UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Price Formation in Energy and Ancillary Services Markets Operated by Regional Transmission Organizations and Independent System Operators	**)** **)** **)** **)**	**Docket No. AD14-14-000**

POST-TECHNICAL WORKSHOP COMMENTS OF THE NEW YORK INDEPENDENT SYSTEM OPERATOR, INC.

Pursuant to the Notice Inviting Post-Technical Workshop Comments ("Notice") and the Notice Granting Extension of Time issued by the Federal Energy Regulatory Commission ("Commission") on January 16, 2015 and February 9, 2015, respectively, in the above-referenced docket, the New York Independent System Operator, Inc. ("NYISO") hereby submits its Comments in response to the questions posed by the Commission in the Notice. The NYISO shares the Commission's vision for proper price formation in the wholesale energy and ancillary services markets it administers. The NYISO continually reviews its markets to identify opportunities to improve long-term market efficiency by ensuring that market prices reflect, to the greatest extent practicable, the cost or value of each product.

I. COMMUNICATIONS AND CORRESPONDENCE

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II. COMMENTS IN RESPONSE TO COMMISSION QUESTIONS

The NYISO provides the following responses to the questions articulated in the Notice:

1. **Offer Caps**
   a. **Should the $1,000/MWh offer cap be modified?**
      i. **If the offer cap is modified, what form should the offer cap take? For instance, should a modified cap be set at a level greater than the current $1,000/MWh cap and apply even if a resource has costs greater than the new cap or should the offer cap be replaced with a structure that allows offers at the higher of marginal cost or the existing $1,000/MWh cap? Should it be a fixed cap or a floating cap that varies with the price of fuel (*e.g.*, natural gas)? If a modified cap were set as a fixed offer cap, what should the new offer cap be? What should be the basis for determining the fixed offer cap?**
      ii. **If the offer cap should not be modified or set such that marginal costs could be greater than $1000/MWh, how should the Commission ensure that suppliers with costs greater than the cap have the opportunity to recover those costs?**
      iii. **Do the real-time and day-ahead market clearing processes allow sufficient time to verify the cost-basis of the marginal resources that exceed the offer cap? Does the settlement process allow sufficient time to verify costs of resources that receive uplift associated with offers that exceed the offer cap?**
   b. **What are the advantages and disadvantages of having offer caps be set at the same level across all RTOs/ISOs? Would different offer caps across the RTOs/ISOs exacerbate interface pricing issues at RTO/ISO borders? If so, how? Would an offer cap that takes the form of the higher of marginal cost or $1,000/MWh create the same issues as setting different offer caps across RTOs/ISOs?**
   c. **What impact would adjusting the offer cap have on other aspects of RTO/ISO price formation (*e.g.*, mitigation rules or shortage pricing rules)? Would other market rule changes be necessary if offer cap levels were adjusted? Do other challenges associated with modifying offer cap rules exist? If so, what are they? If offer cap rules are adjusted, how quickly could RTOs/ISOs incorporate adjusted offer cap rules into their software and the market clearing process?**
   d. **Should the same offer cap that applies to generation also apply to load bids? What are the advantages and disadvantages of applying an offer cap to load bids?**

NYISO Response:

Offer caps serve several important functions including protecting the marketplace against the inadvertent submission of offers above the level of the cap and potential exercises of market power that are otherwise not addressed by existing mitigation rules. Adjustments to the offer cap level should be carefully evaluated to ensure that consumers will realize reliability and economic benefits from any proposed change. Changes should be responsive to actual conditions.

The NYISO has not seen evidence of natural gas prices or other fuel prices that would warrant a need for raising the current $1,000 per MWh offer cap that is applicable to Incremental Energy and Minimum Generation Bids in New York.[1] Last winter, natural gas prices rose to unprecedented high levels in New York and elsewhere.[2] Despite previously unseen gas prices, no supply resource in New York submitted invoices to the NYISO showing it incurred costs in excess of $1,000 per MWh or sought recovery of actual costs in excess of the $1,000 per MWh offer cap.[3]

[1] Capitalized terms not otherwise defined herein shall have the meaning specified in Section 1 of the NYISO Open Access Transmission Tariff ("OATT") and Section 2 of the NYISO Market Administration and Control Area Services Tariff ("Services Tariff").

[2] In response to the high natural gas prices and its concern that such prices could potentially reach levels that would prevent certain supply resources from recouping their actual costs under the current $1,000 per MWh offer cap, the NYISO requested a temporary waiver to allow it to consider Incremental Energy and Minimum Generation Bids in excess of $1,000 per MWh and compensate Generators that were able to demonstrate that they actually incurred variable costs in excess of $1,000 per MWh. The NYISO requested that such temporary waiver apply from January 22, 2014 through February 28, 2014. Docket No. ER14-1138-000, *New York Independent System Operator, Inc.*, Petition for Temporary Tariff Waivers, Request for Shortened Comment Period, and Request for Expedited Commission Action by January 31, 2014 (January 22, 2014). In granting the NYISO's temporary waiver request, the Commission directed the NYISO to submit an informational filing by March 28, 2014 to, among other matters, provide the total amount of energy that qualified to receive compensation for costs in excess of $1,000 per MWh during period in which the temporary waiver was in effect. *New York Independent System Operator, Inc.*, 146 FERC ¶ 61,061 at P 24 (2014).

[3] Docket No. ER14-1138-000, *supra*, Bid Restriction Waiver Informational Filing (March 28, 2014).

Notwithstanding the sustained cold weather conditions that have occurred this winter the NYISO has not identified any natural gas or other fuel prices during winter 2014-2015 that warrant increasing the current offer cap level. February 2015 was the coldest February on record in New York City since 1885.[4] Despite the sustained frigid conditions, the highest natural gas prices experienced in New York City during winter 2014-2015 have been less than $60 per MMBtu – approximately 50 percent lower than the highest prices experienced during last winter.[5]

Although the NYISO has not seen evidence to date that would warrant any changes to the offer cap level in New York, the NYISO supports the coordinated inter-regional implementation of comparable offer caps in order to limit potential seams issues between neighboring regions, protect reliability, and avoid inefficient market outcomes. Offer caps must be discussed at an inter-regional level in order for all interested parties to evaluate the potential for seams issues and other impacts that could arise from having different offer caps apply in markets that have access to an overlapping set of resources.

Electric markets in the Mid-Atlantic and Northeast compete for a common supply of natural gas. Generators located in regions that are subject to lower offer caps could be denied access to fuel. Enacting materially different offer caps in regions that depend on the same

[4] Reuters, *As New England Freezes, Natural Gas Stays Cheap* (March 1, 2015) available at: http://www.reuters.com/article/2015/03/02/energy-natgas-newengland-idUSL1N0W12U220150302.

[5] Although the NYISO does not anticipate natural gas or other fuel costs will reach levels that would result in supply resources incurring costs in excess of the currently effective $1,000 per MWh offer cap, the NYISO is willing to further consider with its stakeholders whether inclusion of a "backstop" mechanism in its tariffs to provide suppliers with the assurance of cost-recovery in the event that unprecedented fuel cost price spikes were to occur in the future is warranted. Utilization of *any* fixed offer cap level presents the potential, however remote, for variable costs to exceed the level of the cap. A "backstop" mechanism providing supply resources assurance of the ability to recover legitimate costs incurred may be helpful regardless of the level of the offer cap.

natural gas supply could require operator actions to avoid electric system reliability impacts during periods of cold weather and high gas prices. Inter-regional or national coordination to establish appropriate offer caps (or to modify existing offer caps) is essential to ensure that generators in all electric markets enjoy equivalent access to fuel. If changes to offer caps are not coordinated, offer cap driven market outcomes could result in natural gas supply flowing to the supply resources in the region with the highest offer cap instead of directing scarce fuel supplies to the resources that can use the available fuel to serve load most efficiently.

2. **Transparency**
   a. **What should RTOs/ISOs do to improve transparency of uplift credits and charges, unit commitment, and other operator actions? Please comment on the type of information that would be useful, why it is necessary, whether it should be shared with specific resources or available to all, the timing of its release, and whether it is feasible to release the information in real-time.**
   b. **What types of information should not be shared publicly? Why? What are the concerns with commercially sensitive information?**
   c. **Commission Staff's August 2014 report on uplift noted several issues with the consistency and granularity of uplift data provided as part of the Electric Quarterly Reports. What steps could be taken to improve the quality of uplift data required to be reported as part of the Electric Quarterly Reports?**

NYISO Response:

The NYISO strives to provide a high degree of transparency regarding its market outcomes, including uplift costs, while balancing the need to protect confidential information. The NYISO makes publicly available a host of information to assist Market Participants and the public in understanding the amount and underlying causes/categorization of uplift costs in New York's wholesale energy markets.

The NYISO produces monthly operations performance metrics reports that contain detailed information on uplift costs in New York.[6] The NYISO's monthly operations performance metrics reports contain the following information:

- monthly total statewide uplift costs and the monthly rate (stated in $ per MWh) associated therewith;

- the categorization of statewide uplift costs as balancing congestion residual costs, which result from differences between the Day-Ahead and Real-Time markets, or make-whole payments to supply resources;

- detailed breakdowns of the balancing congestion residual component to provide categorization of such costs on a monthly and daily basis, including a root cause analysis to identify the underlying reason for the congestion residuals. Causes that are identified in the monthly report include unscheduled transmission outages, derates to the transfer limits of internal or external interfaces and increases to unscheduled clockwise loopflow around Lake Erie; and

- additional detail and categorization of monthly and daily make-whole payments to supply resources identifying the statewide and local allocation of such costs, as well as detailed regional information regarding the Generators committed out-of-market pursuant to the NYISO's Day-Ahead Reliability Unit ("DARU") and Supplemental Resource Evaluation ("SRE") commitment processes and the total hours each month during which such units were committed pursuant to DARU and SRE procedures.

These reports are posted publicly for review on the NYISO's website and are discussed with Market Participants during several monthly stakeholder meetings.[7] Discussion during stakeholder meetings is designed to provide all interested parties the opportunity to review the data available and ask questions to better understand market outcomes or trends that may be developing with respect to certain cost categories.

[6] For example, the information included in its monthly operations performance metrics reports for January 2015 is posted on the NYISO's website at the following location: http://www.nyiso.com/public/webdocs/markets_operations/documents/Studies_and_Reports/Reports/Monthly_Reports/2015/Board%20Monthly%20Report%20January%202015.pdf.

[7] In addition to the NYISO's monthly reports that serve as an aggregation of data throughout each month, the NYISO posts information to its website on a daily basis to inform all interested parties of out-of-market commitments of supply resources, including the type of commitment and the resource committed.

In addition to the NYISO's monthly reports, uplift costs, root causes and the impacts of operator action thereon are reviewed in detail as part of the quarterly and annual reports prepared by Potomac Economics, the NYISO's external Market Monitoring Unit ("MMU"). The MMU's reports address statewide and regional uplift costs, including the impact out-of-market resource commitments have on uplift costs. The reports include a detailed analysis of the causes of make-whole guarantee payments to supply resources. The MMU includes recommendations on market enhancements that may warrant consideration by the NYISO to improve market efficiency by incorporating causes of uplift into the NYISO's economic commitment and dispatch.

Over time, the NYISO has revised and enhanced its data reporting and the format in which such information is presented based on feedback from interested parties and its own internal review. Such enhancements are aimed at improving clarity and making data and information more readily accessible and easily comprehensible. The NYISO continually seeks opportunities to enhance its information reporting to improve transparency and enhance understanding of market outcomes by all interested parties, while maintaining the confidentiality of commercially sensitive information.

3. **Pricing Fast-Start Resources**
   a. **During the Operator Actions Workshop, panelists explained that relaxing resource minimum operating limits can lead to incentive and operational issues such as over-generation. What tradeoffs are involved with relaxing the minimum operating limits of block-loaded resources to zero for purposes of price setting? Should relaxing the minimum operating level be limited to block-loaded fast-start resources, or should relaxation be available to a larger set of resources?**
   b. **What are the merits of expanding the set of costs included in the energy component of LMP (*i.e.*, start-up and no-load costs)? What factors should be considered when expanding the set of costs included in the energy component of LMP? If the start-up and no-load costs of block-loaded fast-start resources are included in the LMP, how should they be included? For example, should start-up costs only be included during intervals when the resource starts up?**

c. Should off-line resources be eligible to set the LMP? If so, should start-up and no-load costs be included in the price, or just incremental energy costs?

NYISO Response:

Pricing outcomes should, to the maximum extent practicable, align with the physical dispatch that resources are instructed to follow. The hybrid pricing rules NYISO implemented in 2001 ("Hybrid Pricing") are designed to align physical schedules with efficient pricing to the maximum extent possible.[8]

Relaxation of the minimum operating limits of fast-start, block-loaded resources for purposes of price setting can produce incongruous results when relaxation allows the ideal pricing dispatch to diverge significantly from the physical dispatch.[9] Divergence between the ideal and physical dispatches can result in distorted price signals to resources that are not block-loaded. This is particularly true of the price signals sent to flexible resources that are backed down to accommodate the dispatch of a block-loaded resource.

Block loaded resources would not ordinarily be included in price setting, absent special treatment, because they cannot flexibly provide only the next incremental MW needed by the system. The NYISO's Hybrid Pricing addresses this limitation by relaxing the minimum operating limits of certain fast-start, block-loaded resources in order to permit these resources to be eligible to set price based on the incremental need that required a resource's commitment. The NYISO's Hybrid Pricing also ensures that block-loaded resources are ineligible to set price

[8] *See New York Independent System Operator, Inc.*, 95 FERC ¶ 61,121 (2001). The NYISO's Hybrid Pricing applies to Real-Time Market pricing. For the purposes of the Day-Ahead Market, block-loaded resources are treated as flexible (*i.e.*, treating the resource as if it could be dispatched at any level between zero and the resource's maximum capability) and, thus, eligible to set pricing to the extent they are economically committed to serve load.

[9] The physical dispatch accounts for the physical characteristics and operating parameters of supply resources.

in those intervals in which they are not economic to commit but are otherwise blocked on in order to complete their minimum run time (which is typically one hour).[10]

The Hybrid Pricing rules also permit offline 10-minute start-up gas turbines that are not committed by the NYISO's Real-Time Commitment ("RTC") software, but are available for dispatch in real-time, to set prices under certain circumstances.[11] Offline 10-minute gas turbines are eligible to set price in real-time when they are committed by RTD for all intervals of a given RTD run and are economic to serve load for at least the first three five-minute intervals of the RTD run at issue.[12]

By allowing block-loaded resources to be eligible to set price when they are economic to serve load, the Hybrid Pricing rules improve pricing transparency and allow resources to be compensated based on pricing that more accurately reflects the NYISO's least-cost solution to serve load. The pricing signals produced by the NYISO's Hybrid Pricing provide appropriate incentives to available resources, including: (i) incenting the scheduling of import transactions

[10] The NYISO's Real-Time Dispatch ("RTD") system involves a multi-pass process. The first pass treats committed block-loaded resources as blocked on at their applicable maximum capability. In contrast, the second pass treats committed block-loaded resources that are still within their minimum run time as flexible in order to determine whether such resources are economic to serve load. Block-loaded resources that are determined to be economic to serve load in the second pass may be eligible to set prices in the third pass. Block-loaded resources that are not found to be economic in the second pass are not eligible to set price.

[11] *See* Docket No. ER05-1123-000, *New York Independent System Operator, Inc.*, Proposed Tariff Revisions to Remedy Real-Time Market Price Volatility Attributable to Forecasting Uncertainties and Request for Expedited Treatment (June 17, 2005); and *New York Independent System Operator, Inc.*, 112 FERC ¶ 61,075 (2005). Resources eligible for consideration under such rules are offline generators that: (i) are capable of starting with ten minutes; (ii) have satisfied any applicable minimum downtime requirements; and (iii) have not otherwise been committed by RTC or RTD-Corrective Action Mode ("RTD-CAM").

[12] The RTD optimization looks ahead approximately 60 minutes on a five minute interval basis. In evaluating an eligible offline resource, RTD considers both the start-up and incremental energy costs of such resource to ensure the system conducts a sound commitment-related analysis. The Hybrid Pricing rules are designed to allow RTD to commit offline quick-start gas turbines for pricing purposes when such commitment represents the least cost option to meet real-time system conditions.

when imports are less expensive than internal generation; and (ii) incenting price-responsive load to reduce demand during high priced periods. By excluding block-loaded resources from price setting when they must be kept on to complete their minimum run time but are no longer economic to meet real-time load, the Hybrid Pricing rules appropriately reflect the existence of excess, inflexible capacity on the system. During such periods, it is appropriate for prices to be lowered, thereby discouraging additional imports and providing an appropriate price signal to internal generation.

The NYISO does not see a need to extend its Hybrid Pricing to resources other than fast-start block-loaded resources.[13] The NYISO's RTC uses a look-ahead functionality to optimize Energy, Regulation Service and Operating Reserves commitments over the next ten 15 minute increments (150 minutes). Such look-ahead capability allows RTC to determine when additional flexibility will be needed on the system and to commit resources or modify interchange schedules to provide any needed flexibility.

Inclusion of start-up and no-load costs in prices could result in more explicitly recognizing the costs a resource incurs to supply energy and potentially reduce uplift costs at times when LBMPs are inadequate to cover minimum generation and start-up costs. However, the NYISO is concerned that expanding the set of costs included in the energy component of the NYISO's Locational Based Marginal Pricing ("LBMP") to always include start-up and no-load costs could undermine market efficiency.

Embedding start-up costs in the interval in which a resource is started could produce inaccurate price signals during such periods, especially when the resource that is starting up has a

[13] The NYISO, however, continues to evaluate whether: (i) revisions to its current Hybrid Pricing rules are warranted in order to allow for increased price setting eligibility for fast-start block loaded resources; and (ii) any such revisions, if further pursued, would result in more efficient pricing.

long start-up or minimum run time requirement. Resources with long start-up or minimum run time requirements may be started during off-peak hours in order to allow sufficient time for such resources to ramp up for peak hours. If units are ramping up or operating at minimum generation levels during off-peak hours and start-up costs are reflected in the energy component of LBMP during those hours, energy prices may be artificially inflated during off-peak hours.

During off-peak periods when a significant amount of resources may be operating at minimum generation levels to be available to ramp up to serve peak loads later in the day, LBMPs should be low to signal the availability of low-cost exports to neighboring regions and to discourage imports to New York (which could exacerbate system excess conditions). Inclusion of start-up and no-load costs in LBMPs during the period when resources with long start-up or minimum run time requirements are started could produce artificially high prices during the off-peak hours. Setting artificially high off-peak LBMPs could inaccurately portray system conditions and incentivize inefficient market responses.[14]

Start-up costs also vary greatly among resources and are incurred intermittently. Inclusion of such costs in LBMP, therefore, could produce inconsistent price signals and undermine the ability of pricing to provide longer-term signals.

[14] The NYISO's Hybrid Pricing rules account for start-up costs of offline fast-start resources when such resources are committed and economic to serve load in real-time. The Hybrid Pricing rules apply to fast-start resources in the Real-Time Market. Such resources have short minimum run times and the time period over which start-up costs should be allocated are readily discernible, thereby avoiding the aforementioned problems associated with resources that have long minimum run time requirements. Consideration of start-up costs for offline fast-start resources is consistent with the approach recommended by Potomac Economics. *See* Docket No. AD14-14-000, *Price Formation in Energy and Ancillary Services Markets Operated by Regional Transmission Organizations and Independent System Operators*, Post-Technical Workshop Comments of Potomac Economics, Ltd. at 9 (February 24, 2015) (hereinafter referred to as the "Potomac Economics Price Formation Comments").

4. **Settlement Intervals**
   a. **What are the advantages and disadvantages of moving to sub-hourly settlements for the real-time market as they relate to price signals, market efficiency, and operations?**
   b. **What metering and RTO/ISO software changes would be needed to change settlement intervals from hourly to sub-hourly for the real-time market, and how long would these changes take to implement? Are there significant costs to RTOs/ISOs, and to market participants, of such changes? Are there any other impediments to adjusting settlement intervals?**
   c. **What are the advantages and disadvantages of changing from hourly to sub-hourly settlements in the day-ahead market?**

NYISO Response:

Since its inception, the NYISO has utilized sub-hourly settlements in its Real-Time Market.[15] The use of sub-hourly settlements appropriately links compensation with performance thereby incenting resources to not deviate from their dispatch instructions. Incenting resources to conform to dispatch instructions improves system operations and reliability.

Sub-hourly settlements in the Real-Time Market incentivize conformance with NYISO-issued dispatch instructions. The use of sub-hourly settlements also provides supply resources the opportunity to receive full compensation for their performance and responding to real-time prices. The NYISO's sub-hourly real-time pricing accurately and transparently reflects the value of providing specific services in response to actual system conditions. Compensation should, therefore, appropriately reflect resource performance in response to such price signals.

Sub-hourly settlements also reduce the potential for over-compensation to suppliers as a result of providing services during an hour with very high prices in only a few intervals that result in an artificially inflated average hourly price. Sub-hourly settlements do not provide

[15] Real-Time Market settlements for Energy, Regulation Service and Operating Reserves are consistent dispatch intervals used by RTD, which are generally five minutes, except during RTD-CAM activation when intervals may be shorter or longer than five minutes depending on system conditions.

artificial incentives to over-supply when a few transient price spikes occur during a settlement hour, resulting in an artificially inflated average hourly price.

The use of sub-hourly settlements also provides incentives for investment in supply technologies that can quickly respond to changes in real-time prices. Increased rapid response capability increases flexibility and can provide reliability and economic benefits to the system.

Settlement intervals should align with pricing and scheduling intervals to provide the proper incentives to supply resources. The NYISO does not utilize sub-hourly settlements in its Day-Ahead Market because the NYISO has aligned day-ahead commitment scheduling and settlement periodicity. Because the NYISO provides hourly commitment schedules in its Day-Ahead Market, it likewise settles its Day-Ahead Market on an hourly basis.

To realize the potential benefits (if any) of sub-hourly settlements in its Day-Ahead Market (such as the potential for improved day-ahead and real-time price convergence, interchanges schedules, and more consistent resource self-scheduling) would require the NYISO to implement day-ahead sub-hourly commitment scheduling as well. Implementing such capability would require significant software changes. The NYISO has concerns that implementing sub-hourly commitment scheduling in its Day-Ahead Market could significantly increase the computational time necessary to produce and post Day-Ahead Market results. Delayed posting of Day-Ahead Market results could have adverse impacts. For example, it could reduce the time available for generators that receive day-ahead commitments to procure the necessary fuel to meet such schedules.[16] Such implications must be considered in any further assessment of pursuing sub-hourly commitment scheduling in the Day-Ahead Market.

[16] *See* Docket No. AD14-8-000 et al., *Winter 2013-2014 Operations and Market Performance in Regional Transmission Organizations and Independent System Operators,* Post-Technical Conference Report of the New York Independent System Operator, Inc. at 8-9 (February 18, 2015).

5. **New Products to Incent Flexibility**
   a. **How do RTOs/ISOs currently ensure that they will have sufficient flexibility during real-time? Specifically, to what extent are residual unit commitments used to acquire anticipated needed flexibility?**
   b. **How are flexible resources compensated for the value that they provide to the system? Does that compensation reflect the value? Why or why not? If compensation to flexible resources does not reflect their value, how should RTOs/ISOs compensate flexible resources for the service they provide?**
   c. **What are the tradeoffs between sending a price signal through a short-duration shortage event versus establishing a ramping product that is priced separately?**
   d. **What are the tradeoffs among procuring flexibility through unit commitments (*e.g.*, headroom requirements) rather than through the ten-minute reserve products or through ramp products?**
   e. **Does allowing combined-cycle natural gas resources to submit different offers for different configurations facilitate more efficient price formation? What are the advantages and disadvantages to generators of bidding these configurations?**

NYISO Response:

The NYISO's market design includes various components that collectively ensure that sufficient flexibility exists on its system. Market design features that ensure adequate flexibility include: (i) a reliability pass in the NYISO's Security Constrained Unit Commitment ("SCUC") software used for the Day-Ahead Market; (ii) look-ahead functionality in the NYISO's RTC and RTD systems; (iii) utilization of sub-hourly settlements in real-time; and (iv) procurement of Operating Reserves day-ahead. The NYISO has not experienced a lack of sufficient flexibility or fast start capability.

The NYISO's SCUC includes a reliability pass to ensure that sufficient supply resources are committed day-ahead to meet forecasted load. The reliability pass commits any additional supply resources needed to make up any difference between the load bid into the Day-Ahead Market and the NYISO's forecasted load requirements. This functionality has significantly reduced out-of-market actions taken in real-time.

The NYISO's RTC and RTD systems incorporate look-ahead capabilities that help ensure that sufficient flexibility exists to meet real-time system conditions. RTC optimizes resource commitments over a 2.5 hour period utilizing 15 minute increments. This functionality allows the software to assess whether additional flexibility on the system will be required and commit the resources necessary to provide such flexibility.[17] RTD optimizes resource dispatch in five minute intervals over a period of approximately one hour. RTD's forward looking capability helps the software to recognize and dispatch resources in a manner consistent with real-time system conditions.[18]

As explained in the response to Question No. 4, the NYISO's use of sub-hourly settlements helps to further ensure that sufficient flexibility exists on the system. The use of sub-hourly settlements provides incentives for investment in supply technologies that can quickly respond to changes in real-time prices and obtain compensation based on such prices. Sub-hourly settlements also incent resource performance and conformance with NYISO issued dispatch instructions.[19]

The use of sub-hourly settlements minimizes the need for creating a separate ramping product. Sub-hourly settlements provide incentives for resource flexibility and fast response capability arising therefrom. The NYISO's co-optimization of Energy and Ancillary Services and the forward looking capabilities of RTC and RTD ensure that the system commits and

[17] The use of 15 minute schedules produced by RTC, which includes schedules for interchange transactions with several neighboring regions, provides additional flexibility by allowing the system to respond more readily and adjust resource commitments (including external transaction schedules) based on real-time system conditions.

[18] As described in the NYISO's response to Question No. 3, RTD can commit offline fast-start resources if doing so would be economic to serve load during the optimization horizon.

[19] Supply resources are further incented to bid flexibly because flexible-bid resources are eligible for make-whole guarantee payments to ensure that such resources recoup their costs for providing energy.

dispatches adequate resources to meet the flexibility requirements of the system. The value of products is appropriately based on such commitment and dispatch decisions. These market design features obviate the need to engage in incremental commitments for certain capabilities, such as ramping and quick response capabilities.

The NYISO procures Operating Reserves in both its Day-Ahead and Real-Time Markets. By procuring Operating Reserves day-ahead, supply resources are incented to make fuel supply and other arrangements to ensure availability to meet their day-ahead commitments in real-time and be capable of responding to real-time system conditions.

The NYISO has worked with Market Participants to adjust its systems to provide mechanisms to better facilitate efficient participation of combine-cycle natural gas resources in the Real-Time Market.[20] In 2009, the NYISO implemented revisions to its RTC software to better accommodate the physical characteristics of combined-cycle gas turbines ("CCGTs"), resulting in more efficient real-time dispatch of such resources.[21] Specifically, RTC was adjusted to allow CCGTs to utilize a two hour minimum run time, rather than the one hour minimum run time typically evaluated by RTC. Use of a two hour minimum run time for some CCGTs is appropriate to reduce wear and tear on equipment. Permitting a two hour minimum run time allows the unit owner to more realistically price its energy offer, thereby allowing the real-time dispatch software to better match the physical operating characteristics of CCGT equipment with a unit's economic value to the market. Prior to this revision, CCGTs desiring to offer in the Real-Time Market were required to incorporate the costs of running for the required

[20] *See, e.g.*, Docket No. ER04-230-000 et al., *New York Independent System Operator Inc.*, Eighteenth Quarterly Report by New York Independent System Operator, Inc. (May 28, 2009).

[21] *See* Docket No. ER09-1596-000, *New York Independent System Operator, Inc.*, Proposed Tariff Revisions to Address Real Time Modeling of Combined Cycle Units (August 17, 2009); and Docket No. ER09-1596-000, *supra*, Letter Order (September 24, 2009).

two-hour period into their offer for the first hour and then bid as a price taker for the second hour. This bidding construct distorted RTC's evaluation of the economics of committing the resource because the resource appeared artificially uneconomic in the first hour.[22]

6. **Operating Reserve Zones**
   a. **How does the establishment, elimination or reconfiguration of reserve zones affect price formation? What should the triggers be? From experience, do the RTOs/ISOs have the appropriate reserve zones defined? Are additional, fewer, or different reserve zones needed?**
   b. **Are processes in place for adding, removing, or changing reserve zones adequate for efficient price formation?**

NYISO Response:

The NYISO utilizes operating reserve constraints that reflect reliability requirements and transmission constraints to meet N-1-1 transmission operations for two regions – East of Central-East and Long Island. As further explained below, the NYISO has proposed the addition of a new operating reserve region – southeastern New York (*i.e.*, Load Zones G, H, I, J and K) – to address N-1-1 system needs.

The establishment and utilization of operating reserve zones is akin to locational pricing of energy. Properly designed reserve zones, together with co-optimization of Energy and Ancillary Services, can reflect reliability requirements, improve market outcomes, increase market efficiency and better aligning pricing with the needs of the system and actions taken by operators. The increased granularity associated with the utilization of reserve zones provides signals to the market regarding the relative value of various reserve products across different geographic regions. In the longer-term, operating reserve zones help to induce investment in resources located within the areas where they are needed most from a system reliability

[22] In proposing to implement this change, the NYISO estimated that such improved modeling of CCGTs could result in real-time energy production cost savings of at least $8 million per year.

perspective. Reserve zones also appropriately consider the implications of transmission constraints that may limit the deliverability of reserves in one area to meet system needs in other areas.

Triggers for consideration of whether to establish or reconfigure reserve zones should include: (i) the presence and frequency of transmission constraints; (ii) the deliverability of reserves held in a given location to the rest of the system; and (iii) assessment of operator actions which may be specific to maintaining reliability in a particular zone or area.

The NYISO has identified a need to implement a new reserve region in New York. Implementing a new reserve zone will improve market efficiency and better align the procurement of operating reserves with the needs of the system and maintaining the reliable operation thereof. As part of its Comprehensive Shortage Pricing project, the NYISO recently filed for Commission approval to: (i) implement an additional reserve region encompassing southeastern New York; (ii) revise its currently effective shortage pricing levels to better reflect resource costs and ensure continued comparability with shortage pricing in neighboring regions; and (iii) place limitations on the contribution of reserves held on Long Island to the rest of New York in light of certain transmission constraints that limit the flow of energy off Long Island.[23] Subject to Commission approval, the NYISO intends to implement these enhancements during winter 2015-2016.

The NYISO continually reviews its markets to identify potential opportunities for enhancement, as well as the need for potential adjustments over time that may result from changes in system topology and the resource mix in New York. The MMU also provides

[23] *See* Docket No. ER15-1061-000, *New York Independent System Operator, Inc.*, Proposed Tariff Revisions to Ancillary Service Demand Curves and the Transmission Shortage Cost (February 18, 2015) (hereinafter referred to as the "Comprehensive Shortage Pricing Filing").

quarterly and annual reviews of market outcomes and develops recommendations for certain market rule changes or enhancements based on its ongoing reviews. As demonstrated by the NYISO's recent Comprehensive Shortage Pricing project filing, ongoing review by the NYISO and its MMU produce actionable market rule revisions and reforms that the NYISO pursues through its stakeholder shared governance process.[24]

7. **Uplift Allocation**
   a. **Do uplift allocation rules reflect cost causation or mute potential investment signals? If so, how?**
   b. **What philosophy should govern uplift allocation? Do any of the RTOs/ISOs have a best practice? What is it and why is it a best practice?**
   c. **Should uplift allocation categories reflect the reasons for committing a unit and incurring uplift? Would disclosing these reasons through publicly available data improve uplift transparency and provide information to facilitate modifications of the allocation of uplift costs?**

NYISO Response:

The NYISO differentiates and categorizes uplift costs based on the underlying cause for such costs.[25] In doing so, the NYISO identifies whether such uplift costs are attributable to actions by the NYISO to ensure statewide reliability or to address local reliability at the request of a Transmission Owner. Such categorization is undertaken for the purpose of cost allocation.

The NYISO allocates uplift costs consistent with "beneficiaries pay" principles (*i.e.*, those receiving the benefits of a given action ultimately bear its costs). Uplift payments to ensure statewide reliability are allocated to all loads in the New York Control Area, while uplift costs associated with local reliability issues are allocated only to the load within the transmission

[24] *Id.*

[25] As further described in its response to Question No. 2, the NYISO provides regular reporting to its Market Participants and the public to detail the categorization of various uplift costs.

district for which the local reliability actions were taken.[26] Costs are allocated to the applicable loads proportionately on a load-ratio share basis, based on the actual real-time metered loads, during the hours in which such uplift costs are incurred.

8. **Market and Modeling Enhancements**
   a. **Assuming that RTOs/ISOs should improve their market models to better reflect the cost of honoring reliability constraints in energy and ancillary services market clearing prices, what types of constraints should RTOs/ISOs include in their market models, and what types of constraints should be handled by manual commitments? Of those reliability constraints that should be in the market models, which reliability constraints should RTOs/ISOs prioritize?**

NYISO Response:

The NYISO seeks to model as many constraints as practical in its market models. The NYISO modeling already includes certain N-1-1 constraints, including local N-1-1 thermal requirements in New York City. The NYISO also models certain voltage constraints that can be solved by a defined set of resources.[27]

The NYISO reviews market outcomes to identify potential opportunities for modeling enhancements to improve market efficiency. Since 2008, the NYISO has conducted internal daily reviews of the prior day's market outcomes. Such reviews include evaluation and assessment of uplift costs to evaluate whether potential modeling changes are needed to more efficiently respond to causes of uplift.

[26] The NYISO's existing uplift allocation procedures are consistent with the recommendations of Potomac Economics in that the NYISO categorizes uplift costs based on the underlying cause and then allocates costs accordingly based on cost causation principles. *See* Potomac Economics Price Formation Comments at 16-18.

[27] Other voltage constraints that can be solved in multiple ways (*e.g.*, implementation of local control actions on the lower voltage system that would alleviate the need to commit a resource) are not included in the NYISO's market model.

The NYISO continually seeks to improve its modeling and, where warranted, incorporate additional constraints to be solved.[28] In assessing whether to model additional constraints, the NYISO considers multiple factors, including:

- whether the NYISO can effective develop the constraint in its market model. For example, if local control actions can be taken on the lower voltage system that would alleviate the need to commit a resource, it may not be appropriate or necessary for the NYISO to include such constraint in its commitment and dispatch models;

- if a particular constraint is non-thermal (*e.g.*, voltage needs), whether the NYISO can model such non-thermal constraint or develop an appropriate proxy thermal constraint;

- whether multiple supply resources can solve the constraint and, if not, whether modeling such a constraint would give rise to market power concerns or the need for additional mitigation measures to effectively guard against such market power concerns;

- frequency with which the constraint at issue materializes; and

- the magnitude of uplift costs associated with the constraint at issue.

b. In 2013, ISO New England Inc. (ISO-NE) increased its replacement reserve requirement to "reduce the need to schedule additional resources above the load and reserve requirements" in its Reserve Adequacy Analysis. PJM has a similar proposal to increase day-ahead and real-time reserve requirements when extreme weather is expected. In what circumstances can such practices improve efficiency of price formation?

NYISO Response:

Increasing overall reserve requirements to meet system needs and refinement of reserves procurement through the establishment of reserve zones, where appropriate, can improve market efficiency and reduce out-of-market actions and uplift costs associated therewith. The NYISO prefers to procure a consistent amount of reserves each day, rather than procuring incremental

[28] The NYISO also considers recommendations from the MMU. As a single example from a multitude of modeling enhancements over the years, in 2012, in response to changes in resource mix and system topology, the NYISO implemented additional modeling of certain 230 kV constraints in Load Zone A in both the Day-Ahead and Real-Time Markets. The modeling enhancements were intended to reduce uplift costs by minimizing out-of-market action by operators to secure the modeled transmission constraints.

reserves only during defined periods or only in certain circumstances. Procuring a consistent amount of reserves each day and including such procurement in the Day-Ahead Market solution produces a more efficient and lower cost of procurement over the long-term. Day-ahead procurement relies on a larger pool of resources to provide the needed service, thereby providing opportunities to lower the cost of such procurement. Procuring additional reserves only under conditions that are identified closer in time to the potential for an actual shortage to occur is likely to produce a much smaller set of resources that can meet the reliability need and could result in higher procurement costs.

If appropriately implemented, procuring additional reserves each day will result in their value being low during non-critical periods due to the large pool of resources available to provide the service. During critical periods, when reserves are needed most and the likelihood of actual shortage conditions increases, the price of reserves should likewise increase, providing efficient signals to the market.

Consistent procurement also provides appropriate price signals to ensure that the capability to provide the required service will be available when it is needed most. Day-ahead procurement encourages resources to make necessary fuel supply and other arrangements to perform and be available in real-time in order to avoid the risk of buying out of their day-ahead positions at potentially high real-time prices when their services are needed most. Incentivizing resources to perform consistent with their day-ahead commitments reduces deviations between day-ahead and real-time schedules and increases stability in real-time operations.

c. Do transmission constraint relaxation penalty factors improve the efficiency of price formation? If so, should these penalty factors be allowed to set the energy price if a transmission constraint is relaxed?

NYISO Response:

In 2007, the NYISO implemented a transmission shortage cost of $4,000 per MW to resolve transmission constraints.[29] As discussed in its response to Question No. 10, the NYISO plans to revise its current Transmission Shortage Cost later this year through implementation of its recently-approved graduated transmission demand curve.[30] Implementation of a graduated transmission demand curve will further improve the efficiency of resolving transmission constraints by reflecting an escalating cost associated with increasing levels of shortage in securing the transmission system.

The use of transmission shortage costs (or relaxation penalty factors) improves market efficiency. Transmission shortage costs reflect the cost of securing the transmission system. Use of transmission shortage costs also reduce the likelihood of inefficient dispatch in response to relieving a constraint and facilitate the ability of the commitment and dispatch software to identify the most economic solution to resolve the constraint.

Relaxation of a transmission constraint without applying an appropriate shortage cost produces energy prices that fail to accurately reflect system needs and costs. Relaxation without

[29] *See* Docket no. ER07-720-000, *New York Independent System Operator, Inc.*, Revisions to its Market Administration and Control Area Services Tariff and its Open Access Transmission Tariff to Apply an Upper Limit on Transmission Shortage Costs Reflected in Locational Based Marginal Prices (April 5, 2007); *New York Independent System Operator, Inc.*, 119 FERC ¶ 61,237 (2007); and Docket No. ER07-720-000 et al., *supra*, Letter Order (January 11, 2008). Prior to 2007, the NYISO's commitment and dispatch software included a transmission shortage cost that represented a multiplier of the highest energy supplier's offer. The NYISO, however, determined that this prior transmission shortage cost was too high and, at times, could result in inefficient dispatch solutions.

[30] *See* Docket No. ER15-485-000, *New York Independent System Operator, Inc.*, Proposed Tariff Amendments to Revise Transmission Shortage Costs (November 25, 2014); and Docket No. ER15-485-000, *supra*, Letter Order (January 15, 2015).

applying a shortage cost may also produce artificially low prices during the intervals in which the constraint is relaxed. The resulting artificially low prices may provide inaccurate signals that incent exports and reduce internal supply at a time when retention of supply may be critically important to maintaining system reliability.

Notably, however, setting transmission shortage costs at artificially high values could result in inefficient dispatch. Shortage cost values should be set consistent with the anticipated costs to meet transmission constraints. In establishing its $4,000 per MW transmission shortage cost value, as well as the pricing points for its recently-approved graduated transmission demand curve, the NYISO examined historic costs to resolve transmission constraints and set its transmission shortage costs in line with the results of its analysis.[31]

d. Are there any new constraints that represent other physical characteristics of the system (with corresponding penalty factors), such as N-1-1 reliability constraints, that could be included in the model to improve the efficiency of price formation? If so, what types of constraints should be included and how should the penalty factors be determined?

NYISO Response:

As further described in the response to subpart (a) of Question No. 8, the NYISO's commitment and dispatch models already include certain constraints that reflect N-1-1 contingencies. The response to subpart (a) of Question No. 8 also explains that the NYISO has existing processes in place by which it continually reviews market outcomes to determine whether modeling of additional constraints may be warranted and feasible.

[31] *See* Docket no. ER07-720-000, *supra*, Revisions to its Market Administration and Control Area Services Tariff and its Open Access Transmission Tariff to Apply an Upper Limit on Transmission Shortage Costs Reflected in Locational Based Marginal Prices at 4-5 (April 5, 2007); and Docket No. ER15-485-000, *supra*, Proposed Tariff Amendments to Revise Transmission Shortage Costs at 8-9 (November 25, 2014).

e. Should RTOs/ISOs create new products that procure the capacity necessary to address reliability constraints that cannot be captured in market models? If so, what should these products look like, and what process should RTOs/ISOs use to design these products?

NYISO Response:

Each RTO/ISO has its own load patterns, resource mix, set of system conditions and reliability rules that must be satisfied, resulting in different reliability challenges, system needs and operating constraints. What may be an appropriate response to a given need in one region may not be workable or appropriate for another region. Each RTO/ISO must develop means to address the reliability constraints it faces in a manner that appropriately accounts for its system topology, resource portfolio and the options that may be available to meet system needs.

The NYISO has existing processes in place, including collaboration with Market Participants through its stakeholder shared governance process, to continually review system needs and develop effective solutions.[32]

f. In some cases, creating new products to satisfy system needs (*e.g.*, ramp capability, local reliability product, or additional reserves to account for operational uncertainty) may amount to procuring a level of spinning or non-spinning reserves above the mandatory reliability requirement. If the "new product" can be satisfied by an existing ancillary service product (*e.g.*, ten minute reserves), is it necessary to create a new and separate product with its own price and co-optimization? Rather than developing a new product, could RTOs/ISOs change the cost allocation of any additional ancillary services procured above the mandatory reliability requirement?

NYISO Response:

As further described in its responses to Question Nos. 6 and 9, as part of its Comprehensive Shortage Pricing project, the NYISO undertook a comprehensive review of

[32] The NYISO's Comprehensive Shortage Pricing project, as described in the responses to Question Nos. 6 and 9, is a solution developed for addressing certain reliability constraints through the market using reserve products.

reserves constraints to address reliability needs. This effort highlighted the importance of locational reserve requirements to ensure proper distribution of reserves across the system. The development of *new* products may not always be necessary to address system needs. Instead, modifications or improvements to an existing product, such as the NYISO's creation of additional reserve zones, may provide a more efficient means of addressing identified needs.

Additionally, as noted in its response to subpart (a) of Question No. 8, the NYISO already manages certain local reliability requirements in its market solution. In such cases, the NYISO has developed cost allocation methods to ensure that the costs for resolving local needs are allocated only to load within the transmission district for which the local reliability actions were taken.

9. **Shortage Prices**
   a. **What principles should be used to establish shortage price levels? Should there be one price for any shortage or a set of escalating prices for greater levels of shortage? Is it important to have shortage price levels consistent across adjacent RTOs/ISOs to avoid seams issues?**
   b. **What are the advantages and disadvantages of implementing shortage pricing in the day-ahead market as well as in the real-time market? If shortage pricing is established only in the real-time market but not in the day-ahead market, are other policies needed to facilitate price convergence between the day-ahead and real-time markets during periods of shortage? If so, what are these other policies? If not, why not?**

NYISO Response:

The NYISO uses "shortage pricing" to reflect the gradually increasing value of Operating Reserves, Regulation Service and transmission security as the system becomes more constrained. "Scarcity pricing" refers to the manner in which the NYISO seeks to ensure that real-time prices reflect the value of demand response resources when called upon to maintain adequate reserve levels. Consistency needs to be maintained between the NYISO's shortage and scarcity pricing

mechanisms to ensure that shortage pricing accurately accounts for the scarcity pricing levels that result from utilizing demand response resources to maintain reserves.

The NYISO implements shortage pricing in both its Day-Ahead and Real-Time Markets utilizing various demand curves for Operating Reserves (*i.e.*, Operating Reserve Demand Curves), Regulation Service (*i.e.*, Regulation Service Demand Curve) and transmission security (*i.e.*, Transmission Shortage Cost). These demand curves represent the escalating value of each product as the level of any shortage thereof increases. The NYISO has utilized demand curves for shortage pricing since 2005.[33]

Shortage pricing levels should be based on the expected costs associated with operator action that could be taken in real-time to maintain reliability and avoid shortage conditions. Shortage pricing levels should consider the offer prices of resources that may be committed to resolve shortage conditions (including fast-start resources and demand response).[34] Shortage pricing design should also include escalating prices as the level of a given shortage increases. Escalating prices allow the NYISO's commitment and dispatch software to determine the most economic solutions to resolve different levels of product shortages.[35] Escalating pricing also provides signals to incent greater flexibility on the system by rewarding resources that are capable of responding to real-time system conditions.

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[33] *See* Docket No. ER04-230-000, *New York Independent System Operator, Inc.*, Tariff Revisions Reflecting Implementation of Enhanced Real-Time Scheduling Software (November 26, 2003); and *New York State Independent System Operator, Inc.*, 106 FERC ¶ 61,111 (2004).

[34] As part of its recently-filed Comprehensive Shortage Pricing project, the NYISO proposed to revise its shortage pricing levels to better reflect recent incremental energy and start-up cost bids of generators in New York that are eligible to provide 30-minute reserves. *See* Comprehensive Shortage Pricing Filing at 7.

[35] The use of escalating prices provides greater leeway in making dispatch decisions allowing for tradeoffs between committing resources to provide Energy or Ancillary Services, as well as permitting shortages of lesser value (and thus less expensive) reserves if necessary to maintain higher value (and thus more expensive) reserves.

The establishment of appropriate shortage pricing levels should be coordinated to ensure comparability between neighboring regions. Comparability of shortage pricing between neighboring regions helps ensure that when the region as a whole is in shortage conditions, energy is not flowing out of one region and to a neighboring region as a result of higher shortage prices being assigned to reflect similar or less critical shortage conditions in the neighboring area.

The NYISO's shortage pricing applies in both the Day-Ahead and Real-Time Markets. Implementing the same rules in both markets: (i) improves price convergence; (ii) provides supply resources the same incentives to provide Ancillary Services in each market; and (iii) provides supply resources that are committed to provide reserves day-ahead appropriate incentives to be prepared to meet their day-ahead commitments in order to avoid the potential of having to buy-out of their obligation at high shortage pricing levels in real-time.

10. Transient Shortage Events

a. Should there be a minimum duration for a shortage event before it triggers shortage pricing? Why or why not? How would one determine that minimum time, and how does it relate to the settlement interval?

b. Do RTO/ISO rules regarding transient shortage events result in appropriate price signals? Why or why not? To the extent possible, please provide empirical evidence supporting your answer.

c. Should treatment of transient shortages be consistent across all RTOs/ISOs? Why or why not?

NYISO Response:

All shortages regardless of the length of time that they persist should be priced. The duration of shortages should, to the extent practicable, be considered in establishing the appropriate price.

Transient shortage events are indicative of actual system conditions and needs. It is important to price such events and recognize the actual costs associated with the underlying

shortage. Pricing transient shortages provides incentives to supply resources that have the capability to respond to short-duration events to be available. Incenting the availability of fast response resources provides additional flexibility to the system, thereby improving the ability of the system to respond to real-time conditions.

The NYISO seeks to properly balance pricing with event duration through the use of escalating prices for shortages and sub-hourly settlement intervals. The use of escalating prices results in smaller magnitude shortage events being priced at lower levels than larger magnitude shortages, while simultaneously ensuring that the pricing of shortage conditions properly reflects the value to the system of going short each product type. Shortages of higher value products and services, such as spinning reserves, Regulation Service and transmission security, are priced higher than other lower value products and services, such as 30-minute reserves.

Relatively short duration events likely do not require the same magnitude of pricing as longer duration events. The NYISO continually reviews its shortage pricing rules and market outcomes to identify opportunities for enhancements.[36]

Treatment of transient shortage events need not be consistent across all RTO/ISO markets. Each RTO/ISO has its system conditions and reliability rules that must be complied with or addressed. Each RTO/ISO faces different system needs and operating constraints within

[36] For example, the NYISO noted that the use of escalating prices for increasing levels of transmission shortage under its recently-approved graduated transmission demand curve "serve[s] as a proxy for dealing with transient transmission shortage conditions and represent[s] a step forward in addressing such conditions. *See* Docket No. ER15-485-000, *supra*, Proposed Tariff Amendments to Revise Transmission Shortage Costs at 7 (November 25, 2014).

its region. A transient shortage event pricing solution that may be reasonable and appropriate in one region may not be workable or appropriate for another region.[37]

11. Interchange Uncertainty

a. What can the RTOs/ISOs do to reduce interchange uncertainty? Does CTS help to reduce the uncertainty in interchange created by the lag between price posting and interchange schedules? Does the ability to reduce uncertainty depend on whether all interchange spread bids are incorporated into the RTO/ISO dispatch model (as proposed for the CTS implementation between NYISO and ISO-NE) rather than simply allowing interchange spread bids on a voluntary basis (as proposed for the CTS implementation between NYISO and PJM)? Are there other steps that should be taken to reduce interchange uncertainty?

b. What information do market participants need to better respond to interchange price signals?

NYISO Response:

More frequent cross-border (interchange) transaction scheduling, economic evaluation of interchange offers/bids and Coordinated Transaction Scheduling ("CTS") each significantly reduce interchange uncertainty.[38] Market participants using CTS submit a single CTS Interface Bid to indicate their desire to simultaneously buy Energy in one RTO/ISO and sell Energy into the other participating RTO/ISO based on the forecasted price difference between the two markets at the relevant location. CTS provides market participants a more precise method of arbitraging price differences between markets.

Instead of submitting a strike price, CTS Interface Bids specify a minimum predicted price difference between the two markets for the RTOs/ISOs to use in deciding whether or not to schedule a CTS Interface Bid. Schedules are based on the price differences projected by the participating RTOs/ISOs. At the NYISO/PJM border, the NYISO incorporates PJM's forecasted

[37] Although the actual manner for addressing transient shortage events need not be uniform across all RTO/ISO markets, all RTOs/ISOs should provide equal transparency regarding the methodology employed for addressing transient shortage events.

[38] NYISO and PJM implemented CTS on November 4, 2014. The NYISO and ISO-NE intend to implement CTS later in 2015.

prices into the NYISO's RTC optimization and economically evaluates bids and offers to determine cross-border Transaction schedules each quarter-hour.[39]

CTS reduces uncertainty and improves scheduling efficiency by: (i) allowing Transmission Customers to offer different MW quantities at different prices for each 15-minute interval within an hour; (ii) reducing counter-intuitive inter-regional schedules by explicitly incorporating projected price differences between Control Areas into scheduling decisions; and (iii) establishing intra-hour schedules 15 minutes closer to actual, real-time operations. The scheduling process, repeated every 15 minutes, more efficiently utilizes available transfer capability whenever economic transactions are proposed to move power from the lower cost Control Area to the higher cost Control Area. Establishing intra-hour schedules closer to the actual 15 minute scheduling interval also improves the accuracy of cross-border scheduling decisions because those decisions reflect updated system conditions. Finally, submitting a CTS Interface Bid protects the Transmission Customer from the financial risk of obtaining inconsistent transmission schedules because CTS Interface Bids are jointly scheduled and coordinated between the participating RTOs/ISOs.[40]

The NYISO utilizes its RTC system to economically evaluate and schedule interchange bids and produce transaction schedules on a 15 minute basis. Economic evaluation and

[39] Every 15 minutes, the NYISO runs a multi-period optimization covering the next 2.5 hours in 15-minute intervals. PJM provides the NYISO the forecasted LMPs from its Intermediate Term Security Constrained Economic Dispatch ("IT SCED") application prior to each RTC run, as an input into the NYISO optimization.

[40] The NYISO estimates that the combined enhancements to real-time scheduling with PJM produced in excess of $1.5 million in production cost savings for the two regions between November 2014 and January 2015. *See* NYISO, *Broader Regional Markets Metrics Report* at 3 (January 2015) available at: http://www.nyiso.com/public/webdocs/markets_operations/committees/bic_miwg/meeting_materials/2015-02-26/Monthly%20Report%20for%20MIWG%20-Jan%202015.pdf.

scheduling of interchange between the NYISO and its neighbors has resulted in improved transparency and predictability with respect to interchange transactions. The coordinated dispatch of CTS transactions also ensures that interchange schedules are developed in a manner consistent with the needs of each region and the bids submitted by market participants. Such coordinated dispatch through a single clearing engine significantly reduces interchange uncertainty with respect to the interfaces utilizing CTS.

The ability of CTS to reduce interchange uncertainty and efficiently schedule interchange between neighboring regions is significantly influenced by the participating RTOs'/ISOs' ability to accurately forecast future system needs and provide price signals that accurately reflect forecasted needs. The ability of market participants to respond appropriately to price signals between regions is dependent on their ability to understand how forecasted prices and settlements are calculated. Transparency as to the price formation concepts and methodologies on each side of an interface is necessary for market participants to accurately predict and efficiently react to prices. Because market participants react to price signals, it is important to ensure that prices are efficient from the outset. If market participants are responding to inefficient price signals, the resulting interchange schedule is likely to produce inefficient results.

12. Next Steps

a. Are there other price formation issues that, if addressed, would improve energy and ancillary services price formation in RTO/ISO markets? What are they?

b. What are the highest-priority price formation issues to address? Is the priority of issues different in different RTO/ISO markets? If so, what are the priorities for each RTO/ISO and are the RTOs/ISOs currently addressing those issues sufficiently?

NYISO Response:

Mechanisms that allow supply resources to reflect changes in their cost to produce energy over the course of the operating day are an important capability that enhances price formation in

RTO/ISO markets. The ability to submit costs on a granular basis across the operating day has taken on enhanced importance due to the growing dependence on natural gas as a primary fuel source for electricity generation.

The NYISO has permitted hourly changes to real-time offers since 1999. In 2010, the NYISO implemented increasing bids in real-time ("IBRT") functionality to allow resources that are committed in the Day-Ahead Market to increase their real-time offers for day-ahead committed incremental energy.[41] The IBRT functionality permits day-ahead committed units to reflect changes, such as increases in fuel cost, to their cost to produce energy in real-time, thereby allowing: (i) suppliers an opportunity to manage the risk of unexpected fuel cost increases; and (ii) the NYISO's real-time commitment and dispatch software to evaluate such changes in cost and reflect such unexpected circumstances in real-time prices. Establishing real-time prices on the basis of the most accurate fuel cost information allows real-time prices to more accurately reflect the value of energy to the system.

The NYISO's near-term priorities for Energy and Ancillary Services market enhancements are primarily encompassed by its Fuel Assurance Initiative. The Fuel Assurance Initiative is aimed at identifying ways to further protect reliability by improving the incentives for generator performance, unit availability and fuel availability in light of New York's growing dependence on natural gas for electricity production. In addition to the NYISO's recently-filed Comprehensive Shortage Pricing project that is referred to in the response to Question Nos. 6 and 9, the Fuel Assurance Initiative includes: (i) the NYISO's Comprehensive Scarcity Pricing project, which is aimed at revising the NYISO's current scarcity pricing rules that apply when

[41] *See* Docket No. ER10-1977-000 et al., *New York Independent System Operator, Inc.*, Proposed Tariff Clarifications Regarding Real-Time Energy Offers (July 26, 2010); and *New York Independent System Operator, Inc.*, 132 FERC ¶ 61,271 (2010).

demand response resources are activated from an *ex-post* to an *ex-ante* pricing process; and (ii) evaluation of improvements to the fuel price assumptions included in supply resources' day-ahead reference levels. These initiatives are further described in the recent report submitted by the NYISO regarding its efforts to address fuel assurance issues.[42] As explained in its response to Question No. 3, the NYISO is also undertaking a comprehensive review of its Hybrid Pricing rules to determine whether further enhancements to increase price setting eligibility for fast-start block-loaded resources are warranted. The NYISO intends to pursue these initiatives with its stakeholders and expects to file any necessary tariff revisions relating thereto over the next several years.

[42] *See* Docket No. AD14-8-000 et al., *Winter 2013-2014 Operations and Market Performance in Regional Transmission Organizations and Independent System Operators*, Post-Technical Conference Report of the New York Independent System Operator, Inc. (February 18, 2015).

III. CONCLUSION

As further described herein, the NYISO supports the Commission's vision for proper price formation and increased transparency in wholesale energy and ancillary services markets. The NYISO has designed it markets in a manner that is consistent with this vision and continually reviews its markets to identify opportunities for enhancements to improve market efficiency and transparency of market outcomes. NYISO respectfully requests that the Commission consider these comments in determining what, if any, actions should be taken in this proceeding.

Dated: March 6, 2015

Respectfully submitted,

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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 6th day of March, 2015.

By: */s/ John C. Cutting*

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