

PJM's Capacity Performance Proposal: FERC Delivers a Strong Order

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The Bottom Line

1. FERC's green light for PJM's proposed Capacity Performance (CP) requirements will benefit already compliant units, existing low compliance cost oil, coal, and nuclear units, and new units with firm fuel supply. This will all combine to create excess supply and drive capacity prices below equilibrium (Net CONE) but still uplifted to the range of \$160/MW-day to \$200/MW-day. Depending on bidding prices could be even higher.
2. ICF disagrees with predictions of high upcoming Base Capacity prices, and estimates prices at a significant discount relative to the CP product in the range of \$50-\$100/MW-day. Bidding strategies and investment plans will need to reflect this discount.
3. Reserve Margins should remain fairly steady, as we predict that 8 to 10 GW of new capacity will clear in the upcoming auction. However, these will be in part offset by a decline in Demand Response resources and imports.

FERC's Order and Timelines for Upcoming Auctions — What Happens Now?

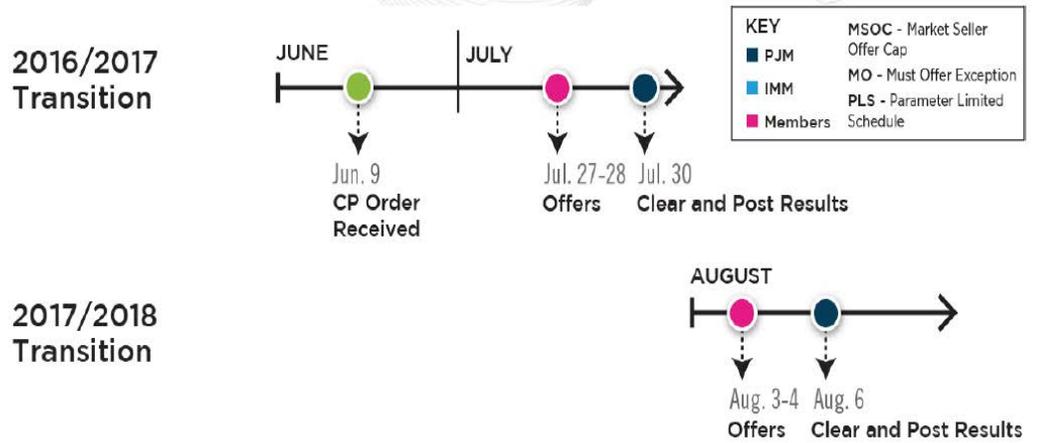
Following PJM's response regarding deficiencies in its original filing, on Tuesday June 9th, 2015, FERC issued its decision on PJM's proposal for a major restructuring of its capacity market, known as the Capacity Performance (CP) proposal.

FERC's decision removes months-long speculation on the future of PJM's capacity markets and addresses concerns regarding loopholes and serious inefficiencies in the previous capacity market tariff.

With FERC's decision, PJM has finalized the timelines both for the upcoming transitional auctions and for the Base Residual Auction (BRA), the latter of which was delayed for the first time in the 10-yr history of PJM's capacity market. The exhibits below provide these timelines.

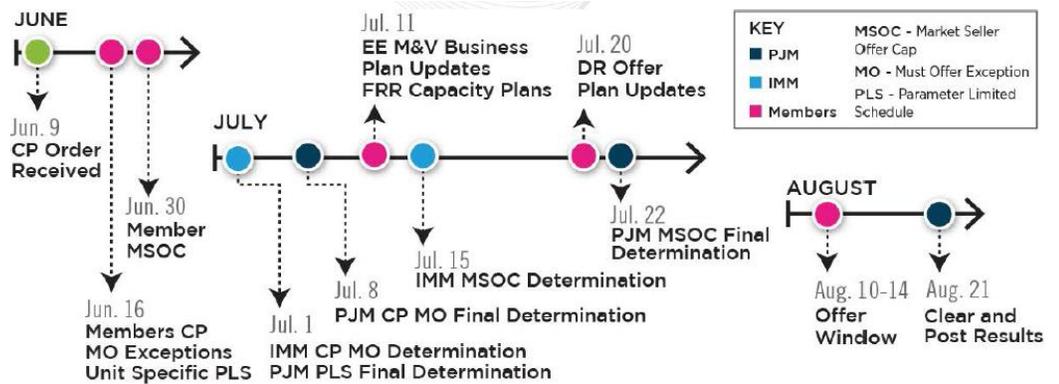


Exhibit 1 – Schedule for Transition Auctions



Source: Capacity Performance Enhanced Liaison Committee

Exhibit 2 – PJM Schedule for 2018/2019 BRA



Source: Capacity Performance Enhanced Liaison Committee

The remainder of this paper provides follow up to several previous ICF papers on this subject¹ while presenting our latest views on PJM capacity markets, incorporating FERC’s Order. Further this paper provides a summary of details of the PJM CP proposal and the FERC’s Order.

¹ We recommend especially “[Capacity Performance: Changing the Game in PJM ISO.](#)”

KEY ELEMENTS OF THE CP PROPOSAL

- **Compliance Hours** are defined as the hours during which PJM declares emergency actions. CP resources will be evaluated for their performance during these hours and will be assessed performance payments (bonus or penalties) at a predefined \$/MWh Performance Payment Rate (PPR) based on any deviations of the resource's actual performance from its Expected Performance.
- **Expected Performance (EP)** of a CP resource reflects its pro-rata share of system requirements during compliance hours. The performance payments for a CP resource dispatching at MWactual during compliance hours are calculated using the following formulas:

$$\text{Performance Payments (\$)} = (\text{MWactual} - \text{EP}) * \text{PPR}$$

$$\text{EP (MW)} = \text{MWcleared} * (\text{Peak Demand} + \text{Reserve Requirements}) / (\text{MW committed from all resources})$$

Where,

$$\text{PPR (\$/MWh)} = (\text{Net CONE}/30 \text{ hours}) * 365 \text{ days}$$

- **Balancing Ratio (BR)** is the ratio [Peak Demand + Reserve Requirements] / [MW committed from all resources] and is a measure of the performance of the system during compliance hours.
- **Offer Caps:** existing units that qualify as CP product can be offered in the auctions at a price up to Net CONE times the corresponding Balancing Ratio. This is a significant increase from the existing offer caps that reflect going forward costs (net ACR).
- **Transition Auctions:** to create a glide path for a smooth transition to the new system, there will be transition auctions for the 2016/2017, 2017/2018 and 2018/2019—2019/2020 periods where the CP product will be procured at 60%, 70% and 80% of PJM's reliability requirements respectively, with corresponding decreases on penalty rates and offer caps .

For a detailed discussion of the CP proposal visit: <http://www.icfi.com/insights/white-papers/2015/capacity-performance-changing-pjm-iso>

ICF's Take

FERC's Order does not significantly alter ICF's earlier assessments on availability and pricing of Capacity Performance (CP) and Base Capacity products.

Supply and Pricing of CP Product: With FERC upholding most of PJM's proposed requirements for capacity resources to qualify as CP product, ICF estimates that the combination of existing compliant units (nuclear, coal and dual-fired), existing units with lower compliance costs, and new units with firm fuel supply will exceed the RTO target requirements for CP resources in the upcoming 2018/2019 base residual auction (BRA). This will result in CP product prices below equilibrium and in the range of \$160/MW-day to \$200/MW-day. This estimate mostly reflects the investment cost to procure firm fuel supply and higher bid levels to incorporate the risk of the new CP penalties.

FERC also rejected two PJM proposals that could have affected prices. PJM's proposal to limit the increase in monthly penalties would have decreased risk for generators, and thereby put downward pressure on capacity prices. PJM also proposed disallowing CP resources from offsetting their losses in the energy market when dispatched outside of minimum operating parameters—thus, under PJM's approach, there would have been additional upward pressure on prices. Because each proposal would have pushed prices in opposite directions to about the same degree, FERC's rejections here should effectively cancel each other out in terms of the ultimate effect on capacity prices.

ICF believes that other changes in PJM's capacity markets such as new demand curves, lower net CONE, lower demand, and elimination of short-term procurement targets will also mostly offset each other.

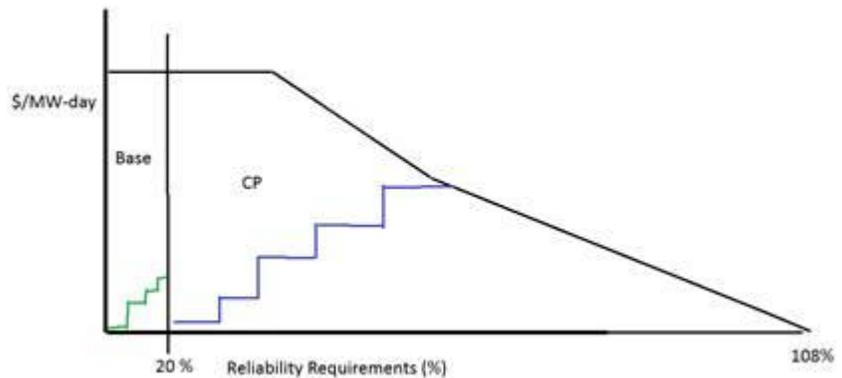
Supply and Pricing of Base Product: FERC approved PJM's proposal that allows capacity market participants to provide coupled offers for the Base and CP product. As a result, several market participants estimate a relatively high price for the Base product in the upcoming auction, dictated by the following equation and reflecting equilibrium pricing.

$$CP \text{ Product Price} = \text{Base Product Price} + CP \text{ Compliance Cost (Risk of CP penalties, firm fuel supply etc.)}$$

ICF disagrees with these assessments and estimates that the Base product price will be at significant discount relative to the CP product and in the range of \$50-\$100/MW-day. There are three primary reasons for this assessment:

1. Much lower base requirements compared to CP requirements and relatively excess base capacity in the system. For example, in 2018/2019, the maximum base capacity requirement is only approximately 26 GW compared to minimum CP requirement of approximately 134 GW. With excess base case supply prices for the Base Product lower.
2. As shown in Exhibit 3, PJM's BRA values Base product with a vertical demand curve instead of a sloping demand curve, thereby not providing any pricing support for oversupply in the Base product.

Exhibit 3 – Pricing Mechanism: Base product vs. CP product

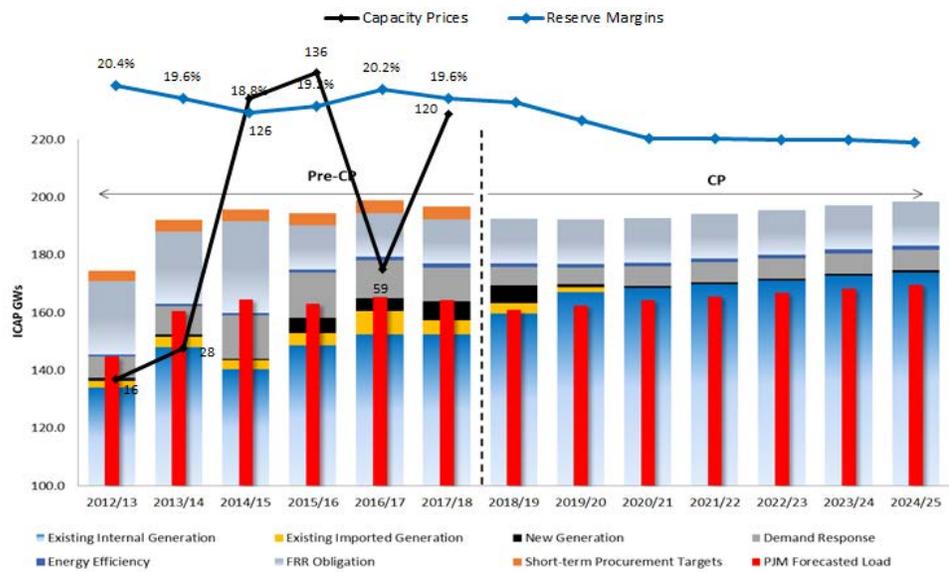


Source: ICF

3. Base product offer caps will be based on adjusted Avoidable Cost Rates which are expected to be much lower than the default offer caps of CP resources (Net CONE times Balancing Ratio).

PJM Long Term Supply and Demand Balance: Exhibit 4 summarizes both historical data and ICF's preliminary projections for supply/demand balance and reserve margins in PJM. ICF does not expect reserve margins to change significantly in the upcoming 2018/2019 auction. We project that approximately 8 to 10 GW of new capacity will clear in the upcoming auction, which will be in part offset by a decline in DR and imports. DR resources are expected to decrease because of more stringent requirements for DR resources (limited and extended summer DR will not be eligible as stand-alone capacity resources under the new regime and will have to be offered in aggregation with other resources with complimentary dispatch profiles) and risk of penalties for non-performance. Imports are also expected to decrease because: (i) only imports with firm transmission rights can qualify as CP product and (ii) supply/demand balance is expected to tighten in the neighboring regions.

Exhibit 4 – PJM Supply Demand Balance



Source: ICF and PJM ISO

Local Deliverability Areas (LDA) Pricing: With varying but lower CP requirements across LDAs compared to the whole of PJM, as shown in Exhibit 5, ICF does not expect major price separation across the LDAs. For example, the CP requirements for PJM in 2018/2019 auction is 84% whereas the CP requirements for COMED is 60%.

However, ICF’s assessment of the CP supply/demand balance across different LDAs does includes the fact that MAAC and COMED are two of the most constrained LDAs, and as a result, there is a chance that they may separate in the upcoming auction. Separation of COMED will depend on whether the Exelon nuclear units clear the auction or not. Increased import limits for PSEG-N have decreased the chance of separation for this region.

Exhibit 5 – PJM Base and CP requirements by LDA for 2018/2019

% of Total Requirements	Base Requirement ¹	CP Requirements
PJM Region	16%	84%
MAAC	24%	76%
EMAAC	35%	65%
PS NORTH	28%	72%
COMED	40%	60%

Source: PJM ISO

Notes:

¹PJM provides Base Requirements as percentage of Peak Demand. For example, the base requirement for RTO as a percentage of peak demand in 2018/2019 is approximately 18.9%. This requirement when expressed as percentage of total capacity requirements including reserves is approximately 16%.

Key Details of the FERC Order on the Capacity Performance Filing

Capacity Performance Product Requirements: In broadly accepting PJM's overall proposal for the CP Product, FERC rejected requests from some market participants for stricter characteristics of the CP product as well as opposing requests from other market participants for looser requirements that would account only for historical performance and availability of fuel. PJM therefore modified section 5.5 A of Attachment DD of its OATT to include a provision that an offer of a CP resource requires that (i) the seller "*has made, or is capable of demonstrating that it will make, the necessary investment to ensure the Capacity Resource has the capability for the entire such Delivery Year to provide energy at any time when called upon by the Office of the Interconnection*" (ii) "[the seller is] *capable of complying with the performance obligations.*" (iii) an external generating resource "*meets the criteria for obtaining an exception to the Capacity Import Limit*" i.e. has firm transmission into PJM's territory and (iv) "*contemplates the physical delivery ... no later than the commencement of the applicable delivery year.*"² FERC granted authority to PJM (but not to the PJM Independent Market Monitor ((IMM) as requested by some participants)) to verify qualification as a CP product. In its price and supply effects, the end result should therefore be close to initial ICF expectations.

Mitigation Measures: On mitigation measures, arguably the most contested element of the proposal, FERC accepted PJM's modified filing. The modified mitigation measures include: (i) unmitigated offer caps at Net CONE times the Balancing Ratio for all CP resources (with higher bids allowable with review and approval from PJM's IMM), and (ii) must-offer requirements for all resources that meet CP product qualifications. In addition, for the next 3 BRA auctions, before the market transitions to an all-CP product, resources that participate as Base Capacity are subject to mitigation with offer caps based on Avoided Cost Rates (ACR) that are modified to incorporate the risk of underperformance.

Despite opposition to the proposed offer caps for CP resources, FERC found these caps to be just and reasonable as they are based on the estimated capacity revenues that a representative capacity resource would require to incur a capacity supply obligation as a CP resource.

Market participants expressed concerns over the option for owners' CP resources to submit a coupled sell offer as both a CP and Base Capacity resource. Arguing that "*a Capacity Market Seller with a portfolio of resources and high concentration in a geographic area could have a greater incentive under PJM's proposal than under the existing RPM construct to have a resource not clear at all or at least not clear as a Capacity Performance Resource, enabling large fleet owners to directly benefit from the higher clearing price and by gaining insurance against performance risk, in spite of a lower clearing volume*" they asked FERC not to permit large owners to submit coupled offers. However, since owners' rational economic considerations are reflected through the submission of coupled offers and offers at competitive rates or

² In addition PJM revised tariff for all no intermittent or no Storage CP Resources requires that owners "*reasonably expects to obtain and hold, the contractual and other rights necessary to ensure firm fuel supply to each of its affected units during the Delivery Year. For such purpose, units intending to rely on on-site fuel storage must be able to demonstrate, as needed, the basis for their reasonable expectation that such arrangements as may be necessary to replenish the on-site fuel on a rolling basis*"

rates that are approved by the market monitor, FERC did not accept this request, in order to allow the market to respond more flexibly to the behavior and incentives of participants.

FERC also rejected PJM's proposal to exclude planned generation resources from must-offer requirements before they become operational. In addition, FERC did not consider the IMM's request to establish a new buyer side mitigation measure (for new or existing CP resources that seek to offer below the CP offer cap) as PJM did not request additional buyer-side mitigation measures and the IMM's proposal was beyond the scope of the proceeding.

Performance Rates and Penalty Caps: While FERC approved PJM's proposal to calculate performance penalties (or bonuses) at Net CONE³ divided by 30 — a number that reflects PJM's expectations for performance (i.e. emergency actions) hours, FERC acknowledged that performance rates are an important element of the new market design and requested *"PJM making annual informational filings with the Commission to provide updates on the use of 30 hours for this parameter"* and encouraged 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."*

Following PJM's IMM concerns and acknowledgments from PJM that the CP monthly stop-loss limit weakens the incentives in the proposal, FERC rejected PJM's proposal to place limits on monthly performance penalties at 0.5 times Net CONE, but maintained the proposed annual stop-loss limit at 1.5 times Net CONE.

Transition Auctions: Even though load and power retailers expressed concerns for increasing costs and raised legal arguments regarding unlawful retroactive ratemaking, FERC accepted PJM's proposal for two transition auctions for the 2016/2017 and 2018/2019 capacity periods under the parameters filed by PJM.

Elimination of Short Term Procurement Targets: Without major objections, FERC removed the Short Term Procurement Targets, a rule that required 2.5% of the reliability requirement to be set aside from the BRA and to be procured in the incremental auctions from short lead-time resources such as DR.

[Key Details of the FERC Order on the Energy Market Filing](#)

Along with the capacity performance filing, in a separate filing (EL15-29-00, the "energy market filling"), PJM requested several updates on its existing energy market rules, specifically asking for modification on rules addressing operating parameters of capacity resources, force majeure, and generator outages provisions. Although FERC approved without major modifications the capacity performance filing, FERC rejected and requested modification for several important parts of the energy market filling.

For CP resources,⁴ PJM proposed qualification requirements that include start-up and notification times less than 24 hours before Hot/Cold Weather Alerts and less than 14 hours during Hot/Cold Weather Alerts or higher emergency events. FERC rejected these requirements because they do not account for

³ Cost of New Entry (CONE) net of energy and ancillary service revenue. This parameter is provided by PJM before each auction.

⁴ For Capacity Storage resources (hydro, pump storage, batteries etc.), PJM required less than 1 hr. notification/start-up time and less than 1 hr. minimum run down time.

unit-specific physical constraints and asked PJM to modify the proposed qualification requirements accordingly.

PJM was also concerned with the fact that the dispatch parameters of resources (such as minimum run and minimum down times, maximum daily/weekly starts etc.) reflected in energy market bids are based not only on physical limitations but also on budgetary considerations, decreasing dispatch flexibility and inflating energy prices during emergency hours. It therefore proposed that, under certain circumstances that could precede an emergency event, the dispatch parameters of CP resources should be based only on their physical characteristics. In addition, PJM proposed that during performance hours, operation of the resources outside of the approved dispatch parameters will (i) result in penalties for any deviations from UCAP MWs (i.e. capacity committed in the auctions) and (ii) will prohibit resources from recovering energy market losses through make-whole payments. Currently, when a resource is dispatched by PJM, it is guaranteed make-whole payments to offset any losses from operation in the energy markets.

FERC rejected PJM's proposal to eliminate energy market offerings with dispatch parameters outside the physical characteristics of the resources. FERC found that resources should be allowed to earn make-whole payments based on actual constraints that include other elements such as contractual requirements. FERC directed PJM to *"submit tariff language to establish a process through which a resource that operates outside of its unit-specific parameter limits can seek to justify such operation to PJM as the result of actual constraints, rather than the exercise of market power. If the resource provides adequate justification, it should be eligible for any appropriate make-whole payments for that operating interval."*

However, in rejecting the proposal, FERC also stressed that in making a *"revision to ensure that resources are appropriately compensated for their operation in the energy market they [PJM] do not excuse a resource from failing to fulfill its capacity obligation...all resources that do not perform or underperform because of parameter limitations will be subject to performance penalties."*



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