

# NYISO Energy Marketplace

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## E-Learning Module



# Energy Marketplace

## Module Objectives:

- Explain the function and features of the NYISO Energy Market
- Identify the differences between the Day Ahead and Real Time Markets and associated settlements
- Describe the Energy Market Processes including
  - Load Bids and Supply Offers
  - Commitment and Dispatch of Resources
  - Market Timeline

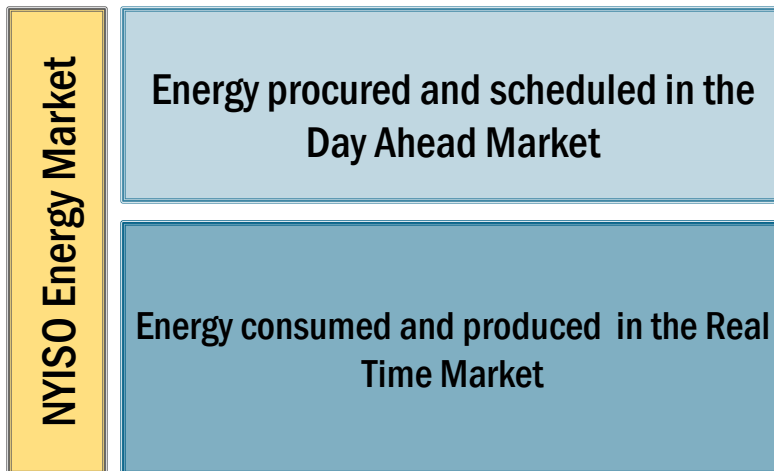
# Market Features and Two Settlement System

# NYISO's Energy Market

## ■ Function and Features

- Maintains Reliability Rules while satisfying system constraints
- Allows for competitive bid-based process
- Sales and procurement of electrical energy at the wholesale level
- Provides load and supplier schedules
- Produces prices for settlement mechanism

# Energy Market: Two Settlement System



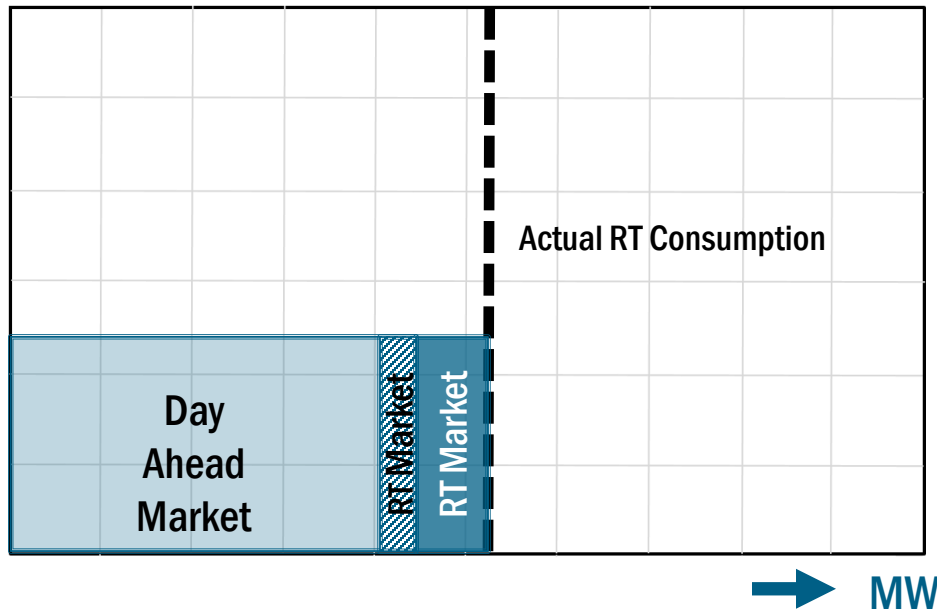
# Day Ahead vs. Real Time Market Two Settlement System

- **Day Ahead Market**
  - Buy and Sell Energy the day prior to actual consumption or production
  - In preparation for actual energy consumption
  - Financially Binding
- **Factors that influence the Day Ahead Market:**
  - Forecasted Load
  - Load Bids from Load Serving Entities (LSEs)
  - Supply offers from resources
- **Benefits:**
  - Adequate resources identified to meet forecasted load
  - Price certainty against real time volatility

# Day Ahead vs. Real Time Market Two Settlement System

- **Real Time Market**
  - Buy and Sell the difference during the consumption day
  - Real Time Market Balances DAM Schedule to actual consumption
  - Balancing Market
- **Factors that influence Real Time Market:**
  - Changes in load
  - Changes in generation availability
  - Neighboring control area system changes
- **Benefits:**
  - Dispatches resources to meet actual consumption

# Energy Market – Two Settlement System



DAM + RT =  
Actual Consumption

DAM - RT =  
Actual Consumption



# Two Settlement System – Example 1

Power Suppliers (for example hour):

Day Ahead Market	
DAM MWh	75 MWh
DAM LBMP \$/MWh	\$50
DAM LBMP Settlement	$75 \times 50 = \$3750$

Real Time Market	
RT MWh	85 MWh
Balancing MW (RT-DAM)	$85 - 75 = 10 \text{ MW}$
RT LBMP \$/MWh	\$60
RT LBMP Settlement	$10 \times 60 = \$600$

**Total Settlement for example hour (DAM\$ + RT\$) = \$4350**

# Two Settlement System – Example 2

Power Suppliers (for example hour):

## Day Ahead Market

DAM MWh	75 MWh
DAM LBMP \$/MWh	\$50
DAM LBMP Settlement	$75 \times 50 = \$3750$

## Real Time Market

RT MWh	65 MWh
Balancing MW (RT - DAM)	$65 - 75 = -10 \text{ MW}$
RT LBMP \$/MWh	\$60
RT LBMP Settlement	$10 \times -60 = -\$600$

**Total Settlement for example hour (DAM\$ + RT\$) = \$3150**

# Two Settlement System – Example 1

Load Serving Entities (LSEs) (for example hour):

## Day Ahead Market

DAM MWh	-25 MWh
DAM LBMP \$/MWh	\$50
DAM LBMP Settlement	$-25 \times 50 = -\$1250$

## Real Time Market

RT MWh	-30 MWh
Balancing MW (RT-DAM)	$(-30) - (-25) = -5 \text{ MW}$
RT LBMP \$/MWh	\$60
RT LBMP Settlement	$-5 \times 60 = -\$300$

**Total Settlement for example hour (DAM\$ + RT\$) =  $-\$1550$**

# Two Settlement System – Example 2

Load Serving Entities (LSEs) (for example hour):

## Day Ahead Market

DAM MWh	-25 MWh
DAM LBMP \$/MWh	\$50
DAM LBMP Settlement	$-25 \times 50 = -\$1250$

## Real Time Market

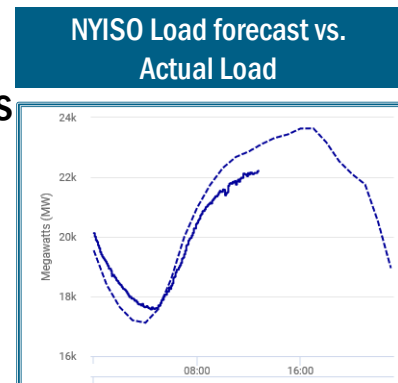
RT MWh	-20 MWh
Balancing MW (RT-DAM)	$(-20) - (-25) = 5 \text{ MW}$
RT LBMP \$/MWh	\$60
RT LBMP Settlement	$5 \times 60 = \$300$

**Total Settlement for example hour (DAM\$ + RT\$) = - \$950**

# **Energy Market Process : Load Forecasting and Bidding**

# Load Forecasting

- **Two Components:**
  - NYISO's Load forecast
  - LSE's Load Forecast
- **NYISO's Load Forecast is used for scheduling resources/reliability needs**
  - Historical Data
  - Weather
  - TO Forecast Submittals
  - Zonal basis, then summed
- **LSE Load Forecast used for initial billing purposes**
  - LSEs submit estimated consumption to NYISO



# Load Bidding/Purchasing Options

- LSE can enter bid (in the DAM only) to procure energy from NYISO
  - Fixed Bids
  - Price Capped Load Bids
  - Any accepted bids lock-in a DAM price

*Physical Load Bid*

Physical Load Name:  Date:  (mm/dd/yyyy)

Interruptible Type:  None Selected

Time	Forecast MW	Fixed Bid MW	Price Cap #1		Price Cap #2		Price Cap #3		Interrupt Price Cap		Interrupt Fixed		Bid Status
			MW	\$/MW	MW	\$/MW	MW	\$/MW	MW	\$/MW	MW	\$/MW	
00:00	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
01:00	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
02:00	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	

# Energy Market Process: Supply Offers and Parameters



# Submission of Supply Offers

- Suppliers submit offers to sell energy in the DAM or RT Market
- Supply Offer Submissions include:
  - \$/MWh Offer
  - Unit Parameters
  - Operating Mode

# Supply Offers: Unit Parameters

**Generator Bid**

Generator Name:  v      ESR Beginning Energy Level MWh:       Fuel Type:  v      Burdened Fuel Price (\$/mmbtu):

Bid Date:  (mm/dd/yyyy hh:mi)      Num of Hours:       Market:  v      Expiration (DAM only):  (mm/dd/yyyy hh:mi)

**Energy Bid**

CSR Injection Limit (MW)		CSR Withdrawal Limit (MW)		CSR Outage Type			
<input type="text"/>		<input type="text"/>		<input type="text"/> v			
Lower Storage Limit (MWh)	Upper Storage Limit (MWh)		ESR Energy Management Mode		Lower Operating Limit (MW)		ESR Outage Type
<input type="text"/>	<input type="text"/>		<input type="radio"/> ISO <input type="radio"/> Self		<input type="text"/>		<input type="text"/> v
Upper Operating Limit (MW)		Emergency Upper Operating Limit (MW)		Minimum Generation (MW)		Minimum Generation Cost (\$)	
<input type="text"/>		<input type="text"/>		<input type="text"/>		<input type="text"/>	
Self Scheduled (MW)				Unit Operations		Host Load (MW)	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/> ISO Committed Flex <input type="radio"/> Self Committed Flex <input type="radio"/> Self Committed Fixed <input type="radio"/> ISO Committed Fixed		<input type="text"/>	
00 Minute MW	15 Minute MW	30 Minute MW	45 Minute MW			Start-Up Cost (\$)	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>			<input type="text"/>	
<b>Bid Curve (Block Format)</b>							
MW (Basepoint)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
\$/MW	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
\$/MW (Opportunity Cost)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Incremental Energy Offer (\$/MW)

Duration

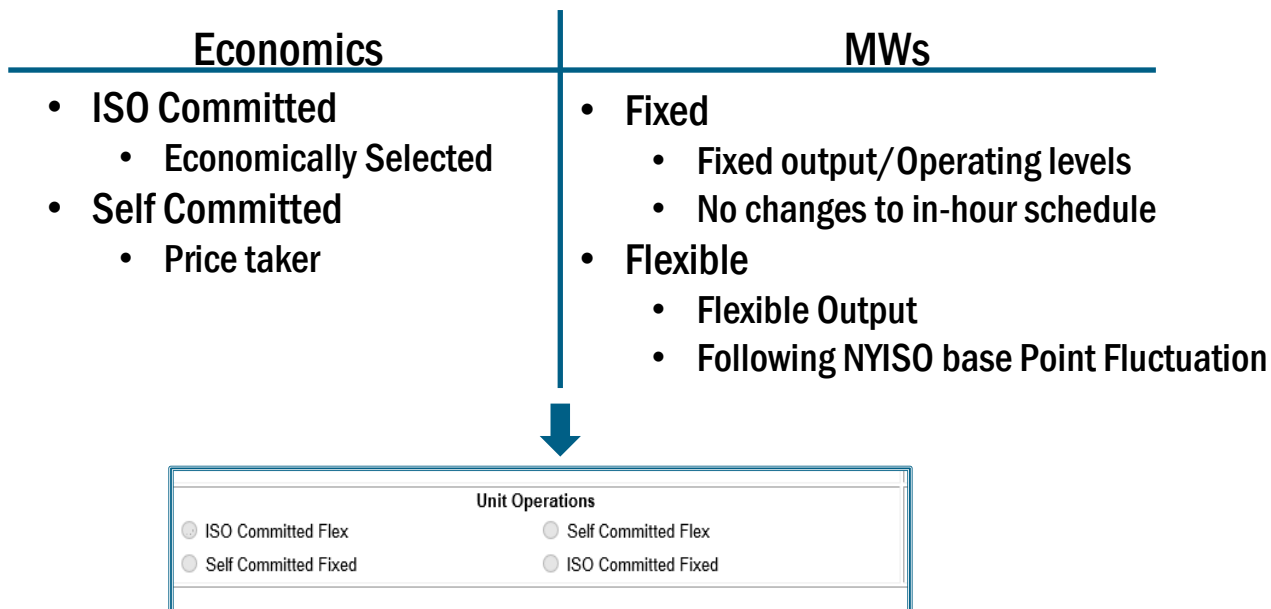
Expiration date

Min Gen

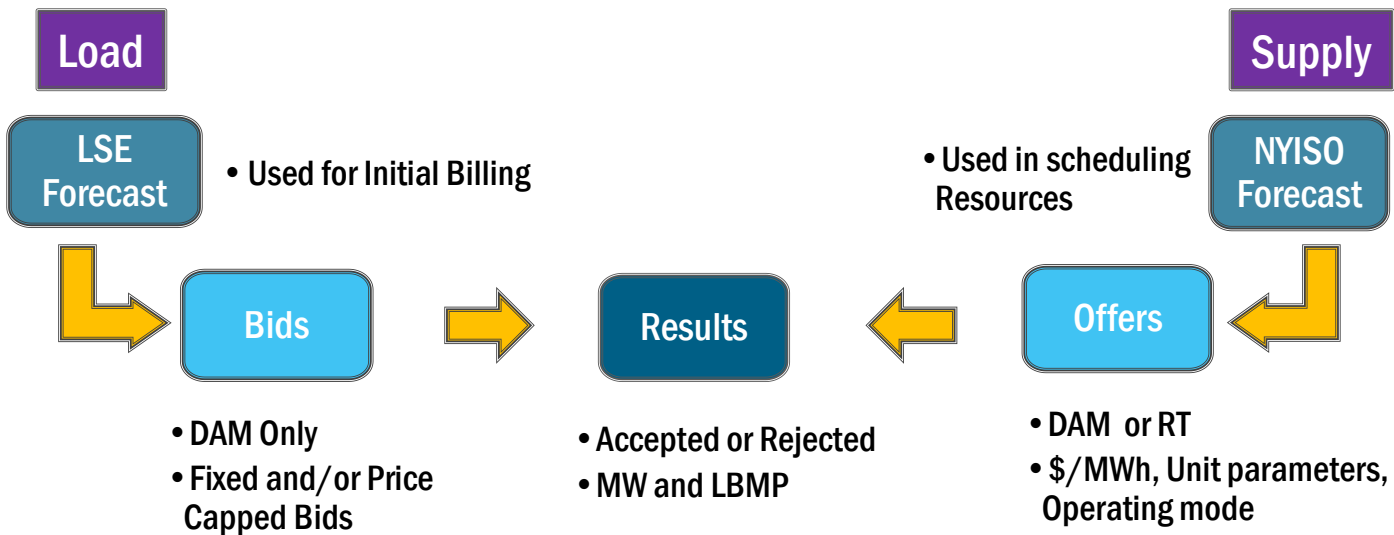
Upper Operating Limit

Start-Up Cost

# Supply Offers – Unit Operating Modes



# Energy Market Process - Summary



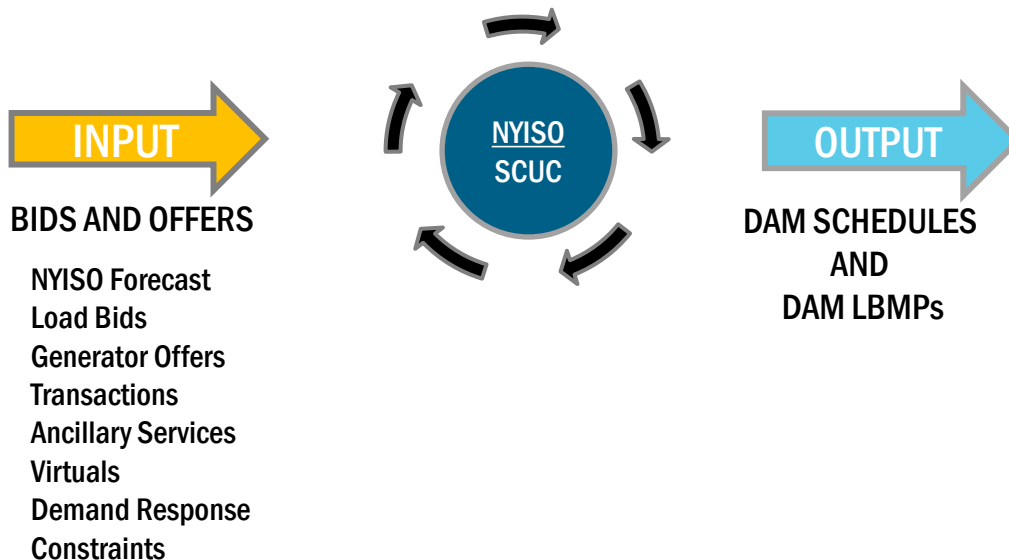
# **Energy Market Process: Commitment, Dispatch and Market Timelines**

# Commitment and Dispatch

- Minimize the as-bid production cost
- Satisfy system constraints and reliability rules
- Time Line
  - Day Ahead Market
  - Real Time Market

# Commitment and Dispatch -DAM

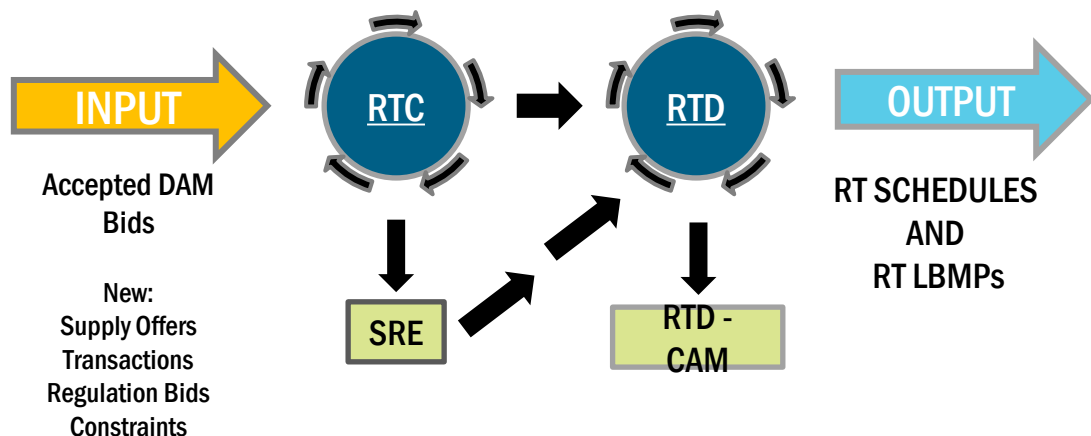
- DAM uses Security Constrained Unit Commitment (SCUC)
  - DAM Schedules
  - DAM LBMP



# Real Time Commitment and Dispatch

## – RTC and RTD

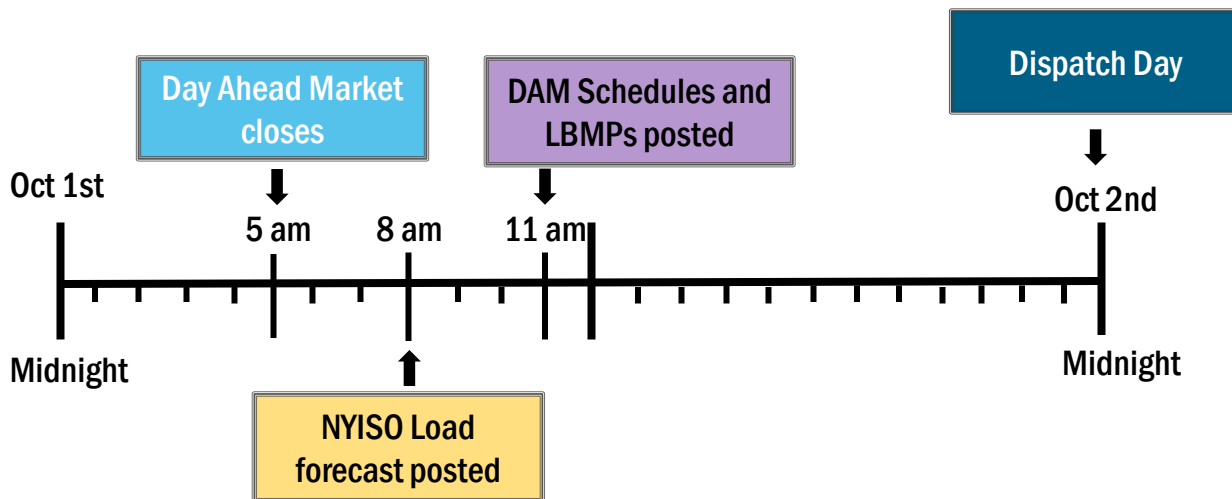
- Includes Supplemental Resource Evaluation (SRE) and RTD Corrective Action Mode (RTD CAM)





# Day Ahead Market - Timeline

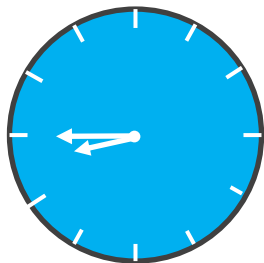
One Day before Dispatch Day (Oct. 2<sup>nd</sup>)



# RT Market -Timeline

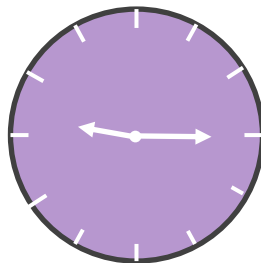
Operating Day – Oct. 2<sup>nd</sup> HB 10

8:45 AM



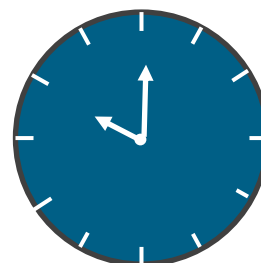
RT Bidding Closes  
(75 minutes prior to  
operating hour)

9:15 AM



RT Results Posted  
(45 minutes prior to  
operating hour)

10:00 AM



RTD - Operating Hour  
(5 minutes intervals)

*NYISO provides advisory commitment information for a 2.5 hour optimization period*

# Energy Marketplace Summary

- Energy Market function and features
- DAM vs. RT Market and the Two Settlement System
- Market Process
  - Submission of bids/offers
  - Commitment and Dispatch of Resources
  - Market time line

# Additional Resources

- **Tariffs: MST and OATT**
- **Day Ahead Scheduling Manual**
- **Transmission and Dispatching Operations Manual**
- **Market Participant User's Guide**

# Questions?

For any future assistance, please contact NYISO Stakeholder Services at [stakeholder\\_services@nyiso.com](mailto:stakeholder_services@nyiso.com) or by phone at (518) 356-6060