



Base Capacity and Reliability

Seasonal Capacity Resources Sr. Task Force

June 6, 2016

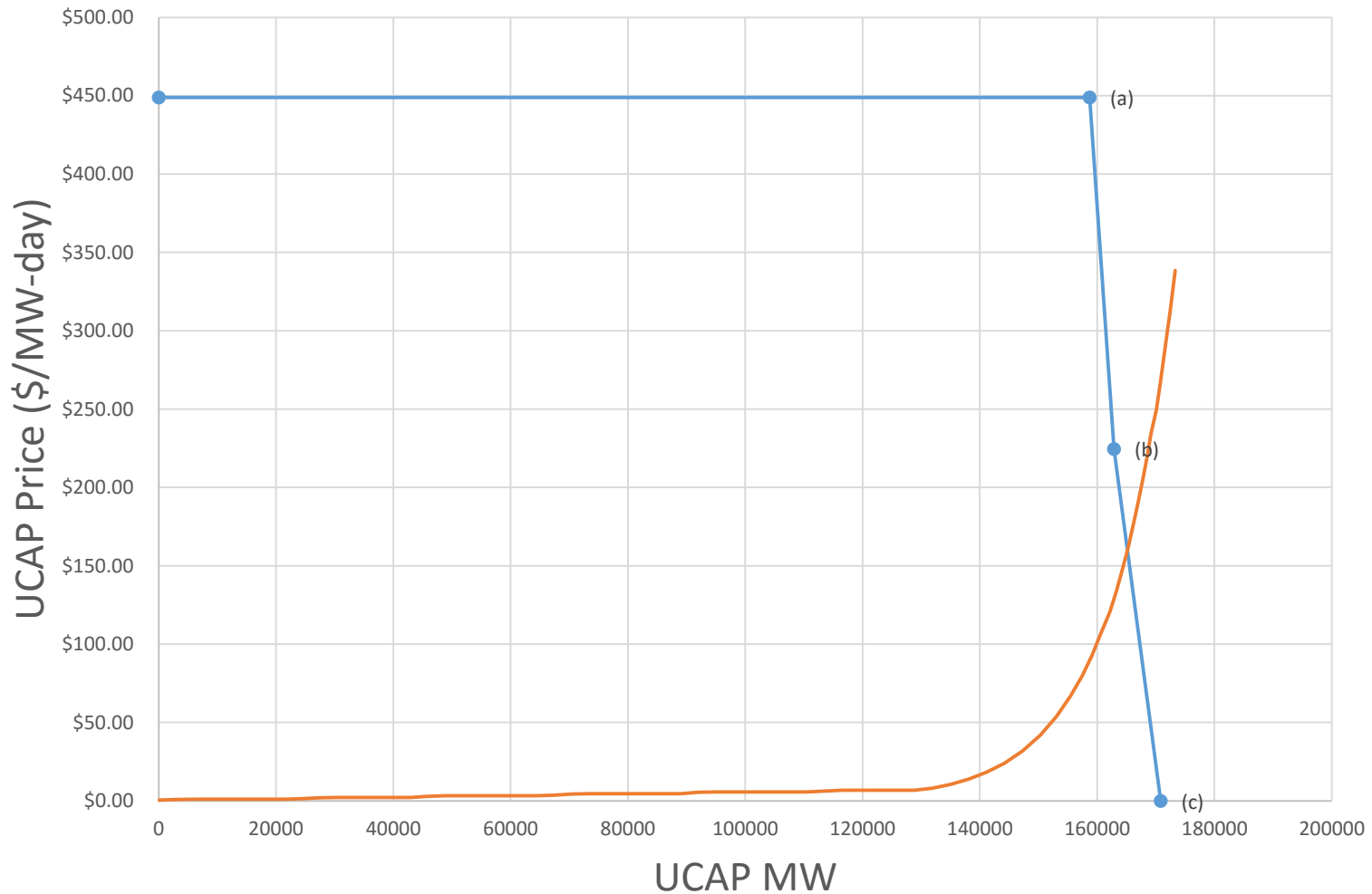
Purpose of Presentation

- Look more specifically at the reliability effects of including base capacity (or similar summer-only product) in RPM
- Assess the cost/benefit tradeoffs of all-annual vs. mixed annual and summer-only capacity market solutions.

Sources: VRR curve from PJM, 2019/20 BRA Planning Parameters. Supply Curve from IMM, Analysis of the 2017/18 RPM Base Residual Auction.

VRR Curve

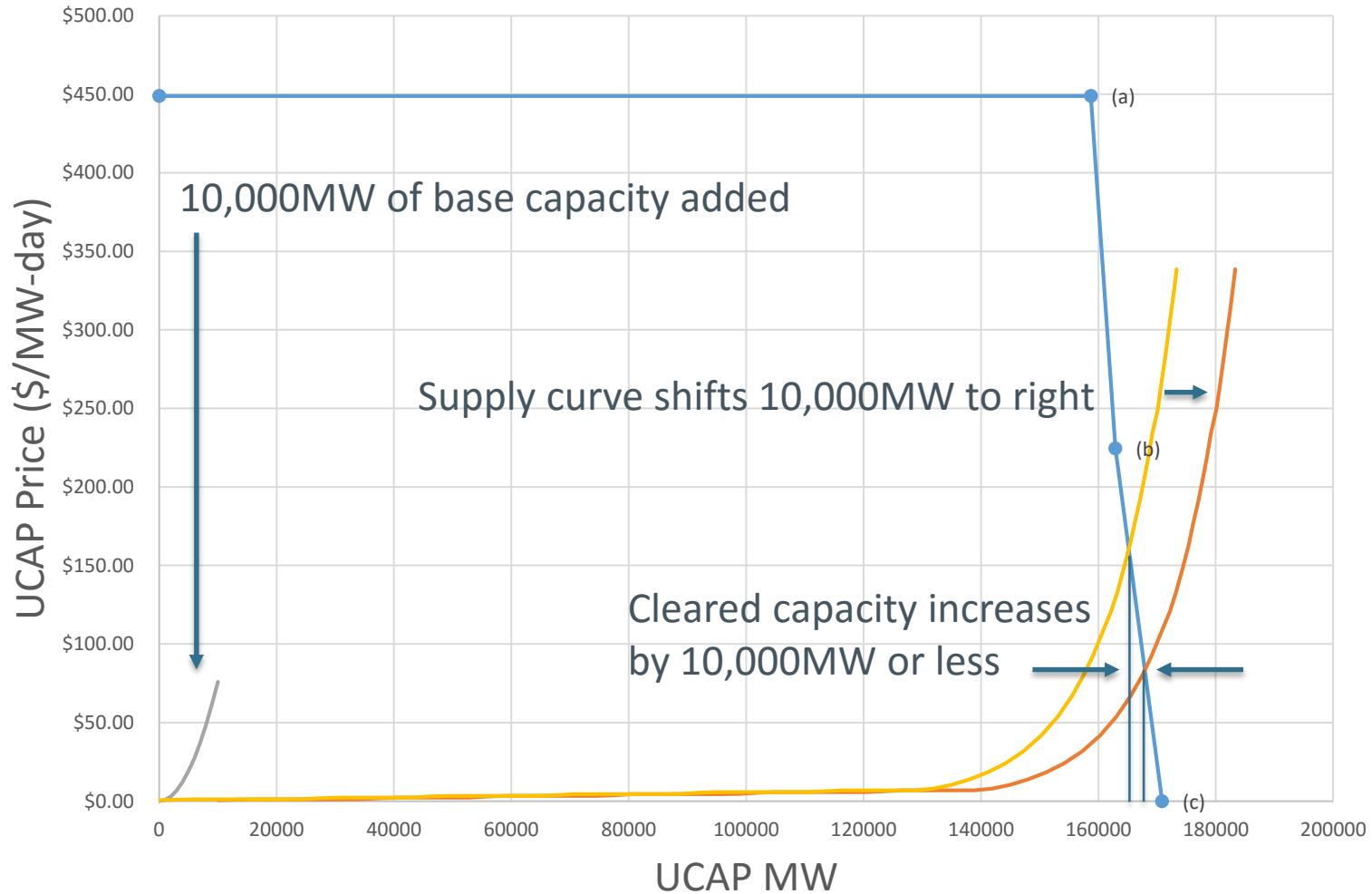
RPM auctions clear at the intersection of the VRR curve and the supply curve



Sources: VRR curve from PJM, 2019/20 BRA Planning Parameters. Supply Curve from IMM, Analysis of the 2017/18 RPM Base Residual Auction.

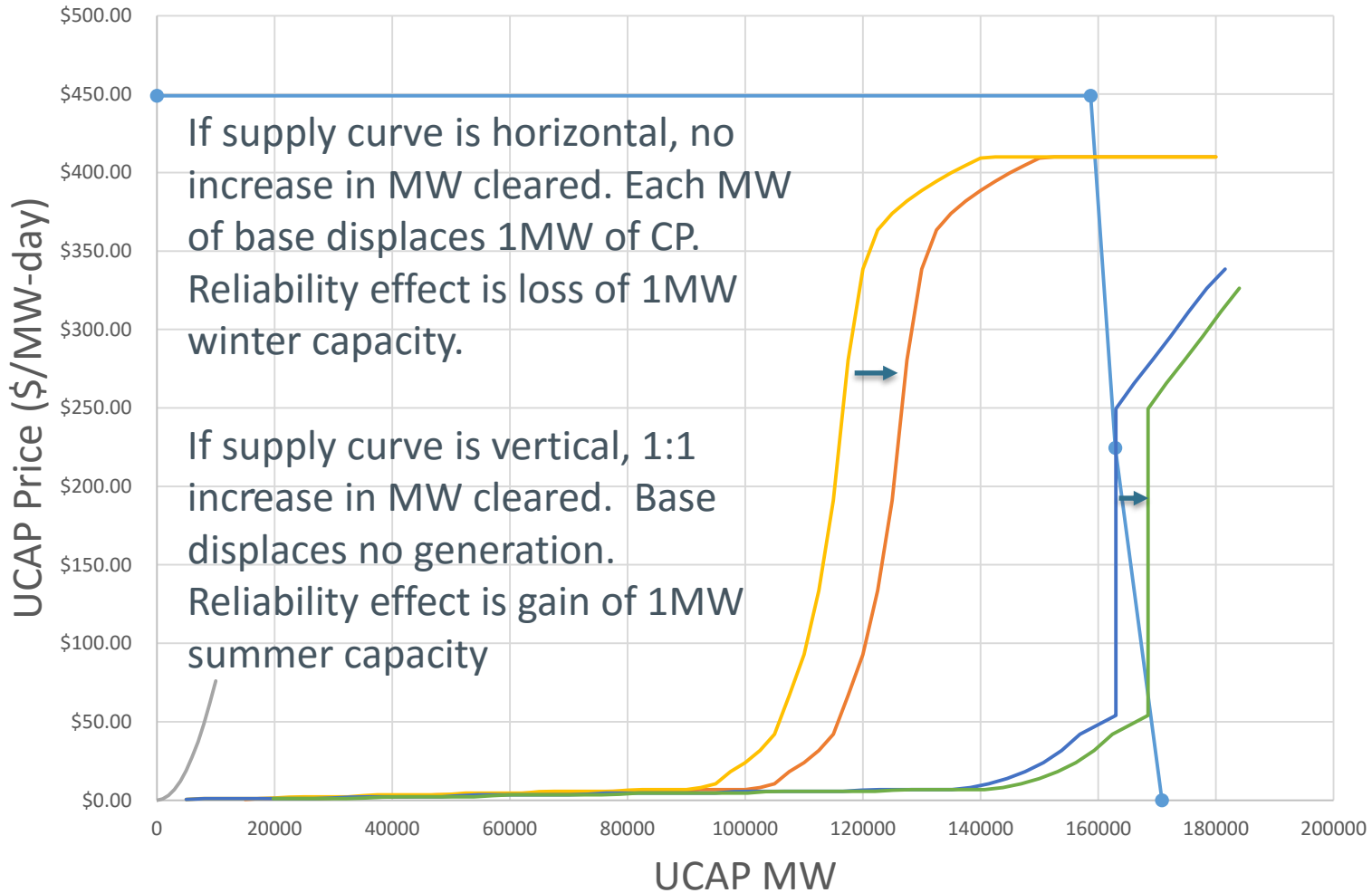
Adding Base Capacity

Cleared Base Capacity has the effect of shifting the CP supply curve to the right



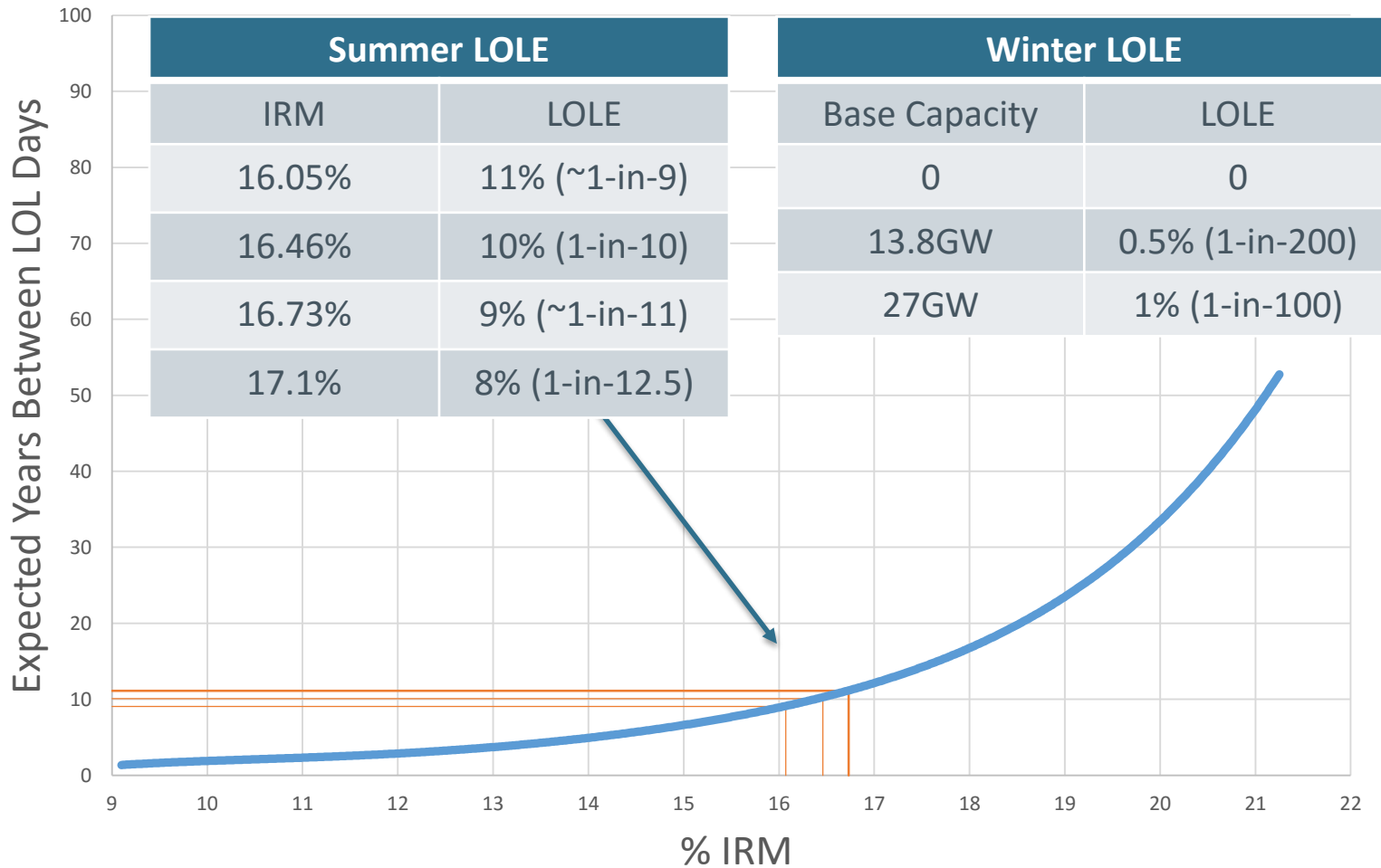
Effect depends on slope of supply curve

Each MW of Base capacity cleared displaces between 0 and 1 MW of CP.



Reliability Value

The Reserve Requirement Study calculates the reliability value of summer capacity. The Base Capacity Constraint sets some limits on the value of winter capacity.



Sources: PJM, 2015 PJM Reserve Requirement Study, Figure II-5 and 2019-20 BRA Planning Parameters

Tradeoffs

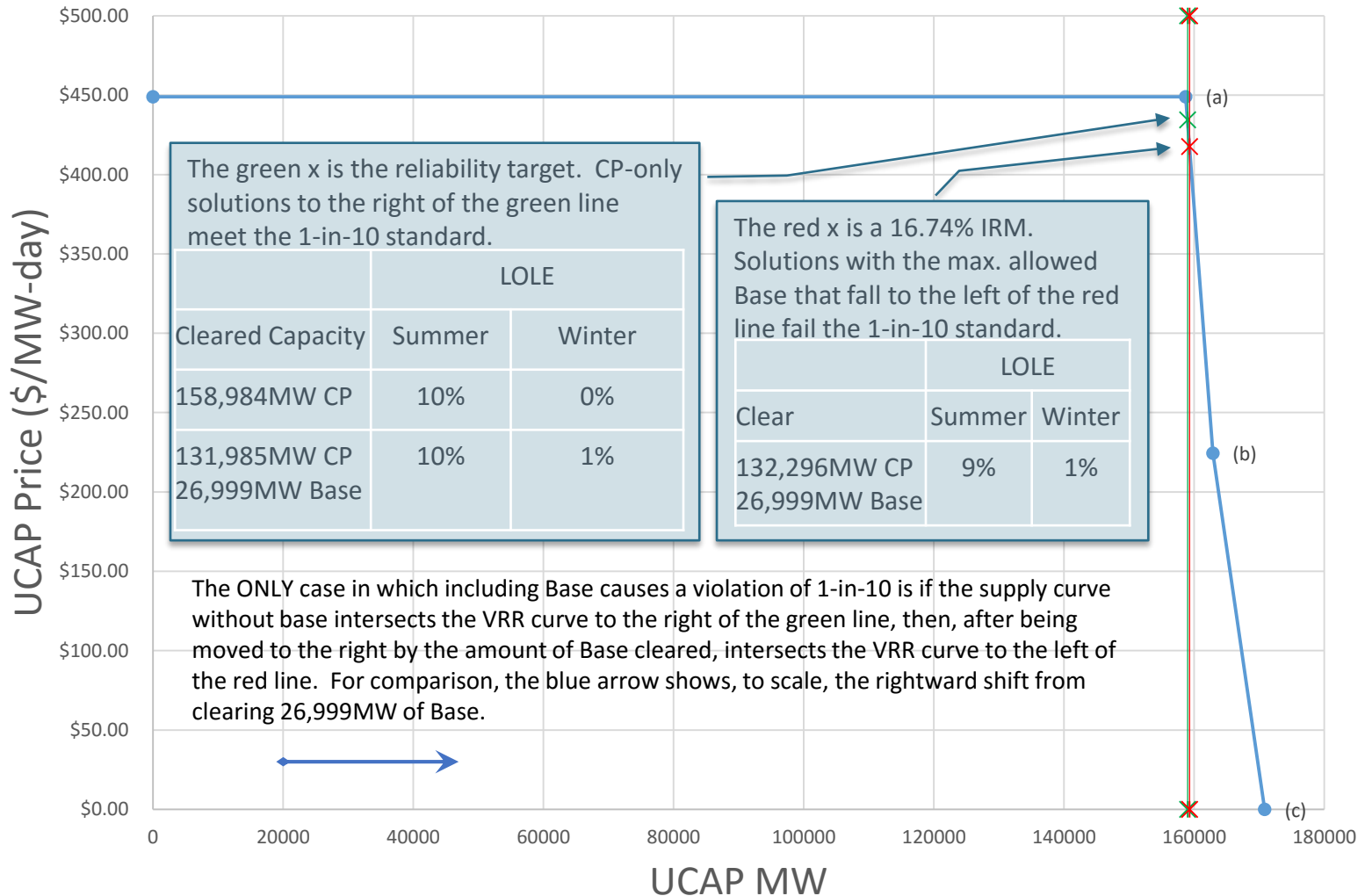
Any combination of Summer and Winter LOLE that totals 10% meets reliability standards

LOLE		IRM	UCAP Needed		
Summer	Winter		CP	Base	Total
10%	0%	16.5%	158,985	0	158,985
9.5%	0.5%	16.58%	146,261	13,832	159,093
9%	1%	16.73%	132,296	26,999	159,295
8%	2%	17.1%	?	?	159,794
7%	3%	17.5%	?	?	160,333

- The winter reliability effect of tens of thousands of MW of base capacity is offset by the summer benefits of a few hundred extra total MW.
- Ideally, the market would clear where the cost per % change in LOLE is the same across Base and CP.
- In contrast, the 2019/20 auction paid about 22 times as much for the last percent of winter reliability vs. the last percent of summer.
- A version of the chart from the previous slide showing the relationship between available winter capacity and winter LOLE would let us extend this analysis.

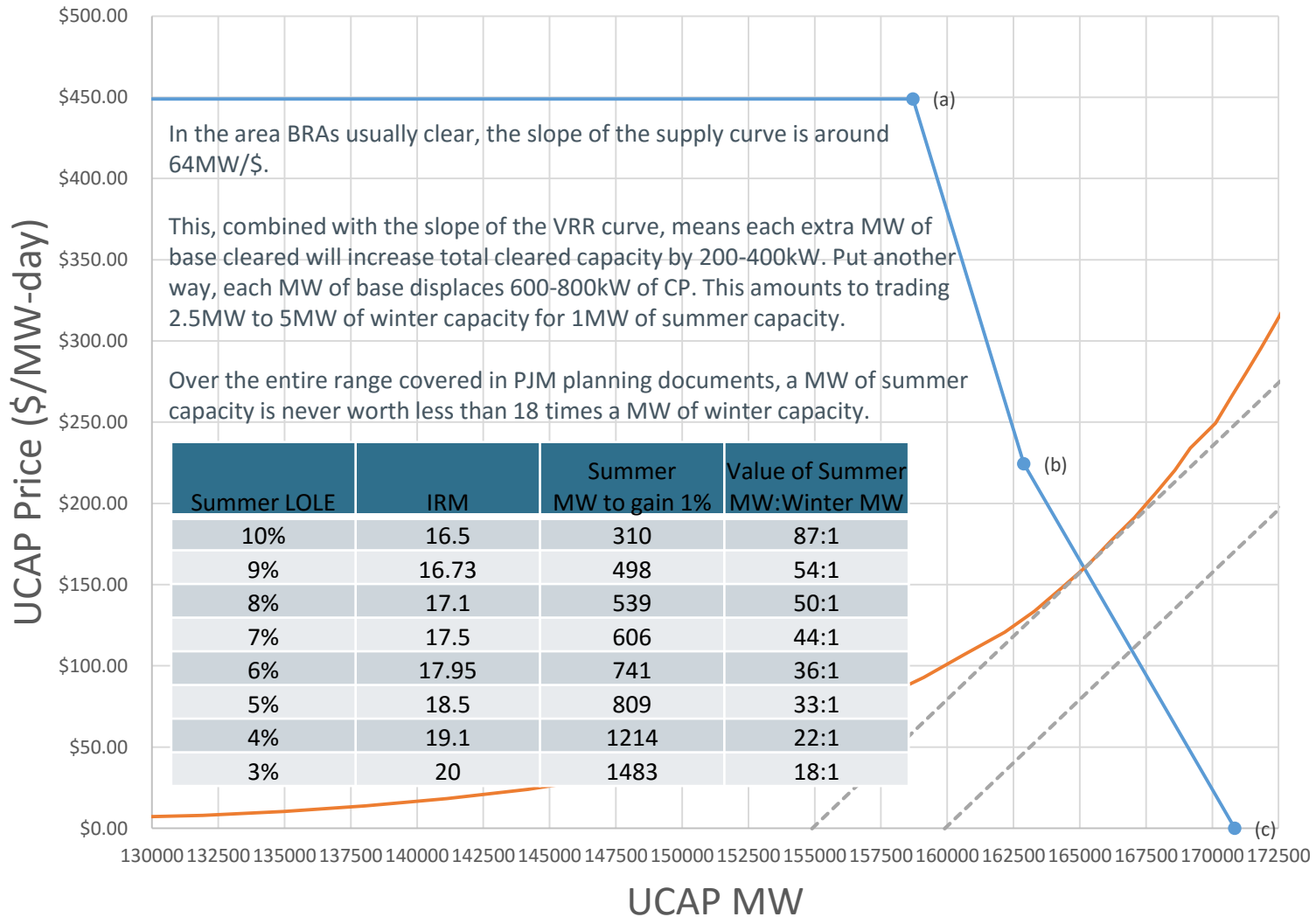
Meeting 1-in-10 Criteria

Including Base capacity will not realistically reduce reliability below 1-in-10



Mo' Base, Mo' Reliability

The reliability value of any cleared base capacity far exceeds that of displaced CP resources



Conclusions

Base capacity has essentially identical reliability value as Capacity Performance

In a perfectly optimized market:

- Including Base Capacity will deliver any desired level of reliability at the same or lower cost.
- For any given amount of money, including Base Capacity in the resource mix will deliver the same or better reliability.

RPM is a close approximation to this:

- Under any realistic supply curve, including Base Capacity increases reliability and lowers cost.
- The worry that base capacity can cause violation of 1-in10 LOLE is just a mathematical curiosity.
- Increasing the target IRM by 0.25% - 0.6% (310 – 810MW) would allow from 13,800MW to more than 27,000MW of base to clear with no net change in reliability.

Describing summer capacity as “not substitutable for annual capacity” or “not providing the same service” is not supported by reliability analysis:

- A megawatt of Base Capacity has 94-99% the reliability value of a megawatt of CP.
- The marginal value of winter capacity is close to zero, suggesting that any price premium for annual capacity over summer-only capacity should be small.
- Current rules limiting base capacity to 1% winter LOLE do not appear based on economic fundamentals and do not result in least-cost solutions