Centrally Procured Multi-Period Capacity and Consequences for Short LSEs

Submitted by Vistra in response to PJM's Call for Papers under the Powering Reliability Through Market Design workshop process

Abstract: PJM's Powering Reliability Through Market Design whitepaper asks how the region should procure resource adequacy when recent auctions have cleared at the price cap and still fallen short of the requirement. This paper offers our current thinking on a direction that uses a Path A option with elements of Path B into an integrated solution: a centrally procured, laddered multi-period capacity contract (MPCC), settled as a contract for differences against the annual system capacity price, with consequences for short LSEs when PJM does not meet the resource adequacy target.

Disclaimer

This whitepaper reflects Vistra's initial thinking on a path toward a long-term, durable solution to the resource adequacy challenges facing the PJM region. It is offered to facilitate discussion in the PJM stakeholder process, and the concepts described here are preliminary and subject to refinement. Vistra reserves the right to modify or supplement its positions as the design discussion develops, and nothing in this paper waives any position Vistra may take in any regulatory proceeding. We look forward to discussing this proposal alongside PJM's and other stakeholders' recommendations, and to incorporating feedback as the region works toward the best achievable solution.

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Executive Summary

Policymakers have expressed concern that PJM's annual capacity construct is no longer producing the investment the region needs. This paper recommends a framework solution that unifies PJM's Option 1 and Option 2 into a single design: a mechanism to encourage bilateral self-supply election for LSEs, backed by a centrally procured, laddered multi-period capacity contract (MPCC) covering load that does not contract on its own.

The problem is a failure in investment, not in administration. The last three Base Residual Auctions (BRA) cleared at the administrative price cap, and the 2028/29 auction procured 149,182 MW (including the Fixed Resource Requirement [FRR]) against a reliability requirement of 156,013 MW which is short of the capacity requirement by 6,831 MW. Current prices are retaining existing supply but are not eliciting new entry, while unhedged load absorbs the full cost of capacity market prices. Other drivers compound the market structure deficiency: a closed interconnection queue, auctions run close to the delivery period, accreditation uncertainty, load forecast uncertainty, and lengthening development timelines. The price collar, while shielding consumers from high prices, adds further regulatory uncertainty to an already difficult investment environment. This paper's working assumption is that even with these other drivers addressed, in the current environment a one-year capacity commitment may not finance sufficient new entry going forward. Any market design, including the current one-year auction run three years forward, will be viewed as deficient against an unspecified ideal market design. This paper is meant to present a concrete alternative to which we can compare the current capacity market design.

The paper contemplates four design principles to guide the development of any durable solution:
1) promote efficient entry and exit (while recognizing the need to balance which parties own the investment risk); 2) allow load serving entities (LSEs) to manage their positions within existing state retail procurement constructs; 3) reduce the volatility of capacity costs without artificially suppressing them; and 4) assign costs to the LSEs that cause them.

To address the stated concern and achieve the design principles, any design will need to provide additional certainty of supply to promote investment. As such, this proposed design has three components:

1. **Centrally-Procured Annual Capacity Product.** For each delivery period the market procures an annual capacity product which carries the performance obligation. This product is effectively unchanged from the product procured through the BRA under the current design.
2. **Centrally-Procured Multi-Period Capacity Contract (MPCC).** For each delivery period, the market procures a multi-period, laddered product on behalf of load which is a physically-backed contract settled on the difference between the system annual capacity price and MPCC product price. This would be procured through a separate laddered requirement in each period.
3. **Consequences for a supply-deficient LSE when PJM is in an operational emergency.** The annual capacity and MPCC product procurement are meant to ensure system-wide resource adequacy and allow individual LSEs to rely on these markets or hedge outside the market. To the extent, the annual market clearing nonetheless fails to achieve the resource adequacy target, short LSEs will be required to designate load to be curtailed if PJM enters an operational emergency.

The current thinking is the MPCC would have a seven-period term with one tranche cleared for each period, inflation-indexed pricing, notional quantity fixed at the resource's accredited capacity at time of clearing, and an MPCC-contingent offer option so new entry is never left with only a one-period annual capacity obligation. Physical supply continues to clear the annual product under today's operational, performance, and accreditation rules. The MPCC settles financially alongside the annual capacity product, and its net cost or credit is allocated only to non-self-supplied load using existing billing determinants.

The result is a more financeable, multi-period commitment that new and existing resources compete for on comparable terms, a blended vintage price that dampens capacity cost volatility without suppressing scarcity signals, and cost allocation that follows causation, all achieved with modest implementation changes. The BRA, the Incremental Auctions, Reliability Backstop Procurement (RBP) obligations, the FRR election,[1] and the performance, accreditation, and settlement constructs are all retained. The MPCC is added to BRA clearing and settlement rather than replacing anything, impact to existing LSE contracts should be minimized, and no state needs to change its retail procurement construct.

The biggest challenge to the MPCC is how to most effectively transition from the existing market structure (currently in shortfall conditions) to an extended multi-period, laddered construct while continuing to meet the region's resource adequacy requirements.

[1] The FRR could conceivably be rolled into the MPCC framework to give LSEs that currently use FRR a mechanism to hedge prices on a forward basis. This paper does not detail such a conversion.

1. Introduction

This paper is provided in response to PJM's request for feedback on potential solution options to address the shortfalls in resource adequacy that have been observed in recent auctions.

- Section 2 provides background context from PJM's Powering Reliability Through Market Design paper and our perspective on the different proposed paths.
- Section 3 explains the problem that must be addressed from our perspective.
- Section 4 defines specific design principles that should be achieved by any solution.
- Section 5 provides a conceptual design direction and strawman proposal for consideration with stylized examples to demonstrate properties of the design.
- Section 6 provides perspective on design elements that would require additional discussion and evaluation.

2. Background: Powering Reliability Through Market Design

PJM's "Powering Reliability Through Market Design" whitepaper responds to the Board of Managers' directive for a holistic review of capacity market design and investment incentives to determine why the current markets may not result in sufficient investment to meet the region's resource adequacy requirements.

On why entry is not occurring, the paper states, "[t]he barriers cited – repeatedly and across investor types – were revenue durability over the project financing horizon and regulatory stability sufficient to make long-term revenue projections credible," because lenders underwrite project debt "based on projected revenue streams over a 15- to 20-year debt tenor,"[2] so "[l]ong-term revenue certainty is a structural requirement, not a preference." On why voluntary contracting has not filled the gap, the paper states, "adequate long-term contracting and hedging has not occurred in the market when allowed to be voluntary."[3] On how most load actually buys capacity, the paper states, default service providers "procure capacity primarily through short-term default service auctions calibrated to the annual Base Residual Auction [(BRA)] cycle,"[4] and those short terms "were not an oversight; they were deliberately designed to support retail choice by preserving customer optionality."[5] On the political challenges of scarcity prices, the paper states, "high scarcity prices that are economically necessary to signal the need for investment become, in this environment, the trigger for governmental intervention that undermines the credibility of those same prices," because "a market signal is only effective if it is durable enough to trigger the investment it is intended to prompt."[6]

PJM also acknowledges other challenges beyond the market design which have contributed to the resource adequacy shortfalls that have been observed. PJM then lays out three paths for consideration. These paths are not mutually exclusive and there is certainly value in proposing changes within each area.

[2] PJM Interconnection, Powering Reliability Through Market Design, May 6, 2026, p. 32.
[3] Ibid., p. 34.
[4] Ibid., p. 6.
[5] Ibid., p. 34.
[6] Ibid., p. 5.

Path A: Stabilized Markets (the "Come Hedged" Model)

Within Path A, PJM presents two constructs as alternatives: Option 1, mandatory LSE hedging requirements, and Option 2, centralized long-term procurement, under which "the vast majority of load is required to be covered through long-term forward commitments."[7] For Option 1, PJM identifies the enforcement challenge directly: "[a] 'forward showing' requirement is only as strong as the penalty for noncompliance," and since a penalty capped at the spot price returns "to the circular arguments of the current construct," PJM concludes the penalty must act as "a super-cap" high enough that hedging is "the only rational business decision."[8] For Option 2, PJM offers an illustrative shape: procure a share of capacity needs each year on multi-period contracts, laddered so the portfolio turns over gradually, with parameters of 10% per year on seven-year terms building toward roughly 70% of obligations, and lists the procurement level, the term, and load's willingness to pay as open design elements.[9]

Option 1 is somewhat limited in its application since under current retail procurement structures, not all LSEs have arrangements that would allow them to contract to bring necessary new supply onto the system. During periods when the system is long, there would be capacity available for LSE to contract with to meet their capacity requirement; however, when the system is short, an LSE that does not have a long-term arrangement with load may not take action to acquire new supply to meet its capacity requirement. In these cases, the next best alternative for an LSE may be to pass through whatever penalty is assessed for not contracting for their share of the capacity requirement, rather than taking action to acquire new supply to meet their obligations. Such a decision could put that LSE at a competitive disadvantage relative to LSEs that both serve load and own generation. Investment in new supply under this approach is dependent on either integrated competitive companies investing to realize their competitive advantage or other entities willing to act to invest in new supply in the absence of longer-term contracts.

Option 2 places the long-term purchase with a centralized entity and ignores that LSEs may be contracting outside of the market itself and as such would not require a centralized entity to procure long-dated arrangements on their behalf. Further, the illustrative example provided by PJM highlights one of the other complexities of Option 2 related to how much capacity needs to be procured on a multi-period basis. A procurement level well short of the capacity requirement (e.g., 70%) may result in robust contracting of existing supply, but may never reach the level to acquire new entry unless specific administrative requirements are included around some portion of capacity requirement having to be from new supply to close the gap in the total supply and capacity requirement when shortfalls materialize.

Near-Term Action: PJM is taking immediate action (following Path A, Option 2) to address the current shortfall in the market through the resource backstop procurement (RBP) proposal which acquires new capacity through a multi-period commitment. This auction has an administrative requirement that specifically limits participation of supply to new capability in the system, thus working around the challenges with existing supply participating and displacing potential new supply. We do not believe a backstop procurement is a durable design.

Path B: Differential Reliability (Rationing of Capacity in Scarcity Conditions)

PJM observes that reliability differentiation contemplated under Path B already happens when the system is short and load must be shed; however, the distribution system structure and emergency protocols decide who is cut first, with little connection to which customers value reliability most. The path asks

[7] Ibid., p. 29.
[8] Ibid., p. 30.
[9] Ibid., pp. 7, 30-32.

whether the region should make that rationing deliberate, principled, and governable rather than implicit.[10] PJM is candid about the difficulties. Pricing different reliability tiers would be a significant market design undertaking beyond the single-clearing-price auction. PJM asserts that governance is the hardest part, because curtailment priority sits with FERC, retail service with state commissions, and the underlying value judgments with state legislatures, which PJM calls a multiyear regulatory undertaking rather than a near-term market design change. While there are certainly challenges with Path B solutions, demand response and distributed energy resource participation in the capacity market have provided mechanisms for participants to provide curtailable power reflecting the economic preferences and level of reliability these loads are willing to accept. These aspects of the market can certainly be further enhanced to allow for demand to better reflect their economic and reliability preferences to the market. Further, a requirement that supply-deficient suppliers designate load for curtailment could avoid this governance challenge as PJM would be focusing consequences on participants in the PJM markets.

The biggest shortcoming with Path B is that while it allows demand to better represent its economic and reliability preferences, in the absence of other changes it may not motivate investment in new supply that is necessary to allow demand to specify its economic and reliability preferences (i.e., demand may not want to be curtailed, but because of the absence of new supply the system is a shortfall condition).

Near-Term Action: PJM has proposed the interim resource adequacy service (IRAS) proposal that requires large load to bring new supply to the system or otherwise be curtailable during constrained operating conditions.

Under IRAS, large loads need to evaluate the trade-offs between the cost of potential curtailment and the costs of contracting for new supply outside the market (there is no in-market procurement option for large loads). The expected curtailment cost over time is the “penalty” that motivates investment in new supply (or not). Assuming curtailment risk motivates large loads to contract for supply and RBP and BRA clearing are sufficient to close the gaps between supply and demand, IRAS requirements are sunset until conditions where the market were to approach shortfall again. However, if large loads are willing to accept the curtailment risk as the lower cost option this could result in a persistent shortfall condition and the IRAS provisions remain in perpetuity as an active participation model for large load.

Ultimately, we believe IRAS starts with a false premise, that existing load has a property right to existing generation, so large loads are responsible for the resource adequacy shortfall. However, a reframing of the premise, that supply-deficient LSEs are collectively responsible for the resource adequacy shortfall, points the way to a complementary market design. Using a Path A mechanism to allow a centralized means for all LSEs to meet future supply needs, with a Path B mechanism that requirement that supply-deficient suppliers designate load for curtailment when the Path A mechanism fails to achieve resource adequacy.

[10] Ibid., pp. 36-38.

Path C: Energy Market Transition (the "Shift the Revenue Recovery" Model)

Path C would let improved energy and ancillary services (E&AS) price formation carry more of the revenue recovery, shrinking the residual missing money the capacity market must fill until the capacity market is right-sized toward a backstop procurement auction.[11] PJM grounds the path in the energy-only market literature and in instruments intended to make the transition tractable, notably reliability options (converting the capacity payment into a call option that leaves energy spot prices free to clear at scarcity levels) and mandatory forward energy hedging by LSEs, which PJM notes could serve as a near-term structural reform to Path A while longer-run E&AS reforms develop.

Continued improvement of energy and ancillary service market pricing will bring value by reducing the dependency on the capacity market through targeted compensation to performing resources. However, allowing energy prices to rise to the level necessary to incent investment in absence of a capacity market may be untenable and run the risk of intervention to limit these impacts (as was observed with the introduction of the price collar in the capacity market).

Further, requiring LSEs to acquire reliability call options as a mechanism to hedge load from high energy scarcity prices would reduce the volatility that load is exposed to in the energy market, but has similar challenges to what was observed under Path A, Option 1. If LSEs do not have long-term responsibility for the load, they may be unwilling to get into arrangements with new supply to hedge their positions. This could result in either their load being unhedged and, similar to the capacity market, LSEs wanting to pass these scarcity charges through to consumers. In concept, forward energy scarcity price call options could also be centrally procured for multiple periods as considered under Path A, Option 2, but this would just be a different mousetrap to address the same problem that the capacity market is already trying to solve, so unclear if this is better or just different.

3. Problem

We believe that the problem that needs to be addressed is a market failure that is resulting in a lack of investment in new supply to meet the increasing demand and the associated resource adequacy requirements.

PJM's Reliability Assurance Agreement requires LSEs to support the resource adequacy requirements through the capacity market, but the obligation is administered financially. The LSE pays its share of whatever the annual BRA clears. The LSE need not own anything, contract for anything, or demonstrate any arrangement with supply in advance. Historically, the auction, run roughly three years or less ahead of the delivery period, procures on behalf of all load simultaneously (excluding any load participating per the fixed resource requirement [FRR] construct). The market structure assumes that clearing existing supply once a year, plus a one-year commitment to new entrants, is enough to draw investment in new and existing supply when the market needs it, as well as maintain existing supply. While nothing in the current market precludes long-term contracting to support development of new supply, the market often depends on merchant generation acting to bring new capacity independent of specific long-term load contracting. That new generation can be used to contract with LSEs or to back commercial positions, but the long-term investment risk resides with the generation owner itself, not with load. If market prices fall over time, in absence of longer-term contracts, the merchant generator faces the consequences, and load does not bear the cost risk. This is the value competitive markets have brought. Markets collectively created opportunities, which spurred both entry and exit while maintaining sufficient supply and allowing those parties best equipped to manage risk to do so.

[11] Ibid., pp. 39-40.

Recent results are now testing that assumption and the ability for the market to procure adequate capacity under conditions with significant load growth. The last three BRAs cleared at the administrative price cap, and the 2028/29 auction procured 149,182 MW (including FRR) against a reliability requirement of 156,013 MW, short by 6,831 MW. Under these conditions, the resulting market prices should retain existing supply barring significant capital investment required (e.g., regulation compliance, unit damage/failure); however, they do not appear to be providing sufficient incentive for additional supply development. These prices have translated into increased payments for supply and increased costs for load where longer-term arrangements are not in place to hedge these load positions. This highlights an important dynamic in the markets. While during lower price periods unhedged supply bears the risk of losses on their investments, during higher price periods unhedged load is exposed to the increased costs with little that can be done to mitigate the impacts. High prices that do not elicit adequate market response over multiple periods to address the shortfall become untenable and point to a market failure which results in actions being taken such as the price collar.

However, the inability of supply to meet this increased demand has multiple drivers not all related to the market performance. A closed interconnection queue, auctions being run relatively close to the delivery periods, accreditation design changes that have impacted available capacity and created additional uncertainty, a significant increase in expected load (which may or may not materialize) and increased projects costs and supply chain issues extending development timelines (reducing the supply that could be brought forward to address shortfalls) have all compounded the current situation.[12]

For the sake of discussion, this paper's working assumption is that even with the other drivers addressed, the annual capacity construct would not finance sufficient entry in an environment with high load growth to meet capacity requirements, though practically these challenges will continue to exist at some level. Entry of supply in response to high prices can put downward pressure on future period prices though predictable and consistent long growth can mitigate this risk. The combination of accreditation uncertainty (e.g., accredited capacity is further reduced), load uncertainty (e.g., forecast load driving high prices does not materialize), regulatory uncertainty and disconnects in auction clearing and development lead times can make it too risky for companies to be willing to commit scarce capital in PJM rather than in other regions where those risks may be lower. Further, lenders may not be willing to underwrite a one-year commitment.[13]

This outcome is inconsistent with the broader objectives of the markets and is good for neither suppliers nor consumers. High prices in a single year without sufficient certainty may not enable investment to address resource adequacy needs, while consumers pay these high prices and experience degraded reliability. The intervention to establish a price collar, while protecting consumers from high prices that may or may not be eliciting a market response, creates further uncertainty, exacerbating the potential unwillingness for suppliers to invest.

[12] Ibid., pp. 16-17.
[13] Ibid., p. 31.

4. Design Principles

We have identified four key design principles to guide the development of a durable solution for ensuring there is adequate capacity to meet resource adequacy requirements:

1. **Promote efficient entry and exit.** Any structure should send signals for efficient entry and exit of supply from the market consistent with the resource adequacy requirements. This entry may be triggered by increased load or the exit of existing supply, and the design should support investment in new and existing supply and demand reduction technologies that are most cost effective in meeting system reliability needs. Part of this is balancing how much risk is transferred between suppliers and consumers.
2. **Allow LSEs to manage their positions within the existing state retail procurement constructs.** LSEs differ structurally (as discussed further in Appendix A) and each state has differing retail procurement approaches. A design should allow LSEs to choose how to cover their share of capacity requirements. Because retail procurement design belongs to the states, a construct that works without any state changing its retail construct is far easier to implement than one that may require significant changes across many state jurisdictions. Designs that require modification to retail regulatory structures across multiple states present unique challenges and are best avoided, if possible, to expedite the development of a longer-term durable solution.
3. **Reduce the volatility of market costs.** The current design pays the same spot price to all capacity. Spot markets are inherently more prone to volatility than forward markets. Any construct should reduce the volatility of costs paid by consumers and avoid large swings in costs from period to period that consumers face.
4. **Appropriately assign costs to the LSEs.** Applying cost-causation and beneficiary-pays principles to any design is critical to its success, particularly for the treatment of large loads.

5. Design Direction

This paper's contribution to the solution discussion is to combine PJM's Path A, Options 2 and elements of Path B into a single design with a choice of paths that supports the different existing load-serving models and state regulatory constructs.

We believe that Path A is the best solution direction to the resource adequacy challenges facing the region. A properly functioning annual capacity market, complemented by bilateral contracting and a default central procurement of a multi-period product on behalf of load that is not otherwise contracted, can create efficient entry and exit signals and strong performance incentives while also reducing the volatility in capacity costs and by extension energy costs faced by consumers. While Path B and Path C solutions are certainly complementary to Path A solutions, we do not believe these can practically address the identified problems on their own in a timely manner. We do believe we can introduce an element of Path B to address the circumstance when the Path A solution does not fully address resource adequacy. We support requiring a supply-deficient LSE to designate load to be curtailed, during operational emergencies, when PJM does not meet the resource adequacy standard. This would address the concern PJM purports to address with IRAS, but focuses attention on the entities driving the resource inadequacy.

Path A solutions are premised on the need for additional certainty to promote investment in new supply to meet expected load growth. PJM observes that "[t]he barriers cited – repeatedly and across investor types – were revenue durability over the project financing horizon and regulatory stability sufficient to make long-term revenue projections credible."[14] PJM presents two constructs (Option 1: LSE Hedging Requirements and Option 2: Centralized Long-Term Procurement) as alternatives for delivering that certainty, under which "the vast majority of load is required to be covered through long-term forward commitments either through mandatory LSE hedging requirements or through centralized, long-term procurement of capacity."[15]

Overview

The design direction requires no conceptual changes to the procurement of the annual capacity product procured through the BRA today. LSE hedging is facilitated and encouraged through two additions to the existing framework. First, we introduce a multi-period capacity contract design that provides a vehicle for the collective PJM load to be hedged over a longer-period time. Second, we introduce a requirement that during delivery years when PJM does not meet the resource adequacy target generation-deficient LSEs designate load for curtailment during emergency conditions.

The second element of the design is an evolution of the idea Vistra introduced during the initial CIFP process. We initially proposed that generation-deficient LSEs pay a financial penalty when PJM was not able to achieve its resource adequacy target. Establishing a consequence for generation-deficient LSEs that have long-term responsibility for serving load gives those parties workable options to act, including getting into longer-term arrangements with new supply. Where this design construct is used in other regions, a high penalty cost typically motivates investment in new supply (i.e., the cost of new supply is lower than the penalty). For LSEs that do not have longer-term relationships with their load, the next best alternative to a hedging requirement may be to accept the "pass-through option," whether that is a specific penalty or the capacity price, rather than to enter a long-term arrangement with new supply. In many ways encouraging LSE hedging would still depend on the single-year capacity market to promote investment in new supply, which PJM has observed does not work in the current market design.

The introduction of a centrally procured multi-period capacity product for LSEs that choose not to contract outside of the market provides a well-defined structure to support investment in supply necessary to meet the resource adequacy requirements without requiring any significant changes to the existing retail structures that support the market. This design does not charge a penalty to LSEs that do not have contracts to meet their share of the capacity requirement but rather allocates them the cost required by supply to provide the capacity product for that period reflecting both the prices from the annual capacity product and the laddered prices resulting from the multi-period capacity product procured as a hedge against much of the annual capacity cost.

The sections below review the conceptual design structure and provide some stylized examples to help demonstrate the dynamics of the design. While the proposal itself tries to minimize changes to the overall market design, there will remain significant details that need to be worked through before a final proposal can be brought forward.

[14] Ibid., p. 32.
[15] Ibid., p. 7.

Conceptual Design

Note: A number of external factors have been identified that have contributed to the inability of the markets to keep pace with increased demand including, but not limited to the inability to develop new supply in a timely manner (e.g., interconnection queue, supply chain), price caps or parameters (e.g., Net CONE) inconsistent with the costs of developing new supply, and regulations that limit development or accelerate retirement. This proposed design direction is not intended to overcome these issues which if left unaddressed are likely to make the ability of any market reforms to attract new investment challenging. As noted above, this design would incorporate two additions to the existing BRA framework.

Consequences for Generation-Deficient LSEs when PJM is Not Resource Adequate

The first component of the design is the introduction of a requirement that resource deficient LSEs designate load for curtailment in any delivery year when PJM is unable to achieve the resource adequacy target. The designated load would be treated like a demand response resource and curtailed at the same time as other demand response resources. This element is designed to address the operational concerns PJM has identified as justifying the IRAS proposal but focuses the consequence on a PJM-relevant entity that is the ultimate contributor to resource inadequacy.

Mechanically, the requirement would be initiated fairly soon before the delivery year, e.g., after the third incremental auction. If PJM does not achieve the resource adequacy target, the shortfall will be allocated to generation-deficient LSEs on a pro rata basis. All LSEs will make a showing of owned or contracted generation against the LSEs capacity obligation. For the purpose of this mechanism, the LSE for default service load will be deemed to be the entity that is awarded the right to serve default service load, not the utility for the default service load. A deficient LSE can designate its own load to be curtailed or can contract with a third-party load to be curtailed.

This element of the proposal is designed to be minimally intrusive. It will only be relevant in delivery years when PJM is unable to achieve the resource adequacy target, which should be less likely with the introduction of the MPCC. Further, the designated resources will not be curtailed unless PJM is in an operational emergency. Finally, this requirement does not dictate a hedging requirement to any LSE – competitive or regulated. Rather, it provides a consequence to the extent an LSE contracts with load that it does not have generation to serve.

Centrally Procured Multi-Period Capacity Contract Design

The multi-period capacity contract (MPCC) is a new multi-period product cleared in conjunction with the annual capacity product in the BRA using a laddered approach. The laddered approach is a critical aspect of the design that allows for a more effective hedge for load through lower capacity cost volatility.

The MPCC is a physically backed contract for differences where the BRA now establishes a separate annual capacity price (based upon one set of offers) and MPCC price for the tranche being cleared for that period (based upon a different set of offers).[16] Physical supply continues to clear the annual capacity obligation as today and the MPCC obligation settles financially in conjunction with it. The BRA will be run for a delivery year three years forward and the MPCC will be run for a period starting three years forward and ending at the end of the MPCC defined period. In other words, the BRA and the first year of the MPCC

[16] For clarity of terminology the BRA would clear two products, annual capacity obligation and an MPCC obligation. The annual capacity obligation is what is currently procured through the BRA under the current rules.

will overlap.[17] The annual capacity product's operational and performance requirements are untouched from today's rules.

Offers for the MPCC product would be based upon an expectation of future annual capacity prices and expected costs that needed to be recovered over the period of the MPCC. This offer structure promotes efficient investment in new supply, but also reduces financial risk for existing supply promoting investment that could improve operational performance, increase the amount of capacity provided and/or extend the life of resources. We expect it to be especially useful for resources that require substantial new investment to extend a resource nearing the end of its useful life. It also provides a path for new supply to re-lock a rate for an extended period after the initial term of its MPCC is over. From the seller's perspective, the product trades multi-period certainty of payments against the potential upside of annual capacity prices. A resource that clears both products nets the MPCC price each year of the MPCC term, while a resource that only clears the annual capacity product is paid that price. From an LSE perspective, they are receiving a less volatile charge than being exposed to only the annual capacity price. The design promotes more investment through increased price certainty and reduces the potential for not meeting capacity requirements.

Additionally, this design provides information on current period annual "spot" prices through the annual capacity prices and an expectation of future market prices reflected through the MPCC prices. This information will be informative to the market when evaluating longer-term contracting options.

The table below reviews major aspects of the design and provides some perspective on our current thinking on how this proposed design would perform.

Area	Summary
Instrument	Contract for differences on the system annual capacity price, paired with the resource's physical capacity sale. The resource receives the MPCC price and pays the system annual capacity clearing price.
Eligibility	New or existing resources must clear the annual capacity product to be eligible to sell the MPCC product in the period. In subsequent periods, the resource would not be required to clear the annual capacity product to keep their MPCC obligation. Resources that have previously cleared an MPCC obligation would not be eligible to sell the MPCC product from the same capability.
Locational Requirements	The current proposal assumes, like the RBP proposal, that there would not be a location-specific requirement for the MPCC product and it would be cleared on a system-wide basis. As such, the MPCC would settle based upon the difference in the system annual capacity price and the MPCC price, not the resource's locational capacity price. This structure would allow resources that may clear within constrained locations to keep the upside of the locational annual capacity price above the system annual capacity price. In this way the market still sends a locational signal for where capacity is most valuable without introducing locational requirement for the MPCC product. For example, if the MPCC price is $200/MW-day, the system annual capacity price is $300/MW-day and the resource's locational annual capacity price is $450/MW-day, then the resource would be paid the $450/MW-day annual capacity price and would

[17] The MPCC period could alternatively start one year after the delivery year for the associated BRA. Doing so may give a new resource additional time to come online, but also extends the first-year revenue one year later for resource able to be online in three years.

Area	Summary
	be charged \$100/MW-day reflecting the difference between the \$300/MW-day system annual capacity price and the \$200/MW-day MPCC price for a net payment of \$350/MW-day.
Term, laddering and tranche sizing	The length of the term would need to be established (e.g., seven-period term, with one tranche cleared each period, is a good place to start the discussion). The amount of capacity in each tranche would be split equally across the set number of periods; however, additional load would have to be acknowledged as well as the maximum amount that would be procured through the MPCC (relative to the total annual capacity requirement). The total MPCC requirement could be less than the annual capacity requirement in the first year, though setting this too low may not result in new entry being able to clear when the capacity market is short. The MPCC would need to procure in total across all of the tranches nearly at the full annual capacity requirement for the first period to be able to acquire new capacity when required; however, there are a number of factors that would also need to be considered (e.g., existing resources that may not want a multi-period obligation, load forecast uncertainty) in determining this quantity target.
MPCC demand representation	The MPCC demand curve would mirror the annual curve where the tranche's capacity requirement anchors the curve at Net CONE. The increased certainty received through the MPCC payment reduces the need for prices to climb as high as what could be observed for the annual capacity product, so while the MPCC price cap likely has to be at least equal to Net CONE for the tranches to be able to clear new entry, it should sit below the annual capacity price cap.
Settlement	Annual obligation is settled at the annual capacity clearing price, if the resource cleared the annual capacity product. MPCC settlement (MPCC price minus system annual capacity price) is paid or charged financially to the resource. Performance obligations are only through the cleared annual capacity obligation. Under this design it would be possible for a resource to have an MPCC obligation, but not clear in the annual capacity obligation unless specific rules were put in place to prevent this outcome. A resource in this scenario would either pay the replacement cost if the annual capacity price was greater than the MPCC price or be compensated if the annual capacity price declined relative to the MPCC price. A resource may choose not to clear an annual capacity obligation when it has an MPCC obligation, if, for example, their non-performance risk of taking on annual capacity obligation exceeded the annual capacity clearing price.
New entry protection	A resource not subject to the must-offer requirement may make its annual offer MPCC-contingent (clear both products or neither), so a new resource is never left holding a one-period annual capacity obligation without the certainty that comes with the MPCC obligation.
Existing resource offer requirements	Resources would not be required to offer to sell the MPCC. An existing resource that did offer to sell MPCC would also need to clear the associated annual capacity product.

Area	Summary
Notional quantity	MPCC cleared quantity would be fixed at the resource's accredited capacity. Period-to-period accreditation fluctuation is the seller's risk. For example, a resource that was accredited in the BRA in delivery period 1 at 100 MW and cleared 100 MW MPCC obligation at $120/MW-day, but then in delivery period 2 was cleared at a 90 MW annual capacity obligation at a price of $100/MW-day would be paid for the 90 MW at $100/MW-day and 100 MW at $20/MW-day ($120/MW-day minus $100/MW-day). The effective payment for the initial 100 MW of accredited capacity in this case is not the MPCC price, but rather only $110/MW-day reflecting the drop in the resource's accreditation. On the opposite side, an increase in accreditation would result in the resource keeping the incremental payment for the higher accreditation at the annual capacity price (or being able to sell more MPCC obligation).
Inflation Adjustments	The MPCC price will be inflation-indexed so supply offers do not need to embed an inflation assumption over the period. This reduces supplier risk (and what they need to reflect in their offers).
Credit	MPCC obligations create long-dated exposure for a supplier that might not clear a future annual capacity obligation. The application of supplier credit requirements will need to be evaluated as part of the development of this design.
Trading and Market Exit	MPCC obligations can be transferred bilaterally to another resource for all or a portion of the remaining tenor. Allowing these obligations to be resold into the BRA would need to be evaluated as there are complexities with potential mismatches in tenor of obligations (e.g., selling one of its remaining five years of a seven-year term to an auction that is buying MPCC obligations for a full seven-year term). Deactivation does not terminate the MPCC obligation, so resources approaching retirement may self-select out of offering into the MPCC, and their absence from the MPCC supply could signal (assuming requirements are sufficiently sized) the need for replacement capacity sooner than a retirement notice would.
Cost Allocation	The net cost or credit is allocated to load in each period using existing capacity billing determinants.

Table 1: MPCC Market Design Components

The proposed design delivers on each of the four design principles.

1. **Promote efficient entry and exit.** The MPCC converts the capacity requirement into a financeable multi-period commitment that any resource, new or existing, supply or demand reduction, can compete for on comparable terms. Tranches clear competitively under a demand curve based upon system needs. The risk balance moves rather than disappears as suppliers retain performance risk, accreditation risk, and market risk on everything they do not clear for the MPCC, while consumers pay a bounded, competitively set price for the certainty they receive.
2. **Allow LSEs to manage their positions within existing state retail procurement constructs.** No state needs to change how its retail procurement is performed, and no LSE is punished for the structure it operates within, though generation-deficient LSEs will face consequences if PJM does not meet the resource adequacy requirements. LSEs that choose to contract pay their contract

rates and the LSE that does not pays the market-cleared cost of the coverage procured on its behalf.

3. **Reduce the volatility of capacity costs.** Because the MPCC is procured as a ladder, only a fraction of the requirement reprices in any period, and non-self-supplied load pays a blend of prices rather than just the annual capacity price. Volatility falls without suppressing prices. The MPCC clears competitively under its own demand curve, and the annual capacity market's scarcity pricing is untouched (though is impacted through the MPCC clearing).
4. **Assign costs to the LSEs that cause them.** MPCC costs and credits are allocated on existing billing determinants, and tranche sizing recognizes new large load, so the cost of large load is specifically charged to that load through the annual capacity product and/or the MPCC product.

These results come at the cost of relatively modest modifications to how the market design is implemented. The BRA, the Incremental Auctions, RBP obligations, the performance and accreditation constructs, the FRR election, and the settlement structures are all maintained. The MPCC product is added to BRA clearing and settlement rather than replacing anything. This design leverages structures refined over two decades and is far easier to implement and do so quickly than potentially other more significant changes to the market design.

Illustrative Design Comparison

Note: All figures are intended to be illustrative to convey the concepts discussed in the examples.

This section provides two stylized examples that allow the performance of the current design and proposed design to be compared. These examples use a stylized set of assumptions to demonstrate the design mechanics and does not represent the range of potential outcomes which could occur. All parameters are used to provide context and are not intended to be construed as final recommendations for how these should be established. Clearing quantities and prices results are rounded for ease of understanding concepts.

The following is assumed for both examples: a reliability requirement of 90 GW growing 3 GW per period to 99 GW, existing supply of 92 GW, Net CONE of $300/MW-day, an annual capacity product price cap of $525/MW-day (1.75 x Net CONE), an MPCC price cap of $360/MW-day (1.2 x Net CONE), and a three-period MPCC term. The horizon is shown as Delivery Periods 4 through 7, with a full MPCC ladder assumed to be standing from tranches cleared in the prior periods.   The MPCC length is assumed to be three periods to make the mechanics digestible.

Figure 1 shows how the two products' demand curves relate. The MPCC demand curve tracks the annual capacity product's Variable Resource Requirement (VRR) curve, with two differences:

1. Aggregate MPCC requirement across all tranches is set slightly below the annual capacity requirement recognizing that not all existing capacity will want a multi-period obligation, It is set to 98% in these examples.
2. MPCC price cap sits below the annual capacity price cap (1.2 x Net CONE) because the certainty resulting from the MPCC construct reduces the potential price needed to attract supply (as compared to only a single annual period auction clearing design) and reflects a lower willingness of load to pay high prices for multiple forward periods. The MPCC always clears below the scarcity range that remains with the annual capacity product.

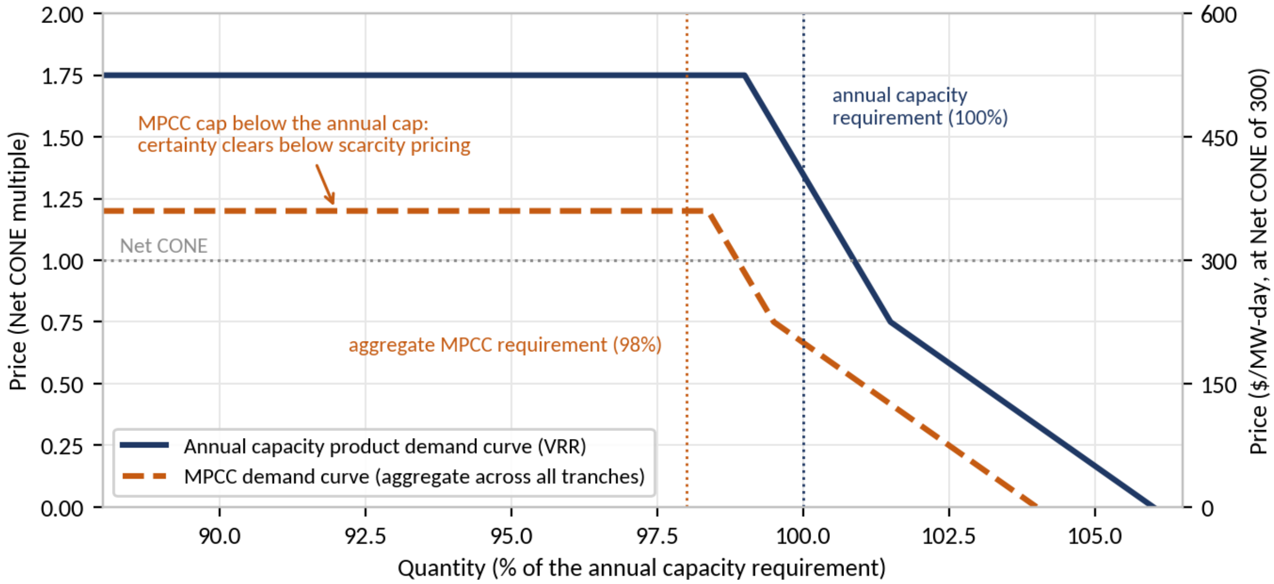

Figure 1: Aggregate MPCC Demand Curve vs. Annual Capacity Demand Curve (VRR)

Example 1: Current Market Design

The first example shows outcomes under the current annual capacity product procurement. This assumes that new capacity will not clear in sufficient quantities to respond to the increasing demand with only a one-year capacity commitment. Over a four-period horizon, the requirement grows from 90 GW to 99 GW against existing supply of 92 GW with some new entry. New supply clears (2 GW in Delivery Period 5 and 1 GW in each of Delivery Periods 6 and 7), but it is not sufficient to close the gap between the requirements and the offered supply.

The market clears long in Delivery Period 4, near Net CONE in Delivery Period 5, and at the price cap in Delivery Periods 6 and 7 ending short by 3 GW (as shown in Figure 2).

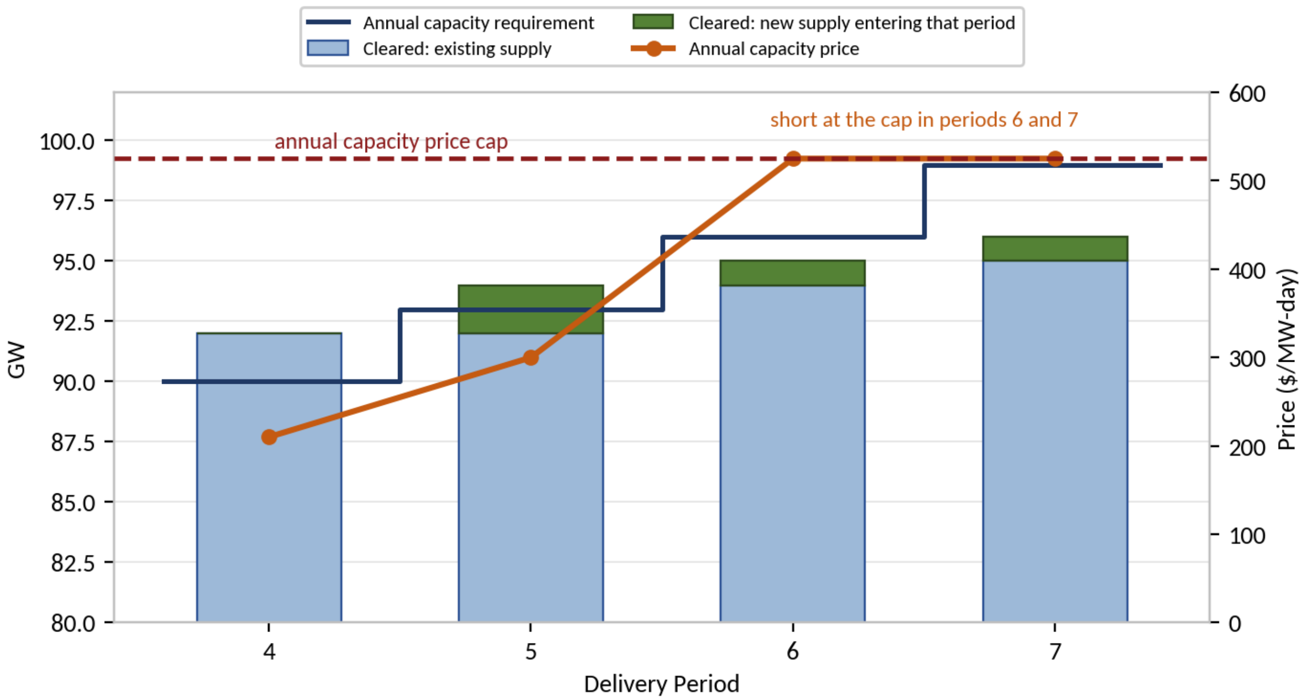

Figure 2: Example 1 – Current Design Summary Clearing

Figure 3 shows the clearing results from the four delivery periods individually and how increasing demand without adequate new entry pushes the system into scarcity.

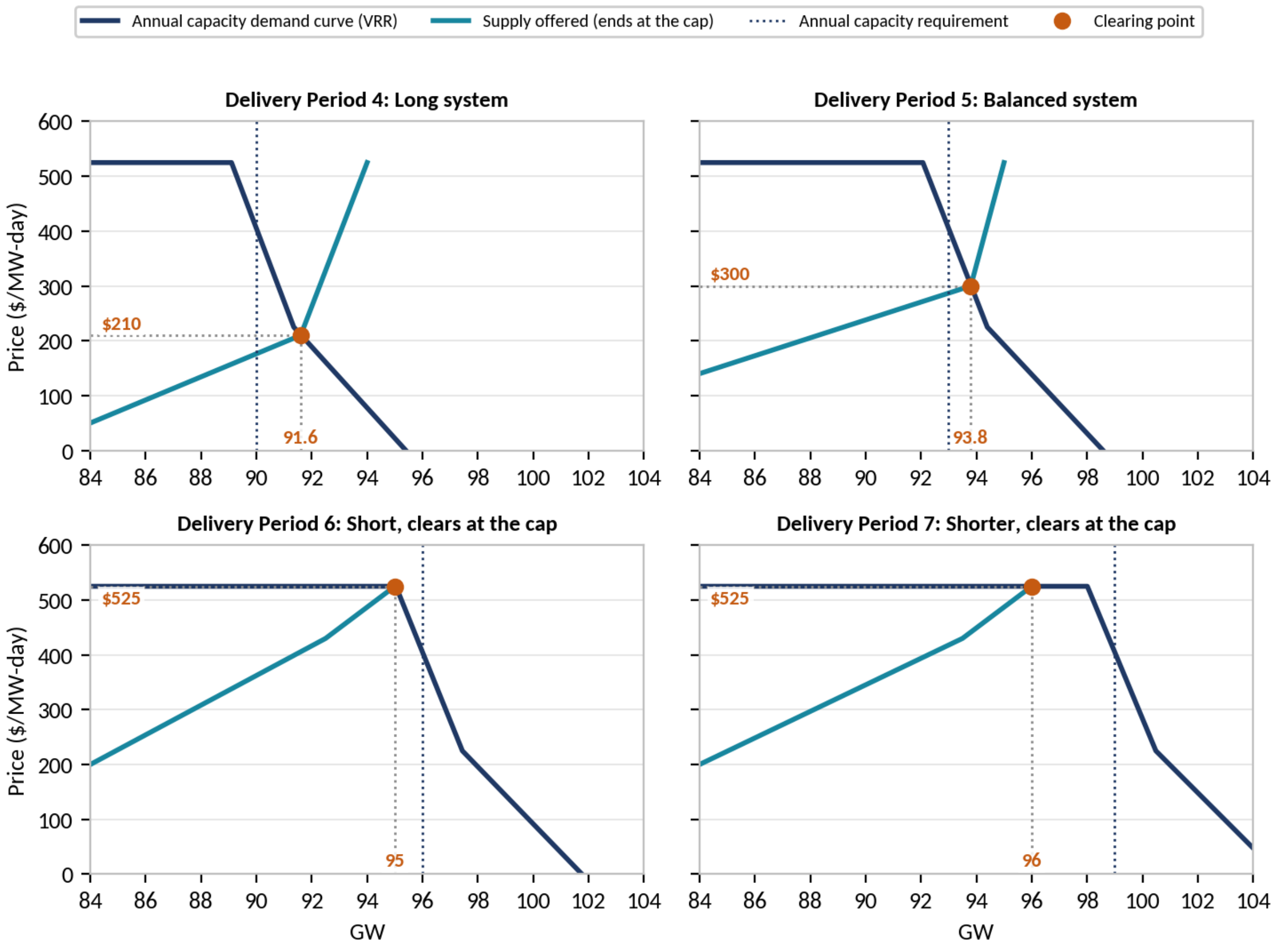

Figure 3: Example 1 – Current Design Detailed Supply and Demand Clearing

The price paid by load jumps 43% and then 75% in consecutive periods (as shown in Table 2), largely the function of the system being short and the price cap setting the clearing price. This is not dissimilar to what was recently observed.

Delivery Period	Annual Capacity Price ($/MW-day)	Capacity Requirement (GW)	Procured (GW)	Shortfall (GW)	Cost ($ billions)
4	$210	90 GW	92 GW	0 GW	$7.1 B
5	$300	93 GW	94 GW	0 GW	$10.3 B
6	$525 (cap)	96 GW	95 GW	1 GW	$18.2 B
7	$525 (cap)	99 GW	96 GW	3 GW	$18.4 B
Total					**$54.0 B**

Table 2: Example 1 – Summary of Costs

Example 2: Proposed Design

This example uses the same four delivery periods with the MPCC product in place (and no self-supply). In each delivery period the market clears one MPCC tranche (one third of the aggregate MPCC requirement, on a three-period term). New and existing supply must offer to sell the annual capacity product and may offer to sell the MPCC product. For this example, it is assumed new supply clears in every period (supported by the increased certainty offered by the MPCC product): 0.5 GW in Delivery Period 4, 2.5 GW in Delivery Period 5, 3 GW in Delivery Period 6, and 2 GW in Delivery Period 7 (as shown in Figure 4) adding 8 GW of new capacity and eliminating the shortfall.

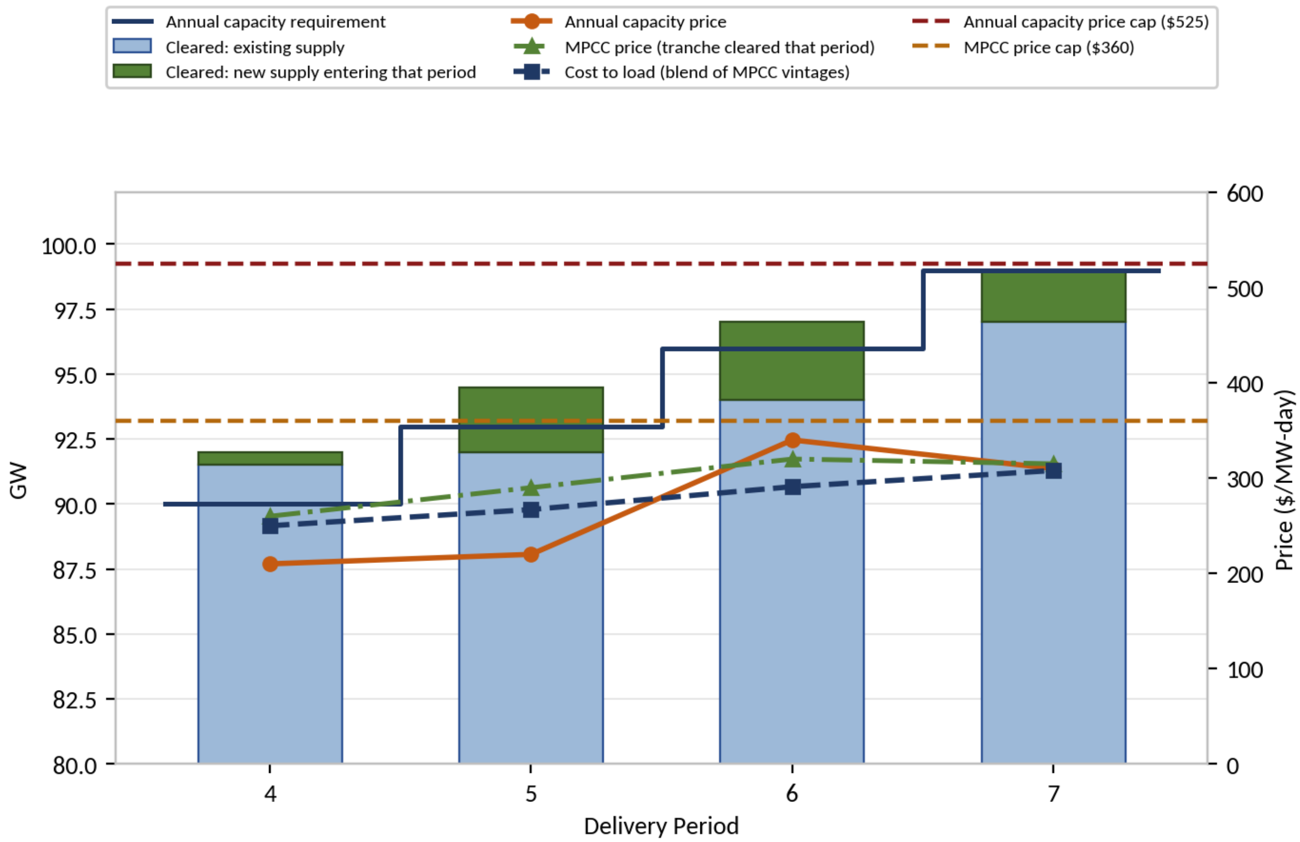

Figure 4: Example 2 – Proposed Design Summary Clearing

Each MPCC tranche is cleared for its set of delivery periods against its own demand curve, which is growing in total size relative to prior cleared tranches as total demand increases. This allows new projects to compete with existing supply for a financeable multi-period commitment as a function of the MPCC requirement. Under the assumptions in this example, new entry starts to clear in greater quantity even in periods where the market is not at the price cap and thus prevents the annual market product from going into a shortage condition.

Figure 5 further highlights these clearing dynamics. Clearing the MPCC and the annual capacity products in the BRA together results in more capacity being willing to clear the annual capacity auction as well, adding more supply than would participate in absence the MPCC product.

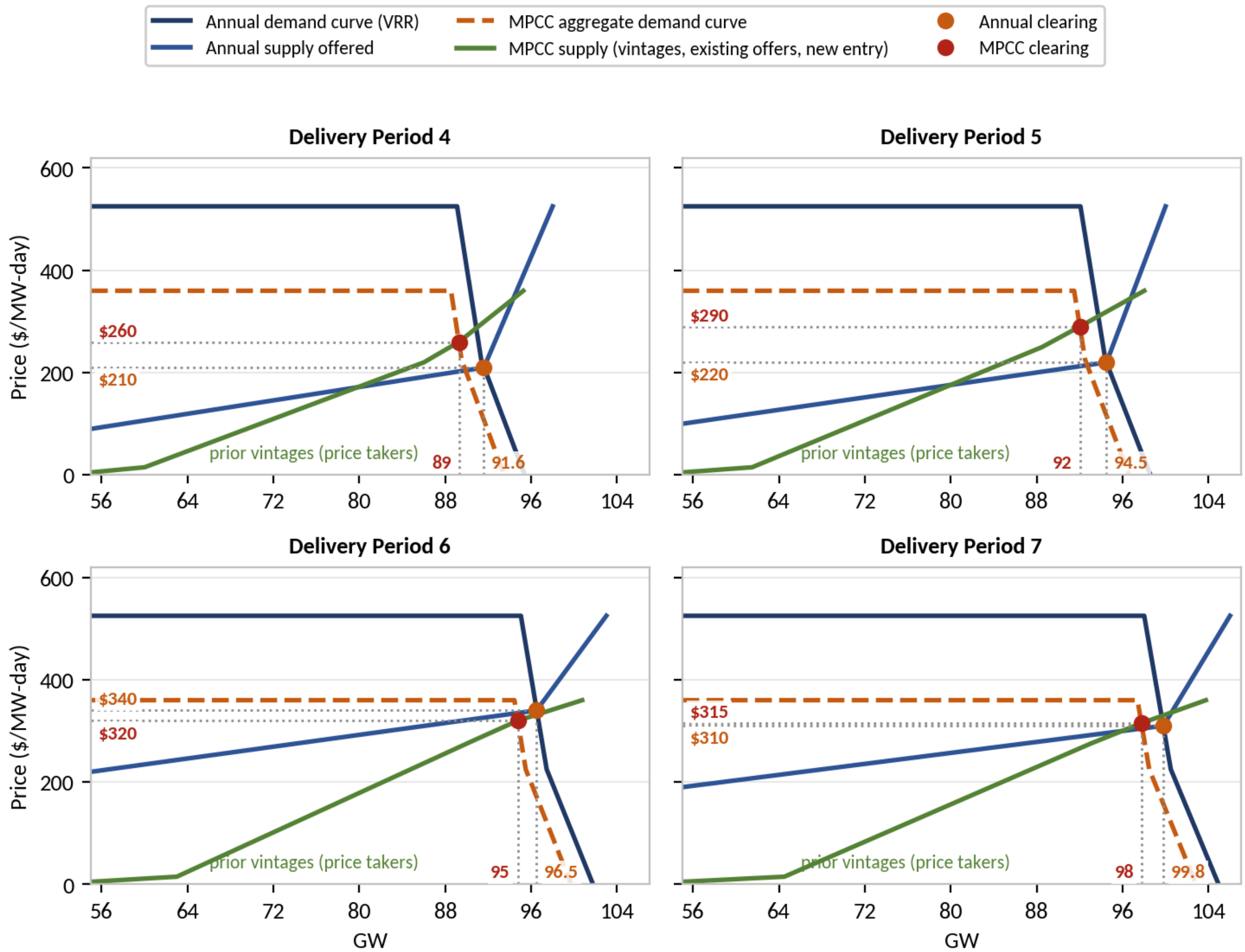

Figure 5: Example 2 – Proposed Design Supply and Demand Clearing

Under the proposed design, costs to load reflect the different MPCC pricing per tranche plus the residual procurement priced at the annual capacity price. In this example, Delivery Periods 1, 2 and 3 already were cleared at the prices for Delivery Periods 2 and 3 are $240/MW-day and $250/MW-day respectively. Using this information and the clearing results from Figure 5, Table 3 shows that load pays modestly more than the annual capacity price in Delivery Period 4, but then the blended price is below the annual capacity price in each subsequent delivery period.

Delivery Period	Annual capacity price ($/MW-day)	MPCC price ($/MW-day)	Blended price to load ($/MW-day)	Annual Capacity Requirement (GW)	Procured (GW)	Cost to load ($ billions)
4	$210	$260	$250	90 GW	92.0 GW	$8.3 B
5	$220	$290	$267	93 GW	94.5 GW	$9.2 B
6	$340	$320	$291	96 GW	97.0 GW	$10.4 B
7	$310	$315	$308	99 GW	99.0 GW	$11.1 B
Total						**$39.0 B**

Table 3: Example 2 – Proposed Design Summary of Costs

Design Performance Comparison

Table 4 compares the design performance in Example 1 and Example 2. In these stylized examples, the proposed design procures more capacity at a lower overall cost than what could be procured without the MPCC product.

The proposed design procures more capacity for about 28% less total cost, with period-to-period price changes under 9% instead of the 43% and 75% swings of the current construct. With the MPCC ladder already committed when the annual auction runs, the annual product itself clears lower in Delivery Period 5, at $280/MW-day versus $300/MW-day under the current construct. The blended capacity price in Example 2 stays near Net CONE instead of jumping to the cap as seen in Example 1 because the MPCC design promoted clearing new capacity earlier in this example.

Delivery Period	Annual Price, current ($/MW-day)	Annual Price, proposed ($/MW-day)	Price to load, proposed ($/MW-day)	Procured, current (GW)	Procured, proposed (GW)	Cost, current ($B)	Cost, proposed ($B)
4	$210	$210	$250	92 GW	92.0 GW	$7.1 B	$8.3 B
5	$300	$220	$267	94 GW	94.5 GW	$10.3 B	$9.2 B
6	$525 (cap)	$340	$291	95 GW	97.0 GW	$18.2 B	$10.4 B
7	$525 (cap)	$310	$308	96 GW	99.0 GW	$18.4 B	$11.1 B
Total						**$54.0 B**	**$39.0 B**

Table 4: Example 1 and 2 Comparison

These examples highlight some of the key properties of the proposed multi-period design as compared to the current annual product design: 1) it promotes clearing more capacity, at lower prices (i.e., lower risk premiums through greater future price certainty) through the MPCC, than a market that procures only the annual capacity product, even when the market may not be short; 2) MPCC prices can exceed annual capacity prices in some periods (though the higher price is paid only to the tranche of capacity that cleared); and 3) load pays a blended price reflecting results across many auction clearings, which reduces the volatility of the capacity cost allocated to load within each period.

While this design will certainly lower volatility and should promote investment in supply, it is not explicitly structured to reduce costs. While costs are lower under the proposed design in these examples, examples could be structured where costs would be greater than the current annual capacity market design. This design reduces risk that supply faces in making investments (which is transferred to consumers), but does not eliminate the risks that supply is exposed and as such we believe strikes a reasonable balance.

The impacts to the annual clearing of the MPCC product procurement mirror the outcomes that would be expected in a market where all load (assuming it was served by entities with longer-term obligations to serve) was required to bilaterally contract for their portion of the capacity requirement.

6. Other Areas for Consideration

The following areas carry design content that belongs to a full proposal rather than a concept paper. They are flagged with the current thinking, not resolved.

- **Large Load Participation.** A key challenge of any forward design will be uncertainty in the load forecast. Procuring capacity in the MPCC for load that materializes later than expected will put downward pressure on near-term BRA prices and encourage retirement for any resource that does not have an MPCC award. If the load materializes later, new entry will be needed when existing resources could have been used to meet that load. The large load forecast is the source of the vast majority of load uncertainty. There are a couple of options that could be considered for large load participation in the market under this proposed design.

  Participation in the shared reliability pool could be approached in different ways:

  1. **Forecasted Demand in Shared Reliability Pool.** Including large load in the load forecast and the resulting capacity requirement that is procured for the annual capacity and MPCC products is the simplest extension of the current capacity market design.
  2. **Bid Demand into the BRA.** Large loads could also be excluded from the load forecast altogether and instead submit priced demand bids for the annual capacity product and the MPCC product allowing them to specify their economic and reliability preferences to the market. An LSE with large load that did not clear their demand (or otherwise did not participate in the capacity market) is likely to be generation-deficient and subject to designation of load to be curtailed if PJM cannot meet the resource adequacy target. It is likely that such an LSE would designate the large load that causes it to be deficient so that load receives "non-firm capacity" service and would be subject to curtailment. For those large loads that do clear, the LSE would pay the annual capacity price or the MPCC price reflecting where they choose to participate and clear. Since the load's LSE is specifically clearing a position (unlike load in the shared reliability pool), the large load would effectively be locking in the MPCC price from the auction it cleared if it chose to buy that product.

     Requiring large loads to make a commitment in this manner puts financial obligations on the large load, rather than depending upon an independent forecast that could overstate or understate the expected large load entering to the detriment of market outcomes. This option introduces a Path B type solution for managing large load participation and is complementary to this proposed solution path.

     A more extreme version of this option would make clearing in the MPCC a gating-mechanism for new large load such that the large load would not be allowed to energize unless it had cleared in an MPCC auction. Since this version likely triggers state jurisdictional issues, it would have to be implemented in coordination with the states.

  Under all of these options large loads that are consuming during the hours used to allocate capacity costs should be allocated capacity costs based upon their consumption (regardless of whether they cleared in the capacity market) as by not being curtailed within these hours they are benefiting from the capacity procured for the region.

- **Offer Requirements and Market Mitigation.** This requires additional discussion and evaluation. Our thinking is that by setting the total requirement less than the annual capacity market requirement and procuring on a system-wide basis this should, under most conditions create a competitive market that does not require specific obligations to offer or price mitigation rules. If existing supply does not offer to sell the MPCC this would increase prices in the MPCC and promote new entry. This additional new entry that is clearing would reduce the annual capacity prices which the supply that chose not to participate in would be compensated. There are certainly existing resources that may not want a multi-period obligation.

    - Resources planning to retire may not want to acquire a multi-period obligation if they are planning to exit within the tenor of the contract (to avoid the buy back risk). This is expected and useful aspect of the market design since it would promote clearing other capacity in the MPCC that would hopefully be positioned to replace the existing capacity providing for some potential overlap when these resources would be available (and also providing protections.

    - Contract based resources that participate as part of aggregations like demand resources and distributed energy resources may not want a long-term commitment in the market and prefer to clear on a period-by-period basis.

  Further the decision on large load participation which could add significant price sensitive demand to the MPCC demand curve would need to be better understood.

  There may be the potential risk for inappropriate market behavior where a participant could withhold its capacity to increase prices in the MPCC for the benefit of its portfolio. Analyzing these circumstances to ensure that the overall design is properly protected and the appropriate level mitigation and offer requirements in the context of how the capacity requirement is defined will be appropriate.

- **Solution Transition.** The biggest challenge with the implementation of this direction is the likely relatively long tenored product and the need to build up MPCC obligations over an extended (e.g., seven-year) period. While this is our recommendation for a longer-term, durable solution the true benefits of this approach (specifically around the ability to acquire new capacity) may not materialize for four or five years when the total MPCC cleared capacity approaches the capacity clearing for the annual product. Recall that while the system is currently short, in a laddered auction for a portion of the MPCC, there would be significant capacity competing for a relatively small slice of the overall annual capacity requirement.

  Running larger tranches to try to acquire the aggregate MPCC requirement in a shorter time period also comes with consequences that would need to be carefully considered since an accelerated approach could lose much of the volatility reduction value associated with the laddering structure.

Appendix A: LSE Contracting Limitations

While there are certainly LSEs in the market that act through contracting and investment in supply to hedge their capacity positions without any specific PJM mandate, many LSEs do not and practically cannot. Large commercial and industrial (C&I) customers have shown willingness to commit to longer-term supply arrangements, most visibly in recent long-term contracts supporting large new loads, and those actions have helped to close the resource adequacy shortfalls being observed in the market. Residential and small commercial loads are different. It is served through default service and retail products whose prices are generally set after the capacity market clears (setting aside recent events that delayed when the BRA has been cleared), so its suppliers rationally pass the known cost through. Additionally, the duration of many of the arrangements between consumers and LSEs may extend only a couple of years, far short of the 14- to 21-year financing horizon PJM states is required for the development of new supply.[18]

The challenge with LSEs being willing to contract with new supply is the timing of when many LSEs take on their load obligation and the duration of that obligation. A design that counts on forward contracting must recognize the term of LSEs' load obligations, including both their duration and when they are taken on.

Actions taken on behalf of load can be grouped broadly into four general categories:

1. **An LSE with long-term responsibility for load.** A vertically integrated utility, cooperative, or municipal system plans on a 10-to-30-year view, builds or contracts through integrated resource planning (including leaning on the capacity market), and carries the position. For this entity, forward contracting for new supply is an option, and no PJM mandate is needed to produce it.
2. **An LSE with short-term responsibility for load.** A default service supplier of record or a competitive retailer that only has obligations that extend out months is less likely to get into long-term arrangements for new supply. The pass through of capacity cost is its rational action where the alternative is a merchant-generation-type investment carrying long-term supply risk against an expectation of how their load obligations will materialize in the future or the direction of capacity prices.
3. **A competitive supplier with a stable aggregate book.** Between the first two categories sits the supplier whose specific customers change but whose baseline load level is relatively dependable. That stability could support a level of baseline ownership or contracting. While these suppliers may be well positioned to hedge their expected load, their investment in new supply to respond to a capacity shortfall, absent expected increases in the level of load they serve, more closely resembles a merchant generation-type investment.
4. **Merchant generation without load.** Generation is developed based upon market expectations and may not be specifically motivated by a long-term load arrangement, though contracts and hedges can be sold by merchant generation to support the development of projects.

[18] PJM Reliability Backstop Procurement proposal and PJM Board letter of July 27, 2026 (15-year RBP commitment term).