



Memorandum

TO: ISO New England and NEPOOL Markets Committee

FROM: David Patton and Pallas LeeVanSchaick

DATE: January 21, 2020

RE: Day-Ahead Market Power Mitigation

Per your request, this memo provides a discussion of market power mitigation measures that are applied to ancillary services markets in New York and the Midcontinent ISO that are similar to those being proposed in New England. Based on our experience monitoring these markets, we offer some recommendations for ISO New England and address questions that have been raised by some of the stakeholders.

A. Summary of Mitigation in Other Day-Ahead Markets

In this section, we provide a summary of how mitigation is applied in other co-optimized day-ahead energy and ancillary services markets that we monitor in Midcontinent ISO (MISO) and New York ISO (NYISO). The MISO and New York ISO markets both have import-constrained areas that are highly concentrated and have relied on effective market power mitigation to address market power concerns.

The chief goal of market power mitigation is to minimize intervention in the market while limiting suppliers who have market power to behavior that is consistent with competitive conduct. The conduct-impact approach is the best practice in applying mitigation in wholesale electricity markets. The conduct-impact test mitigation is a two-step process that uses “reference levels” to test both a participant’s conduct as it relates to a competitive norm and its impact on the market. The first part of the conduct-impact test considers whether a unit’s offer exceeds its reference level by some pre-established threshold. If the threshold is exceeded, then a second part of the test determines whether the conduct (i.e., the offer) has caused an impact on the market clearing price for energy or ancillary services or an impact on an uplift payment.

ISO New England utilizes the conduct and impact mitigation framework in its day-ahead energy-only market and in its real-time energy and ancillary services markets. This framework can effectively be extended to the proposed day-ahead markets. This framework is employed by MISO and NYISO to address market power in their day-ahead markets.

In the MISO and NYISO, market power mitigation is applied to the ancillary services market in the same fashion as in the energy market. The conduct-impact test is used to determine whether the offer of any ancillary service product exceeds the reference value for that ancillary services product by some threshold (e.g., \$10/MW) or whether any other offer parameter is modified significantly to withhold ancillary services. The reference value is an estimate of a unit's short-run marginal cost that can be higher or lower than the true value, so the use of a threshold helps avoid mitigating competitive offers. However, if the threshold is excessively high, it may allow the exercise of market power. Therefore, the threshold should be set at a level that appropriately balances the risk of over-mitigation against the risk of under-mitigation. Criteria for setting the thresholds and reference values are discussed further in Section C.

It is critical to note that in co-optimized energy and ancillary services markets, the individual ancillary services are not procured independently of the other products. They interact with energy and other ancillary service products in a manner that can reduce the market power concerns related to withholding the ancillary service product. For example, if a resource raises the price of its operating reserves offer, the co-optimized dispatch can schedule the resource to provide more energy and schedule operating reserves on a different resource, which can reduce the price effects of the withholding. This interaction is recognized in the mitigation framework as all resources that fail the conduct test described above are tested for impact together, and price impacts are examined for energy and all ancillary services together. If the price for any product rises by a threshold amount, the conduct will be mitigated.

The conduct-impact framework has been very effective in protecting the markets in NYISO and MISO from the exercise of market power, but at the same time has prevented excessive intervention. This framework prevents excessive intervention because participants are only affected if they have a significant market impact. Hence, the impact test takes the place of a structural market power test, which are used to determine when market power is sufficient to justify some sort of regulatory intervention. Because of the product interactions, substantial market impacts caused by withholding are not frequent. This is particularly true in the day-ahead markets in NYISO and MISO.

The reason mitigation is rare in the day-ahead markets is that the markets have more flexibility than in real-time operations. In the day-ahead, the market has the ability to commit all types of resources with different start-up times, and virtual trading throughout the markets provide tremendous scheduling flexibility. Therefore, if the real-time market is well-mitigated, participants' expectations of competitive real-time prices tend to discipline the day-ahead markets. This explains why the imposition of market power mitigation is limited in the New York ISO and MISO day-ahead markets.

B. Application of Lessons Learned to ISO-NE’s Proposed Markets

This experience in other RTO markets can be usefully applied to the products being proposed by ISO New England. In this section, we describe the similarities and differences between the day-ahead ancillary services products proposed by ISO New England and those currently procured in NYISO and MISO. We then discuss how these similarities and differences lead to recommendations regarding changes in the market power mitigation that may be needed in New England.

Day-Ahead Ancillary Services in NYISO

In the NYISO day-ahead market, NYISO procures the same operating reserves that it requires in the real-time market, which includes the following requirements:

- Regulation capability market-wide;
- 10-minute spinning reserves, 10-minute total reserves, and 30-minute total reserves requirements for the following regions:
 - All of New York State,
 - East New York,
 - Southeast New York (which is nested in East New York), and
 - New York City (which is nested in Southeast New York).

Like ISO-NE, the NYISO market allows a higher quality product to satisfy a lower quality requirement. For example, one MW of 10-minute spinning reserves can be used to satisfy one MW each of the 10-minute spinning, 10-minute total, and 30-minute total reserves requirements. Likewise, the NYISO market allows a MW of reserves in a nested region to satisfy the requirement of a larger region. For example, one MW of reserves in Eastern New York can be used to satisfy one MW each of the Eastern New York and New York statewide requirements.

Not all of the NYISO’s reserve requirements have the same reliability value. Some requirements are not mandated by NERC or NPCC, but the reserve demand curves are generally set to ensure that NERC and NPCC criteria are satisfied. If there is no underlying reliability criterion for a particular reserve requirement, the NYISO uses a demand curve value of \$25/MWh for the requirement. For instance, there is no specific reliability requirement that necessitates holding a specific quantity of 10-minute spinning reserves in Eastern New York, but the NYISO uses a \$25/MWh demand curve for this market requirement so that the market tends to distribute 10-minute spinning reserves evenly across the state.

The NYISO does not procure an energy imbalance product or replacement reserve as proposed by ISO New England, however, it enforces a capacity requirement in its day-ahead market that

will commit additional resources as necessary to satisfy the forecasted load plus operating reserve requirements. Although this capacity requirement is not reflected in the pricing and scheduling step of the day-ahead market, it may lead to the commitment of additional resources, adding to the supply of resources that can be scheduled for spinning reserves in the day-ahead market (without incurring additional start-up costs) and, thereby, increasing the elasticity of supply for reserves in the day-ahead market.

The NYISO's day-ahead ancillary services products settle as forward contracts for real-time ancillary services rather than as call options on real-time energy. Therefore, if a reserve provider in the day-ahead market sells energy instead in the real-time market, it will buy back its reserve schedule and be paid for its energy at the real-time prices.

Day-Ahead Ancillary Services in MISO

In the day-ahead market in MISO, the RTO primary procures market-wide products:

- Regulation;
- 10-minute spinning reserves and 10-minute total reserves;

MISO has the authority to enforce zonal reserve requirements, but rarely does so. It has filed to create "short-term reserve" requirements, which include market-wide 30-minute reserves, as well as 30-minute reserve requirements for its subregions (North and South) and certain load pockets. This product will not be implemented until 2021.

Like in NYISO, the existing ancillary services products in MISO settle as forward ancillary services contracts so they settle in the real-time market based on deviations from the day-ahead schedules. If the real-time co-optimization transitions a resource from providing operating reserves day-ahead to providing energy in real-time (or vice versa), the settlements will ensure that supplier is better off financially making this transition.

Proposed Day-Ahead Ancillary Services in ISO New England

The day-ahead ancillary services proposed by ISO New England are similar in some regards, but different in others from the products described above in MISO and NYISO. ISO New England has proposed the following three products be procured through its day-ahead market, which we describe below in comparison to the products in NYISO and MISO:

- Contingency Reserves: Includes 10-minute spinning reserves, 10-minute total reserves, and 30-minute total reserves that are defined as call options on energy.
 - 10-minute spinning reserves and 10-minute total reserves are also required in the NYISO and MISO markets;

- 30-minute total reserves are currently required in the NYISO and have been proposed in MISO.
- In MISO and NYISO, all of these reserve products are defined as forward contracts for each reserve.
- Energy Imbalance Reserves: equals the balance of the energy that must be procured to satisfy the forecasted real-time load constraint (i.e., the Forecast Energy Requirement, or FER). Units that are scheduled to be online or that are fast-start capable are eligible to provide this product. The shadow price of the FER is paid to EIR providers and DA physical energy providers.
 - NYISO and MISO do not have EIR, so under-scheduling of energy in the DAM may lead to supplemental generation commitments to maintain adequate reserves.
- Replacement Reserves: Two additional reserve requirements are defined to satisfy up to the two-and-a-half largest contingencies. The first replacement reserve requirement can be satisfied by resources that can deploy the reserves within 90 minutes, while the second replacement reserve requirement can be satisfied by resources that can deploy the reserves within 240 minutes.
 - NYISO procures sufficient reserves to satisfy the two largest contingencies, but this is done by raising the 30-minute total reserve requirement (rather than satisfying a portion of the requirement with 90-minute reserves).
 - MISO does not procure replacement reserves, in part because it has access to substantial supply via its many interfaces with other control areas.

Factors Affecting the Competitiveness of the Day-Ahead AS Markets

There are several factors that will affect the susceptibility of ISO-NE to the exercise of market power and the design of mitigation measures compared to other markets. Some of these factors tend to reduce competitive concerns associated with the proposed products, while others increase potential competitive concerns.

Eligibility of Resources to Provide the Products. The fact that ISO-NE will allow replacement reserves to be deployed in up to four hours increases the set of resources eligible to provide reserves. This additional supply will increase competition and diminish the effectiveness of withholding. The following list summarizes how broadening participation (by relaxing the time required to deploy the reserves) increases the potential supply for each product from offline resources.¹

10 minutes: 4.5 GW

¹ Assumptions are described in *Energy Security Improvements: Market-Based Approaches, Replacement Energy Reserves*, presented by Ben Ewing to the NEPOOL Markets Committee, January 14-15, 2020.

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|--------------|--------|
| 30 minutes: | 5.6 GW |
| 90 minutes: | 7.3 GW |
| 240 minutes: | 9.4 GW |

Additionally, any of these four products could be provided by the dispatchable output ranges of on-line resources. The quantities above do not include quantities that could be provided from online resources, which depend on the ramp rates of these resources and the timing of the reserve product.

The FER Constraint. ISO-NE’s use of the FER constraint will enhance cross-substitution between energy and reserves. It will increase the effectiveness of non-generation resources (e.g., imports and virtual transactions) in disciplining attempts to withhold reserve capability. For instance, if a reserve supplier withholds one MW of 30-minute reserves, the co-optimized day-ahead market can substitute one MW of energy for reserves from other generation sources, and still meet the day-ahead demand for energy with imports, virtual supply, or any other energy offer. Thus, the co-optimization of products increases the competitiveness in the day-ahead market. The MISO and NYISO markets rely more heavily on supplemental commitment processes that do not allow for the same level of cross-product substitution which, therefore, can result in less competitive outcomes.

Overall Demand for Reserves. Operating reserve requirements account for a larger share of the overall demand for generating capacity in the New England compared to other markets, accounting for 25 percent in New England compared to 15 percent in NYISO and just 3 percent in the MISO. Hence, the addition of reserve requirements in New England will tend to increase market power by increasing the frequency with which at least one large supplier is pivotal (i.e., that the total demand for energy and reserves cannot be satisfied without some of the supplier’s capacity).

Energy Option vs. Reserve Forward. ISO-NE’s call option style day-ahead reserve product has a significantly higher marginal cost in the day-ahead market than the forward reserve style product used in the NYISO and MISO markets. Consequently, the supply of reserves in ISO-NE will have a different shape, which will affect the potential effectiveness of attempts to withhold supply. Although the ISO’s Market Power Analysis is not being used to evaluate the forward reserve style product, the ISO’s analysis will provide empirical information about how changes in the shape of the supply cost curve will increase or decrease the potential for market power.

Fuel Supply. The supply of natural gas and other input fuels to New England is more limited than in the NYISO and MISO markets for three to four months of the year. Pipeline constraints limit the flexibility of generators to increase output after the day-ahead market. Oil tank and hydro reservoir inventory constraints frequently increase the opportunity costs of producing

energy. The logistics of LNG imports often limit the utilization of LNG import capacity. These factors generally increase the marginal cost of supply. However, even when these fuel inventory constraints raise the marginal cost of supply, they do not prevent suppliers from responding when others attempt to exercise market power, which improves the competitiveness of the market.²

It is difficult to assess the overall impact of this confluence of factors on ISO-NE relative to other markets, since some of the factors increase competitiveness of the proposed markets in New England and others reduce it. The ISO’s market power analysis should provide insight regarding the net effects of these factors and the vulnerability of the proposed day-ahead energy and ancillary services markets to the exercise of market power. However, the conduct and impact market power mitigation framework is extremely robust and has been proven effective in a wide array of market settings. We are confident that this framework can be effectively applied to the new day-ahead ancillary service products proposed by ISO-New England as well.

Nonetheless, the ISO’s market power analysis will be important for calibrating the conduct and impact thresholds in New England to levels that appropriately balance the risk of under-mitigation against the risk of over-mitigation. The next section discusses the principles and criteria we recommend that the ISO adopt for establishing competitive reference levels applicable to the proposed day-ahead products, as well as the conduct and impact thresholds to be applied for imposing market power mitigation.

C. Application of the Conduct and Impact Mitigation Framework to the New Day-Ahead Ancillary Services Products

The key components of the conduct and impact mitigation framework are: a) the competitive benchmarks or “reference levels” for each offer parameter, and b) the conduct and impact thresholds used to determine when an offer warrants mitigation. We discuss both of these components in this Section as they relate to the day-ahead ancillary services products proposed by ISO New England.

Establishing Reference Levels for the New Products

The reference levels established for mitigation purposes are intended to reflect a competitive offer level for each offer parameter. For the economic parameters, the reference levels should reflect a generator’s short-run marginal costs. Marginal costs include all of the costs of selling a

² Electricity markets exhibit a greater degree of market power than other commodity markets because of electricity cannot generally be stored (notwithstanding that small amounts of energy can be stored in other forms in facilities such as hydroelectric generators and batteries). However, resources with available fuel inventories allow for intertemporal substitution because suppliers that choose to use less fuel on one day have more available on subsequent days, and vice versa. Intertemporal substitution increases the competitive response of the market to withholding and, thus, reduces market power.

product, including the expected costs of satisfying the products' obligations. It is an important input to the market power mitigation measures because if it is inflated, it could allow the supplier to exercise market power. If it is too low relative to the generator's marginal cost, it could lead competitive suppliers to be mitigated below cost. Hence, the IMM will need to administer a process where it estimates the short-run marginal costs of selling the proposed reserves products in the day-ahead market for each generator. In this subsection, we discuss the factors that should determine these costs.

The principal factors that account for the marginal cost of selling day-ahead reserves are the following:

Cost of settling the call option-style reserve product. A generator that sells a call option in the day-ahead market must pay the difference between the real-time LMP and the Strike Price of the option whenever the real-time LMP is larger. Ignoring risk preferences, the cost of settling the call option is generally very similar for each reserve supplier in each hour because it primarily depends on the common strike price and the volatility of real-time LMPs at a common location.³ However, this cost can fluctuate substantially from one day to the next, because market conditions can vary greatly by season and time of day.

Net cost of any additional fuel procurement. A generator may have to procure fuel if it is scheduled for reserves. If the generator does not anticipate that real-time LMPs will be high enough to support the cost of procuring the additional fuel, the generator will reflect the expected net cost (fuel and other costs minus real-time LMP revenue) in its offer price. The net cost of any additional fuel procurement will vary considerably based on pipeline conditions where the generator is located, fuel supply logistics for specific fuel in certain areas, etc.

Opportunity costs. Generators with low fuel inventories may not be able to sell reserves in all hours when it would be profitable based on the previous two criteria. In such cases, the generator will likely raise its offer prices to avoid being scheduled for a quantity of reserves exceeding its capability to generate. This cost depends on the quantity of fuel available to the generator and its opportunities to sell in other hours.

A large component of the reference level will be based on the first component, which will be very similar for most generators in a particular hour. Hence, it will be important for the IMM to develop a robust model to estimate this component of the competitive cost. The second and third components may also be significant for some generators under tight fuel supply conditions, but the data inputs for these categories will vary from generator to generator. Hence, the reference level methodology will need to be able to accommodate resource specific differences in these components.

³ The expected cost of settlement also depends on real-time prices in the event that the generator has a forced outage, so the cost of settlement varies across individual generators. But this source of individual variation tends to be much smaller than common cost drivers.

In addition to these components of short-run marginal costs, suppliers' varied expectations of LMPs, price volatility, and risk preferences can affect their offer prices even if they have no market power. These differences in expectations and risk preferences can cause competitive suppliers to submit offers that vary substantially from supplier to supplier. These variances are likely best accommodated through the conduct thresholds discussed in the next subsection rather than by increasing reference levels based on subjective criteria (e.g., risk preferences).

Ultimately, if the reference levels are reasonably accurate and the conduct and impact thresholds are not overly restrictive, suppliers should have adequate opportunities to adjust their offers competitively in the face of volatile market conditions.

Setting Conduct and Impact Thresholds

The mitigation thresholds should be set at levels that allow market participants with competitive incentives the flexibility to express different expectations and risk preferences, while limiting the adverse effects of market power when some suppliers would have anticompetitive incentives to withhold.

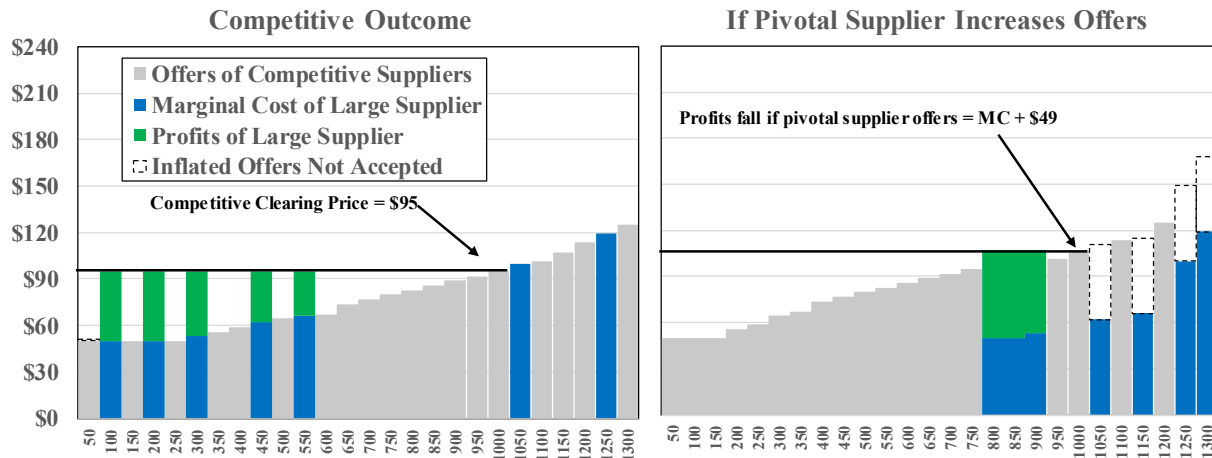
Under most conditions in a power market with uniform nodal pricing, a competitive supplier has an incentive to offer at its short-run marginal cost. Short-run marginal cost varies significantly across different generation technologies, ages, and fuel types. In recent years, the New England market has experienced more frequent constraints on the timing and quantities of fuel that may be procured, leading to increased levels of financial risk. Generators may also experience large changes in marginal costs because of fuel inventory limitations (e.g., hydroelectric generators with reservoir capacity, battery storage units, and fossil-fuel units with limited fuel inventories). It is impossible for the IMM to perfectly estimate the effects of all such factors and continuously update generator cost reference levels. Hence, the thresholds need to be large enough to avoid mitigating competitive offers.

Striking a reasonable balance in setting the thresholds is important. If the thresholds are too tight, it may prevent suppliers from expressing legitimate preferences and reflecting legitimate differences in competitive costs. This can interfere with the competitive performance of the market. On the other hand, if the thresholds are set too high, suppliers may have the incentive and ability to exercise market power by withholding supply from the market. Additionally, when the thresholds are set appropriately, it can change the incentives of suppliers to offer more competitively.

For example, the following figure depicts the supply curve in an area with 1000 MW of demand and 1300 MW of supply where one supplier is pivotal because it holds 350 MW of generation capacity (while the remaining 950 MW has competitive incentives). If the pivotal supplier offers

its supply at marginal cost, the clearing price will be \$95 per MW, and the supplier will earn a profit of \$9,700 on 250 MW of sales (which is depicted in the left side of the figure).

If there is no market power mitigation, the supplier can maximize profits by offering its supply at the market-wide offer cap of \$1,000 per MW. Since the supplier is pivotal, this would drive the clearing price all the way to \$1,000 per MW, and the supplier would earn a profit of \$47,500 on 50 MW of sales. This no-mitigation scenario is not depicted in the chart.



If market power mitigation were implemented with a conduct threshold of \$50, the pivotal supplier could only raise its offer to \$49 above marginal cost without exceeding the conduct threshold, which significantly reduces the supplier's incentive to withhold. Raising the offer by \$49 would raise the clearing price to \$107 per MW, and the supplier would earn a profit of \$8,400 on 150 MW of sales (as depicted on the right side of the figure). Therefore, the pivotal supplier would prefer to offer competitively because this would lead it to earn more profit. This example illustrates how the mitigation thresholds can change the incentives of suppliers even when mitigation is not actually being imposed. Considering these incentive effects will be important as the ISO develops conduct and impact thresholds that balance the concerns described above.

Finally, in a competitive market with price volatility and other sources of market risk, some competitive suppliers may choose to limit their exposure by offering with a risk premium (i.e., an increase in the offer price above the short-run marginal cost that is intended to reduce the likelihood of the supplier selling at a loss). Hence, competitive suppliers may submit offers that exceed short-run marginal costs in some cases. Allowing for legitimate differences in price expectations and risk preferences is important. Hence, the conduct and impact thresholds must enable competitive suppliers to reflect a reasonable risk premium in their offer price. This will require the development of a risk-based model to estimate the variation in such a premium to ensure that the thresholds accommodate it under a wide range of conditions. In this stakeholder

process, the Analysis Group has presented techniques for quantifying risk that could be useful in this regard.

The market power analyses being performed by the ISO will be very helpful in evaluating and quantifying these considerations. We stand ready to assist the ISO with these analyses and to recommend the market power mitigation rules and parameters indicated by their results.

D. Discussion of Must-Offer and Other Issues

This section addresses several related issues, as well as related questions that have been raised by individual stakeholders.

Need for a Must-Offer Obligation for the Day-Ahead Ancillary Services Products

There are many reasons why a competitive supplier might prefer not to offer reserves in the day-ahead market, even if it is technically capable of doing so. The formulation of profitable reserve offers is a complex task, requiring an on-going assessment of gas market and power market conditions. Ultimately, this may require additional staff and/or back office software. A competitive supplier will not rationally incur these upfront costs unless it anticipates sufficient reserves sales to recoup the costs. Hence, it may not be cost-effective under all conditions for some suppliers to offer the proposed day-ahead products.

Likewise, the sale of reserves may increase plant staffing costs if it requires additional employees to be available on short notice to accommodate changes in the commitment schedule after the day-ahead market. Although a portion of the additional plant staffing costs would be variable and, thus, could be incorporated into the day-ahead reserve offer, some fixed costs would be incurred to hire staff with additional flexibility. Such costs may not be rational for suppliers to incur that do not anticipate frequently being economic to provide reserves.

In the NYISO and MISO markets, where the supply of resources capable of providing each reserve product far exceeds the requirements, many high cost resources choose not to offer in many hours. The decision not to offer is evaluated as potential physical withholding, when warranted. However, we generally find that these generators lack market power and are rationally choosing not to offer. If competitive suppliers are required to offer when it would not be economic to do so, it will lead to several undesirable consequences.

- It will unnecessarily drive up costs for suppliers that own resources that are not economic to provide the day-ahead reserve products.
- Some generators may offer capacity at arbitrarily high price levels to comply with the must-offer rule, but still avoid being scheduled. Such units are unlikely to be mitigated since they won't have a significant market impact. However, it increases the risk that the ISO may schedule reserves on resources that are not actually available, thereby undermining the purpose of implementing a day-ahead reserve market.

- For some units, the ability to provide reserves may change based on gas system conditions. If such units are required to document the reasons for not offering in advance of the day-ahead market for every hour, it will be administratively burdensome (or infeasible) for suppliers and the IMM.

Given the large surplus of capacity that is qualified to provide each product, allowing high cost units to not offer will have no material effect on market outcomes under most conditions. Instead of a must offer requirement, we recommend having ex post market power mitigation measures that are specifically designed to deter physical withholding. In MISO and NYISO, such ex-post mitigation is in the form of physical withholding sanction (i.e., a financial penalty assessed in accordance with the tariff.). This would allow the IMM to focus on suppliers that choose not to offer under conditions when it might actually affect prices, and it would reduce compliance costs particularly for small suppliers that are usually not economic to provide reserves. An ex post process would also allow the IMM to more fully consider the relevance of explanations provided by suppliers for not offering the products.

Good Faith Requirement for Reserve Suppliers

In its October 23 letter, NESCOE asked for us to consider its statement that: “it will be important to clarify what ISO-NE and the IMM consider the ‘good sold’ in the case of [the reserve awards in the day-ahead market], and how they might evaluate ex post whether an offer was made in ‘good faith’ or not.”

We have evaluated this statement proposed by NESCOE and agree that it will be important for the ISO to clarify the obligations of the reserve sellers as a matter of good market design. Additionally, clarifying the expectation that suppliers be prepared to provide the reserve product in real time will improve the effectiveness of the products in satisfying the ISO’s reliability needs. Clarity on this point will also be essential for setting accurate reference levels.

Elements of Market Design that Affect Competition

The ISO has proposed to have demand “curves” for each reserve requirement in the day-ahead market, in the form of “stepped” reserve constraint penalty factors. Even in this crude form, such a demand curve for reserves allows the market to procure less than the “requirement” if the cost of procuring additional reserves exceeds the demand curve. While the demand curve is not an element of the mitigation measures, it does affect competition by reducing supplier market power. Hence, it will be important for the ISO to model the effects of reserve demand curves when it performs its Market Power Analysis.

E. Conclusions and Recommendations

We conclude that for the most part, the day-ahead ancillary services products are very similar to such products procured by other RTOs. These RTOs have successfully utilized the conduct and impact mitigation framework to effectively mitigate the potential exercise of market power for these products. Hence, we find that ISO New England’s conduct and impact mitigation

measures will likely be effective in addressing potential market power concerns related to the new ancillary services products in the co-optimized day-ahead energy and ancillary services market.

However, the market power analyses being undertaken by the ISO will be important for at least two reasons. It will allow the ISO to:

- Determine whether automated market power mitigation measures should be applied market-wide in the day-ahead market for energy and ancillary services; and
- If so, establish conduct and impact thresholds for these products that strike a reasonable balance between effectively mitigating market power and minimizing the risk of inappropriate mitigation.

Therefore, we look forward to collaborating with the ISO in its modeling and evaluation of potential market power associated with providing the new day-ahead ancillary services products.

Additionally, we have considered the value of applying a must offer requirement to these products. In general, we find that efficient markets should provide sufficient incentives to ensure adequate supply of these products. To the extent that market power provides incentives for one or more suppliers to not offer these products, we recommend the ISO address this issue with focused sanctions that deter such withholding. We will be available to evaluate the design and effectiveness of such sanctions.

Finally, will be available to discuss these issues with New England's stakeholders and address questions or concerns that are beyond the scope of this memo.

Feel to contact us with any questions.

DBP and PLVS