Attachment V

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

New York Independent System Operator, Inc. **Docket No. ER15-____-000**

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 market design, economic efficiency, and the determination of generator reference levels as well as preparing a number of reports that assess the performance of the NYISO's markets. I currently serve as the Director of the MMU for the NYISO.

3. I have worked as an energy economist for over 13 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 Comprehensive Shortage Pricing proposal consists of several key elements:

- Creating a new Southeast New York ("SENY") operating reserve zone to recognize in scheduling and pricing outcomes the costs that are necessary to maintain reliability and transmission security in that portion of the state;
- Increasing the New York Control Area ("NYCA") operating reserve requirement to satisfy certain important system-level reliability criteria more efficiently;
- Raising the demand curve levels of critical operating reserves requirements; and
- Making conforming changes to the Regulation Service Demand Curve[1] and the Transmission Shortage Cost, which I will refer to hereinafter as the "Graduated Transmission Demand Curve."

6. The purpose of this affidavit is to explain why the proposed changes to the shortage pricing rules will lead to more efficient congestion management, reserve scheduling, and pricing during periods when the NYISO is maintaining reliability under tight system conditions.

7. The remainder of this affidavit is divided into the following sections. Section III discusses the benefits of efficient shortage pricing in general. Section IV explains why the proposed changes will improve the efficiency of prices and resource schedules. Section V evaluates the reasonableness of how the NYISO proposes to incorporate Long Island into the larger SENY, East of Central-East, and NYCA reserve areas. Section VI discusses the time frame in which the NYISO proposes to make these changes and the implications of delaying these changes unnecessarily. Section VII summarizes my conclusions.

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[1] Capitalized terms that are not defined herein shall have the meaning ascribed to such terms in the NYISO's Market Administration and Control Area Services Tariff ("Services Tariff") and if not defined therein, shall have the meaning ascribed to them in the NYISO's Open Access Transmission Tariff ("OATT").

III. Benefits of Efficient Shortage Pricing

8. Shortage pricing is an essential element of an efficient and competitive market design for centralized wholesale electricity markets. Prices are efficient when they reflect the cost of serving demand and maintaining reliability. Efficient prices should also reflect costs associated with the diminished reliability of the system when short of reserves. These costs should determine the Operating Reserve Demand Curves that reflect the willingness of the operators to incur additional costs to make reserves available. This section discusses the benefits of efficient shortage pricing when the available resources are insufficient for the NYISO to satisfy some operating reserve requirements.

9. In the real-time market, efficient shortage pricing rewards resources for reliable performance and for maintaining a high level of availability on days with tight operating conditions when good performance is most important for system reliability.

10. In the day-ahead and intraday scheduling time frames, market participants schedule based on how they expect real-time conditions will be reflected in market clearing prices. Hence, the expectation of tight conditions encourages import scheduling, generation commitment, and fuel procurement. In this way, efficient pricing promotes the scheduling of resources that will likely be needed to satisfy the reliability needs of the system. Shortage pricing is essential in this process because scheduling incentives are primarily driven by the expected value of prices during a potential shortage—the probability of a shortage occurring times the shortage pricing level.

11. Over the long-term, efficient shortage pricing provides incentives for investment: in resources with flexible operating characteristics, in locations where resources are most valuable, in the maintenance of existing resources to ensure reliable performance, and in procuring fuels that take weeks or months to be delivered.

12. Efficient shortage pricing also reduces the amount of revenue that must be recovered through the installed capacity market because it provides additional compensation to resources that perform reliably during stressed operating conditions. Shifting reliance from the capacity market to shortage pricing tends to reduce overall wholesale costs for load

customers because shortage prices are paid only to resources that perform during stressed conditions, while capacity prices must be paid to nearly all in-service resources.

IV. Proposed Demand Curves will Improve Market Efficiency

13. The NYISO has proposed changes to the market requirements and demand curves for operating reserves that would be a significant improvement over the current rules. The proposed changes would lead the day-ahead and real-time market models to make scheduling decisions and set market clearing prices that are more consistent with the operational needs of the system. These changes are designed to address several deficiencies that we have identified in recent years.[2] This section discusses key changes and the deficiencies they would address.

A. Proposed Operating Reserve Requirements Are Appropriate

14. First, the NYISO proposes to create a SENY 30-minute reserve requirement to help ensure adequate resources would be available to maintain transmission security following a large contingency (without resorting to actions such as firm load shedding). This new market requirement is consistent with the NYSRC reliability criteria that requires the NYISO to prepare SENY for the second largest contingency within 30 minutes following an occurrence of the largest contingency.[3]

15. Second, the NYISO proposes to increase the NYCA total 30-minute operating reserve requirement from 1.5 times the largest single contingency to twice the largest single contingency. This new market requirement would purchase all of the reserves necessary to comply with the NYSRC reliability criteria that requires the NYISO to be able to restore 10-minute reserves within 30 minutes following an occurrence of the largest contingency, rather than relying on latent reserves and/or out-of-market actions to meet such requirement.[4]

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2 *See, e.g.,* Potomac Economics, *2013 State of the Market Report for the New York ISO Markets* at 69, 100-101 (May 2014).

3 New York State Reliability Council, L.L.C. ("NYSRC") Reliability Rule F-R1c.

4 NYSRC Reliability Rule D-R4. Latent reserves are unscheduled reserves held by dispatched generators between their scheduled output levels and their upper operating limits.

16. Currently, the NYISO market does not fully reflect these reliability criteria, instead the NYISO relies on a combination of market procurement and latent reserve capability or operator actions to comply with such requirements. As such, out-of-market actions are often necessary to satisfy these criteria during peak conditions, including SRE commitments, EDRP/SCR Resource activations, export curtailment, and out-of-merit dispatch. For example, during hours since 2013 when load was at least 90 percent of the all-time NYCA peak load of nearly 35 GW, one or more of these out-of-market actions was used in all of the hours for SENY and in all of the hours for NYCA

17. Out-of-market actions are necessary when the day-ahead and real-time markets do not schedule sufficient operating reserves to satisfy these reliability criteria. As such, the use of out-of-market actions may result in market prices that do not always reflect the full cost of maintaining reliability. When prices are depressed, some suppliers will not have sufficient incentives to make resources available or, in the case of latent capability, to procure adequate fuel to make such latent capability available. Thus, fully reflecting the need for operating reserves in SENY and for NYCA will better align the reserve market requirements with the reliability needs of the system.

B. Proposed Demand Curve Levels Will Enhance Market Efficiency

18. First, the NYISO proposes to increase the levels of several Operating Reserve Demand Curve values to between $750 and $775 per MWh, including the demand curves for NYCA Spinning Reserves, NYCA total 10-minute reserves, Eastern total 10-minute reserves, and a portion of the requirement for NYCA total 30-minute reserves.[5] These would be increased from the current levels, which range from $200 to $500 per MWh.

19. These increased demand curves are justified because they would better align the market requirements with the needs of the system, helping ensure that when high cost resources are needed, their costs are reflected in prices. Each of the demand curves associated with the reserve requirements noted above is designed to help satisfy important reliability

[5] The proposed revisions to the demand curve for NYCA total 30-minute reserves consists of four pricing points based on varying levels of shortage: (i) $25 per MW for shortages of fewer than 300 MW; (ii) $100 per MW for shortages of at least 300 MW but less than 655 MW; (iii) $200 per MW for shortages of at least 655 MW but less than 955 MW; and (iv) $750 per MW for shortages of 955 MW or greater.

criteria, so the NYISO generally takes all available actions to satisfy the underlying requirements. The increased demand curves will help ensure that the market does not reject a supply offer that must subsequently be scheduled out-of-market by the NYISO. This is particularly important for the NYISO, where more than 3 GW of thermal peaking units have heat rates between 14 and 20 MMbtu per MWh and sometimes must operate on diesel or kerosene during peak conditions. When operating on oil, it is not uncommon for these units to have costs exceeding $400 per MWh over the first hour of commitment.

20. The benefits of increased demand curves are illustrated by the following example. Suppose a $450/MWh gas turbine must be started so that a $50/MWh combined cycle unit can be backed-down to provide spinning reserves to reduce the severity of an Eastern 10-minute reserve shortage. Suppose the shortage is expected to last for 45 minutes during which the 10-minute reserve price will be $500/MWh and the LBMP is $550/MWh. Further suppose additional imports are expected to become available in the last 15 minutes of the hour, resulting in an LBMP of $90/MWh in that period. In this example, the market model would value energy at an average of $435/MWh, so the model would not start the gas turbine to reduce the shortage.[6] On the other hand, if the example is modified to use the proposed level of $775/MWh, the gas turbine would be started to reduce the shortage, even if it was expected to last for only 30 minutes.[7] Thus, the proposed demand curve levels are much more likely to lead to the commitment of available thermal peaking units when necessary to avert a shortage.

21. Second, the NYISO proposes to increase the demand curve to $200 per MWh for shortage levels of NYCA 30-minute operating reserves that reduce the amount of scheduled reserves below the requirement of 1.5 times the largest contingency. This level would be an increase from $50 and $100 per MWh for shortages of similar magnitude for the currently-effective demand curve for NYCA 30-minute reserves. This increase is important for

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[6] The real-time commitment model ("RTC") forecasts whether a gas turbine will be economic to commit looking over a 150-minute period in 15-minute increments. In this case, $435/MWh is an average based on 45 minutes at a forecasted LBMP of $550/MWh and 15 minutes at $90/MWh.

[7] This assumes the $775/MWh demand curve results in an LBMP of $825/MWh during the 30 minutes of shortage. In this case, the average LBMP would be $457.50/MWh, assuming RTC forecasts 30 minutes at an LBMP of $825/MWh and 30 minutes at $90/MWh.

ensuring that the NYISO schedules available online capacity to help satisfy system needs. For example, suppose that ramping-up a $180/MWh oil-fired steam unit would allow the NYISO to create operating reserves by ramping-down a $50/MWh online unit. The market model will only make this trade-off if the operating reserve product is worth $130/MWh or more.[8] So, the proposed demand curve will help ensure that the NYISO does not need to use out-of-merit commitment and dispatch to maintain adequate reserves.

22. Third, the NYISO proposes to use a demand curve of $25 per MWh for the newly created SENY reserve requirement. Since SENY operating reserves are currently valued at $0 in the NYISO market, the proposed demand curve is an improvement over the status quo. During tight operating conditions, however, the cost of maintaining adequate resources in SENY will likely exceed $25 per MWh, which may make it necessary for the NYISO to take out-of-market actions. Accordingly, the Market Monitoring Unit plans to evaluate the SENY demand curve level in future State of the Market reports to assess the appropriateness of this level.

C. Conforming Changes to Regulation Service Demand Curve and Graduated Transmission Demand Curve

23. The NYISO's proposal will increase substantially the economic priority of scheduling operating reserves to ensure that the available resources are scheduled and priced through the market rather than through out-of-market actions. However, if conforming changes are not made to the demand curves for regulation and transmission security, the market may schedule resources to provide operating reserves when they would be more valuable providing regulation or congestion relief.

24. The NYISO proposes to modify all three steps of the Regulation Service Demand Curve. For small (<= 25 MW) shortages, the demand curve would fall from $80 to $25 per MWh to reduce the severity of transient price spikes that result on a daily basis as the system ramps under normal operating conditions. For moderate (25 to 80 MW) shortages, the demand curve would rise from $180 to $400 per MWh to ensure that the prices and

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[8] Ramping-up a $180/MWh unit and ramping-down a $50/MWh unit to increase operating reserves would result in a marginal cost of $130/MWh, so the reserve clearing price would be set at that level.

schedules reflect that regulation service is more valuable than 30-minute reserves for NYCA as a whole. For significant (>80 MW) shortages, the demand curve would rise from $400 to $750 per MWh to reflect that the value of regulation is comparable to 10-minute spinning reserves for NYCA. These changes are reasonable and will generally result in an efficient allocation among the different Ancillary Services products.

25. The increase in the pricing point on the Graduated Transmission Demand Curve for moderate (5 to 20 MW) violations of a transmission limit from $1,175 to $2,350 per MWh is necessary so that the market model places the appropriate economic priority on transmission security versus operating reserves. For example, when the critical Central East interface limit binds, most generators East of Central-East have a shift factor of around -50%. If this step of the Graduated Transmission Demand Curve remained at $1,175/MWh, energy East of Central–East would be priced at around $600/MWh during moderate violations, which would make securing the interface appear less valuable than scheduling 10-minute reserves (which would have a demand curve value of $775/MWh) for the interface. Since the 10-minute reserve requirement East of Central-East is ultimately there to secure the Central-East interface, it is important to place a higher economic priority on energy than 10-minute reserves under such circumstances.

V. Inclusion of Long Island in the SENY Reserve Zone is Reasonable

26. In recent years, it has become apparent that internal transmission constraints limit the extent to which Long Island can export to upstate New York. Consequently, the NYISO proposes to limit the amount of reserves that can be scheduled on Long Island resources to help satisfy the reserve requirements for SENY, East of Central-East, and NYCA. The NYISO's proposal is reasonable because it strikes a balance between allowing Long Island resources to be scheduled when they are likely to help satisfy reliability criteria, while preventing Long Island resources from providing reserves when they would likely not contribute to the reliability of the larger reserve zone.

27. The NYISO proposal would treat Long Island as nested within larger import-constrained areas such as SENY. This is usually appropriate because when Long Island reserves are deployed, it usually: (a) allows a SENY generator outside Long Island to ramp-down,

increasing available reserves in SENY, and/or (b) reduces transmission flows into SENY, thereby relieving overloaded transmission facilities into the area. Either way, deploying reserve units on Long Island usually helps the NYISO maintain reliability following a contingency that would otherwise overload transmission into SENY.

28. On the other hand, the NYISO has found that Long Island has little ability to export to the rest of New York because of certain transmission limitations. Although Long Island is normally a net importer from the rest of New York, it does have a large amount of peaking capacity. As such, the sum of energy supply plus available operating reserves can exceed load on Long Island by a significant margin during certain periods. At such times, there is a limit to the amount of operating reserves that could be deployed if a large contingency occurred outside Long Island because of the transmission constraints noted above. For example, suppose that on Long Island load is 5.0 GW and generation plus imports from PJM and ISO-NE totals 4.5 GW, resulting in 500 MW of imports from the rest of New York. In such cases, it would not always be possible to deploy more than 500 MW of operating reserves before reaching an export limit following a contingency outside Long Island. Thus, if the NYISO market allowed more operating reserves to be scheduled in Long Island, they would not be deliverable, and it would lead the market to schedule insufficient reserves outside Long Island.

29. The NYISO proposal balances these concerns by limiting the amount of reserves that could be provided by Long Island units to a value ranging from 270 to 540 MW, depending on the hourly locational 30-minute reserve requirement for Zone K. This is reasonable given the limitations of the transmission system and the current market software.[9]

VI. Timeframe for Implementation

30. The NYISO's proposed changes will provide significant benefits from improved pricing and scheduling efficiency as soon as they are implemented. As noted above,

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[9] In long-term, it may be desirable for the NYISO to consider software enhancements that would allow the real-time market to co-optimize the Long Island reserve export limitation with energy and ancillary services and whether such enhancements are feasible and cost-effective. In future State of the Market Reports, the Market Monitoring Unit will evaluate whether such enhancements may lead to more efficient pricing and scheduling outcomes.

implementation of the proposed changes will improve market efficiency and provide adequate incentives for resources to maintain a high level availability, especially during tight operating conditions when such resources are needed most.[10] Additionally, the proposed changes will provide incentives for resources to make appropriate fuel supply arrangements to ensure availability, which is critically important during winter peak conditions and other periods of fuel supply constraints. As such, delaying the changes beyond the anticipated effective date in November 2015 would unnecessarily prevent the market from realizing these efficiency benefits for the Winter 2015/16 period.

VII. **Conclusions**

31. Based on the foregoing, I support the NYISO's proposal to implement a new SENY reserve zone and the 30-minute reserves requirement associated therewith, as well as the proposal to increase the NYCA total 30-minute reserves requirement. These changes are consistent with certain reliability criteria applicable to the NYISO and will improve market efficiency in meeting such requirements. In addition, the proposed revisions to the various demand curves are reasonable and better align market pricing outcomes with system reliability needs, thereby reducing the need for potential reliance on out-of-market actions by operators. Furthermore, given the beneficial improvements associated with the NYISO's proposal, implementation thereof should not be delayed beyond the Winter 2015/16 period.

32. This concludes my affidavit.

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[10] Accordingly, the new SENY reserve requirement will be particularly beneficial during summer peak conditions, while the changes related to the NYCA reserve requirements will be beneficial during both winter and summer peak conditions.

ATTESTATION

I am the witness identified in the foregoing Affidavit of Pallas LeeVanSchaick, Ph.D. dated February 18, 2015 (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
February 18, 2015

Subscribed and sworn to before me
this 18th day of February 2015

Notary Public

MATTHEW JAMES CARRIER
NOTARY PUBLIC
REG. #7233763
COMMONWEALTH OF VIRGINIA
MY COMMISSION EXPIRES NOVEMBER 30, 2017

My commission expires: Nov. 30 2017