Demand Side Ancillary Services:

1. Introduction

Donna Pratt
New York Independent System Operator

DSASP Training Course
November 21, 2008

Training Sections

- **1. Introduction to Demand Side Ancillary Services**
  - *Operating Reserves*
  - *Regulation*
  - *References*
- **2. Scheduling and Pricing**
  - *Operating Reserves*
  - *Regulation*
- **3. Participation**
  - *DSASP General Participation Requirements*
    - Registration
    - Meter Configurations
    - Communication Configurations

- *DSASP Reserve Participation Requirements*
- *DSASP Regulation Participation Requirements*
- **4. Bidding**
  - *DSASP Bidding Characteristics*
- **5. Performance Calculations**
  - Regulation
  - Reserves
- **6. Settlement and Invoices**
  - Data Submission
  - Settlement
  - Hourly Invoice
  - Daily Invoice
  - Monthly Invoice
  - Consolidated Invoice

Introduction to Ancillary Services
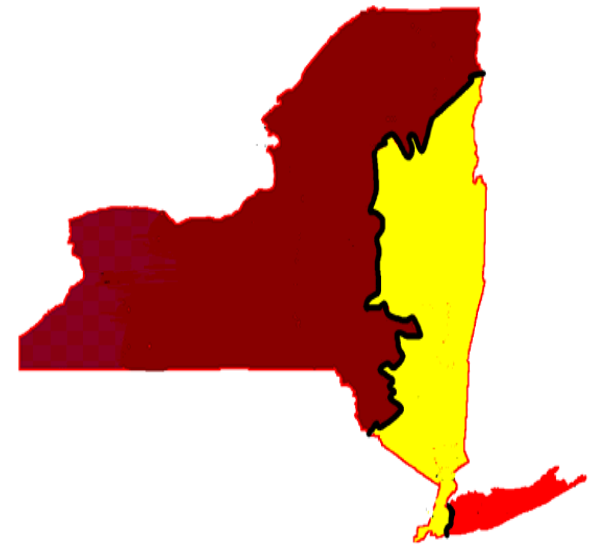
Operating Reserves and Regulation

Operating Reserves

Regional Requirements

- New York Control Area (NYCA)
- East
- Long Island

Time Requirements

- *10 Minute Spinning (Synchronous) Res*
- *10 Minute TOTAL*
  - includes 10-Minute Synchronous and 10-Minute Non-Synchronous Reserve
- *30 Minute Reserve TOTAL*
  - Synchronous and Non-Synchronous

Note: *A higher quality reserve can replace a lower quality reserve if the higher quality reserve is cheaper than the lower quality reserve*

Reserve Requirements

Reserve Product	NYCA	Eastern New York	Long Island
10 Minute Spinning (Synchronous) Reserve	600 MW (1/2 Single Largest Contingency)	300 MW (1/4 Single Largest Contingency or ½ NYCA)	60 MW (1/20 Single Largest Contingency)
10 Minute Total Reserve	1200 MW (Single Largest Contingency)	1200 MW (1000 MW w/NE)	120 MW (1/10 Single Largest Contingency)
30 Minute Reserve	1800 MW (1.5 X Single Largest Contingency)	1200 MW (1000 MW w/NE)	270 - 540 MW

Reference: Table 6.2 Ancillary Services Manual

Locational Reserve Requirements

- Separate Clearing Prices for
  - *Different Services:*
    - 10-Minute Synch
    - 10-Minute Total (10-Min Non-Synch)
    - 30-Minute Total (30-Min Non-Synch)
  - *Locations:*
    - NYCA (West)
    - East (East of Central East)
    - Long Island
      - Long Island prices may not exceed East reserve clearing prices when reserve constraint is binding (per FERC ruling)

Regulation Service

- The continuous balancing of resources and load

- To maintain frequency at 60 Hz

- Accomplished by committing Generators and Demand Side Resources (Regulation Suppliers) whose output or demand is raised or lowered (predominately using Automatic Generation Control (AGC)) as necessary to follow moment-by-moment changes in load.

- Seasonal and hourly regulation requirements

Reference: Ancillary Services Manual, Section 4

NYISO Regulation Requirements (MW)

Hour Beg	April -May Weekday	April -May Sunday	June-August Weekday	June-August Sunday	September-October Weekday	September-October Sunday	November - March Weekday	November - March Sunday
0	150	150	175	175	180	160	190	160
1	150	150	175	175	180	160	190	160
2	150	150	175	175	180	160	190	160
3	150	150	175	175	180	160	190	160
4	150	150	175	175	180	160	190	160
5	175	150	200	175	250	160	250	160
6	275	150	275	175	275	160	275	160
7	275	150	275	175	275	160	275	160
8	275	150	275	175	275	160	275	160
9	200	160	250	160	260	180	250	180
10	175	175	240	175	250	210	250	210
11	150	150	210	175	210	160	210	160
12	150	150	175	175	180	160	180	160
13	150	150	175	175	180	160	180	160
14	150	150	175	175	180	160	180	160
15	175	150	175	175	190	160	190	160
16	200	175	250	230	250	230	275	230
17	200	200	250	250	250	250	275	250
18	200	200	250	250	250	250	275	250
19	200	200	250	250	250	250	250	250
20	200	200	250	250	250	250	250	250
21	200	200	250	250	250	250	250	250
22	175	175	225	225	240	225	240	225
23	150	150	175	175	190	175	190	175

Reference:

http://www.nyiso.com/public/webdocs/market_data/reports_info/nyiso_regulation_req_sum04.pdf

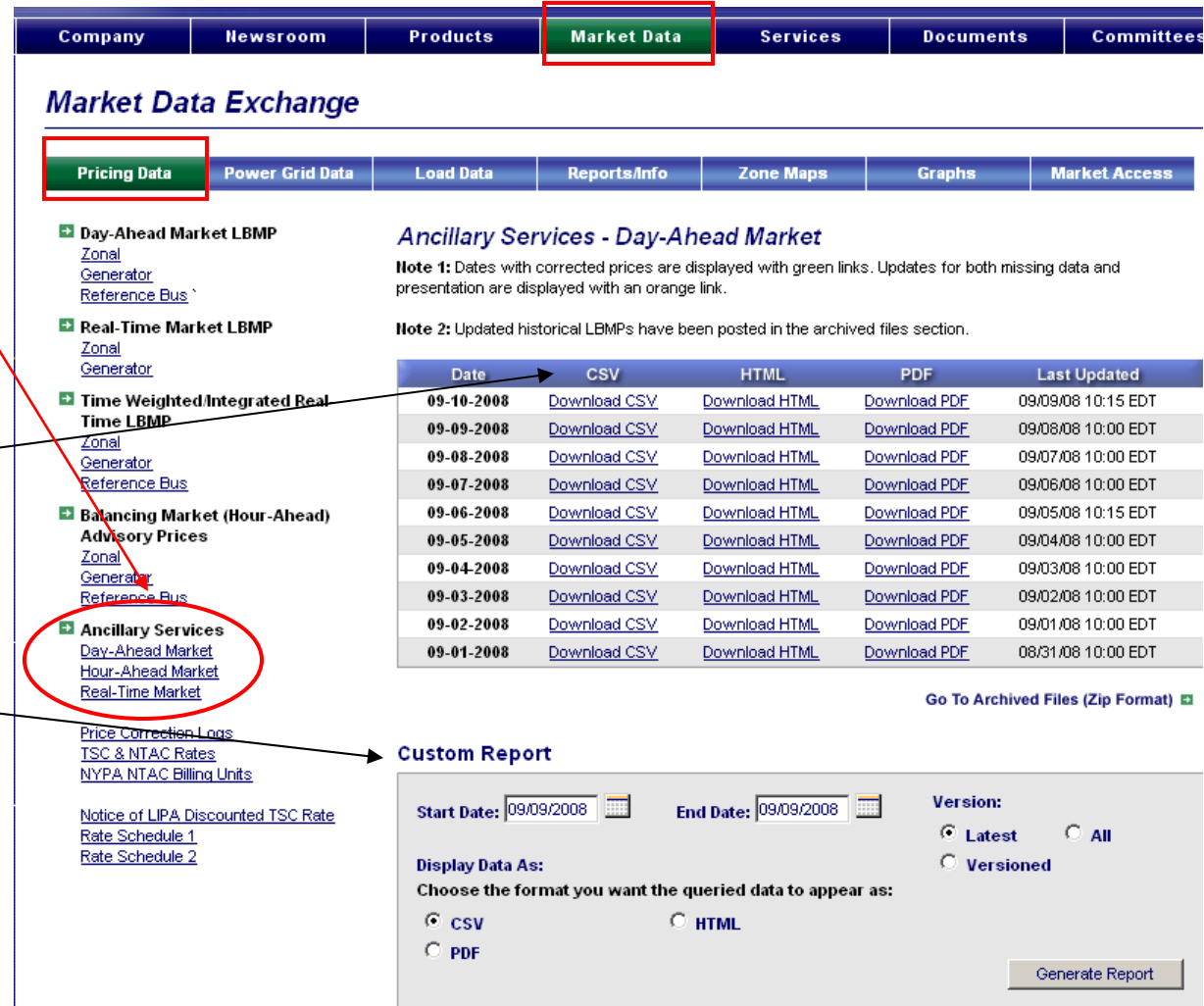# Ancillary Service References

NYISO Price Information

Select which type of Ancillary Services prices you wish to view/download.

Individual days may be downloaded in one of three file formats.

To download a range of days, use the Custom Report section to specify the date range.

Recommended: Save the file first, then open it.

Sample Day-Ahead Ancillary Price File

Eastern Date Hour	Pricing Reg	10 Min Sync	10 Min Non Sync	30 Min Non Sync	Regulation	Price Version
10/27/2008 5:00	EAST	3.09	3.09	0.3	45	1
10/27/2008 5:00	WEST	0.3	0.3	0.3	45	1
10/27/2008 6:00	EAST	3.37	3.37	0.3	50	1
10/27/2008 6:00	WEST	0.3	0.3	0.3	50	1
10/27/2008 7:00	EAST	9.91	3.41	0.5	50	1
10/27/2008 7:00	WEST	7	0.5	0.5	50	1
10/27/2008 8:00	EAST	9.89	3.39	0.5	50	1
10/27/2008 8:00	WEST	7	0.5	0.5	50	1
10/27/2008 9:00	EAST	9.99	3.49	0.99	50.49	1
10/27/2008 9:00	WEST	7.49	0.99	0.99	50.49	1
10/27/2008 10:00	EAST	9.89	3.39	0.99	50.49	1
10/27/2008 10:00	WEST	7.49	0.99	0.99	50.49	1
10/27/2008 11:00	EAST	9.89	3.39	0.75	50.25	1
10/27/2008 11:00	WEST	7.25	0.75	0.75	50.25	1
10/27/2008 12:00	EAST	9.89	3.39	0.5	50	1
10/27/2008 12:00	WEST	7	0.5	0.5	50	1

Sample Real-Time Ancillary Price File

RTD End Time Stamp	Pricing Region	10 Min Sync	10 Min Non Sync	30 Min Non Sync	Regulation	Price Version
10/27/2008 17:00	EAST	0	0	0	50	1
10/27/2008 17:00	WEST	0	0	0	50	1
10/27/2008 17:05	EAST	0	0	0	50	1
10/27/2008 17:05	WEST	0	0	0	50	1
10/27/2008 17:10	EAST	0	0	0	50	1
10/27/2008 17:10	WEST	0	0	0	50	1
10/27/2008 17:15	EAST	0	0	0	50	1
10/27/2008 17:15	WEST	0	0	0	50	1
10/27/2008 17:20	EAST	0	0	0	50	1
10/27/2008 17:20	WEST	0	0	0	50	1
10/27/2008 17:25	EAST	0	0	0	50	1
10/27/2008 17:25	WEST	0	0	0	50	1
10/27/2008 17:30	EAST	0	0	0	50	1
10/27/2008 17:30	WEST	0	0	0	50	1
10/27/2008 17:35	EAST	200	0	0	250	1
10/27/2008 17:35	WEST	200	0	0	250	1
10/27/2008 17:40	EAST	21.58	0	0	71.58	1
10/27/2008 17:40	WEST	21.58	0	0	71.58	1
10/27/2008 17:45	EAST	19.15	0	0	69.15	1
10/27/2008 17:45	WEST	19.15	0	0	69.15	1
10/27/2008 17:50	EAST	23.87	0	0	73.87	1
10/27/2008 17:50	WEST	23.87	0	0	73.87	1
10/27/2008 17:55	EAST	57.55	0	0	107.55	1
10/27/2008 17:55	WEST	57.55	0	0	107.55	1

Reference: Ancillary Service Manual

- Regulation: Section 4
  - *Operating States*
  - *Scheduling*
  - *Performance*
  - *Settlements*
  - *Regulation Demand Curve*
  - *Prequalification & Audit*

- Reserves: Section 6
  - *Types of Operating Reserves*
  - *Eligibility Criteria*
  - *Bidding and Bid Selection*
  - *Settlement*
  - *Scarcity Pricing & Operating Reserve Demand Curves*
  - *Performance*
  - *Prequalification & Audit*

Reference: Market Participant User's Guide

- ◆ Section 4: NYISO Customer Relations

  - ▪ *Digital Certificates*

  - ▪ *Update of Generator Physical Parameters*

  - ▪ *Changing Market Participant Administrators*

- ◆ Section 6: Market Participant Administrator Tasks

  - ▪ *Getting Started*

  - ▪ *Displays and Tasks*

- ◆ Section 7: Market Participant User Tasks

  - ▪ *Generator and Ancillary Services Bids*

- ◆ Section 8: Upload/Download Batch Procedures

NEW YORK INDEPENDENT SYSTEM OPERATOR

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Demand Side Ancillary Services:

2. Scheduling and Pricing

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Scheduling and Pricing

Operating Reserves

Availability Bids for DSASP Resources

- ◆ Only as ISO-Committed Flexible
- ◆ May provide Synchronous or Non-Synchronous Reserves, but not both
  - ▪ *Non-Synchronous resources may not provide Regulation Service*
  - ▪ *Local/Backup generation only permitted as Non-Synchronous supplier in DSASP*
- ◆ Must bid Energy
  - ▪ *Minimum Energy Bid of $75/MWh*
  - ▪ *DSASP resources are not paid for energy if/when scheduled*

Purpose of Energy Bids for DSASP Resources

- ◆ Day Ahead
    - ▪ *In order to be a Reserves provider, the resource must have an energy bid*
    - ▪ *DSASP Resources will not be evaluated as an energy resource in the DAM*

- ◆ Real Time
    - ▪ *Used as an economic indicator of the price at which the resource can be scheduled*

Operating Reserve – Availability Bids

- Resources bidding Flexible are <u>required</u> to place Availability Bids
  - *All RT availability bids are set to $0*

- All dispatchable capacity is available for scheduling reserve
  - *Available 10 & 30 minute Spinning (Synchronous)*
  - *Available 10 & 30 minute Non-Synch*

- Reserve is limited by a Resource's:
  - *Emergency Response Rate (ERR)*
    - Response Rate is expressed in MW per min.
    - 10-Min. Spinning Reserve MW = 10 * ERR
  - *Applicable Upper Operating Limit (UOL)*
    - Seasonal

Scheduling - Reserves

- ◆ **Resources are evaluated every five minutes**

- ◆ **One of three outcomes for next 5-min period:**

  - ▪ *Not scheduled for reserves*

  - ▪ *Converted to energy*

    - • DSASP resource is not paid for energy, but still gets the reserve margin for the amount of its reduction

  - ▪ *Reserve contract (scheduled for reserves)*

- ◆ **Selection and scheduling of reserves <u>are not</u> tied to a reserve ("pickup") event, though likelihood of being scheduled is higher during a reserve "pickup" event**

Reserves in Real Time Dispatch Corrective Action Mode (RTD-CAM)

- ◆ Operator-initiated version of RTD to initiate:

  - ▪ *Reserve Pickups (RPU)*

    - • Large event or Small event

      - • Small event permits base points to be lowered to reduce transmission line loading

  - ▪ *Maximum Generation Pickups*

  - ▪ *Capability to commit 10-minute quick-starts*

- ◆ Base points ASAP

Reserve Requirements are Locational

3 Locations   3 Products
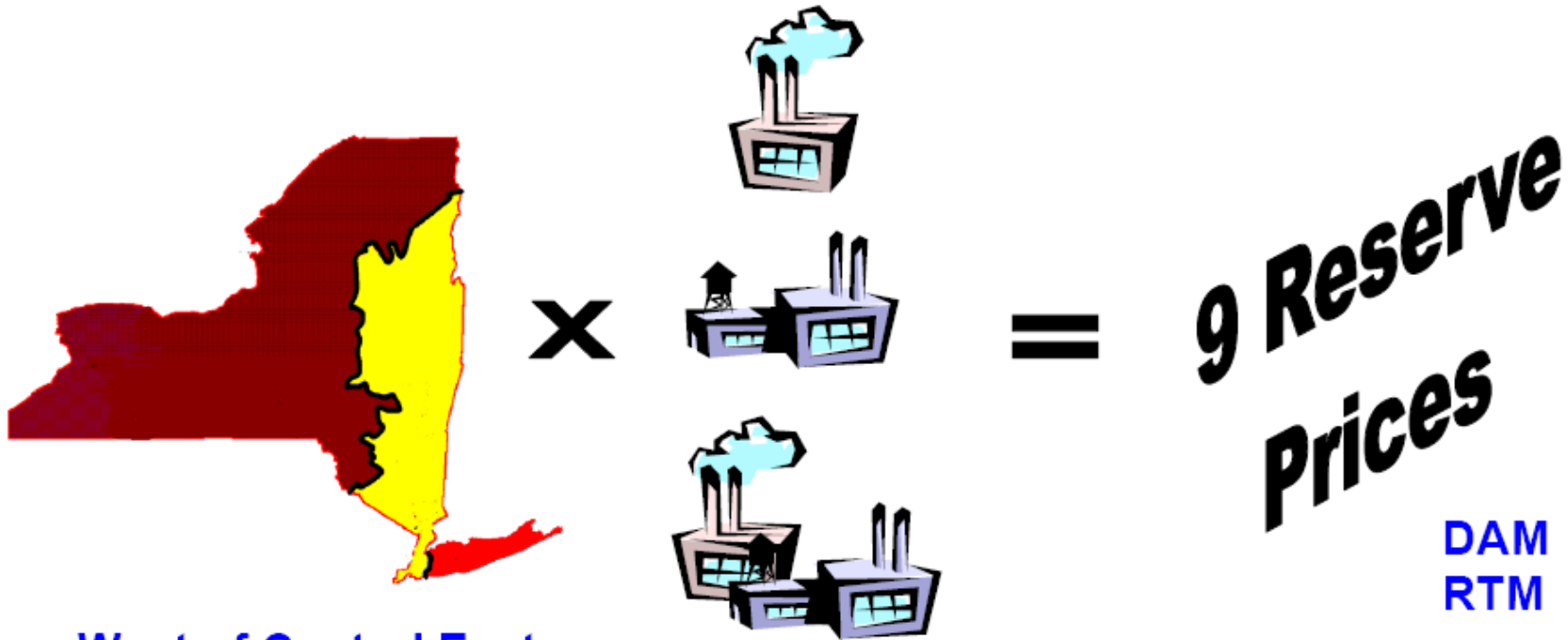
× = **9 Reserve Prices**

- West of Central East
- East of Central East
- Long Island

10 Minute Spin
10-Minute Non-Synch
30-Minute

DAM
RTM

Reserve Clearing Price
Shadow Price

Shadow Price:

The actual cost to provide the next available MW of reserve

Calculated for
→ *DAM*
→ *Real-time Market*

↳For each reserve product;

↳In each of the three reserve locations

Reserve Clearing Price
Lost Opportunity Cost

LOC = the margin on the sale of energy that the marginal unit foregoes to provide an ancillary service (*Reserve* & Regulation)

$$\text{LOC} = \left\{ \text{LBMP for Energy} \right\} - \left\{ \text{Marginal } \textit{Reserve} \text{ units energy offer} \right\}$$

Reserve – Day-Ahead Example

U1

U2

U3

U4

Load
590 MW

10 Min Spin Reserve
25 MW
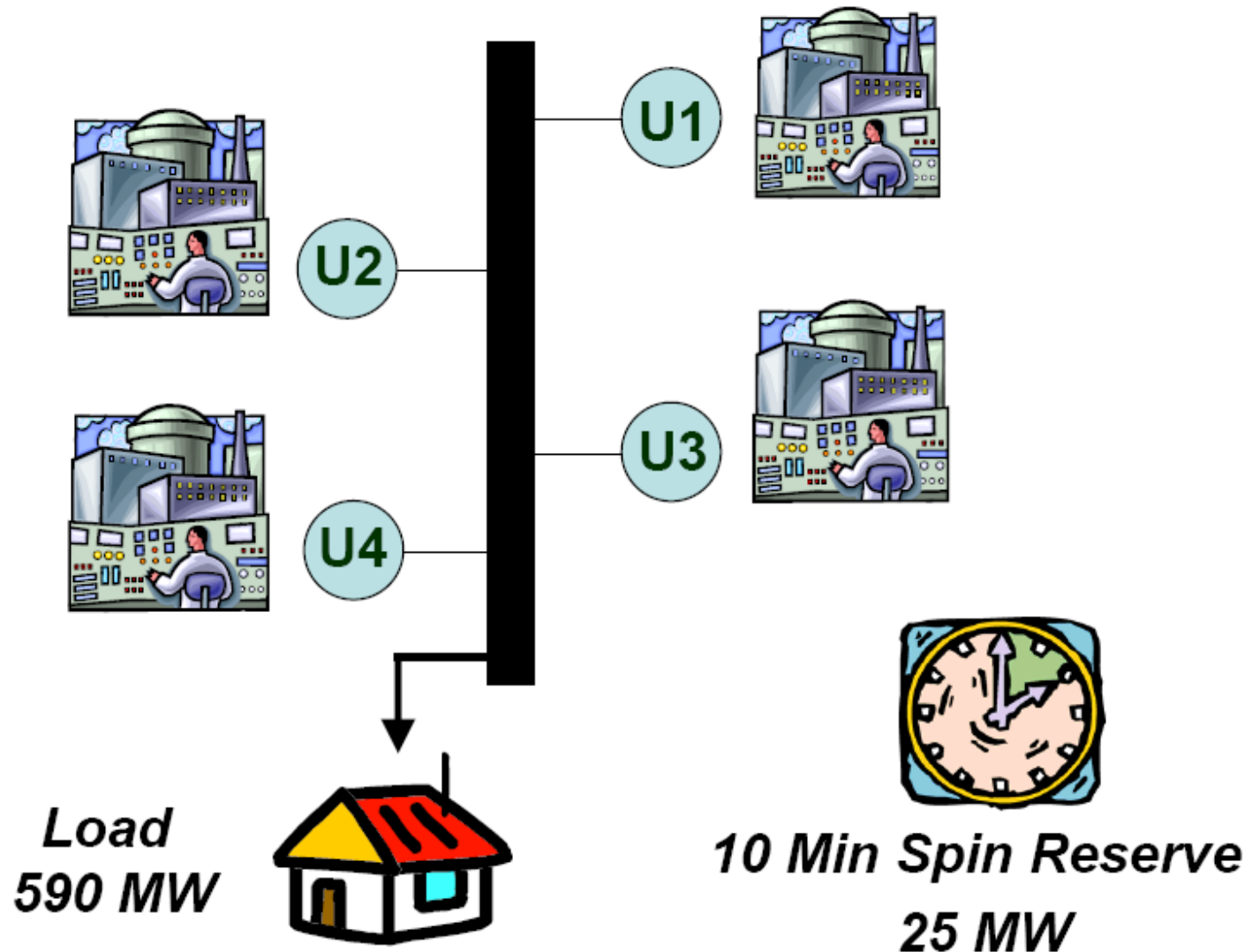
Reserve – Day-Ahead Example

Unit One

UOL:200MW

MinGen:50MW

10MinSpin:10MW

Energy $25 Avail Bid $1

Unit Two

UOL:200MW

MinGen:50MW

10MinSpin:10MW

Energy $35 Avail Bid $2

Unit Three

UOL:200MW

MinGen:50MW

10MinSpin:10MW

Energy $45 Avail Bid $3

Unit Four

UOL:200MW

MinGen:50MW

10MinSpin:10MW

Energy $55 Avail Bid $4

Solving for Energy

Total Capacity needed: 615 MW   *DAM*   🏠 590 MW   ✋ 25 MW

	Min Gen (MW)	Incremental Energy (MW)	Max. Capacity (MW)	Spinning Reserve (MW)	Incremental Energy Offer ($/MW)	Energy Schedule (MW)
Unit 1	50	150	200	10	$25/MW	50 + 150
Unit 2	50	150	200	10	$35/MW	50 + 150
Unit 3	50	150	200	10	$45/MW	50 + 90
Unit 4	50	150	200	10	$55/MW	50

Total: 590

🏠 590 MW

Solve for Load

Marginal Energy Provider is Unit 3

LBMP is $45/MW

Solving for Reserves

Total Capacity needed: 615 MW **DAM** 🏠 590 MW 🖐 25 MW

	Min Gen (MW)	Inc. Energy (MW)	Max. Capacity (MW)	Spinning Reserve (MW)	Inc. Energy Offer ($/MW)	Avail. Bid ($/MW)	Energy Schedule (MW)	Reserve Schedule (MW)
Unit 1	50	150	200	10	$25/MW	$1/MW	50 + 150	
Unit 2	50	150	200	10	$35/MW	$2/MW	50+145	5
Unit 3	50	150	200	10	$45/MW	$3/MW	50 + 95	10
Unit 4	50	150	200	10	$55/MW	$4/MW	50	10
						Total	590	25

🖐 25 MW

Solve for Reserve
Marginal Reserve Provider is Unit 2

Total Capacity needed: 615 MW

DAM

590 MW   25 MW

	Min Gen (MW)	Inc. Energy (MW)	Max. Capacity (MW)	Spinning Reserve (MW)	Inc. Energy Offer ($/MW)	Avail. Bid ($/MW)	Energy Schedule (MW)	Reserve Schedule (MW)
Unit 1	50	150	200	10	$25/MW	$1/MW	50 + 150	
Unit 2	50	150	200	10	$35/MW	$2/MW	50 + 145	5
Unit 3	50	150	200	10	$45/MW	$3/MW	50 + 95	10
Unit 4	50	150	200	10	$55/MW	$4/MW	50	10

In the DAM, Unit 3 sets the energy price @ $45 because Unit 4 is at minimum generation.

Unit 2 is backed down for reserves, so the reserve price is this unit's lost opportunity cost (difference between LBMP and their energy bid) plus the availability bid or 45-35+2 = 12.

Reserve Clearing Price

Total Capacity needed: 615 MW DAM 590 MW 25 MW

	Min Gen (MW)	Inc. Energy (MW)	Max. Capacity (MW)	Spinning Reserve (MW)	Inc. Energy Offer ($/MW)	Avail. Bid ($/MW)	Energy Schedule (MW)	Reserve Schedule (MW)
Unit 1	50	150	200	10	$25/MW	$1/MW	50 + 150	
Unit 2	50	150	200	10	$35/MW	$2/MW	50 + 145	5
Unit 3	50	150	200	10	$45/MW	$3/MW	50 + 95	10
Unit 4	50	150	200	10	$55/MW	$4/MW	50	10

Lost Opportunity Cost = { LBMP for Energy $45/MW } − { Marginal Reserve units Energy offer $35/MW } = $10/MW

Clearing Price = LOC ($10/MW) + Avail. Bid ($2/MW) = $12/MW

Scheduling and Pricing

Regulation

Regulation Suppliers

- Flexible Resources must have Automatic Generation Control (AGC) capability

- Economically selected in DAM and scheduled in RT

- Single statewide clearing price

- Resources are not obligated to provide regulation
  - *Must be qualified to bid regulation*

Automatic Generation Control (AGC)

- ◆ AGC base point signals:
  - *Sent approximately every 5 minutes (RTD) for Energy*
  - *Sent every 6 seconds for Regulation*
    - Derived from unit's 5-minute RTD base point

- ◆ Control Signals
  - *NYISO transmits signals to TO*
  - *TO retransmits signals to their Control Area units*

- ◆ ICCP
  - *Communications protocol used for transmission of NYISO control signals*
  - *Information in Direct (Gen) Communications Manual*
    - Requires completion of CEII Request Form and Non-disclosure agreement
      - CEII Request Form & NDA available from Customer Relations

Regulation Pricing

- **No locational requirements for regulation**

- **If Unit must be backed down in order to provide Regulation, there is Lost Opportunity Cost (LOC)**

- **Regulation prices impact LBMP only when the marginal unit providing regulation is capacity constrained**

- **Shortage pricing is based on demand curve**

Regulation	Demand Curve
Need > 25 MW to meet Target Level	$300/MW
Need < 25 MW to meet Target Level	$250/MW

ISO NEW YORK INDEPENDENT SYSTEM OPERATOR

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Demand Side Ancillary Services:

3. Participation Requirements

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New York Independent System Operator

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Purpose of DSASP

◆ Allow Demand Side Resources to participate in Ancillary Services markets.

■ *Regulation and frequency response services*
  • Demand side resources will be committed to raise or lower demand using Automatic Generation Control (AGC)

■ *Operating Reserve services*
  • Demand Side Resources will provide demand response when economics of the energy bid indicate willingness to be curtailed
    • Likelihood is higher when there is a system contingency/reserve pickup

Coordination with Other Demand Response Programs
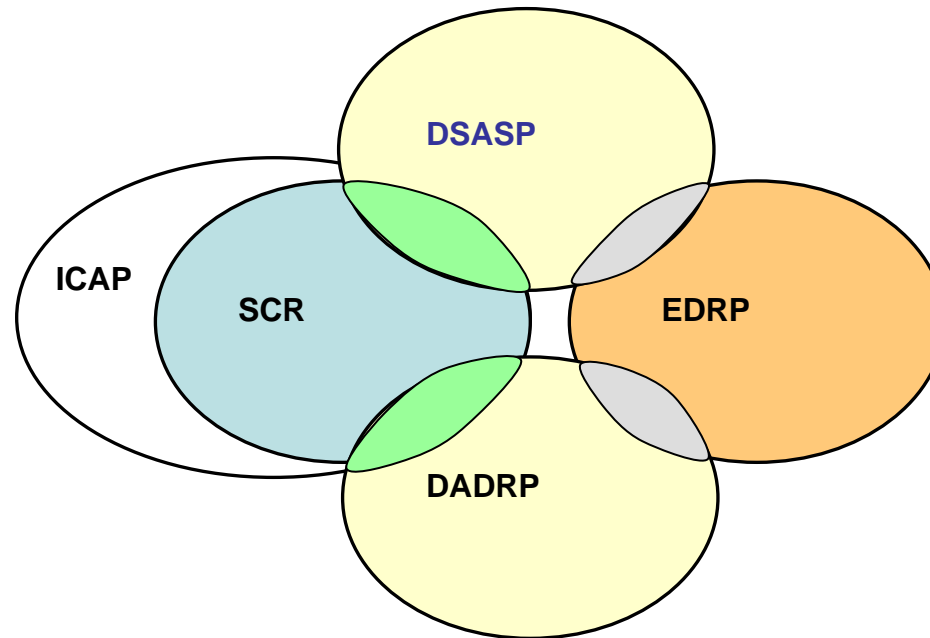
- ◆ ICAP/SCR and EDRP are mutually exclusive
- ◆ DADRP & DSASP programs are mutually exclusive
- ◆ ICAP/SCR and EDRP resources may also participate in DSASP or DADRP

Coordination with other DR programs Registration

- DSASP resources must complete the Demand Response Program Status Form in the DSASP registration packet to indicate enrollment in other DR programs

  - *When the resource first enrolls in DSASP*

  - *Every time there is a change to enrollment in another NYISO DR program*

    - Join EDRP or ICAP/SCR
    - Change CSP in EDRP
    - Change RIP in ICAP/SCR
    - Withdraw from EDRP or ICAP/SCR

- Failure to notify NYISO of a change can affect performance calculations and payments in one or both DR programs

- Form should be sent to NYISO's Customer Relations Department

Organization Name	

3. DSASP RESOURCE DEMAND RESPONSE PROGRAM STATUS FORM

Submit this form with initial DSASP resource enrollment and each time there is a change to the DSASP Resource's participation in other NYISO Demand Response Programs.

3.1 Type of Demand Response Program Status Update

☐ New DSASP Resource

☐ Change to existing DSASP Resource: Generator ID: ☐

NYISO Generator Name of DSASP Resource: ☐

3.2 Participation in other NYISO Demand Response Programs

☐	Not participating in any other NYISO Demand Response Program Effective Date of change to DSASP record: ☐
☐ EDRP	**Emergency Demand Response Program (EDRP)** Effective Date of enrollment in EDRP: ☐ Name of Curtailment Service Provider: ☐ EDRP ID: ☐ Effective Date of change to DSASP record: ☐
☐ SCR	**Special Case Resource Program (SCR)** Effective Date of enrollment in SCR: ☐ Name of Responsible Interface Party: ☐ SCR ID: ☐ ☐ Individual ☐ Part of an aggregation Effective Date of change to DSASP record: ☐
☐ TDRP	**NYISO Use ONLY:** **Targeted Demand Response Program (TDRP)** Effective Date of assignment to TDRP: _____ Sub-load pocket identifier (J1 – J9): _____ Effective Date of change to DSASP record:

The Applicant understands and certifies that any changes to its participation in other NYISO Demand Response programs shall be submitted to the New York Independent System Operator, Inc. (NYISO) in writing under the signatures of the DSASP Agent and the DSASP Resource. Failure to notify NYISO of changes to enrollment in other NYISO Demand Response programs may affect performance status and/or payment in the Demand-Side Ancillary Service Program and/or the other NYISO Demand Response program in which the DSASP Resource is enrolled.

Sample of the DSASP Resource Demand Response Program Status Form in DSASP Registration Packet

Coordination with other DR programs
Day-Ahead Schedule in DSASP or DADRP

- ◆ If DSASP or DADRP resource is scheduled in the Day-Ahead Market and an SCR, EDRP or TDRP activation (audit or event) occurs:

  - *DSASP resources must respond to ICAP/SCR, EDRP or TDRP activations (including tests) if jointly enrolled*

    - Out-of-merit process will not distinguish between mandatory and voluntary SCR events

    - Program settlement provisions will apply for Day-Ahead MW scheduled

      - DSASP resource will be taken out of merit for event period, including any extended event hours

  - *DADRP resource is required to perform to day-ahead schedule*

    - Any deviation settled according to DADRP rules

  - *Any additional MW reductions will be settled per ICAP/SCR or EDRP program energy settlement rules*

  - *ICAP/SCR performance measured against total reduction*

Coordination with other DR programs
DSASP Resource with Real-Time Bids

♦ If DSASP resource has real-time bids and an SCR, EDRP or TDRP activation (audit or event) occurs:

▪ *DSASP resources must respond to ICAP/SCR, EDRP or TDRP activations (including tests) if jointly enrolled*

- Bid invalidation process will not distinguish between mandatory and voluntary SCR events

▪ *Real-time bids will be invalidated for entire event period, including any extended event hours*

- If event is terminated early, real-time bids for remaining event hours will not be reinstated, they must be resubmitted

▪ *ICAP/SCR performance measured against total reduction*

Operating Characteristics of a Demand-Side Resource
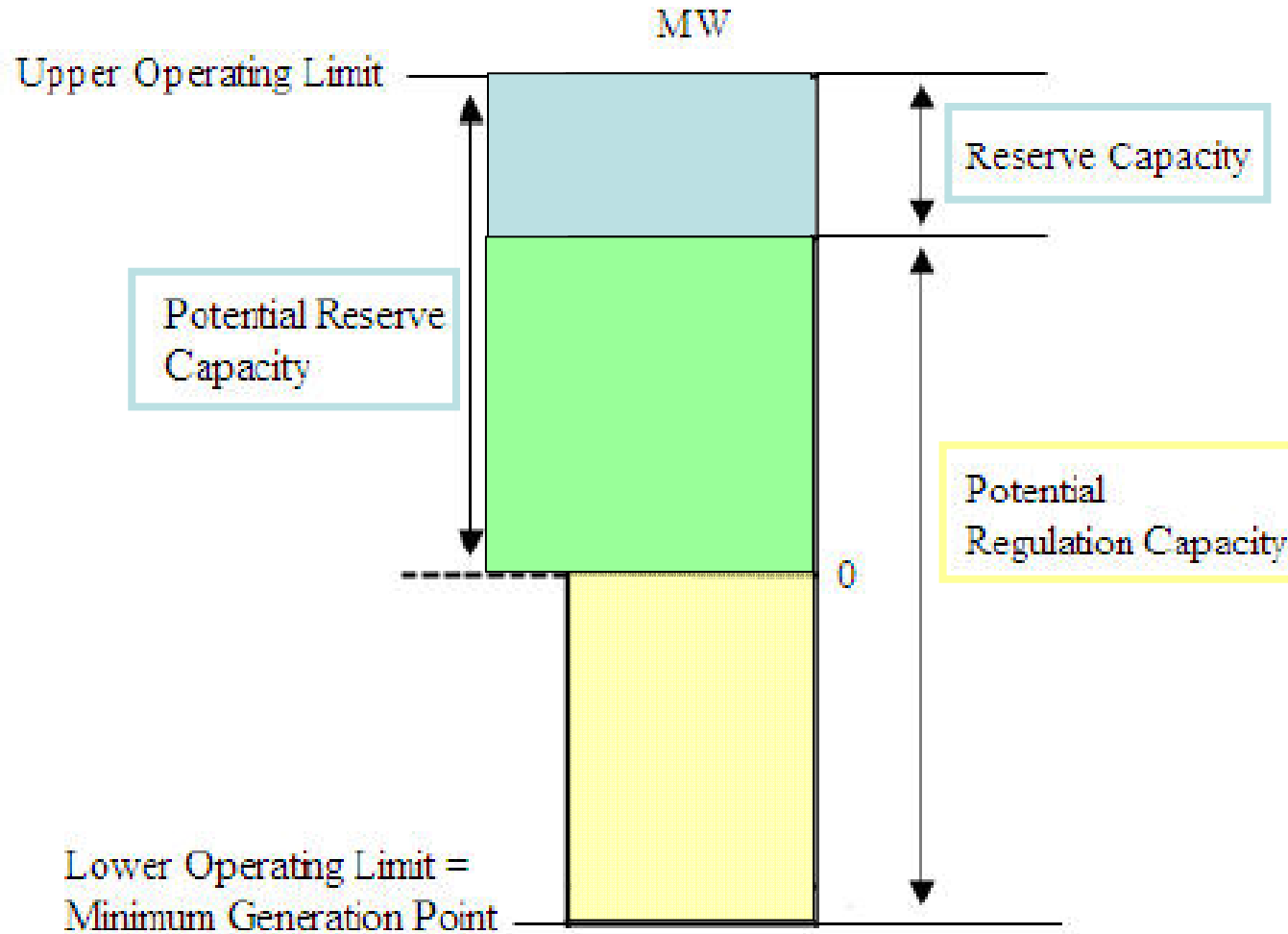
DSASP

Registration

DSASP Participation Processes

TO Interconnection

| Contact Transmission Owner for Interconnection Requirements | → | Complete Interconnection Agreement | → | Procure, Install/Configure and Test Telemeter Equipment | → | TO provides telemetry information to NYISO | → | Test period | → | DSASP Services begin |

DSASP Registration

| Complete NYISO Customer Registration Packet | → | Complete NYISO DSASP Registration Packet | → | Submit Registration Packet(s) to NYISO | → | Respond to requests from NYISO Customer Relations, Credit and Finance |

NYISO Registration Process

| Customer Relations receives NYISO Customer Registration Packet | → | Customer Relations receives DSASP Registration Packet | → | Customer Relations confirms completeness of registration forms | → | NYISO Operations models DSASP resource as a generator |

| NYISO Legal review of Customer application | → | NYISO establishes Credit Requirements with DSASP applicant | → | Customer Relations builds MIS account for organization and DSASP resource | → | DSASP resource notified registration is complete | → | DSASP resource coordinates pre-qualification process with Customer Relations |

DSASP Registration

- *DSASP Agent – Must be a NYISO Customer*

- *DSASP Resource – Modeled as a generator*

- *Registration Packet:*

  - http://www.nyiso.com/public/products/demand_response/dsasp.jsp

  - Word FORM document

    - *Save as a document on local machine*
    - *Enter the data into the fields provided*
    - *Save document*
    - *Print, sign, and send to Customer Relations Department*

2.1 Market Status

Specify which services the resource will provide

		Yes	No
2.1	Will Synchronous Reserves be offered from a Demand Side Resource?	☐	☐
2.2	Will Regulation be offered from a Demand Side Resource?	☐	☐
2.3	Will Non-Synchronous (Non-Spinning) Reserves be offered from a Demand Side Resource?	☐	☐

Registration Packet
2.3 MIS Modeling Form

New DSASP Resources

Generator Name (*Subject to naming conventions*)	
Transmission Owner (TO)	
Interconnection Point	
Zone	
Metering Installed (Yes/No)	☐ Yes ☐ No
Metering Installation Date	
Engineering Diagrams Submitted (One-Line)	☐ Yes ☐ No
TO Contact Name	
TO Contact Phone	
Target Test Synchronization to Grid	

2.4 DSASP Resource Data

Resource Type, Bid Privileges, and Unit Commitment Parameters

Minimum of 1 MW

GENERATOR PTID (**NYISO will assign for new generator**)			
GENERATOR NAME (*Subject to NYISO naming conventions*)			
GENERATION TYPE			
Demand Side Resource – Load Reduction		☐	
Demand Side Resource – Local Generation (may only provide non-synchronous reserves)		☐	

GENERATOR LIMITS		**BID FLAGS ***	**DAM**	**RTM**
Summer MW Rating		**Dispatch Energy**	☐	☐
Winter MW Rating		**10 min Spin**	☐	☐
Physical min Gen (MWs)	0 MW	**30 min Spin**	☐	☐
Emergency Response Rate (MWs/Min)		**10 min Non-Sync**	☐	☐
Max Regulation Response Rate (MWs/Min)		**30 min Non-Sync**	☐	☐
Normal Response Rate (MWs/Min)		**Regulation Control**	☐	☐
		*Subject to NYISO Gen Bid Rules		

Registration Packet
2.5 Meter Installation Information

This information is required for the Instantaneous Meter/RTU, the revenue-grade meter used for DSASP data reporting, and any other devices used for DSASP participation.

First Name		**Last Name**	
Title			
Meter Authority Name			
Address Line 1			
Address Line 2			
City		**State/Province**	
Zip/Postal Code		**Country**	
Primary Phone		**Secondary Phone**	
Cell Phone		**Pager Number**	
Fax Number		**Professional License Number:**	
E-Mail Address			

2.6 Meter Configuration

This section covers information about interval meters at the DSASP facility.

Is the meter used for reporting load subscribed to DSASP the same meter used by the Transmission Owner to bill the resource?	☐ Yes	☐ No
Is the load subscribed to DSASP submetered? **If yes, include one-line diagram of submetering configuration of load enrolled in DSASP.**	☐ Yes	☐ No

METER DEVICE USED FOR REPORTING LOAD SUBSCRIBED TO DSASP:			
Manufacturer		**Model**	
Type		**Accuracy Class**	
Rating		**Loss Compensation**	
Instrument Transformer Correction Factor		**Meter Multiplier, if applicable**	
As-left meter test criteria, as prescribed in the New York Department of Public Service 16 NYCRR Part 92 Operating Manual:			
Date of last meter test			

2.7 Meter Authorities

This section covers who collects the meter data and who submits the meter data to NYISO.

Meter data is collected by:	☐ Transmission Owner		☐ Meter Data Service Provider	
First Name		**Last Name**		
Title				
Meter Authority Name				
Address Line 1				
Address Line 2				
City		**State/Province**		
Zip/Postal Code		**Country**		
Primary Phone		**Secondary Phone**		
Cell Phone		**Pager Number**		
FAX Number				
E-Mail Address				

Organization Name	

3. DSASP RESOURCE DEMAND RESPONSE PROGRAM STATUS FORM

Submit this form with initial DSASP resource enrollment and each time there is a change to the DSASP Resource's participation in other NYISO Demand Response Programs.

3.1 Type of Demand Response Program Status Update

☐ New DSASP Resource

☐ Change to existing DSASP Resource: Generator ID: ▢

NYISO Generator Name of DSASP Resource: ▢

3.2 Participation in other NYISO Demand Response Programs

☐	Not participating in any other NYISO Demand Response Program Effective Date of change to DSASP record: ▢
☐ EDRP	**Emergency Demand Response Program (EDRP)** Effective Date of enrollment in EDRP: ▢ Name of Curtailment Service Provider: ▢ EDRP ID: ▢ Effective Date of change to DSASP record: ▢
☐ SCR	**Special Case Resource Program (SCR)** Effective Date of enrollment in SCR: ▢ Name of Responsible Interface Party: ▢ SCR ID: ▢ ☐ Individual ☐ Part of an aggregation Effective Date of change to DSASP record: ▢
☐ TDRP	**NYISO Use ONLY:** **Targeted Demand Response Program (TDRP)** Effective Date of assignment to TDRP: _____ Sub-load pocket identifier (J1 – J9): _____ Effective Date of change to DSASP record:

The Applicant understands and certifies that any changes to its participation in other NYISO Demand Response programs shall be submitted to the New York Independent System Operator, Inc. (NYISO) in writing under the signatures of the DSASP Agent and the DSASP Resource. Failure to notify NYISO of changes to enrollment in other NYISO Demand Response programs may affect performance status and/or payment in the Demand-Side Ancillary Service Program and/or the other NYISO Demand Response program in which the DSASP Resource is enrolled.

Registration Packet
Section 3.

DSASP Resource Demand Response Program Status Form

DSASP

Control Equipment

Metering and Communications

DSASP Metering Requirements

- *The Transmission Owner specifies the interconnection requirements for resources providing operating reserves and regulation*

  - Contact the local Transmission Owner for specific device and installation requirements

- *Instantaneous Meter/Remote Terminal Unit (RTU):*

  - *Capable of scanning output data every six seconds*

  - *Reference*

    - RTU---NYISO Direct Generator Communications Manual

- *Revenue Meter used for DSASP reporting*

  - *NY PSC- Approved meter list (http://www.dps.state.ny.us/approved_meter_list.PDF)*

Meter Configurations – Regulation or Synchronous Reserves
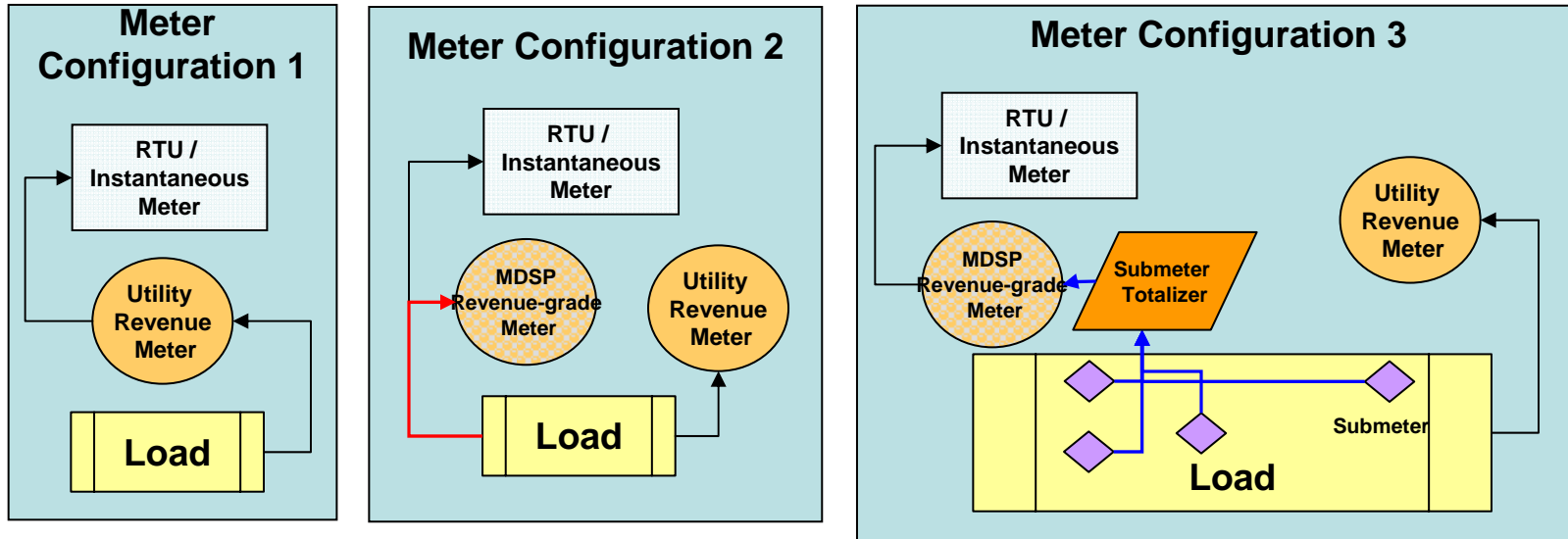
- Meter Configuration 1:
  - *Total Load connected to Utility Meter*
  - *Utility Meter connected to RTU/Instantaneous Meter*

- Meter Configuration 2:
  - *Total Load connected to MDSP Revenue-grade Meter*
  - *MDSP Revenue-grade Meter connected to RTU/Instantaneous Meter*

- Meter Configuration 3:
  - *Submetered loads are totalized through a hardware totalizer*
  - *Hardware totalizer is connected to MDSP Revenue-grade Meter*
  - *MDSP Revenue-grade Meter connected to RTU/Instantaneous Meter*

Meter Configurations – Non-Synchronous Reserves

Meter Configuration 4
Meter Configuration 5
Meter Configuration 6
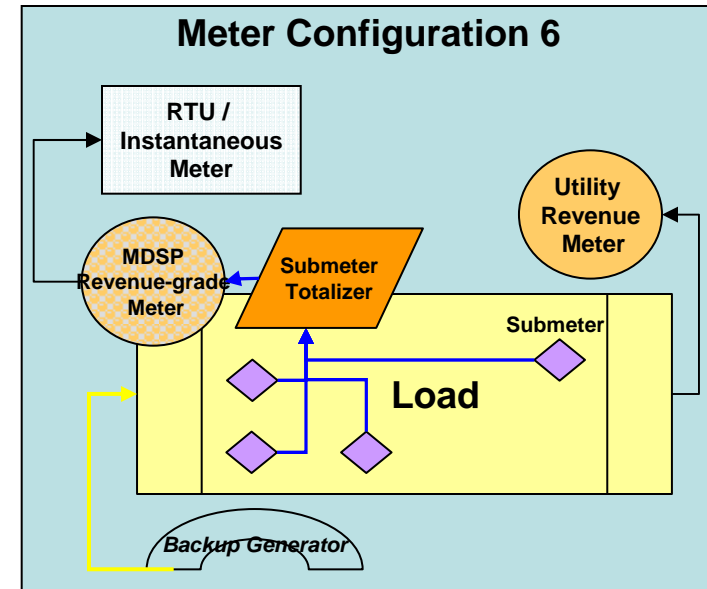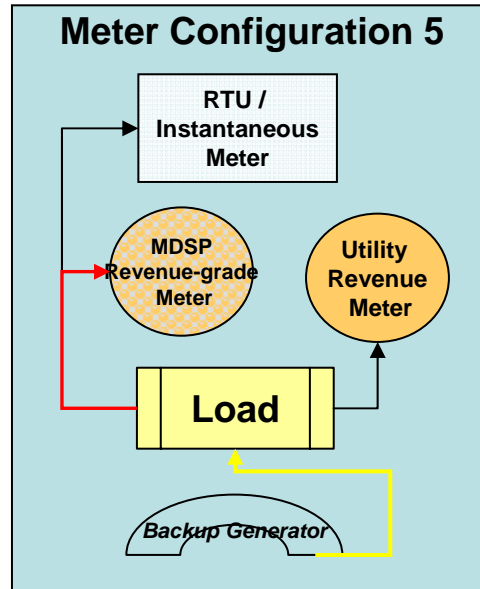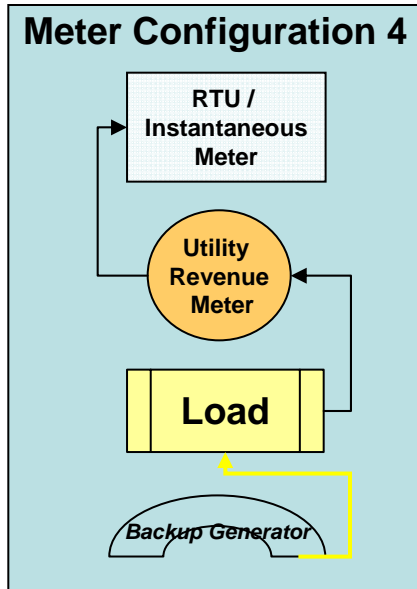
- Meter Configuration 4:
  - Total Load connected to Utility Meter
  - Utility Meter connected to RTU/Instantaneous Meter
  - Backup Generator connected to Load (net metered)

- Meter Configuration 5:
  - Total Load connected to MDSP Revenue-grade Meter
  - MDSP Revenue-grade Meter connected to RTU/Instantaneous Meter
  - Backup Generator connected to Load (net metered)

- Meter Configuration 6:
  - Submetered loads are totalized through a hardware totalizer
  - Hardware totalizer is connected to MDSP Revenue-grade Meter
  - MDSP Revenue-grade Meter connected to RTU/Instantaneous Meter
  - Backup Generator connected to Load

DSASP Communication Configurations

- Be capable of receiving automatic control signals through TO and optionally with NYISO
  - *on a 6 second periodicity for regulation*
  - *on a 5 minute periodicity for operating reserves*
- Be capable of providing telemetered output data through TO and optionally with NYISO that can be scanned every 6 seconds.
  - *Telemetry measures load curtailment*
    - Compliant with NERC Disturbance Control Standards (DCS)
    - Must be positive during energy schedule and zero at all other times
- Provide for all required interfaces to the Transmission Owner (TO) control centers as defined by the TO-MP Interconnection Agreement

Communication Configurations
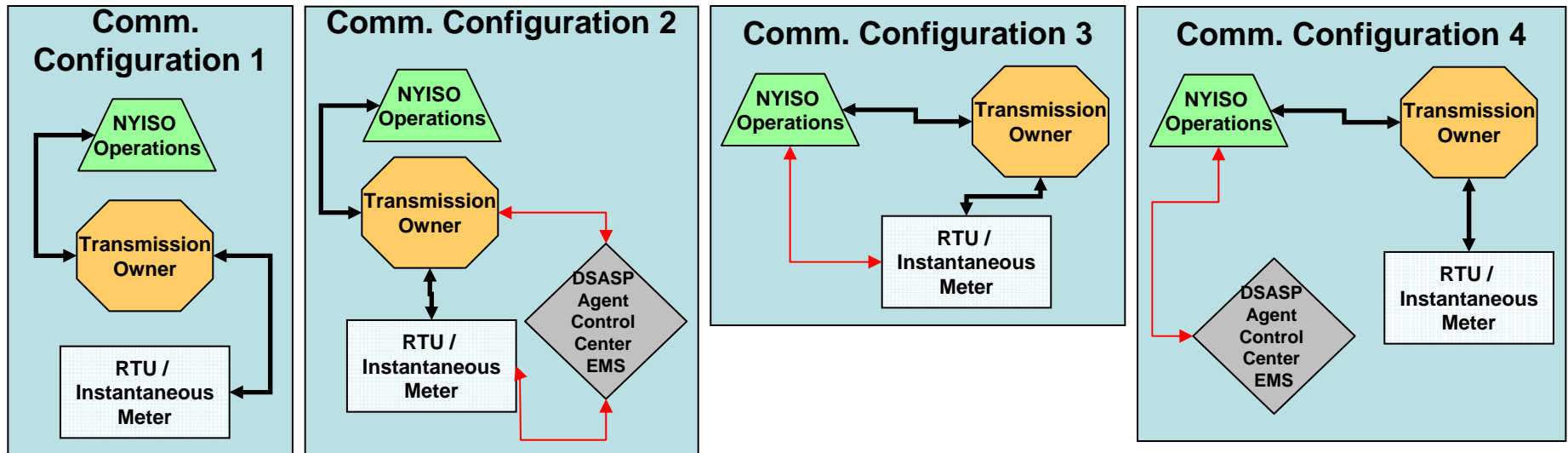
- ◆ Communication Configuration 1 – *Required*:
  - ▪ *NYISO communicates with TO via ICCP*
  - ▪ *TO communicates with RTU/Instantaneous Meter via ICCP*
- ◆ Communication Configuration 2:
  - ▪ *Primary path: Communication Configuration 1*
  - ▪ ***Plus**: TO communicates with DSASP agent's EMS system via ICCP which is connected to RTU/Instantaneous Meter*
- ◆ Communication Configuration 3:
  - ▪ *Primary path: Communication Configuration 1*
  - ▪ ***Plus**: NYISO in direct communication with RTU/Instantaneous Meter*
- ◆ Communication Configuration 4:
  - ▪ *Primary path: Communication Configuration 1*
  - ▪ ***Plus**: TO communicates simultaneously with DSASP agent's EMS system via ICCP*

DSASP Dispatch Signals

- ◆ Communication parameters transmitted every 6 seconds:

  DSASP-specific

  - ▪ *Regulation flag*
    - Specifies when a regulation schedule is active
  - ▪ *Breaker Status*
    - For synchronous reserves – always 1
    - For non-synchronous reserves – based on schedule
  - ▪ *AGC Base point*
    - 6-second dispatch instruction
  - ▪ *RTD Base point*
    - 5-minute dispatch instruction
  - ▪ *Base Load MW*
    - Interval before dispatch instruction
      - Regulation: Regulation Flag set to 1
      - Reserves: non-zero RTD base point
  - ▪ *Response MW*
    - Difference between Base Load MW and actual load during a reserve or regulation schedule

Complete details in Direct Communications Manual – Secure Document that must be requested from Customer Relations

Example: Regulation Schedule

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
AGC Basepoint	-	-	-	1.0	2.0	2.0	1.0	-	-	(1.0	(1.0	(1.0	(1.0	-	-	-	-	-	-	1.0	1.0	2.0	2.0	-	-	(1.0	(2.0	(2.0	-	-
Regl Resp MW	-	-	0.5	1.0	2.0	2.2	1.0	0.1	-	(1.0	(2.0	(1.0	(1.0	(1.0	-	-	-	-	-	0.8	1.0	1.0	1.3	0.5	-	(1.0	(1.0	(2.0	-	-
Regl Flag	-	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	-	-	-	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	-	-
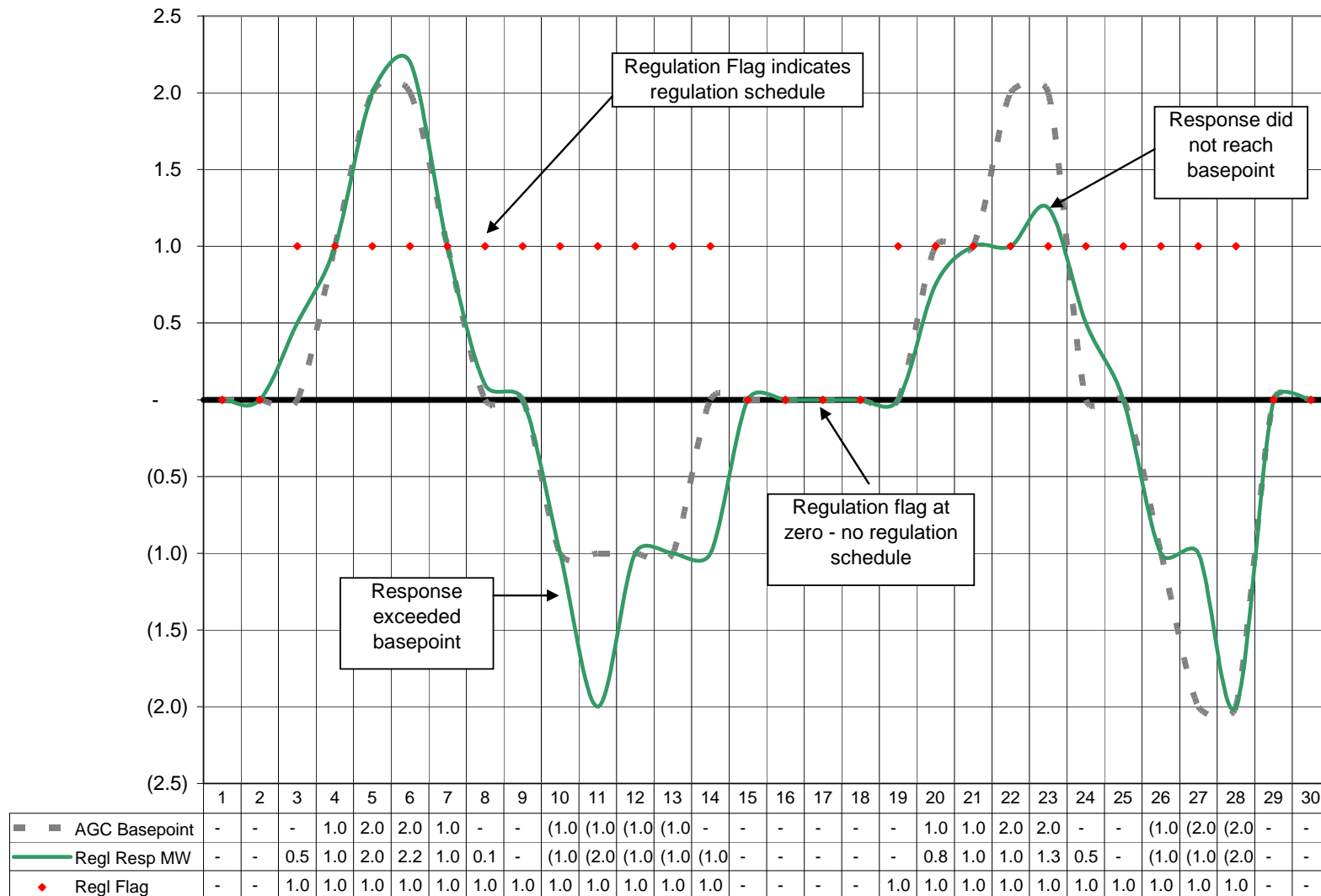
Example: Reserve Schedule

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
RTD Basepoint	-	-	-	0.5	3.0	5.0	5.0	3.3	1.7	-	-	-	-	-	-	-	-	-	0.5	3.0	5.0	5.0	5.0	5.0	5.0	3.3	1.7	-	-	-
Resrv Resp MW	-	-	-	0.5	2.9	4.9	5.5	2.5	1.5	-	-	-	-	-	-	-	-	-	2.9	2.0	3.0	4.0	5.0	5.0	3.3	2.0	-	-	-	-
Regl Flag	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
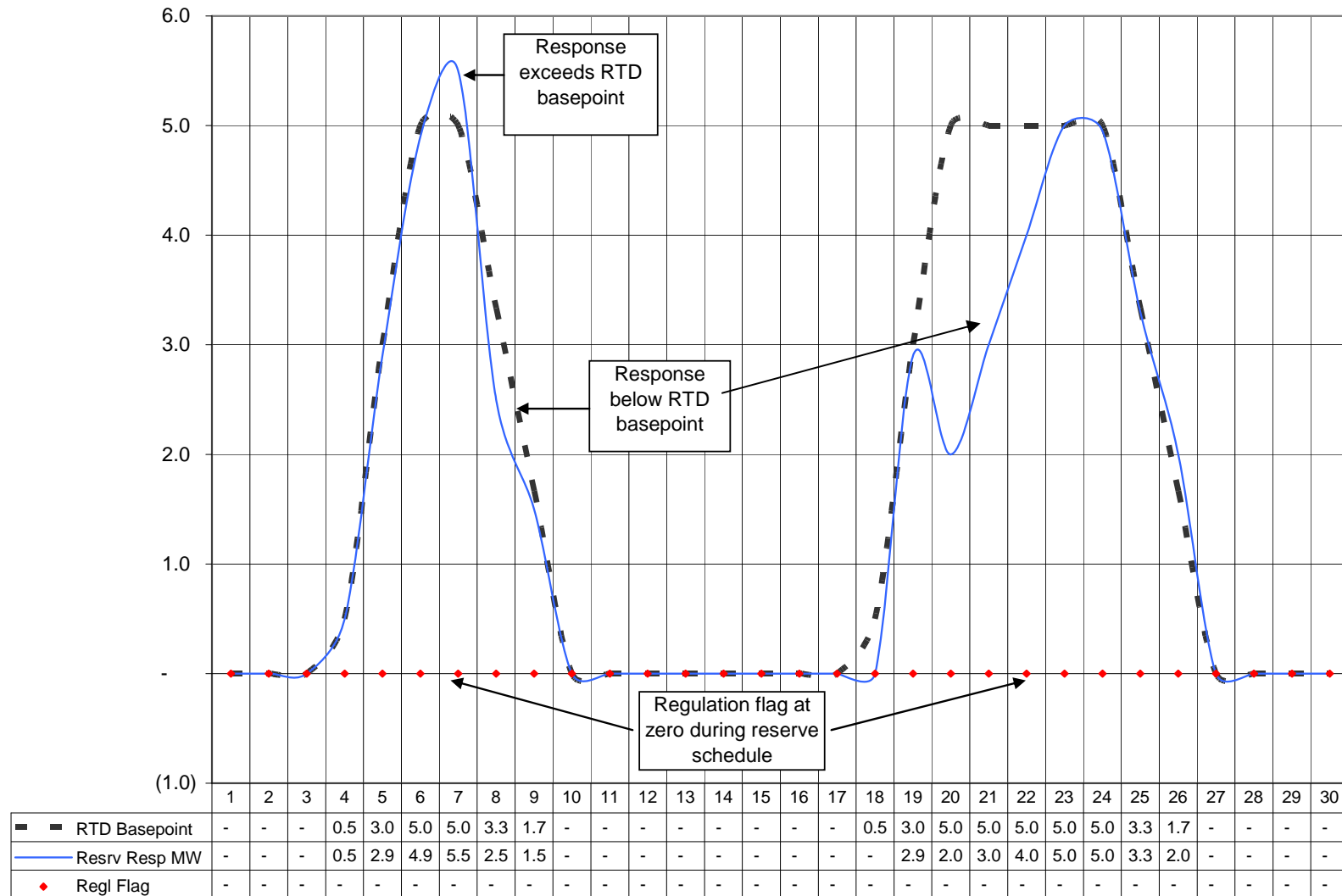
DSASP

Operating Reserve
Participation Requirements

DSASP Operating Reserve Requirements

◆ Capability of reserve response to:

- *Reduce demand in Real-Time when scheduled by the NYISO in all hours for which they have been selected to provide Operating Reserve*

- *Achieve ten minute or thirty minute response times, depending on registered bid qualifications*

- *A minimum 1 MW reserve*

DSASP Reserve Credit/Collateral Requirements

- Regional requirements
- Two month intervals
  - *Based on reserve activation and DAM/RT price differentials for previous same two months*
    - Max hourly Operating Capacity (MW) X Regional Credit Support ($/MW) X 3 days
      - Regional Credit Support
        - Eastern or Western
        - Price differential for same two month in previous year X higher of two (2) or the number of reserve activation
- If qualified to provide both regulation and reserves, DSASP regulation credit requirements apply

- Reference Market Service Tariff Attachment K
- If a margin call occurs and bidding privileges are suspended
  - *Same rules as for Regulation apply for when bidding privileges are reinstated*

Reserve Qualification Criteria

- *Reserve suppliers must*
  - *Must be located in NYCA*
  - *Reduce demand when called upon by the NYISO*
  - Specify a Day-Ahead availability bid for each category of reserve
- *Eligibility Criteria*
  - **Spinning Reserve (10-minute synchronous)**
    - *Demand Side Resources that are not supporting their Demand Reduction through the use of Local Generation*
  - **10-Minute Non-Synchronized Reserve**
    - *Demand Side Resources that are supporting their demand reduction through the use of Local Generators*
  - **30-Minute Reserve (spinning and non-synchronized)**)
    - *Demand Side Resources that are not supporting their Demand Reduction through the use of Local Generation*
    - Demand Side Resources that are supporting their demand reduction through the use of Local Generators that are capable of starting, synchronizing, and increasing their output level within thirty minutes

Reserves Pre-qualification testing/Audit

◆ Pre-qualification test is scheduled to evaluate

- The Resource's response at the emergency response rate for 10 minutes or 30 minutes must normally be attained or exceeded during a test.

  - For individual unit demonstration of 10 Minute Reserve, a variation of 2% of required pickup or 1 MW (whichever is greater) of required pickup may be used. A one minute tolerance is allowed.

  - For individual unit demonstration of 30 Minute Reserve, a variation of 2% of required pickup or 2 MW (whichever is greater) of required pickup may be used. A three minute tolerance is allowed.

◆ The NYISO may conduct a performance audit of a Demand Side Resource at any time and without prior notice

DSASP

Regulation Participation Requirements

DSASP Regulation Requirements

- ◆ Minimum 1 MW reduction

- ◆ Capable of Regulation response

    - ▪ Capable of supplying Regulation Service continuously in both the up and down directions for intervals in the scheduled hour and for all hours with accepted bids

    - ▪ *Capable of responding to automatic generator control signals on a 6-second basis*

DSASP Regulation Credit/Collateral Requirements

- Two month intervals
  - *Based on reserve marginal price differential between DAM and RT*
    - Max hourly Operating Capacity (MW) X Regulation Credit Support ($/MW) X 3 days
      - Regulation Credit Support
        - Price differential hourly time weighted RT/DAM (when RT price > DAM)
        During two month time from previous year

- Reference Market Service Tariff Attachment K
- If a margin call occurs and bidding privileges are suspended
  - *Existing bids are invalidated*
  - *June 2008 – February 2009:*
    - Bids are automatically resubmitted when bidding privileges are reinstated
  - *March 2009:*
    - Bids <u>will not</u> be automatically resubmitted
    - Bids may be resubmitted after bidding privileges are reinstated

Regulation Pre-qualification Testing/Audit

- ◆ Provide 100 hours of regulation service
    - At maximum regulation capability that wish to qualify.
    - A time weighted Performance Index $\geq$ .85 must be demonstrated
    - *Testing window will be open for a calendar month.*

- ◆ The NYISO may conduct a performance audit of a Demand Side Resource providing regulation service at any time and without prior notice

ISO **NEW YORK**
INDEPENDENT
SYSTEM OPERATOR

The New York Independent System Operator (NYISO) is a not-for-profit corporation that began operations in 1999. The NYISO operates New York's bulk electricity grid, administers the state's wholesale electricity markets, and provides comprehensive reliability planning for the state's bulk electricity system.

_____

www.nyiso.com

Demand Side Ancillary Services:
4. Bidding

Donna Pratt
New York Independent System Operator

DSASP Training Course
November 21, 2008

Bidding Characteristics

- Follow same rules as generators for submittal of reserve bids:
  - *MW values determined by ramp rates*
  - *Availability bids allowed in Day-Ahead.*
  - *Must bid reserves at $0 in RT.*

- A flexible energy bid in real time does not require a Reserves bid
  - *No energy payment for DSASP resources scheduled day-ahead or real-time*

- Energy bid floor price of $75/MWh
  - *No energy payment for DSASP resources scheduled day-ahead or real-time*

Operating Characteristics of a Demand-Side Resource
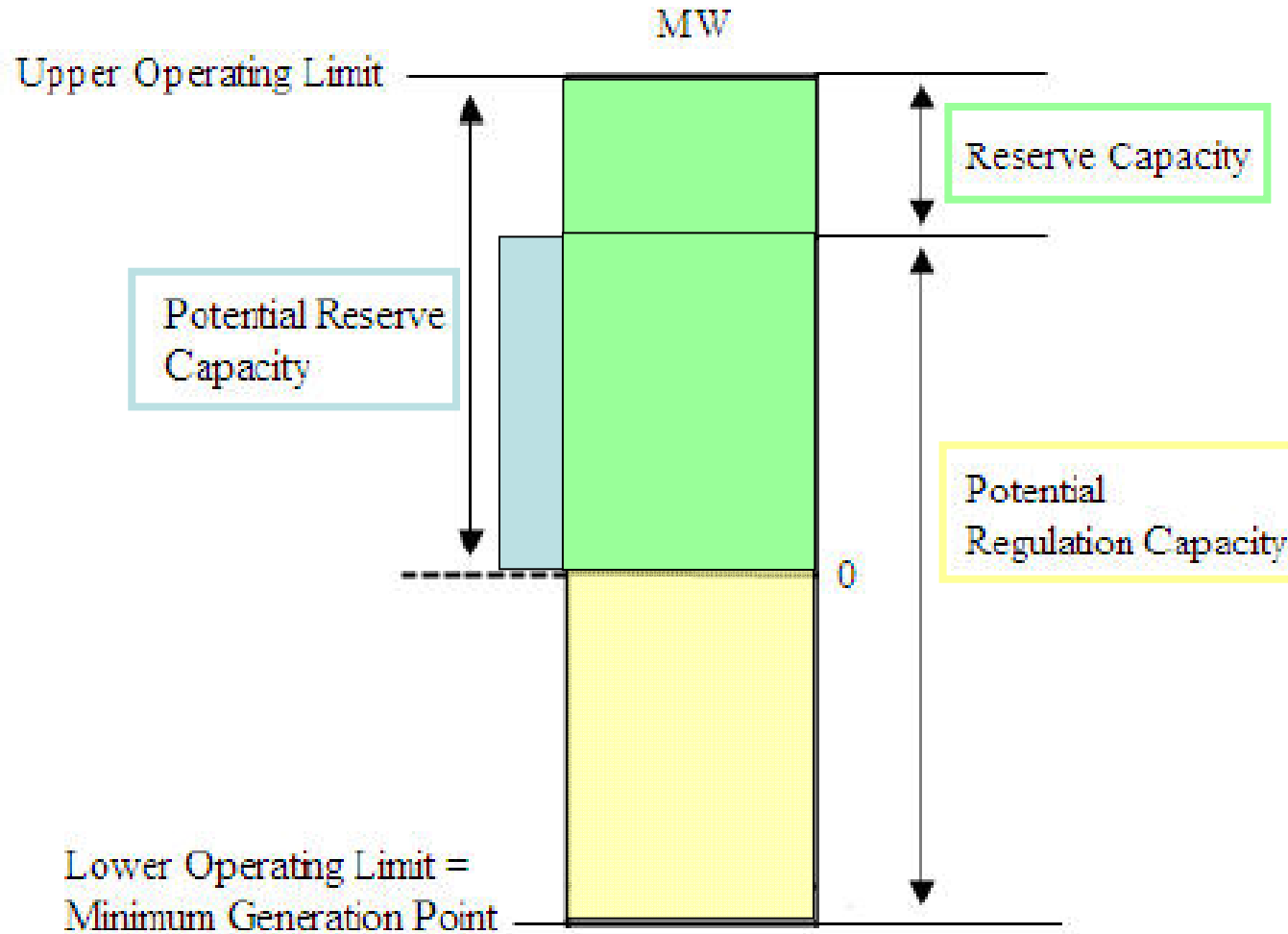
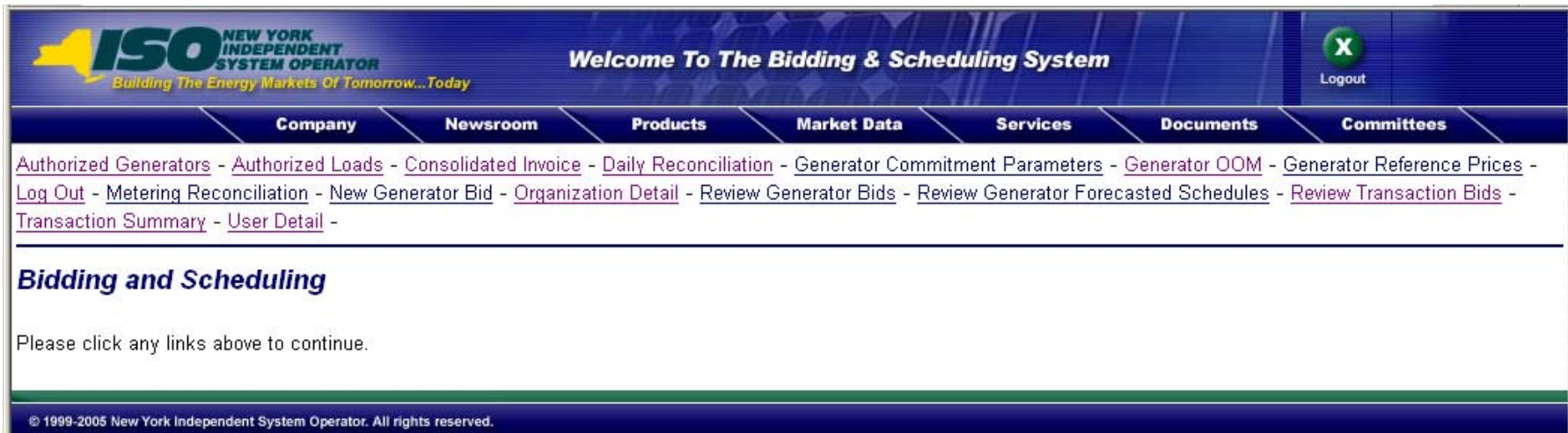# Bidding Characteristics - Examples

- Energy bid required for entire MW range
  - *Reserve:*   *[0 : X] Energy*

                        [X]   Reserve

  - *Regulation:*   *[-X : X] Energy*
                        [2X]   Reserve
                        [X]   Regulation

  - *Both:*   *[-X : Y] Energy*
                        [Y + X] Reserve
                        [X]   Regulation

- Example:
  - *Normal Response Rate of 1 MW/min. = 10 MW for 10-min. synchronous reserves (10 min. * 1 MW/min.)*
  - *Regulation Response Rate of 2 MW/min. = 10 MW for regulation (5 min * 2 MW/min.)*

Service			Range Min	Range Max	Response Rate
Reserve	Energy: [0 : X]		0	10	
	Reserve: [X]		10		1 MW/min.
Reserve and Regulation *(symmetrical)*	Energy: [-X : X]		-10	10	
	Reserve: [2X]		20		2 MW/min.
	Regulation: [X]		10		2 MW/min. (Upper Op. Limit)
Reserve and Regulation *(NOT symmetrical)*	Energy: [-X : Y]		-10	15	
	Reserve: [Y + X]		25		2.5 MW/min. (Emergency Resp. Rate)
	Regulation: [X]		10		2 MW/min.

Marketplace User Menu

Refer to NYISO Market Participant User's Guide for more details

http://www.nyiso.com/public/webdocs/documents/guides/mpug_mnl.pdf

Commitment Parameters

Generator Commitment Parameters

Select Generator: [None Selected ▼] [DISPLAY]

Before submitting changes, you need to display the unit, even if parameters do not exist yet.

Current Generator:
Last Changed By:
Last Changed Date:

Minimum Run Time (hrs)	
Minimum Down Time (hrs)	
Maximum Stops per Day	
Start up Notification Time (hrs)	

Startup Cost Curve

Hours Off Line						
Startup Cost ($)						

Startup Notification Time Curve

Hours to Start						
Hours Off Line						

[SUBMIT] [RESET]

Must be set up before a resource can bid

Reference: Market Participant User's Guide, Section 7.3.1

New Generator Bid Screen

Generator Bid

Required field for all DSASP bids
Required field for type of service offered

Generator Name: [_____] [▼]

Bid Date	Num of Hours	Market	Expiration (DAM Only)
[_____] (mm/dd/yyyy hh:mi)	[____]	[___] [▼]	[_____] (mm/dd/yyyy hh:mi)

Energy Bid

Upper Operating Limit (MW)	Emergency Upper Operating Limit (MW)	Minimum Generation (MW)	Minimum Generation Cost ($)
[_____]	[_____]	[_____]	[_____]

Self Scheduled MW				Unit Operations		Start-Up Cost ($)
00 Minute MW	15 Minute MW	30 Minute MW	45 Minute MW	⦿ ISO Committed Flex ○ Self Committed Flex	○ Self Committed Fixed ○ ISO Committed Fixed	[_____]
[____]	[____]	[____]	[____]			

Bid Curve (Block Format)

MW (Basepoint)	[___]	[___]	[___]	[___]	[___]	[___]	[___]	[___]	[___]	[___]	[___]	[___]
$/MW	[___]	[___]	[___]	[___]	[___]	[___]	[___]	[___]	[___]	[___]	[___]	[___]

Ancillary Services

Item	MWs	$/MW
10 Minute Spinning Reserves		[___]
10 Minute Non-Synchronized Reserve		[___]
30 Minute Spinning Reserve		[___]
30 Minute Non-Synchronized Reserve		[___]
Regulation	[___]	[___]

SUBMIT   RESET

Reference: Market Participant User's Guide, Section 7.4.1

Generator Bidding Basics

- Day-ahead bids must be submitted and have a status of "Validation Passed" by 5 am on the day ahead of the bid date

- Real-time bids must be submitted and have a status of "Validation Passed" at least 75 minutes ahead of the bid time

  - *Real-time bids are referred to as HAM bids on the Generator bid screens*

  - *Real-time bid $ may be changed, but may not be increased*

- Can only bid for services qualified

- Generator Commitment Parameters must be properly defined

New Generator Bid Fields

- **Upper Operating Limit (MW)** – indicates the maximum net schedule
  - *DSASP unit bidding Regulation requires UOL greater than or equal to 1*
  - *DSASP units are not required to bid to UOL*
- **Emergency Upper Operating Limit** (MW) – indicates the UOL under emergency conditions
- **Minimum Generation (MW)** – indicates the minimum amount of generation that must be run should the bid be accepted
  - *Regulation bids include a negative Minimum Generation value*
  - *Must be zero for a DSASP Spinning Reserve only bid*
  - *DSASP unit qualified to bid Non-Synchronous reserves must have a Physical Min Gen value greater than or equal to 1 and the Min Gen MW value must be greater than or equal to Physical Min Gen value.*

New Generator Bid Fields - 2

- **Minimum Generation Cost ($)** – the cost for the minimum generation segment
  - *DSASP units bidding Regulation or Spinning Reserves must have a Minimum Generation Cost of $0*
  - *DSASP units bidding Non-Synch must have a Minimum Generation Cost greater than or equal to Bid Floor Price*

- **Unit Operations**
  - *DSASP units must indicate **ISO Committed Flex***

- **Start Up Cost ($)**
  - *DSASP units bidding Synchronous (Spinning) Reserves and/or Regulation must bid a Start Up Cost = $0*
  - *Bid startup cost takes priority over Unit Commitment Parameters*

- **Bid Curve (Block Format) –** up to 11 blocks in ascending order
  - *MW (Base point): Base point for each block*
  - *$/MW: Bid cost for the Base point (up to 2 decimal digits)*

New Generator Bid Fields - 3

◆ **Bid Curve (MW) and ($)**

- *DSASP Bid Floor Price is currently $75/MW*

- *For DSASP bids, MW bid curve points less than or equal to zero must have price <u>less than or equal to</u> the Bid Floor Price times minus one.*

- *For DSASP bids, MW bid curve points greater than zero to must have price greater than or equal to the Bid Floor Price*

- *DSASP Bid curve must include zero transition point with $/MW below Bid Floor Price times minus one.*

- *For DSASP units bidding Non-Synchronous reserves, bid curve MW value cannot be less than 0.*

New Generator Bid Fields - 4

- ◆ **Ancillary Services**

  - ▪ *$/MW*

    - Units bidding Flexible must enter an Availability bid for appropriate Reserve categories

      - Value must be in dollars and cents with up to two decimal digits

      - Failure to enter an Availability bid in the DAM will result in failed validation

      - Reserve bid is not required in the HAM

  - ▪ *MW*

    - Required for Regulation only

    - Must be bid qualified to provide Regulation

    - The value indicates the ability to move both up and down by the total MWs bid. This is 5 Minutes times the unit's Regulation Response Rate.

Example 1: DAM Bid – Regulation Only

Generator Bid

Generator Name: Gen1_DSASP

Bid Date	Num of Hours	Market	Expiration (DAM Only)
09/12/2008 08:00 (mm/dd/yyyy hh:mi)	6	DAM	(mm/dd/yyyy hh:mi)

Energy Bid

Upper Operating Limit (MW)	Emergency Upper Operating Limit (MW)	Minimum Generation (MW)	Minimum Generation Cost ($)
5	5	-5	0

Self Scheduled MW				Unit Operations		Start-Up Cost ($)
00 Minute MW	15 Minute MW	30 Minute MW	45 Minute MW	⦿ ISO Committed Flex ○ Self Committed Flex		0
				○ Self Committed Fixed ○ ISO Committed Fixed		

Bid Curve (Block Format)

MW (Basepoint)	0	5									
$/MW	-750	750									

Ancillary Services

Item	MWs	$/MW
10 Minute Spinning Reserves		0
10 Minute Non-Synchronized Reserve		0
30 Minute Spinning Reserve		0
30 Minute Non-Synchronized Reserve		0
Regulation	5	1

SUBMIT   RESET

Example 1: Validation & View Bids

Generator Bid Results - Submitted Bids Only

This page only displays details for bids that have just been submitted. To view additional details for these bids as well as bids for the same generator, hour and market, click the 'VIEW ADDITIONAL INFORMATION' button at the bottom of this screen

Bid Identification			
Date	**Market**	**Generator**	**Status**
09/12/2008 08:00 EDT	DAM	Gen1_DSASP	VALIDATION PASSED
09/12/2008 09:00 EDT	DAM	Gen1_DSASP	VALIDATION PASSED
09/12/2008 10:00 EDT	DAM	Gen1_DSASP	VALIDATION PASSED
09/12/2008 11:00 EDT	DAM	Gen1_DSASP	VALIDATION PASSED
09/12/2008 12:00 EDT	DAM	Gen1_DSASP	VALIDATION PASSED
09/12/2008 13:00 EDT	DAM	Gen1_DSASP	VALIDATION PASSED

Number of rows returned: 6

Click "View Additional Information" to see Generator Bid Results

VIEW ADDITIONAL INFORMATION

Generator Bid Results

Bid Identification				Schedules (MW)								Delete Bid	Select for Deletion
Date	Market	Generator	Status	Time	Energy	10 Min Spin	10 Min Non-Synch	30 Min Spin	30 Min Non-Synch	Regulation	Op Cap Reserve		
09/12/2008 08:00	DAM	Gen1_DSASP	VALIDATION PASSED									Delete	☐ Delete
09/12/2008 08:00	DAM	Gen1_DSASP	VALIDATION PASSED									Delete	☐ Delete
09/12/2008 08:00	DAM	Gen1_DSASP	VALIDATION PASSED									Delete	☐ Delete
09/12/2008 08:00	DAM	Gen1_DSASP	VALIDATION PASSED									Delete	☐ Delete
09/12/2008 08:00	DAM	Gen1_DSASP	VALIDATION PASSED									Delete	☐ Delete
09/12/2008 08:00	DAM	Gen1_DSASP	VALIDATION PASSED									Delete	☐ Delete

Number of rows returned: 6

SELECT ALL   CLEAR ALL   DELETE SELECTED

A hyperlink associated with a field on the screen indicates additional information is available. Click on hyperlink to see the details.

Example 1: View Bid Detail

By clicking on date/time link on Generator Bid Results, Bid Detail for the selected date/time is displayed

Review Generator Bids

Welcome To The Bidding & Scheduling System

Logout

| Company | Newsroom | Products | Market Data | Services | Documents | Committees |

Authorized Generators - Authorized Loads - Consolidated Invoice - Daily Reconciliation - Generator Commitment Parameters - Generator OOM - Generator Reference Prices - Log Out - Metering Reconciliation - New Generator Bid - Organization Detail - Review Generator Bids - Review Generator Forecasted Schedules - Review Transaction Bids - Transaction Summary - User Detail -

Page Ref: E-4

Generator Bid Selection Criteria

Reminder: Start Time is required, but Stop Time is optional. If data is submitted with null Stop Time, System will assume Stop Time is one day later than Start Time

Generator Name: None Selected

Market: ○ DAM ○ HAM ● BOTH

Start Time: [   ] (mm/dd/yyyy hh:mi)

Stop Time: [   ] (mm/dd/yyyy hh:mi)

Bid Status: None Selected

Number of Rows: [   ]

☐ Display Advisory Schedules

DISPLAY   RESET

Review Generator Bids

- **Select the Generator Name**
- **Select the Market**
- **Enter the Start Time**
- *Optional:*
  - *Stop Time*
  - *Bid Status*
  - *Number of Rows*

Note: Limited to one month of data at a time
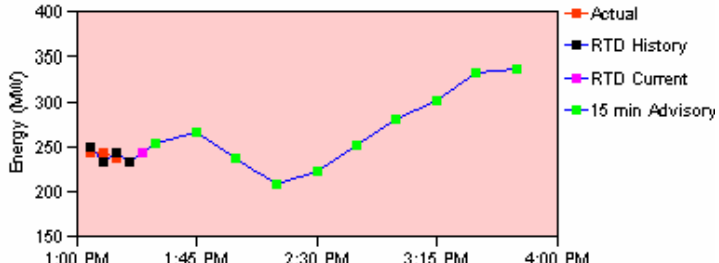
Example 1: Generator Bid Results

Generator Bid Results

Day-Ahead

Bid Identification				Schedules (MW)								Delete Bid	Select for Deletion
Date	Market	Generator	Status	Time	Energy	10 Min Spin	10 Min Non-Synch	30 Min Spin	30 Min Non-Synch	Regulation	Op Cap Reserve		
09/12/2008 08:00 EDT	DAM	Gen1_DSASP	VALIDATION PASSED									Delete	☐ Delete
09/12/2008 08:00 EDT	DAM	Gen1_DSASP	BID REJECTED									Delete	☐ Delete
09/12/2008 09:00 EDT	DAM	Gen1_DSASP	VALIDATION PASSED									Delete	☐ Delete
09/12/2008 09:00 EDT	DAM	Gen1_DSASP	BID REJECTED									Delete	☐ Delete
09/12/2008 10:00 EDT	DAM	Gen1_DSASP	VALIDATION PASSED									Delete	☐ Delete
09/12/2008 10:00 EDT	DAM	Gen1_DSASP	BID REJECTED									Delete	☐ Delete
09/12/2008 11:00 EDT	DAM	Gen1_DSASP	VALIDATION PASSED									Delete	☐ Delete
09/12/2008 11:00 EDT	DAM	Gen1_DSASP	BID REJECTED									Delete	☐ Delete
09/12/2008 12:00 EDT	DAM	Gen1_DSASP	VALIDATION PASSED									Delete	☐ Delete
09/12/2008 12:00 EDT	DAM	Gen1_DSASP	BID REJECTED									Delete	☐ Delete
09/12/2008 13:00 EDT	DAM	Gen1_DSASP	VALIDATION PASSED									Delete	☐ Delete
09/12/2008 13:00 EDT	DAM	Gen1_DSASP	BID ACCEPTED	13:00	5.0						0.0	Delete	☐ Delete

Generator Forecast Schedule (RT)

Generator	Source Type	Date	Schedules (MW)						Energy Chart
			Energy	10 Min Spin	10 Min Non-Synch	30 Min Spin	30 Min Non-Synch	Regu-lation	
	RTD Hist	09/28/2006 13:05 EDT	251.70	40.00		80.00		0.00	
	RTD Hist	09/28/2006 13:10 EDT	234.90	19.00		80.00		0.00	
	RTD Hist	09/28/2006 13:15 EDT	244.90	40.00		80.00		0.00	
	RTD Hist	09/28/2006 13:20 EDT	234.90	40.00		80.00		0.00	
	RTD Current	09/28/2006 13:25 EDT	244.90	40.00		80.00		0.00	
	RTD	09/28/2006 13:30 EDT	254.90	40.00		78.20		0.00	
	RTD	09/28/2006 13:45 EDT	267.70	25.30		80.00		0.00	
	RTD	09/28/2006 14:00 EDT	237.70	40.00		80.00		0.00	
	RTD	09/28/2006 14:15 EDT	209.30	40.00		80.00		0.00	
	RTC	09/28/2006 14:30 EDT	224.60	40.00		80.00			
	RTC	09/28/2006 14:45 EDT	253.30	40.00					
	RTC	09/28/2006 15:00 EDT	283.30	40.00					
	RTC	09/28/2006 15:15 EDT	303.40	40.00					
	RTC	09/28/2006 15:30 EDT	333.40	39.70					
	RTC	09/28/2006 15:45 EDT	337.90	31.50		3.70			

Example 2: DAM Bid – 10-Min Spin Only

Generator Bid

Generator Name: Gen2_DSASP

Bid Date	Num of Hours	Market	Expiration (DAM Only)
09/12/2008 14:00 (mm/dd/yyyy hh:mi)	4	DAM	(mm/dd/yyyy hh:mi)

Energy Bid

Upper Operating Limit (MW)	Emergency Upper Operating Limit (MW)	Minimum Generation (MW)	Minimum Generation Cost ($)
10	10	0	0

Self Scheduled MW				Unit Operations		Start-Up Cost ($)
00 Minute MW	15 Minute MW	30 Minute MW	45 Minute MW	⦿ ISO Committed Flex ○ Self Committed Flex		0
				○ Self Committed Fixed ○ ISO Committed Fixed		

Bid Curve (Block Format)

MW (Basepoint)	0	10									
$/MW	-100	500									

Ancillary Services

Item	MWs	$/MW
10 Minute Spinning Reserves		.10
10 Minute Non-Synchronized Reserve		
30 Minute Spinning Reserve		0
30 Minute Non-Synchronized Reserve		
Regulation		

SUBMIT   RESET

ISO NEW YORK
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The New York Independent System Operator (NYISO) is a not-for-profit corporation that began operations in 1999. The NYISO operates New York's bulk electricity grid, administers the state's wholesale electricity markets, and provides comprehensive reliability planning for the state's bulk electricity system.

_____

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Demand Side Ancillary Services:

5. Performance Calculations

Donna Pratt
New York Independent System Operator

DSASP Training Course
November 21, 2008

Performance

Determining

DSASP Response MW

Metered quantities

- ◆ Instantaneous Bus Load

  - ▪ *6-second load of the DSASP resource*

- ◆ Base Load MW

  - ▪ *"Snapshot" of Instantaneous Bus Load*

    - Interval before dispatch
    - Remains constant throughout dispatch
    - Reset when the schedule is over
      - REGULATION reset conditions
        - ▪ Regulation Flag = 0;
        - ▪ Base Point = 0; and
        - ▪ DSASP Calculated Response MW <= 0
      - RESERVES reset conditions
        - ▪ Base Point = 0; and
        - ▪ DSASP Calculated Response MW <= 0

Example: Base Load MW - Regulation

Base Load MW remains fixed during regulation schedule

Base Load MW reset at end of regulation schedule

Response MW

Regulation Flag indicates regulation schedule

Regulation flag at zero - no regulation schedule
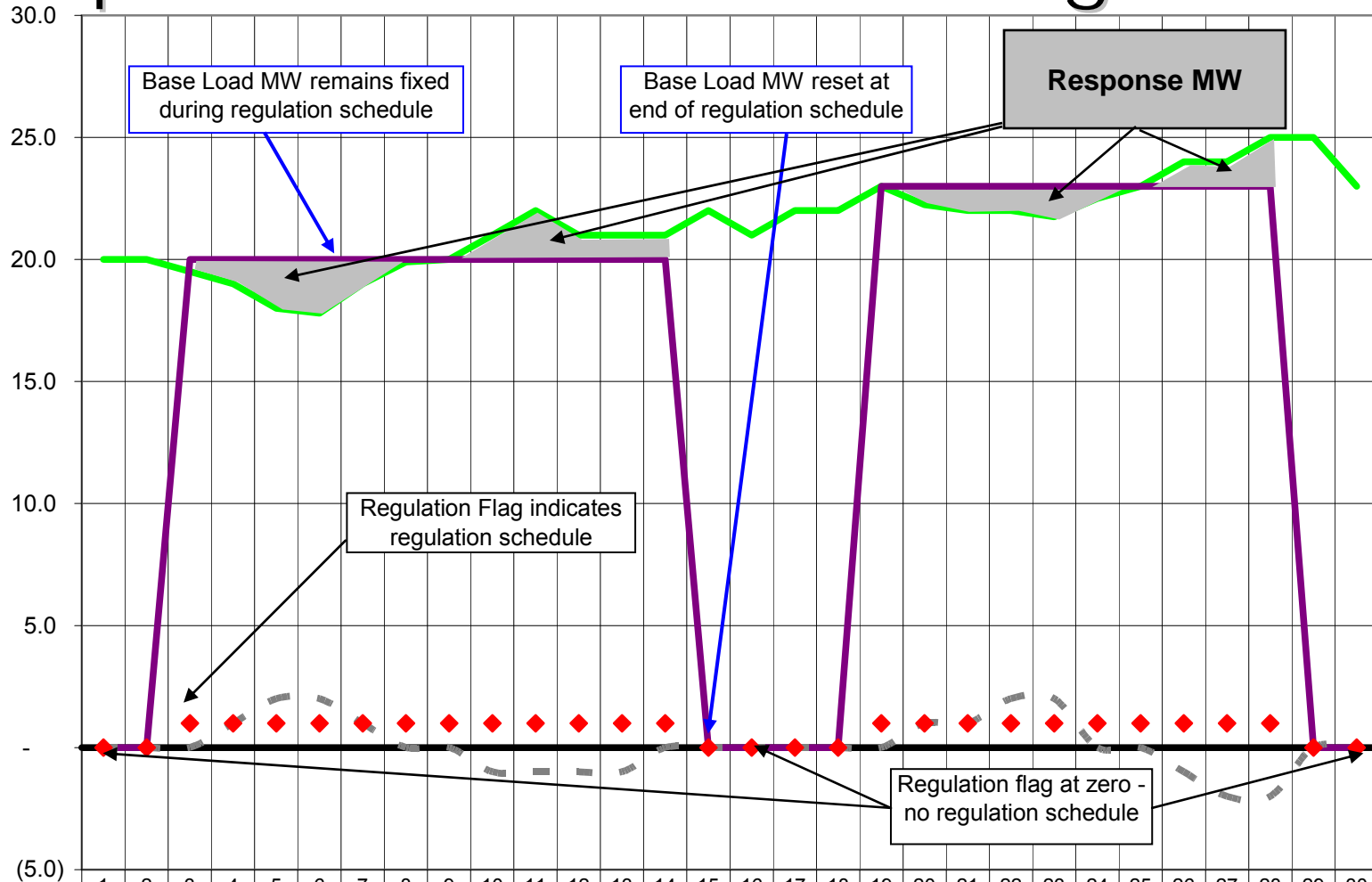
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Bus Load	20.	20.	19.	19.	18.	17.	19.	19.	20.	21.	22.	21.	21.	21.	22.	21.	22.	22.	23.	22.	22.	22.	21.	22.	23.	24.	24.	25.	25.	23.
Base Load MW	-	-	20.	20.	20.	20.	20.	20.	20.	20.	20.	20.	20.	20.	-	-	-	-	23.	23.	23.	23.	23.	23.	23.	23.	23.	23.	-	-
Regl Flag	-	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	-	-	-	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	-	-
AGC Basepoint	-	-	-	1.0	2.0	2.0	1.0	-	-	(1.0	(1.0	(1.0	(1.0	-	-	-	-	-	-	1.0	1.0	2.0	2.0	-	-	(1.0	(2.0	(2.0	-	-

Example: Base Load MW - Reserves

Base Load MW remains fixed during reserve schedule

Response MW

Base Load MW reset at end of reserve schedule

Regulation flag at zero during reserve schedule

MW
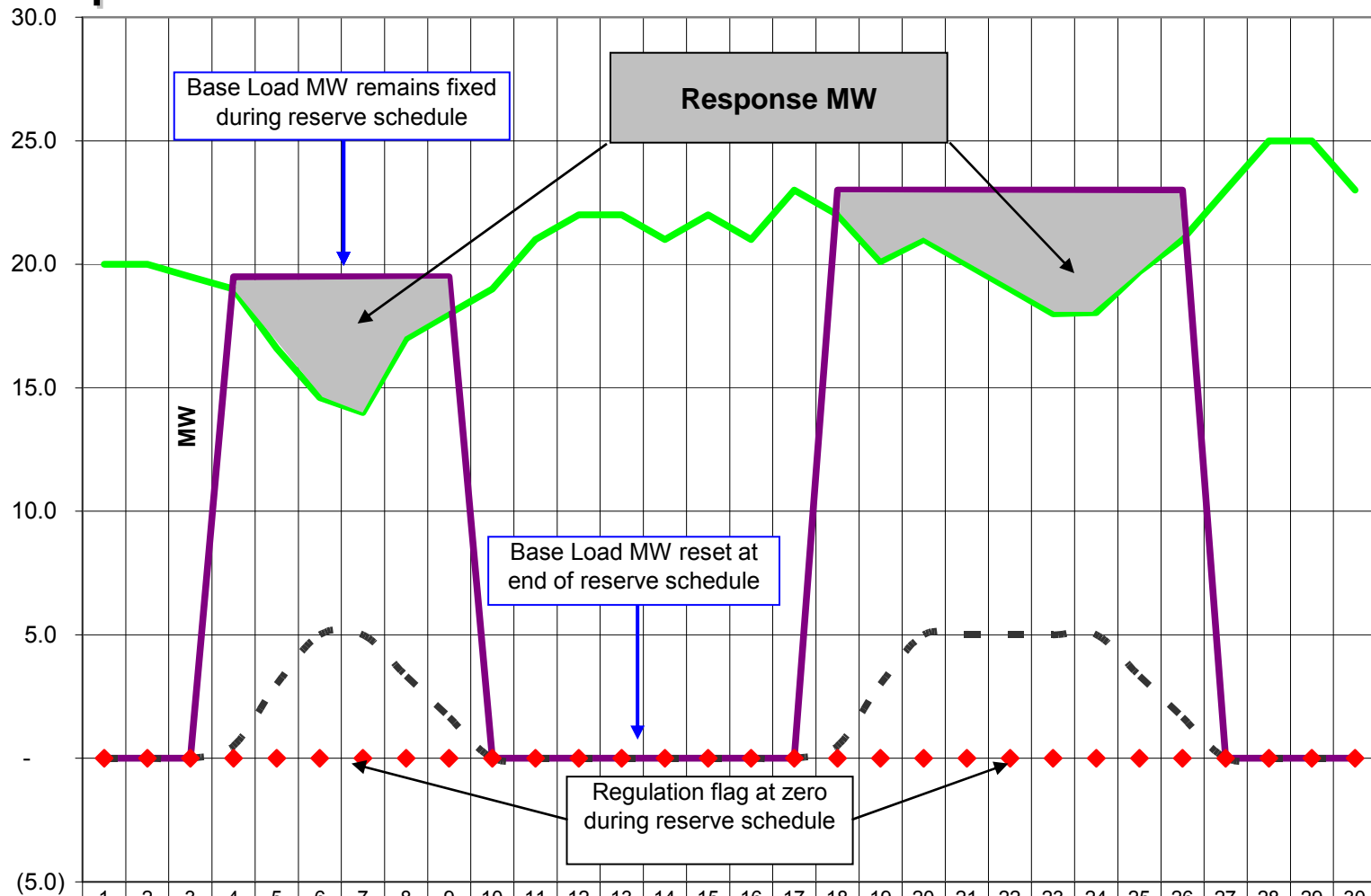
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Bus Load MW	20.	20.	19.	19.	16.	14.	14.	17.	18.	19.	21.	22.	22.	21.	22.	21.	23.	22.	20.	21.	20.	19.	18.	18.	19.	21.	23.	25.	25.	23.
Base Load MW	-	-	-	19.	19.	19.	19.	19.	19.	-	-	-	-	-	-	-	-	23.	23.	23.	23.	23.	23.	23.	23.	23.	-	-	-	-
Regl Flag	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RTP Base point	-	-	-	0.5	3.0	5.0	5.0	3.3	1.7	-	-	-	-	-	-	-	-	0.5	3.0	5.0	5.0	5.0	5.0	5.0	3.3	1.7	-	-	-	-

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Performance

Operating Reserve

Performance Calculations

Reserve Settlement

- Suppliers selection based on
  - *Response rates, upper operating limit, and bid*
- Separate DAM and RT prices for three Operating Reserve products for each of three locations
- The price of higher quality Operating Reserves will not be set at a price below the price of lower quality Operating Reserves in the same location.
  - *The price of Spinning Reserves will not be below 10-Minute Total Reserves or 30-Minute Reserves and the price for 10-Minute Non-Synchronized Reserves will not be below 30-Minute Reserves*
- Balancing (DAM/RT) Payments
  - *RT Schedule < DAM schedule---supplier charge*
  - *RT Schedule > DAM Schedule NYISO pays supplier*

Reserve Penalties

◆ NYISO may disqualify Suppliers that consistently fail to provide Energy when scheduled from providing Operating Reserves in the future

◆ A Demand Side Resource will have a reserve performance index calculated for each interval of its real-time demand reduction schedule

  ▪ The Reserve Performance Index is used in the Day-Ahead Margin Assurance Payment ("DAMAP") calculation which may reduce the DAMAP payments to Demand Side Resources.

Example 1: Day-Ahead bid accepted, Converted to energy for 15 min in Real Time

- Scenario: 5MW Day-Ahead Reserve bid of $50/MW for one hour selected at $50/MW
  - *Day-Ahead Reserve payment of $250 (5 MW * $50/MW)*
  - *Converted to energy (scheduled in real-time) for 15 minutes in at $100/MW (same RT price for each of the 3 five-minute intervals)*
- Resource must buy out of the reserve market for the 15 min. it was converted to energy
- Reserve balancing obligation is $125
  - *(5 MW * ($100 * 1/12))*   *= $41.67*
  - *+ (5 MW * ($100 * 1/12))*   *= $41.67*
  - *+ (5 MW * (100 * 1/12))*   *= $41.67*
  - *= $125*   *= $125.00*
- Day-Ahead Margin Assurance Payment (DAMAP) guarantees to cover the reserve balancing obligation if the Reserve Performance Index for the 15 min = 1, otherwise, the reserve balancing obligation is prorated based on the Reserve Performance Index

Example 2: Day-Ahead bid accepted, Not scheduled for Reserves in Real Time

- ◆ Scenario: 5MW Day-Ahead bid of $30/MW is selected for one hour at $50/MW
  - *Day-Ahead Reserve payment of $250 (5 MW * $50/MW)*
  - *Not scheduled for reserves in Real Time*

- ◆ Resource must buy out of the reserve market at Real Time price for Reserves
  - *Balancing obligation is $375 (5 MW * $75 Real Time Price)*

- ◆ Automatically assigned a Reserve Performance Index of 1

Example 2 (cont.): Day-Ahead bid accepted, Not scheduled for Reserves in Real Time

♦ DAMAP payment possibilities depending on Real Time Price:

- ▪ *If the Real Time price is lower than the day-ahead margin, no DAMAP payment is made*
  - • RT price is $25/MW, RT margin is -$25
    - ▪ *(5 MW – 0 MW) * ($25 RT- $30 bid)*

- ▪ *If the Real Time price is greater than the day-ahead bid: (Day-Ahead Schedule – Real Time Schedule)* (Real Time Price – Day-Ahead Bid) * Reserve Performance Index * Seconds/3600*
  - • RT price is $75/MW, DA margin is $225
    - ▪ *(5 MW – 0 MW) * ($75 RT- $30 bid)*
  - • Net position for the hour: $100
    - ▪ Balancing Obligation of -$375 + Day-Ahead Payment $250 + DAMAP $225
    - ▪ Difference between DA schedule ($50) and DA bid ($30) = $20 * 5 MW = $100
  - (Note: In this example, all intervals are the same length)

Interval = 5 minutes

MW

Response below RTD basepoint

Regulation flag at zero during reserve schedule
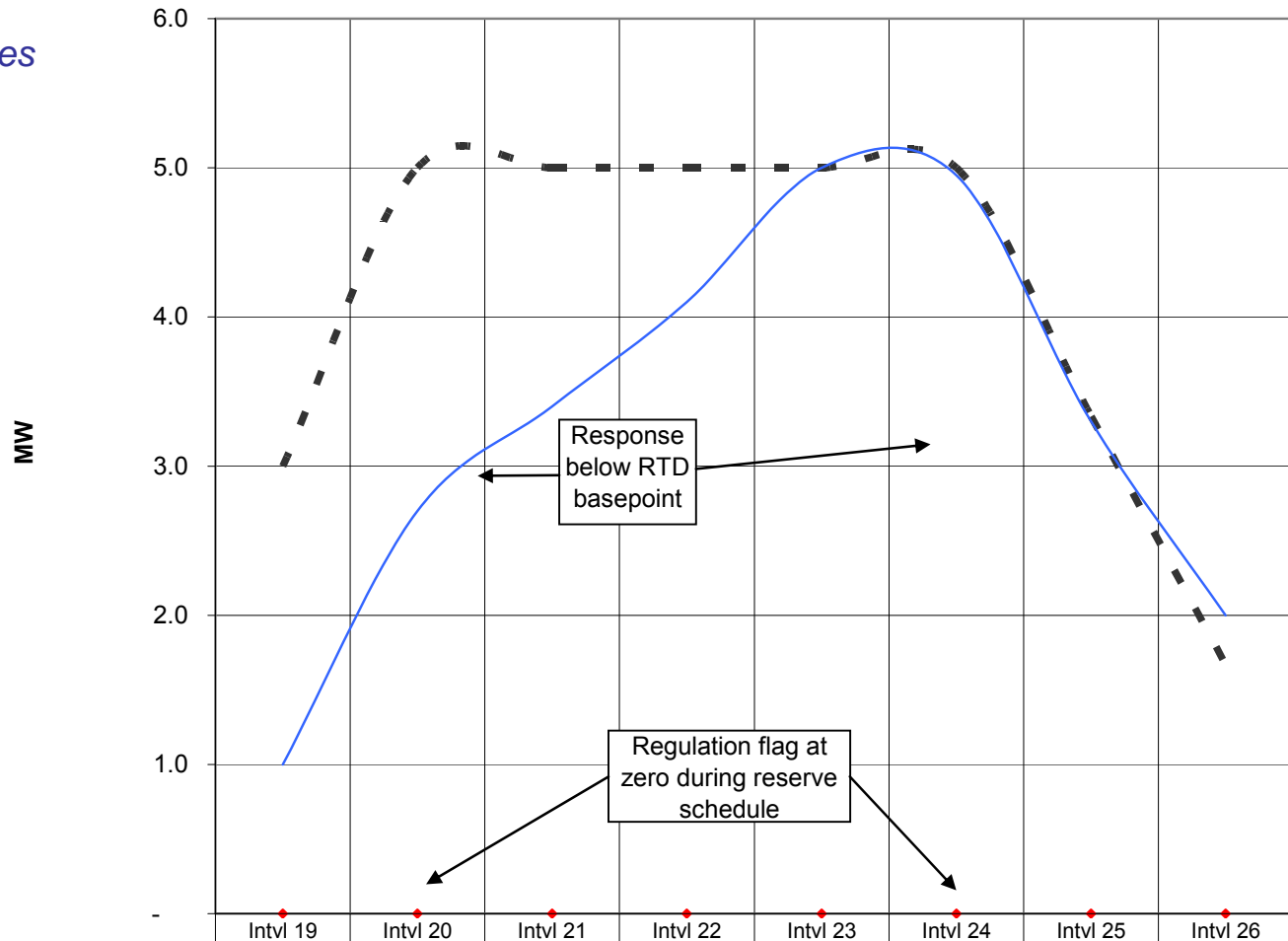
	Intvl 19	Intvl 20	Intvl 21	Intvl 22	Intvl 23	Intvl 24	Intvl 25	Intvl 26
RTD Basepoint (Ramped scheduled Reduction)	3.0	5.0	5.0	5.0	5.0	5.0	3.3	1.7
Resrv Resp MW (Average Actual Demand Reduction)	1.0	2.7	3.4	4.1	5.0	5.0	3.3	2.0
Regl Flag	-	-	-	-	-	-	-	-
Resrv perf index	0.43	0.64	0.78	0.92	1.00	1.00	1.00	1.00

Reserve Performance Index

- Reserve PI_i = Min[((ADR_i/RSR_i) + .10), 1]
  - *Where:*
    - ADR_i = Average Actual Demand Reduction for interval i
      - If ADR_i <= 0, then Reserve PI_i = 0
    - RSR_i = Ramped Scheduled Reduction for interval i

- Example: Interval 21
  - *ADR_i = 3.4*
  - *RSR_i = 5.0*
  - *Min [((3.4/5.0) + .10), 1]*
  - *Min [.68 + .10, 1]*
  - *Min [.78, 1]*
  - *Reserve PI_i = .78*

Interval	Intvl 21
RTD Basepoint (Ramped scheduled Reduction)	5.0
Regl Flag	-
Resrv Resp MW (Average Actual Demand Reduction)	3.4
Resrv perf index	0.78

Performance and Settlement

Regulation

Performance Calculations

Regulation Performance Index

- Tracked by NYISO's Performance Tracking System (PTS)

- Tracks how well a regulation supplier responds to the control signals that are issued every six seconds. A regulation performance index is calculated for every RTD interval.

$$PI_i = \left[\frac{URMi - (PCE_i + NCE_i)}{URM_i} + 0.10 \right] \times \left[\frac{RegPeriod_i}{s_i} \right]$$

Regulation Performance Index: Control Error

- ◆ Control Error
  - ▪ *Positive Control Error: Measure of provider's over- generation (OG)*
    - • Each 30 seconds, the measured output ($MW_{meas,p}$) is compared to the largest of the six-second base points of the past 30 seconds.
    - • $OG = (MW_{meas,p} - BP^+_{AGC30})$, *but not less than zero*
  - ▪ *Negative Control Error: Measure of provider's under-generation (UG)*
    - • Each 30 seconds, the measured output ($MW_{meas,p}$) is compared to the smallest of the six-second base points of the past 30 seconds.
    - • $UG = (BP^-_{AGC30} - MW_{meas,p})$, *but not less than zero*

- ◆ *Over- and under-generation is accumulated for each 30-second period in the RTD interval*
  - ▪ $PCE_i = \sum OG_{\text{30-second periods in the RTD interval}}$
  - ▪ $NCE_i = \sum UG_{\text{30-second periods in the RTD interval}}$

Regulation Performance Index: Unit Regulation Margin

◆ The amount that the regulation provider's output could change during an RTD interval

- $URM_i = RR \times [s_i/60]$

    - RR = Regulation ramp rate (MW/min)

    - s_i = number of seconds in RTD interval "i"

Example 1: Regulation Schedule

Interval = 6 seconds

Response exceeded basepoint

Regulation Flag indicates regulation schedule

	Intvl 1	Intvl 2	Intvl 3	Intvl 4	Intvl 5	Intvl 6
AGC Basepoint	0.5	1.0	2.0	4.0	4.0	2.0
Regl Resp MW	0.7	2.0	2.0	4.0	4.2	3.0
Regl Flag	1.0	1.0	1.0	1.0	1.0	1.0
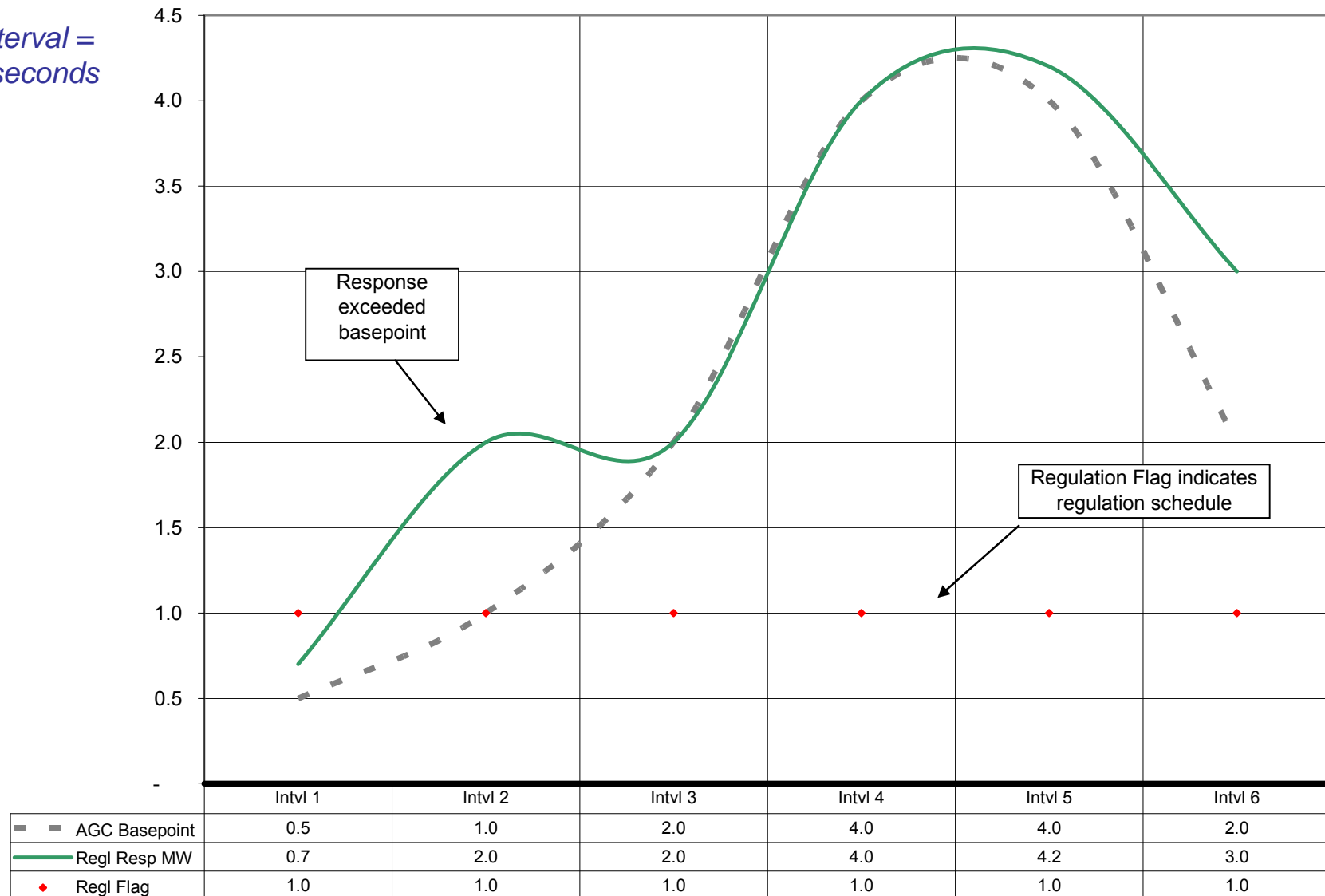
Example 1: Control Error for intervals 1 - 5

Interval	Intvl 1	Intvl 2	Intvl 3	Intvl 4	Intvl 5
Base Ld Int	22.0	22.0	22.0	22.0	22.0
Load	21.3	20.0	20.0	18.0	17.8
AGC Basepoint	0.5	1.0	2.0	4.0	4.0
Regl Flag	1.0	1.0	1.0	1.0	1.0
Regl Resp MW	0.7	2.0	2.0	4.0	4.2

- OG = (MW $_{meas,p}$ - BP$^+$ $_{AGC30}$), *but not less than zero*
  - *MW $_{meas,p}$ = 2.6 (average of Regl Resp MW for intervals 1 through 5)*
  - *BP$^+$ $_{AGC30}$ = 4.0 (maximum AGC basepoint for intervals 1 through 5)*
  - OG = 2.6 – 4.0
  - OG = -1.4
  - Since OG < 0, OG = 0, no overgen
- UG = (BP$^-$ $_{AGC30}$ - MW $_{meas,p}$), *but not less than zero*
  - *MW $_{meas,p}$ = 2.6 (average of Regl Resp MW for intervals 1 through 5)*
  - *BP$^-$ $_{AGC30}$ = .5 (minimum AGC basepoint for intervals 1 through 5)*
  - OG = .5 – 2.6
  - OG = -2.1
  - Since UG < 0, UG = 0, no undergen
- *PCE$_i$ = 0*
- *NCE$_i$ = 0*

Example 1:
Unit Regulation Margin

- The amount that the regulation provider's output could change during an RTD interval
  - $URM_i = RR \times [s_i/60]$
    - RR = Regulation ramp rate (MW/min)
    - s_i = number of seconds in RTD interval "I"
- *EXAMPLE:*
  - RR = .2 MW per min.
  - s_i = 60
  - URM_i = .2 x [60/60]
  - URM_i = .2

Example 1: Regulation Performance Index

- Tracks how well a regulation supplier responds to the control signals that are issued every six seconds. A regulation performance index is calculated for every RTD interval.

- EXAMPLE:

$$PI_i = \left[\frac{URMi - (PCE_i + NCE_i)}{URM_i} + 0.10 \right] \times \left[\frac{RegPeriod_i}{s_i} \right]$$

  - *URM_i = .2*
  - $PCE_i = 0$
  - $NCE_i = 0$
  - $RegPeriod_i = 60$ seconds
  - *s_i = 60*
  - $PI_i = [((.2 - (0 + 0)/.2) + .10] * [60/60]$
  - $PI_i = [(1) + .10] * [1]$
  - $PI_i = 1.10 * 1$
  - $PI_i = 1$ (Performance index cannot exceed 1)

Example 2: Regulation Schedule

Interval = 6 seconds

Regulation Flag indicates regulation schedule

Response does not reach basepoint

Regulation Flag = 0 indicates no regulation schedule

	Intvl 26	Intvl 27	Intvl 28	Intvl 29	Intvl 30
AGC Basepoint	(1.0)	(2.0)	(2.0)	-	-
Regl Resp MW	(1.0)	(1.0)	(2.0)	-	-
Regl Flag	1.0	1.0	1.0	-	-
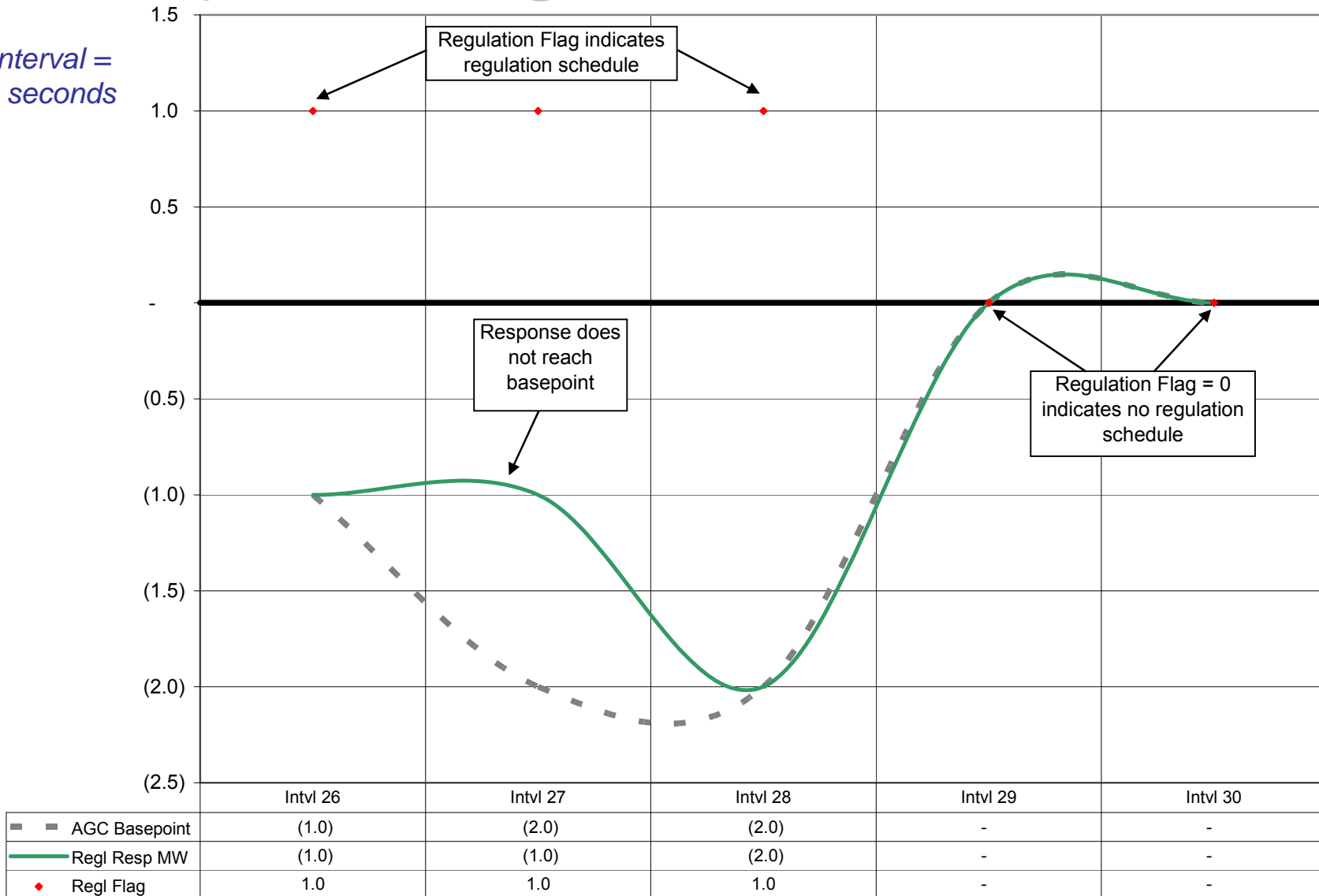
Example 2: Control Error for intervals 26 - 30

Interval	Intvl 26	Intvl 27	Intvl 28	Intvl 29	Intvl 30
Base Ld Int	23.0	23.0	23.0	-	-
Load	24.0	24.0	25.0	25.0	23.0
AGC Basepoint	(1.0)	(2.0)	(2.0)	-	-
Regl Flag	1.0	1.0	1.0	-	-
Regl Resp MW	(1.0)	(1.0)	(2.0)	-	-
Regl perf	1.0	1.0	1.0	-	-

- OG = (MW $_{meas,p}$ - BP$^+$ $_{AGC30}$), *but not less than zero*
  - *MW $_{meas,p}$ = -0.8 (average of Regl Resp MW for intervals 26 through 30)*
  - *BP$^+$ $_{AGC30}$ = 0 (maximum AGC basepoint for intervals 26 through 30)*
  - OG = -0.8 - 0
  - OG = -0.8
  - Since OG < 0, OG = 0, no overgen
- UG = (BP$^-$ $_{AGC30}$ - MW $_{meas,p}$), *but not less than zero*
  - *MW $_{meas,p}$ = -0.8 (average of Regl Resp MW for intervals 26 through 30)*
  - *BP$^-$ $_{AGC30}$ = -2.0 (minimum AGC basepoint for intervals 26 through 30)*
  - OG = -0.8 – (-2.0)
  - OG = -2.8
  - Since UG < 0, UG = 0, no undergen
- *PCE$_i$ = 0*
- *NCE$_i$ = 0*

Example 2:
Unit Regulation Margin

- The amount that the regulation provider's output could change during an RTD interval

  - $URM_i = RR \times [s_i/60]$

    - RR = Regulation ramp rate (MW/min)

    - s_i = number of seconds in RTD interval "I"

- *EXAMPLE:*

  - RR = .2 MW per min.

  - s_i = 60

  - $URM_i = .2 \times [60/60]$

  - $URM_i = .2$

Example 2: Regulation Performance Index

- Tracks how well a regulation supplier responds to the control signals that are issued every six seconds. A regulation performance index is calculated for every RTD interval.

- EXAMPLE:

$$PI_i = \left[\frac{URM_i - (PCE_i + NCE_i)}{URM_i} + 0.10 \right] \times \left[\frac{RegPeriod_i}{s_i} \right]$$

  - $URM_i = .2$
  - $PCE_i = 0$
  - $NCE_i = 0$
  - $RegPeriod_i = 60$ seconds
  - $s_i = 60$
  - $PI_i = [((.2 – (0 + 0)/.2) + .10] * [60/60]$
  - $PI_i = [(1) + .10] * [1]$
  - $PI_i = 1.10 * 1$
  - $PI_i = 1$ (Performance index cannot exceed 1)

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Demand Side Ancillary Services:

6. Settlement and Invoices

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New York Independent System Operator

DSASP Training Course
November 21, 2008

Settlement and Invoices

Invoices

Draft- For Discussion Only

Hourly Invoice

- **First section of sample Hourly Invoice**

- **DSASP transactions under Power Suppliers section**

POWER SUPPLIERS							
100	200	201	101	102	202	203	204
Org name	Gen name	Gen Ptid	Start day	Start hour	DAM Hrly LBMP MWh	DAM Hrly LBMP $	DAM Forward energy $
LSE LBMP ENERGY							
100	400	401	101	102	402	403	404
Org name	LSE name	Bus name	Start day	Start hour	DAM Hrly LBMP MWh	DAM LBMP $	Hrly Fwd Energy $
TRANSACTIONS							
100	400	500	101	102	501	502	503
Org name	LSE name	Trans Id	Start day	Start hour	DAM Scheduled Transactions	Hrly Transaction DAM Loss	Hrly Transaction DAM Congestion $
TRANSACTIONS LBMP ENERGY							
100	400	500	101	102	511	512	513
Org name	LSE name	Trans Id	Start day	Start hour	DAM LBMP Market MWHr	DAM LBMP Market Energy $	DAM LBMP Market Loss $
ANCILLARY SERVICES							
100	400	101	102	600	601	602	603
Org name	LSE name	Start day	Start hour	Hrly Ancillary service Billing MWHr	Hrly Ext Export Transactions MWHr	Hrly Ext Wheel Thru Transactions MWHr	NTAC Rate
ISO Billing Sample		OCT/27/2008	0	0	0	0	0.6
ISO Billing Sample		OCT/27/2008	1	0	0	0	0.6
ISO Billing Sample		OCT/27/2008	2	0	0	0	0.6
ISO Billing Sample		OCT/27/2008	3	0	0	0	0.6
ISO Billing Sample		OCT/27/2008	4	0	0	0	0.6

Reserves Settlement – Hour 1

Bill Code	229	228	
	Hr DAM Sched Spin Avail (MW)}	Hr DAM Reg Spin West ($/MWh)	Hr DAM Spin Avail Stlmnt ($)
DAM Interval			
1	6	$10	$60

RTD Interval	RTD Interval Length (Hr)	RTD RT Sched Spin Avail (MW)	Hr DAM Sched Spin Avail (MW)	RTD RT Sched Spin Avail Energy (MWh)	RTD RT Spin Price West ($/MWh)	RTD RT Spin Avail Stlmnt ($)
1	0.0833	6	6	0.0	$ 10.00	$ -
2	0.0833	6	6	0.0	$ 10.00	$ -
3	0.0833	6	6	0.0	$ 10.00	$ -
4	0.0833	6	6	0.0	$ 10.00	$ -
5	0.0833	6	6	0.0	$ 10.00	$ -
6	0.0833	6	6	0.0	$ 10.00	$ -
7	0.0833	0	6	-0.5	$ 20.00	$ (10.00)
8	0.0833	0	6	-0.5	$ 20.00	$ (10.00)
9	0.0833	0	6	-0.5	$ 20.00	$ (10.00)
10	0.0833	0	6	-0.5	$ 20.00	$ (10.00)
11	0.0833	0	6	-0.5	$ 20.00	$ (10.00)
12	0.0833	0	6	-0.5	$ 20.00	$ (10.00)
			Hr RT Sched Spin Avail Energy (MWh)	-3.0000	**Hr RT Spin Avail Stlmnt ($)**	$ (60.00)

DAM Payment $ 60.00
RT Payment $ (60.00)

$ -
Bill Code 232 Reserves

Spinning Reserves **Hr DAM Spin Avail Stlmnt ($) + Hr RT Spin Avail Stlmnt ($)**

Daily Settlement **Sum of Spinning , NonSync and 30 Minute Reserves Settlements for all hours of the day**
Bill Code 308

Regulation Settlement – Hour 1

Bill Code	217 Hr DAM Sched Reg Avail (MW)	218 Hr DAM Reg Price West ($/MWh)	Hr DAM Reg Avail Stlmnt ($)
DAM Interval 1	5	$65	$325

RTD Interval	RTD Interval Length (Hr)	RTD RT Sched Reg Avail (MW)	RTD RT Reg Performance Index	Hr DAM Sched Reg Avail (MW)	RTD RT Sched Reg Avail Energy (MWh)	RTD RT Reg Price West ($/MWh)	RTD RT Reg Avail Stlmnt ($)
1	0.0833	5	1	5	0.0000	$ 65.00	$ -
2	0.0833	5	1	5	0.0000	$ 65.00	$ -
3	0.0833	5	1	5	0.0000	$ 65.00	$ -
4	0.0833	5	1	5	0.0000	$ 65.00	$ -
5	0.0833	5	1	5	0.0000	$ 65.00	$ -
6	0.0833	5	1	5	0.0000	$ 65.00	$ -
7	0.0833	1	1	5	-0.3333	$ 90.00	$ (30.00)
8	0.0833	1	1	5	-0.3333	$ 90.00	$ (30.00)
9	0.0833	1	1	5	-0.3333	$ 90.00	$ (30.00)
10	0.0833	1	1	5	-0.3333	$ 90.00	$ (30.00)
11	0.0833	1	0.8	5	-0.3500	$ 90.00	$ (31.50)
12	0.0833	1	0.9	5	-0.3417	$ 90.00	$ (30.75)

Hr RT Sched Reg Avail Energy (MWh)	-2.0250	Hr RT Reg Avail Stlmnt ($)	$ (182.25)
Bill Code	250		251

DAM Payment $ 325.00
RT Payment $ (182.25)

	$142.75	
Bill Code	308	Regulation

Daily Settlement   **Day DAM Reg Avail Stlmnt ($) + Day RT Reg Avail Stlmnt ($)**
The daily settlements are rollups of the hourly settlements (NET)

Hourly Invoice – Example Entries

POWER SUPPLIERS				
100	217	218	228	229
Org name	Hrly DAM Reg Avail	Hrly DAM Reg MCP $	Hrly Synch Res MCP $	Hrly Synch Res MWHr
	5	$ 65.00	$ 10.00	6

POWER SUPPLIERS				
100	232	239	250	251
Org name	Hrly Synch Res Avail $	Hrly DAM Contract Bal Pmnt $	Hrly Bal Mkt Reg Avail MWHr	Hrly Bal Mkt Reg Avail $
	$ -	$162.75	-2.025	$ (182.25)

- ◆ Regulation Settlement – 1 hour
  - ▪ *Bill Codes 217, 218, 250, 251*

- ◆ Reserve Settlement – 1 hour
  - ▪ *Bill Codes 228, 229, 232*

Daily Invoice

- **First section of sample Daily Invoice**
- **DSASP transactions under Power Suppliers section**

POWER SUPPLIERS DATE - AS OF:	mm/dd/yy							
100	200	201	101	300	301	302	303	304
Org name	Gen name	Gen Ptid	Start day	DAM LBMP MWh	DAM Forward Energy $	DAM BPCG $	R/T MWh	R/T Energy $
LSE LBMP ENERGY AND TRANSACTIONS DATE - AS OF:	OCT/27/2008							
100	400	101	700	701	702	703	704	705
Org name	LSE name	Start day	DAM LBMP MWh	Fwd Energy $	Fwd Loss $	Fwd Cong $	LSE R/T MWh	R/T Energy $
LSE TRANSACTIONS LBMP ENERGY DATE - AS OF:	OCT/27/2008							
100	400	101	758	759	760	761	762	763
Org name	LSE name	Start day	DAM LBMP Market MWh	DAM LBMP Market Energy $	DAM LBMP Market Loss $	DAM LBMP Market Cong $	DAM LBMP Market LBMP $	R/T LBMP Market MWh

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Daily Invoice – Example Entries

POWER SUPPLIERS DATE - AS OF:	mm/dd/yy						
100	200	308	309	310	311	312	313
Org name	Gen name	Regulation Payment $	Regulation Charge $	Operating Reserve Payment $	Black Start Daily Revenue Reqt	Black Start Service Payment $	DAM Contract Balancing Payment $
		$ 142.75		$ -			$ 162.75

- ## Regulation Payment
  - *Bill Code 308 (net of DA & RT)*

- ## Reserve Payment
  - *Bill Code 310 (DA)*

- ## DAMAP
  - *Bill Code 313*

Monthly Invoice – Example Entries

- Summation of Daily Invoices

- DAMAP for Ancillary Services (Bill Code 313) becomes part of Bill Code 303

  - *Bill Code 303 also includes any balancing payments or charges for energy suppliers*

Power Supplier Statement - 07/01/2008	Initial Settlement
Billing Date	8/7/2008
Energy(MWh)	
300 Forward Energy	0
303 Balancing Energy	$ 162.75
Energy Settlement ($)	
301 Forward Energy	0
304 Balancing Energy	0
314 ELR DAM Contract Balancing Payment $	0
302 DAM Bid Production Cost Guarantee	0
305 R/T Bid Production Cost Guarantee	0
328 Margin Restoration (MOB) Payment $	
Ancillary Service Charges	
Cost Based Ancillary Services	
306 Reactive Supply and Voltage Control Avail Pymt.	0
307 Reactive Supply and Voltage Control LOC Pymt.	0
312 Black Start Service Payment	0
1100 Wind Forecasting Service Charge	0
Market Based Ancillary Service	
308 Regulation and Frequency Response Avail Payment	$ 142.75
309 Regulation and Frequency Response Penalty Charge	0
310 Operating Reserves Service Availability Payment	$ -
310 Operating Reserves Service Penalty Charge	0
320 322 324 326 Scheduling System Control & Dispatch Service - Injections	0
1017 Local Black Start and Restoration Services Payment	0

Consolidated Invoice - Example

NYISO Market Participant Billing Summary - Invoice Date August 07, 2008

Market Participant Name: Gen1_DSASP

	July 2008 Initial Settlement	March 2008 4 Month Settlement	January 2008 6 Month Settlement	Total
Monthly Payments/(Charges)				
Power Supplier	$305.50	$0.00	$0.00	$305.50
Transmission Customer	$0.00	$0.00	$0.00	$0.00
Transmission Congestion Contract Holder	$0.00	$0.00	$0.00	$0.00
Transmission Owner	$0.00	$0.00	$0.00	$0.00
Demand Response Customer	$0.00	$0.00	$0.00	$0.00
Virtual Bidding Customer	$0.00	$0.00	$0.00	$0.00
Sub Total Payment to (Charge to) Market Participant	$305.50	$0.00	$0.00	$305.50
Adjustments - See Page 2 for details	$0.00	$0.00	$0.00	$0.00
Interest Payment to (Charge to) Market Participant	$0.00	$0.00	$0.00	$0.00
ICAP Payment to (Charge to) Market Participant	$0.00			$0.00
Working Capital Transactions	$0.00			$0.00
Current Invoice Payment to (Charge to) Market Participant	$305.50	$0.00	$0.00	$305.50
Balance Due on Prior Invoice(s)				
Total Payment to (Charge to) Market Participant				$305.50

Date Posted: 08/07/2008
Payments to NYISO Due: 08/18/2008
Payments to Market Participants Due: 08/20/2008

	Opening Balance	Current Month Contributions	Current Month Interest	Other Transactions	Ending Balance
Working Capital Activity for the Current Month	$0	$0.00	$0	$0.00	$0

The New York Independent System Operator (NYISO) is a not-for-profit corporation that began operations in 1999. The NYISO operates New York's bulk electricity grid, administers the state's wholesale electricity markets, and provides comprehensive reliability planning for the state's bulk electricity system.

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