



Problem Statement / Issue Charge

Enhancing All Aspects of Energy and Reserve Market Price Formation

Problem Statement:

The forces of market competition, in particular, the entry of efficient natural gas fired generation, led to the lowest electricity prices in the history of the PJM competitive markets in 2016. Competition benefits the market by providing incentives to generators to improve efficiency and by providing retirement signals to inefficient generation.

Low prices have also prompted PJM to question whether prices are inefficiently low. Inefficiently low energy prices would undervalue energy, reserves, and transmission constraint relief and unnecessarily shift cost recovery to uplift payments and to the capacity market. Efficiency must be clearly defined in order to evaluate and compare energy price formation methods.

Price formation in the energy and reserve markets depends on several factors, which include: the demand curves used by PJM to define the value of energy and reserves under scarcity conditions; the method PJM uses to calculate prices; market participant behavior in response to prices and uplift payments; the manual actions PJM takes to define demand curves, commit resources, and modify dispatch.

Demand curves. The demand curves include operating reserve demand curves and transmission constraint demand curves based on transmission penalty factors.¹

Pricing method: The method PJM uses to calculate prices is the LMP pricing calculation.

Market Behavior: Market participant behavior includes offer levels, offer parameters, responses to dispatch instructions, self scheduling practices, load bidding, and virtual trading.

Manual actions: PJM's manual actions include defining constraints, setting constraint limits, setting transmission penalty factors, choosing load forecasts, choosing reserve requirements, creating and triggering closed loop interfaces, and manually committing resources.

¹ The demand curves for pricing constraints are under evaluation under another PJM problem statement and issue charge.

Evaluation of efficiency in energy and reserve market prices requires consideration of all these aspects of price formation.

Issue Source:

Monitoring Analytics, as an alternative to PJM's Price Formation Problem Statement and Issue Charge

Stakeholder Group Assignment:

This work will be assigned to a new senior task force reporting to the Markets and Reliability Committee (MRC).

Key Work Activities:

1. Demand Curves:
 - a. Provide education on the demand curves PJM uses to price operating reserves.
 - b. Evaluate the properties and potential impacts of various formulations of demand curves including the shape, level, and additivity of zonal and market wide demand curves.
 - c. Develop market rules to support changes to operating reserve demand curves, if applicable.
 - d. Thoroughly test and evaluate any proposed rule changes prior to implementation with opportunity for participant feedback.
2. Pricing method:
 - a. Provide education, to the extent not already provided, on the method currently used to calculate prices and alternative methods of calculating prices.
 - b. Evaluate the properties and potential impacts of various pricing methods including any related required changes to other market rules and changes to market participant incentives.
 - c. Develop market rules to support changes to the energy and reserve pricing method, if applicable.
 - d. Thoroughly test and evaluate any proposed rule changes prior to implementation with opportunity for participant feedback.
3. Market behavior:
 - a. Provide education on market participant behavior that impacts energy and reserve market pricing and uplift levels, as well as PJM market rules that address or fail to address inefficient behavior.
 - b. Evaluate the potential impacts of market rule changes to address the incentives to submit inaccurate physical operating parameters, to self schedule uneconomic generation, to block load generation resources, and to deviate from the economic dispatch signal.

- c. Develop market rules to support changes to the PJM Market Rules, if applicable.
 - d. Thoroughly test and evaluate any proposed rule changes prior to implementation with opportunity for participant feedback.
4. Manual actions:
- a. Provide education on manual actions taken by PJM operators that impact energy and reserve market prices and uplift.
 - b. Evaluate changes to market rules to create greater transparency and consistency around manual actions and to define new products or change demand curves to allow the demand for reliability observed by PJM Operations to be reflected in the market. Evaluate the impacts to the market of potential changes.
 - c. Develop market rules or market design changes to support increased transparency and consistency, to define new products, or to alter demand curves, if applicable.
 - d. Thoroughly test and evaluate any proposed rule changes prior to implementation with opportunity for participant feedback.

Expected Deliverables:

Recommendations as to whether changes are needed to support an efficient market design on each of the four issues.

Out of Scope Items:

None

Expected Overall Work Duration:

One to two years

Decision Making Method:

Sector weighted voting will be used.