LSE Perspective – PJM Excess Capacity Sales

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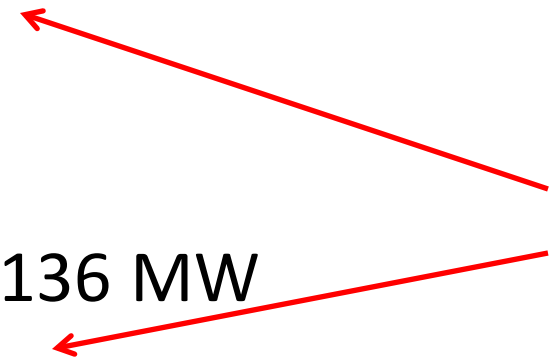
Volumetric Risk of Sales

Example

- 2017/2018 Delivery Year
- 1st IA → 2nd IA
- Peak Load Reduction
  - 146,896 MW → 141,345 MW
  - 5,551 MW Reduction
- UCAP Obligation
  - 166,725 MW → 163,136 MW
  - 3,588 MW Reduction



1st IA Obligation Peak Load Scaling Factor

- 1st IA
  - Peak Load Forecast (PLF) = 146,896 MW
  - UCAP Obligation (UCAP Ob) = 166,725 MW
  - STRTP = 3,300 MW
  - FPR = 1.0911
- 1st IA Obligation Peak Load Scaling Factor (OPLSF) = (UCAP Ob – STRTP)/(PLF*FPR)

1st IA OPLSF = 1.02

2nd IA Obligation Peak Load Scaling Factor

- 2nd IA
  - Peak Load Forecast (PLF) = 141,345 MW
  - UCAP Obligation (UCAP Ob) = 163,136 MW
  - STRTP = 2,475 MW
  - FPR = 1.0959
- 2nd IA Obligation Peak Load Scaling Factor (OPLSF) = (UCAP Ob – STRTP)/(PLF*FPR)

2nd IA OPLSF = 1.04

Impact

- Peak load reduction exceeds UCAP obligation reduction
- *What does it mean?*
- OPLSF scales peak load to UCAP obligation
- ***More capacity MWs are borne by each MW of peak load***
- 1st IA → Each MW of Peak Load carried 1.02 MW of Capacity
- 2nd IA → Each MW of Peak Load carries 1.04 MW of Capacity

Volumetric Risk

What if PJM sold 0 MW in 2nd IA?

- 1st IA → 2nd IA
- Peak Load Reduction
  - 146,896 MW → 141,345 MW
  - 5,551 MW Reduction
- UCAP Obligation
  - 166,725 MW → 166,725 MW
  - 0 MW Reduction

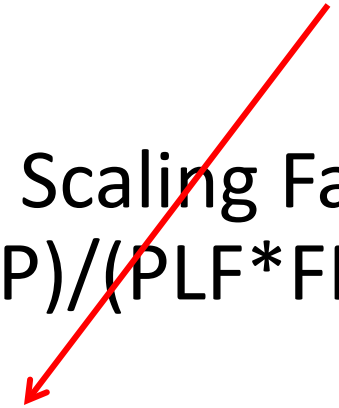
1st IA Obligation Peak Load Scaling Factor

- 1st IA
  - Peak Load Forecast (PLF) = 146,896 MW
  - UCAP Obligation (UCAP Ob) = 166,725 MW
  - STRTP = 3,300 MW
  - FPR = 1.0911
- 1st IA Obligation Peak Load Scaling Factor (OPLSF) = (UCAP Ob – STRTP)/(PLF*FPR)

1st IA OPLSF = 1.02

2nd IA Obligation Peak Load Scaling Factor

- 2nd IA
  - Peak Load Forecast (PLF) = 141,345 MW
  - UCAP Obligation (UCAP Ob) = 166,725 MW
  - STRTP = 2,475 MW
  - FPR = 1.0959
- 2nd IA Obligation Peak Load Scaling Factor (OPLSF) = (UCAP Ob – STRTP)/(PLF*FPR)



2nd IA OPLSF = ***1.06***

Impact

- 1st IA → Each MW of Peak Load carried 1.02 MW of Capacity
- 2nd IA → Each MW of Peak Load carries 1.06 MW of Capacity

Volumetric Risk Increases

So we should try to sell every MW….right?

Not so fast…there is also a pricing risk….

Load Price

- Load pays “Adjusted Zonal Capacity Price” (AZCP)
- Essentially a weighted average price of capacity procured in LDA across all RPM auctions

$$LDA\ AZCP = ((BRA\ UCAP\ Quantity\ * BRA\ LDA\ Price) - \sum(IA\ UCAP\ Quantity\ * IA\ LDA\ Price)) / (BRA\ UCAP\ Quantity\ -\ \sum(IA\ UCAP\ Quantity))$$

IA Impact on Load Price

$$LDA\ AZCP = ((BRA\ UCAP\ Quantity * BRA\ LDA\ Price) - \sum(IA\ UCAP\ Quantity * IA\ LDA\ Price)) / (BRA\ UCAP\ Quantity - \sum(IA\ UCAP\ Quantity))$$

- When PJM sells capacity, each MW acts as a credit against the Total BRA Cost
- The smaller the IA LDA Price, the lower the Impact of each MW of sale

IA Impact on Load Price

$$LDA\ AZCP = ((BRA\ UCAP\ Quantity * BRA\ LDA\ Price) - \sum(IA\ UCAP\ Quantity * IA\ LDA\ Price)) / (BRA\ UCAP\ Quantity - \sum(IA\ UCAP\ Quantity))$$

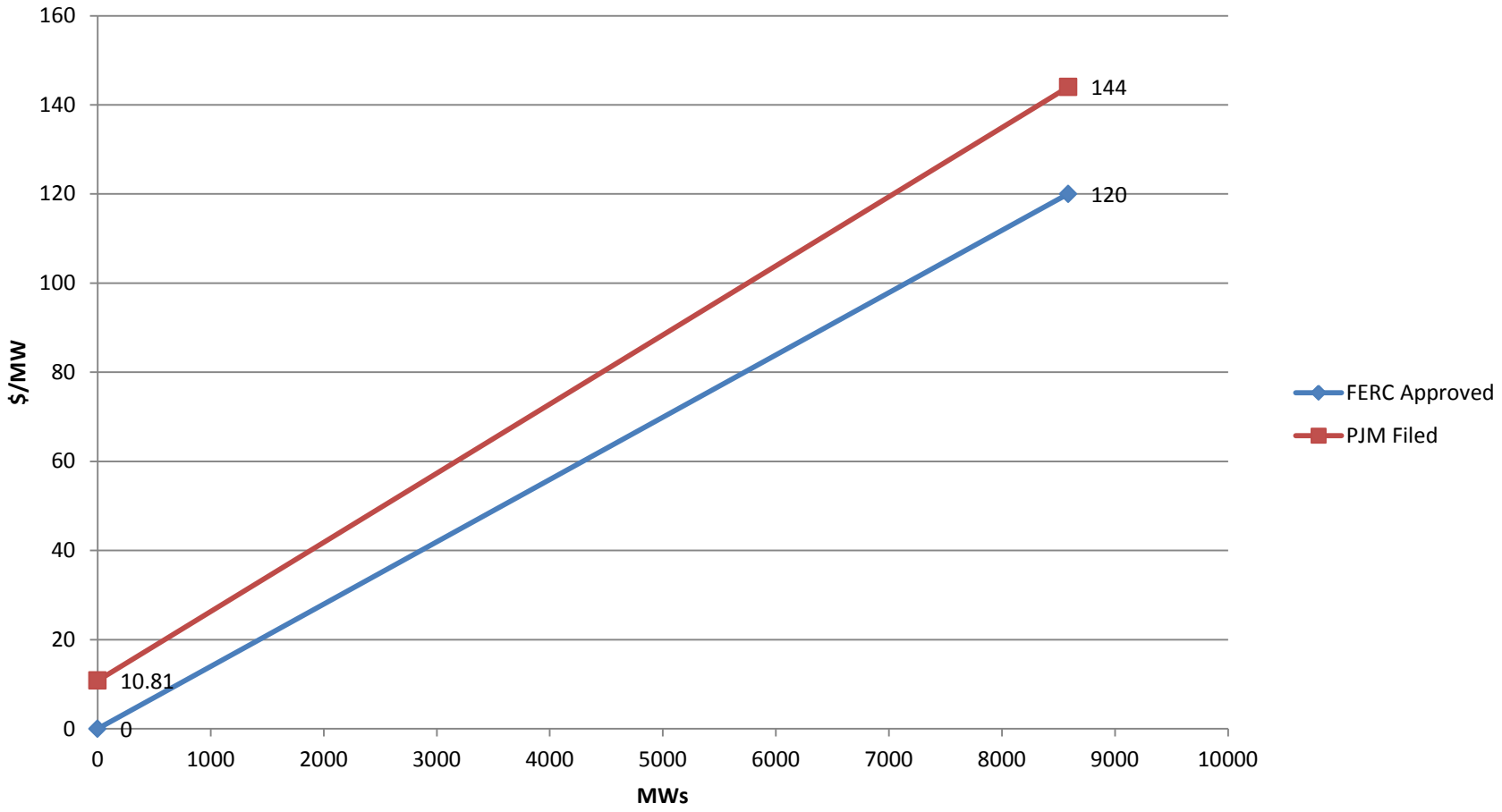
Regardless of the credit against BRA cost, the UCAP quantity gets reduced when PJM sells capacity

Price Risk - IA prices that are lower than the BRA price increase the LDA AZCP that is charged to load

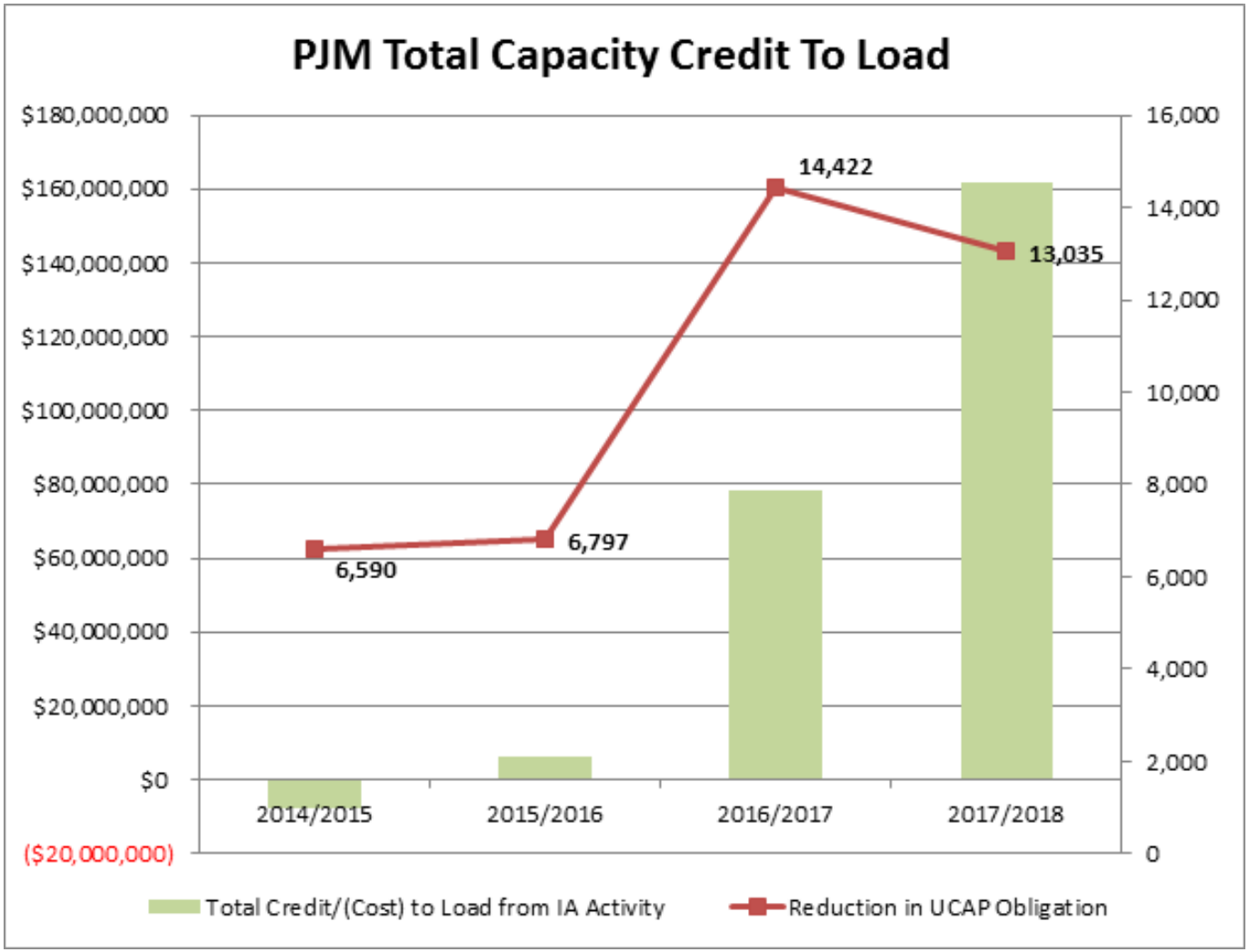
Optimal IA Sales Strategy

- Ideal price/quantity pair would maximize quantity sold (volumetric risk) while also maximizing sale price (price risk) (of course…)
- Sloped offer curve adopted by PJM for 2017/2018 3rd IA attempted to *approximate* this tradeoff

2017/2018 3rd IA PJM Sell Offer



Results


PJM Total Capacity Credit To Load
$180,000,000
$160,000,000
$140,000,000
$120,000,000
$100,000,000
$80,000,000
$60,000,000
$40,000,000
$20,000,000
$0
($20,000,000)
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
14,422
13,035
6,797
6,590
2014/2015
2015/2016
2016/2017
2017/2018
Total Credit/(Cost) to Load from IA Activity
Reduction in UCAP Obligation

Results – Successful…

- 2017/2018 – Load received approximately ***$49 per MW of UCAP Obligation reduction***

Compare with…

- 2016/2017 - $21 per MW
- 2015/2016 - $3.02 per MW
- 2014/2015 – ($4.75) per MW

Note – Per MW numbers adjusted to remove STRPT

…but still not a very good deal…

- 2017/2018
  - BRA (plus CP TA) Cost of Capacity = $150 per MW
  - IA "Refund" = $49 per MW
- 2016/2017
  - BRA (plus CP TA) Cost of Capacity = between $100 - $160 per MW
  - IA "Refund" = $21 per MW
- 2015/2016
  - BRA Cost of Capacity = between $134 - $166 per MW
  - IA "Refund" = $3.02 per MW
- 2014/2015
  - BRA Cost of Capacity = between $125 - $135 per MW
  - IA "Refund" = ($4.75) per MW

Consider that load pays the difference between the BRA Cost of Capacity and the "IA 'Refund'" for each MW of UCAP Obligation reduction…and gets NOTHING in return….

Better Ways to Price PJM Sales?

- Is there a threshold price below which load is better off retaining capacity rather than selling? If so, what is it?
- Is the VRR curve a proper reflection of load's willingness to sell an existing capacity commitment?
  - Consider:
    - E&AS benefit
    - Reliability benefit
    - Scarcity pricing avoidance

Should All Excess Capacity be Sold?

- If excess capacity is “worthless” as valued by the VRR curve at the time of an IA, should load bear this risk?
- Worthless excess capacity results from problems with:
  - VRR curve – capacity value above reserve margin not correct?
  - Load forecast – core issue leading to excess capacity
- Worthless capacity should be excused?

Alternatives to load forecast for setting reliability requirement

- Prior year's 5CP
- Prior year's metered (non-weather normalized) peak