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Memorandum

Subject: MOPR Proposal Presented at the PJM Stage 4 Meeting June 30, 2021

From: Paul M. Sotkiewicz, Ph.D.

To: PJM Stakeholders

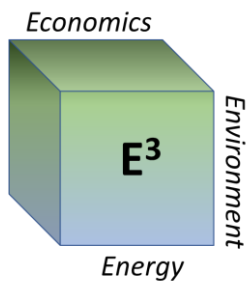
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Date: June 23, 2021

Executive Summary

The proposal presented in the matrix to mitigate buyer-side market power in PJM is based on solid economic foundations both theoretically and empirically while also satisfying the mandates of the Federal Power Act to ensure just and reasonable rates that are non-discriminatory and non-preferential. The proposal in the matrix has the following properties:

1. Targets only those parties and associated resources that have the ability and incentive to exercise buyer-side market power.
2. Parties that have the ability to exercise market power are those who on net are purchasers of capacity in the PJM RPM Capacity Market who either contract, self-build, or in some other way act as a single entity to pay for Capacity Resources.
3. The mechanism by which the exercise of buyer-side market power is exercise in the capacity market is to force an uneconomic, above market cost resources into the supply at zero cost to artificially reduce market prices.
4. Exercises of buyer-side market power are more easily successful the greater the net load to be served, and the greater the size of the uneconomic resource to the total demand in the constrained LDA.
5. The proposed mechanism does not discriminate by resource type, fuel, age, or size in applying MOPR.
6. The proposed mechanism will test all new entry resources and those existing resources, not tied to any IOU, municipal, or cooperative vertically integrated utility, receiving out of market revenues through non-bypassable charges.
7. The proposed mechanism avoids the messy and likely costly legal battles of what state policies should or should not be subject to MOPR. Rather generically, policies that create and force non-bypassable charges onto all load, will be subject to the market power test whether public power, vertically integrated utilities, or “forced collusion” of competitive load serving entities to pay out of market for uneconomic resources.



8. The proposal shines light onto the true financial condition of existing resources not tied to any IOU, municipal, or cooperative vertically integrated utility, receiving out of market revenues through non-bypassable charges as to whether they are truly uneconomic or whether they are simply engaged in enhancing their profitability because they have better information than policymakers about the true economic state of their resources. Those resources that have cleared while being subject to MOPR clearly did not need the extra money.

Introduction and Purpose

This memo provides a narrative summary of the matrix proposal and provides some examples to show how this proposal would work in practice.

Defining Buyer Side Market Power

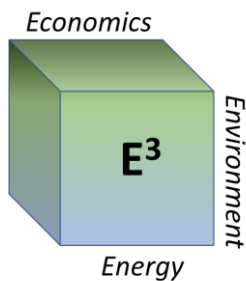
Buyer-side market power is the ability to artificially reduce market prices below competitive levels through the withholding of demand from the market to reduce the overall expenditures on a good or service (in this case, Capacity in the PJM RPM Capacity Market). Buyer-side market power is the mirror image of supplier market power where a supplier can withhold supply from the market to artificially increase prices above competitive levels to increase profits.

How Buyer-side Market Power Can be Exercised in the RPM Capacity Market

Within the RPM Capacity Market, the demand for capacity is established based on the load forecast and the Net Cost of New Entry (CONE), and thus load cannot exercise buyer-side market power in the traditional sense that it cannot withhold demand from the RPM Base Residual Auction (BRA) directly. In the alternative, load can indirectly reduce its “net load” or load less the resources it owns or has under contract, through the self-supply by contract or self-build of a resource that has costs that are above market costs (costs above the competitive price). The next step in this process is to offer that resource at a price below the competitive level (zero makes the most sense) to reduce the market clearing prices. The load benefits when the overall cost of serving the net load is reduced by more than it costs to supply the resource that has above market costs.

Simple Examples

These simple examples show how buyer-side market power would be evaluated in concept. The main idea is that buyer-side market power can be exercised when inserting a resource acts as a “loss leader” to pay a higher price for a resource than the market price while reducing the overall load expenditures.



**Figure 1: Buyer-side Market Power Test:
Simple Example No Ability to Exercise Buyer-side Market Power.**

LSE 1000 MW UCAP Net Short Position	LSE Self-build or Contracts for 500 MW of UCAP at \$250/MW-day
<ol style="list-style-type: none"> 1. LSE does not build. or contract and the RPM clearing price is \$140/MW-day 2. For the net short position of 1000 MW UCAP, the LSE pays (\$140/MW-day) x (1000 MW) = \$140,000/day 3. The rest of the load obligation is settled at the cost of the resources already serving the load. 	<ol style="list-style-type: none"> 1. LSE puts this into the auction as inframarginal (or zero) and the RPM clearing price is \$130/MW-day. 2. For the remaining 500 MW UCAP net short position the LSE pays (\$130/MW-day) x (500 MW) = \$65,000/day. 3. LSE also pays for the other 500 MW at \$250/MW-day for a total of \$125,000/day 4. Total is \$125,000 + \$65,000 = \$190,000/day (\$50,000 increase)

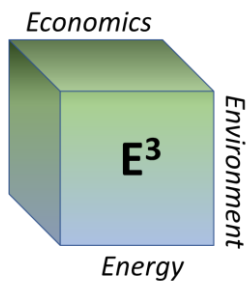
Since the total load expenditures for capacity exceed the expenditures absent the new build there is no exercise of buyer-side market power and thus NO MOPR Floor Price is applied.

This first example in Figure 1 shows how total expenditures go up, and so this is not an exercise of buyer-side market power as the LSE is only raising its costs and the costs to its customers.

**Figure 2: Buyer-side Market Power Test:
Simple Example with Ability to Exercise Buyer-side Market Power...Think Small LDA**

LSE 1000 MW UCAP Net Short Position	LSE Self-build or Contracts for 500 MW of UCAP at \$250/MW-day
<ol style="list-style-type: none"> 1. LSE does not build. or contract and the RPM clearing price is \$140/MW-day 2. For the net short position of 1000 MW UCAP, the LSE pays (\$140/MW-day) x (1000 MW) = \$140,000/day 3. The rest of the load obligation is settled at the cost of the resources already serving the load. 	<ol style="list-style-type: none"> 1. LSE puts this into the auction as inframarginal (or zero) and the RPM clearing price is \$25/MW-day. 2. For the remaining 500 MW UCAP net short position the LSE pays (\$25/MW-day) x (500 MW) = \$12,500/day. 3. LSE also pays for the other 500 MW at \$250/MW-day for a total of \$125,000/day 4. Total is \$125,000 + \$12,500 = \$137,500/day (\$2,500/day savings)

Since the total load expenditures for capacity are below the expenditures absent the new build there is an exercise of buyer-side market power and a MOPR Floor Price is applied.



This second example in Figure 2 shows an exercise of buyer-side market power where expenditures go down due to the insertion of the “loss leader” into the supply stack.

First Screen: Assuming Vertical Supply and Moving Down the Demand Curve

This first screen is the “worst-case” scenario. If a resource passes this screen, there is no need to run the second screen of a market simulation.

Figure 3: Small Net Short Position in RTO. No Buyer-side Market Power

Simple First Cut Test: Using the 2022/2023 Demand and Known Market Outcome: RTO and 500 MW UCAP New Entry Combined Cycle

- Net CONE for CONE Area 3: \$208.42/MW-day
 - RTO Clearing Price: \$50.00/MW-day
 - Cleared quantity (MW UCAP): 144,477.3
 - 2000 MW UCAP Net Short
 - Impact of 500 MW of supply as a vertical supply and clearing:
 - Slope of this section of demand is $-\$0.02867/\text{MW}$
 - $500 \text{ MW} \times (-\$0.02867) = -\$14.335/\text{MW-day}$
 - Before added supply:
 - $2000 \text{ MW UCAP} \times \$50.00/\text{MW-day} = 100,000/\text{day}$
 - After added supply:
 - $[1500 \text{ MW UCAP} \times \$35.665/\text{MW-day}] + [500 \times \$208.42/\text{MW-day}] = \$157,707.5/\text{day}$
- No Buyer-side Market Power Exercised! Expenditures Went Up!***

The example in Figure 3 shows that even for a large change in price in RTO by moving down the demand curve as if supply were vertical, shows there is no ability to exercise buyer-side market power and that no simulations need to be run.

The next example in Figure 4 shows that with a much larger net load position, 8000 MW in RTO, it might be possible that buyer-side market power could be exercised.

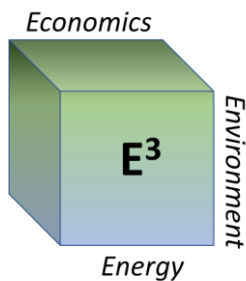


Figure 4: Potential Buyer-side Market Power

Simple First Cut Test: Using the 2022/2023 Demand and Known Market Outcome: Larger Net Short, RTO and 500 MW UCAP New Entry Combined Cycle

- Net CONE for CONE Area 3: \$208.42/MW-day
- RTO Clearing Price: \$50.00/MW-day
- Cleared quantity (MW UCAP): 144,477.3
- 8000 MW UCAP Net Short
- Impact of 500 MW of supply as a vertical supply and clearing:
 - Slope of this section of demand is $-\$0.02867/\text{MW}$
 - $500 \text{ MW} \times (-\$0.02867) = -\$14.335/\text{MW-day}$ which implies a new price of $\$35.665/\text{MW-day}$
- Before added supply:
 - $8000 \text{ MW UCAP} \times \$50.00/\text{MW-day} = 400,000/\text{day}$
- After added supply:
 - $[7500 \text{ MW UCAP} \times \$35.665/\text{MW-day}] + [500 \times \$208.42/\text{MW-day}] = \$371,697.50/\text{day}$

Possible Buyer-side Market Power Exercise! Next Check is Market Simulation

Figure 4 shows it is possible to exercise buyer-side market power, but the next step is to run a market simulation to confirm this is true, or to show buyer-side market power cannot be exercised and thus allowing the resources to pass the screen and not be subject to MOPR.

As this first test is the worst-case scenario, the market simulation could easily show that buyer-side market power is not able to be exercised and MOPR may still not apply.