

# **PJM CIFP-RA Capacity Accreditation – Tradable Performance Credits Initial Proposal**

**June 1, 2023**

A decorative graphic at the bottom of the slide consisting of a dark blue curved line above a green curved line, resembling a stylized horizon or landscape.

- PJM Board directive: ***Align accreditation with reliability contribution.***
- PJM Proposal: ***Multi-tiered framework of performance assessments and testing to help ensure delivery of the capacity that has been committed through forward auctions.***
  - ✓ Daily Commitment Deficiency Assessment
  - ✓ Generator Summer / Winter Rating Tests
  - ✓ Energy Market Must Offer Obligation Assessment
  - ✓ PAIs

***How can Capacity Resources best deliver on reliability commitments while managing risk in a cost-efficient manner?***

- The BRA does not guarantee recovery of risks (operational and/or market) or recovery of resource investments intended to mitigate unit-specific risks
  - Event risks have many causes and there is not necessarily a relationship between a specific investment a unit makes at  $t_0$  and mitigation of the realized event risks in a future unknown time period
  - Some investments enhance theoretical availability without enhancing energy production and/or gross margin as system economics change
- Asymmetry exists between the system risks PJM is aware of versus the information generators receive both at the time of the BRA and during the delivery year
- In a low BRA clearing price/high performance risk environment investments which improve resource availability also increase performance expectation which reduces potential bonus revenue
- The system will never achieve perfect reliability and load would be unwilling to pay for perfect reliability

***Resources should have transparent mechanism to assess and respond to system risks while maintaining a high level of participation in the BRA.***

## Framework enables generators to trade an expectation of high performance with resources that have a risk of under-performance

### What it is Not

- Replacement for RPM
- The BRA remains the primary mechanism for establishing commitment level, expected payout for resources and for recovery of net avoidable costs
- Incremental auction remains the mechanism to take on additional physical obligation and/or buy-back physical obligation
- Does not replace performance obligations

### What it Is

- A complementary financial or physical product to enable generators to manage risks closer to the delivery period
- Mechanism intended to reduce risk associated with making plant investments (e.g. not clearing, low clearing price, technology mismatch with event risk)
- A market operations tool for PJM to improve operational awareness
- Dependent on strong penalty/bonus framework; common baseline and limited excusals

# Example: Why Product is Needed

Asset Owner	Pre-Investment	Post-Investment
Max Capacity	100 MW	100 MW
UCAP	90 MW	95 MW
Cleared MW	90 MW	90 - 95 MW
Balancing Ratio	1	1
Potential Bonus	0 - 10 MW	0 - 10 MW
Clearing Price*	\$1.25/MWh	\$1.25/MWh
Penalty Rate**	\$3,000/MWh	\$3,000/MWh
Shortfall risk	0 - 90 MW	0 - 95 MW

**Note.** \* Clearing Price =  $(\$30/\text{MW-Day}) / 24 \text{ hours} = \$1.25/\text{MWh}$ , \*\* Penalty Rate =  $(\$244/\text{MW-Day}) * 365/30$

***The investment lowers overall system risk but may reduce the bonus opportunity and also exposes the asset owner to more downside risk.***

## Investment Risks

- Unit may not clear its incremental accreditation
- Bonus payout ratio < 1
- Unknown balancing ratio
- No performance events materialize
- Forecast event risk declines as more units make investment
- RPM clearing prices decline or remain flat as a result of lower expected system risk
- Investment provides protection against seasonal risk but does not provide all year protection (e.g. adding back-up fuel oil)
- Transmission constraints may limit opportunity to capture bonus in real-time.

# Performance Credits - Definitions



## Performance Credit Components

Component	Definition
UCAP MW	Performance shortfall or Bonus MW
Time	# of Performance Intervals
Season	Winter, Summer (Some investments may only enhance reliability in winter but not provide additional UCAP in summer)
Term	Investment life (i.e. # of Delivery Years)

## Credit Generation

Component	Definition
Resource Investment	During quadrennial review PJM develop lists of investments which are eligible for credits, the term of credits and seasonal eligibility
Unsold Capacity	Today any unsold capacity has bonus value
Credit Value	PJM produces weekly risk assessment (LOLE/EUE) based on load/renewable forecast variation, outages, fuel supply surveys including pipeline conditions. Credit value is a function of buyer and seller expectations of PAI likelihood and penalty rate

# Performance Credits - Settlement



Credit Type	Requires Unsold Capacity	Seller	Buyer	Pre-PAI Period Settlement	Post PAI Settlement
<b>Investment-Linked</b>	No	Seller discounts event likelihood or is confident in unit performance above expected performance	Needs downside protection against performance shortfall	Buyer provides seller Credit Value x UCAP x Time	No exchange between buyer and seller Buyer provides PJM credits to offset performance shortfall
<b>Bonus-Linked</b>	Yes	Seller discounts event likelihood or bonus payout ratio	Needs downside protection against performance shortfall	Buyer provides seller Credit Value x UCAP x Time	Seller provides buyer bonus revenue: Penalty Rate x UCAP x Time x Bonus Payout Ratio
<b>Settlement Mechanism</b>	PJM will run auction(s) or develop an exchange framework to match buyers and sellers; PJM will need to track performance credit components.				

# Credit Trading Examples: Investment-Linked

Component	Description
Credit Type	Investment-Linked Credit
Credit UCAP*	10 MW
Credit Price	\$500/MWh
Credit Time	24 PAI (2 hours)
Total Credit value (\$)	$500 \times 2 \times 10 = \$10,000$
Shortfall offset	$2 \text{ hours} \times 10 \text{ MW} = 20 \text{ MWh}$
Seller Penalty Expectation	0 MW
Buyer Penalty Expectation	10 MW
Buyer Expected Penalty Costs	$10 \text{ MW} \times \$3,000/\text{MWh} \times 2 \text{ hours} = \$60,000$

Note. \*Seller can sell fractional or whole value of credit. Exchange/Auction operator must ensure that credits are valid for delivery period given the season and term attribute



**No Actual PAI:** Seller gains credit value (\$10k), buyer loses premium, (\$10k).

## PAI:

- Seller loses protection against PAI but retains bonus potential.
- Buyer avoids \$60k in penalties but paid \$10k for a net risk avoidance of \$50k.
- Total PJM penalty collection and bonus payout ratio is lower, but this is no different from current effect of excusals or replacement transactions. (Bonus pool could be enhanced by limiting to resources with CIRs).
- Both buyer and seller incentivized to perform given high energy prices and penalty avoidance.



# Credit Trading Examples: Bonus-Linked

Component	Description
Credit Type	Bonus-Linked Credit
Unsold MW	10 MW
Bonus MW	Up-to Unsold MW
Credit Price	\$500/MWh
Credit Time	24 PAI (2 hours)
Total Credit value (\$)	$500 \times 2 \times 10 = \$10,000$
Bonus Credit	$2 \times 10 = 20 \text{ MWh}$
Seller Penalty Expectation	0 MW
Buyer Penalty	10 MW
Buyer Penalty Costs	$10 \text{ MW} \times \$3,000/\text{MWh} \times 2 \text{ hours} = \$60,000$
PJM Bonus Payout Ratio	60%
Seller Bonus	$10 \text{ MW} \times \$3000/\text{MWh} \times 2 \text{ hours} \times 60\% = \$36,000$



**No Actual PAI:** Seller gains credit value (\$10k); buyer loses premium (\$10k).

## PAI:

- Seller forgoes bonus payment but earns \$10k cash flow at time of sale.
- Buyer offsets \$60k in performance penalties with \$36k in bonus payment for net penalty of \$24k. Including the premium buyer sees a net cash flow of negative (\$34k).
- Total PJM Penalty collection stays the same and bonus payout rate stays the same.
- Both buyer and seller incentivized to perform given high energy prices and penalty avoidance.

**Note.** Exchange/Auction operator must ensure that credits are valid for delivery period given the season and term attribute.

## Capacity Resources with Performance Credits Linked to Investment

Can sell the credits through auction framework prior to the delivery interval enabling asset owner to convert bonus potential and/or avoidance of potential penalties into cash flow.

## Capacity Resources without Investment-Linked Performance Credits

Can buy and resell credits within performance credit settlement mechanism (i.e. auction or exchange) to gain risk protection against performance shortfall or to gain access to bonus payments.

## Load Serving Entities and Financial entities

- ✓ No requirement for load to participate
- ✓ Participation increases market liquidity (performance framework less of a zero-sum framework amongst generators)
- ✓ As a purely financial product whose re-sale value offsets higher energy and reserve costs during shortage (high-priced) periods
- ✓ Frequent risk assessments and high transaction volume may be required to make attractive to entities managing load and/or to financial entities

- Enables dynamic re-evaluation of unit-level and system risks
  - ✓ Increases PJM's operational awareness of individual resource risk, area risks and correlated availability risk
  - ✓ Allows resources to balance their capacity risk in a transparent and efficient manner
  - ✓ Incentivizes cost-efficient resource investment to enhance reliability
  - ✓ Provides more dynamic evaluation of risks than incremental auctions and/or bilateral arrangements
  - ✓ Maintains strong penalty structure that incentivizes performance, while allowing resources to appropriately hedge risk
  - ✓ Aligns investment incentive with opportunity for bonus revenue
  - ✓ Provides a substitute mechanism for replacement transactions

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- Helps *ensure system reliability* while *minimizing costs and risks* to customers
  - ✓ Resource will be inclined to reflect closer to their avoidable cost in Base Residual Auction since there is a more transparent framework to both assess and recover performance risk post-BRA
  - ✓ Load can voluntarily send price signal for more reliability
  - ✓ Financial players can develop more customized products to help generators manage risk

# Questions?

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