CP Balancing Ratio and Offer Cap

MIC

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Background

- The purpose of a market seller offer cap in the capacity market is to mitigate market power.
- The default level market seller offer cap should be the competitive offer level for a capacity resource given the capacity performance rules.
- The level of the default offer cap is not to provide a safe harbor for exercising market power.

Background

- The default market seller offer cap level is the competitive offer of a resource whose net going forward cost is less than the energy only bonus revenues it can earn without a capacity commitment (Low ACR resource).
- The assumptions that lead to the competitive offer of such a resource to equal Net CONE times B are:
  - The nonperformance charge rate is Net CONE divided by the expected number of performance assessment intervals.
  - B is the expected average Balancing Ratio during the performance assessment intervals.
  - The bonus payment rate equals the non-performance charge rate.
  - The expected number of performance assessment intervals currently assumed is 360 (30 hours).

Background

- **FERC Order (ER15-623), P 163:**

*We also accept PJM's proposal to rely on an estimate of 30 hours of Emergency Actions to formulate the Non-Performance Charge rate…. However, given that the Performance Assessment Hour estimate affects core components of the Capacity Performance design, including the Non-Performance Charge rate and the default offer cap, we condition our acceptance of PJM's proposal on PJM making annual informational filings with the Commission to provide updates on the use of 30 hours for this parameter….**We also encourage PJM to reassess the assumed number of Performance Assessment Hours after it has gained more experience with Capacity Performance** and submit a filing if it finds a revision is warranted.*

Derivation

- For a resource without a capacity obligation (energy only resource), the only opportunity to earn capacity revenues to cover its ACR is bonus payments for over performing during Performance Assessment Intervals (PAIs).
- Without a capacity obligation, all of its output during a PAI is considered bonus performance.
- The opportunity exists only if there is a likelihood of having PAIs during which resources are held to their performance obligation and non-performing resources are not excused.

Energy only resource

- Bonus payments during a PAI can be calculated as:

  MWh_{output}*Bonus Payment Rate (CPBR)

- Using an availability metric for a resource, where

  A = MWh_{output}/UCAP

- Bonus payments = **UCAP*A*CPBR**
- Bonus payments over a delivery year can be calculated as the summation of bonus payment in a PAI over the expected number of PAIs during a DY:

$$\boldsymbol{Energy\ only\ Bonus\ Revenues = UCAP * \sum_{i=1}^{H} (A_i * CPBR_i)}$$

Energy only resource

- The net revenues for an energy only resource for a DY can be described using:

$$R_e = UCAP * \left[\sum_{i=1}^{H} (A_i * CPBR_i) - Net\ ACR \right]$$

where Net ACR is the avoidable costs net of energy and ancillary service (EAS) revenues calculated per MW UCAP of the resource for the delivery year.

Capacity Resource

- For a resource with a capacity obligation, the net revenue can be described using:

$$R_c = UCAP * \left[p + \sum_{i=1}^{H} (CPBR_i * (A_i - B_i)) - Net\ ACR \right]$$

  - where ‘p’ is the capacity price.
- A resource with a capacity commitment has an obligation to perform at least up to its UCAP times the Balancing Ratio during a PAI.
- The resource receives bonuses only for the portion of energy and reserves it provides above its obligation:

$$UCAP * (A_i - B_i)$$

Low ACR resource

- If the energy only bonus revenues are high enough to cover a resource's avoidable costs net of any EAS revenues, then the resource would not take on a capacity obligation, i.e. when:

$$\boldsymbol{R_e \geq 0}$$

$$\boldsymbol{UCAP * \left[\sum_{i=1}^{H}(A_i * CPBR_i) - Net\ ACR\right] \geq 0}$$

$$\boldsymbol{or,} \qquad \boldsymbol{Net\ ACR \leq \sum_{i=1}^{H}(A_i * CPBR_i)}$$

- We refer to such a resource as a 'Low ACR' resource.

Low ACR resource

- For a low ACR resource to take on an obligation, it needs enough capacity revenues to be indifferent to having a capacity obligation, i.e.

$$\boldsymbol{R_e \geq R_c}$$

$$\boldsymbol{p - \sum_{i=1}^{H} (CPBR_i * B_i)) \geq 0}$$

$$\boldsymbol{p \geq \sum_{i=1}^{H} (CPBR_i * B_i))}$$

- Using expected values for CPBR, B and H:

$$\boldsymbol{p \geq \overline{CPBR} * H * \overline{B}}$$

Low ACR resource

- If the number of expected PAIs is low, this opportunity is diminished. Fewer resources would qualify as ‘Low ACR’.
- There have been no emergencies declared since April of 2014, where generators were subject to performance assessment.
- With higher installed reserve margins, upward biased peak load forecasts, and lower pool wide outage rates, the expected number of PAIs is lower.
- If the expected number of PAIs is zero, every resource with a positive Net ACR is a ‘High ACR’ resource.

Default Offer Cap

- If the bonus payment rate is assumed to be equal to the non-performance charge rate (PPR), then:

$$p \geq PPR * H * \overline{B}$$

- The competitive offer is directly proportional to the expected value of H. Recent history indicates the expected value of H is close to zero.
- PJM Package B proposed floor of 5 hours (60 intervals) is a conservatively high estimate that considers the possibilities for low probability emergency events. In the event of higher PAIs occurring in the future, the package also adjusts the estimate for H by using the actual average number of PAIs.

Default Offer Cap

- Calpine and Exelon proposals to have 10 hours and 15 hours as the floor for expected PAIs are unsupported, and artificially inflate the offer cap, while diluting the non-performance charge rate.
- Calpine and Exelon mention consistency, but ignore accuracy. Calpine and Exelon proposals to reduce the CP performance requirements, while maintaining the same offer cap, are inconsistent.
- With an artificially high default offer cap, the market is not protected against offers that are higher than competitive levels.

Target IRM vs. Actual Reserve Margins

Delivery Year Beginning	Target IRM	Actual Reserve Margin	Reserve Margin in Excess of IRM	
			Percent	ICAP (MW)
June 1, 2016	16.4%	22.3%	5.9%	8,209.2
June 1, 2017	16.6%	24.1%	7.5%	10,522.9
June 1, 2018	16.1%	22.9%	6.8%	9,499.8
June 1, 2019	15.9%	26.4%	10.5%	14,677.8
June 1, 2020	16.6%	23.9%	7.3%	10,338.3
June 1, 2021	15.8%	22.0%	6.2%	8,703.8

- RPM consistently clears well above the target IRM.
- PJM's MARS study estimates 24 PAIs (2 hours) at 21.8% Reserve Margin.
- There is no evidence to support using the projected PAIs at target IRM.

Default Offer Cap

- The default offer cap does not prevent resources with higher ACRs from offering at their competitive offer levels.
- It ensures resources that can potentially impact RPM prices go through a market power review.
- Type 1 error – detecting market power when none exists.
  - The consequence is to mitigate using competitive offers.
  - The cost of type 1 error is zero.
- Type 2 error - failure to detect market power when it exists.
  - The consequence is offers above competitive level set prices.
  - The cost of type 2 error is large.

Non-Performance Charge Rate (PPR)

- The current non-performance charge rate (in $/MWh) is set at Net CONE/30 hours.
- 30 was the number of PAHs in 2013-14 delivery year.
- The fundamental principle is that if a resource does not perform during any of the expected PAIs, it should pay total non-performance charges that equal net CONE to incent new entry. This sets the non-performance charge rate at net CONE divided by the estimate for the number of PAIs.
- This principle is critical if PJM were approaching low capacity reserve margins and a new resource needs net CONE as CP bonus revenues to supplement its net EAS revenues to enter.

Non-Performance Charge Rate (PPR)

- Using the conservatively high estimate for PAIs of 60 (5 hours), the non-performance charge rate (in $/MWh) would have been net CONE (in $/MW-year) divided by 5 (hours/year).
- If the denominator is increased, the non-performance charge rate is reduced.
- If the non-performance charge rate is set at a value lower than net CONE divided by 5 hours, the default offer cap needs to be adjusted to the competitive level.
- Using 60 intervals, the new non-performance charge rate would be six times the current non-performance charge rate, keeping net CONE the same.

Non-Performance Charge Rate (PPR)

Zone	2020-21 Delivery Year Net Cone ($/MW-day)	Current Non-Performance Charge Rate ($/MWh) using 30 hours as denominator	Non-performance charge rate ($/MWh) using 5 hours as denominator	Annual Stop Loss ($/MW)
AECO	311	3,779	22,672	170,037
AEP	298	3,625	21,752	163,139
APS	278	3,384	20,301	152,260
ATSI	289	3,514	21,082	158,113
BGE	230	2,798	16,786	125,892
COMED	324	3,943	23,658	177,434
DAY	294	3,579	21,473	161,047
DEOK	294	3,582	21,490	161,173
DOM	298	3,629	21,773	163,297
DPL	283	3,437	20,623	154,669
DUQ	299	3,637	21,823	163,670
EKPC	309	3,757	22,544	169,079
JCPL	277	3,369	20,215	151,614
METED	275	3,344	20,062	150,464
PECO	282	3,433	20,595	154,466
PENELEC	202	2,455	14,733	110,496
PEPCO	269	3,268	19,609	147,064
PPL	283	3,443	20,660	154,948
PSEG	311	3,785	22,712	170,344
RECO	308	3,753	22,517	168,876
RTO	303	3,682	22,092	165,690

IMM Proposal

- Default offer cap = PPR*B*H (intervals per year)/365
  - where B = average of the Balancing Ratios during the 3 DYs that immediately precede the BRA using:
    a. actual Balancing Ratios calculated during RTO PAIs of the DY, and
    b. for any DY with less than H intervals of RTO PAIs, estimated Balancing Ratios calculated during the intervals of the highest RTO peak loads that do not overlap a PAI
  - PPR ($ per MW-5min) = [(Net $CONE_{LDA}$ (in $ per MW ICAP-day)* 365 days) / H (intervals)]
  - H = Average number of RTO PAIs experienced in prior 3 DYs, but no less than 60 intervals (5 hours).

FERC Determination in ISO-NE

- **Docket ER18-620, P 38:**

We agree with ISO-NE that…. the purpose of the Dynamic De-List Bid Threshold is not to signal the likely market clearing price, but instead to help ensure that the marginal bid is subject to IMM review for the potential exercise of market power. Further, the proposed Dynamic De-List Bid Threshold does not prevent capacity suppliers from submitting properly supported de-list bids that exceed the threshold.

Appendix
High ACR resource Competitive Offer

High ACR Resource

$$if, \quad R_e < 0$$

$$or, \quad UCAP * \sum_{i=1}^{H} (A_i * CPBR_i) - Net\ ACR < 0$$

- The resource cannot recover its net avoidable costs by simply relying on bonus payments during PAIs.
- Resources whose net avoidable costs are greater than the energy only bonus revenues are referred to as ‘High ACR’ resources.
- For such resources, they have to clear as capacity and recover their avoidable costs net of EAS revenues.

High ACR Resource

- The competitive offer of a high ACR resource should be such that $\boldsymbol{R_c \geq 0}$

$$\boldsymbol{UCAP * \left[p + \sum_{i=1}^{H} (CPBR_i * (A_i - B_i)) - Net\ ACR \right] \geq 0}$$

$$\boldsymbol{p \geq \left[Net\ ACR - \sum_{i=1}^{H} (CPBR_i * (A_i - B_i)) \right]}$$

- The competitive offer of such a resource is its Net ACR net of any additional bonus revenues it expects to earn during PAIs.

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