Attachment I

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

New York Independent System Operator, Inc. **Docket No. _____**

AFFIDAVIT OF PALLAS LEEVANSCHAICK, PH.D.

I. Qualifications

1. My name is Pallas LeeVanSchaick. I am an economist and vice president at Potomac Economics. Our offices are located at 9990 Fairfax Boulevard, Fairfax, Virginia 22030. Potomac Economics is a firm specializing in expert economic analysis and monitoring of wholesale electricity markets, and is the Market Monitoring Unit ("MMU") for the New York Independent System Operator, Inc. ("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 ("ERCOT").

2. As the MMU for the NYISO, Potomac Economics is responsible for assessing the competitive performance of the market, for identifying potential market design flaws and abuses of market power, and for commenting on the NYISO's implementation of the mitigation rules. This has included providing advice on numerous issues related to the determination of generator reference levels. I currently serve as the Director of the MMU for the NYISO.

3. I have worked as an energy economist for over ten years, focusing primarily on wholesale power markets. I have provided advice to Regional Transmission Organizations on transmission pricing, market design, congestion management issues, and market power mitigation. I have co-authored a number of studies evaluating the competitiveness of market outcomes in the NYISO, ISO-NE, and ERCOT. I have provided expert testimony before the Federal Energy Regulatory Commission ("Commission") related to the

application of market power mitigation rules and the efficient design of operating reserve markets.

4. I have a Ph.D. in Economics and a M.A. in Economics from George Mason University, and a B.A. in Economics and in Physics from the University of Virginia.

II. Purpose and Summary of Affidavit

5. The NYISO's market power mitigation measures for the Day-Ahead Market require that In-City generators offer Spinning Reserve at $0 per MWh and that the reference levels of generators capable of providing 10-Minute Non-Synchronized Reserve be no greater than $2.52 per MWh. [1] The purpose of this affidavit is to provide my assessment of the NYISO's proposal to phase-out these two mitigation provisions. Unless otherwise specified, capitalized terms used in my affidavit have the same meanings specified in the NYISO Services Tariff.

6. The remainder of my affidavit is divided into the following sections. Section III describes the market inefficiencies that have resulted from the two mitigation provisions that the NYISO proposes to phase-out. Section IV discusses the market power mitigation measures that the NYISO proposes to retain and assesses their adequacy after the two mitigation provisions are eliminated as proposed. Section V discusses how the procedure that the NYISO proposes for phasing-out the two mitigation provisions will provide additional protection for NYISO customers if the mitigation measures prove to be inadequate. Section VI summarizes my conclusions.

III. Market Inefficiencies Resulting from the Existing Mitigation Provisions

7. The proposed rule changes are necessary to avoid certain inefficient scheduling outcomes that have been observed during high load conditions since 2005 when the NYISO first implemented fully co-optimized energy and ancillary services in the Day-Ahead and Real-

---

[1] The limit on In-City Spinning Reserve suppliers is in NYISO Market Services Tariff §23.5.3.3. The limit on 10-Minute Non-Synchronized Reserve suppliers is found in §23.3.1.4.5. Reference levels are intended to be an estimate of a competitive offer, and they are defined in §23.3.1.4.

Time.[2] It is particularly important to schedule efficiently during high load conditions, since market inefficiencies tend to have larger effects on wholesale market costs and on signals for new investment during high load conditions. This section of the affidavit discusses how two of the current market power mitigation provisions sometimes prevent Operating Reserves suppliers from responding efficiently to market incentives.

8. To understand how the current market power mitigation rules inhibit efficient behavior, it is instructive to consider how competitive Operating Reserve suppliers behave in a co-optimized energy and ancillary services market. Competitive suppliers generally have an incentive to offer energy and operating reserves at marginal cost, allowing the ISO to select the lowest overall cost resources to satisfy the demand for both products. The clearing prices of each product are set so that suppliers who offer at marginal cost are scheduled to provide whichever product is more profitable, thereby reinforcing their incentive to offer at marginal cost. Hence, factors that limit their ability to offer at marginal cost tend to reduce the efficiency of scheduling.

9. The incentives of competitive Operating Reserve suppliers are affected by the interaction between the Day-Ahead and Real-Time Markets. To the extent that a supplier sells reserves at the Day-Ahead clearing price, the supplier has less reserve capacity available to sell at the Real-Time clearing price. Therefore, if the supplier expects Day-Ahead clearing prices to be lower than Real-Time clearing prices, the supplier will defer selling reserves until the Real-Time Market. A supplier can avoid selling in the Day-ahead Market by raising its Day-Ahead offer price to reflect the lost opportunity cost of selling at the Day-Ahead clearing price. Similarly, if Day-Ahead clearing prices are expected to be higher than Real-Time clearing prices, a supplier can lower its Day-Ahead offer price in order to sell a larger share of reserve capability at the higher Day-Ahead clearing price.[3,4] In this

---

[2] Previously, energy and ancillary services were co-optimized in the Day-Ahead Market, and the co-optimization was reflected in the Day-Ahead Energy LBMPs. However, the co-optimization was not reflected in the Day-Ahead clearing prices for Ancillary Services.

[3] Note, since Operating Reserve offer prices cannot be negative, a supplier may not be able to reduce its offer price low enough to be scheduled for reserves in the Day-Ahead Market.

manner, competitive suppliers respond to inconsistencies between Day-Ahead and Real-Time clearing prices in ways that promote consistency.

10. Substantial inconsistencies have been observed between Day-Ahead and Real-Time clearing prices for Spinning Reserve and 10-Minute Non-Synchronized Reserve during high load conditions in each year since 2005 when the co-optimization of energy and ancillary services were first reflected in the clearing prices of ancillary services.[5] For instance, the average Day-Ahead clearing price for 10-Minute Non-Synchronized Reserves in Eastern New York in the summer of 2011 in hours-beginning 15 and 16 was $8.80 per MWh, 73 percent lower than the average Real-Time clearing price for the product during the same set of hours. Under such market conditions, competitive suppliers would be expected to increase their Day-Ahead offer prices until Day-Ahead clearing prices were consistent with expected Real-Time clearing prices. However, the market power mitigation rules prevent reserve suppliers from raising their Day-Ahead offer prices, thereby inhibiting the market from bringing about better consistency between Day-Ahead and Real-Time clearing prices.

11. Two provisions of the NYISO's market power mitigation measures inhibit competitive offers in the Day-Ahead Market. First, In-City generators are required to offer Spinning Reserve at $0 per MWh in the Day-Ahead Market. Second, the reference levels for 10-Minute Non-Synchronized Reserve are limited to be no greater than $2.52 per MWh. The two mitigation provisions are not sufficiently targeted or flexible to allow suppliers to raise their offer prices when it would be competitive to do so. This is in sharp contrast with most of the NYISO's market power mitigation measures, which are designed to be imposed only when the behavior likely constitutes an exercise of market power.[6] Taken together,

---

4 In a competitive market, a modest premium is expected on the Day-Ahead clearing price relative to the expected value of the Real-Time clearing price, since Operating Reserve suppliers face the risk of having an unplanned outage and being required to buy out of their Day-Ahead Operating Reserve Schedule at elevated Real-Time clearing prices.

5 The pattern was identified in the *2005 State of the Market Report, New York ISO* (by Potomac Economics) on page 41 and in each subsequent annual state of the market report.

6 See NYISO Market Services Tariff §23.1.1.

these two provisions are applied to approximately 69 percent of the combined supply of Spinning Reserve and 10-Minute Non-Synchronized Reserve capability in Eastern New York, leading the Day-Ahead clearing prices of these products to be set below competitive levels in some hours.

12. If Operating Reserve suppliers were able to adjust their offers competitively, it would lead to an increase in Day-Ahead clearing prices for Spinning Reserve and 10-Minute Non-Synchronized Reserve in Eastern New York during high load conditions. This would result in better consistency between Day-Ahead and Real-Time clearing prices for these products. Improved price convergence would, in turn, lead to more efficient commitment and scheduling of resources in the Day-Ahead Market in at least two ways:

    - Higher reserve clearing prices in the Day-Ahead Market would favor the commitment of internal units that have Spinning Reserve capability as opposed to energy-only resources, such as Imports and internal generators that do not have Spinning Reserve capability.
    - Higher offer prices from Spinning Reserve and 10-Minute Non-Synchronized Reserve suppliers would lead more of their reserve capacity to be unscheduled in the Day-Ahead Market, but their capacity would be remain available to the Real-Time market.

    Both of these changes in Day-Ahead scheduling would increase the amount of additional capacity available in the Real-Time Market for the system to respond to unexpectedly tight operating conditions on days when such conditions are more likely (e.g., peak load conditions). For these reasons, I recommend the NYISO eliminate the provisions that prevent suppliers from raising their offer prices during competitive conditions.

IV. Adequacy of Market Power Mitigation Measures

13. Since the original implementation of the two mitigation provisions that the NYISO proposes to eliminate, many new combined cycle and peaking generators have been built in Eastern New York, adding approximately 1.8 GW of additional Spinning Reserve and 10-Minute Non-Synchronized Reserve capability. Furthermore, most of the new generators are owned by firms that did not have large portfolios in 2000, leading to a considerable reduction in the concentration of ownership of resources that are able to provide those products. Nonetheless, it is important to consider whether the remaining market power

mitigation measures will be adequate to ensure the market performs competitively after the proposed changes are made. In this section, I summarize the market power analyses performed by the NYISO, and I discuss the market power mitigation measures that the NYISO proposes to retain and why I expect that they will be sufficient to ensure workably competitive market outcomes.

14. The NYISO evaluated structural market power in the relevant markets using the Herfindahl-Hirschman Index and the Residual Supply Index. At the time of the assessment, the NYISO required: 300 MW of Spinning Reserve in Eastern New York, 600 MW of Spinning Reserve in NYCA, 1,200 MW of 10-Minute Total Reserve in Eastern New York, and 1,200 MW of 10-Minute Total Reserve in NYCA.[7] The 10-Minute Total Reserve requirements can be met by any combination of Spinning Reserve capacity or 10-Minute Non-Synchronized Reserve capacity. Based on these requirements, the NYISO evaluated the structural market power indices for four products:

- Spinning Reserve in Eastern New York ("Eastern Spinning Reserve");
- Spinning Reserve in NYCA ("NYCA Spinning Reserve");
- 10-Minute Total Reserve in Eastern New York ("Eastern 10-Minute Total"); and
- 10-Minute Total Reserve in NYCA ("NYCA 10-Minute Total").

The NYISO evaluated potential market power on an hourly basis during one high load period in the summer when a large share of supply resources were in service (July 2011) and during one mild load period in a shoulder season when a substantial share of supply resources were on planned outages (October 2011). The NYISO further distinguished peak hours (i.e., hour 7 to 22, Monday through Friday) from off-peak hours. For each of the four products, the NYISO tabulated the indices separately for the summer versus the shoulder season and for peak hours versus off-peak hours, yielding a total of 16 product categories.

---

[7] In June 2012, the Spinning Reserve requirement for Eastern New York, the Spinning Reserve requirement for NYCA, and the 10-Minute Total Reserve requirement for NYCA were adjusted to 330 MW, 655 MW, and 1,310 MW, respectively. These requirements were changed due to an increase in the size of the NYISO's largest single supply contingency from 1,200 MW to 1,310 MW.

A. Herfindahl-Hirschman Index

15. The Herfindahl-Hirschman Index ("HHI") is a standard measure of market concentration calculated by summing the square of each supplier's market share. The antitrust agencies generally characterize markets with HHIs of greater than 1,800 as highly concentrated.[8] All else being equal, the higher the HHI, the more likely it is that firms would be able to extract excess profits from the market.

16. The NYISO found that the mean HHIs for most of the 16 product categories were generally moderate, falling primarily in the range between 1,000 and 1,800. The mean HHIs were below 1,800 for all eight peak hour product categories and three of the four off-peak 10-Minute Total product categories, while the fourth off-peak 10-Minute Total product category was 1,851. However, the mean HHIs ranged from 1,930 to 2,829 for the four off-peak Spinning Reserve product categories. The NYISO's HHI calculations reflect that the available supply of reserves falls during low demand periods (i.e., off-peak hours and shoulder seasons) when fewer resources are online and available to provide reserves, and they reflect that the ownership of supply of Spinning Reserve is more concentrated than the ownership of supply of 10-Minute Total reserves.

17. HHI statistics are an indicator of market concentration in electric power markets, but not a definitive measure of market power.[9] The usefulness of HHIs is limited by the fact that they reflect the concentration of supply, while ignoring demand-side factors that affect competition. Hence, the NYISO's HHI calculations do not reflect that the demand for reserve products is generally much smaller than the total available supply. Ultimately, these shortcomings of the HHI metric are better addressed by the Residual Supply Index, which is discussed below.

---

[8] The DOJ and FTC evaluate the change in HHI as part of standard merger analysis. However, this is only a preliminary analysis that would typically be followed by a more rigorous simulation of the likely price effects of the merger.

[9] For example, see Severin Borenstein, James B. Bushnell, and Christopher R. Knittel, "Market Power in Electricity Markets: Beyond Concentration Measures," *Energy Journal* 20(4), 1999, pp. 65-88.

B. Residual Supply Index

18. A supplier is pivotal when some of its resources are needed to meet demand in the market, so a pivotal supplier has the ability to unilaterally raise the spot market prices to arbitrarily high levels by offering at a very high price level. The market may be subject to substantial market power abuse when one or more suppliers are pivotal and the suppliers have the incentive to take advantage of their position to raise prices. The Residual Supply Index ("RSI") is the ratio of the total available supply, excluding the largest supplier, to the total demand. An RSI greater than one indicates that the largest supplier is not pivotal, while an RSI less than one indicates that the resources of the largest supplier are necessary to meet demand . An RSI greater than two indicates that even after excluding the largest supplier, supply is more than twice the level of demand.

19. In its RSI evaluation, the NYISO found that no supplier was ever pivotal for any of the four products. Furthermore, the RSI was greater than 2.0 in nearly all of the hours studied for all product categories except 10-Minute Total Reserves in Eastern New York during the shoulder season in off-peak hours. Even for this product category (the RSI ranged between 1.5 and 2.0 in a large number of hours), the RSI results suggest that there is limited potential for the exercise of market power.[10] Nonetheless, the NYISO's phased approach to the proposed elimination of the two mitigation provisions (which is described in Section V) provides considerable protection from the exercise of market power.

20. Since the NYISO's RSI evaluation was conducted, there have been several changes in the supply and demand for Spinning Reserve and 10-Minute Non-Synchronized Reserve that will affect competition. The largest single source contingency in NYCA increased from

---

[10] It would also be appropriate to perform the RSI evaluation for total 10-Minute Reserve and energy combined in Day-Ahead Market. This is because a supplier could potentially be pivotal for the two products combined without being pivotal for just one product or the other. However, it is unlikely that such an RSI evaluation would find a substantial number of hours when a supplier was pivotal (after appropriately netting out the capacity of suppliers that was needed to satisfy the supplier's own load obligations), since both NYCA and Eastern New York enjoy considerably more capacity than is necessary to satisfy the demands for energy and 10-Minute Total Reserve in the Day-Ahead Market in vast majority of hours. Although there may be a small number of hours during the year when a supplier is pivotal for total 10-Minute Total Reserve and energy combined in Eastern New York or in NYCA as a result of generation and transmission outages, the NYISO's market power mitigation measures limit the potential harm that could result from withholding during such periods.

1,200 MW to 1,310 MW, increasing the requirements for Eastern Spinning Reserve, NYCA Spinning Reserve, and NYCA 10-Minute Total Reserve each by 9 to 10 percent. However, the increased demand for these reserve products has been more than offset by the addition of new supplies of Spinning Reserve and 10-Minute Total Reserve in Eastern New York. Therefore, it is likely that the potential for a supplier to exercise market power has, if anything, diminished since the NYISO conducted the RSI evaluation.

C. Market Power Mitigation Measures for Ancillary Services

21. The NYISO's market power mitigation rules limit the potential harm from the exercise of market power in the ancillary services market using the conduct-and-impact framework, which is designed to limit withholding behavior that is likely to have a substantial effect on clearing prices, while minimizing unnecessary intervention in a competitive market. The conduct-and-impact framework consists of two parts. First, the conduct test identifies Operating Reserve suppliers that increase their offer prices by a specified amount (the lesser of $50 per MWh or 300 percent) above their reference level.[11] Second, the impact test estimates the effect of such conduct on clearing prices, and if the impact is estimated to be greater than $100 per MWh or 200 percent, the conduct will be mitigated.[12]

22. Although the markets for Spinning Reserve and 10-Minute Non-Synchronized Reserve are expected to perform competitively, the mitigation measures that will be retained to substantially limit the likelihood that a supplier could successfully exercise market power. Furthermore, the mitigation measures limit the potential harm that would result if one or more suppliers attempted to withhold to increase the clearing price in some hours. Nonetheless, the NYISO's proposal includes a conservative approach to phasing-out the two mitigation provisions that it proposes to eliminate. The phased approach will ensure that the market is expected to perform competitively before the two mitigation provisions are totally eliminated. The phased approach is discussed in the following section.

---

[11] The conduct threshold is defined in NYISO Market Services Tariff §23.3.1.2.1.2.

[12] The impact threshold is defined in NYISO Market Services Tariff §23.3.2.1.1.

V. Discussion of Proposed Procedure for Changing Existing Rules

23. The NYISO's proposal includes the following plans for phasing-out the two mitigation provisions that it proposes to eliminate.

    - For 10-Minute Non-Synchronized Reserve, the NYISO will gradually increase the cap on the reference level. Step 1 will adjust the cap from the current level of $2.52 per MWh to $5 per MWh, Step 2 will adjust the cap to $10 per MWh, and Step 3 will remove the cap entirely. The mitigation measures will not be eliminated for this product, only the cap on the reference level.
    - For Spinning Reserve suppliers in New York City, the NYISO will gradually increase the offer cap. Step 1 will adjust the offer cap from the current level of $0 per MWh to $5 per MWh, Step 2 will adjust the offer cap to $10 per MWh, and Step 3 will remove the offer cap entirely. The mitigation measures will not be eliminated for this product, only the offer cap.

24. In the months following the transition from one step to another, the MMU will evaluate Day-Ahead Market performance and report its findings in the next quarterly or annual State of the Market Report. Specifically, the MMU will examine whether Operating Reserve offers are consistent with competitive conduct and whether the consistency of Day-Ahead and Real-Time clearing prices improves. If the market performs competitively, the MMU will recommend the NYISO proceed to the next step. If the market does not perform competitively or if it is not expected to perform competitively at the next step, the MMU will recommend the NYISO return to the previous step or remain at the current step.

25. The proposed approach to phasing-out the two mitigation provisions strikes a reasonable balance between the risks of over-mitigating and under-mitigating given several considerations. First, it is difficult to modify existing mitigation rules in the stakeholder process without addressing the concern that changes in the rules might lead to unforeseen changes in behavior. Second, the two mitigation provisions could be completely phased-out before the summer of 2014 if the market performs competitively at each step, which is a reasonably short period. Furthermore, the phased approach was used successfully by the Midwest ISO when it initially implemented its co-optimized energy and ancillary services market in 2009 to build confidence in the new market.

VI. Conclusions

26. Two of the NYISO's mitigation provisions have been found to limit competitive behavior by Operating Reserve suppliers in the Day-Ahead Market, contributing to poor consistency between Day-Ahead and Real-Time clearing prices. I expect that the market will perform competitively if the two mitigation provisions are eliminated as the NYISO proposes in this filing. Nonetheless, I support the NYISO's proposal to phase-out the two mitigation provisions in a manner that will allow the MMU to evaluate whether the market is performing as expected before the two mitigation provisions are totally eliminated.

27. This concludes my affidavit.

ATTESTATION

I am the witness identified in the foregoing Affidavit of Pallas LeeVanSchaick, Ph.D. dated October 25, 2012 (the "Affidavit"). I have read the Affidavit and am familiar with its contents. The facts set forth therein are true to the best of my knowledge, information, and belief.

Pallas LeeVanSchaick
October 25, 2012

Subscribed and sworn to before me
this 25th day of October 2012

Notary Public

MATTHEW JAMES CARRIER
Notary Public
City/County of Fairfax
Commonwealth of Virginia
Notary registration number - 7233763
My commission expires - Nov. 30, 2013

My commission expires: Nov. 30, 2013