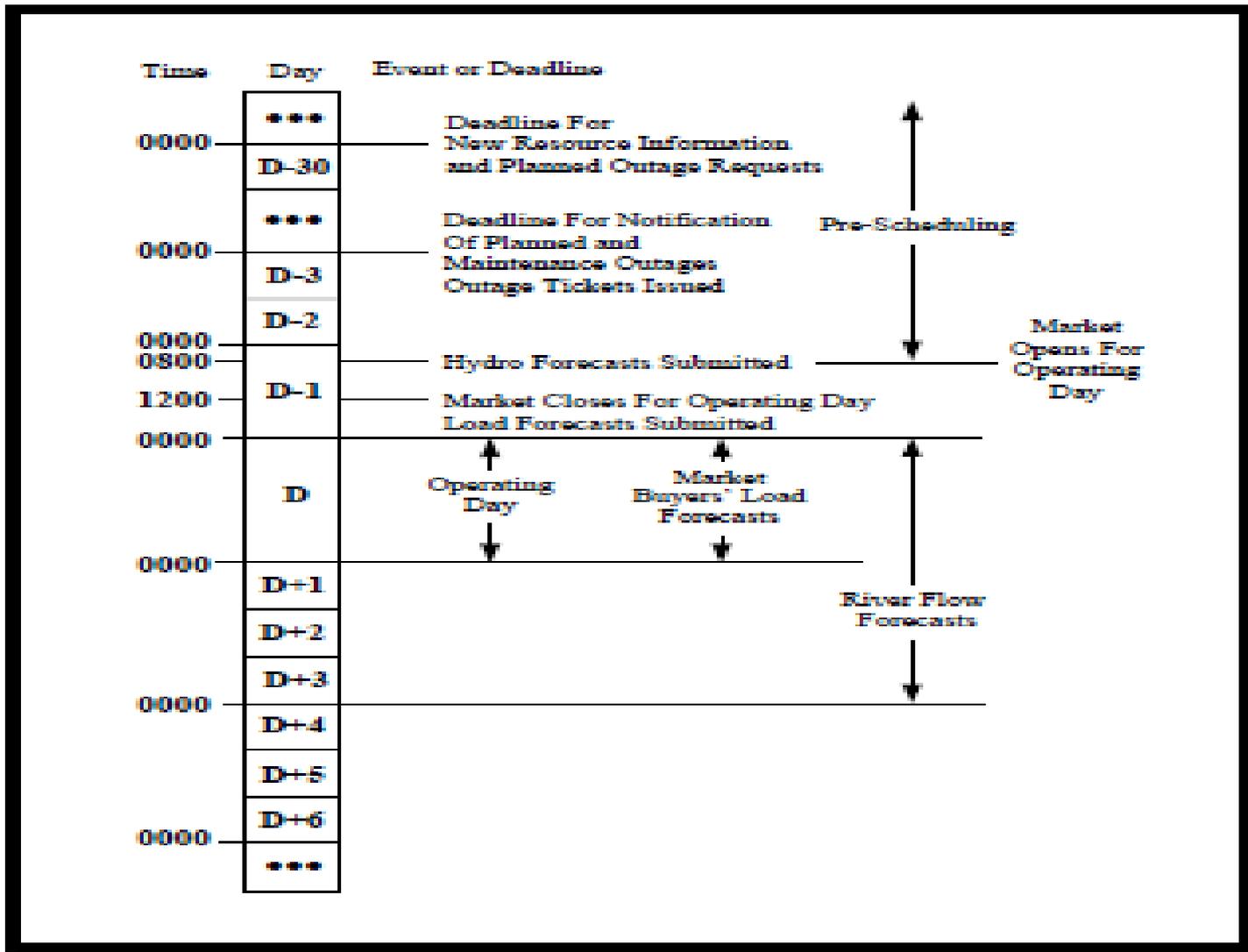


MW with Completed Feasibility and Impact Studies as of 12/6/2010 and In-service By 2014 Q3

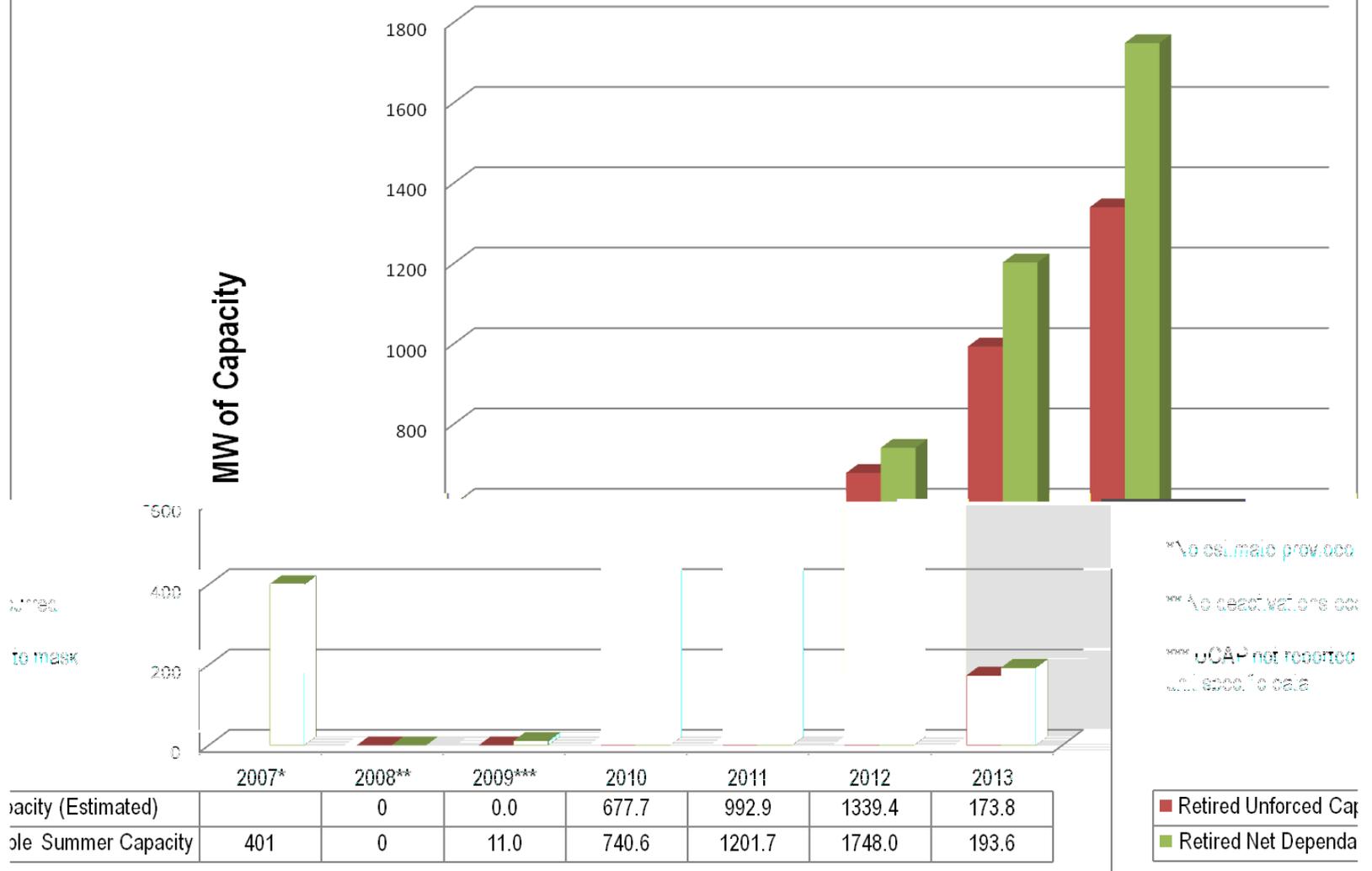


- Requests for outages are evaluated and approved on a first come, first served basis
 - PJM *does not* schedule outages, but merely coordinates to ensure reliability is maintained
 - An outage request can be denied if there is deemed to be a threat to system reliability
- Market incentives are such that generation owners would not wish to schedule planned outages that may threaten reliability
 - High correlation with periods of higher energy prices implying higher costs to the outage
 - Unapproved outages during peak periods may also carry capacity market penalties

Timeline for Planned Retrofit Outages in the Big Picture



Actual and Announced Generation Deactivations in PJM 2007-2013



- Generators are only required to provide 90 days notice for deactivation
 - Usually there is much greater notice provided in practice
 - PJM studies transmission reliability implications of deactivations
- Generation owners may elect to continue operating under an RMR arrangement until transmission solutions are in place
 - Tariff defined arrangement that provides incentives for advanced notice, but does not allow much for project investment if it is required
 - In the alternative, a generation owner may seek approval of a cost-of-service rate from FERC to allow it to continue operating
 - But nothing requires a unit remain in service beyond its announced deactivation date

- Ensure reliability of the bulk power system
 - Ensure resource adequacy through the RPM Capacity Market
 - Coordinate planned outage scheduling, though PJM does not actually do the scheduling
 - Ensure transmission security with announced generator deactivations through studies, new transmission builds, and if necessary RMR type arrangements