

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

**Joint Technical Conference on New York Markets) Docket No. AD14-18-000
& Infrastructure)**

**WRITTEN STATEMENT OF DR. DAVID B. PATTON,
MARKET MONITORING UNIT FOR
THE NEW YORK INDEPENDENT SYSTEM OPERATOR**

I. INTRODUCTION AND PURPOSE OF STATEMENT

Federal Energy Regulatory Commission (“FERC”) and the New York Public Service Commission (“NYPSC”) have called this joint technical conference to discuss issues regarding the New York Independent System Operator (“NYISO”) capacity market and its role in attracting investment and ensuring resource adequacy and reliability.

The NYISO capacity market established a market-based mechanism for load-serving entities to satisfy their capacity requirements. The NYISO has operated its current capacity markets for more than 14 years when FERC approved the NYISO-administered markets. Since that time, NYISO and its stakeholders have developed and implemented various improvements to the capacity market to improve its performance in facilitating resource adequacy in New York in concert with its energy and ancillary services markets.

My name is David B. Patton. I am an economist and the President of Potomac Economics. Potomac Economics serves as the Market Monitoring Unit (“MMU”) for NYISO. Potomac Economics serves in a substantially similar role for ISO New England (“ISO-NE”), the Midwest Independent Transmission System Operator, Inc., and the Electric Reliability Council of Texas.

As the MMU for the NYISO, Potomac Economics is responsible for assessing the competitive performance of the markets that the NYISO administers and for assisting in the implementation of a market monitoring plan to identify and remedy potential market design flaws and abuses of market power. This work has included preparing a number of reports that

assess the performance of these markets and providing advice on numerous issues related to market design and economic efficiency. Much of this work has focused on evaluating and recommending improvements to NYISO's capacity markets.

I have worked as an energy economist for 23 years, focusing primarily on the electric utility and natural gas industries. I have provided strategic advice, analysis, and expert testimony in the areas of electric power industry restructuring, pricing, mergers, and market power. I have also advised Regional Transmission Organizations on transmission pricing, market design, and congestion management issues. With regard to competitive analysis, I have provided expert testimony and analysis regarding market power issues in a number of mergers and market-based pricing cases before the FERC, state regulatory commissions, and the U.S. Department of Justice.

The purpose of my Statement is to address certain issues associated with the NYISO capacity market as requested by the FERC in its *Supplemental Notice of Technical Conference* in this docket. The FERC has asked that the MMU report on the current performance of the NYISO capacity markets and its recommendations for improvements. My Statement is organized as follows. Section II provides a discussion of the role of capacity markets in a competitive and efficient wholesale market structure. In Section III, I discuss the performance of the NYISO capacity market and how it may be improved. I address specific questions raised by the FERC in Section IV.

II. THE NEED FOR CAPACITY MARKETS

Market-based investment in wholesale electricity markets is ultimately facilitated by the markets' economic signals. These signals are provided by prices in energy, ancillary services, and capacity markets, and inform suppliers' decisions about investment, retirement, and maintenance decisions. These investment and retirement decisions are important for meeting planning reserve requirements.

An efficient long-run equilibrium is achieved when energy, ancillary services, and capacity revenues in these markets allow a marginal resource to cover its entry costs when new resources are needed to meet the planning reserve requirements. If prices are inefficiently high, the market will facilitate decisions that produce a capacity surplus. If prices are inefficiently low, the market will not sustain sufficient resources and intervention will be needed.

A. The “Missing Money” Problem

In order to inform the present discussion of NYISO’s capacity market, it is useful to discuss the outcomes of “energy-only” markets. As we will explain below, energy-only markets will not provide sufficient revenues to sustain capacity levels that satisfy NYISO’s planning reserve requirements. This has been referred to as the “missing money” problem, which is the reason capacity markets have been developed.

“Energy-only” markets have energy and ancillary services markets, but not a capacity market. Revenues are earned in accordance with clearing prices that in most hours are based on the marginal costs of the resources that are dispatched. In some hours, efficient shortage pricing can cause prices to be set well in excess of the cost of supply and instead be set based on the cost of losing load (i.e., set at the value of lost load). We believe the value of loss load likely ranges from \$10,000 to \$20,000/MWh, which translates to efficient operating reserve shortage prices ranging from \$500 to \$2,500/MWh for most shortages.¹

Participants in an energy-only market must cover their energy production cost, their fixed operating costs, and their capital costs from the energy and ancillary services markets during normal conditions and shortage conditions. As planning reserve levels fall, the frequency of operating reserve shortages and associated revenues will increase. Therefore, energy-only markets will achieve a long-run equilibrium at *some* level of resources.

However, the level of resources that will be sustained in an energy only market with efficient shortage prices will generally not meet the RTO’s planning requirements. This is because there must be sufficient capacity to meet the “one-day-in-ten-years” reliability standard. With reasonable assumptions about capacity cost and energy prices, this reliability standard implies a value of lost load of \$100,000 to \$200,000 per MWh. This is well above a reasonable estimate of the value of loss load and would result in shortage prices substantially higher than the current ones used in New York. It also is important to recognize that as capacity levels rise to satisfy planning reserve requirements, the frequency of operating reserve shortages will fall along with the associated shortage revenues.

Hence, without substantially inflated shortage prices, energy-only markets cannot provide enough revenue to satisfy planning reserve requirements. Additional revenue is needed to

¹ See Motion to Intervene and Comments of the ISO’s External Market Monitor, *ISO New England, Inc.*, Docket No. ER14-1050-000 (February 13, 2014).

satisfy these requirements, which is the “missing money” problem addressed by the capacity markets.

In addition to insufficient shortage revenue from energy and ancillary service markets, other factors contribute to the missing money problem. The above discussion of RTOs’ shortage pricing holds in a world where the RTOs take no out-of-market actions. In reality, RTOs frequently take costly actions to avoid reserve shortages and therefore reduce the incidence of shortage pricing. These actions generally are not reflected in the market so they tend to reduce real-time prices, thereby reducing overall revenue and contributing to the missing money problem. For example, the RTO may commit costly resources, curtail exports, invoke demand response, and take other emergency actions.

Finally, the energy and ancillary services markets can only provide revenues when planning needs are reflected in the market requirements. To the extent that some planning requirements have no analog in the day-ahead and real-time markets, then the energy and ancillary services markets will provide no revenues to help satisfy the planning requirements. Hence, this will increase the missing money needed to satisfy these requirements. In reality, some planning requirements cannot be readily reflected in the real-time market.

Therefore, in order to satisfy planning reserve requirements, additional revenues beyond energy and ancillary services market are needed to prompt the higher level of investment (and slower retirements) that would otherwise result.

III. CAPACITY MARKET PERFORMANCE

The NYISO capacity market is an example of a fundamentally sound RTO capacity market design. In the NYISO market, suppliers submit offers to supply capacity for various time periods (i.e., monthly and seasonally). Because it is a uniform clearing-price auction, under competitive conditions the offers will reflect the minimum payment needed to continue to operate (i.e., “going-forward costs”).

The NYISO market uses a demand curve for capacity and clearing pricings are established where supply offers (the stack of competitive offers) intersect the demand curve. The NYISO capacity market has the virtue of a sloped demand curve. A sloped demand curve for capacity produces lower prices for capacity when the level of capacity in the market exceeds the planning requirements. This reflects the diminishing marginal value of capacity in providing reliability to the NYISO system as capacity levels grow. In a well-functioning market, these capacity clearing prices, in conjunction with efficient energy and ancillary service market prices,

will facilitate efficient long-term decisions. These decisions include new investment, retirement, and maintenance decisions.

A. Evaluating the Performance of a Capacity Market

As we introduced above, the NYISO market is a well-designed market. In order to evaluate performance of a capacity market, one should focus on the outcomes it has facilitated and whether the outcomes have been efficient.

An efficient capacity market should have at least four attributes:

- Capacity enters *when* and *where* it is needed;
- Capacity retires when it is no longer economic or needed;
- Market power is not exercised; and
- Capacity prices are transparent and predictable over the long term.

A capacity market that will provide these outcomes will allow the market to move to a long-run equilibrium where capacity is maintained to meet reliability needs at the lowest cost over the long run. The first two attributes measure if the market is able to meet the reliability requirement – entry and exit when appropriate. The other two attributes ensure the market is cleared efficiently (and therefore at the least cost) – market power is not exercised and transparent prices ensure that participants can rely on the market signals to make long-term decisions. We will discuss below how the NYISO market performed relative to these criteria.

B. The Performance of the NYISO Capacity Market

Based on the criteria discussed in the previous section, the NYISO capacity market has performed relatively well. The outcomes have been consistently competitive with very little capacity withheld from the market. The market has facilitated new investment when and where it has been needed to satisfy NYISO's planning requirements. NYISO has never been short of its planning requirement market-wide or in its load pockets.

More than 12,000 MW of new capacity has been developed in New York over the past 14 years. This investment has included merchant generation, merchant transmission, and investment with various types of forward contracts. Retirement decisions also generally have been efficient. However, the delay in defining the Southeast New York capacity zone likely led to some inefficient retirements and hindered investment in that area.

C. Factors Contributing to the Good Performance of the NYISO Capacity Market

A number of attributes contribute to the NYISO capacity market's good performance.

Sloped Demand Curve. As we discussed above, the sloped demand curve is an essential feature that reflects the reliability value of additional capacity above the minimum requirement, which provides a number of benefits. It provides efficient spot capacity prices that reflect the prevailing supply because it reflects the forward-going cost of capacity and the expected revenues of the energy and ancillary services markets. It also improves price stability, which facilitates investment by reducing risk. It improves price stability because prices will decline predictably when surpluses grow, instead of dropping to zero as would be the case in a vertical demand curve regime. Finally, the sloped demand curve reduces incentives to withhold capacity by raising the opportunity costs of withholding and decreasing price effects of the withholding.

Locational Requirements. The NYISO capacity market also employs locational requirements that reflect the fact that transmission constraints cause RTOs' planning needs to vary by location. The locational market allows prices to efficiently signal the value of capacity in local areas based on the supply and demand in each area.

Effective Market Power Mitigation Measures. Another virtue of the NYISO market is the market power mitigation measures that help ensure competitive outcomes. On the supply side, market power mitigation measures prevent withholding of capacity that would otherwise increase prices. On the buyer side, the market power mitigation measures help deter uneconomic investment intended to lower prices.

Transparent Spot Prices. The NYISO capacity market provides transparent spot prices for NYISO capacity, which facilitates longer-term forward capacity contracting and long-term decision making by market participants.

D. Recommendations for Improvements

Our monitoring of the NYISO capacity markets over the years has indicated a relatively well-functioning and efficient market. Nonetheless, we continue to recommend incremental improvements that will promote increasingly effective and efficient markets. We currently have recommendations for improvements in two key areas. These recommendations are discussed in more detail in our 2013 State of the Market report for the NYISO Markets.

1. Refinements in the Mitigation Measures

The first area where improvements would be beneficial is related to market power mitigation measures in the NYISO's capacity markets. These changes will keep the market power mitigation measures effective, while ensuring the measures do not hinder efficient investment. They include changes to buyer-side mitigation and supply-side mitigation.

Regarding recommended changes to buyer-side mitigation, we have proposed:

- A competitive entry exemption. We have proposed granting an exemption to suppliers engaged in purely private investment would allow merchant investors to make investment decisions based on their own expectations of the increased capacity revenues that would occur if additional retirements occur (beyond those that have been noticed to the PSC).
- Modifying key assumptions in the exemption analysis, including the assumed entry date and the status of mothballed units. The current assumptions depress the forecast of capacity revenues for a resource and increase the likelihood of mitigation even if the resource is economic.
- Improving the offer floor applied to mitigated units to strengthen the mitigation measures by narrowing the threshold under which a project is determined to be uneconomic.

Regarding changes to supply-side mitigation, we have proposed enhancing the pivotal supplier test in NYC so that it matches the rule for the new capacity zone.

2. Dynamic Locational Framework

When planning needs arise because of new deliverability constraints between locations, it is highly beneficial for capacity prices to immediately reflect these needs. Likewise, it is important that capacity prices do not reflect these needs when the deliverability constraints are no longer binding.

Locational needs can arise or disappear quickly as resources enter or retire, or as transmission is built. A dynamic framework should facilitate actions by participants in advance of the locational prices emerging based on the expected changes in supply, demand, or the transmission network. In addition, a dynamic framework reduces the potential that reliability contracts may be needed in the future to address unpriced reliability needs.

We have proposed that “pre-defined” interfaces or zones be created to ensure that locational capacity prices would immediately adjust to reflect changes in market conditions. These changes can arise quickly, such as in the unexpected retirement of key units in the state’s aging fleet. A more dynamic framework will allow investors to be more confident that the reliability needs will be fully priced and facilitate timely market-based investment. Such timely investment can occur in anticipation of changes in locational needs and would mitigate capacity price volatility.

We have also proposed to grant internal capacity deliverability rights between zones when private investors upgrade the transmission system to expand the capability into a local area. Creating these internal capacity transfer rights will help: a) provide efficient incentives for economic investment in transmission, and b) reduce barriers to entry that sometimes occur under the existing rules when a new generation project is required to make uneconomic transmission upgrades.

In sum, a more dynamic locational framework will facilitate efficient investment in both generation and transmission to satisfy New York’s local planning needs.

IV. TECHNICAL CONFERENCE QUESTIONS

In this section, I address selected questions raised in the agenda for the technical conference.

Should the NYISO capacity market provide a longer revenue certainty period (e.g., 3, 5, or 10 years)?

It is not necessary for capacity markets to provide long-term revenue certainty. The NYISO’s capacity market already should facilitate bilateral contracting that can provide revenue certainty. The NYISO capacity market should be understood in the broader context of the wholesale electricity markets. The capacity market does not have to satisfy all of the participants’ and investors’ needs in isolation. The NYISO capacity market is a spot capacity market, which is meant to procure capacity needed in the short-term and provide efficient price signals over the longer term. The spot market is designed to provide a transparent and efficient price signal that should facilitate forward bilateral contracts and long-term resource decisions.

Does the existing NYISO capacity market appropriately incent investment as compared with three-year forward market designs in other capacity markets (e.g., PJM, ISO-NE)?

Yes, based on the past results in New York, the existing market structure provides appropriate investment incentives for long-term capacity decisions.

In comparing the existing NYISO capacity market structure with a three-year mandatory forward procurement market design, we do not find that the three-year forward structure would improve investment incentives. Resource investment decisions are long-term decisions that span 30 to 40 years (the life of the asset). The short procurement length in both models (one season or one year) likely means that a rational investor will primarily base decisions on expected revenues over the life of the asset, rather than the outcome of any single three-year forward auction. We have seen very little evidence that awarding one-year capacity contracts three years forward would better motivate investment. To the extent that accepting a forward obligation would create additional risk for the supplier, such a structure could actually hinder investment and accelerate retirements.

Nonetheless, it may be true that a “lock-in” provision that would guarantee a supplier the auction clearing price over an extended period (e.g., 7 years) would motivate investment. However, we are concerned that such provisions will raise costs over the long-term. Such a provision discriminates in favor of new resources and would likely accelerate resource retirements. The NYISO is studying all of these issues and we look forward to reviewing its results.

Are long-term bilateral contracts a feasible alternative procurement mechanism for New York (e.g., California model)?

Bilateral contracts between load-serving entities and resource owners complement the NYISO capacity market, but such contracting is not a reasonable substitute for a coordinated capacity market. Unlike the multi-lateral capacity market, bilateral contracts do not provide transparent price signals that will facilitate efficient decisions by other participants.

Such contracts must be available to all existing and new suppliers in order to maintain sufficient resources to satisfy the RTO’s planning requirements. In such a structure, suppliers may have the ability to raise costs of such contracts well above the clearing prices of a well-functioning capacity market. This is particularly true of relatively large suppliers in transmission constrained areas.

Finally, since captive customers are ultimately the buyers in these contracts, bilateral contracts as a substitute for the capacity market would shift substantial risk from suppliers/investors to NYISO's customers, which is not costless.

Are changes to NYISO's capacity market necessary to better ensure resource performance during peak demand conditions?

The primary incentive for good resource performance is NYISO's real-time pricing (shortage pricing in particular). Resources that are unavailable during peak periods incur tremendous costs or lost profits, particularly when they contribute to a shortage. Efficient shortage pricing should always be the primary means to achieve efficient incentives for suppliers to perform during peak conditions. NYISO is currently undertaking efforts to enhance its shortage pricing, which will improve suppliers' performance incentives. The need for any additional changes should be evaluated only after these shortage pricing improvements are implemented.

Why are Reliability Support Services (RSS) agreements needed?

Reliability agreements are generally needed when the locational capacity market needs do not fully reflect an RTO's true reliability needs. RSS contracts have generally been used in New York only for relatively narrow local needs that can be addressed by very few suppliers.

What is the effect of RSS agreements on the ability of the NYISO capacity market to efficiently meet the intended goal of incentivizing investment in resources and infrastructure?

The effect on market efficiency is minimal if the agreements are with lowest cost resource for satisfying the local need. In this case, the resource should be considered economic and the RSS should not adversely affect the broader capacity market.

Are there other market and infrastructure impacts of the use of RSS agreements?

Markets could be impacted if the use of RSS expands beyond the current isolated local needs. The dynamic local framework we recommend would tend to limit the expanded use of RSS agreements.

Are changes to the capacity market needed to account for fuel availability/firmness of fuel, or to differentiate the value of capacity resources based on the "firmness" of fuel arrangements?

As discussed above in the question regarding performance incentives, the real-time energy market should play the primary role in providing these incentives. Efficient shortage pricing greatly rewards non-gas units that can run during gas shortages and resources with back-

up or firm fuel supplies. Hence, RTOs should ensure that the real-time market efficiently rewards such characteristics before modifying the capacity markets to do so. The proposed changes in NYISO's real-time shortage pricing will improve these incentives. The NYISO is evaluating whether additional changes in the energy or capacity markets may be warranted.

V. CONCLUSION

The NYISO market design has been very effective in facilitating investment and maintaining adequacy. However, the buyer-side mitigation measures could be improved to ensure that they do not impede economic investment. Additionally, improvements to the locational market framework could allow it to be more responsive to changing system conditions. Ultimately, this would improve the performance of the NYISO capacity market by facilitating more efficient and more timely long-term decisions by market participants.

Finally, stability in the design and operation of the capacity market is critical. Investors must be able to project capacity revenue over the life of their resources. Instability raises investment risk that will cause investors to require higher prices to enter. Hence, limiting substantial changes in capacity market design is essential for achieving good capacity market performance. This concludes my statement.