

PJM's Proposal to Reduce Biddable Nodes for Virtuals:  
Unjust, Unreasonable and Inconsistent with Market Design Principles

March 13, 2017



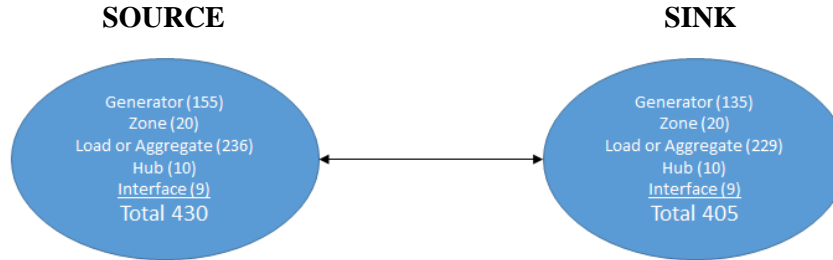
# Chronology of Events

October 19, 2015	PJM presents its report <i>Virtual Transactions in the PJM Energy Markets</i> dated Oct. 12, 2015 (the “Virtual Transactions Report”), which includes suggested modifications to biddable points available to INCs, DEC and UTCs. PJM’s recommended <i>adding</i> UTC trading locations in the Virtual Transactions Report.
September 2016	PJM’s Energy Market Uplift Senior Task Force (“EMUSTF”) first discusses proposals regarding the availability of biddable points (PJM refers to these proposals as the “Phase 3” packages).
December 20, 2016	Three (3) of the Phase 3 packages are discussed at EMUSTF.
December 20, 2016 - January 23, 2017	Three (3) additional Phase 3 packages are submitted to EMUSTF, but not discussed.
January 19, 2017	The FERC issues the Uplift Cost Allocation and Transparency NOPR in Docket No. RM17-2-000.
January 23, 2017	Without prior notice to stakeholders, PJM submits Package A in EMUSTF. Package A contradicts PJM’s position in the Virtual Transactions Report, reducing the number of biddable points by <b>90.21%</b> .
January 25, 2017 - February 10, 2017	At least one (1) additional Phase 3 package is submitted to EMUSTF, but not discussed.
February 13 - 17, 2017	Stakeholder voting on Phase 3 packages in EMUSTF.
February 21, 2017	At PJM’s Members Committee webinar, it is announced that PJM’s Package A receives the majority vote in EMUSTF.

# PJM's Biddable Points Proposals

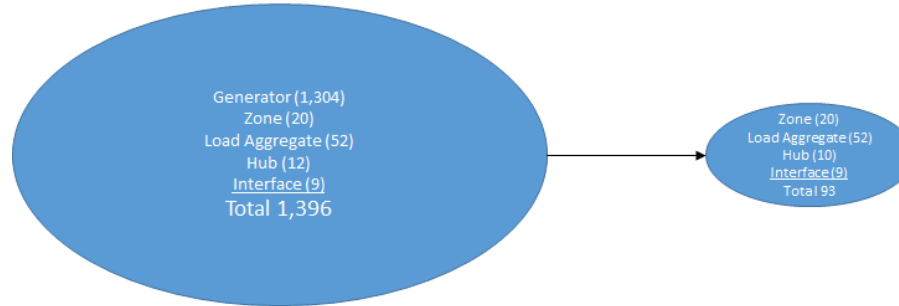
## Comparison with Status Quo

### STATUS QUO



### PJM PROPOSAL

Virtual Transactions Report  
October 19, 2015



### PJM PROPOSAL

Package A  
January 23, 2017



# PJM's Proposals Result in Overloaded Lines and Congestion

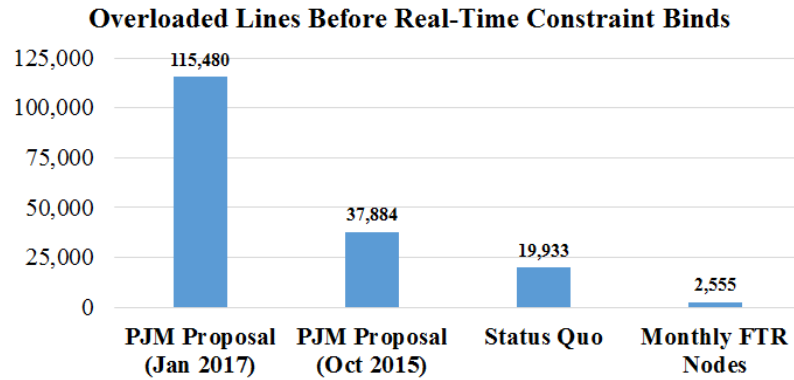


Figure 1

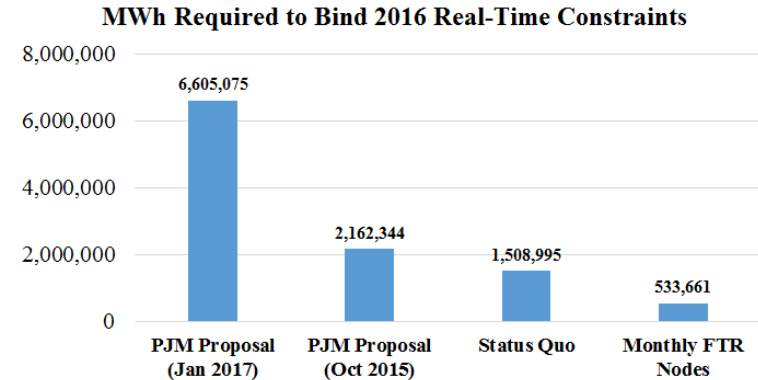


Figure 2

XO Energy analyzed each constraint that occurred in PJM's 2016 Real-Time Market. Figure 1 illustrates the number of lines that would overload in the Day-Ahead Market before a particular constraint bound under each of PJM's proposals, the status quo and XO's proposal to expand the biddable points to the monthly FTR nodes. Figure 2 illustrates the number of megawatts that would be required to bind the 2016 real-time constraints in the Day-Ahead Market under the same four proposals.

# PJM's Revised Biddable Points Proposal

## From Nodal to Zonal Markets? An Unjust and Unreasonable Solution.

PJM's revised proposal to restrict biddable points will transform its wholesale energy market from a nodal to zonal market. The proposal is:

1. Flawed. PJM's Package A, which proposes to limit UTCs to zones, hubs, and aggregates, cannot, by definition, enhance the convergence of the nodal markets or nodal transmission constraints. By limiting UTC transactions to hubs, interfaces and load zones, PJM will effectively remove the product's ability to mitigate local market power and converge nodal congestion in the PJM markets.
2. At Odds with FERC Precedent and Policies. FERC has repeatedly held that convergence of the Day-Ahead and Real-Time Markets is a key measure of market efficiency. Decreasing the number of biddable nodes, thereby decreasing convergence, is inconsistent with the economic theories advocated by both the FERC and the academic community, which has quantified the enhanced value of nodal markets over zonal markets.

# PJM's Revised Biddable Points Proposal

From Nodal to Zonal Markets? An Unjust and Unreasonable Solution. (continued)

3. At Odds with PJM's Virtual Transactions Report. In contrast with PJM's current proposal, the Virtual Transactions Report points to the "commitment convergence" gained with the expansion of the UTC product to include all generators. At the nodal level, the UTC is a real-time congestion hedge that allows market participants to voluntarily hedge their real-time congestion exposure. This product is critical to well-functioning wholesale markets and, ultimately, retail power markets.
4. Inconsistent with Fundamental Market Design Principles. PJM's proposal does not comport with fundamental market design principles, such as best practices and cost causation, and will only exacerbate market inefficiencies, as highlighted by noted economists Dr. William Hogan and Dr. David Patton. Although PJM's proposal to decrease the number of biddable nodes for virtual transactions may be a welcome change to load serving entities, it is not consistent with the tenets of a competitive wholesale market.

# PJM and Its IMM are Overwhelmingly Supportive of Nodal Markets

## Why doesn't this Support Extend to PJM's Virtual Transactions?

In response to the FERC's Electric Storage NOPR, the PJM Independent Market Monitor (the "IMM") filed comments arguing that electric storage resources must be aggregated on a nodal - not zonal - basis. Yet at the same time, the IMM argues that virtual transactions must be zonal, not nodal. This logical inconsistency is perplexing.

"Permitting distributed resources to aggregate across nodes while being treated as the same resource is inconsistent with the basic structure of nodal markets. In PJM and other organized wholesale power markets under the Commission's jurisdiction with locational prices and where location of the resources for system security and price formation is of paramount importance, participation should require wholesale node specific resources definitions. This means limiting aggregation of resources to their specific, actual wholesale nodes, with telemetry and metering that captures activity of the aggregated resources at that node."

"There is no reason for a complex workaround to the basic features of a nodal market. Distributed energy resources at multiple nodes should participate at each such node. Aggregation of distributed resources is no more necessary or appropriate than aggregation of existing generation resources. The basis for the belief that distributed resources cannot compete at the nodes where they are located is unclear. It is unclear why there need to be special rules. All resources in a nodal market should be treated equally and no specific approach to resources should be provided an advantage over others."

# PJM and its IMM are Overwhelmingly Supportive of Nodal Markets

Why doesn't this Support Extend to Virtual Transactions? (continued)

“Locational requirements are not artificial restrictions in a nodal market but are fundamental to nodal markets. RTOs/ISOs manage geographically dispersed resources with full situational awareness on a regular basis using a fully nodal system. A fully nodal system is the most effective way to maintain this approach.”

**“There is no reason why distributed resources cannot be managed with *fully nodal wholesale prices*.”**

“This discussion is really about the *granularity of settlements*. The RTOs/ISOs settle participants’ interactions with market participants based on nodal injections, withdrawals and prices.”

“Given those facts, the nodal information should be provided to the RTO/ISO and the RTO/ISO should provide nodal settlement.”

Comments of the Independent Market Monitor of PJM at 12-15,  
Docket No. RM16-23-000 and AD16-20-000  
(filed February 21, 2017).



# The ISOs Support Nodal Markets

“Other things being equal, zonal pricing always subsidizes the dominant local generator and increases monopoly profits above those that would occur under nodal pricing. [Z]onal aggregation subsidizes the monopolist and increases the profits that can be extracted through the exercise of market power. **By contrast, nodal pricing supports the market and expands the range of tools available to help mitigate market power.**”<sup>1</sup>

“Key Finding - Savings to consumers = \$5.6 billion (NPV) over the first ten years of operation of the nodal market.”

## “Efficiencies of a Nodal Market

- Improved price signals
- More efficient dispatch of electric generation
- Improved ability to anticipate system conditions to reduce local congestion
- Ability to assign local congestion to the resource causing the congestion”<sup>2</sup>

## “Current market design deficiencies

- No centralized day-ahead energy market – no price transparency
- No nodal pricing – real-time congestion cost socialized.
- No meaningful participation by final demand – it is what it is.”<sup>3</sup>

“By making prices local and transparent, LMPs provide a strong incentive for cost-effective demand response programs that reduce electric use during peak hours. On the supply side, persistently high LMPs signal to potential investors where additional energy supplies are most needed. LMPs serve to induce investment – in new generation supplies, in transmission capacity to reduce congestion, and in demand response measures.”<sup>4</sup>

# In Order to Support Distributed Energy Resources at the Retail Level, Nodal Markets are Required at the Wholesale Level

- FERC, the ISO/RTOs and the states have agreed that demand response programs, such as PJM's Price Responsive Demand, "... requires metering capable of providing hourly integrated values, dynamic retail rates triggered by *nodal LMPs*, and automated usage reductions at prices predetermined by the customer." (PJM, 2011)<sup>5</sup>
- As part of the Electric Storage NOPR, the Commission expressly found that "the sale of energy from the organized wholesale electric markets to an electric storage resource that the resource then resells back to those markets must be at the wholesale LMP." Electric Storage NOPR at P 28.<sup>6</sup>
- On May 1 - 2, 2017, FERC is holding a technical conference on "State Policies and Wholesale Markets Operated by ISO New England Inc., New York Independent System Operator, Inc., and PJM Interconnection, L.L.C." (Docket No. AD17-11-000).

# In Order to Support Distributed Energy Resources at the Retail Level, Nodal Markets are Required at the Wholesale Level (continued)

“The Commission should establish consistent locational requirements across the ISOs/RTOs. Establishing appropriate, consistent locational requirements will create an environment that incentivizes new entrants. Specifically, allowing DER aggregations across as many pricing nodes as possible (as opposed to one) is appropriate as it provides for flexibility in portfolio and resource design and thus more participation.”<sup>7</sup>

“By identifying where and when DERs can deliver benefits to the broader power system, policymakers will be able to better guide California’s investments in grid modernization. But before regulators authorize spending ratepayer money on tomorrow’s grid, the utilities need to know where to invest. That requires a methodology for mapping the system. ‘Everyone agrees the methodology needs to be as accurate as possible but also needs to be usable by developers,’ said EPRI Vice President Mark McGranaghan. ‘It needs to be as location-specific as possible and needs to allow as much DER as possible. A methodology that gives answers that are too conservative or limits DER is not acceptable.’”<sup>8</sup>

“To facilitate more economically efficient DER benefits, the NYISO will provide more granular price signals reflecting location specific system conditions. These granular price signals are available to the NYISO, but have not been publicly available. To provide more locationally accurate pricing data to DER, resources that choose to participate in the NYISO’s Energy and Ancillary Services markets will be mapped to their appropriate electrical buses and settled at the nodal price associated with the bus. The NYISO’s goals are to deliver real-time nodal LBMPs, calculated every five minutes, to reflect more localized system conditions.”<sup>9</sup>

“Now supported largely by federal and state policies, DER cannot fully mature until their services are properly valued by markets, [Sky Stanfield] said. That will not happen until their unique locational and temporal values can be monetized and those values will only be clearly revealed by [hosting capacity analysis or] HCAs.”<sup>10</sup>

# In Order to Support Competitive Retail Prices, Nodal Markets are Required at the Wholesale Level (continued)

“The end goal is what many have termed transactive energy — a system where DERs can receive locational and temporal compensation for the services they offer to the grid in real time. ‘We don’t expect consumers to be day trading or worrying about that,’ [Audrey Zebelman] said. ‘They may just sign up for an economic program and then the devices will respond to prices and constraints that the customer might put on. But it will move I believe to much more a real-time market, perhaps a millisecond market.’”<sup>11</sup>

“A Dynamic Retail Rate is a retail rate structure or design that changes the retail charge or retail rebates in response to changes in the wholesale energy prices or system conditions. To translate the Dynamic Retail Rate into Price Responsive Demand (PRD) at the wholesale level, **the dynamic retail rate must be explicitly linked to the PJM Real-time LMP at the nodal or bus level.** Nodal Real-time LMP that triggers higher prices under dynamic retail rates is the common currency between retail and wholesale. If a zonal Real-time LMP is used, reductions in demand may occur upstream of localized transmission constraints making the condition worse.”<sup>12</sup>

“Industry experts increasingly recognize the importance of improving the link between wholesale and retail power markets, because of its potential for improving the efficiency of electric power system operations and resource investments. Currently the two sides of the electricity market are largely disjointed. Retail electricity revenues totaled nearly \$300 billion in 2005. Estimates of the potential benefits from increasing price-responsive demand vary widely. Based on a number of analyses of time-of-use and real-time pricing programs, we estimate that economic efficiency could be improved by approximately 0.5 to 2 percent, which implies annual resource cost savings and enhanced consumer value of \$3 billion to \$6 billion.”<sup>13</sup>

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