Sustainable FERC Project

Policies for a Clean Electric Grid

PJM Board Presentation, May 14th

- **VRR Curve**
- **Fuel Security**
- **Seasonal Resources**





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Sustainable FERC Project

Policies for a Clean Electric Grid

- Ensure access to affordable, clean, reliable electricity
- Competitive markets should lower costs and create more choice
- Recent and proposed decisions by PJM threaten to raise costs, particularly for states and consumers choosing cleaner energy, often without clear reliability benefits
  - Capacity Performance
  - Energy Price Formation
  - Capacity Repricing/MOPR-Ex
  - VRR Curve
  - Fuel Security

VRR Curve

- PJM is procuring too much capacity, largely due to the VRR curve, increasing costs to consumers

- Brattle's new recommendations on the VRR curve could mitigate some oversupply issues, save consumers hundreds of millions of dollars annually, facilitate retirement of uneconomic units, and continue to exceed reliability requirements

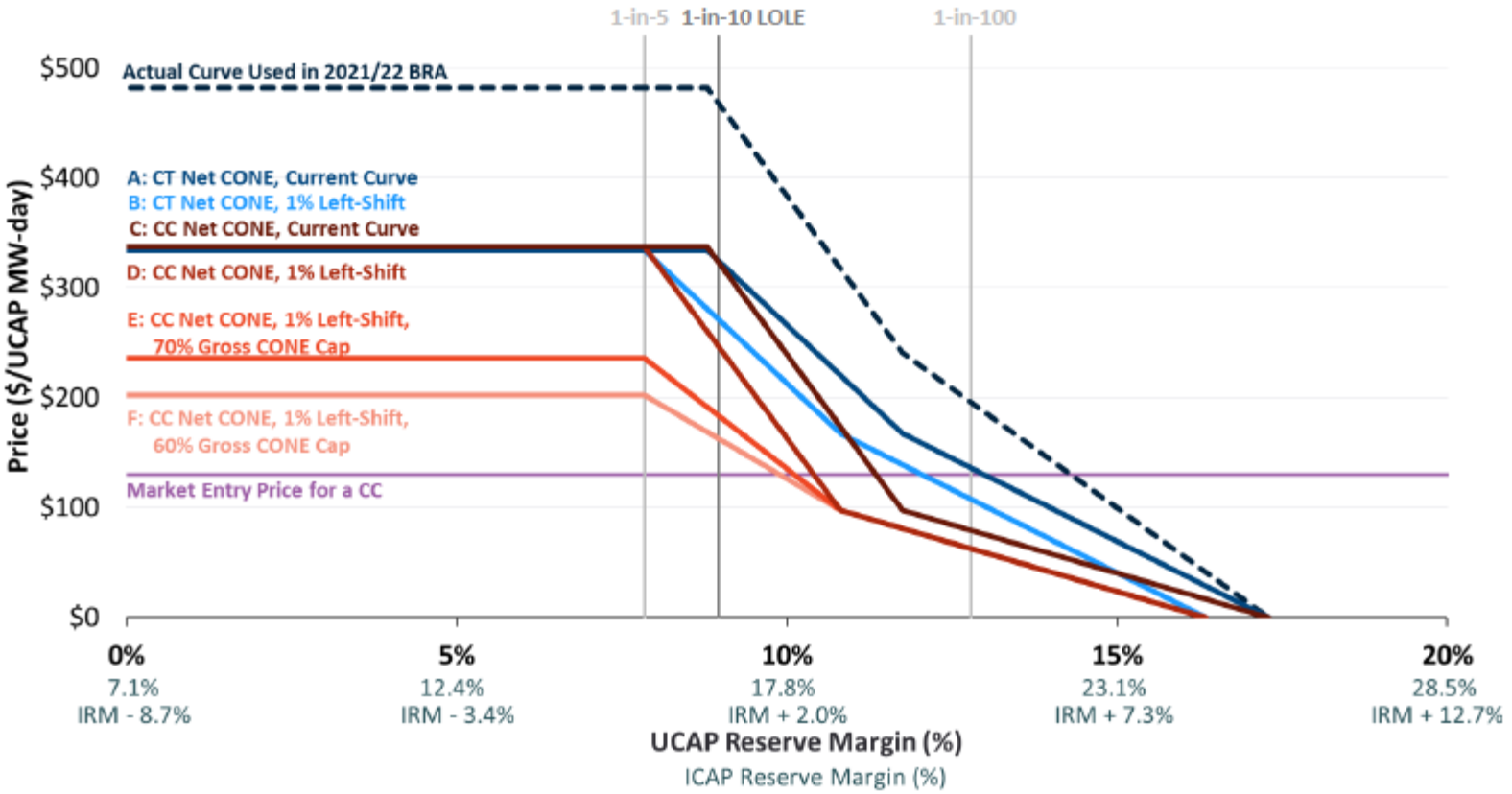
- PJM staff is currently recommending against that expert analysis, raising costs to consumers

VRR Curve

- Brattle:
  - Prior drivers of uncertainty (MATS, CPP) that led to highly conservative approach “no longer a concern”
  - CCs the overwhelming choice of new generation, ~27,000 MW cleared in auctions for delivery in 2015/16 - 2020/21. CC plants have entered at clearing prices 50-80% below PJM’s CT-based Net CONE. The cleared quantities in the PJM capacity auctions have exceeded the PJM reserve margin target by 3-6%.
  - Continuing to set the VRR curve prices based on CT Net CONE can attract 5% excess capacity above the resource adequacy target, at significant cost.

Brattle's Recommendation: Curve E

Candidate Curves



Source and Notes:
VRR Curve Report, Figure ES-1.
Current VRR curve parameters taken from 2021/22 BRA parameters.

Curve E would save $212 million annually, exceed reliability standards

Curve E strikes a balance across design objectives

All Results Assume Market Entry Price = CC Net CONE

$212 million in savings annually

	Admin Net CONE	Price and Procurement Costs			Reliability					
		Avg. Price (= Market Entry Price)	Standard Deviation of Price	Average Cost (P × Q)	Average LOLE	Stress LOLE *	Average Excess (Deficit)	Reserve Margin Standard Deviation	Frequency Below Reliability Requirement	Frequency Below 1-in-5
	($/MW-d)	*($/MW-d)*	*($/MW-d)*	*($mil)*	*(Ev/Yr)*	*(Ev/Yr)*	*(IRM + X%)*	*(% ICAP)*	*(%)*	*(%)*
CT as Reference Technology										
A: Current Curve	$222	$129	$34	$8,139	0.011	0.023	4.3%	1.1%	0%	0%
B: 1% Left-Shift	$222	$129	$34	$8,065	0.023	0.041	3.3%	1.1%	0%	0%
CC as Reference Technology										
C: Current Curve	$129	$129	$58	$8,039	0.031	0.046	2.8%	1.1%	1%	0%
D: 1% Left-Shift	$129	$129	$	$7,969	0.053	0.072	1.8%	1.1%	5%	0%
E: 1% Left-Shift, 70% Gross CONE Cap	$129	$129	$50	$7,927	0.071	0.163	1.4%	1.5%	15%	4%
F: 1% Left-Shift, 60% Gross CONE Cap	$129	$129	$46	$7,906	0.091	0.331	1.1%	1.7%	20%	6%

Downward and left-shifted curves reduce customer costs (2.6% for curve E)

All curves exceed 1-in-10 standard

Under stress conditions, curve with 60% gross CONE cap performs poorly

Recommended curve reliability performance is comparable to PJM's right-shifted curve in our 2014 Review

Sources and Notes:

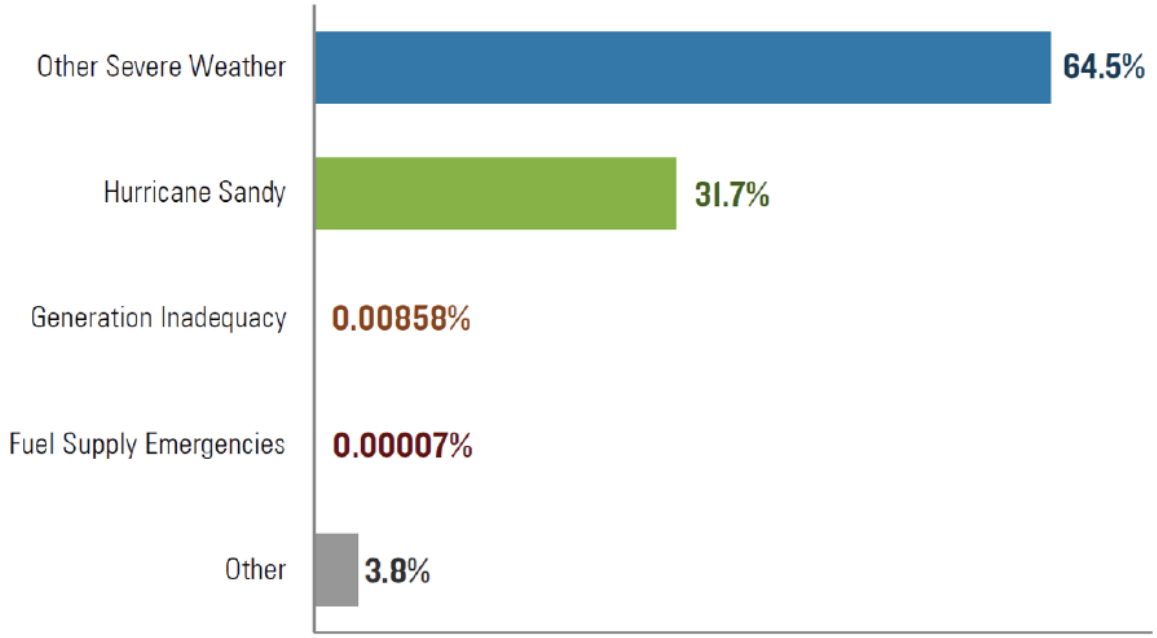
VRR Curve Report, Table 11. Current VRR curve parameters taken from 2021/22 BRA para[illegible]

* "Stress LOLE" assumes the market entry price is 20% higher than the value used to anchor the VRR curve.

Why Fuel Security?

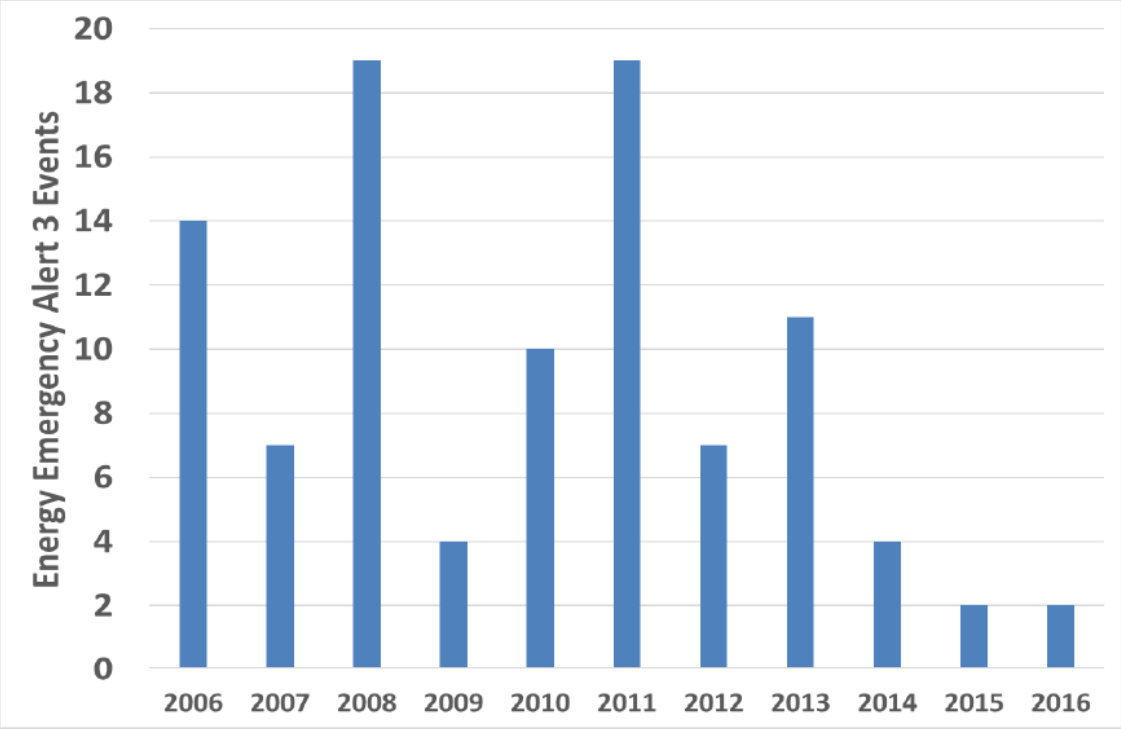
Figure 7 – Cause of major electricity outages by customer-hours disrupted in the U.S., 2012-2016

Source: Marsters et al. (2017)



Why Fuel Security?

Figure 8 -- Generation shortfall events, based on Energy Emergency Alerts
(Source: NERC (undated-b))



Fuel Security

- PJM staff's draft scope for the proposed "Valuing Fuel Security" analysis contains unrealistic assumptions (like ISO-NE's)
  - Ignores resources in the system but not clearing in the capacity market (e.g. those disqualified under capacity performance)
  - Arbitrarily reduces capacity to minimum reserve margin, despite clearing above that amount
  - Assumes no new clean energy and unannounced retirements, despite PJM's analyses of what is necessary to meet state laws

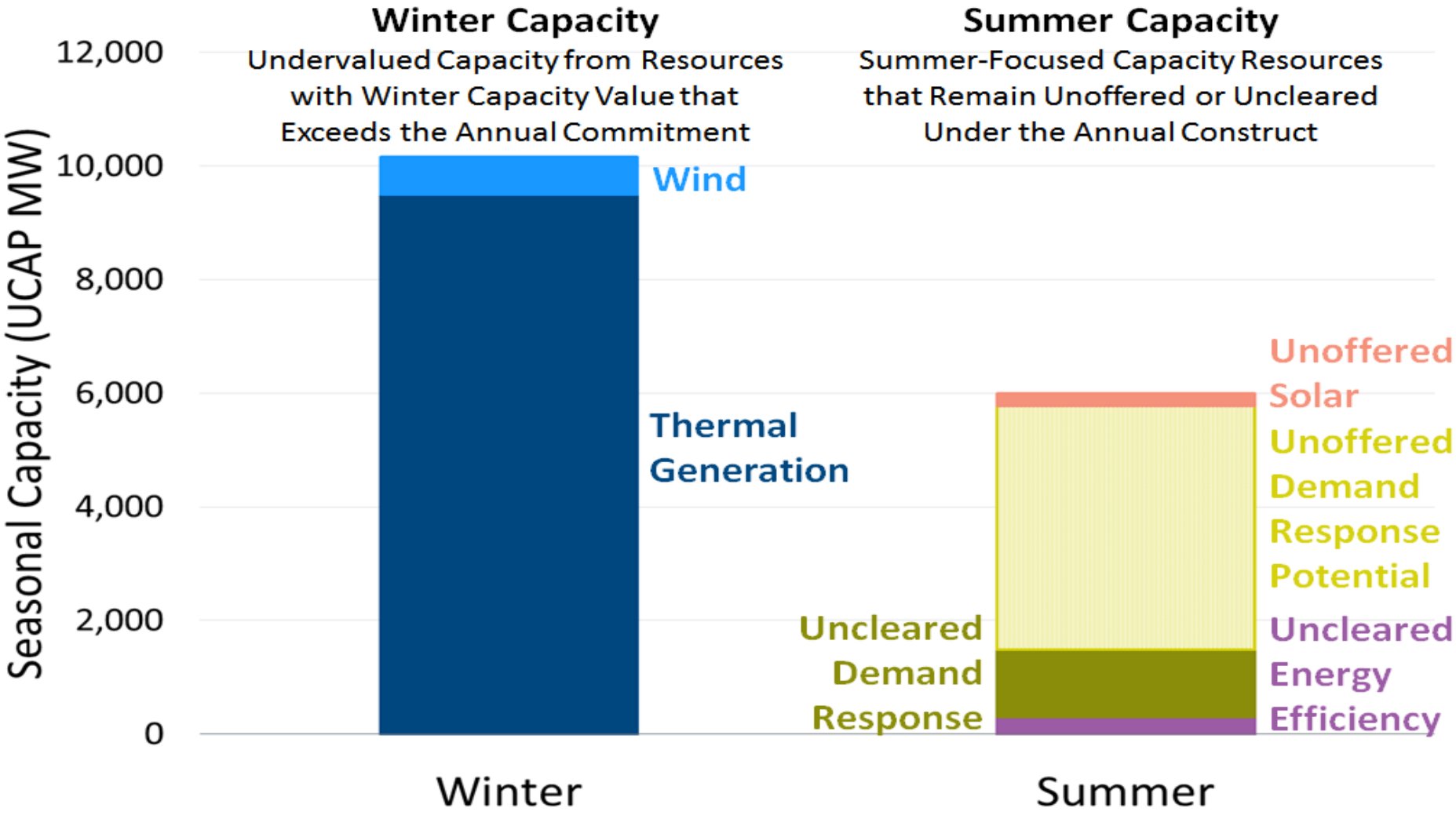
Fuel Security

- Getting these analyses wrong undermines credibility (see, e.g., ISO-NE):
  - *"New report shows ISO got it wrong" – UpriseRI, May 3rd, 2018*
  - *"Clean Energy Advocates Reject Regional Fuel Supply Warnings" – New Hampshire Public Radio, May 3rd, 2018*

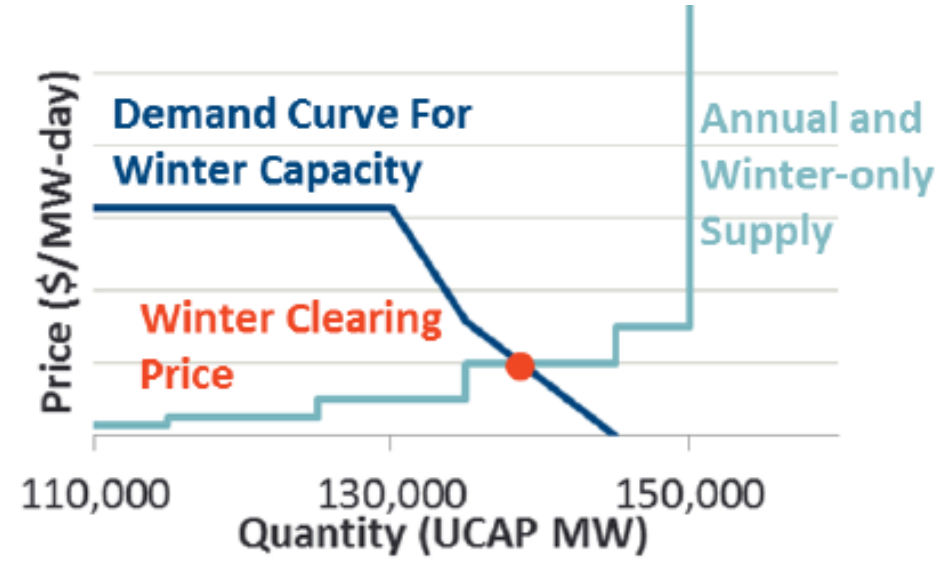
- Fuel supply has not been shown to be a major contributor to reliability or resilience challenges, distracts from important priorties

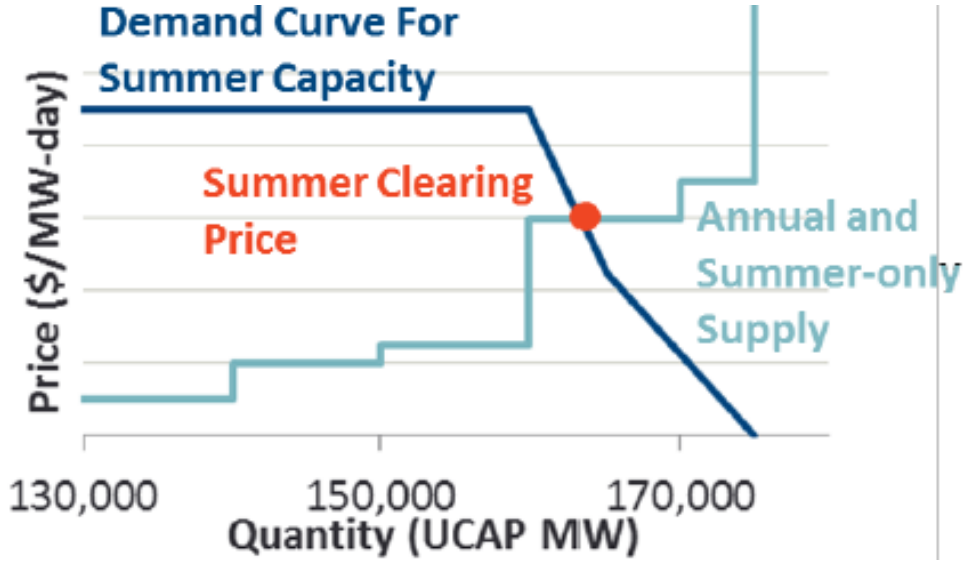
Recommendations: Ensure inputs to analysis are fully vetted with stakeholders, focus instead on higher value areas of concern, e.g. coordination with distribution system and transmission planning.

Undervalued/Excluded Seasonal Capacity Under Annual Approach



Co-optimized Clearing Would Produce Efficient Prices Without Introducing Uncertainty





Flexibility for the Future

- Resource mix will continue to evolve in potentially unanticipated ways and continue to incorporate greater quantities of non-traditional resources.
  - Two-season capacity market would more efficiently value full capability of newer resources, seasonal potential of thermal resources, seasonal imports/exports, and mid-year entry and exit.
- There could be changes in load patterns such as the electrification of transportation and heating that may change summer/winter peaks.
  - Flexibility of two-season auction could become increasingly valuable.