

Energy Market Transactions

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New York Market Orientation Course (NYMOC)

October 25-28, 2022

White Plains, NY

Module Objectives

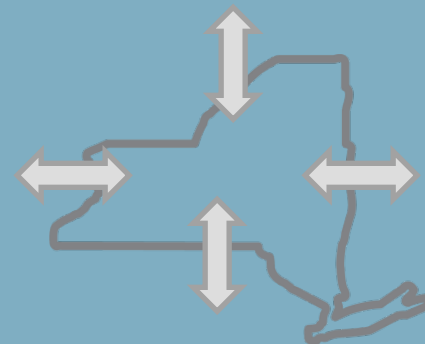
At the conclusion of this module, participants will be able to:

- Describe the purpose of Transactions
- Distinguish between the different types of transactions
- Identify source and sink points of transactions
- Identify the different types of transaction bids

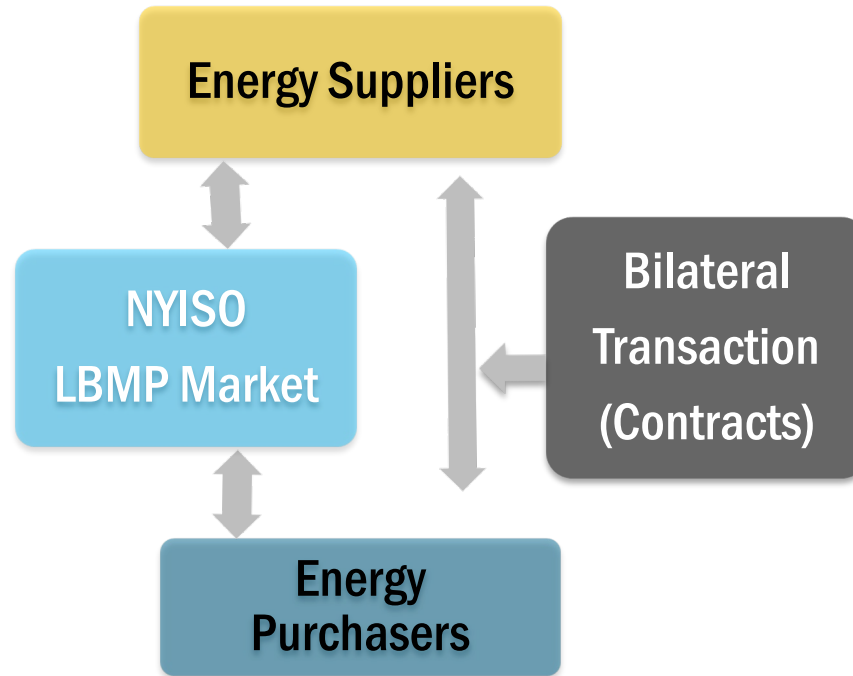
Module Objectives

- Describe how transactions bids are evaluated
- Understand the two-step process in scheduling external transactions
- Calculate the settlement for a transaction
- Identify additional charges associated with transactions

Transactions – An Introduction



Buying and Selling Wholesale Energy in NY



Energy Market Transactions

- **Why would an MP choose the Transaction option?**
 - Direct contract between supplier and purchaser with fixed long term price for energy
 - Makes financial sense: external supplier may get a better price for energy sold to NY than other control areas
 - Internal suppliers could get a better price for energy sold out of NY

- **Who can utilize the transaction scheduling option?**
 - Any MP (e.g., Generators, Loads and 3rd party marketer/trader) can register to utilize transaction scheduling

Transaction Terms

Source / Sink Points

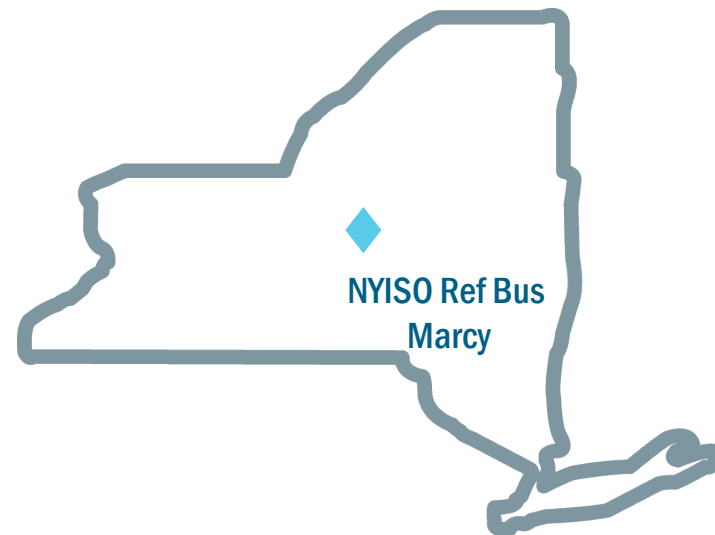


- **Source: Point of Injection (POI);** where the power is coming from, e.g., Generators
- **Sink: Point of Withdrawal (POW);** where the power is going to, e.g., Loads
- **Important role in distinguishing transactions**

Transaction Terms

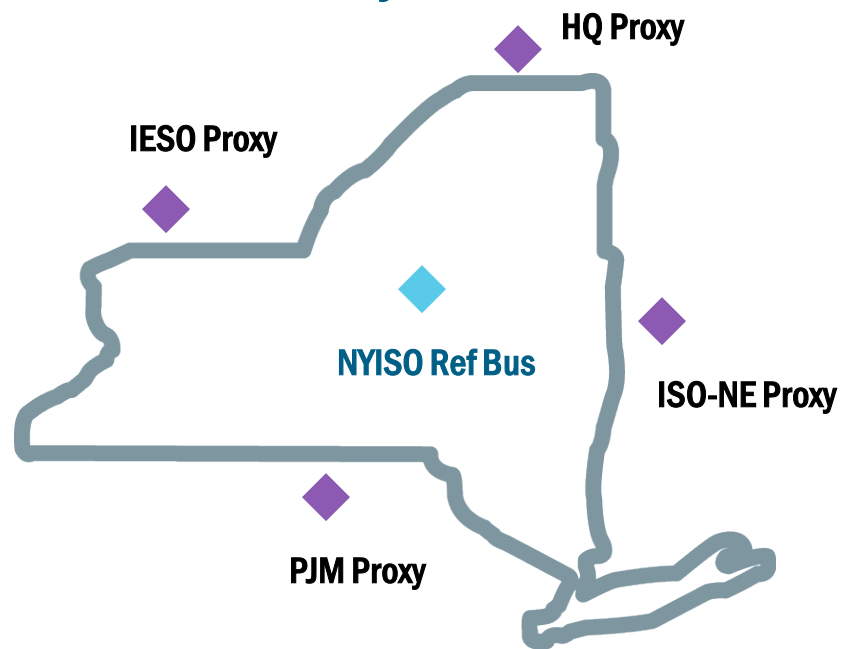
NY Reference Bus - Marcy

- NYISO point of reference for marginal cost of energy (Ref Bus LBMP) calculation
- Congestion and Losses are zero at this location
- aka the Marcy Ref Bus (NYPA Marcy 345kV transmission substation)
- Possible source / sink point



Transaction terms

External Proxy Bus



- Location outside the NYCA that is selected by the ISO to represent a load/gen bus in an adjacent Control Area
- LBMP prices for external proxy buses are calculated with reference to the NY reference bus
- NYISO designated for PJM, HQ, IESO, and ISO-NE

Control Area/Proxy Bus – Imports and Exports

Control Area - Interface	Source Proxy Bus	Sink Proxy Bus
Hydro Quebec – Chateauguay Import/Export	HQ_GEN_IMPORT	HQ_LOAD_EXPORT
Hydro Quebec – Chateauguay Wheels-Through	HQ_GEN_WHEEL	HQ_LOAD_WHEEL
HQ – Dennison	HQ_GEN_CEDARS_PROXY	HQ_LOAD_CEDARS_PROXY
ISO New England – Sandy Pond	N.E._GEN_SANDYPOND	N.E._LOAD_SANDYPOND
ISO New England Northport- Norwalk Scheduled Line	NPX_GEN_1385_PROXY	NPX_LOAD_1385_PROXY
ISO New England Cross-Sound Scheduled Line	NPX_GEN_CSC	NPX_LOAD_CSC
Ontario Independent Market Operator	OH_GEN_PROXY	OH_LOAD_PROXY
PJM Interconnection	PJM_GEN_KEystone	PJM_LOAD_KEystone
PJM Neptune Scheduled Line	PJM_GEN_NEPTUNE_PROXY	PJM_LOAD_NEPTUNE_PROXY
PJM Linden VFT Scheduled Line	PJM_GEN_VFT_PROXY	PJM_LOAD_VFT_PROXY
PJM HTP Scheduled Line	PJM_HTP_GEN	HUDSONTP_345KV_HTP_LOAD

From MST Section 4.4.4

Transaction Terms

Financially Responsible Party (FRP)

- The transaction contract owner
- The party initially creates the transaction contract in the MIS/JESS
- Financially responsible for the charges associated with the transactions
- Can be a source organization (gen), sink organization (load) or a third party (Marketer)

Transaction Categories

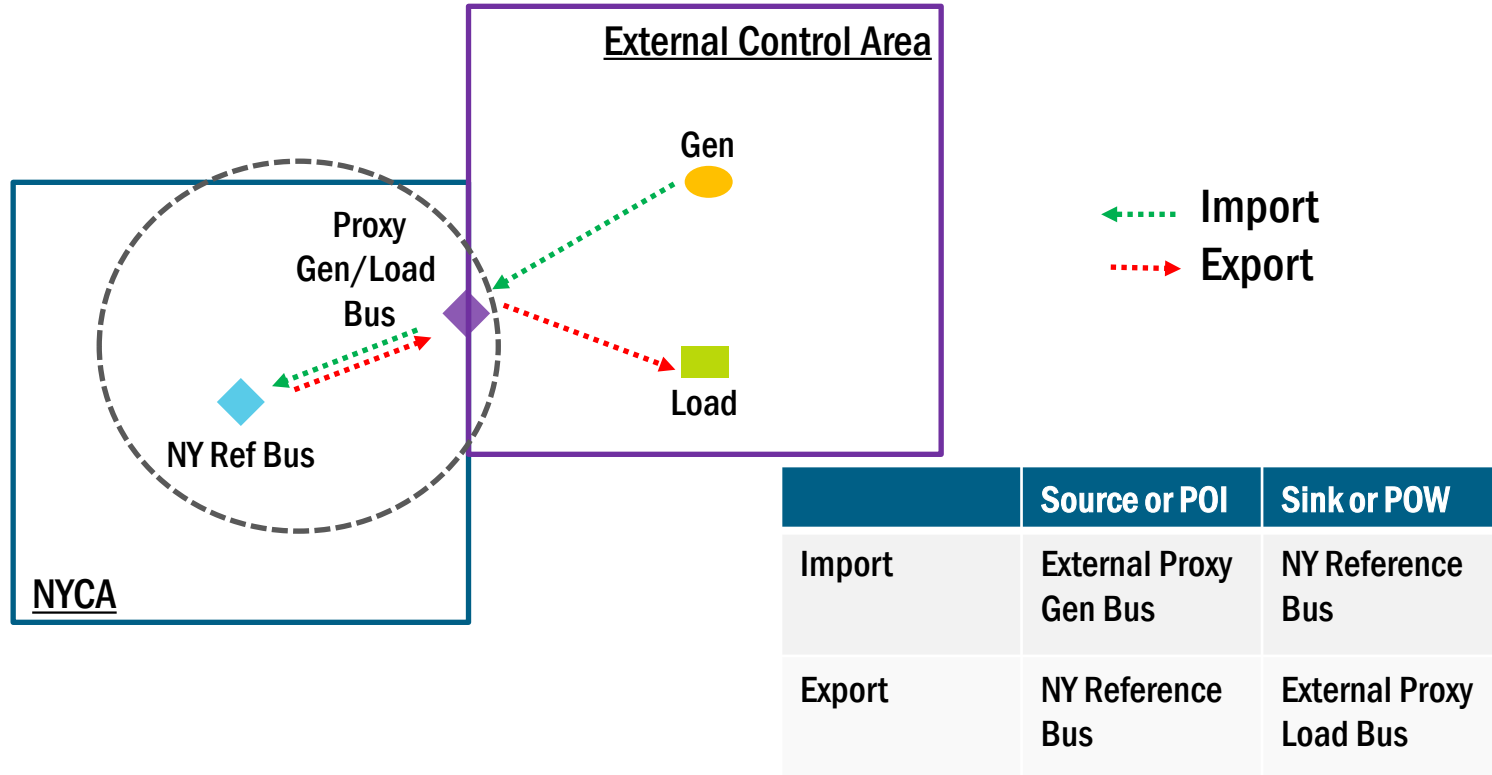
LBMP transactions

- Buys from/sells to - the NYISO Energy Market
- Two types:
 - Imports
 - Exports

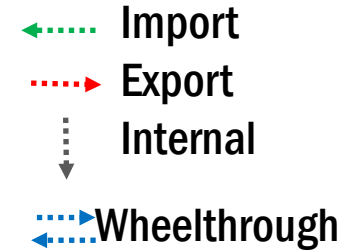
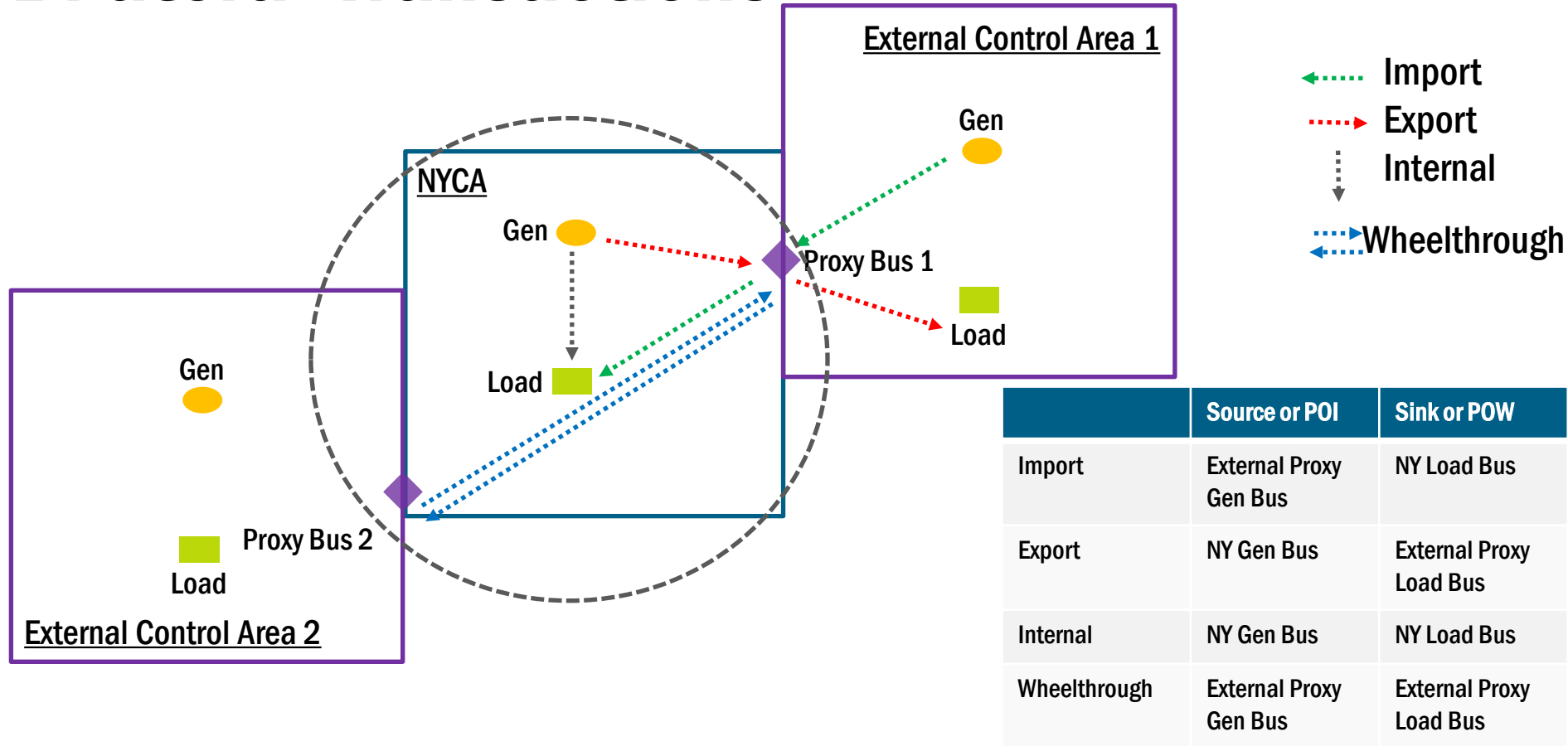
Bilateral Transactions

- Direct energy contract between parties
- Price of energy negotiated between buyer and seller, not part of NYISO Settlement
- Four types:
 - Internal Bilateral
 - Imports
 - Exports
 - Wheels Through

LBMP Transactions



Bilateral Transactions



Let's Review

Which source / sink point assumes zero losses and congestion by design?

Generator Bus

NYISO Reference Bus

External Proxy Bus

Let's Review

What is the location outside of the NY control area in which LBMPs are calculated?

Generator Bus

NYISO Reference Bus

External Proxy Bus

Let's Review

An internal generator schedules power such that the sink is the external proxy in Ontario. What kind of transaction is this?

Internal Bilateral

Import Bilateral

Export Bilateral

Wheelthrough

Let's Review

A NY Load schedules a transaction with an internal generator.
What kind of transaction is this?

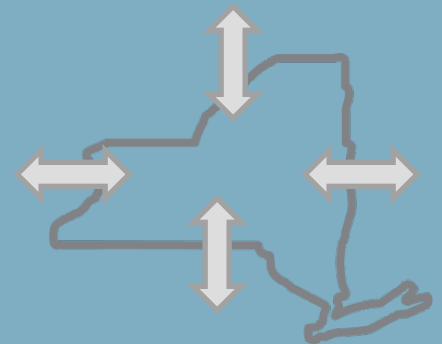
Internal Bilateral

Import Bilateral

Export Bilateral

Wheelthrough

Transactions – Bids and Evaluations



Transaction Categories- BIDS

Internal Bilateral

- Bid (\$/MW) not submitted
- Scheduled automatically

External Import LBMP Bilateral

- Import Gen Bid (or)
- Coordinated Transaction Scheduling (CTS)

External Export LBMP Bilateral

- Export Load Bid (or)
- Coordinated Transaction Scheduling (CTS)

Wheels Through

- Congestion Cost Bid

Internal Bilateral Transactions

- Scheduled automatically regardless of economics
 - Bid (\$/MW) is not submitted
 - NYISO needs to be aware of MWs only
 - Types
 - Gen Bus to Load Bus
 - Gen Hub to Load Bus
 - Gen Bus to Load Hub
- } Trading Hubs

Import Bid Evaluation



- Bid = \$ / MW using up to a 11-point Bid curve
- Bid evaluated as an external gen bid
- Minimum price MP is willing to be paid for energy (MP is willing to accept no less than Bid price)

Bid accepted if $\text{Bid} \leq \text{Proxy (Source) LBMP}$

Import Bid Example

- MP enters a bid of \$30/MW for a transaction from ISO-NE to NY
- ISO-NE Proxy bus price is \$68/MW
- IMPORT – buying power from outside NYISO to serve load inside New York-EXTERNAL GEN
- Will this transaction be scheduled?

MP wants to be paid Min \$30/MWh				
NE Selling to NY	Min "Gen" Bid	ISO-NE Proxy LBMP	Bid \leq ISO-NE Proxy LBMP?	Bid Accepted/Rejected
LBMP Import	\$30/MW	\$68/MW		

Export Bid Evaluation



- Bid = \$ /MW using up to a 11 pt. Bid Curve
- Bid referred to as Sink Price Cap Bid
- Bid evaluated as an external load bid
- Maximum MP is willing to pay for the energy (MP is willing to pay no more than Bid price)

Bid accepted if Bid \geq proxy (sink) LBMP

Export Bid Example

- MP enters a bid of \$30/MW for a transaction from NY to ISO-NE
- ISO-NE Proxy bus price is \$68/MW
- EXPORT – buying power from New York to serve load out of NYISO area - EXTERNAL LOAD
- Will this transaction be scheduled?

MP will pay Max \$30/MW				
NY Selling to NE	Max "Load" Bid	ISO-NE Proxy LBMP	Bid \geq ISO-NE Proxy LBMP?	Bid Accepted/Rejected
LBMP Export	\$30/MW	\$68/MW		

Replacement Energy - Import Bilateral Transactions

- For import bilateral transactions, if the Bid is completely or partially rejected during evaluation
 - The Load obligation must be met by purchasing energy from the NYISO market at LBMP prices – Replacement Energy

Example:

Bid Curve:

MW	100
\$/MW	\$35

If LBMP = \$29/MW, Bid is Rejected during Evaluation

The energy import offer of 100MWs must be purchased from the NYISO market at LBMP prices by the FRP (Replacement Energy)

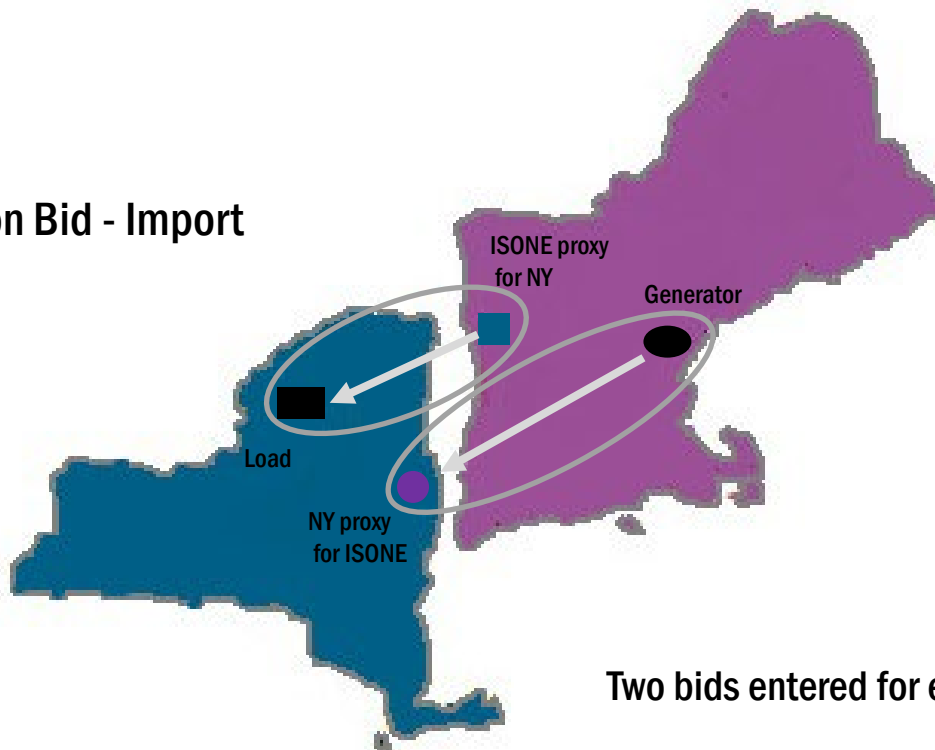
Coordinated Transaction Scheduling

- Mechanism to bid external transactions at CTS enabled interfaces
- Applicable to NY-PJM and NY-ISO-NE transactions at CTS enabled interfaces
- Only available in the Real-Time market
- Applicable for imports and exports
- Bids represent the spread or difference between the NYISO and
- PJM/ISO-NE forecasted Proxy Bus prices

Coordinated Transaction Scheduling - New York ISO

Illustration

Traditional Transaction Bid - Import



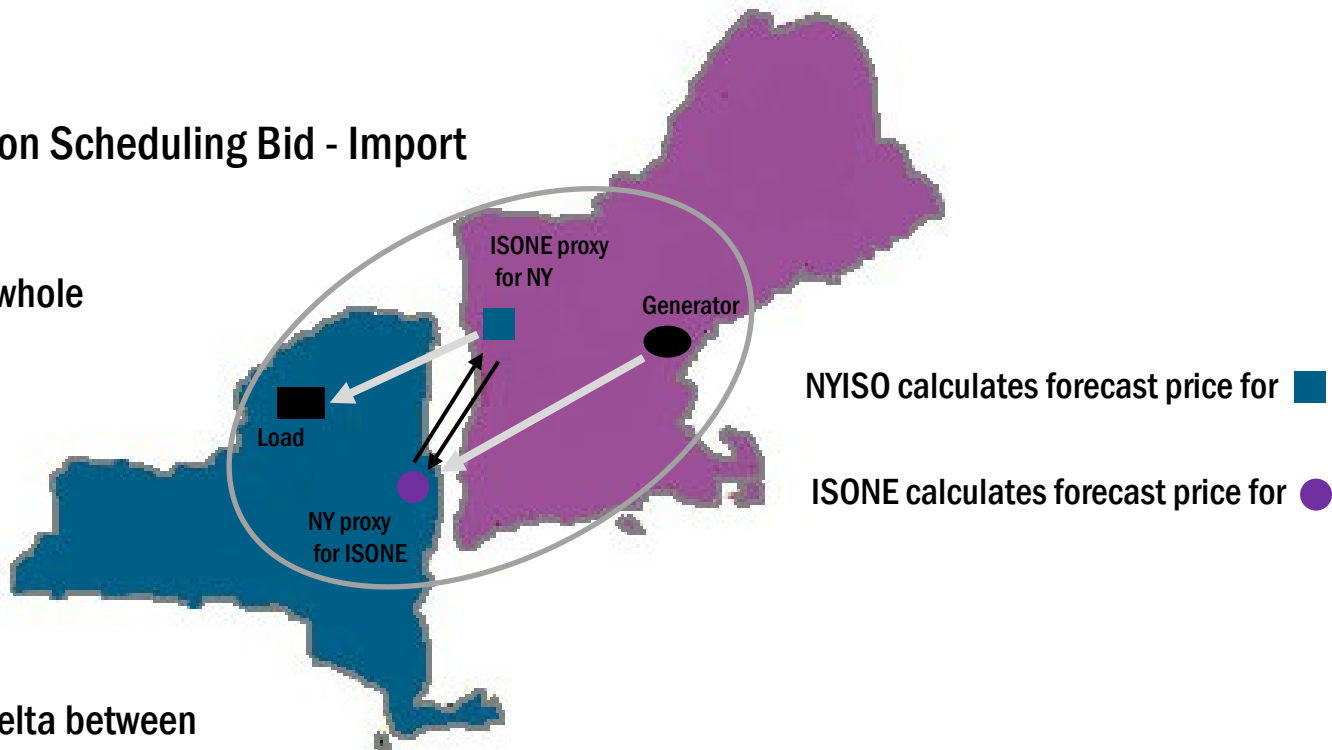
Two bids entered for each leg of transaction

Coordinated Transaction Scheduling - New York ISO

Illustration

Coordinated Transaction Scheduling Bid - Import

Only one bid entered for whole transaction



CTS Import Bid compared to delta between the two forecast prices (dependent on direction of flow)

CTS Bid Evaluation

- CTS bids are evaluated economically against the difference (or spread) between the NYISO vs. PJM/ISONE forecasted Proxy Bus prices

If Bid \leq Expected Spread Bid is **ACCEPTED**

If Bid $>$ Expected Spread BID is **REJECTED**

CTS Import Example

Import CTS bid = \$5/MW (e.g. PJM to NY)

PJM projected price at NYISO connection = \$17/MW

NYISO projected price at PJM proxy = \$23/MW

CTS Import: PJM to NY					
CTS Bid	PJM Price	NYISO Proxy Price	Spread	Bid \leq Spread?	Bid Accepted/Rejected
\$5/MW	\$17/MW	\$23/MW			

CTS Export Example

Export CTS bid = \$6/MW (e.g. NY to ISO-NE)

ISO-NE projected price at NYISO connection = \$24/MW

NYISO projected price at NE-ISO proxy = \$16/MW

CTS Export: NY to ISO-NE					
CTS Bid	NYISO Proxy Price	ISO-NE Price	Spread	Bid \leq Spread?	Bid Accepted/Rejected
\$6/MW	\$16/MW	\$24/MW			

CTS- Comparison between PJM and ISO-NE

<u>Feature</u>	<u>PJM</u>	<u>ISO-NE</u>
<u>CTS Scheduling locations</u>	Keystone Linden VFT Neptune Hudson Transmission Project (HTP)	Sandy Pond
<u>Import/Export CTS Bid</u>	Permitted (15-minute scheduling)	Required (15-minute scheduling)
<u>Decremental/Sink Price Cap Bid</u>	Permitted (15-minute scheduling)	Not Permitted
<u>Bid Makeup</u>	Bid contains up to a 11 point MW/\$ bid curve	Bid contains 1 point MW/\$ bid

Wheel-through Bilateral Transactions

- Bid is evaluated against the Congestion Cost of the transaction
- Congestion Cost is difference between congestion at the sink and the congestion at the source

$$\text{Congestion cost} = (\text{Congestion sink} - \text{Congestion source})$$

The Transaction will be accepted if $\text{Bid} < \text{Congestion Cost}$

Wheel Through Bid- Example

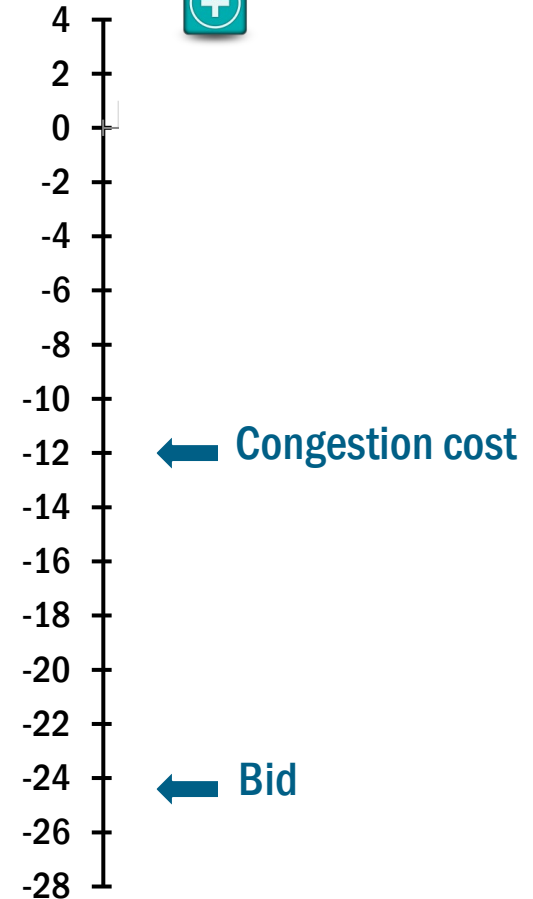
Will this wheel-through bid be accepted?

Transaction from NE to PJM (10 MW): Bid = \$-24/MW

Sink	LBMP =	\$104/MW
	Energy	\$82/MW
	Loss	\$5/MW
	Congestion	\$-17/MW
Source	LBMP =	\$92/MW
	Energy	\$82/MW
	Loss	\$5/MW
	Congestion	\$-5/MW

Congestion Cost = $(-17) - (-5) = -12/\text{MW}$

Is $-\$24 < -\12 ?



Let's Review

MP enters transaction bid in DAM as follows:

PJM to NY

Bid price: \$35/MW for 20 MWs

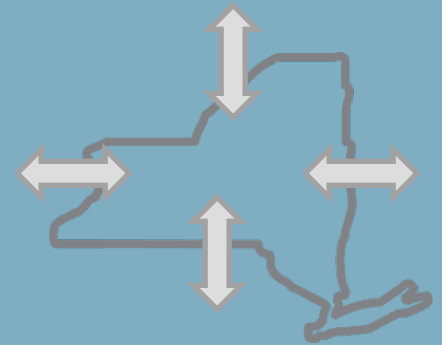
PJM Proxy Bus DAM LBMP = \$50/MW

This bid is Rejected during evaluation

True

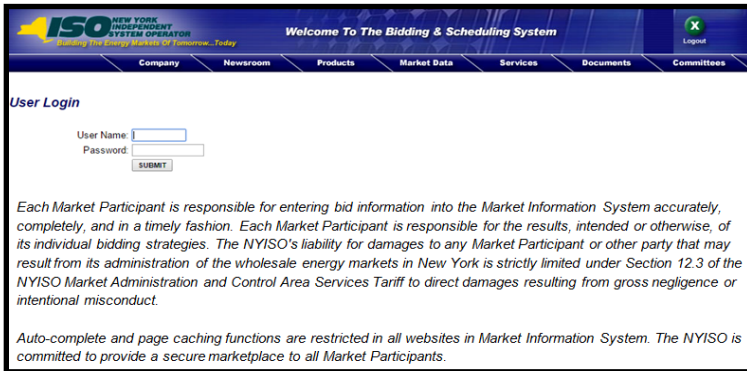
False

Market Mechanics



Entering Transactions into NYISO Web Interfaces


Market Information System (MIS)



The screenshot shows the MIS User Login page. At the top, there is a navigation bar with the NYISO logo and the text "NEW YORK INDEPENDENT SYSTEM OPERATOR" and "Ensuring The Smooth Markets Of Tomorrow... Today". Below the navigation bar, there is a "Welcome To The Bidding & Scheduling System" message and a "Logout" button. The main content area is titled "User Login" and contains a form with "User Name" and "Password" fields, a "SUBMIT" button, and a "Logout" button. Below the form, there is a disclaimer: "Each Market Participant is responsible for entering bid information into the Market Information System accurately, completely, and in a timely fashion. Each Market Participant is responsible for the results, intended or otherwise, of its individual bidding strategies. The NYISO's liability for damages to any Market Participant or other party that may result from its administration of the wholesale energy markets in New York is strictly limited under Section 12.3 of the NYISO Market Administration and Control Area Services Tariff to direct damages resulting from gross negligence or intentional misconduct." At the bottom, there is a note: "Auto-complete and page caching functions are restricted in all websites in Market Information System. The NYISO is committed to provide a secure marketplace to all Market Participants."

Internal Bilateral Transactions

Joint Energy Scheduling System (JESS)



The screenshot shows the JESS User Login page. At the top, there is the NYISO logo and the text "NEW YORK INDEPENDENT SYSTEM OPERATOR". Below the logo, there is the text "Joint Energy Scheduling System". The main content area contains a form with "User Name" and "Password" fields, a "Log In" button, and a link to "Need to Change Your Password?". Below the form, there is a disclaimer: "Each Market Participant is responsible for entering bid information into the Market Information System accurately, completely, and in a timely fashion. Each Market Participant is responsible for the results, intended or otherwise, of its individual bidding strategies. The NYISO's liability for damages to any Market Participant or other party that may result from its administration of the wholesale energy markets in New York is strictly limited under Section 12.3 of the NYISO Market Administration and Control Area Services Tariff to direct damages resulting from gross negligence or intentional misconduct." At the bottom, there is a note: "Autocomplete and page caching functions are restricted in all websites in Market Information System. The NYISO is committed to provide a secure marketplace to all Market Participants."

External Transactions

NERC Electronic-Tags (E-Tags)

- All RT market External Transactions require a NERC E-Tag
 - Identifies a transaction to all appropriate Control Areas
 - E-Tag must be submitted at least 75 minutes prior to the dispatch hour (before HAM closes) or NYISO will not evaluate transaction

- PSE (Purchase/Selling Entities) submit E-Tags through OATI (Tagging Authority)
 - PSE is responsible for entering and updating E-Tags
 - E-Tag centralized database automatically notifies NYISO and other Balancing Authorities (Control Areas) each time the E-tag is created or modified
 - Balancing Authorities approve or deny a transaction based on the information from the E-Tag

- Energy Profile in E-Tag and in MIS transaction schedule must match

E- Tag Identifier

- Each E-tag is identified by a unique E-Tag Identifier
- The E-Tag Identifier contains
 - Source Balancing Authority Entity (SCA) Code
 - PSE Code (Tag Author PSE)
 - Unique Transaction identifier (e-tag Code/Unique)
 - Sink (Receiving) Balancing Authority Entity (RCA) Code

Bid Date:

Num Hours:

Market:

Schedule Type: ?

NERC Tag:

SCA

PSE

Unique Num


RCA

JESS Screen for Submitting an External Transaction

Logged in as: [redacted]
Manage Trusts | Upload/Download | Visit Marketplace | Logout

Joint Energy Scheduling System

Dashboard > Bidding



Contract Details

Transaction ID: [redacted] Your Organization is a Financially Responsible Party ("FRP") for this Contract.

Source: [redacted] Sink: [redacted]
 User Reference: [redacted] Multi-Hour Block Transaction: No
 NYISO FRP: [redacted]
 Non-NYISO FRP: [redacted]
GIS: Missing the optional GIS Identifier

New Bid (from existing bid)

In Progress

Bid Date: 07/06/2015 23:00 EDT

Num Hours:

Market: DAM

Schedule Type: Hourly LBHP

NERC Tag:

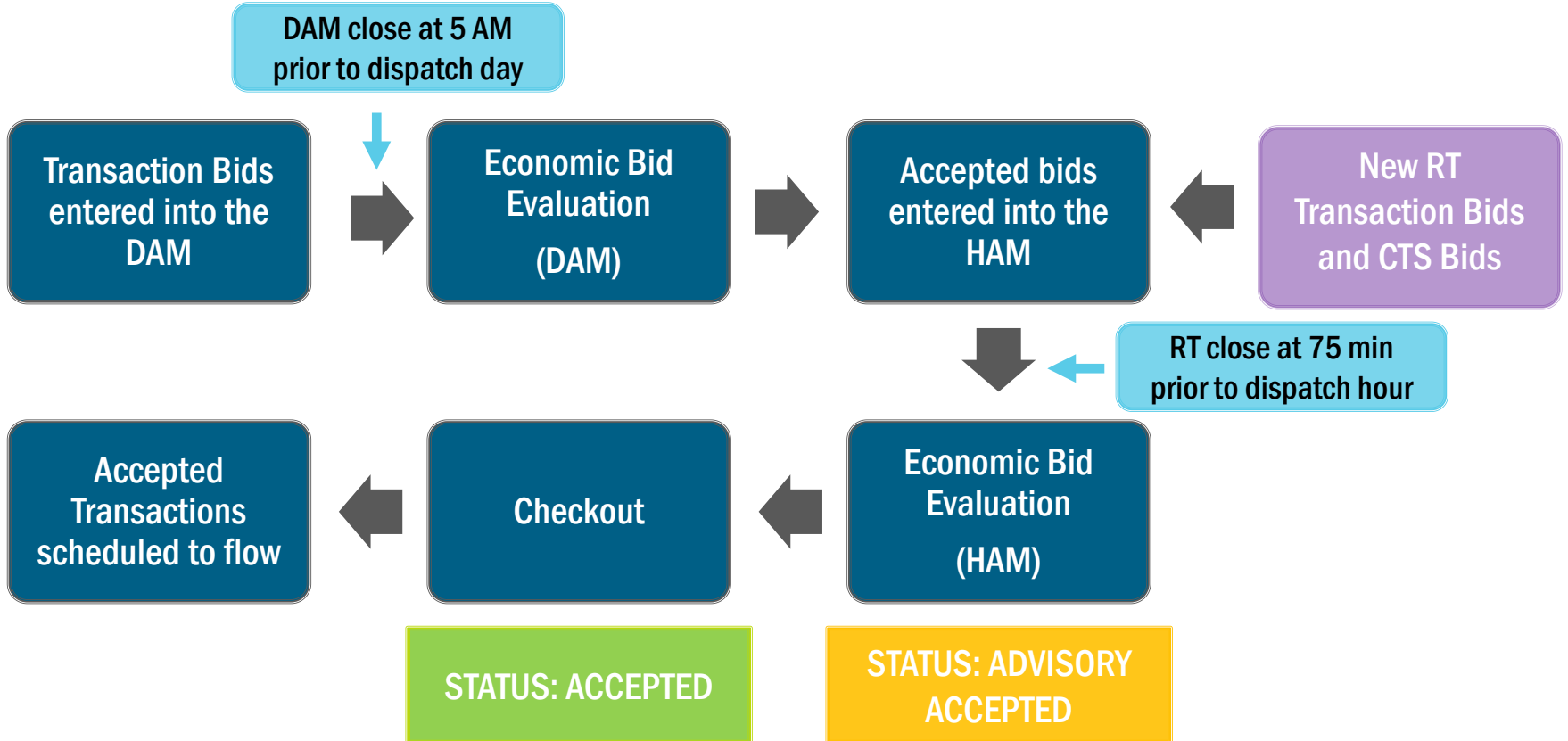
SCA PSE Unique Num RCA

Curve Time Frame: 23:00 - 23:59 **Energy Profile MW:** 1 **RTM Bid Price:**

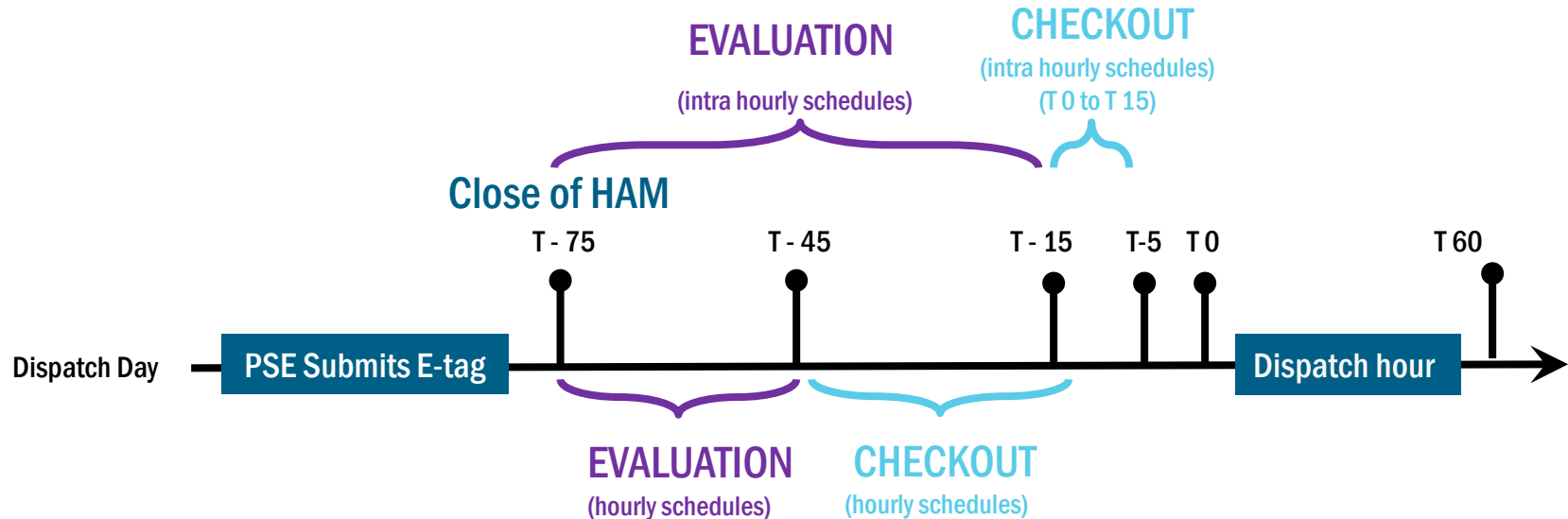
Point	1	2	3	4	5	6	7	8	9	10	11
MW	<input type="text" value="1"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
\$ Price	<input type="text" value="999.7"/>	<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"/>

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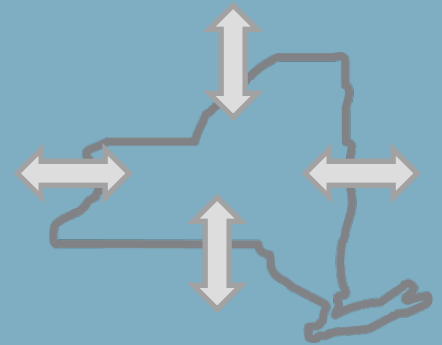
Transaction Scheduling – Process Flow



Transaction Scheduling, Process and Timeline, RT



Transactions- Settlements



Transaction Settlements

LBMP

- Import
- Export

- Proxy LBMP(\$/MW)*MWs

Bilateral

- Internal
- External

- Transmission Usage Charge (TUC)
- Energy price negotiated directly

Settlement of LBMP- Import and Export

- Purchasing or selling energy at the external proxy LBMP

DAM – Settle as follows:

DAM LBMP (proxy bus) x DAM MWh

RT – Settle as follows:

RT LBMP (proxy bus) x RT MWh
(~5-minute level)

Transmission Usage Charge (TUC)

- Transmission Usage Charge (TUC) is the cost of moving the power from source to sink
- Component of LBMP

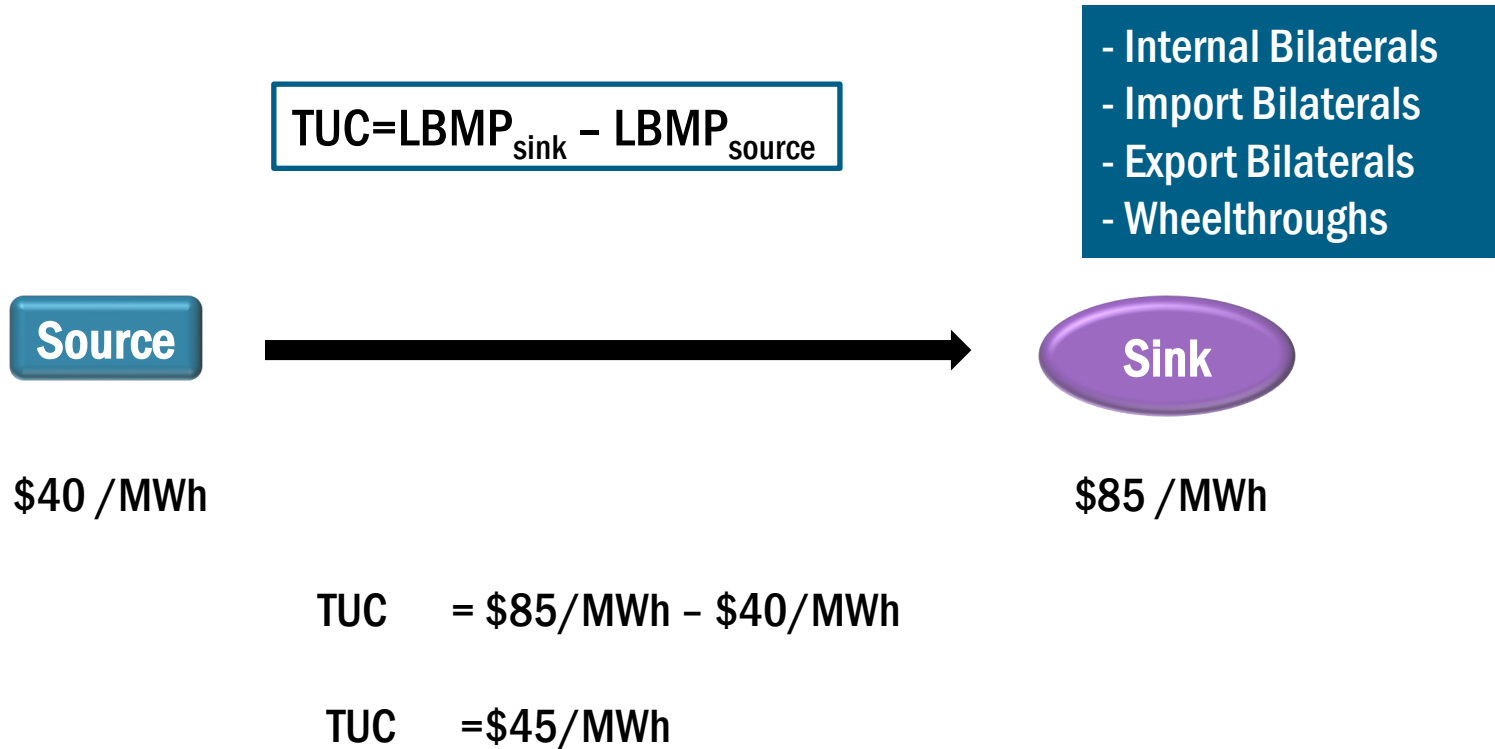
$$\text{LBMP} = \text{Marginal Energy Price} + \underbrace{(\text{Loss}) - (\text{Congestion})}_{\text{TUC}}$$

(Reference Bus Energy Price)

- For a transaction, TUC is calculated as

$$\text{TUC} = [\text{Sink LBMP } (\$/\text{MW}) - \text{Source LBMP } (\$/\text{MW})] \times \text{MWs}$$

TUC Settlement for Bilateral Transactions



Let's Review

Who is billed for the TUC on a bilateral transaction?

Generator

Load

Transaction Owner

Transaction Settlements - Summary

- **Imports (injections)** – are typically paid
 - LBMP Transactions: Energy, Loss and Congestion
- **Exports (withdrawals)** – are typically charged
 - LBMP Transactions: Energy, Loss and Congestion
- **Bilateral Transactions: Transmission Usage Charge** – typically assessed to the FRP (Financially Responsible Party) or the Transaction owner
 - (Δ Loss and Congestion)



Additional Settlement Charges

- **Financial Impact Charge (FIC)**
 - MPs may also be charged curtailment charges due to MPs actions

- **Ancillary Services Charges**
 - Scheduling System Control & Dispatch
 - Operating Reserve
 - Voltage Support

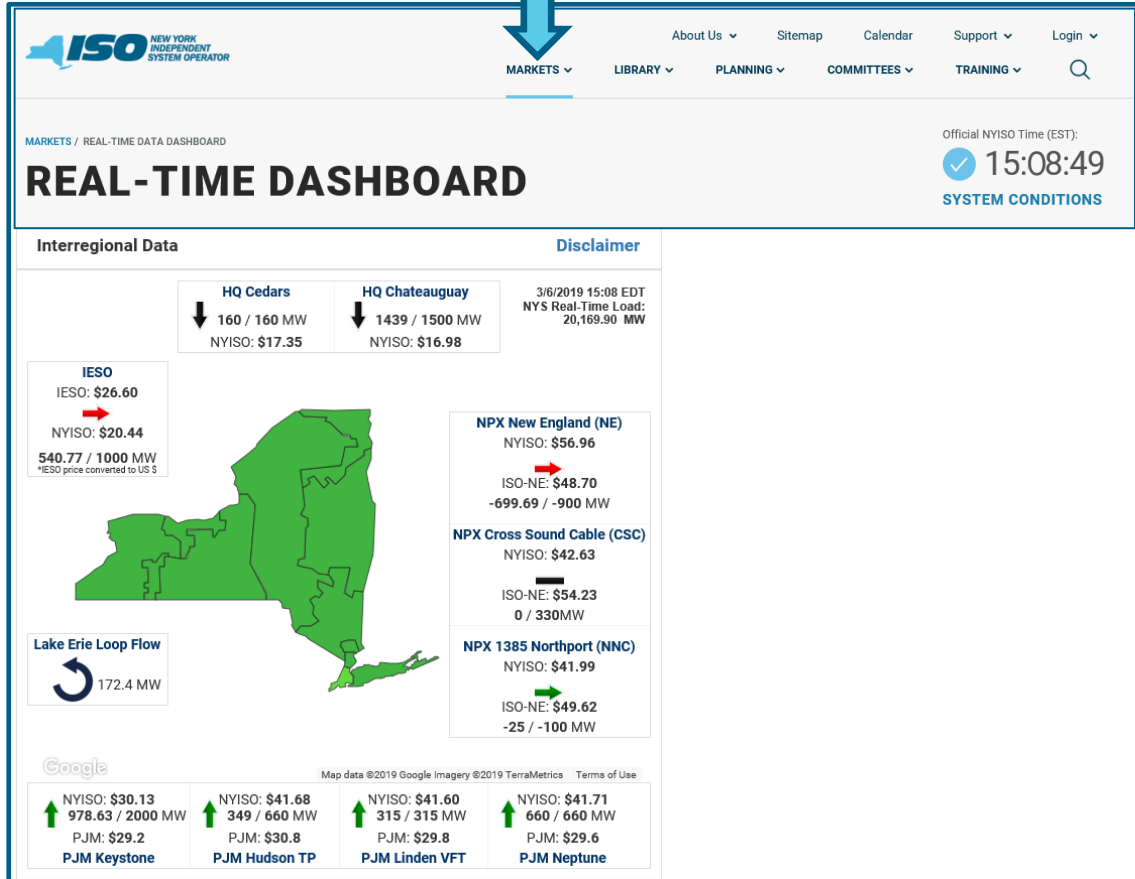
- **Transmission Charges ***
 - Transmission Service Charge (TSC)
 - NYPA Transmission Adjustment Charge (NTAC)

Quick Reference Sheet

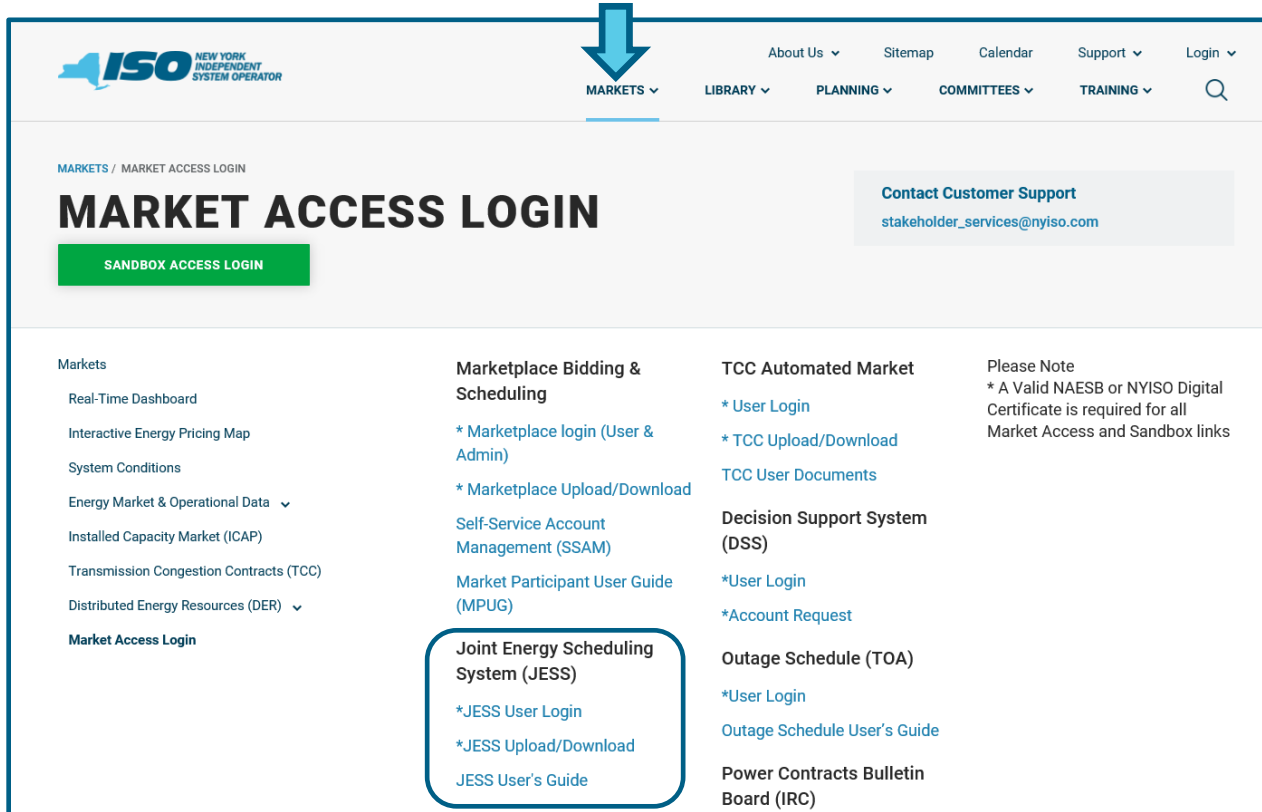
Transaction Type	LBMPs	TUCs
Import LBMP <i>Proxy to Marcy</i>	Transaction Owner/FRP - Receives proxy LBMP	N/A Built into the LBMP
Export LBMP <i>Marcy to Proxy</i>	Transaction Owner/FRP - Pays Proxy LBMP	N/A Built into the LBMP
Import Bilateral <i>Proxy to Internal Load</i>	For Replacement Energy only - Transaction Owner/FRP - pays proxy LBMP	Transaction Owner/FRP - Pays
Export Bilateral & Wheels <i>Internal Gen to Proxy; Proxy to Proxy</i>	N/A	Transaction Owner/FRP - Pays
Internal Bilateral <i>Internal Gen to Internal Load (including Hubs)</i>	N/A	Transaction Owner - Pays

Transactions– NYISO Website Data

Interregional Data – Imports and Exports



JESS- Market Access Login



The screenshot shows the NYISO website's Market Access Login page. A blue arrow points to the 'MARKETS' dropdown menu in the top navigation bar. The page title is 'MARKET ACCESS LOGIN' with a sub-link for 'SANDBOX ACCESS LOGIN'. A 'Contact Customer Support' box provides the email stakeholder_services@nyiso.com. The main content area is divided into four columns: Markets, Marketplace Bidding & Scheduling, TCC Automated Market, and a Please Note section. The 'Joint Energy Scheduling System (JESS)' section is highlighted with a rounded rectangle.

MARKETS / MARKET ACCESS LOGIN

MARKET ACCESS LOGIN

[SANDBOX ACCESS LOGIN](#)

Contact Customer Support
stakeholder_services@nyiso.com

Markets <ul style="list-style-type: none">Real-Time DashboardInteractive Energy Pricing MapSystem ConditionsEnergy Market & Operational DataInstalled Capacity Market (ICAP)Transmission Congestion Contracts (TCC)Distributed Energy Resources (DER)Market Access Login	Marketplace Bidding & Scheduling <ul style="list-style-type: none">* Marketplace login (User & Admin)* Marketplace Upload/DownloadSelf-Service Account Management (SSAM)Market Participant User Guide (MPUG)Joint Energy Scheduling System (JESS)<ul style="list-style-type: none">*JESS User Login*JESS Upload/DownloadJESS User's Guide	TCC Automated Market <ul style="list-style-type: none">* User Login* TCC Upload/DownloadTCC User DocumentsDecision Support System (DSS)<ul style="list-style-type: none">*User Login*Account RequestOutage Schedule (TOA)<ul style="list-style-type: none">*User LoginOutage Schedule User's GuidePower Contracts Bulletin Board (IRC)	Please Note * A Valid NAESB or NYISO Digital Certificate is required for all Market Access and Sandbox links
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- Distinguish between the different types of transactions
- Identify source and sink points of transactions
- Identify the different types of transaction bids
- Describe how transactions bids are evaluated
- Understand the two-step process in scheduling external transactions
- Calculate the settlement for a transaction
- Identify additional charges associated with transactions

Additional Resources:

- **Tariffs - MST and OATT**
- **Market Participants User's Guide (MPUG)**
- **JESS (Joint Energy Scheduling System) User's Guide**
- **Accounting and Billing Manual**
- **Transmission and Dispatching Operations Manual**
- **Technical Bulletins**