



A536: Real-Time Scheduling Market Information Posting

CONCEPT OF OPERATION (COO)

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1 INTRODUCTION

This COO identifies the Information Posting changes that need to be made in support of the new Real-Time Scheduling (RTS) System, which will replace the existing BME and SCD programs.

2 DISCUSSION

Changes reflect inputs from the Market Structures Working Group and the NYISO team.

Note 1: Zonal prices as described in this COO are the prices to be paid by the loads. These prices will be calculated according to the prevailing settlement definitions.

Posted LBMPs will have three components (same as now):

- 1) Energy
- 2) Losses
- 3) Congestion

Table 2-1: Definitions, Acronyms, and Abbreviations

Term	Description
AAS\$	Advisory ex-ante Ancillary Services prices (from RTD 15-minute increments)
AGC	Automatic Generation Control
ATC	Available Transfer Capability (from RTC15)
AZGP\$	Advisory ex-ante zonal and generator LBMP (from RTC and RTD 15-minute increments)
BME	Balancing Market Evaluation
C\$	Limiting Constraints information (from RTD 5-minute look-ahead)
EET	Economically Evaluated External transaction (from RTC15 for the binding hour)
HAM	Hour Ahead Market
LBMP	Locational Based Marginal Price
PAR	Phase Angle Regulator
PXP\$	Ex-ante external bus Proxy prices (from RTC15 for the binding hour)
RTC	Real-Time Commitment
RTCxx	Real-Time Commitment that posts at xx minutes after top-of-hour
RTD	Real-Time Dispatch
RTDxx	Real-Time Dispatch that posts at xx minutes after top-of-hour
RTS	Real-Time Scheduling
SCD	Security Constrained Dispatch
TTC	Total Transfer Capability
X\$	Ex-ante Energy prices for generators and zones (from RTD 5-minute look-ahead)
5AS\$	5-minute look-ahead ex-ante Ancillary Services prices from RTD
5MBP	5-minute look-ahead basepoint (for AGC) from RTD
15MBP	15-minute increment basepoint from RTD

3 DESCRIPTION

3.1 Present Market Information Posting

Some of the information that is currently being posted will continue to be posted in its present format. The indicated posting changes relate primarily to the replacement of the existing BME and SCD programs by the new Real-Time Commitment (RTC) and Real-Time Dispatch (RTD) programs respectively.

3.1.1 Public Information

The following is a subset of in-day information (related to BME/SCD) that is currently available on the NYISO website. A detailed description is presented in the NYISO Market Participant User's Guide:

- 1) Real-Time Market LBMP
 - a) Zonal (to be replaced by 5-minute preliminary ex-post energy pricing)
 - b) Generator (to be replaced by 5-minute preliminary ex-post energy pricing)
- 2) Hour-Ahead Market Ancillary Services Prices (to be replaced by 5-minute preliminary and 15-minute advisory ex-ante pricing from RTD)
- 3) NYISO Reference Bus LBMP (to be replaced by 5-minute preliminary ex-post energy pricing)
- 4) Real-Time LBMP prices on e-Data Services
- 5) Hour-Ahead Market LBMP
 - a) Zonal (to be replaced by 15-minute advisory ex-ante prices from RTC and RTD; and 15-minute advisory ex-ante external bus proxy prices for the binding hour from RTC)
 - b) Generator (to be replaced by 15-minute advisory ex-ante prices from RTC and RTD)
- 6) Time Weighted/Integrated Real-Time LBMP (to be calculated on an hourly basis and posted hourly)
 - a) Zonal
 - b) Generator
- 7) LBMP Zone Maps
 - a) Hour-Ahead Market Data (to be replaced by 15-minute advisory ex-ante prices from RTD)
 - b) Real-Time Market Data (to be replaced by 5-minute preliminary ex-post energy pricing)
- 8) Limiting Constraints (to be produced by RTD)
- 9) PAR Schedule (to be produced by RTD)

10) ATC/TTC (to be produced by RTC)

11) Zonal Actual Load.

3.1.2 Private Information

The following is a subset of in-day information that is currently available to authorized Market Participants on a confidential basis:

- 1) Accepted and rejected bids
- 2) Generation schedules (to be produced by RTD)
- 3) Price Responsive Load schedules (to be produced by RTD)
- 4) Economically Evaluated Transaction schedules (to be produced by RTC for the binding hour).

3.1.3 Data Dictionary (Version 16.0)

The existing data dictionary will also need to be updated to reflect the implementation of RTC and RTD and the related posting of information.

3.2 New Market Information Posting

The new Real-Time Scheduling (RTS) process will produce new market information that needs to be posted. This market information consists of:

- 1) Information that is available to the Public
- 2) Information that is available to individual Market Participants on a private and authorized basis.

The format and style of the information to be posted is not described in this COO, but will be defined during the design phase of the RTS project. The goal will be to post information for timely and convenient access and viewing.

3.2.1 Real-Time Commitment (RTC) Information

The public and private information to be posted from the execution of RTC as described in this subsection is different than the information presently being posted for the Hour-Ahead Market (HAM). An RTC information table is presented to show the data to be posted.

Public: The following information will be produced RTC and will need to be posted:

- 1) Advisory ex-ante external bus Proxy Prices for the binding hour, when constrained. Refer to the RTC15 table entries (PXP\$) below. Other ex-ante prices will be produced by RTD.
- 2) Updated ATCs for each RTC interval. Refer to the RTC15 table entries (ATC) below.
- 3) Advisory ex-ante prices for Zones and Generators, indicated by “AZGP\$” in the RTC table below. These prices will be posted together with advisory ex-ante RTD prices as shown by the table in Figure 3-3 at the end of this COO.

Private: The following information will be produced by RTC and will need to be made available to authorized MPs:

- 1) Economically Evaluated External Transaction (EET) MW schedules for the binding hour. Refer to the RTC15 table entries (EET) below.

The following table shows the information to be posted by RTC. The column headings RTC15, RTC30, RTC45, and RTC60 represent the four executions of RTC that occur each hour. For example, RTC15 starts shortly after the top-of-hour and has its results available at 15 minutes after top-of-hour. RTC15 calculates commitments and schedules for 10 look-ahead times, which are labeled as @30 to @165 in minutes from the top-of-hour in which RTC15 executes. The asterisks in the table indicate that results are calculated by RTC, but are not posted.

Table 3-1: Information to be Posted by RTC

	Information to be Posted by RTCxx (times are from top-of-hour)			
RTC>>	15	30	45	60
@ 30	ATC			
@ 45	ATC	*		
@ 60	ATC PXP\$, EET	*	*	
@ 75	ATC PXP\$, EET	*	*	*
@ 90	ATC PXP\$, EET, AZGP\$	*	*	*
@ 105	ATC PXP\$, EET, AZGP\$	AZGP\$	*	*
@ 120	ATC, AZGP\$	AZGP\$	AZGP\$	*
@ 135	ATC, AZGP\$	AZGP\$	AZGP\$	AZGP\$
@ 150	ATC, AZGP\$	AZGP\$	AZGP\$	AZGP\$
@ 165	ATC, AZGP\$	AZGP\$	AZGP\$	AZGP\$
@ 180		AZGP\$	AZGP\$	AZGP\$
@ 195			AZGP\$	AZGP\$
@ 210				AZGP\$
Note 2: (*) means that no Postings by RTC30, RTC45, and RTC60 are anticipated at this point in time for the time intervals shown.				

3.2.2 Real-Time Dispatch (RTD) Information

The public and private information to be posted from the execution of RTD as described in this subsection is different than the information presently being posted for the Real-Time Market (RTM). An RTD information table is presented to show the data to be posted.

Public: The following information will be produced by RTD and will need to be posted:

- 1) Real-Time Market LBMP, using advisory ex-ante zonal and generator LBMPs for each 15-min look-ahead interval of RTD. The prices are to be updated as shown by (AZGP\$) in the RTD Table.
- 2) Preliminary ex-ante Ancillary Services prices for the 5-min look-ahead interval of RTD as shown by (5AS\$) in the following RTD table. The following incremental prices are posted:
 - a) 10-min Spinning Reserve (West and East)
 - b) 10-min Non-Spinning Reserve (West and East)

- c) 30-min Spin/Non-Spin Reserve (West and East)
 - d) NYISO Regulation.
- 3) Advisory ex-ante Ancillary Services prices for each 15-min look-ahead interval of RTD as shown by (AAS\$) in the following RTD table. The following incremental prices are posted:
- a) 10-min Spinning Reserve (West and East)
 - b) 10-min Non-Spinning Reserve (West and East)
 - c) 30-min Spin/Non-Spin Reserve (West and East)
 - d) NYISO Regulation.

Public: The following additional information will be posted as required:

- 1) Phase Angle Regulator (PAR) schedules for internal NYISO PARs (These will either be based upon pre-determined schedules or as determined by RTS, depending on agreed-upon RTC/RTD program options).
- 2) Limiting Constraints on transmission network MW flows (Constraint Type [Base/Contingency] and Shadow Price). These are shown as (C\$) in the RTD table below.

Public: The following information will be produced by a separate pricing program running in conjunction with RTD and will need to be made available every 5-minutes after real time:

- 1) Preliminary ex-post LBMPs for Generators
- 2) Preliminary ex-post LBMPs for NYISO Zones
- 3) Preliminary ex-post NYSIO reference bus LBMP
- 4) Preliminary ex-post LBMPs for the NYISO LBMP Zone Map.

A final set of ex-post prices will also be posted periodically at a NYISO specified time. These “final” prices may be corrected and reposted as required.

Public: The following Time Weighted/Integrated LBMP information will be produced by a separate pricing program, using the preliminary 5-minute ex-post prices. The time weighted/integrated LBMPs will be posted on an hourly basis within 10-minutes after top-of-hour:

- 1) Zonal
- 2) Generator

Private: The following information will be produced by RTD and will need to be made available to authorized MPs:

- 1) MW base points for each look-ahead interval of RTD. The first base point from RTD is a 5-minute look-ahead and is immediately passed on to the Automatic Generation Control (AGC) program.

Refer to (5MBP) in the following RTD table. The remaining base points are considered to be advisory and are given at 15-minute intervals as shown by (15MBP) in the RTD table.

Note 3: Market Participants must examine the RTD 15-minute advisory base points in order to get advance notice of upcoming Unit Startups and Shut Downs. The beginning and end of a Startup period or Shutdown period always occurs at the 15-minute clock times as established by RTC.

The following table shows the information to be posted by RTD. The column headings RTD00 to RTD55 represent the 12 executions of RTD that occur each hour. For example, RTD05 starts shortly after the top-of-hour and has its results available at 5 minutes after top-of-hour. RTD05 calculates schedules for five look-ahead times, which are labeled as @10, @15, @30, @45, and @60 in minutes from the top-of-hour in which RTD05 executes.

Table 3-2: Information to be Posted by RTD

RTD>>	Information to be Posted by RTDxx (times are from top-of-hour)											
	00	05	10	15	20	25	30	35	40	45	50	55
@ 05	5MBP 5AS\$ C\$, X\$											
@ 10		5MBP 5AS\$ C\$, X\$										
@ 15	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	5MBP 5AS\$ C\$, X\$									
@ 20				5MBP 5AS\$ C\$, X\$								
@ 25					5MBP 5AS\$ C\$, X\$							
@ 30	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	5MBP 5AS\$ C\$, X\$						
@ 35							5MBP 5AS\$ C\$, X\$					
@ 40								5MBP 5AS\$ C\$, X\$				
@ 45	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	5MBP 5AS\$ C\$, X\$			
@ 50										5MBP 5AS\$ C\$, X\$		
@ 55											5MBP 5AS\$ C\$, X\$	
@ 60	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	5MBP 5AS\$ C\$, X\$
@ 65												
@ 70												
@ 75			15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$
@ 80												
@ 85												
@ 90						15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$
@ 95												
@ 100												
@ 105									15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$	15MBP AAS\$ AZGP\$
@ 110												
@ 115												
@ 120												15MBP AAS\$ AZGP\$

Note 4: The Ex-ante Energy prices (X\$) for generators and zones will be posted by RTD only if the 5-minute preliminary ex-post energy prices cannot be calculated as desired.

Table 3-3: Advisory Ex-Ante Prices to be Posted for Zones and Generators

	Prices to be Posted by RTC/RTD at the times from top-of-hour											
TIME>>	00	05	10	15	20	25	30	35	40	45	50	55
@ 15	RTD 00 AZGP\$	RTD 05 AZGP\$										
@ 30	RTD 00 AZGP\$	RTD 05 AZGP\$	RTD 10 AZGP\$	RTD 15 AZGP\$	RTD 20 AZGP\$							
@ 45	RTD 00 AZGP\$	RTD 05 AZGP\$	RTD 10 AZGP\$	RTD 15 AZGP\$	RTD 20 AZGP\$	RTD 25 AZGP\$	RTD 30 AZGP\$	RTD 35 AZGP\$				
@ 60	RTD 00 AZGP\$	RTD 05 AZGP\$	RTD 10 AZGP\$	RTD 15 AZGP\$	RTD 20 AZGP\$	RTD 25 AZGP\$	RTD 30 AZGP\$	RTD 35 AZGP\$	RTD 40 AZGP\$	RTD 45 AZGP\$	RTD 50 AZGP\$	
@ 75	RTC 45 AZGP\$	RTC 00 AZGP\$	RTD 10 AZGP\$	RTD 15 AZGP\$	RTD 20 AZGP\$	RTD 25 AZGP\$	RTD 30 AZGP\$	RTD 35 AZGP\$	RTD 40 AZGP\$	RTD 45 AZGP\$	RTD 50 AZGP\$	RTD 55 AZGP\$
@ 90	RTC 45 AZGP\$	RTC 00 AZGP\$	RTC 00 AZGP\$	RTC 00 AZGP\$	RTC 15 AZGP\$	RTD 25 AZGP\$	RTD 30 AZGP\$	RTD 35 AZGP\$	RTD 40 AZGP\$	RTD 45 AZGP\$	RTD 50 AZGP\$	RTD 55 AZGP\$
@ 105	RTC 45 AZGP\$	RTC 00 AZGP\$	RTC 00 AZGP\$	RTC 00 AZGP\$	RTC 15 AZGP\$	RTC 15 AZGP\$	RTC 15 AZGP\$	RTC 30 AZGP\$	RTD 40 AZGP\$	RTD 45 AZGP\$	RTD 50 AZGP\$	RTD 55 AZGP\$
@ 120	RTC 45 AZGP\$	RTC 00 AZGP\$	RTC 00 AZGP\$	RTC 00 AZGP\$	RTC 15 AZGP\$	RTC 15 AZGP\$	RTC 15 AZGP\$	RTC 30 AZGP\$	RTC 30 AZGP\$	RTC 30 AZGP\$	RTC 45 AZGP\$	RTD 55 AZGP\$
@135	RTC 45 AZGP\$	RTC 00 AZGP\$	RTC 00 AZGP\$	RTC 00 AZGP\$	RTC 15 AZGP\$	RTC 15 AZGP\$	RTC 15 AZGP\$	RTC 30 AZGP\$	RTC 30 AZGP\$	RTC 30 AZGP\$	RTC 45 AZGP\$	RTC 45 AZGP\$
@150		RTC 00 AZGP\$	RTC 00 AZGP\$	RTC 00 AZGP\$	RTC 15 AZGP\$	RTC 15 AZGP\$	RTC 15 AZGP\$	RTC 30 AZGP\$	RTC 30 AZGP\$	RTC 30 AZGP\$	RTC 45 AZGP\$	RTC 45 AZGP\$
@165					RTC 15 AZGP\$	RTC 15 AZGP\$	RTC 15 AZGP\$	RTC 30 AZGP\$	RTC 30 AZGP\$	RTC 30 AZGP\$	RTC 45 AZGP\$	RTC 45 AZGP\$
@180								RTC 30 AZGP\$	RTC 30 AZGP\$	RTC 30 AZGP\$	RTC 45 AZGP\$	RTC 45 AZGP\$
@195											RTC 45 AZGP\$	RTC 45 AZGP\$

Note5: Only a single column of prices will be posted and updated every five minutes. RTD xx and RTC yy indicate the sources of these prices.

Each column in the above table lists the most recent advisory ex-ante price information that is to be posted. These public look-ahead prices are given in 15-minute increments out to the horizon of RTC. Only one column of information will be posted and updated every five minutes and will be available for viewing and down loading by the Market Participants.

The source of the prices, either RTD (shaded) or RTC is also indicated. The RTD xx prices correspond to the resources that were committed by the RTC yy shown in the same column. In other words, all the prices in a column are from a consistent commitment of resources. The prices from RTD are updated every five minutes and the prices from RTC are updated every 15 minutes (five minutes after the completion of the RTC execution).