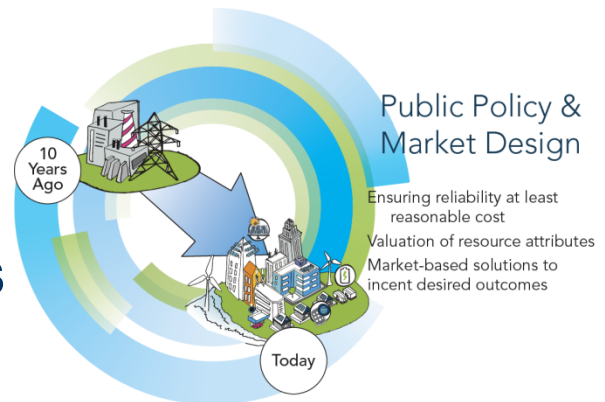


Context for PJM Market Design Proposals Responding to State Public Policy Initiatives

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Since the inception of competitive wholesale electricity markets, the industry has evolved significantly and in ways that could not have been fully anticipated. Technological disruptions – in particular hydraulic fracturing to access vast natural gas reserves; environmental regulation; highly efficient lighting, appliances and industrial processes; and increasing penetration of renewable, distributed and demand response resources – have altered the economics of electricity supply, creating new opportunities and challenges.

Demands on electricity markets also are evolving. Increasingly, public policies seek to recognize value associated with generation plants beyond their cost effectiveness and reliability attributes.

This document introduces and links to three working papers that offer straw proposals to spur discussion on the interaction of state actions to promote generation meeting environmental, social and/or political interests beyond simply ensuring resource adequacy at the lowest cost and the operation of the wholesale electricity markets. State actions take the form of subsidies or out-of-market economic support that currently impedes formation of competitive prices in PJM Interconnection's capacity and energy markets.

Two working papers introduce proposals to directly address the state subsidy issue: the first discusses “advancing” state environmental interests in a manner that preserves the operational integrity of PJM markets; the second discusses “accommodating” state programs by recognizing affected resources as capacity, while protecting the formation of a competitive price in PJM's capacity market.

Additionally, a third working paper addresses price formation in PJM's energy market. The price formation proposal does not respond *per se* to state subsidy programs. Instead, it examines whether the aforementioned profound changes to the industry require re-examination of PJM rules that define when and under what circumstances a generator is eligible to set marginal prices. The hypothesis is that the correct energy price in some intervals is understated by operation of rules that disqualify inflexible generation from setting price, even when such generation is needed and economic in that given interval. If this hypothesis is accurate, the pricing problem does not arise because subsidies have distorted prices. Rather, state programs, to some extent, may be a response to organic deficiencies in market design. Getting the market design “right” from the standpoint of price formation – which is justified on its own merits – may have the secondary effect of reducing forces motivating subsidy programs.

All three working papers likely will evolve as PJM works with members, stakeholders, states and the Federal Energy Regulatory Commission to achieve alignment on how best to reach public policy goals while harnessing the benefits of wholesale markets. PJM hopes to start a conversation by offering ideas to modify the competitive wholesale electricity markets to address changing demands placed on the grid and the associated markets PJM administers.



Addressing Subsidies

Wholesale electricity markets have proven to be a nimble, flexible tool to implement a host of state and federal public policies ranging from the development of retail choice to the integration of new renewables and demand response technologies stimulated by state standards and goals. However, the most recent iteration of state policies has involved explicit, legislatively-driven subsidies for specific generating units.

As discussed in the May 2017 FERC Technical Conference¹ on state policies and wholesale markets, these types of subsidies can suppress wholesale electricity market prices and threaten these markets' basic design mission, at least for those independent system operators and regional transmission organizations and their associated states that rely on markets for resource adequacy. PJM believes that market design should evolve to bridge the gap between state policy initiatives and existing market constructs and is evaluating two possible independent paths forward.

Working Paper 1: Advancing Zero Emissions Objectives through PJM's Energy Markets (Updated: Aug 24, 2017)

The paper discusses advancing state environmental initiatives by establishing a regional or sub-regional carbon price that can be reflected in wholesale market prices.

Working Paper 2: Capacity Market Repricing Proposal (June 12, 2017)

The paper discusses accommodating state policy initiatives in the capacity market by committing only the amount of capacity the market otherwise would determine to be economic, but administratively adjusting subsidized resource offers to prevent capacity price distortion.

- The Capacity Market Repricing Proposal updates PJM's [Potential Alternative Approach to Expanding the Minimum Offer Price Rule to Existing Resources](#) proposal from the [August 2016 Grid 20/20](#) on public policy and market efficiency.
- The Capacity Market Repricing proposal likely will be evaluated with other potential solutions by the [Capacity Constructs / Public Policy Senior Task Force](#).

¹ <https://www.ferc.gov/EventCalendar/EventDetails.aspx?ID=8663&CalType=%20&CalendarID=116&Date=05/01/2017&View=Listview>



Energy Market Price Formation

Electric industry evolution has exposed the need to examine whether energy market prices accurately reflect true, real-time costs incurred to meet demand.

Working Paper 3: Energy Market Price Formation (June 15, 2017)

A shift in energy market economics has occurred as:

- Sustained low natural gas prices have reduced variable operating costs of natural gas-fired generation.
- Environmental regulations have increased capital and operating costs for steam fossil generation, especially coal-fired generation.
- Penetration of zero-marginal-cost resources, such as wind and solar, has increased and will continue to increase.
- Growth in electricity demand has slowed.

As a result, PJM has observed:

- A supply curve flip in which less-flexible units formerly committed as base and mid-merit supply now are more regularly situated as the marginal resource needed to meet demand. Previously, marginal resources typically were natural gas peaking units that additionally offered operational flexibility to meet load following and other dynamic services needed at the margin.
- Overall flattening of the supply curve, resulting from lower fuel costs in the growing natural gas generation fleet and increasing marginal costs of what previously had been thought to be “base load” resources.
- Diminishing energy market returns to resources resulting in a shift to the capacity market for a greater proportion of units’ recovery of their total costs.

These shifts in economic trends and market dynamics could lead to an unintended bias in the energy markets favoring lower capital cost resources. The concern is that this phenomenon is driven, in part, by current energy pricing mechanisms failing to signal the true, full cost incurred to meet the marginal increment of load. Although this issue is not new, its impact on energy prices is exacerbated by flattening supply curves and low demand, which put financial stress on all units, but particularly large units with high capital costs.