Attachment III

# UNITED STATES OF AMERICA BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION

#### New York Independent System Operator, Inc.

Docket No. ER17- -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 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 15 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. Since its inception, the NYISO has relied on large amounts of capacity from quick start gas turbine units, particularly in import-constrained areas such as New York City and Long Island. Consequently, the NYISO was the first organized wholesale market to recognize the need for special price-setting rules for quick start units back in 2000. In recent years, the NYISO's MMU has recommended modifying the price-setting rules to address circumstances when the current rules do not lead to efficient prices. <sup>1</sup> The NYISO's filing proposes market rule changes that would help address these concerns. The purpose of this affidavit is to explain why the proposed changes will improve incentives and the efficiency of real-time clearing prices.
- 6. The remainder of this affidavit is divided into the following sections. Section III discusses general market design principles that should guide enhancements to nodal markets like the NYISO's. Section IV explains how the current hybrid pricing rules work and why these sometimes lead to inefficient pricing outcomes. Section V describes the NYISO's proposed enhancement and why this will lead to more efficient outcomes. Section VI summarizes my conclusions.

## III. Efficient Pricing in Nodal Electricity Markets

7. The NYISO's proposed changes will improve the efficiency of real-time clearing prices during periods when quick start units are needed to satisfy demand and manage congestion. This will reduce the need to make Bid Production Cost Guarantee ("BPCG") payments to gas turbines that are dispatched in economic merit order but which do not receive enough

<sup>&</sup>lt;sup>1</sup> See e.g., Potomac Economics, 2015 State of the Market Report for the New York ISO Markets ("2015 SOM Report"), Section XI.B.14 (May 2016).

LBMP revenue to recoup their as-bid costs.<sup>2</sup> This section discusses how these changes will improve incentives and pricing efficiency in the real-time market.

- 8. The NYISO conducts what is essentially a uniform-price auction where all suppliers at a particular location are paid the same clearing price. A key benefit of the uniform-price auction format is that it allows the NYISO to maintain the necessary balance between supply and demand at all times while providing incentives for sellers to reveal their marginal costs (i.e., submit bids that are consistent with their marginal costs), allowing the NYISO to select the least expensive sellers. Since every seller at a location is paid the same clearing price based on the bid of the marginal resource, competitive suppliers maximize their profits by bidding at their own marginal cost of supply. This way, if the bid is accepted, the seller will earn revenue greater than or equal to its cost. When sellers have an incentive to bid at marginal cost, it allows the system operator to select the lowest cost resources across the system.
- 9. In contrast, competitive sellers in a "pay-as-bid" auction maximize their profits by raising their bids above marginal cost. They weigh the potential profit from an increased margin against the risk of not being selected in the auction if their bid is too high. Ultimately, sellers in a pay-as-bid auction make forecast errors which sometimes result in their not being selected when they would be economic. These forecast errors increase the overall cost of production across the system in a pay-as-bid auction. On the other hand, the uniform-price auction format does not require sellers to forecast the bids of their competitors to maximize profit—sellers only need to estimate their own costs accurately. Thus, the uniform-price auction format facilitates the selection of the lowest cost sellers in the market. Accordingly, wholesale markets should be designed to provide generators with incentives to bid at marginal cost, so it is important to limit the use of BPCG payments since they provide pay-as-bid incentives.
- 10. When evaluating the efficiency of market clearing prices in wholesale power markets, it is important to use an appropriate standard. An efficient clearing price is one that "clears the

<sup>&</sup>lt;sup>2</sup> Note, consistent with the NYISO tariffs, the term "bids" is used to refer to seller offers throughout this affidavit.

market" (i.e., a clearing price that is greater than or equal to the bids of accepted sellers and less than or equal to the bids of sellers whose bids are not accepted). To the extent that real-time clearing prices are not consistent with this ideal standard, it will lead to inefficient incentives and investment signals. Accordingly, the NYISO used this standard when it performed an assessment of the efficiency of its proposed prices as discussed below in Section V.

- 11. Over the long-term, efficient real-time prices contribute to efficient incentives for investment, particularly for resources with flexible operating characteristics and in locations where resources are needed to manage congestion. Efficient prices also provide incentives for the maintenance of existing resources to ensure reliable performance and for fuel procurement on days with tight natural gas supplies.
- 12. In this case, efficient real-time pricing will reduce 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 when peaking units are dispatched. Shifting reliance from the capacity market to the energy and ancillary services markets reduces overall wholesale costs for load customers because energy prices are paid only to resources that perform during stressed conditions, while capacity prices must be paid to nearly all in-service resources regardless of whether they have flexible operating characteristics.

## IV. Concerns with Current Hybrid Pricing Method

- 13. The NYISO has proposed changes to the price-setting rules for quick start units to address deficiencies that have been identified with the existing hybrid pricing rules. This section discusses the identified issues and why they occur under the existing rules.
- 14. The last five NYISO State of the Market Reports have found that when gas turbines are dispatched in merit order by the real-time market software, the resulting clearing prices are often lower than the bid price of the gas turbine. While this occurs for multiple reasons (including differences between the forecast model that commits quick start generation and the five-minute dispatch), the 2015 State of the Market Report found that gas turbines did not set the clearing price in 16 to 21 percent of the real-time pricing intervals in which they

were among the least expensive resources that could be used to satisfy energy and ancillary services requirements while managing congestion.<sup>3</sup>

- 15. In the NYISO's currently effective tariff, Fixed Block Units are only eligible to set price under certain conditions. The price-setting eligibility logic consists of a multi-step process. In the first pricing step, the RTD software performs a dispatch treating all GTs as flexible between zero MW and the Upper Operating Limit ("UOL") to determine which Resources are economic. A GT will generally be dispatched at zero MW in the first step if less expensive Resources would have been dispatched if the GT had not been in its minimum run time. In the second pricing step, GTs that were not economic in the first pricing step, and that have not yet achieved their minimum run-time, are included as block-loaded must run Resources scheduled at their respective UOL. The second pricing step establishes the prices that are used for real-time settlement. The block-loaded GTs that were not needed in the first pricing step and were in their minimum run times are not permitted to set price in the second pricing step and may reduce prices since they supplant the most expensive suppliers that were needed in the first pricing step. Thus, if the real-time commitment software over-forecasts the need for generation relative to the amount of generation needed in the five-minute dispatch, there is a tendency for clearing prices to be under-stated for as long as some generators are in their minimum run time periods.
- 16. The following example illustrates why the current hybrid pricing rules lead to inefficiently low real-time prices in some cases. The example assumes a load pocket that has 500 MW of import capability and 300 MW of internal quick start generation. Figure 1 shows the supply stack assuming imports are available at \$25 and internal quick start generators are available in 25 MW increments from \$40 to \$150. Figure 2 shows load with a purple line, scheduled imports with green bars, and blocks of scheduled generation with blue bars. It also shows the "efficient clearing price," which would occur in the pocket if generation is committed efficiently. To illustrate the price impact of excess generation commitment, the example shows blocks of generation committed in excess of the amount that is needed using striped bars in Hours 14, 15, and 16. The resulting prices are labeled "Actual price –

<sup>&</sup>lt;sup>3</sup> See, e.g., 2015 SOM Report, Page 89.

hybrid pricing method." In such periods, the current hybrid pricing method treats the excess gas turbines as ineligible to set price. Consequently, these units are fixed at their upper operating limit similar to a self-scheduled generator, leading prices to be lower than the competitive equilibrium that would result from perfect foresight.



17. Figure 1 shows that as load increases above 500 MW, internal generation must be dispatched with increasing marginal cost. In Figure 2, the line labeled as "efficient clearing price" is greater than or equal to the cost of generators that are needed to satisfy demand and less than the cost of generators that are not needed. Thus, an efficient clearing price is a price that clears the market (as described in Section III). However, the line labeled "Actual price – hybrid pricing method" shows that the current pricing method would frequently produce lower clearing prices. In periods with excess commitment due to forecast errors (i.e., Hours 14, 15, and 16), the hybrid pricing method produces prices that are not sufficiently high to cover the costs of generators that are needed to serve load in the load pocket. Thus, the NYISO proposes to correct this issue by setting clearing prices at the level of the "efficient clearing price" shown in Figure 2. The NYISO's proposal for setting clearing prices is discussed further in the next section.

### V. Evaluation of NYISO Proposal

- 18. The NYISO has proposed changes to the price-setting rules for quick start units that would be a significant improvement over the current hybrid pricing rules. The proposed changes would lead the real-time market models to set market clearing prices that are more consistent with the operational needs of the system. These changes are designed to address some of the deficiencies that have been identified in recent years.<sup>4</sup>
- 19. Specifically, the NYISO proposes to eliminate the second step that is mentioned above in Paragraph 15. Instead, the NYISO proposes to calculate real-time Energy prices and realtime Shadow Prices for Regulation Service and Operating Reserves that the NYISO will use for settlements in the first step. Consequently, the real-time clearing prices will no longer be lower than the bids of gas turbines that are found to be among the least costly units available to satisfy load and other operational requirements.
- 20. As discussed in Section III, the ideal competitive equilibrium price is the price that clears the market such that lower-priced offers are fully scheduled and higher-priced offers are not scheduled. This ideal is difficult to achieve in a real world electricity market that is complicated by non-incremental cost parameters like start-up costs and other commitment costs. Nonetheless, the ideal competitive equilibrium price provides a useful standard for measuring the efficiency of the pricing outcomes. The NYISO used this principle to study the efficiency of its proposed pricing method and compare it to the current method.
- 21. To verify that the proposed pricing methodology will likely result in prices that are more efficient than the current hybrid pricing method, the NYISO performed an analysis comparing the actual prices that resulted from the hybrid pricing method on eleven days to the prices that would have resulted from the proposed method on the same days. Specifically, the NYISO calculated the magnitude of pricing inefficiencies under each

<sup>&</sup>lt;sup>4</sup> The 2015 SOM Report identified that LBMPs are routinely set below the marginal running costs of gas turbines that are economic. Recommendation #14 on page 121 proposes to allow the economic gas turbines to set price based on their marginal running costs (which are reflected in the Incremental Energy bid component) plus amortized start-up cost bids. The NYISO proposal will allow these units to set price, but start-up costs will not be included. This may lead to prices that continue to be under-stated. Future state of the market reports will evaluate whether the inclusion of start-up costs in the price-setting criteria would lead to more efficient prices.

pricing method by measuring the value associated with: (a) real-time ramp-able bids dispatched at a bid price greater than LBMP, and (b) real-time ramp-able bids not dispatched at a bid price lower than LBMP. This comparison allowed the NYISO to test which pricing method would be closest to the ideal standard. The NYISO found that the proposed method reduced this measure of price inefficiency by a net of \$117,280 on the eleven days studied. Thus, this analysis supports the contention that the proposed method would be a significant improvement over the current method. <sup>5</sup>

## VI. Conclusions

- 22. Based on the foregoing, I support the NYISO's proposal to implement the new GT pricing methodology. These changes should lead to real-time prices that are more consistent with the cost of resources needed to satisfy the needs of the system. This will lead to better incentives for flexible resources to remain in service and operate reliably. Potential new investors will have better incentives to build new resources with more flexible operating characteristics.
- 23. This concludes my affidavit.

<sup>&</sup>lt;sup>5</sup> The NYISO summarized the results of this study in a presentation to the NYISO Management Committee on September 28, 2016 titled "Hybrid GT Pricing Improvements" by Ethan Avallone, Slides 9-14. Slide 14 states that the estimated lost opportunity cost of generators with bids not accepted below the clearing price increased by \$81,943. However, the estimated potential uplift (i.e., bids of units scheduled with a bid greater than the clearing price) fell by \$199,223. So, there was a significant net improvement.

## ATTESTATION

I am the witness identified in the foregoing Affidavit of Pallas LeeVanSchaick, Ph.D. dated December 14, 2016 (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 December 14, 2016

Subscribed and sworn to before me this 14th day of December 2016

Notary Public

31,2018 My commission expires:

