ENERGY BAR ASSOCIATION

ANNUAL MEETING & CONFERENCE 2025

Are Resource Adequacy Markets Adequate?

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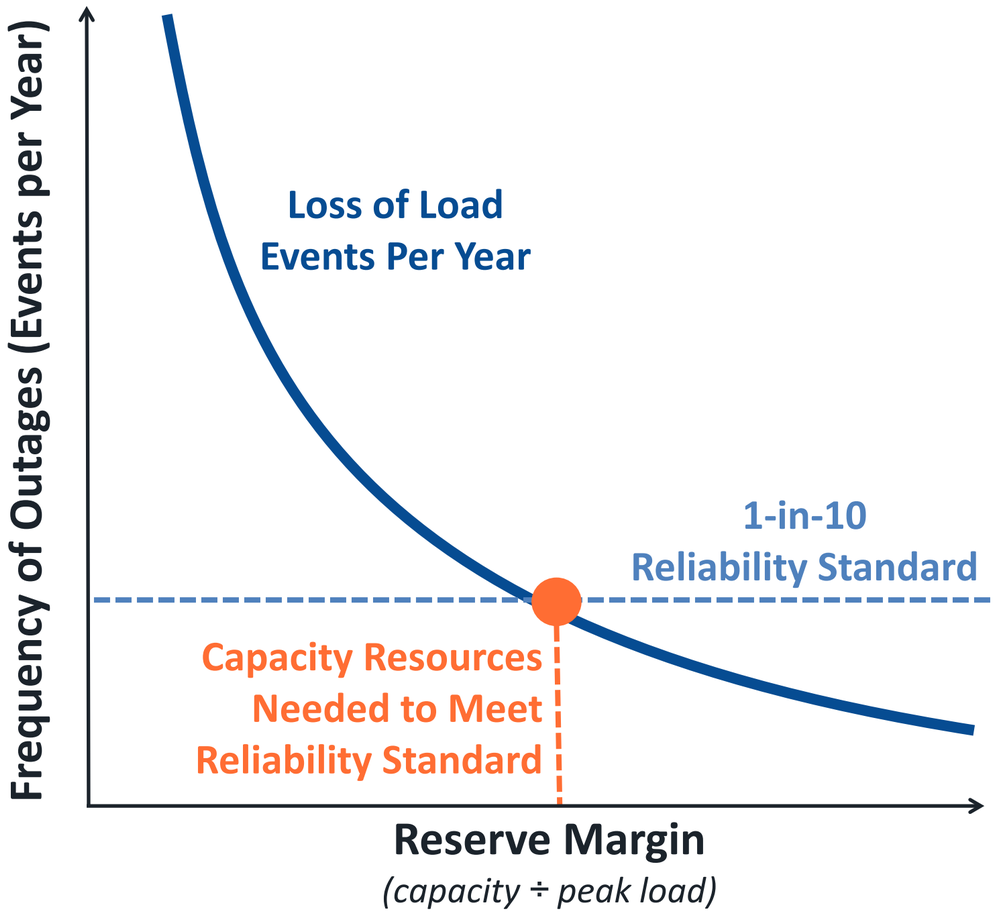
What is “resource adequacy”?

Resource Adequacy = Enough resources to reliably serve customers

- Most regions aim for 1-in-10 reliability standard
- Establishes the quantity of capacity needed

- **Resource Adequacy Markets:** are the centralized or bilateral capacity markets utilized to ensure that every customer (or utility or RTO buying on their behalf) has procured enough supply to meet their own reliability needs

Reliability Improves with More Capacity Supply



Further Reading: Pfeifenberger, Spees, Carden, Wintermantel. *Resource Adequacy Requirements: Reliability and Economic Implications*. Prepared for the FERC.

There are several ways to achieve resource adequacy:

Resource Investment Frameworks

Planning Oriented
Customers Bear Risks
Most Policy Control
Least Competitive
Most Pricing Stability

Integrated Resource Planning (IRP)

Vertically integrated utilities or a government entity does resource planning to build or contract new resources

Regulated utilities & public power across US & Canada

(Many IRP entities also participate in capacity markets for residual purchases & sales)

Resource Adequacy Markets

Organized market for "capacity" product that reflects sellers' commitment to deliver resource adequacy

Bilateral Capacity Markets

California, **WRAP**

Centralized Capacity Auctions

MISO, **PJM**, NYISO, ISO-NE, Ontario, France, UK, Italy, Ireland

Competition-Driven
Investors Bear Risks
Policies via Contract/Subsidy
Most Competitive
Highest Price Volatility

Energy-Only Markets

Energy prices (plus "scarcity price" during tight hours) is primary mechanism to attract new investments

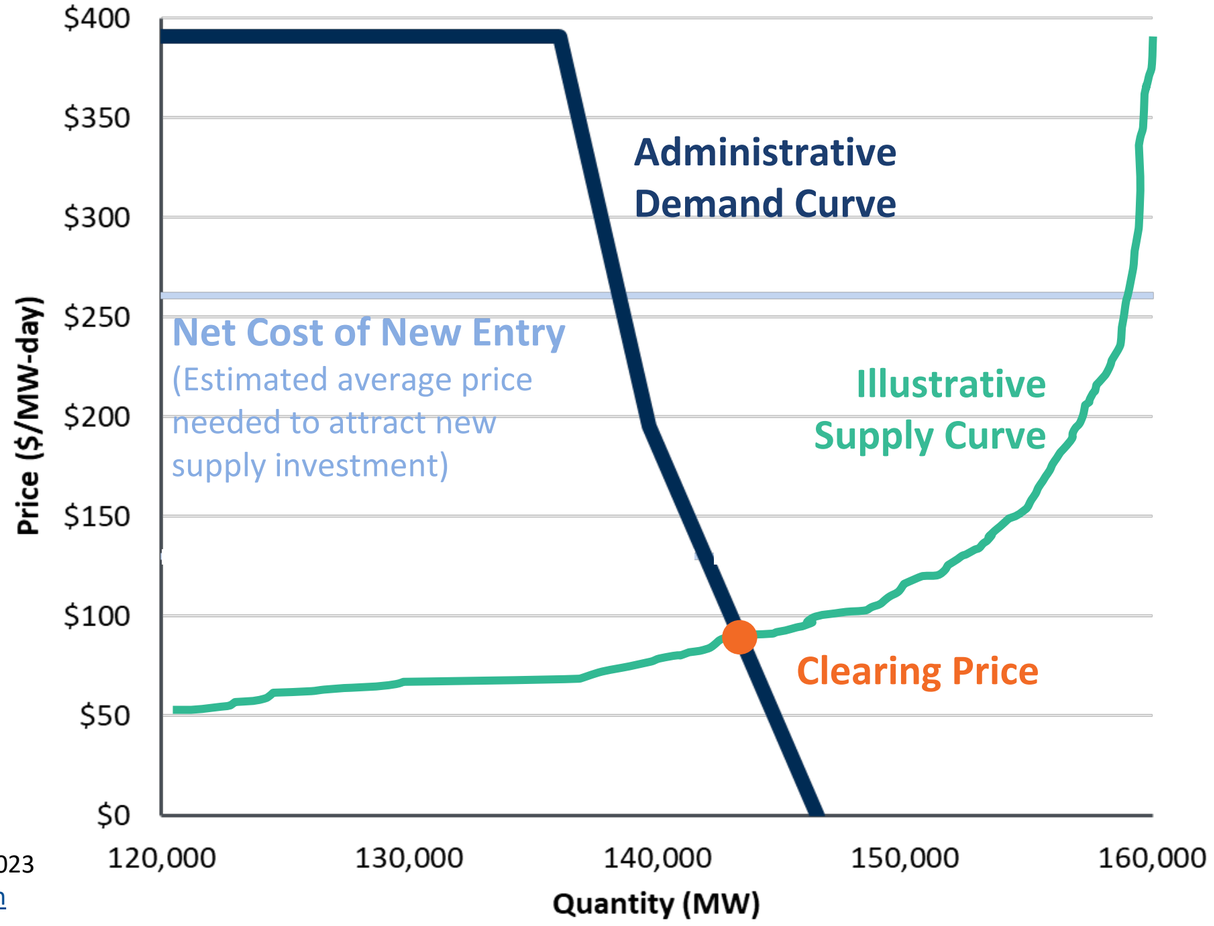
Australia, Alberta, Texas
Previously: most of Europe

Further Reading: Pfeifenberger, Spees. *A Comparison of PJM's RPM with Alternative Energy and Capacity Market Designs*. Prepared for PJM; Newell, Spees, et al. *ERCOT Investment Incentives and Resource Adequacy*. Prepared for ERCOT; EU Agency for the Cooperation of Energy Regulators. *Security of EU Electricity Supply*.

How do capacity markets attract supply investment?

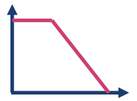
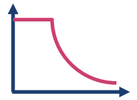
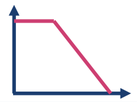
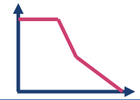
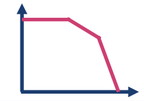
- **Product:** The obligation to be online and available to produce energy during shortage conditions, denominated as unforced capacity (UCAP) MW
- **Supply Curve:** Built from sellers' submitted offer price to make a capacity commitment. All capacity can participate on a resource-neutral basis (generation, storage, demand response, uprates, net imports)
- **Demand:** Determined administratively to reflect declining incremental value of capacity as a function of the reserve margin. Price cap and parameters high enough to attract supply
- **Clearing Price & Quantity:** Intersection of supply and demand (all sellers earn the same price)

Example: Capacity Auction Clearing
(Approximated from PJM 2022/23 Base Auction)

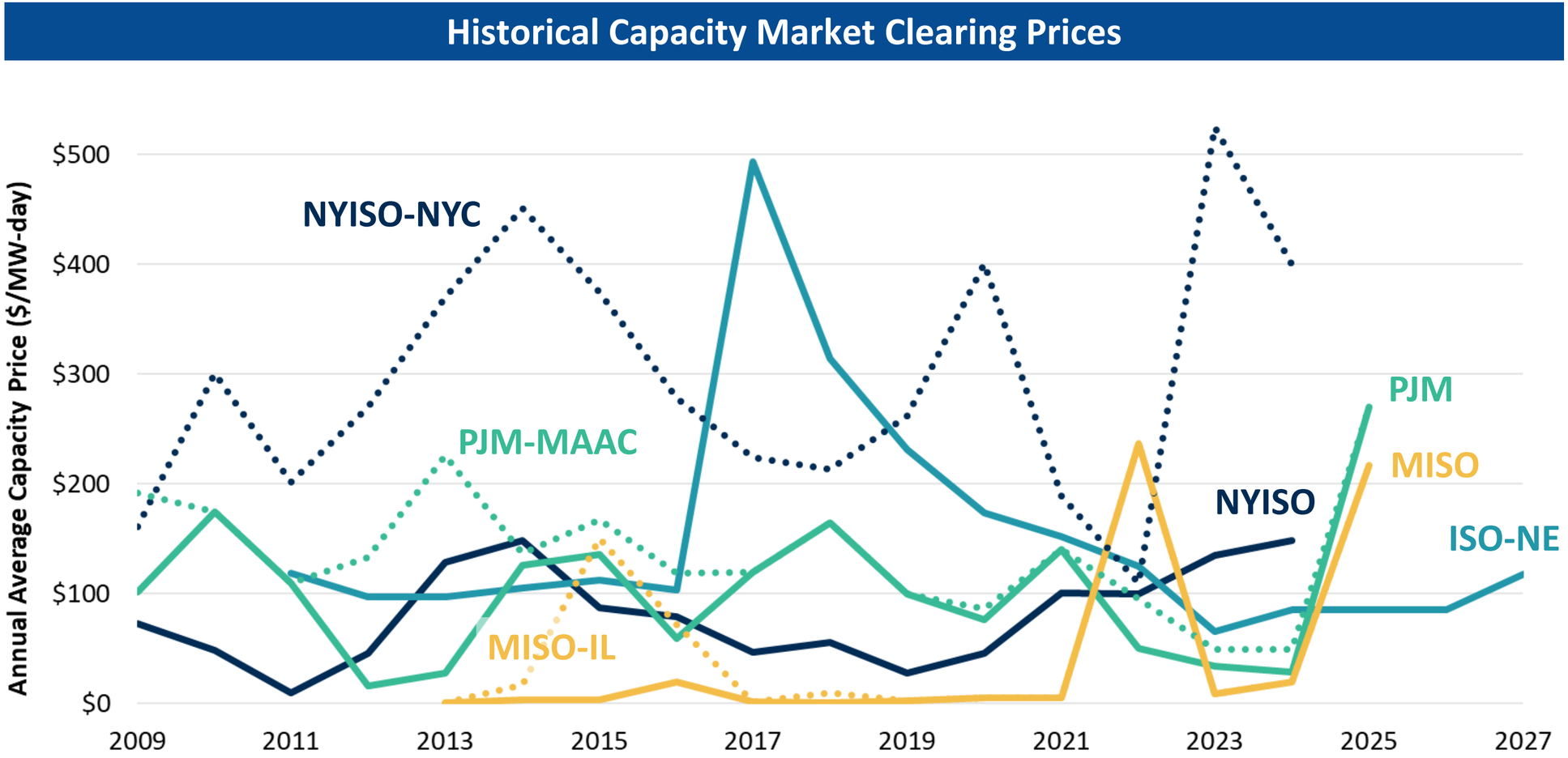


Sources and Notes: Gas plant UCAP rating based on combined cycle class average EFORd; Admin net CONE and 2022/2023 demand curve from PJM, 2022/2023 Base Residual Auction Planning Parameters. Supply curve shape from Brattle, Fifth Review of PJM's Variable Resource Requirement Curve, April 19, 2018.

Role and design of market differs greatly by region…

	Forward Period	Seasonality	Delivery Period	Capacity Auctions	Integrated Planning?	Retail Choice?	Merchant Entry?	Demand Curve
WRAP	7 months	J J A S O N D J F M A M	2 Seasons & Monthly	None (Bilateral Market)	Yes	No	No	none
CAISO	2 months (annual) 45 days (monthly)	J F M A M J J A S O N D	Monthly x 24 slice of day	None (Bilateral Market)	Yes (state & utility)	Limited	No	none
Ontario	4 Months	Summer / Winter	Seasonal (2 Seasons)	Centralized Auction Residual Need Only	Yes (by IESO)	Limited	No	
MISO	1.5 Months	Sum / Fall / Win / Spring	Seasonal (4 Seasons)	Mandatory Auction (Net of Self-Supply)	Mostly (but not all)	Limited	Mostly No Needed for IL	
NYISO	0-6 Months	A M J J A S O N D J F M	Monthly & 6-Month Strip	Voluntary & Mandatory Auctions	Partial (state studies & contracts)	Yes	Yes	
PJM	3 Years (Currently 11 Mo)	Annual	Annual	Mandatory Auction (w/ FRR Opt-Out)	Some (but not majority)	Yes	Yes	
ISO-NE	Prior: 3 Years Plan: Non-Forward	Annual	Annual Plan: Seasonal	Mandatory Auction	Some (but not majority)	Yes	Yes	
Britain	3.5 Years	Annual	Annual	Mandatory Auction	No	Yes	Yes (15-Year Term)	

…and price movements challenge both customers & producers



Are resource adequacy markets adequate?

Why we love them:

- **Benefits of Trade & Diversity:** Lower total capacity requirements and lower costs compared to individual
- **Reliability:** Historically, resource adequacy markets have met or exceed reliability requirements with few exceptions. Mutually agreed measures of reliability
- **Competition:** Can drive down prices
- **New Supply:** Demonstrated capability to attract supply
- **Emerging Technologies & New Business Models:** Can enter the market with few barriers to entry, demonstrated capability to win market share against traditional suppliers and capture market share
- **Transparency**: Clear “price to beat” that informs self-supply, bilateral, and policy decisions of utilities, customers, and regulators that

Why we hate them:

- **Acute Tight Conditions:** Coming years present most challenging conditions to date (rapid load growth, high cost of supply, resource delays). Threatens to produce the bad combination of high prices and poor reliability
- **Customers:** See prices as too high, too volatile, and paying too much to existing resources
- **Policymakers:** Concerned about affordability and volatility for unhedged customers, inconsistency of capacity resource mix with policy objectives, and maintaining jurisdiction
- **Sellers**: Concerned about unfair treatment for their resources, impacts of policy/contracts, and risk of interventions eliminating their upside
- **Everyone:** Rules are too complicated, changing too much, too contentious, and still not moving fast enough to keep up with the times