

Shortage Pricing Circuit Breaker: Principles and Design Elements

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views expressed are my own and not necessarily those of any client.*

Shortage Pricing “Circuit Breaker”: Motivation

If shortage pricing overheats, it could quickly burn up the stakeholder and policymaker support for PJM-administered wholesale markets.

From Wilson 2019-3 slide 2 (references at end).

ORDC: Proxy for Demand Side

- Administrative ORDCs are used due to the lack of demand bidding
 - “An ORDC arises to proxy for the absence of demand bidding...” Hogan & Pope 2019
 - With a very active demand side (consumers and devices) the energy and reserve demand curves would be highly elastic at prices \ll ORDCs
- First Principles: Administrative ORDCs should reflect *customers’ willingness to pay*/marginal reliability value (Hogan & Pope 2019)
 - Close to VOLL at Security Minimum
 - Decline based on LOLP
 - Focus on getting prices right in the *very short term*; cumulative impacts over time not considered

FYI: Current ORDCs Are Not Based on First Principles, Do Not Reflect Marginal Reliability Value

- There was no attempt in the EPFSTF to estimate the VOLL of the customers who would be dropped or the marginal reliability value of reserves; ORDCs reflect penalty factors not marginal reliability value
- MRR is the reserve target and not the security minimum beyond which PJM would drop firm load

Further explained in Wilson 2019-2

Shortage Pricing: Potential Unintended Outcomes

Circumstances could lead to shortage pricing that extends for days or weeks, and markets that may not be workably competitive, due to some combination of the following causes:

- Substantial loss of generation, transmission, and/or fuel supply due to extreme weather, major equipment failure, terrorist or cyber attack, regulatory/judicial act, or other cause;
- Market design flaws or shortcomings;
- Market participant conduct (gaming, exercise of market power, delayed repairs) that exploits or fails to mitigate the situation.

PJM's proposed ORDCs could lead to billion dollar days, or far more, even if there is little or no reserve shortage ($100,000 \text{ MW} \times \$2,000/\text{MWh} \times 5 \text{ hours} = \1 billion) and such outcomes could continue for days or weeks

Shortage Pricing Circuit Breaker: Proposed Elements

1. Pre-defined *alternative market rules*, such as alternative ORDCs and/or “Stop-Loss” provisions (buyer/consumer losses);
2. Pre-defined **triggers** for when such alternative market rules would go into effect, or for when a process would begin that could activate the alternative rules.
3. It may make sense to have two levels of Circuit Breaker:
 1. Level 1: triggers ORDCs more firmly grounded in First Principles
 2. Level 2: triggers more substantially different alternative market rules

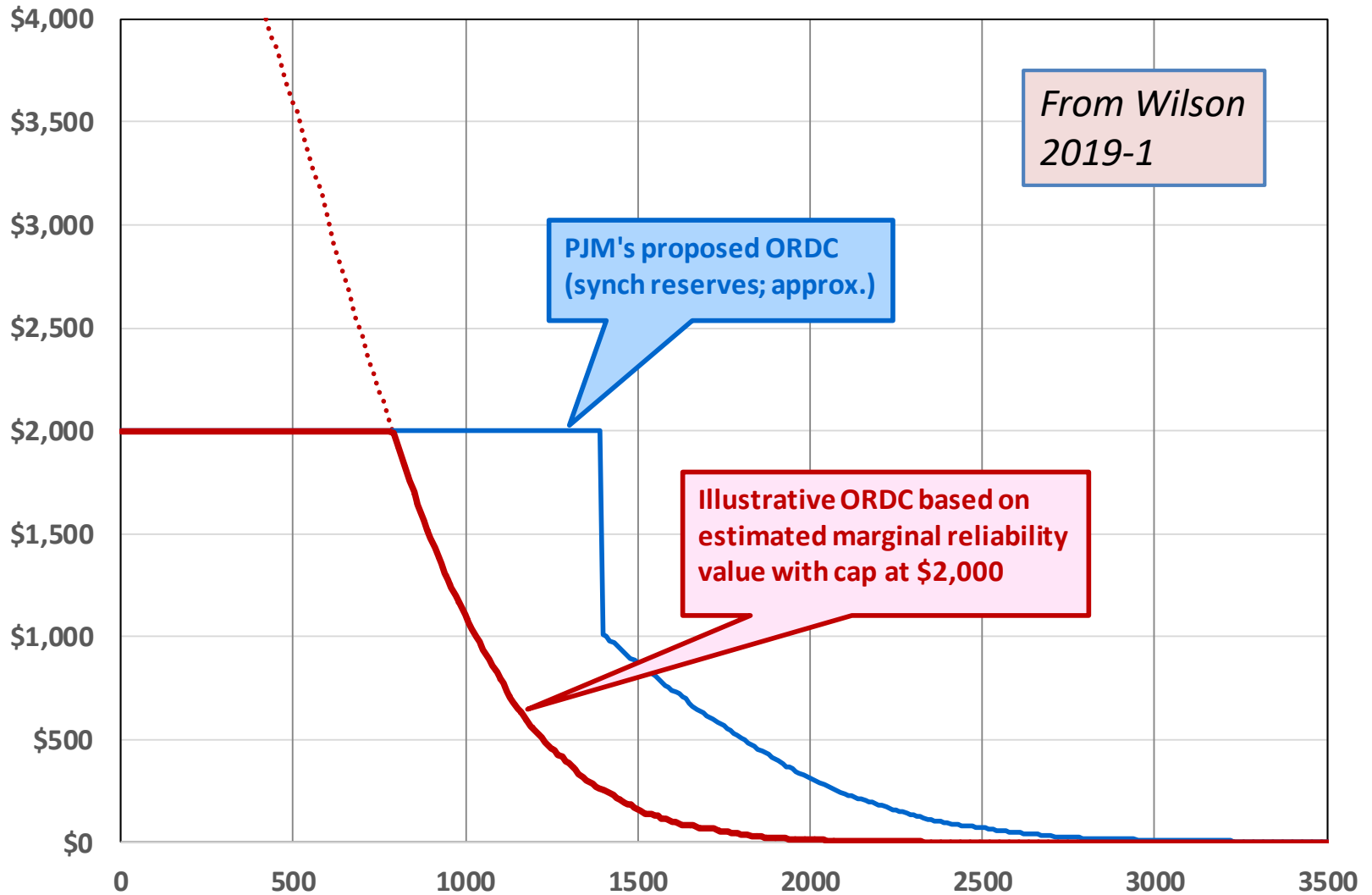
Possible Trigger Concepts

- **Cumulative Dollars:** Threshold cumulative shortage cost anticipated over some period of time; and/or
- **MW x days:** Threshold loss of capacity anticipated for some period of time; and/or
- **Reserve margin x days:** Threshold capacity shortage anticipated for some period of time.

Circuit Breaker Alternative Market Rules: One Approach (First Level)

- Alternative ORDCs based on First Principles:
 - Prices along ORDCs reflect estimated marginal value of reserves to customers
 - Reflects Value of Lost Load (“VOLL”) of customers *likely to be dropped*;
 - Reflects realistic probability of firm load drop at reserve level (“LOLP”)
 - Reflects prices that approach VOLL at *true security minimum* (not MRR)
Hogan 2014 pp. 7-10; Hogan 2015 pp. 13-15; Hogan & Pope 2019; Wilson 2019-2
- System operators would continue to be able to:
 1. Shift the ORDCs under special circumstances, documenting the concern; and
 2. Commit additional resources that did not clear under the ORDCs. Such resources, whose prices exceed marginal reliability value, would be compensated out of market.

Illustrative ORDC Based on Marginal Reliability Value



References

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