Comments on RASTF KWA #3: Capacity Procurement Metric and Level; Seasonal Procurement

James F. Wilson
Principal, Wilson Energy Economics

PJM Resource Adequacy Senior Task Force
February 28, 2022

Consultant to the consumer advocates of NJ, PA, MD, DC, DE;
views expressed are my own and not necessarily those of any client.

Capacity Procurement Metric and Levels

- RASTF Issue Charge KWA #3:
  - Determine the desired procurement metric and level to maintain the desired level of reliability...
  - Review… any benefits or drawbacks to setting the desired metric and level by season.

What Procurement Level Should We Desire?

Ideally, capacity procurement would achieve economically optimal reserve margins in all seasons and zones, balancing marginal cost and marginal benefit of incremental capacity

- Marginal cost: cost of incremental capacity in the particular season and zone (complexity: joint capacity provision across seasons, nested zones)
- Marginal benefit: benefit of incremental capacity, mainly by reducing likelihood and magnitude of load drop due to shortage of capacity (complexity: $$ impact, or VOLL, varies by customer type, season, time of day)

Lets Back Up: Why Do We Have the Capacity Market and What is it Supposed to Be Doing??

- Ideally, we would just balance supply and demand through prices in energy and ancillary services markets, as for all other commodities
- But the demand side is not very active, price caps; concerns about "missing money," inadequate incentives to build capacity
- So, we have a capacity market
  - Ideally, it would achieve economically optimal reserve margins in all seasons and zones, balancing marginal cost and marginal benefit
  - Instead, we have "1 day in 10 years", which provides one or two orders of magnitude more delivered reliability than do distributions systems[1]
  - And our approach to calculating 1-in-10 reserve margins makes very conservative assumptions (so its not really 1-in-10); see KWA3 comments

[1] Wilson, James F., *Reconsidering Resource Adequacy Part 1: Has the one-day-in-ten-years criterion outlived its usefulness*? Public Utilities Fortnightly, April 2010.

What Procurement Level Have We Got?

Far more than we need.

- 1-in-10 is very conservative; and its not required by FERC or NERC or anyone;
- PJM's calculation of reliability requirements based on 1-in-10 is very conservative, errs on high side;
- RPM clears quantities well above these high requirements; and
- There is an increasing amount of uncleared capacity that remains on the system.

FYI: "One Day in Ten Years" Is Not Required

"There is a common misconception that the "one day in ten years" resource adequacy criterion is a requirement imposed by FERC, NERC (North American Electric Reliability Corporation), ReliabilityFirst Corporation, and/or some other authority. But there is no such rule or requirement. With respect to RPM, PJM proposed, and stakeholders accepted, use of the criterion. FERC has approved reliability standard BAL-502-RFC-02 applicable to PJM, which merely requires performing a study using this criterion, but requires no action based on the study (134 FERC ¶ 61,212, Order No. 747, Planning Resource Adequacy Assessment Reliability Standard, P. 23, P. 33). In approving BAL-502-RFC-02 to require a study using "one day in ten years", FERC explicitly stated that it need not determine whether this criterion is "the most effective or most economically efficient method", and it "does not establish the one day in ten years criterion to be the de facto, or the only acceptable metric for resource adequacy assessment." Order 747, P. 31. FERC also noted in Order 747 that the standard "does not touch the establishment of specific resource adequacy requirements, and thus does not intrude on the state's decisional authority with respect to building or acquisition of assets or capacity to meet resource adequacy needs." Order 747, P. 21."

Wilson, James F., *"Missing Money" Revisited: Evolution of PJM's RPM Capacity Construct*, prepared for American Public Power Association, September 2016, footnote 48.

FYI: PJM Reserve Requirements Study is Very Conservative

1. PJM is blessed with many, large, and diverse neighbors – but PJM's PRISM model treats all these regions as a single "World", ignoring diversity
2. PRISM only deals with weekly peaks, so it also ignores diversity in the day and hour of peaks between PJM and neighbors
3. The "World" is assumed to only have "one in ten" capacity; but each region plans for its non-coincident peak (and like PJM, the neighbors are usually long on capacity)
4. Assistance is arbitrarily limited to the Capacity Benefit Margin (3,500 MW)
5. Among other conservative assumptions – so the model is not finding 1-in-10

Figure 2: RPM Base Residual Auction Cleared Reserve Margins

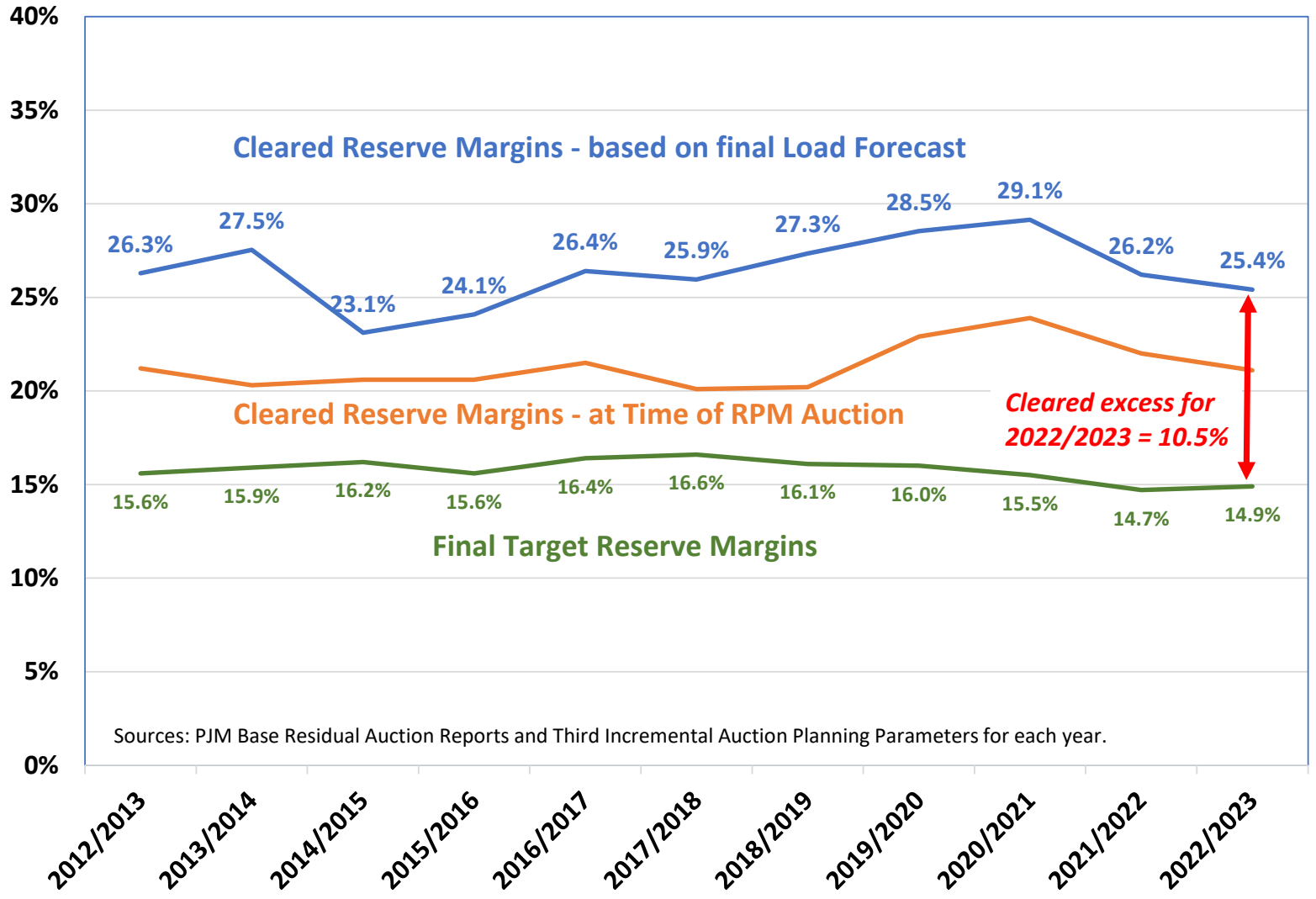
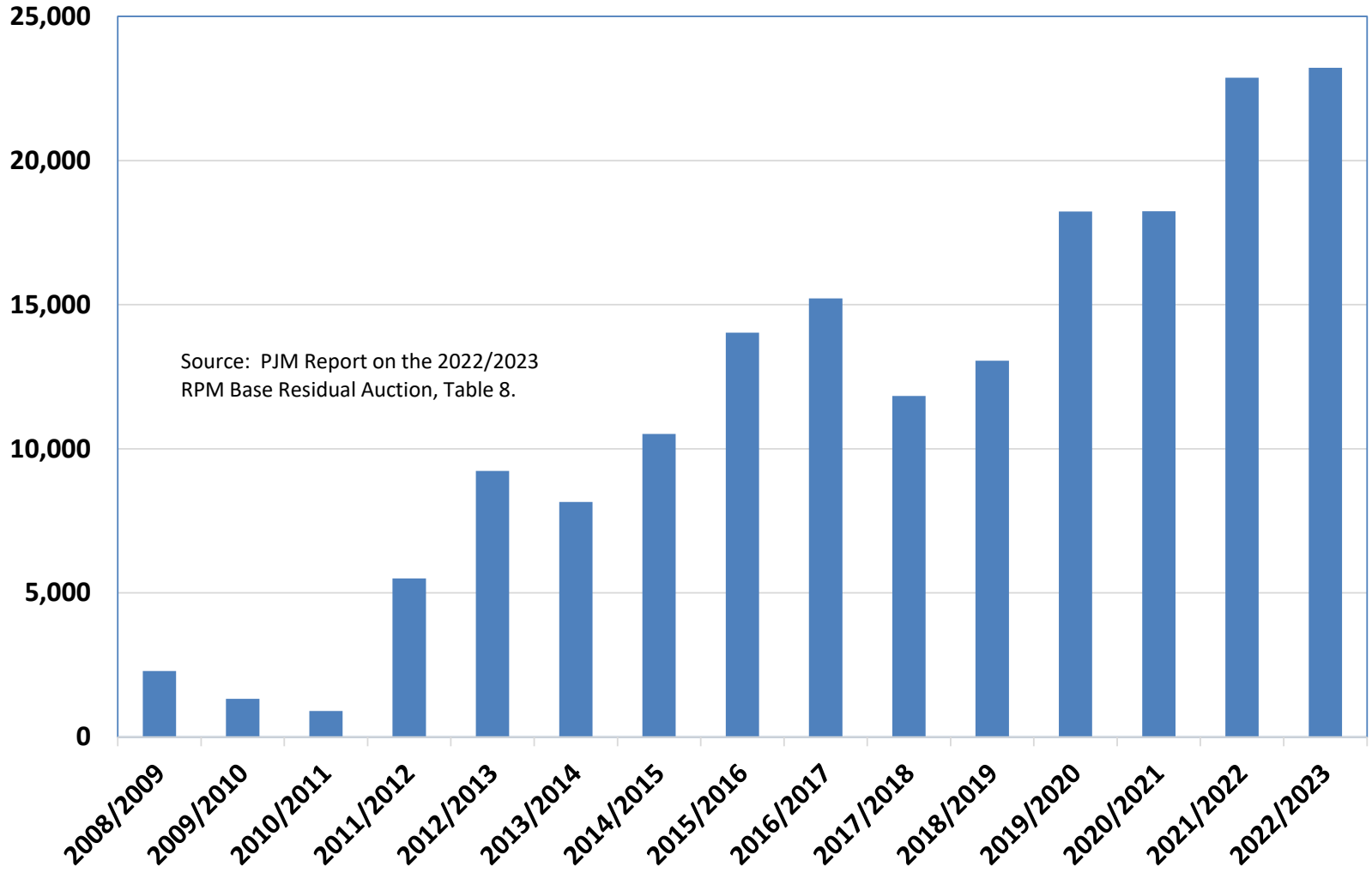


Figure 9: Uncleared Capacity in RPM Base Residual Auctions for the 2008/2009 to 2022/2023 Delivery Years (MW UCAP)



What Procurement Level Should We Desire?

- The desired procurement level depends on the value of service, aka Value of Lost Load (VOLL) (marginal benefit/marginal cost)
- VOLL depends on the customer type, amount of advance warning, duration of outage, season, time of day…
  - Is VOLL declining with expanding use of distributed generation, backup systems and batteries in homes, businesses, appliances and devices?
- And whose VOLL is relevant?
  - Is load drop imposed rationally, to minimize impact – on the customers who would experience the least impact (residential)? If not why not?

LOLE, LOLH, EUE, …?

- None of these physical measures captures the economics of resource adequacy, in particular that VOLL varies by customer type, season, time of day, advance notice, duration of outage, etc. etc.
- EUE is preferred as most granular.
- If a joint limit is imposed across seasons or zones (inefficient and irrational, contrary to MB = MC), at least strive for a similar ratio of MB/MC across seasons and zones
  - Example: ISO New England Marginal Reliability Impact for zones

Re: KWA #3: "…benefits or drawbacks to setting the desired metric and level by season"

- Of course we should procure capacity on a seasonal basis
  - Winter peak loads are less than 90% of summer (PJM 2022 Forecast)
  - Resources' capabilities vary by season (wind, solar, thermal)
  - The record is already there
    - Seasonal Capacity Resources Senior Task Force 2016
    - PJM's ineffective "aggregation" approach ER17-367, 2017-2018
    - Complaint cases EL17-32, EL17-36, technical conference April 2018
    - Work under the Issue Charge: Winter Season Resource Adequacy and Capacity Requirements, 2016-2018
- There are various ways to do it, and any of them would be a big improvement over the current, highly inefficient annual approach (aggregation: 686.8 MW for 2022-2023)

Related Work

Wilson, James F., *Over-Procurement of Generating Capacity in PJM: Causes and Consequences*, prepared for Sierra Club and Natural Resources Defense Council, February 2020

-----, Conference and post-conference comments, technical conference in FERC Docket Nos. EL17-32, EL17-36 (seasonal capacity complaints), April 18 and July 13, 2018.

-----, *Resource Adequacy in PJM: The Seasonal Aspect*, Organization of PJM States Annual Meeting, October 19, 2016

-----, *"Missing Money" Revisited: Evolution of PJM's RPM Capacity Construct*, report prepared for American Public Power Association, September 2016

-----, SCRSTF Alternative Proposal: Winter Performance Equivalents (WIPEs), meeting of the PJM Seasonal Capacity Resources Senior Task Force, August 1, 2016

-----, RPM As a Seasonal Construct: Possible Approaches, Potential Benefits, meeting of the PJM Seasonal Capacity Resources Senior Task Force, June 21, 2016

-----, *Comments on Proposed Reliability Standard BAL-502-RFC-02: Planning Resource Adequacy Analysis, Assessment And Documentation,* FERC Docket No. RM10-10, Dec. 27, 2010

-----, *Reconsidering Resource Adequacy, Part 1: Has the one-day-in-10-years criterion outlived its usefulness*? Public Utilities Fortnightly, April 2010

-----, *Reconsidering Resource Adequacy, Part 2: Capacity planning for the smart grid,* Public Utilities Fortnightly, May 2010

Speaker Information

James F. Wilson
Principal, Wilson Energy Economics
4800 Hampden Lane Suite 200
Bethesda, MD 20814
301-535-6571
jwilson@wilsonenec.com
www.wilsonenec.com

James Wilson is an economist with over 35 years of consulting experience in the electric power and natural gas industries. His work has pertained to the economic and policy issues arising from the interplay of competition and regulation in these industries, including restructuring policies, market design, market analysis and market power. Recent engagements have involved resource adequacy and capacity markets, contract litigation, rate cases, modeling of utility planning problems, and many other economic issues arising in these industries. Mr. Wilson has been involved in electricity restructuring and wholesale market design for over twenty years in PJM, New England, Ontario, California, Russia, and other regions. He also spent five years in Russia in the early 1990s advising on the reform, restructuring, and development of the Russian electricity and natural gas industries for the World Bank and other clients.

Prior to founding Wilson Energy Economics, Mr. Wilson was a Principal at LECG, LLC. He holds a B.A. in Mathematics from Oberlin College and an M.S. in Engineering-Economic Systems from Stanford University.