RESOURCE ADEQUACY CONSTRUCTS IN ORGANIZED WHOLESALE MARKETS

Executive Summary

April 30, 2021

Prepared for:

CONSUMER ADVOCATES OF THE PJM STATES
CAPS

Prepared by:

Christopher A. Parent
Matthew T. Hoyt
Cali C. Clark

EXETER ASSOCIATES, INC.

NOTICE

This report reflects the perspectives and opinions of the authors and does not necessarily reflect those of Exeter Associates, Inc., its clients, or other consultants. Opinions expressed in this report, as well as any errors or omissions, are the authors' alone. The examples, facts, results, and requirements summarized in this report represent the authors' interpretations. Nothing herein is intended to provide a legal opinion.

This report is intended to provide a high-level perspective on different resource adequacy constructs and, as a result, simplifies the complexities associated with how these various constructs are approached in different regions to facilitate comparison and discussion.

EXECUTIVE SUMMARY

There are many different constructs that are used by the independent system operators and regional transmission organizations (ISOs/RTOs) to meet resource adequacy requirements. No one resource adequacy construct in use today is necessarily better or worse than another, as its performance is a function of the design decisions made for the construct. This does not mean that all constructs are equal. There are trade-offs, most notably around assignment of stranded cost risk and how an investment signal is achieved, and certain constructs are better aligned with different regions (e.g., single-state ISOs/RTOs, ISOs/RTOs that remain largely comprised of vertically integrated utilities or are deregulated more fully) or design objectives (i.e., what is trying to be achieved). Different decisions, both from an objective perspective and a design approach (e.g., market-based versus controlled) can also result in different outcomes. To understand how a resource adequacy construct is performing is not a comparison exercise, but rather an analysis exercise focused on key interrelated areas—reliability requirement determination, reliability valuation, resource performance, competition, and cost allocation—to determine whether the design, as structured, achieves its intended overall objective in a cost-effective manner. Similarly, when making changes to these constructs, understanding how a change in one area is impacting other areas is important to ensuring any changes achieve their desired outcomes.

This report provides perspective on how to think about different existing resource adequacy constructs and how to evaluate their performance. This report does not make any specific recommendations on the best resource adequacy path, nor does it perform a prospective analysis on constructs that may work better in a future-state power system beyond brief discussion of proposals that have been raised recently in various stakeholder forums.

Resource Adequacy Constructs

ISOs/RTOs use a variety of constructs in addition to the core energy and ancillary service (EAS) markets to create the signals necessary to incentivize efficient entry, operation, and/or retirement of the resources to serve load. Longer-term planning reliability standards, considered in this report, provide guidelines designed to minimize service disruptions due to inadequate installed resources.

Resource adequacy constructs are required because prices in EAS markets are set based on short-run costs and may not provide adequate revenues for the resources needed to meet resource adequacy requirements to recover their fixed costs. This gap in revenue adequacy is largely a result of the lack of elastic demand in the energy market and supply-side offer caps that limit how high prices may rise. The inability of prices to rise to the level necessary to incent investment is termed the "missing money" problem and has resulted in the creation of different resource adequacy constructs.

The four primary resource adequacy constructs in use in the U.S. ISOs/RTOs today are:

1. **Operating Reserve Demand Curve (ORDC):** Establishes demand and prices associated with ancillary services, generally beyond the minimum requirements in the market, which can increase EAS revenues available to certain resources and incentivize investment in specific technologies that are able to reliably perform to earn these revenues.

2. **Shortage Pricing:** Establishes minimum prices reflected in the market when the system is unable to meet EAS requirements. Shortage pricing works closely with the ORDC, and again can incentivize investment in specific technologies.

3. **Capacity Demonstration:** Establishes capacity requirements that must be demonstrated by load-serving entities (LSEs) through contracting or ownership of supply, usually with some form of penalty for not meeting the specified requirement.[1]

4. **Capacity Market:** Procures capacity from suppliers on behalf of load based on a reliability requirement established for the region, usually represented through a demand curve reflecting the willingness of load to pay for different levels of reliability.

Table 1 provides an overview of the resource adequacy constructs used in each of the ISO/RTO regions.

Table 1. Resource Adequacy Constructs in ISOs/RTOs

ISO/RTO	ORDC	Shortage Pricing	Capacity Demonstration	Capacity Market
CAISO	No	Yes	Yes	No[1]
ERCOT	Yes	Yes	No	No
ISO-NE	No[2]	Yes	No[3]	Yes
MISO	Yes	Yes	Yes	Yes[4]
NYISO	Yes	Yes	No[3]	Yes
PJM	Yes	Yes	Yes[3],[5]	Yes
SPP	Yes	Yes	Yes	No

[1] CAISO runs a deficiency auction in cases where LSEs do not demonstrate their sufficient bilaterally contracted capacity, but this could be viewed as more of back-stop mechanism.

[2] ISO-NE includes a replacement reserve requirement, but this has minimal impact on market outcomes and is not a demand curve in the sense being discussed in this report.

[3] Mandatory capacity markets allow for entities to self-supply their capacity requirements subject to any limitation of the minimum offer price rule (MOPR).

[4] MISO's capacity market uses a residual capacity market construct.

[5] PJM includes the fixed resource requirement (FRR) construct which enables a party to exit the PJM capacity market and instead bilaterally contract with capacity (or demonstrate ownership in resources) to meet its PJM-imposed requirements or pay a penalty.

---

1 A residual capacity market could be viewed as a capacity demonstration construct with a voluntary capacity market that provides another option for LSEs to acquire capacity besides direct contracting or ownership.

Evaluation Approach

The biggest driver of reliability and cost is not the construct itself, but rather the expectations of load and other planning reliability standards as well as how the cost of new entry (CONE) and net CONE values are established and represented in the market and how resource performance is handled.

- All constructs can over- or under-buy installed capacity relative to the expected need and can result in high or low costs (independent of the level of reliability).
- Capacity constructs often provide more visibility into what resources have forward obligations as compared to an energy-only construct where forward arrangements are handled outside the ISO/RTO-administered markets.
- All constructs are prone to changes that create uncertainty in the market. This is often a function of the region more than the construct itself. However, capacity constructs inherently have many rules (e.g., eligibility, penalties) so are more sensitive to the stakeholder process and special interests impacting outcomes. EAS constructs put more responsibility on suppliers and load to make these determinations and generally see less change in their designs and parameters, so are often viewed as more stable.
- All resource adequacy constructs can be aligned with state policy goals or consumer preferences. Recent minimum offer price rule (MOPR) changes have created a notable exception to this in capacity market constructs. However, there is nothing inherent in capacity market constructs that prevents state or consumer resource preferences from being reflected in the market.
- Rules that limit participation in capacity constructs attempt to establish reasonable limitations based on a resource's expected performance when needed. Forward contracting for energy has limitations as well, but the limitations are managed by the supplier and LSE through their arrangements (e.g., a supplier would likely not sell a forward energy contract that they did not believe they could deliver against).
- Capacity demonstration likely places increased investment risk on consumers (by the nature of the arrangements). Other constructs do not prevent LSEs from choosing to take on similar risk, but may provide more options for merchant development.
- All constructs have the potential for weak or strong performance incentives. This is a function of how the construct is designed.

This report proposes five interrelated areas of evaluation to assist with the analysis of a resource adequacy construct. Ideally, this analysis would be conducted in the context of a clear objective and product definition. Even in the absence of a clear objective and product definition, these evaluation areas can be used to better understand both of these items.

1. **Reliability Requirement Determination:** All constructs have some level of expectation of future need generally based on forecasted load. There are also numerous adjustments and assumptions (e.g., resource performance) applied in the formation of this expectation that can have a material impact on the quantity of capacity required.

2. **Reliability Valuation:** All constructs have a proxy for how much load is willing to pay for reliability. These values are established through studies and a stakeholder process. In capacity constructs, the implied value of lost load (VOLL) is calculated based on the net CONE of a dispatchable technology (e.g., combustion turbine). Scarcity prices in the EAS market can be set using a calculated VOLL or on the ability of the ISOs/RTOs to redispatch the system to meet EAS requirements.

3. **Resource Performance:** Resource performance assumptions impact both supply (e.g., by affecting competition) and demand (e.g., by adjusting the reliability requirement). Inconsistent application of these assumptions can artificially inflate capacity procured or inappropriately indicate resource sufficiency. Further, resource performance requirements can shift costs between load and suppliers, depending on the structure.

4. **Competition:** Achieving market outcomes depends on a construct’s ability to facilitate an equal playing field across all technologies, new entrants and incumbents, and supply- and demand-side resources, all while also having appropriate market power protections.

5. **Cost Allocation:** Costs are generally allocated to the parties that cause the costs to be incurred and benefit from the byproducts of those costs (e.g., provision of ancillary services). As the resource mix and, inherently, the product being procured through capacity constructs evolve, it is critical that cost allocation provides similar incentives to (or at least not counter to) supply-side resources. Cost allocation structures should ensure that, when consumers act, these actions result in reductions in cost over time and do not simply avoid costs that have to be paid by other consumers.