UNITED STATES OF AMERICA BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION

New York Independent System Operator, Inc.

Docket Nos. ER12-1653-000, RM11-7-000, AD10-11-000

AFFIDAVIT OF PALLAS LEEVANSCHAICK, PH.D.

I. Qualifications

- 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 plans to comply with the requirements of Order 755 by modifying the regulation market to set distinct clearing prices for Regulation Movement and Regulation Capacity. In the filing to which this affidavit is attached, the NYISO proposes to apply the existing market power mitigation measures for ancillary services to the new offer component for Regulation Movement ("Regulation Movement Bid"). However, the NYISO's proposal includes one significant modification in the application of the mitigation measures to the new Regulation Movement Bid. Specifically, the NYISO proposes not to use the "bid-based reference level" calculation method for the Regulation Movement Bid reference level.¹ Instead, the NYISO proposes to rely on the other established methods for calculating reference levels.² The purpose of this affidavit is to provide my assessment of the NYISO's proposal to rely on reference level calculation methods other than the bid-based method. Unless otherwise specified, capitalized terms used in my affidavit have the same meanings specified in the NYISO Market Services Tariff.
- 6. The remainder of my affidavit is divided into the following sections. Section III discusses the existing framework for market power mitigation in the energy and ancillary services markets and the principles for setting the reference levels that are used in the implementation of the mitigation measures. Section IVanalyzes the incentives for regulation suppliers under the new regulation market design and explains why these

¹ Although the "bid-based reference level" and "reference level" are not capitalized terms, the "bid-based reference level" calculation method is described in NYISO MST §23.3.1.4.1.1, and various methods for calculating "reference levels" are described in NYISO MST §23.3.1.4.

² The other established methods that the NYISO proposes to use for Regulation Movement are described in NYISO MST §23.3.1.4.1.3 and §23.3.1.4.2.

incentives make the bid-based reference level calculation method unsuitable for the Regulation Movement Bid reference level. Section V discusses the adequacy of other established methods for calculating reference levels and why the NYISO's proposal is not likely to result in mitigating competitive Regulation Movement Bids. Section VI summarizes my conclusions.

III. Market Power Mitigation Measures and the Principles for Setting Reference Levels

- 7. The NYISO's existing mitigation measures are designed to limit the exercise of market power, while avoiding unnecessary market intervention. This section of the affidavit describes how reference levels are used in the existing mitigation measures and what principles are used in the calculation of reference levels. In particular, this section explains why it is important for the reference level to be an accurate estimate of the marginal cost of a resource.
- 8. The existing mitigation measures are designed considering that in a wholesale power auction with uniform clearing prices at every location, competitive suppliers generally have an incentive to offer at marginal cost. This is because one clearing price is paid to all suppliers whose offers are accepted in the auction. Therefore, a supplier (that does not possess market power) maximizes its profit by offering at marginal cost, since it will be selected whenever the clearing price is higher than its marginal cost and not be selected whenever the clearing price is lower than its marginal cost.
- 9. On the other hand, a supplier that possesses market power may benefit from withholding supply (i.e., not selling when its marginal cost is less than the clearing price), since the impact of withholding is to raise the clearing price paid for the supplier's remaining sales sufficient to compensate the supplier for any lost profit on the withheld capacity. The mitigation measures are designed to mitigate offers that are inflated above marginal cost when such offers are likely to raise the clearing price by more than certain clearly established thresholds. ³ Mitigation of an inflated offer is done by replacing the offer with an estimate of the supplier's marginal cost, which is known as the "reference level."

³ These thresholds are established in NYISO MST §23.3.

- 10. The reference level of a resource is supposed to approximate its marginal cost. The primary method that has been used to set reference levels for energy and ancillary services is the bid-based reference level method, which sets a resource's reference level based on the resource's accepted offers during competitive conditions over the previous 90 days.⁴ This is based on the principle that a resource's accepted offers during competitive conditions over the resource's marginal cost. For a resource that does not have a bid-based reference level, either because the resource did not have accepted offers in the previous 90 days or because the offers were not accepted during competitive conditions, the reference level is calculated using one of the following alternative methods.
- 11. The first alternative is to base the resource's reference level on an estimate the marginal cost using information received from consultation with the supplier.⁵ Another alternative is to estimate the marginal cost using information from similar resources.⁶ These alternative methods are used routinely to calculate the reference levels of resources that operate infrequently or in areas with limited competition.
- 12. For the Regulation Movement Bid, the NYISO is proposing not to use the accepted bidbased reference level method, since this method is not expected to yield a reliable estimate of the marginal cost of movement for resources on regulation. This is because regulation resources will not generally have an incentive to submit Regulation Movement Bids at marginal cost, even under competitive conditions. The following section analyzes the incentives of resources offering regulation and explains why they will not generally have an incentive to submit Regulation Movement Bids at marginal cost.

IV. Incentives for Resources Offering Regulation

13. The bid-based reference level calculation method is generally reliable when suppliers have had an incentive to offer at marginal cost during the previous 90 days. However, an

⁴ See NYISO MST §23.3.1.4.1.1.

⁵ See NYISO MST §23.3.1.4.1.3.

⁶ See NYISO MST §23.3.1.4.2.

alternative calculation method should be used when a supplier does not have an incentive to offer at marginal cost. This section discusses the incentives for regulation suppliers under the new regulation market design and explains why regulation suppliers do not generally have an incentive to submit Regulation Movement Bids at marginal cost, making the bid-based reference level calculation method unsuitable for the Regulation Movement Bid parameter.

- 14. The incentives of suppliers in the new regulation market will depend on how resources are selected and how clearing prices are determined. In the new regulation market, the real-time market will select the regulation resources that have the lowest estimated cost of Regulation Service per MWh of Regulation Capacity, which will equal the sum of: (a) the Regulation Capacity Bid, (b) the opportunity cost of providing regulation rather than energy or operating reserves, and (c) the Regulation Movement Bid times the Regulation Movement Multiplier. The Regulation Movement Multiplier, which will initially be equal to 10 MW of Movement per MWh of Regulation Capacity, approximates the average amount that regulation resources have been moved per MWh of Regulation Capacity in recent years. Although regulation resources will be selected in merit order implicitly assuming they will be moved 10 MW for each MWh of Regulation Capacity scheduled, resources will be paid according to the actual amount they are moved.
- 15. In real-time market intervals in which the regulation requirement is satisfied, the marginal offer (i.e., the offer with the highest estimated cost of Regulation Service per MWh of Regulation Capacity) is used to set the clearing prices for regulation. The Regulation Movement Market Price is set equal to the Regulation Movement Bid of the marginal resource, and the Regulation Capacity Market Price is set equal to the marginal resource's estimated cost of Regulation Service per MWh of Regulation Capacity minus the marginal resource's Regulation Movement Bid times the Regulation Movement Multiplier.
- 16. In real-time market intervals in which the regulation requirement is not satisfied, the regulation market clears on the regulation demand curve. In such intervals, the NYISO proposes to set the Regulation Movement Market Price equal to the Regulation Movement Bid of the accepted offer with the highest estimated cost of Regulation Service per MWh of Regulation Capacity and to set the Regulation Capacity Market Price equal to the

regulation demand curve level minus the Regulation Movement Bid times the Regulation Movement Multiplier.

17. The actual movement of resources is expected to vary considerably by type of resource and operating conditions. Consequently, fast resources will generally move more than is assumed when the real-time market selects regulation resources, which will give them incentives to strategically adjust their offers to take advantage. The remainder of this section describes the two ways in which a fast resource can benefit from raising its Regulation Movement Bid above marginal cost. The first part discusses how a fast resource can benefit from its effect on the prices for regulation movement and capacity. The second part discusses how a fast resource can benefit from raising its Bid Production Cost Guarantee ("BPCG") payment.

A. Incentives to Raise Regulation Movement Market Price

- 18. Since the Regulation Movement Market Price is based on the offer of the marginal resource, the marginal resource can determine how the overall cost of regulation in the real-time market is distributed into the prices of each component. Fast resources (ie. resources that usually move more than 10 MW per MWh of Regulation Capacity) will have strong incentives to raise their Regulation Movement Bid in order to be the marginal resource and, thereby, cause the distribution to be favorable towards fast resources. The following example illustrates how a fast resource would benefit from being marginal.
- 19. Suppose that the marginal resource has an estimated cost of \$10 per MWh of Regulation Capacity based on a Regulation Capacity Bid of \$3 per MWh, a Regulation Movement Bid of \$0.20 per MW, and a cross-product opportunity cost of \$5 per MWh from not providing energy.⁷ This would result in a Regulation Movement Market Price of \$0.20 per MW and a Regulation Capacity Market Price of \$8 per MWh. In this case, a fast resource that moves an average of 30 MW per MWh⁸ of scheduled regulation capacity would expect to

⁷ Note, the cross-product opportunity cost is not a bid-able parameter. Rather, it is determined by the real-time market model when the model determines which product the resource is most economic to provide.

⁸ This is consistent with the average quantity of movement for some resources in recent months.

earn \$14 per MWh of Regulation Capacity. ⁹ However, if the fast resource submitted a Regulation Capacity Bid of \$0 per MWh and a Regulation Movement Bid of \$1.01 per MW, the resource's estimated cost of Regulation Service would rise to \$10.10 per MWh, and it would become the marginal resource. Although this would increase the estimated cost of the marginal resource by just 1 percent to \$10.10 per MWh, it would shift the distribution of the prices dramatically to \$0 per MWh for Regulation Capacity and \$1.01 per MW for Regulation Movement. Under this scenario, the fast resource would now expect to earn \$30.30 per MWh of capacity, 116 percent higher than if it had not been the marginal resource. ¹⁰ This example shows that the returns from raising offers above marginal cost can be quite large for fast regulation suppliers.

- 20. In any auction with uniform clearing prices, a supplier might benefit from raising its offer price in order to be the marginal resource and thereby set the clearing price at a higher level. However, this is risky because the supplier may lose sales if it raises its offer too much and another supplier is selected instead. This sort of competitive discipline acts as a disincentive for suppliers to raise their offers strategically. However, the previous example shows that the returns from offering strategically would be higher for a fast resource in the regulation market than in the energy market. Furthermore, several aspects of the regulation market will tend to strengthen the incentive for certain suppliers to raise their offers above marginal cost.
- 21. First, the small size of the regulation market (as compared with the energy market) makes it easier for a supplier to predict how it would need to offer in order to be the marginal resource. For instance, in individual hours in the month of December 2012, an average of 3.6 distinct resources were on margin at some point during each hour in the regulation market, while an average of 9.4 distinct resources were on margin at some point during each hour in the energy market. When the marginal resource changes frequently, it is more difficult for a supplier to gauge the optimal level at which to offer in order to affect the

 ^{\$14} per MWh = \$8 per MWh Regulation Capacity Market Price + \$0.20 per MW Regulation Movement Market Price * 30 MW of Movement per MWh of Capacity.

¹⁰ \$30.30 per MWh = \$0 per MWh Regulation Capacity Market Price + \$10.10 per MW Regulation Movement Market Price * 30 MW of Movement per MWh of Capacity.

clearing price. So, the smaller size of the regulation market makes it easier for supplier to benefit from raising their offers above marginal cost.

22. Second, the benefits of raising offer prices above marginal cost will be particularly large during regulation shortages. During regulation shortages, the accepted resource with the highest estimated cost will set the Regulation Movement Market Price, so a fast resource with no energy opportunity cost could submit a Regulation Movement Bid of \$8 per MW and a Regulation Capacity Bid of \$0 per MWh, and its estimated cost would be equal to the regulation demand curve level of \$80 per MWh. The resource would set the prices at \$8 per MW for Regulation Movement and \$0 per MWh for Regulation Capacity. In this case, a fast resource that moves an average of 30 MW per MWh of capacity would expect to earn \$240 per MWh of capacity from this strategy, three times the demand curve level for regulation of \$80 per MWh.

B. Incentives to Raise BPCG Payments

- 23. Although the real-time market model selects the resources with the lowest estimated cost, there is no guarantee that the Regulation Capacity Bids or Regulation Movement Bids of the selected resources will be lower than the respective clearing prices. Consequently, resources selected in merit order may still require BPCG payments to recoup their entire bids. Some suppliers will have strong incentives to raise the Regulation Movement Bids of their inframarginal resources above marginal cost in order to garner larger BPCG payments.
- 24. For example, suppose that the marginal resource's estimated cost is \$10 per MWh and that its Regulation Movement Bid is \$0.20 per MW, resulting in a Regulation Capacity Market Price of \$8 per MWh and a Regulation Movement Market Price of \$0.20 per MW. In this case, a fast resource that moves an average of 30 MW per MWh of capacity would expect to earn \$14 per MWh. ¹¹ However, if the fast resource submitted a Regulation Capacity Bid of \$0 per MWh and a Regulation Movement Bid of \$0.80 per MW, its estimated cost per MWh of Regulation Capacity would still be 20 percent lower than the marginal

¹¹ \$14 per MWh = \$8 per MWh Regulation Capacity Market Price + \$0.20 per MW Regulation Movement Market Price * 30 MW of Movement per MWh of Capacity.

resource, comfortably within the range necessary to be selected as a regulation resource. ¹² This would enable the fast resource to receive a BPCG payment of \$10 per MWh of capacity in addition to the market revenue of \$14 per MWh. ¹³ As a matter of fact, any regulation movement offer between \$0.47 and \$0.99 per MW would enable the fast resource to increase its BPCG payment while still being inframarginal. ¹⁴

25. Although suppliers that raise their offer prices above marginal cost are at risk of not being selected when economic to provide regulation, the large size of the range in this example illustrates that many suppliers will benefit from raising their offers above marginal cost with little risk of not being selected. Furthermore, the incentive for suppliers to raise their offers above marginal cost will be present even under very competitive market conditions when there is a large number of suppliers and the supply of regulation is well in excess of the regulation requirement.

C. Conclusions Regarding Incentives for Regulation Suppliers

26. The factors discussed in this section will provide some resources with strong incentives to raise their offer prices above marginal cost, even under competitive market conditions where the supply of regulation far exceeds demand. Although the discussion in this section focuses on the particular incentives of very fast resources, the incentives of other resources will also be affected to a lesser degree. Consequently, the accepted bids during competitive periods are not likely to provide a reliable indication of the marginal cost of Regulation

- = {\$0 per MWh Regulation Capacity Bid + \$0.80 per MW Regulation Movement Bid * 30 MW of Movement per MWh of Capacity } minus
 - {\$8 per MWh Regulation Capacity Market Price + \$0.20 per MW Regulation Movement Market Price * 30 MW of Movement per MWh of Capacity}

¹² The real-time market would estimate the cost of the fast resource as \$8 per MWh of Regulation Service = \$0 per MWh Regulation Capacity Bid + \$0.80 per MW Regulation Movement Bid * Regulation Movement Multiplier of 10 MW per MWh of Capacity. This would be 20 percent lower than the estimated cost of the marginal resource.

¹³ BPCG payment = {as-offered cost of regulation service} minus {revenue from regulation service}

^{= {\$24} per MWh as-offered cost} minus {\$14 per MWh of revenue}

^{= \$10} per MWh

¹⁴ If the Regulation Movement Bid was \$0.47 per MW, the as-offered cost of regulation would be \$14.10 per MWh = \$0 per MWh Regulation Capacity Bid + \$0.47 per MW Regulation Movement Bid * 30 MW of Movement per MWh of Capacity, slightly in excess of the regulation revenue. Each increase of \$0.01 per MW in the Regulation Movement Bid would result in a \$0.30 per MWh increase in the BPCG payment.

Movement. Therefore, I support the NYISO's proposal not to calculate reference levels using the accepted bid-based method and, instead, rely on alternative calculation methods. The next section discusses why the alternative methods should provide an adequate basis for implementing the mitigation measures.

V. Consultation with Suppliers Regarding Reference Levels

- 27. The NYISO proposes to calculate reference levels for Regulation Movement using two alternatives to the bid-based method. The first alternative is to base the resource's reference level on an estimate the marginal cost using information received from consultation with the supplier, while the second alternative supplements with information from similar resources. Whenever the NYISO calculates reference levels using one of these alternative methods, there is a possibility for a resource's costs to be under-estimated, so it is important to consider whether this is likely to result in over-mitigation (i.e., mitigation of a competitive offer). However, given the protections for suppliers that are currently built into the mitigation process for Ancillary Services, it is unlikely that the NYISO's proposal will lead to over-mitigation for several reasons.
- 28. First, the reference level consultation process allows suppliers to request a reference level adjustment to incorporate any type of legitimate cost. So, to the extent that a cost can be foreseen with substantial lead time, a supplier can request that the NYISO reflect the expected cost in its reference level.¹⁵
- 29. Second, the mitigation measures for Ancillary Services use clearly-defined thresholds for identifying conduct that may warrant mitigation and for assessing the market impact of the conduct. The conduct threshold for Regulation Movement Bids identifies ones that exceed the reference level by at least 300 percent as potentially warranting mitigation. ¹⁶ To the extent that a resource's marginal costs fluctuate according to real-time operating conditions, this conduct threshold will provide ample room for most such variations.

¹⁵ NYISO MST §23.3.1.4.1.3 allows the NYISO to calculate a reference level based on consultation with a supplier. The obligations of the NYISO and suppliers in the consultation process are provided in NYISO MST §23.3.3.

¹⁶ See NYISO MST §23.3.1.2.1.2.2.

Furthermore, mitigation is imposed only if the NYISO estimates that the identified conduct had an impact that either raised a market clearing price by at least the lower of 200 percent of \$50 per MWh or that raised the resource's BPCG payment by 200 percent. ¹⁷ These thresholds ensure that mitigation will not occur unless the identified conduct has significant market impact.

- 30. Third, the mitigation measures for Ancillary Services are applied manually rather than in an automated fashion, further reducing the potential for over-mitigation. Since mitigation is manual, it provides generators with additional opportunities to consult with the NYISO and provide any additional information to justify a competitive offer that exceeds the clearly-defined conduct and impact thresholds.¹⁸
- 31. Given the opportunities for a supplier to consult with the NYISO regarding its reference levels and the substantial conduct and impact thresholds for Ancillary Services mitigation, it is unlikely that a resource submitting a competitive Regulation Movement Bid would be mitigated. Therefore, the NYISO's proposal not to use the bid-based calculation method for Regulation Movement Bids should not result in over-mitigation.

VI. Conclusions

- 32. Under the NYISO's proposed market design, Regulation suppliers will not generally have incentives to offer Regulation Movement at marginal cost, even under competitive conditions. Accordingly, the bid-based reference level calculation method is unlikely to provide reliable estimates of the marginal cost of Regulation Movement. For these reasons, I support the NYISO's proposal not to use the bid-based calculation method for Regulation Movement Bid reference levels.
- 33. This concludes my affidavit.

¹⁷ See NYISO MST §23.3.2.1.1 and §23.3.2.1.2.

¹⁸ See NYISO MST §23.3.3.1.1.

ATTESTATION

I am the witness identified in the foregoing Affidavit of Pallas LeeVanSchaick, Ph.D. dated January 22, 2013 (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 January 22, 2013

Subscribed and sworn to before me this 22th day of January 2013

Notary Public

My commission expires: Nov 30 2013

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