



A536: Real-Time Scheduling Settlement

CONCEPT OF OPERATION (COO)

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1 INTRODUCTION

This COO describes the changes in settlement rules associated with the new Real-Time Scheduling (RTS) System, which will replace the existing BME and SCD programs.

2 DISCUSSION

The Real-Time Scheduling (RTS) project will replace the existing NYISO developed SCD and the ABB Balancing Market Evaluation software with a single software package that operates on a common platform and model as the Day-Ahead SCUC program. This project seeks to achieve scheduling and pricing consistency between the day-ahead and real-time markets and incorporates numerous market enhancements such as a full two-settlement for ancillary services, generator self-scheduling, and ¼ hour transaction and generation scheduling. This document describes the settlement changes associated with this project.

3 DESCRIPTION

3.1 Generators

3.1.1 Energy

- No unscheduled price chasing will be allowed for off-dispatch units. The current price chasing capability has not provided the benefits that were anticipated. The units that have been engaged in price chasing have tended to create operational problems due to the fact that they do not respond consistently to the price signals and tend to move unexpectedly up and down by large amounts causing intermittent security issues. The unpredictable operation can result in inefficient scheduling and commitment decisions in RTC and real-time operations. A unit that wants to respond to prices may do so by submitting MW schedules to the ISO as a self-scheduled unit. This change eliminates the need to do the Economic Performance Limit (EPL) calculation.
- PURPA & Intermittent Units may be subject to performance criteria and penalties. Some exclusion for units below an agreed upon capacity or relaxed tolerances could be allowed to accommodate the different physical constraints and operational agreements that these units have while still recognizing their potential for adversely impacting system security and reliability. The software must be developed to accommodate performance tracking at different tolerance levels by class code for various types of units.
- Persistent undergeneration penalties charged @ the Regulation MCP (No Change).
- ~~A reduced tolerance mode~~ It is an option under consideration intended that the software will accommodate a reduced tolerance mode in RTD that could be implemented-activated by the Dispatcher to improve response and enhance reliability under emergency conditions.- This capability would provide a means to reduce the tolerance for acceptable performance to a value less than 3%. A project is currently underway to address persistent undergeneration in the current implementation of SCD that would reduce a unit's upper limit if it failed to respond in a set period of time. If this feature is implemented in RTS, it may at least partially address some of the need for the reduced tolerance mode.

3.1.2 Day-Ahead Margin Preservation

- Preserve margin for units moved OOM down (No Change).

- Margin preservation applied to situations such as ramp constraints or units blocked down OOM. The two scenarios listed here are known events that may occur, however there may be other, as yet unknown situations where it would be appropriate to apply the margin preservation rule. The underlying philosophy is that if the ISO directs a unit to move and it results in financial harm through no fault of their own, then it would likely be eligible to apply the margin preservation rule.

3.1.3 **Bid Production Cost Guarantees (BPCG)**

- For Units moved OOM - BPCG assigned to party calling the OOM (No Change).
- On-Dispatch - BPCG (RT).
- Self-Scheduled - No BPCG (RT).
- Note that because BPCG is a daily calculation, any unit that is self-scheduled for one or more hours would not be eligible for BPCG for the entire day. In addition, in the day-ahead market, self-scheduled does not necessarily mean that the unit is self-committed. A self-scheduled or On-Dispatch unit that is economically committed by SCUC would be eligible for a day-ahead BPCG. Self-committed units in the day-ahead do not get a BPCG.
- If a unit raises its minimum generation and RTS dispatches the unit to ensure no limit violation, the unit may become ramp constrained. In this case the unit should not be eligible for a BPCG payment.

3.1.4 **Reserves**

- Full two-settlement for reserves. Reserve services will be scheduled and settled, nominally on a 5-minute basis (RT).
- Locationally Priced – East and West (No Change).
- Marginal LOC are incorporated into the clearing price (DA/RT).
- Remove explicit reduction in availability payment based on daily performance index for reserve pickups.
- Remove requirement to purchase replacement energy at LBMP for failure to perform during a reserve pickup.
- Remove 30-minute reserve penalties.

~~3.1.3 Day-Ahead Margin Preservation~~

- ~~□ Preserve margin for units moved OOM down~~
- ~~□ Ramp Constraints + Blocked Units (offset by opportunity profits)~~
- ~~□ The two scenarios described above are known events that may occur, however there may be other, as yet unknown situations where it would be appropriate to apply the margin preservation rule. The underlying philosophy is that if the ISO directs a unit to move and it results in financial harm through no fault of their own, then it would be our intention to apply the margin preservation rule.~~

3.1.4 Bid Production Cost Guarantees (BPCG)

- ☐ For Units moved OOM—BPCG assigned to party calling the OOM (No Change)
- ☐ On Dispatch—BPCG (RT)
- ☐ Self Scheduled—No BPCG (RT)
- ☐ Note that because BPCG is a daily calculation, any unit that is self-scheduled for one or more hours would not be eligible for BPCG for the entire day. In addition, in the day ahead market, self-scheduled does not necessarily mean that the unit is self-committed. A self-scheduled or On-Dispatch unit that is economically committed by SCUC would be eligible for a day ahead BPCG. Self-committed units in the day ahead do not get a BPCG.

3.1.5 Regulation

- ☐ Full two settlement
- ☐ Marginal LOC are incorporated into the regulation clearing price (DA/RT)
- ☐ A performance index (PI) will be calculated for those units being paid for regulation as is done under the current system.

3.1.6 Handling of Reserves during RTD-CAM

- ☐ Reserve Requirements will continue to be calculated during a RTD-CAM.
- ☐ Reserve Prices will continue to be produced during RTD-CAM
- ☐ Reserve Demand Curves apply in RTD-CAM

3.1.5 Handling of Reserves during RTD-CAM

- Reserve Requirements will continue to be calculated during RTD-CAM activation.
- Reserve Prices will continue to be produced during RTD-CAM activation.
- Reserve Demand Curves continue to be applicable in RTD-CAM.

3.1.6 Incentives to follow basepoints during Reserve Pickups

- Persistent undergeneration penalties will be assessed at the Regulation MCP during a reserve pickup (No Change).
- All units paid for overgeneration at LBMP during a reserve pickup (No Change).
- Units that respond to the reserve pickup will not incur performance penalties for overgeneration for 3 RTD intervals following the termination of the reserve pickup (No Change).
- Units dispatched by RTD-CAM have the ability to set the LBMP price.
- Ancillary service schedules from the Day Ahead will be balanced against Real Time schedules at all times. During a reserve pickup, reserve providers with a day ahead schedule that do not perform in real time will automatically buy out of their obligation at the real time reserve price

which will likely be higher. In addition, these units have an incentive to respond so that they will be paid the higher energy price for the energy they provide during the reserve pickup.

- During a reserve pickup, units that have only a real time reserve schedule continue to be paid the availability payment for the MWs that remain as reserves. The reserve MWs that are converted to energy would be paid the LBMP price. Therefore these units have an incentive to respond so that they will be paid the higher energy price for the energy they provide during the reserve pickup.

3.1.7 **Regulation**

- Full two-settlement for regulation. Regulation service will be scheduled and settled, nominally on a 5-minute basis (RT).
- Single, Statewide Price (No Change).
- Marginal LOC are incorporated into the regulation clearing price (DA/RT).
- A performance index (PI) will be calculated for those units being paid for regulation as is done under the current system. The performance index is calculated for units being paid for regulation and is used to prorate payments based on their performance in real time. (No Change).

3.1.8 **30-Minute Start Units**

Consideration may be given to send a base point to 30-minute start units prior to their scheduled commitment time. Currently under BME, these units are scheduled to start on the hour, but operators often ignore the advisory schedule and don't begin the start-up process until a basepoint is received from SCD. Consequently, these units will not hit the line until approximately 30 minutes after the hour. To avoid this, a base point equal to the unit's UOL could be sent by RTD once RTC commits the unit. Two issues must be considered if this is implemented:

- Once a base point is sent, a unit should not be penalized if it starts prior to the commitment time
- It needs to be determined whether a unit will buy out of its DAM reserve commitment once a base point is sent.

3.2 **Transactions**

- Short Notice External Transactions (SNETs) – Will not be included as part of the initial deployment of the RTS. The initial design will not preclude the addition of SNETs at a later date.
- Pre-scheduling (PST) – A limited form of pre-scheduled transactions (PST), on an hourly basis are being implemented to accommodate external ICAP deliverability rules in RTS. Full pre-scheduling capability is being considered as a future enhancement but will not be included in the initial deployment of the RTS. The RTS design will not preclude the addition of pre-scheduled transactions at a later date.
- The ECA-A and ECA-B rules regarding failed external transactions and the settlement of external transactions when the proxy bus is constrained will continue to be applied in RTS. The intent is to add flags to the software for billing to key off of depending on the failure reason. This will allow application of the failed transaction rules to transactions curtailed by the marketer after the RTC-15 run which schedules the hourly transactions.
- RTS will need to accommodate the new settlement rules for non-competitive proxy buses.

3.2.1 Bid Production Cost Guarantees (BPCG)

- Imports – BPCG for import transaction will be maintained (No Change).
- Exports – There is currently no BPCG for export transactions and none is proposed for RTS. There are potential gaming opportunities and cost recovery issues that would need to be addressed in order to consider a BPCG for exports and the benefits of adding a BPCG are not clear (No Change).

3.2.2 Transaction Settlements

- Day-Ahead and Real-Time Balancing – Imports, Exports and Wheels

For day ahead balancing purposes as well as, real time pre-scheduled and economic transactions, RTC₁₅ will set one hourly price if the external interface is import or export constrained in RTC. If not constrained, these transactions will settle against the real time 5-minute ex-ante prices. All net real-time positions at external proxy buses will be settled at the prevailing real-time prices. The prevailing real-time price at the external proxy buses can be set by RTC, RTD or RTD-CAM. If an external interface is constrained in RTC then the RTC price at that external proxy bus is used for all real time settlements associated with that proxy bus. If an external interface is not constrained in RTC then the RTD price at that external proxy bus is used for all real-time settlements associated with that proxy bus unless an RTD-CAM dispatch has been performed that supercedes the RTD prices.

- In-hour Transaction Curtailments

External transactions affected by in-hour transaction cuts made by the NYISO will be protected relative to their day-ahead positions but otherwise will be settled out against the prevailing real time price at the external proxy bus.

Transactions that did not receive day-ahead schedules pay or are paid at the prevailing real-time price at the external proxy bus for the energy they received or delivered and no additional payments are made. Transactions that received day-ahead schedules pay or are paid at the prevailing real-time price at the external proxy bus for the net energy they received or delivered in real-time. An additional payment is made to import transactions to protect the margin on their RTC bid. This additional payment protects the import transaction against high real time prices if they are curtailed and then must buy back their day-ahead obligation. This payment is the difference between the RTC bid and the prevailing real-time price at the time the transaction was curtailed multiplied by the number of MWhs curtailed. Currently, this kind of protection is only given to import transactions.

If BPCGs on exports are implemented in the future, then a corresponding protection for curtailed export transactions would be developed to protect export transactions against low prices when they are curtailed in real-time. It also follows that similar protection for wheel transactions might also be appropriate.

External transactions curtailed by external control areas will not receive any protection against their day-ahead positions. All net real time positions for imports, exports and wheels will be settled against the prevailing real-time prices when the curtailment is called by the neighboring control area.

- Transaction Checkout Failures after RTC

External transactions that fail checkout after RTC has run will not receive any protection against their day-ahead positions. All net real time positions for imports, exports and wheels will be

settled against the prevailing real-time prices.

Transactions that are scheduled by RTC and then fail checkout for reasons within the control of the Market Participant, or that are cancelled at the request of said Market Participant in any control area that is a party to the transaction, will be held accountable for the financial impacts of their actions. Import transactions will be charged the maximum of the Real Time Dispatch price either from RTD or RTD-CAM minus the RTC price at the point of injection or \$0. Export transactions will be charged the maximum of the RTC price minus the Real Time Dispatch price either from RTD or RTD-CAM at the point of withdrawal or \$0. Wheel transactions will be charged at both the point of injection like an import and at the point of withdrawal like an export.

3.2.3 Transaction Bidding Constraints affecting settlement

3.2.3.1 Prescheduled Transactions (PSTs)

- Implementation of in-day pre-scheduling will be for ICAP deliverability and will be on an hourly basis only.
- It is envisioned that a future implementation of pre-scheduling would permit the following.
 - May pre-schedule at ¼ hour Start/Stop intervals.
 - User Defined Minimum Run Time at ¼ hour intervals.
 - Can submit different MW quantities for each ¼ hr interval.

3.2.3.2 Economic Transactions

- Economic Evaluation will be hourly.
- Can provide only one MW quantity and one price for the transaction per hour.

3.2.3.3 ¼ Hr Scheduling impacts on Day-Ahead SCUC Modeling

- SCUC continues to perform its evaluation on an hourly basis; therefore it would have a limited ability to represent the real-time ¼ hour scheduling impacts in the day-ahead evaluation. This creates concerns regarding:
 - Energy vs. Capacity
 - Financial settlement and pricing implications
 - Energy imbalance in DA
 - No ability to perform Security Analysis at different ¼ hr pts.
- Consequently, as part of the initial deployment of RTS, SCUC will not be modified allow ¼ hour economic or pre-scheduled transaction scheduling in the DAM.

3.3 Reserve Pricing and Scheduling

Reserve requirements will be observed by RTC to ensure sufficient resources are available. Binding schedules will be determined in the RTD process. Reserve will not be prorated among equally priced suppliers. Both 10-minute and 30-minute spinning reserve bidders will be able to submit availability bids in the day-ahead market. Thus the

units have ability to value opportunities of not being scheduled day-ahead and the risk of being unable to deliver in real time into their availability bids. By definition a bid selected to provide reserves and an equally priced bid that is not selected to provide reserves are indifferent if both are equal to the reserve-clearing price.

3.3.1 RTD-CAM Reserve Pick-Up Function

Pricing during the reserve pickup will be handled by a combination of the dispatches used to create basepoints. If a large event RPU was run, units that have their basepoints set by the security constrained dispatch will have pricing limits determined by the ex ante pricing logic module consistent with the security constrained dispatch. Units that have their basepoints set by their current output level will have the pricing set by the previous (pre-RPU) RTD dispatch. Ex-ante prices will be sent out immediately after the RPU for the units that were asked to move up, prices for the units held at their actual would receive the prices from the last RTD dispatch. The rationale for this is to create ex-ante prices that will accurately represent the direction units are desired to move when there are security constraints present. It also assures that all generating resources will be paid the LBMP consistent with their scheduled RPU basepoints. Small event RPU runs will have pricing limits determined by the ex-ante pricing module consistent with the security constrained dispatch run.

3.3.2 All other RTD-CAM Functions

3.1.7 Incentives to follow basepoints Pricing during Reserve Pickups

- ☐ Persistent undergeneration penalties charged @ Restoration, BASAP, and max Gen Pickup runs will be determined by the Regulation MCP (No Change).
- ☐ All units paid for overgeneration at LBMP during a reserve pickup.
- ☐ Units dispatched by RTD-CAM have ex-ante pricing module consistent with the security constrained dispatch. ability to set the LBMP price.
- ☐ Ancillary service schedules from the Day Ahead will be balanced against Real Time schedules at all times. During a reserve pickup, reserve providers with a day ahead schedule that do not perform in real time will automatically buy out of their obligation at the real time reserve price which will likely be higher. In addition, these units have an incentive to respond so that they will be paid the higher energy price for the energy they provide during the reserve pickup.
- ☐ During a reserve pickup, units that have only a real time reserve schedule continue to be paid the availability payment for the MWs that remain as reserves. The reserve MWs that are converted to energy would be paid the LBMP price. Therefore these units have an incentive to respond so that they will be paid the higher energy price for the energy they provide during the reserve pickup.

3.2 Transactions

3.2.1 Bid Production Cost Guarantees (BPCG)

- ☐ Imports—No Change
- ☐ Exports—There are gaming opportunities and cost recovery issues that need to be addressed before a BPCG for exports could be implemented. Suitable agreements would need to be in place between neighboring ISOs to ensure proper coordination of transactions that could impact the markets. In addition, the working group would need to develop a proposal and come to agreement on an equitable method for apportioning the costs.
- ☐ SNETs—Will not be included as part of the initial deployment of the RTS. The initial design will not preclude the addition of SNETs at a later date.

3.2.1.2 Settlement

For day-ahead balancing purposes as well as, real-time pre-scheduled and economic transactions, RTC_{15} will set one hourly price if the external interface is import or export constrained in RTC. If not constrained, these transactions will settle against the real-time 5-minute ex-post prices.

3.2.1.3 Transaction Bidding Constraints affecting settlement

3.2.1.3.1 Prescheduled Transactions (PSTs)

- ☐ May preschedule at 1/4 hour Start/Stop intervals
- ☐ User Defined Minimum Run Time at 1/4 hour intervals
- ☐ Can submit different MW quantities for each 1/4 hr interval

3.2.1.3.2 Economic Transactions

- ☐ Economic Evaluation will be hourly
- ☐ Can provide only one MW quantity and one price for the transaction per Hour

3.2.1.4 1/4 Hr Scheduling impacts on Day-Ahead SCUC Modeling

- ☐ SCUC continues to perform its evaluation on an hourly basis, therefore it has a limited ability to represent the real-time 1/4 hour scheduling impacts in the day-ahead evaluation. This creates concerns regarding:
 - ☐ Energy vs. Capacity
 - ☐ Financial settlement and pricing implications
 - ☐ Energy imbalance in DA
 - ☐ No ability to perform Security Analysis at different 1/4 hr pts.
- ☐ As a result, SCUC will not allow 1/4 hour economic transaction scheduling in the DAM. Efforts will be made to implement some 1/4 hour pre-scheduling capability in the day-ahead evaluation.