NEW YORK INDEPENDENT SYSTEM OPERATOR
10 Krey Boulevard ♦ Rensselaer, NY 12144

April 15, 2010

ELECTRONICALLY SUBMITTED

Kimberly D. Bose
Secretary, Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Re: New York Independent System Operator, Inc.'s Comments in Response to the Federal Energy Regulatory Commission's Notice of Inquiry Seeking Public Comment on the Integration of Variable Energy Resources; Docket No. RM10-11-000

Dear Secretary Bose:

The New York Independent System Operator, Inc. ("NYISO") hereby provides its response to the Commission's January 21, 2010 Notice of Inquiry Seeking Public Comment on the Integration of Variable Energy Resources.[1]

On April 8, 2010, the NYISO filed a motion with the Commission, pursuant to Rule 2008 of the Commission's Rules of Practice and Procedure[2] seeking a ten day extension of time — until April 22, 2010 — to file its comments in this proceeding. In accordance with its pending request for an extension, the NYISO respectfully requests leave from the Commission to submit, and the Commission to accept, the attached comments for consideration in this proceeding.

Respectfully submitted,

/s/David Allen

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[1] Integration of Variable Energy Resources. Federal Energy Regulatory Commission Notice of Inquiry, 130 FERC ¶ 61,053, Issued January 21, 2010 (Docket No. RM10-11-000).

[2] 18 C.F.R. § 385.2008

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Integration of Variable Energy Resources	**)**	**Docket No. RM10-11-000**

COMMENTS OF
THE NEW YORK INDEPENDENT SYSTEM OPERATOR, INC.

The New York Independent System Operator, Inc. ("NYISO") respectfully submits this response to the Commission's January 21, 2010 Notice of Inquiry ("NOI") seeking comments on the extent to which barriers may exist that impede the reliable and efficient integration of variable energy resources (VERs) into the electric grid and whether reforms are needed to eliminate those barriers.[1] As a member of the ISO/RTO Council ("IRC") and a signatory to the joint IRC filing[2] made in this proceeding, the NYISO also fully supports the responses to the NOI and additional discussion presented in the IRC White Paper entitled "Variable Energy Resources, System Operations and Wholesale Markets." The IRC White Paper illustrates that there are different operational issues and market concerns being driven by the expansion of VERs within the different ISOs and RTOs. Therefore, while there are many commonalities among the state-of-the-art operational tools and market design solutions being developed and implemented by the ISOs and RTOs to efficiently integrate VERs, these solutions are often distinct responses to the unique needs of the region or system in question. The Commission should take care to avoid a national one-size fits all approach to the policies and practices

[1] Integration of Variable Energy Resources, Federal Energy Regulatory Commission Notice of Inquiry, 130 FERC ¶ 61,053, Issued January 21, 2010 (Docket No. RM10-11-000). ("NOI")

[2] ISO/RTO Council White Paper "Variable Energy Resources, System Operations and Wholesale Markets." Filed at the Federal Energy Regulatory Commission on April 12, 2010 (Docket No. RM10-11-000).

that may result from this proceeding. The varying market design and operating parameters across the nation will require flexible policies and practices that can be conformed to address the similar, yet very distinct needs, that are faced within these regions when integrating VERs.

The comments contained within this filing reflect the NYISO's particular observations and experiences in addressing the operational and market design challenges posed by the rapidly growing number of wind generators in the New York Control Area ("NYCA") over these last five years. To date the NYISO has taken several steps to facilitate greater integration of VERs including developing market rules for intermittent renewable resources and using forecast wind data taken at the wind generation sites to facilitate the commitment of these resources, in both Day-Ahead and Real-Time Markets, in the NYISO security constrained economic dispatch ("SCD") software. As such, the NYISO wholly supports the Commission goals and objectives of this NOI.

I. COMMUNICATIONS AND CORRESPONDENCE

All communications and services in this proceeding should be directed to:

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II. Background

The Commission is seeking comments on the extent to which barriers exist that impede reliable and efficient integration of variable energy resources, such as wind and solar powered generation, into the electric grid and whether reforms of existing policy are needed to eliminate those barriers as well as to ensure that rates remain just and reasonable. The NOI is organized around seven topic areas[3] in order to provide the Commission an updated perspective on the current policies and practices across the nation for integrating VERs and tackling the various operational challenges, market design issues and reliability concerns presented by the integration of significant amounts of these supply resources. These subject areas are: (1) data and reporting requirements including the use of accurate forecasting tools; (2) scheduling practices, flexibility, and incentives for accurate scheduling; (3) forward market structure and reliability commitment processes; (4) balancing authority area coordination; (5) suitability of reserve products and reforms necessary to promote more efficient use of reserves; (6) capacity market reforms; and (7) redispatch and curtailment practices necessary to accommodate VERs in real time.

The Commission's stated purposes in the present proceeding are to ensure just and reasonable rates for jurisdictional service and to prevent VERs from facing undue discrimination. To this end, the Commission has requested broad observations of the challenges posed by the increasing number of VERs, the obstacles faced by VERs and the extent to which the Commission's policies can or should be revisited. The

[3] The Commission noted that this proceeding will not address any issues related to transmission planning and cost allocation as those issues are being considered in a separate transmission planning proceeding: Transmission Planning Processes Under Order No. 890, Notice of Request for Comments, Issued October, 8, 2009 (Docket No. AD09-8-000).

Commission points out in the NOI that the significant amount of new wind generating capacity installed in recent years coincides with the growth of state renewable portfolio standards ("RPS") and other government programs driving development activity for renewable resources. With three-fifths of the states now with an RPS in place and renewable energy projects dominating the interconnection queues[4] throughout the country, the NYISO agrees that taking stock of the numerous developments that have occurred to allow for the greater integration of VERs into markets and grid operations is merited.

III. Comments

A. Overview of Wind Integration in New York

The NYISO appreciates the opportunity to share its observations and experiences integrating wind resources reliably and efficiently into its markets. The NYISO's responses to the Commission's NOI discuss the various market and operational features the NYISO, with its stakeholders, has put in place to facilitate higher penetration levels of wind resources operating in New York's wholesale energy markets. While there are significant existing hydro resources and a growing number of new VER technologies in addition to wind that are being developed in New York State,[5] the NYISO's responses to the questions below are largely derived from its experiences with wind resources. The

[4] For a list of RPS programs, see http://apps1.eere.energy.gov/states/maps/renewable_portfolio_states.cfm. There are approximately 7,000 MWs of wind resources currently identified on the NYISO's Interconnection Queue http://www.nyiso.com/public/webdocs/services/planning/nyiso_interconnection_queue/nyiso_interconnection_queue.xls

[5] A 20 MW flywheel, which is a limited energy storage resource under NYISO's market rules, is currently under construction and New York State is currently reviewing its RPS and considering new development programs to incent renewable resources other than hydro and wind, such as solar energy. *See, e.g.,* New York Indep. Sys. Operator, Filing of Proposed Tariff Revisions to Integrate Energy Storage Devices into the NYISO-Administered Regulation Service Market, (March 11, 2009); *and* Commission's Order Accepting Tariff Revisions, 127 FERC ¶ 61,135, Issued May 15, 2009 (Docket Nos. ER09-836-000 and ER09-836-001); *see also,* Proceeding on Motion of the Commission Regarding a Retail Renewable Portfolio Standard, Order Establishing New RPS Goal and Resolving Main Tier Issues, , New York State Public Service Commission, Case 03-E-0188, Issued January 8, 2010.

NYISO continues to fully support the Commission goals of integration of all types of VERs into the wholesale energy markets.

New York State adopted an RPS in 2004 to spur development of additional renewable resources.[6] The New York RPS required 25 percent of load to be supplied by qualified renewable resources by 2013. In support of the State's efforts to reduce energy costs and air emissions, New York's governor expanded this RPS requirement to 30 percent by 2015 as part of a combined energy efficiency and renewable portfolio standard.[7] In addition, New York is a member of the Regional Greenhouse Gas Initiative and is taking several additional steps to develop policies to further reduce the release of greenhouse gases into the atmosphere. As a result of these statewide initiatives and the federal production tax credits for wind generation, the NYISO has seen the amount of wind on its system increase by a factor of 26, or approximately 1,230 megawatts since 2005. In 2008 and 2009 the installed nameplate of wind resources interconnected to the bulk electric system in New York increased by over 300 percent, from 424 MW to 1,275 MW. With this rapid increase in new wind resources on the system the NYISO has learned that, while the wind generation provides welcome fuel diversity and emission free technology, its variability presents market design and operational challenges that

[6] Proceeding on Motion of the Commission Regarding a Retail Renewable Portfolio Standard, Order Regarding Retail Renewable Portfolio Standard, New York State Public Service Commission, Case 03-E-0188, Issued September 24, 2004.

[7] In his 2009 State of the State Address Governor David Paterson introduced the "45 by 15" Clean Energy Policy that promotes energy efficiency and the state's renewable portfolio standard. Governor David A. Paterson, "Our Time to Lead: State of the State Address" (2009). http://www.state.ny.us/governor/keydocs/speech_0107091.html. The efficiency portion of that goal is 15 of the total 45 percent (also known as "15 by 15"). The remainder of the 45 percent raises the State's RPS to meet 30 percent of the State's electricity use by 2015. *see also*, Proceeding on Motion of the Commission Regarding a Retail Renewable Portfolio Standard, Order Establishing New RPS Goal and Resolving Main Tier Issues, , New York State Public Service Commission, Case 03-E-0188, Issued January 8, 2010; and New York State Energy Planning Board, 2009 State Energy Plan (December 2009). http://www.nysenergyplan.com/stateenergyplan.html.

must be addressed to maintain efficient markets and a reliable and secure transmission system.

The NYISO has been a leader in the effort to facilitate open access and market integration of VERs. Starting in 2003 with the commissioning of a Wind Study by the NYISO and the New York State Energy Research and Development Authority ("NYSERDA"), the NYISO has repeatedly taken steps to address barriers to wind generation and to resolve the potential operational and reliability issues posed by the rapidly increasing numbers of VERs — primarily wind generation — interconnecting to the bulk electric system in the New York Control Area ("NYCA"). For example, much of the 1,275 MW of wind resources now operating and the vast majority of those proposed projects currently identified on the NYISO Interconnection Queue have tended to cluster within certain areas of New York State where the siting conditions and wind resources are the most favorable.[8] The clustering of wind projects can exacerbate the operational challenges associated with the variability of the VERs as the grid operator maintains a secure and reliable system. With a relatively large amount of new variable wind generation within concentrated areas on the grid, NYISO operators began observing transmission system constraints driven by periods of high wind production and low loads or other coincidental operational limitations such as equipment outages.

The NYISO took steps to address this problem in 2008 by implementing a centralized wind forecasting program that was integrated with the real-time and day-

[8] *See*: http://www.nyiso.com/public/committees/documents.jsp?com=bic_miwg&directory=2009-10-19

ahead markets.[9] In 2009, the NYISO, with its stakeholders, implemented market rule changes to model wind resources as flexible resources in the SCD. The changes allow the NYISO SCD software, when faced with more energy than a constrained system can handle, to dispatch down wind resources, in addition to any other flexible resources, based on their price-quantity supply offers. This provides the NYISO the ability to resolve the system constraint in an efficient manner while treating wind resources in a comparable manner to all other flexible resources bidding into the market.

The NYISO market rules now require wind resources — like all other flexible supply resources — to submit economic offers indicating the price at which they desire to reduce their generation. This market design change allows a wind generator to deliver energy to the grid under constrained system conditions based on an assessment of its economic willingness to run in conjunction with its impact on the constraint, as compared to other resources. The NYISO SCD software will then identify units and megawatts that, in the face of a constrained system, are economically appropriate for output reduction in order to maintain reliability. The NYISO's Real-Time Dispatch ("RTD") software re-evaluates the system at five-minute intervals and identifies only as much output reduction and duration as is necessary to resolve the constraint — allowing wind resources to continue to generate as much as the system can reliably handle.

B. Data, Reporting and Forecasting

Q17.1 ***What are the current practices used to forecast generation from VERs? Will current practices in forecasting VERs' electricity production be adequate as the number of VERs increases? If so, why?***

[9] *See* New York Indep. Sys. Operator, Filing to Revise Services Tariff and OATT to Implement Wind Forecasting Mechanism and Enforceable Wind Forecasting Requirements to Better Accommodate Intermittent Power Resources, and to Clarify the Status of Limited Control Run-of-River Hydro Resources, Filed April 18, 2010 *and* Order Conditionally Accepting Tariff Revisions, 123 FERC ¶ 61,267, Issued June 17, 2008 (Docket No. ER08-850-000).

NYISO Response: In 2008, the NYISO implemented a centralized program to forecast energy output for interconnected wind generating resources.[10] These forecasts are provided to the NYISO by AWS Truewind ("AWS"), a third-party wind forecasting company, for both Day-Ahead and Real-Time energy market operations. Individual wind resources are responsible for providing meteorological data electronically to AWS every 15 minutes, which represents the smallest forecast interval.

Individual wind resources are responsible for collecting and providing the meteorological data ("met data") to AWS; and the NYISO may issue penalties to wind resources that fail to provide the required data. Wind resources must collect wind speed and wind direction from at least one point within the limits of the wind resource for every 15-minute interval (24 hours a day, 7 days a week). In addition, the resources have the option to collect and report ambient temperature, barometric pressure and relative humidity. The wind resources are responsible for the costs of installing and maintaining all equipment necessary to collect the met data. The NYISO charges a separate fee to the wind resources to cover the majority of the costs of this centralized wind forecasting program. The forecast data is treated as confidential proprietary information, but each participating wind generator has access to their individual forecast.

AWS uses the on-site met data along with regional and national meteorological reports, current generating levels and resource-specific technical capabilities for each wind resource (including outage schedules) to produce a real-time power output forecast in megawatts for each wind resource. This power output forecast is produced and

[10] Through this NYISO-administered wind forecast program wind-energy output is being forecast for all but two wind generating plants (an exemption was made for two plants that were in commercial operation as of January 1, 2002, each with a name plate capacity of 12MW or less). *See* Order Conditionally Accepting Tariff Revisions, 123 FERC ¶ 61,267, Issued June 17, 2008 (Docket No. ER08-850-000).

delivered to the NYISO every 15 minutes and forecasts wind resource output in 15-minute intervals for an eight hour forecast period. A day-ahead forecast is also produced for each hour of the next two Dispatch Days. This day-ahead forecast is delivered to the NYISO at 4 a.m. and 4 p.m. Since the NYISO does not require wind resources to bid capacity into the Day-Ahead Market ("DAM"), the day-ahead forecast provides the NYISO with an expectation of the amount of wind generation that will likely show up in the following day's real-time dispatch.

Real-time forecasts are integrated into the NYISO's real-time SCD, which includes a Real-Time Commitment ("RTC") as well as the RTD software. RTD is the NYISO's real-time five-minute interval dispatch model and RTC represents the hour-ahead unit commitment model that is broken down into 15-minute intervals. The forecasted wind resource output levels are updated every 15 minutes and provide eight hours of forecast data in 15-minute intervals. In RTD, the NYISO uses persistence data in the near-term, based on the actual plant output at the initiation of the RTD interval, blended with the forecast supplied by AWS for later intervals, to represent the expected wind output levels. The wind forecast is also integrated with RTC. RTC solves the system dispatch for a two and one-half hour time horizon, broken down into 15-minute intervals. The integration of the wind forecast with RTD and RTC allows the NYISO to produce more efficient commitment decisions than would otherwise be available and allows for more efficient transaction scheduling with market participants in neighboring control areas.

The day-ahead wind forecast is integrated into the day-ahead unit commitment process for reliability purposes. In particular, the forecast is integrated into pass two of the NYISO's day-ahead Security Constrained Unit Commitment program or "SCUC."

This pass evaluates the need to commit additional resources to meet the NYISO's own load forecast for the next day. By considering the expected wind output provided in the day-ahead forecast the NYISO minimizes the over-commitment of traditional resources in circumstances when the forecasted wind output would resolve any capacity shortage identified. No wind resources, however, are committed or given a financially binding DAM position based upon the day-ahead forecast. Wind resources do have the option to voluntarily offer energy in the DAM that, if scheduled, would establish a commitment for that generator to provide the scheduled energy in real time.

In 2009, the Mean Absolute Error (MAE) for the real time forecast is approximately 4 percent for one-hour-ahead forecast and the MAE for the day-ahead forecast is approximately 8 percent.

Q17.2 ***What is necessary to transition from the existing power generation forecasting systems for wind and solar generation resources to a state-of-the-art forecasting system? What type of data (e.g., meteorological, outage, etc.), sampling frequency, and sampling location requirements are necessary to develop and integrate state-of-the-art forecasts, and what technical or market barriers impede such development?***

Q17.3 ***What data, forecasting tools and processes do System Operators need to more effectively address ramping events and other variations in VER output, and to validate enhanced forecasting tools and procedures?***

NYISO Response: The NYISO-administered centralized wind forecast has been in place for almost two years and has proved successful, but managing the efficient flow of variable energy over 10,775 miles of high-voltage transmission lines on a minute-to-minute basis, 24 hours-a-day, seven days-a-week requires the NYISO to continue to pursue additional state-of-the-art forecasting tools to improve the situational awareness of operators. These tools will provide operators the ability to manage significant regional wind resource output ramp-up and cut-out events caused by sudden large increases in wind speeds. The NYISO is currently in the process of implementing additional met

data requirements to enable tools that alert system operators of the potential for significant wind ramp events that can result from sudden large increases and decreases in wind speed, as well as excessively high wind speeds that can exceed turbine cut-out levels. In order to identify high wind speeds associated with storm conditions, met data must be collected from many more locations at the wind resource on a more frequent basis. The NYISO is implementing new data requirements that mandate the collection of met data within five kilometers of all wind turbines, which is to be provided directly to the NYISO with a frequency of at least every 30 seconds. With this enhanced awareness of the meteorological conditions where wind resources exist, the NYISO will be able to observe a storm front move across the state, more easily identify high speed wind cut-out events, and anticipate sudden large increases and drops in wind generator outputs. This will allow the NYISO to take actions to address the real time reliability impacts resulting from these ramping events in order to maintain reliable operations.

Q17.6 ***Should the Commission encourage both decentralized and centralized meteorological and VER energy production forecasting? For example, should transmission providers have independent forecasting obligations as part of their reliability commitment processes similar to what is done today for demand forecasting?***

NYISO Response: The Commission approved[11] and the NYISO implemented a centralized wind forecast in 2008 that is conducted by AWS Truewind for all wind resources except for the two oldest, smallest wind resources that were interconnected prior to 2002 and are smaller than 12 MW each. The Commission approved this exemption based on the age and size of these two resources. All new wind resources, however, interconnecting to the bulk electric system in the New York Control Area

[11] Order Conditionally Accepting Tariff Revisions, 123 FERC ¶ 61,267, Issued June 17, 2008 (Docket No. ER08-850-000).

("NYCA"), regardless of size, are now required to participate in the NYISO's centralized forecast.

The decision to implement a centralized wind forecast at the NYISO was based on a few key considerations. First, having a single entity provide wind forecasts for all resources within the NYISO allows for a better understanding of the forecast models used to enable improvements in accuracy over time. In addition, there is NYISO visibility into items that impact the quality of the forecast such as reliable met data. In comparison, having decentralized forecasting would necessitate more outreach to understand the differences in techniques used by each of the wind resources and the associated impacts on forecast quality. Second, a centralized forecast approach enables more data to be leveraged to train the forecast models, thereby improving overall accuracy. Third, there are presumed efficiencies gained in having a centralized forecast that allow for cost savings.

C. Scheduling Flexibility and Scheduling Incentives

The NYISO has developed a best practice for scheduling wind resources and other VERs interconnected to the NYS Power System. The NYISO's Real-Time Dispatch market software directs wind resources — as it does all other flexible resources that are dispatched — to reduce their output when necessary and economically appropriate. Dispatch-directed output reductions based on the economics of a wind generator's offer enhance market efficiency by minimizing the size and duration of wind output reductions necessary to preserve reliability and by including, in the real-time price, the impact of the economically driven wind output reduction. During times when there are no system constraints impacted by wind resources (as reflected by the nodal Location

Based Marginal Price ("LBMP")), however, all the wind energy produced will be accepted regardless of the RTD basepoints.[12]

The NYISO also employs what it considers a best practice to increase the efficiency of its intra-hour dispatch by allowing its LBMPs to go negative when system conditions indicate that resources should be reducing their output to bring the system back into load/generation balance. Moreover, a resource can indicate, with its bids, the extent to which it wants to continue to generate even as LBMPs grow increasingly negative. Allowing negative energy price bids allows the NYISO to manage its set of flexible resources more efficiently.

With respect to managing wind variability, a five-minute dispatch allows for an assessment of wind output, in conjunction with that of other internal suppliers, to meet load on a frequent basis. The fact that a security constrained dispatch automatically occurs every five minutes allows for the internal resource mix across the entire system to be optimized with consideration of actual wind output levels. Adjusting for the variability through a five-minute dispatch minimizes the amount of regulation that must be secured to maintain system control performance.

In addition, the Commission questions whether the scheduling of transmission service on an hourly basis, with intra-hourly transmission service scheduling allowed on an emergency basis only, may limit the ability of VERs to adjust their schedules and

[12] Since the wholesale markets opened in New York, the NYISO has had special market rules that recognize the unique characteristics of wind resources and other renewable resources. These special market rules exempt wind and run-of-river hydro units from financial penalties for deviations from expected schedules. In December 2006, the NYISO filed tariff revisions with the Commission to extend its special market rules, doubling the amount of energy that qualified for special payment provisions and penalty exemptions up to 1,000 MW of installed intermittent resources. Based upon reliability analyses conducted by the NYISO in anticipation of the steep growth of incremental wind resources on the system that occurred in 2008 and 2009, the NYISO submitted revised tariff language to the Commission on April 18, 2008 that further increased the amount of intermittent generation eligible for the special payment provisions and penalty exemptions to 3,300 MW of intermittent renewable resources. *See* Order Conditionally Accepting Tariff Revisions, 123 FERC ¶ 61,267, Issued June 17, 2008 (Docket ER08-850-000); and Order Accepting Tariff Revisions, 118 FERC ¶ 61,068, Issued January 31, 2007 (Docket ER07-285-000).

thereby limit the full utilization of their resource. The Commission also requests comment on whether greater scheduling flexibility at ISO/RTO borders with other Control Areas would provide benefits to the system and facilitate reliable and efficient use of all resources.

New York's financially-based transmission service, integrated with its Energy Markets through RTD, RTC and SCUC, does not require VERs (or any other supply resource) to physically schedule transmission service necessary to accommodate their output. Rather, as discussed above, the NYISO dispatches all resources based on their economic offers every five minutes. This allows the NYISO to respond to five-minute variations in the output of VERs by managing the output of other, controllable resources on a five-minute basis. To date, the NYISO has not materially increased its Regulation Service requirement to assist in managing VERs. Additional analysis by NYISO has indicated that the Regulation Service requirement may increase further as the NYISO approaches 8000 MW of wind.

Although the NYISO responds to fluctuations in VER supply with its RTD and RTC models and forecast, external control area resource scheduling is still determined hourly. The NYISO is in the process of expanding its current hour-by-hour transaction scheduling at its Control Area interfaces to either a five-minute or a 15-minute dispatch.

It is clear to the NYISO that increasing the frequency of these transaction-scheduling windows will assist in managing its variable output generation, particularly in those remote northern locations where wind generation at certain hours may outpace load and transmission system availability. Dispatchable export capability could allow the NYISO to better utilize wind output, particularly at these points in time.

Q22.2 ***What are the benefits and costs of allowing resources and transactions to schedule on an intra-hour basis, and what tariff and/or technical barriers exist to implementing intra-hour scheduling? Are there best practices that could be implemented to facilitate greater intra-hour scheduling?***

NYISO Response: There are no barriers for internal resource intra-hour scheduling since the NYISO currently has a five-minute real-time dispatch in place.

Q22.3 ***Are there an optimum number of intervals within the hour for scheduling? What time increments would be necessary and/or desirable in order to achieve optimum flexibility while still meeting the relevant reliability requirements?***

NYISO Response: The NYISO's RTD is run automatically every five minutes, allowing an optimization of all resources on a frequent basis, which with respect to wind does help address variability. Currently the NYISO has hourly scheduling with the neighboring control areas, but the Broader Regional Markets initiative that is underway aims to reduce the transaction scheduling interval and increase the frequency where practical. Potential limitations to the scheduling frequency that will be attainable are associated with software processing times and the time required to conduct a check out of external transaction schedules with the neighboring control areas. Consistent with internal resources, frequent scheduling of external transactions is considered to be beneficial to managing wind variability.

Q25.1 ***Has the exemption from third-tier penalty imbalances worked as a targeted exemption that recognizes operational limitations of VERs, or has it encouraged inefficient scheduling behaviors to develop? If the latter, what reforms to this exemption would encourage more accurate scheduling practices?***

NYISO Response: Third-tier penalty imbalances are not applicable to resources within the NYISO. Rather, as part of its Market Services Tariff, the NYISO has implemented rules to encourage wind resources to follow curtailment instructions that result in wind output reductions. Given that wind resources do not incur costs associated with fuel, including an incentive to follow NYISO curtailment instructions is needed. Specifically,

wind resources that have been instructed to curtail output, but operate at a level above schedule, including a tolerance, are not paid for the excess generation and pay an overgeneration charge to the NYISO. The NYISO's special market rules for intermittent wind resources, however, currently allow all wind resources interconnected to the system to be compensated for all of their output, even that above the NYISO RTD base point without penalty when the system is unconstrained.

D. Day-Ahead Market Participation and Reliability Commitments

Q28.1 ***Does the lack of day-ahead market participation by VERs present operational challenges or reduce market transparency as the number of VERs increases? Will out-of-market commitments increase as the number of VERs increases? If so, why?***

NYISO Response: The existence of the NYISO's robust day-ahead market, with proper hedging mechanisms, encourages participation in the day-ahead market by wind generators or their affiliates. The NYISO's market design allows hedging mechanisms such as virtual trading, which can arbitrage the difference between prices in the day-ahead market and those in real-time, to the extent that there are predictable differences. Further, the incorporation of hedging mechanisms allows for the expected real-time output of wind to be reflected in day-ahead prices, limiting market impacts.

While the number of out-of-market commitments may increase to preserve reliability as the number of wind resources increase, the NYISO's day-ahead wind forecast will mitigate this result to some extent. The day-ahead wind forecast is included in the day-ahead market as part of the pass that evaluates the need to commit additional resources to meet the NYISO's load forecast for the next day. This approach minimizes the over-commitment of traditional resources when the forecasted wind output resolves any capacity shortage identified.

Further improvements in the accuracy of day-ahead forecasts may help further minimize the out-of-market commitments required to maintain reliability. Significant investment in initiatives to improve the quality and availability of meteorological data is needed. For example, the NYISO has received feedback from stakeholders involved with wind forecasting that indicate that improvements in the national weather service data geared towards wind generation will benefit long-term forecasting. Currently, the bulk of data produced by the national weather service is geared towards predicting weather at 2 meters off the ground. This supports daily and weekly weather reports, but the wind forecasting industry needs more attention paid to 80-120 meters above ground level to make further advances in day-ahead wind energy forecasting. Improving wind forecasts also requires enhancing the existing national weather service models and developing new weather models more pertinent to the wind power industry (*e.g.*, models focused on predicting weather patterns at typical wind turbine heights of 80-120 meters using meteorological data collected at these heights). Government incentives to drive these types of improvements in met data and wind forecasts will certainly prove worthwhile.

Q28.4 ***Would the use of more accurate forecasting tools facilitate participation of VERs in the day-ahead market rather than primarily in the real time market? If so, how?***

NYISO Response: The development of more accurate forecasting tools would reduce risk associated with wind resources taking positions in the day-ahead market, which are based upon their day-ahead forecasts, but that may not be realized in real-time. Therefore, to the extent that forecasts improve, it should encourage more wind participation in the day-ahead market.

Q28.5 ***Should the financial risk of VERs' participating in the day-ahead market be different than the risk imposed on other resources in that market in recognition of their unique characteristics? Are there settlement practices, such as netting deviations,***

which could be employed to address VERs' participating in the day-ahead market? If so, what are they?

NYISO Response: The NYISO market design allows wind resources to take positions in the day-ahead market, but does not provide an exemption from the balancing obligations associated with that participation. Removing the financial risk from wind resources that is associated with day-ahead market participation would simply shift the risk burden to loads. Therefore, the preferred approach is for wind resources to manage their risk with the use of wind forecasting tools and available hedging mechanisms.

Q31.1 ***Would the implementation of a formalized and transparent intra-day reliability assessment and commitment process prior to each operating hour reduce the amount of reserves needed and/or reduce system uplift costs? What would be the optimal time (e.g., 4 to 6 hours ahead of the operating hour) for such a process?***

Q31.2 ***Would an additional market that coincides with the timing of an intra-day reliability commitment process be beneficial in the forward scheduling of VERs? If such a market is implemented, would an intra-day reliability commitment process be necessary? Should the frequency of scheduling intervals resulting from such a market coincide with intra-hour schedules discussed above?***

Q31.3 ***What role should centralized forecasting of VERs' output play in reliability assessment and commitment processes?***

NYISO Response: The NYISO's RTC and RTD processes are described above.

E. Balancing Authority Coordination

Q33.1 ***Will smaller balancing authorities, when operated individually, have higher VER integration costs than geographically or electrically larger balancing authorities? If so, why?***

Q33.2 ***Should the Commission encourage the consolidation of balancing authorities? If so, indicate the potential for and impediments to consolidation among balancing authorities and the means by which the Commission should encourage consolidation.***

Q33.3***What tools or arrangements (e.g., dynamic schedules, pseudo-ties, and virtual balancing authorities) are available and/or could be enhanced or created to reduce barriers to greater operational coordination among balancing authorities? What role should the Commission play in facilitating inter-balancing authority coordination?***

Q33.4 ***What are the costs and benefits, if any, associated with the proliferation of small generation-only balancing authorities? How do NERC Certification and Reliability Standards encourage or discourage the creation of small generation-only balancing authorities?***

Q33.5 ***The Commission is interested in receiving comments on whether the integration of VERs with small host balancing authorities may limit the benefits derived from geographical diversity and increase integration costs. Should the Commission encourage and/or facilitate the creation of a VER balancing authority, essentially a large area virtual balancing authority primarily designed to accommodate VERs across a broad geographic region? What would be the benefits and costs of creating such a large area entity?***

Q33.6 ***Would a large area VER balancing authority be capable of capturing the reduced variability of VERs located across a broad and geographically diverse region? What tariff or technical limitations would prevent and/or inhibit the development of a large area VER balancing authority?***

Q33.7 ***What reliability impacts may be associated with the creation of a large area VER balancing authority?*****Q33.8** ***Should a large area VER balancing authority be limited only to VERs? Why or why not?*****Q33.9** ***Should the Commission consider establishing specific policies that support the creation of a large area VER balancing authority? If so, why?***

NYISO Response: It has been the NYISO's experience that the impact of an individual wind generator's variable output is lessened when balanced across a larger geographic footprint. The NYISO is in the process of implementing various solutions that further expand our system's flexibility through the Broader Regional Markets Initiative.[13] This initiative includes a set of solutions that provide the region's markets greater flexibility to better manage system needs, including the need to manage the variability associated with large penetrations of VERs. These initiatives, including: (a) Buy-Through of Congestion, (b) Congestion Management/Market-to-Market Coordination, (c) Interface Pricing Revisions, and (d) Interregional Transaction Coordination, can help the NYISO and its neighboring balancing authorities more efficiently manage the integration of VERs. The

[13] *See* New York Independent System Operator, Inc.'s Report on Broader Regional Markets, Long Term Solutions to Lake Erie Loop Flow, Submitted January 12, 2010 (Docket ER08-1281-004).

NYISO believes that market solutions such as those included in the Broader Regional Markets initiatives is the most appropriate way to gain and leverage additional system flexibility for managing VERs across multiple balancing authorities.

The NYISO believes that the physical consolidation or expansion of Balancing Authorities for addressing VERS will be less efficient than the Broader Regional Markets proposals considering the different market rules, reliability standards, operating procedures, local regulations, and stakeholders across various regions. Further, creating large Balancing Authorities with a VER-only scope would be less efficient than the market solutions proposed in the NYISO's Broader Regional Market approach.

F. Reserve Products and Ancillary Services

Q36.1 ***To what extent do existing reserve products provide System Operators with the most cost-effective means of maintaining reliability during VER ramping events? To what extent would the other reforms discussed herein, if implemented, mitigate the need for additional reforms to existing reserve products without adversely impacting system reliability?***

Q36.2 ***How could System Operators, managing the variability of VER resources, more fully utilize forecasting information and knowledge about existing system conditions to optimize reserve requirement levels?***

NYISO Response: The NYISO co-optimizes energy and reserves in its RTD five-minute dispatch and its RTC models. In addition, RTC utilizes a blended persistence forecast and real-time forecast for wind generation that provides an efficient and cost-effective means for maintaining reliability during VER ramping events with the NYISO's wind-on-dispatch capabilities

Q36.3 ***Would a load following or similar reserve product facilitate the reduction of costs associated with ensuring that sufficient reserve capacity is available to address the uncertainty and variability associated with VERs? If so, what are the ideal characteristics of such a product?***

NYISO Response: The NYISO's five-minute dispatch (RTD) simultaneously re-dispatches generating resources to match the anticipated load every five minutes. The NYISO's RTD, described above, co-optimizes energy and reserves and therefore captures the costs resulting from shortages of the reserve product in the LBMPs.

Q36.4 ***Existing contingency reserve products were designed to be utilized by System Operators to respond to disturbances (i.e., contingency events) due to a loss of supply and to assure system reliability. Does or should the definition of a contingency event include extreme VER ramping events? If so, would an additional level of contingency reserves be needed to achieve the same level of system reliability? In responding to this question, please include a proposed definition of "extreme ramping event."***

NYISO Response: A definition of "extreme ramping event" is likely to vary between control areas based on the unique characteristics of each system. For example, overall system load, existing transmission topology, location of VERs, the distribution or concentration of VERs, and the amount of reserves normally secured, etc., are all unique intrinsic parameters that will prescribe what constitutes an extreme ramping event for each control area. The NYISO is required by the New York State Reliability Council ("NYSRC") to secure sufficient ten-minute operating reserves to cover the energy loss due to the most severe normal transfer criteria contingency. This currently equates to 1,200MW of 10-minute reserves. The NYISO would consider any event of a similar magnitude to the most severe normal contingency as an "extreme ramping event." In order to minimize the impact of ramp events, the ability to predict the events, and then take action such as limiting wind output when it is expected to approach an extreme ramping condition in order to control the expected wind contingency loss to fall within the Balancing Area's normal largest contingency would be a pro-active approach to minimize this risk. Pre-positioning the generation fleet to minimize the occurrence of an event is the preferred approach as compared to increasing the contingency reserves to allow the system to respond to a large event.

Q36.5 ***Should a new category of reserves, that would be similar to contingency reserves, be developed to maintain reliability during VER ramping events in a cost effective manner? If so, what benefit would such reserves provide to System Operators and customers?***

NYISO Response: No, the NYISO does not see a need for any new reserve products in its energy markets at this time.

Q36.6 ***Could the expanded use of reserve-sharing programs between balancing authorities contribute to lowering the costs associated with integrating VERs? If so, how?***

NYISO Response: The NYISO secures the necessary amount of reserves with internal resources and, therefore, would not benefit from reserve-sharing programs with respect to integrating additional VERs. Reserve-sharing programs, however, may contribute to lowering the costs associated with integrating VERs for other control areas if the amount of reserves a control area must carry is reduced through participation in the program. For example, the Northeast Power Coordinating Council ("NPCC") has a Regional Reserve Sharing program in place. This program provides the participating members the ability to meet their reserve requirements by considering reserves available in neighboring NPCC regions (excluding Hydro-Quebec).

Q36.9 ***To what extent are VERs capable of providing reserve services? Should VERs be expected to provide reserve services? What are the tariff and technical barriers that may impede VERs from providing these reserve products?***

NYISO Response: In order for wind resources to provide reserves several barriers would need to be addressed. Wind resources would have to withhold a portion of their energy in order to provide "up" regulation or reserves. In order to be economically viable for the wind resources, the financial return associated with providing reserves would have to exceed any out-of-market payments associated with renewable energy credits for energy produced. In addition, significant improvements in the wind forecast on a plant

by plant basis would be needed in order to ensure that wind resources could meet reserve and regulation schedules.

G. Real-time adjustments

Q41.1 ***How have redispatch and curtailment practices changed with increased numbers of VERs? Are there any shortcomings of current redispatch and curtailment practices?***

NYISO Response: The NYISO is pleased with the results of its Wind Resource Management program thus far. This capability was put in place in June 2009, providing the NYISO more flexibility to manage wind generators in a manner similar to conventional flexible generators, while also allowing the wind generators to operate in accordance with their economic scheduling priority. The program provides the NYISO, through its RTD, the ability to automatically limit the output of wind generators when system constraints cause the real-time market prices to fall below the level at which a wind generator is willing to produce electricity.

Q41.2 ***Do existing redispatch and curtailment processes unduly discriminate against VERs? If so, how should they be modified?***

NYISO Response: No, as discussed above, the NYISO has special market rules in place to accommodate all output from up to 3,300 MW of intermittent renewable resources when the system is unconstrained. As mentioned earlier, the NYISO now requires wind resources to submit economic offers, which are assessed in the NYISO's real-time SCD software and issued basepoints. The basepoints are flagged by the NYISO to indicate that the system is constrained and that the wind resources receiving these instructions are required to follow the NYISO basepoints during this period.

Q41.3 ***RTOs/ISOs will redispatch VERs based on required economic bids. Should all RTOs/ISOs implement similar practices? Why or why not?***

NYISO Response: Market design and operating system parameters differ across the nation and therefore one solution that facilitates more efficient integration of VERs in one region may not be beneficial in another. While the NYISO's bidding requirements and its treatment of wind generation as a flexible resource in its RTD is a best practice to integrate wind efficiently in New York, the NYISO urges the Commission to develop policies and practices that are flexible and can be conformed to address the distinct needs and concerns of each ISO and RTO.

Q41.4 ***Should transmission loading relief protocols be altered to allow reliability coordinators in non-RTO/ISO regions to consider economic merit when considering curtailing VERs? If so, how? Similarly, should redispatch and curtailment protocols in non-RTOs/ISOs be revised to consider economic merit for all resources? If so, how?***

NYISO Response: The NYISO has responded to the Commission in a separate proceeding regarding potential to improve the TLR/IDC procedures.[14] The NYISO respectfully incorporates its proposed comments in that proceeding regarding the "Buy-Through Congestion" solution. As the NYISO explained in these earlier filings with the Commission, a TLR is an inherently "blunt instrument" that is inferior to market based alternatives.[15]

Q41.5 ***Is the increasing number of VERs affecting operational issues that arise during minimum generation events? Are there ways to minimize curtailments during a minimum generation event? Should conventional base-load resources be offered incentives to lower their minimum operating levels or even shut down during minimum***

[14] *See* Comments of the New York Independent System Operator, Inc.'s Comments in Response to Commission's Notice of Inquiry regarding Transmission Loading Relief Reliability Standard and Curtailment Priorities, Filed March 29, 2010 (Docket No. RM10-9-00).

[15] *Id*., at p. 6. *See also*, New York Independent System Operator, Inc.'s Report on Broader Regional Markets; Long-Term Solutions to Lake Erie Loop Flow; Filed January 12, 2010, (Docket No. ER08-1281-004).

generation events to reflect an economically efficient dispatch of resources? If so, what would be the benefits and costs of doing so?

NYISO Response: The NYISO's market design results in low prices at night and other instances when loads are typically low. At these times the low LBMPs, which can also be negative requiring generators to pay to generate, provide an incentive for most generators to reduce their minimum generation ("min gen") levels as low as possible because they are making insufficient margins to support their costs. Some generators, however, may want to stay on at night in spite of the low LBMP because turning the generator on and off (or cycling the generator) increases maintenance costs and because it increases the likelihood that the generator will be committed for the higher load periods during the day because the SCD will not have to evaluate the generator's start up cost when solving the dispatch. If a generator keeps its min gen level high, there is an increased risk that it will not be committed during higher load periods.

Q41.6 ***To what extent do VERs have the capability to respond to specific dispatch instructions? Are there any advanced technologies that could be adopted by VERs to control output to match system needs more effectively? Should incentives be put into place for VERs that can respond to dispatch instructions? If so, what types of incentives would be appropriate?***

NYISO Response: The wind resources in the NYISO have the technical capability to respond to curtailment instructions (reduce output) as do most or all new turbines. It is a requirement of the NYISO that wind resources be able to respond to curtailment instructions. Automated control systems provide the most effective and timely response and should be encouraged by requiring automated energy curtailment packages that can smoothly ramp output down automatically from an ISO's dispatch instruction. The NYISO has penalties in place, which were discussed above, to ensure response to a curtailment instruction.

To the extent that new technology would enable wind resources to also respond to a dispatch instruction in the upward direction would be very beneficial to the system. In order to respond in the upward direction, however, the wind operator would have to withhold or limit its energy output, which may not make economic sense in most conditions and would fail to exploit the renewable resource to its full potential.

IV. Conclusion

WHEREFORE, the New York Independent System Operator, Inc. respectfully requests that the Commission consider these comments and act or elect not to take action in accordance with the NYISO's comments above and the IRC White Paper, which was submitted under separate cover as joint filing of IRC members in this proceeding and is incorporated herein by reference.

Respectfully submitted,

/s/ David Allen

David Allen
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April 15, 2010

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list compiled by the Secretary in this proceeding in accordance with the requirements of Rule 2010 of the Rules of Practice and Procedure, 18 C.F.R. § 385.2010.

Dated at Rensselaer, NY this 15th day of April, 2010

/s/ Joy Zimberlin
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