

Energy Market Transactions

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New York Market Orientation Course (NYMOC)

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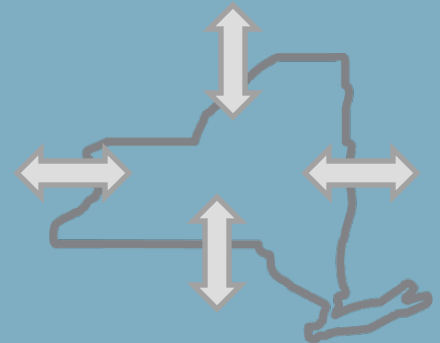
Remote Learning

Module Objectives

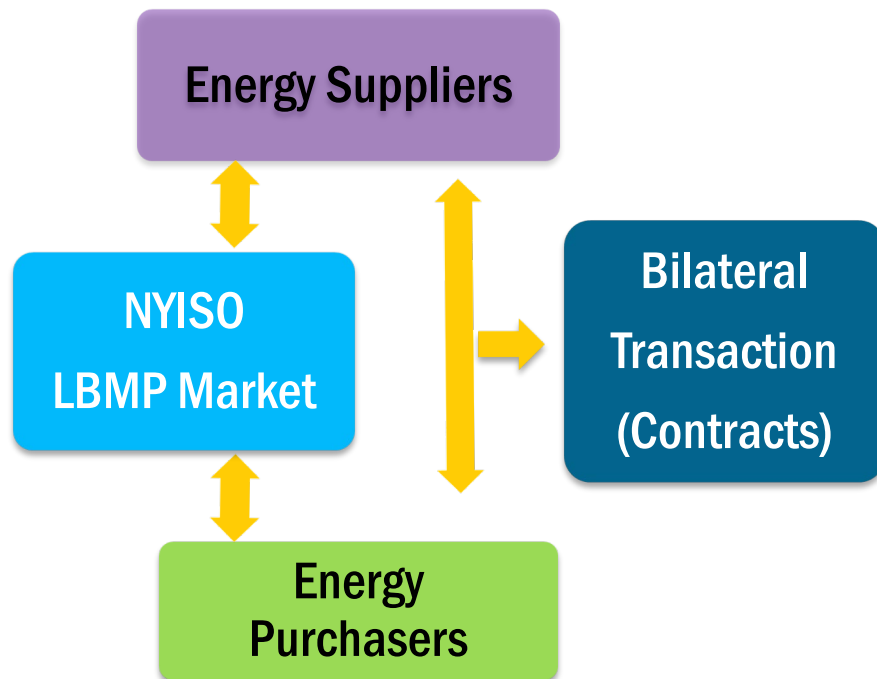
At the conclusion of this module, participants will be able to:

- 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
- 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

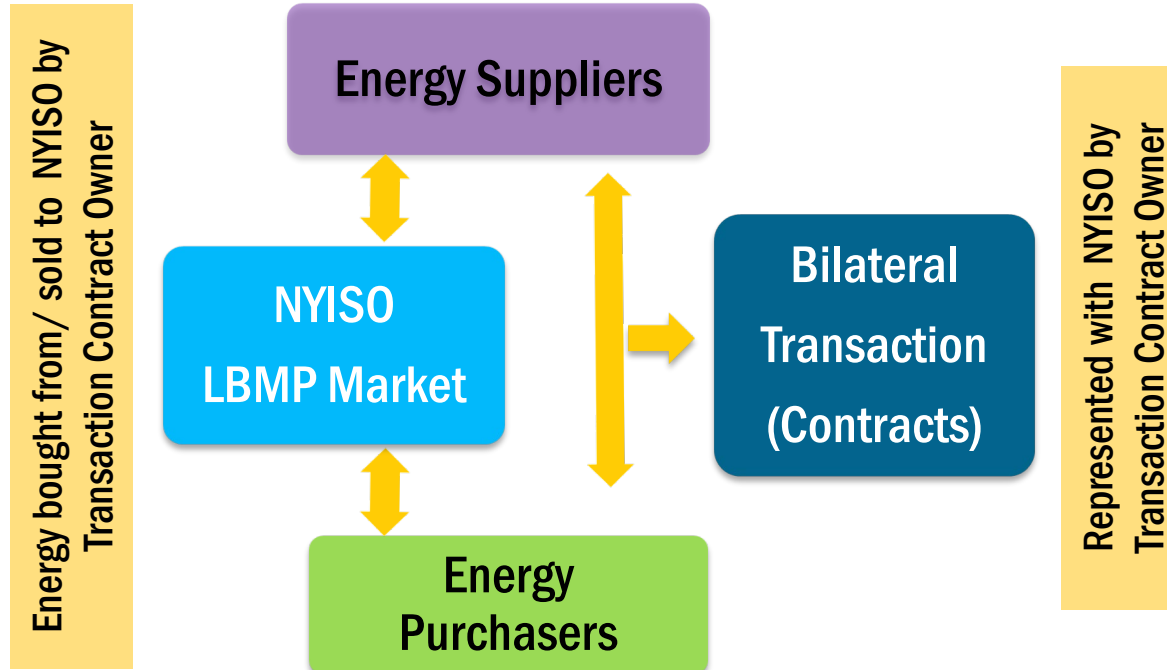
- **Why would an MP choose the Transaction option?**
 - Direct contract between supplier and purchaser with fixed long term price for energy
 - Makes financial sense: external supplier may get a better price for energy sold to NY than other control areas
 - Internal suppliers could get a better price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

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

Energy Market Transactions



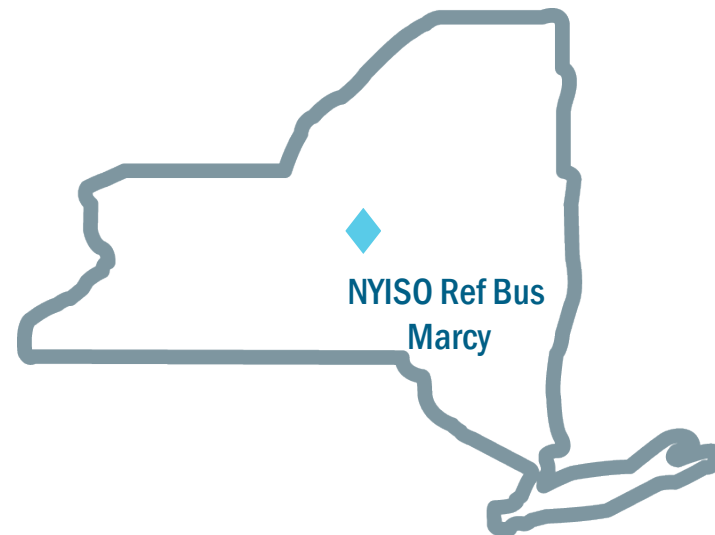
Source and Sink Points



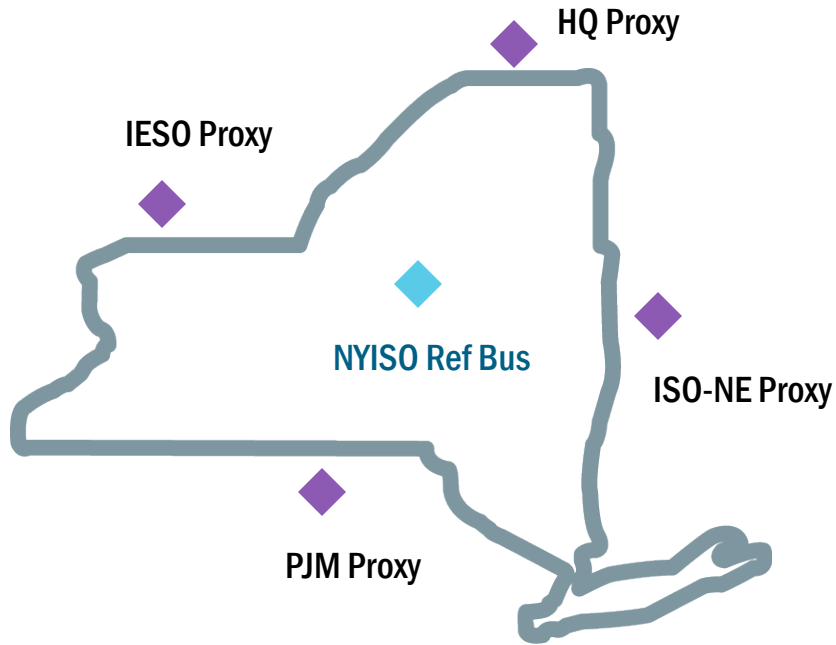
- **Source: Point of Injection (POI);** where the power is coming from, e.g., Generators
- **Sink: Point of Withdrawal (POW);** where the power is going to, e.g., Loads
- **Important role in distinguishing transactions**

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



External Proxy Bus



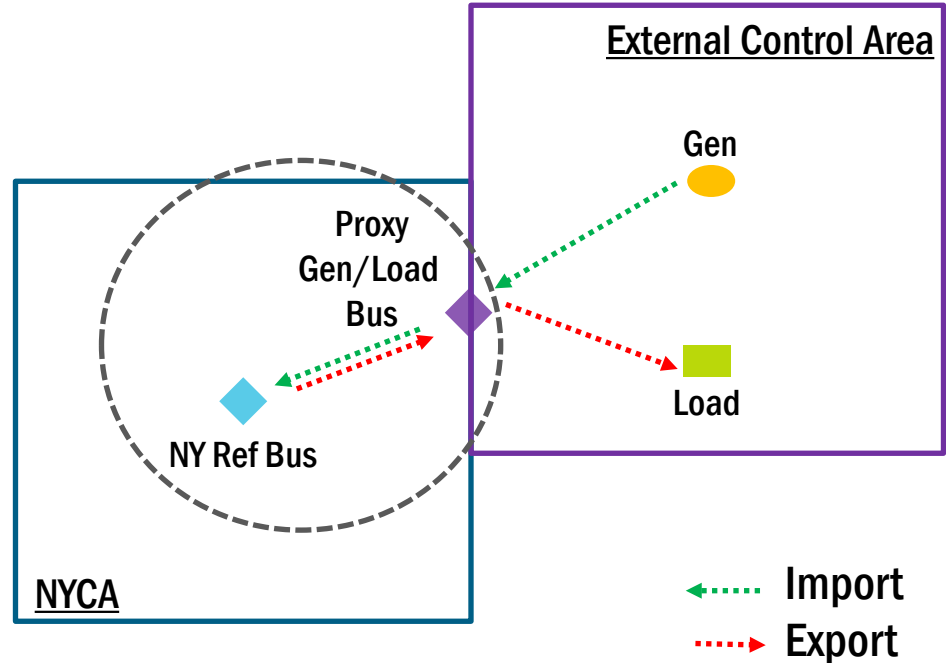
- Location outside the NYCA that is selected by the ISO to represent a load/gen bus in an adjacent Control Area
- LBMP prices for external proxy buses are calculated with reference to the NY reference bus
- NYISO designated for PJM, HQ, IESO, and ISO-NE

Control Area/Proxy Bus – Imports and Exports

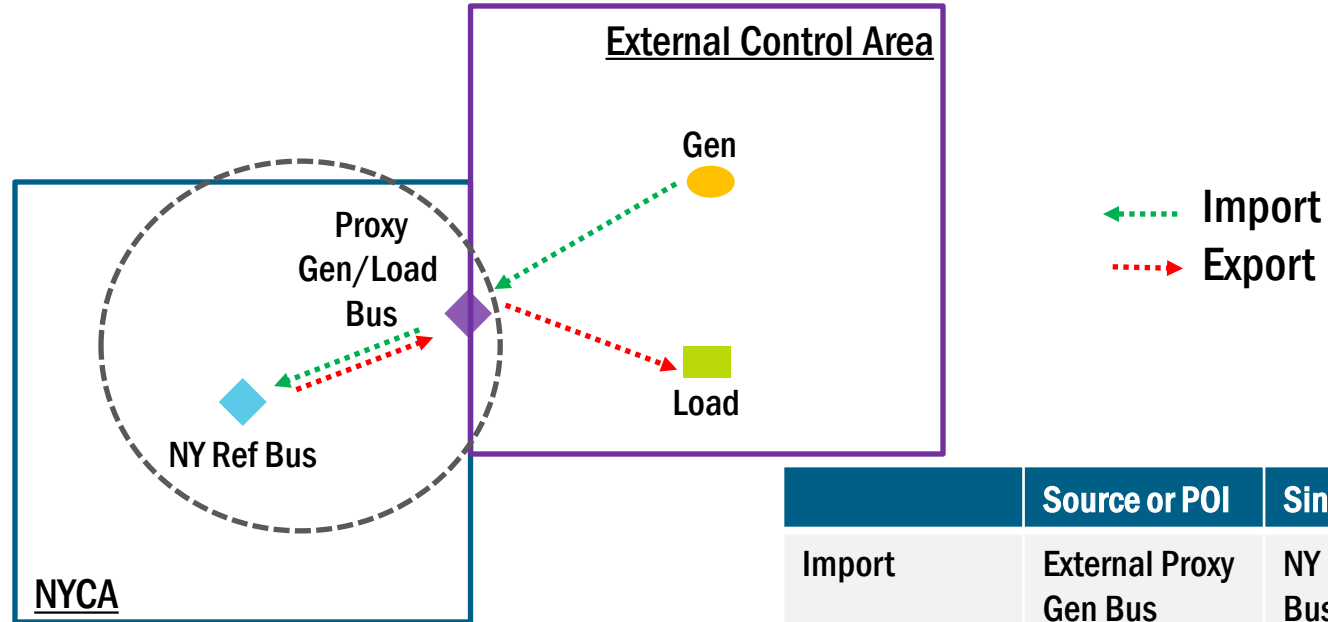
<u>Control Area - Interface</u>	<u>Source Proxy Bus</u>	<u>Sink Proxy Bus</u>
Hydro Quebec – Chateauguay Import/Export	HQ_GEN_IMPORT	HQ_LOAD_EXPORT
Hydro Quebec – Chateauguay Wheels-Through	HQ_GEN_WHEEL	HQ_LOAD_WHEEL
HQ – Dennison	HQ_GEN_CEDARS_PROXY	HQ_LOAD_CEDARS_PROXY
ISO New England	N.E._GEN_SANDY PD	N.E._LOAD_SANDY PD
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
PJM Linden VFT Scheduled Line	PJM_GEN_VFT_PROXY	PJM_LOAD_VFT_PROXY
PJM HTP Scheduled Line	PJM_GEN_HTP_PROXY	

LBMP Transactions

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



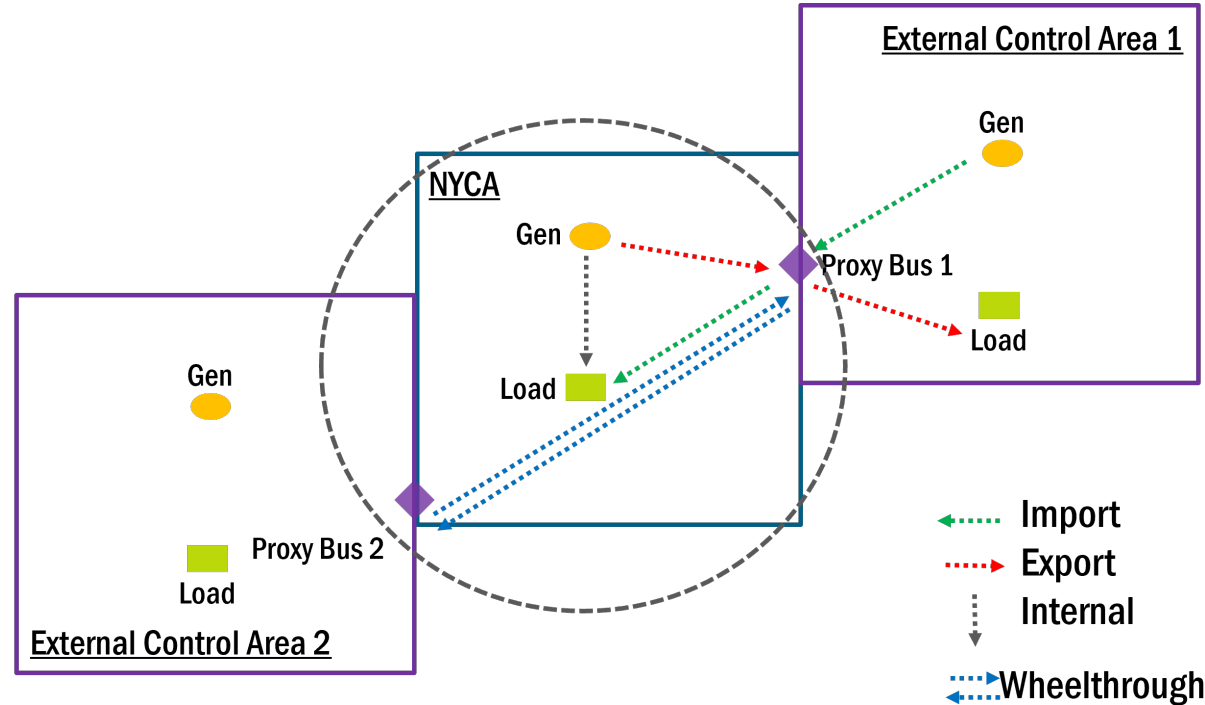
LBMP Transactions



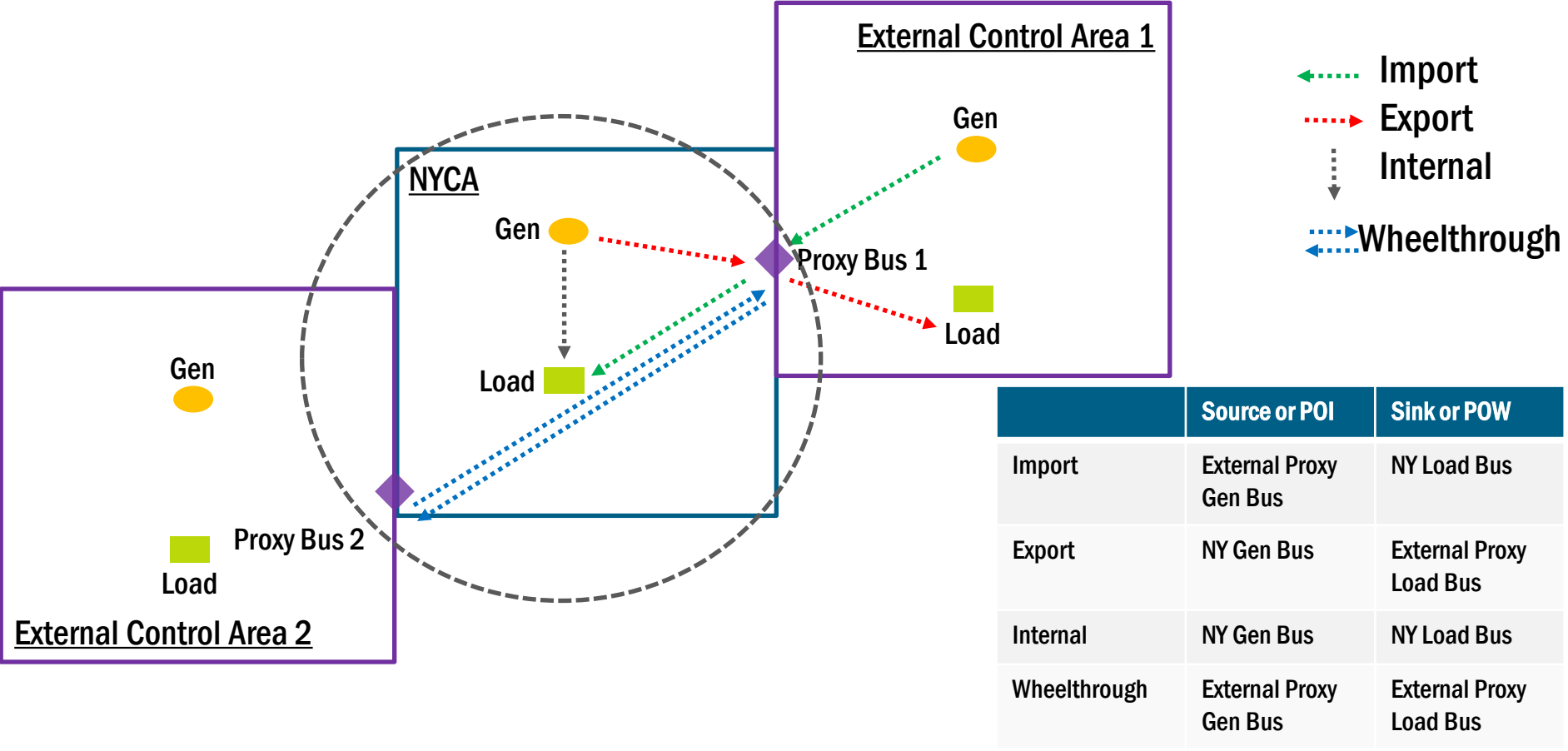
	Source or POI	Sink or POW
Import	External Proxy Gen Bus	NY Reference Bus
Export	NY Reference Bus	External Proxy Load Bus

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



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?**

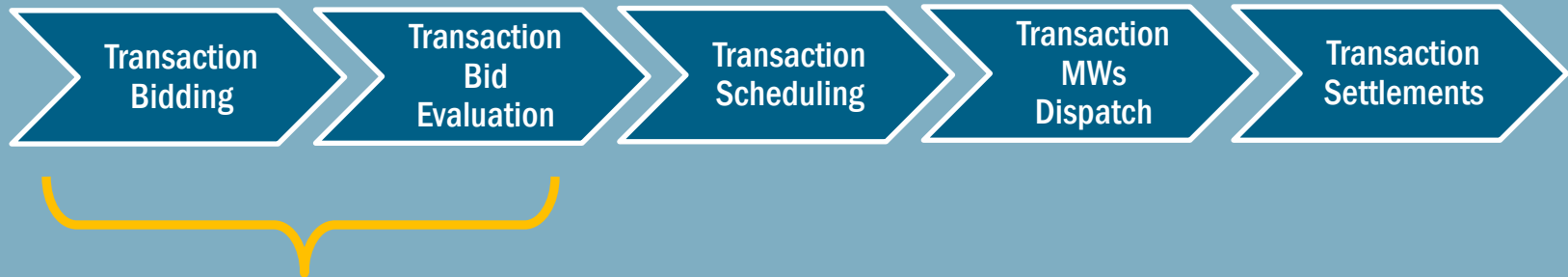
Internal Bilateral

Import Bilateral

Export Bilateral

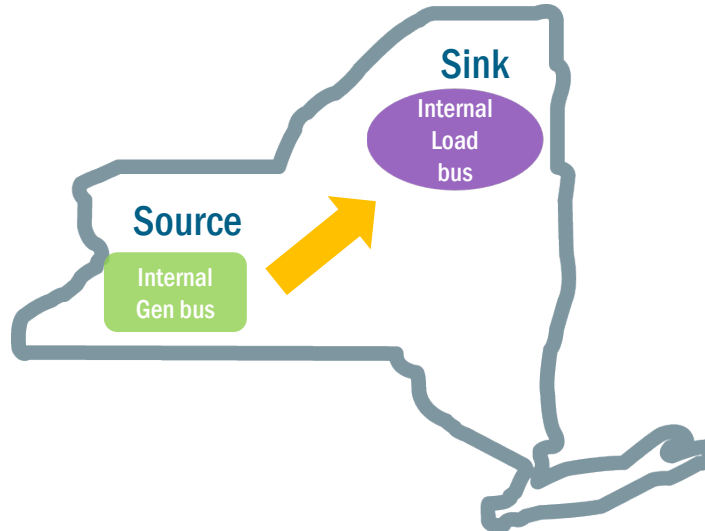
Wheelthrough

Transactions – Bids and Evaluations



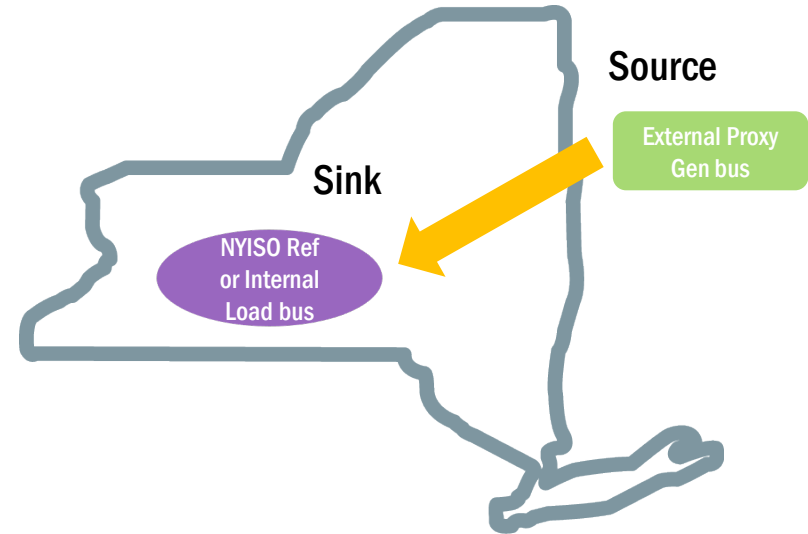
Internal Bilateral Transactions

- Scheduled automatically regardless of economics
- Bid (\$/MW) is not submitted
 - NYISO needs to be aware of MWs only



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		

Import Bid Example

- MP enters a bid of \$50/MW for a transaction from ISO-NE to NY
- ISO-NE Proxy bus price is \$45/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 \$50/MW				
NE Selling to NY	Min “Gen” Bid	ISO-NE Proxy LBMP	Bid \leq ISO-NE Proxy LBMP?	Bid Accepted/Rejected
LBMP Import	\$50/MW	\$45/MW	$50 \leq 45?$	REJECTED

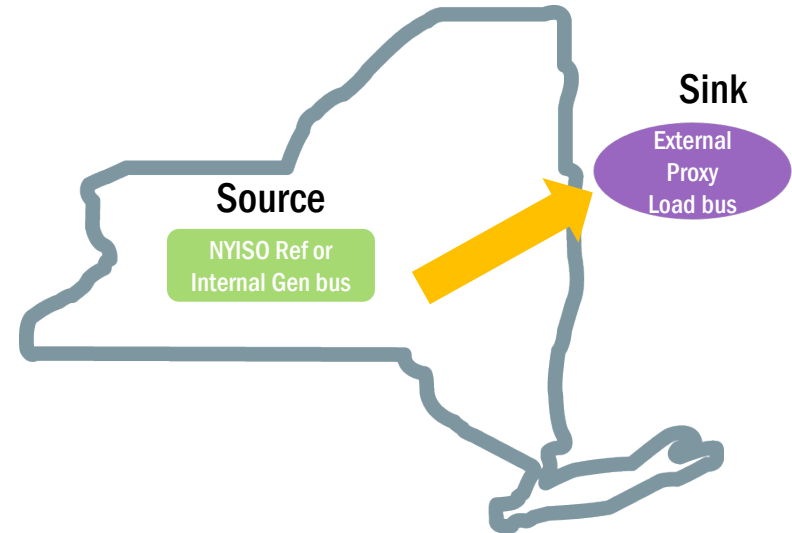
Import Bid Example

MP wants to be paid Min \$50/MW				
NE Selling to NY	Min “Gen” Bid	ISO-NE Proxy LBMP	Bid \leq ISO-NE Proxy LBMP?	Bid Accepted/Rejected
LBMP Import	\$50/MW	\$45/MW	$50 \leq 45?$	REJECTED

- 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](#)

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

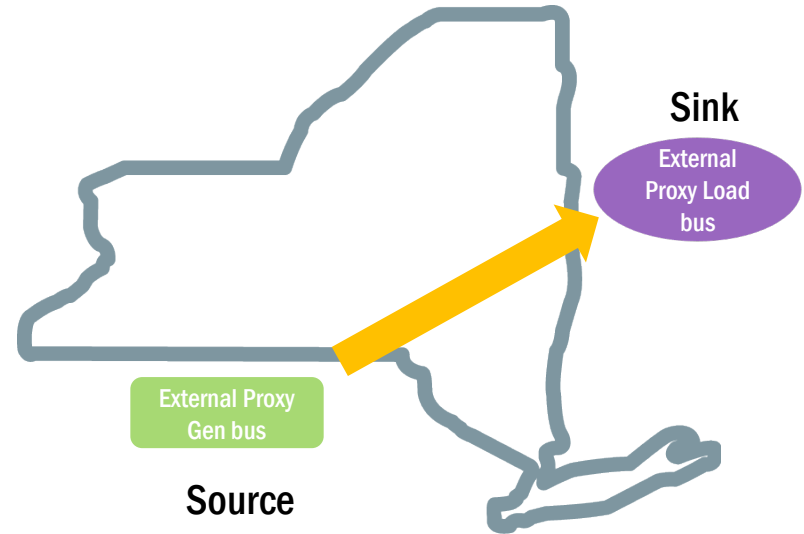
Export Bid Example

- 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		

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



Congestion cost = (Congestion sink - Congestion source)

Bid accepted if Bid < Congestion Cost

Wheel Through Bid- Example

Will this wheel-through bid be accepted?

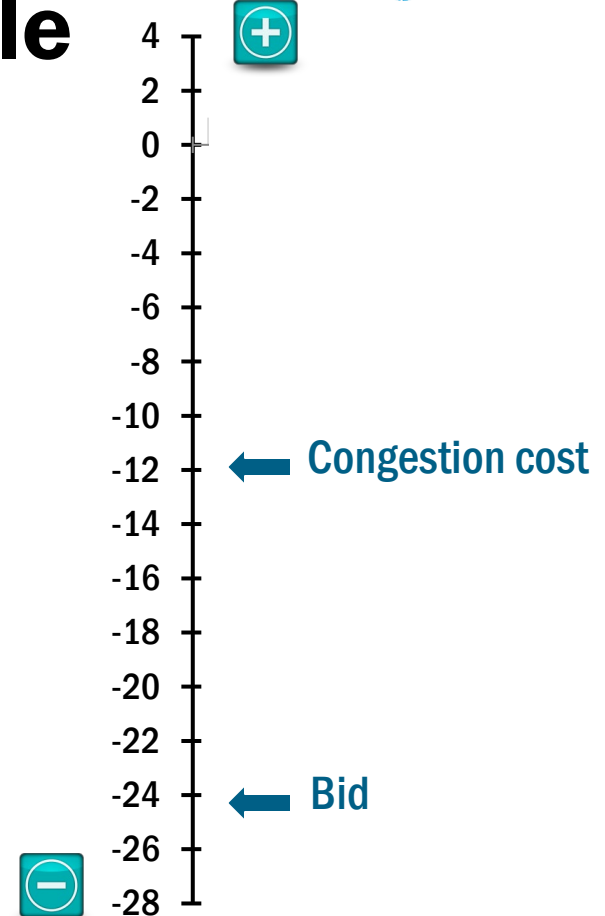
Transaction from NE to PJM (10 MW): Bid = \$-24/MW

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 ?



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

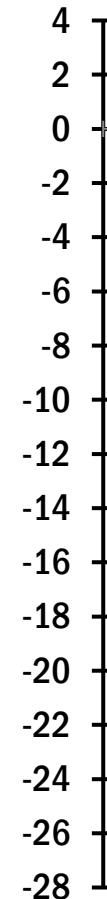
Source LBMP = \$92/MW
 Energy \$82/MW
 Loss \$5/MW
 Congestion \$-5/MW

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

Is $-\$24 < -\12 ?

Bid is less than congestion cost

Bid is **ACCEPTED**



← Congestion cost

← Bid

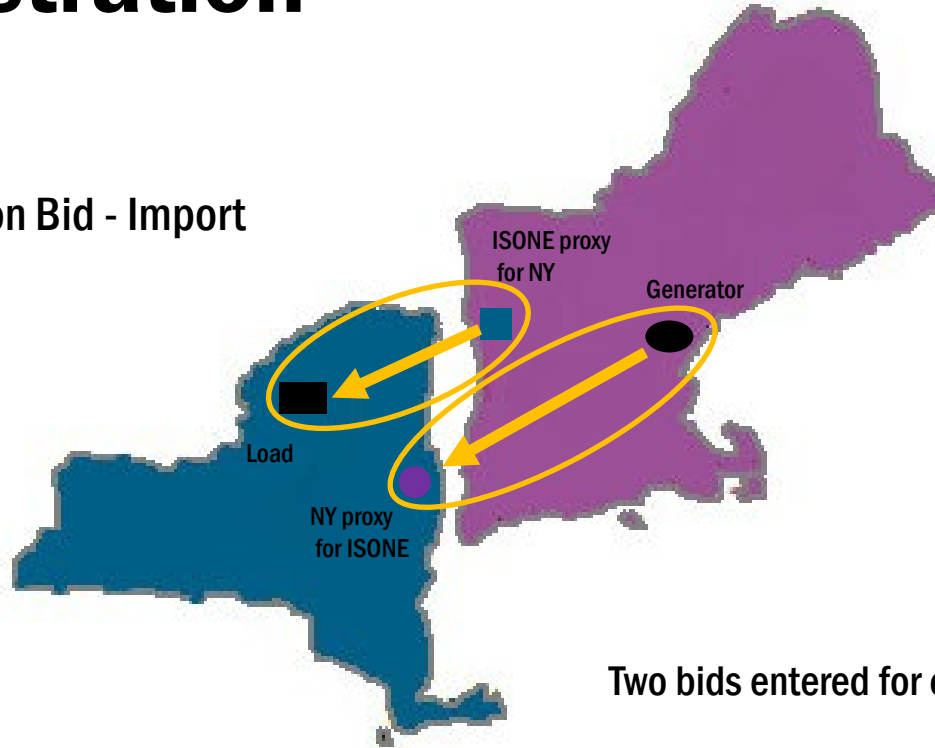


Coordinated Transaction Scheduling

- 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 (CTS) - Illustration

Traditional Transaction Bid - Import

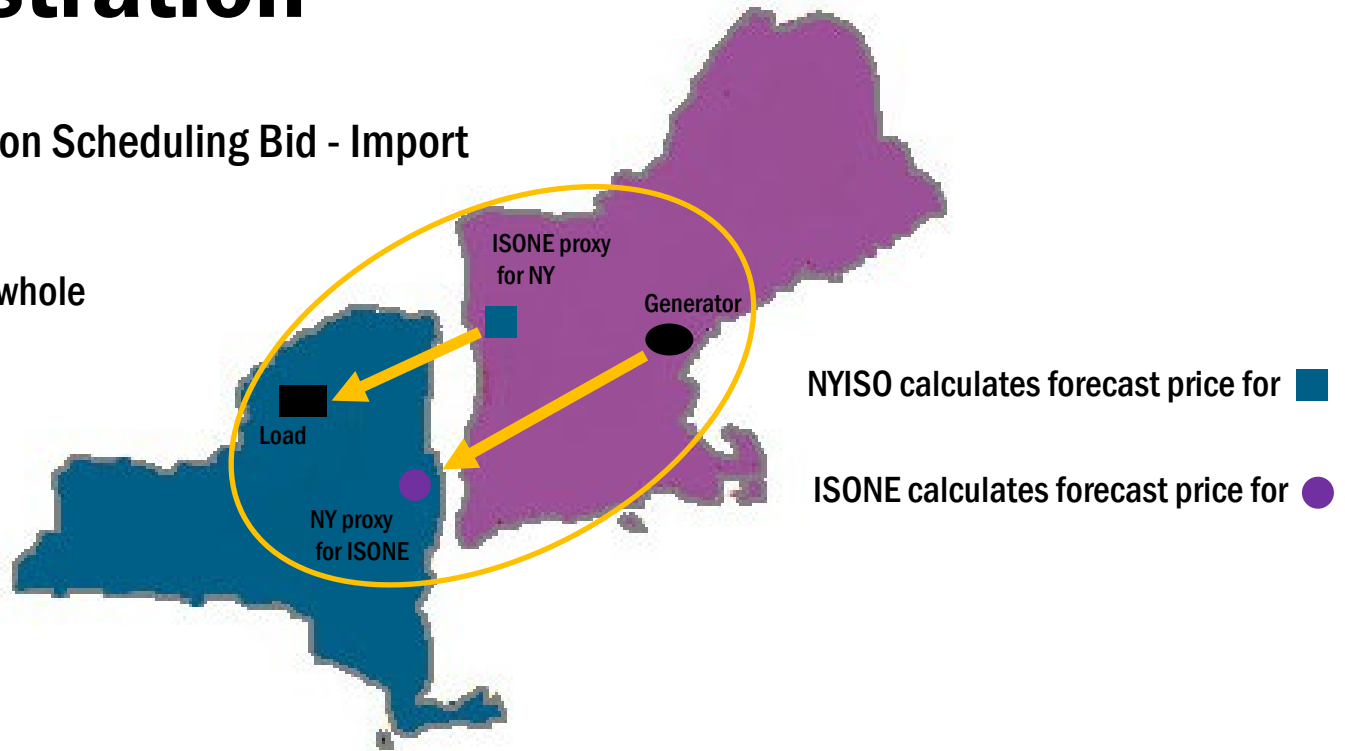


Two bids entered for each leg of transaction

Coordinated Transaction Scheduling (CTS) - Illustration New York ISO

Coordinated Transaction Scheduling Bid - Import

Only one bid entered for whole transaction

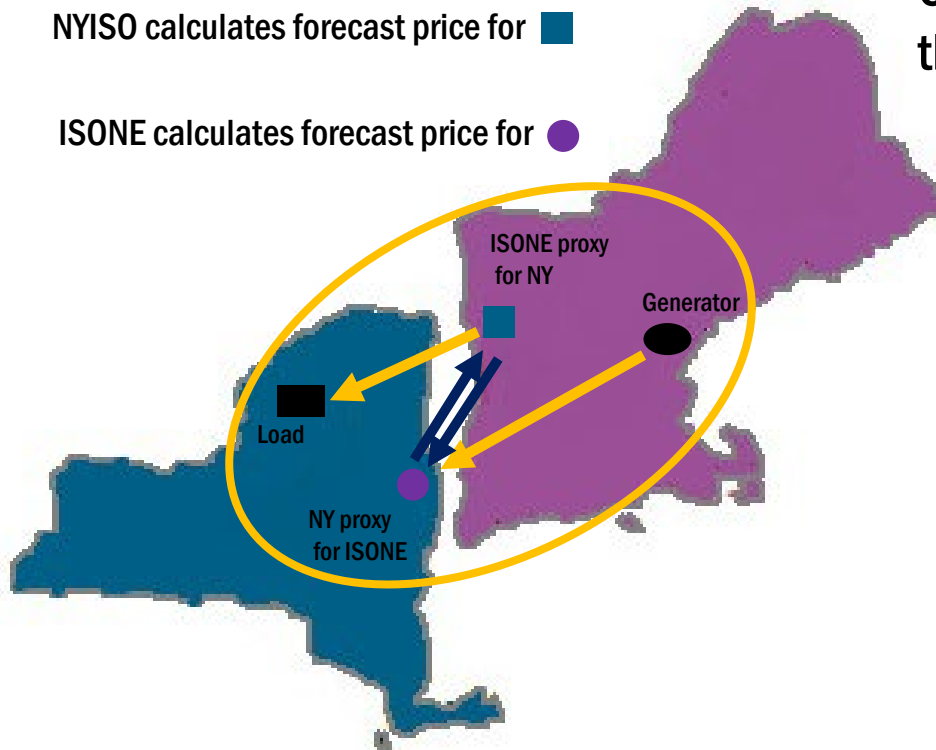


CTS– Bid Evaluation

CTS Bid compared to delta between the two forecast prices (Expected Spread)

NYISO calculates forecast price for 

ISONE calculates forecast price for 

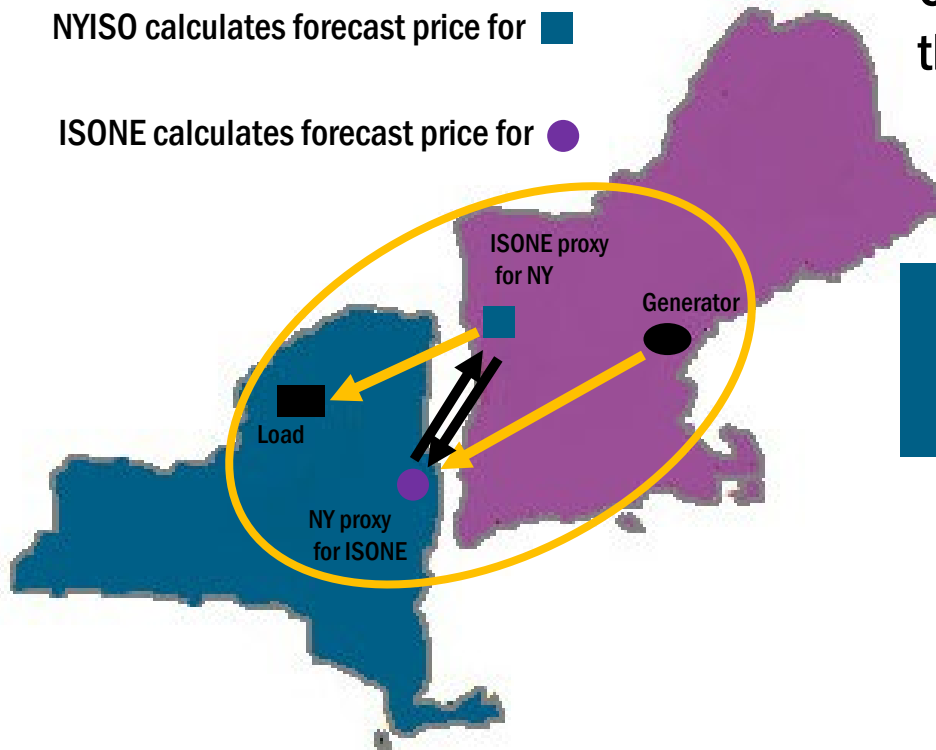


CTS– Bid Evaluation

CTS Bid compared to delta between the two forecast prices (Expected Spread)

NYISO calculates forecast price for 

ISONE calculates forecast price for 



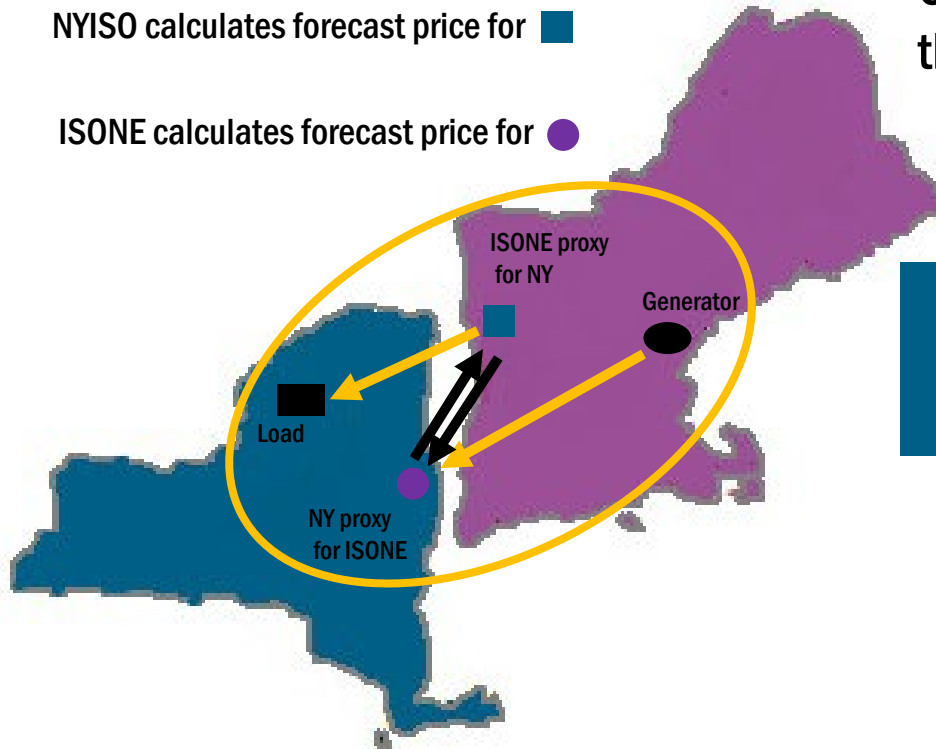
If Bid \leq Expected Spread Bid is ACCEPTED

If Bid $>$ Expected Spread BID is REJECTED

CTS– Bid Evaluation

NYISO calculates forecast price for 

ISONE calculates forecast price for 



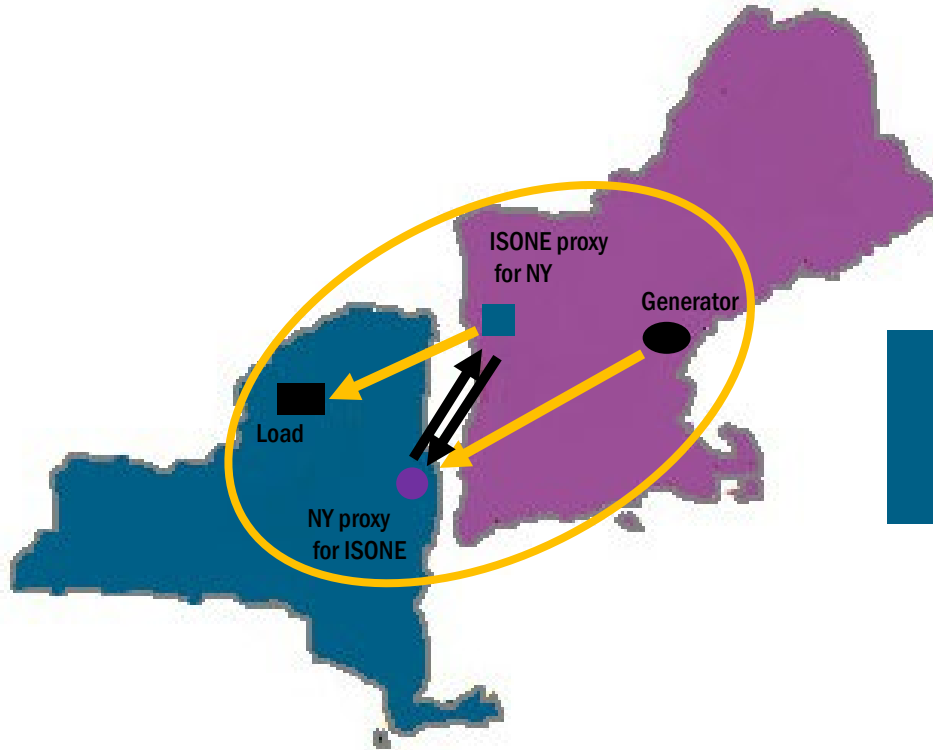
CTS Bid compared to delta between the two forecast prices (Expected Spread)

If Bid \leq Expected Spread Bid is ACCEPTED

If Bid $>$ Expected Spread BID is REJECTED

- Bid Evaluation criteria is the same for Imports and Exports
- Expected Spread calculation is dependent on direction of flow of energy

CTS Import – Bid Evaluation



CTS Import from ISONE control area to NYCA

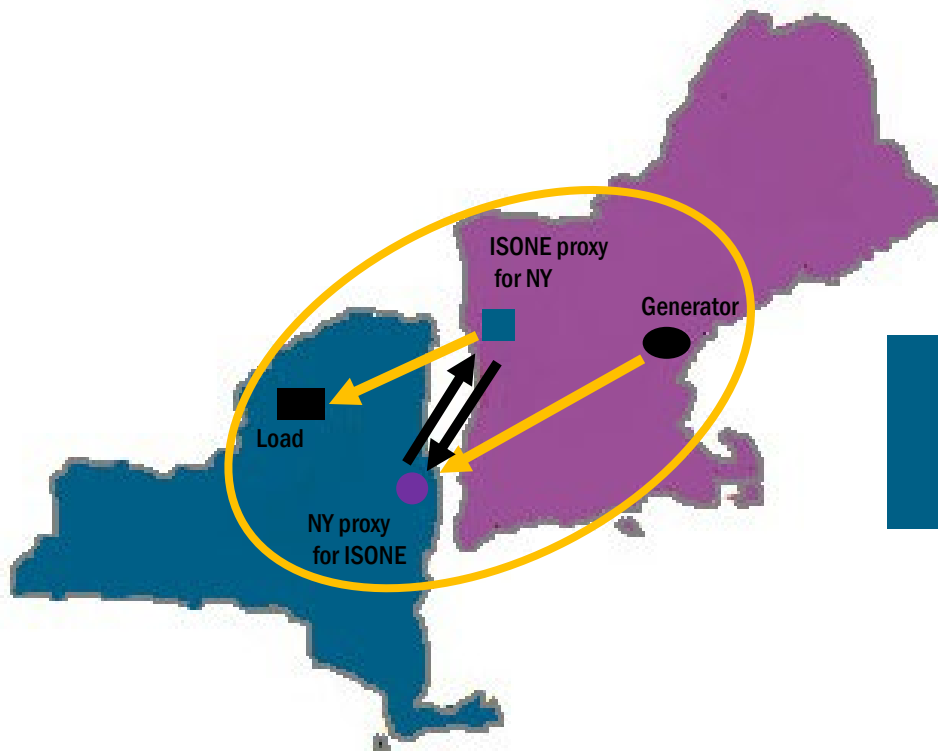
CTS Import Bid	= \$5/MW
Expected Spread (difference in forecast prices)*	= \$6/MW

If Bid ≤ Expected Spread Bid is **ACCEPTED**

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

* Expected spread calculation is dependent on the direction of flow of energy

CTS Import – Bid Evaluation



CTS Import from ISONE control area to NYCA

CTS Import Bid = \$5/MW
Expected Spread (difference in forecast prices)* = \$6/MW

If Bid ≤ Expected Spread Bid is ACCEPTED

If Bid > Expected Spread BID is REJECTED

This Bid is **ACCEPTED** as \$5/MW < \$6/MW

* Expected spread calculation is dependent on the direction of flow of energy

Transaction Bids for Evaluation - Summary

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

Let's Review

MP enters transaction bid in DAM as follows:

PJM to NY

Bid price: \$35/MW for 20 MWs

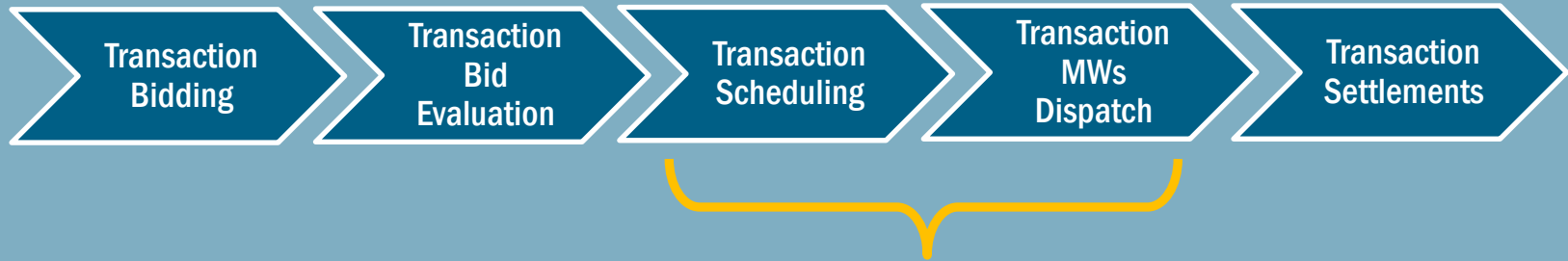
PJM Proxy Bus DAM LBMP = \$50/MW

This bid is Accepted during evaluation

True

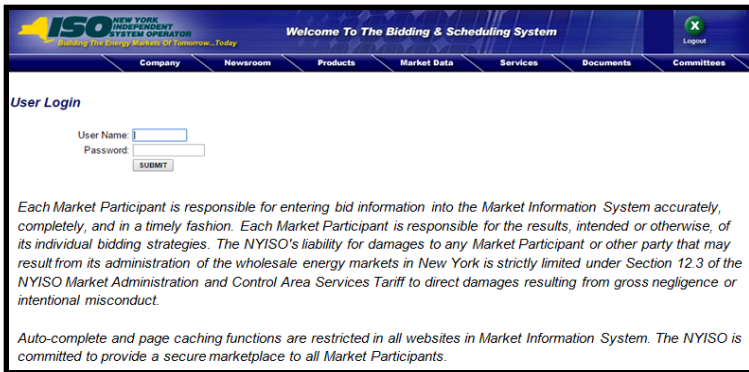
False

Market Mechanics



Entering Transactions into NYISO Web Interfaces

Market Information System (MIS)



The screenshot shows the NYISO MIS User Login page. At the top, there is a navigation bar with links for Company, Newsroom, Products, Market Data, Services, Documents, and Committees. Below the navigation bar, the "User Login" section contains input fields for "User Name" and "Password", followed by a "SUBMIT" button. A "Logout" link is visible in the top right corner. Below the login fields, there is a disclaimer paragraph stating that each Market Participant is responsible for entering bid information accurately and completely, and that the NYISO's liability for damages is strictly limited under Section 12.3 of the NYISO Market Administration and Control Area Services Tariff. At the bottom, another disclaimer states that auto-complete and page caching functions are restricted in all websites in the Market Information System.

Internal Bilateral Transactions

Joint Energy Scheduling System (JESS)



The screenshot shows the NYISO JESS User Login page. At the top, there is a large NYISO logo and the text "NEW YORK INDEPENDENT SYSTEM OPERATOR". Below the logo, the "Joint Energy Scheduling System" title is displayed. The login section includes input fields for "User Name" and "Password", followed by a "Log In" button. A link for "Need to Change Your Password?" is also present. Below the login fields, there is a disclaimer paragraph stating that each Market Participant is responsible for entering bid information accurately and completely, and that the NYISO's liability for damages is strictly limited under Section 12.3 of the NYISO Market Administration and Control Area Services Tariff. At the bottom, another disclaimer states that auto-complete and page caching functions are restricted in all websites in the Market Information System.

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:
Manage Trusts
Upload/Download
Visit Marketplace
Logout

Joint Energy Scheduling System


[Dashboard](#) > [Bidding](#)

Contract Details

Transaction ID:

Your Organization is a Financially Responsible Party ("FRP") for this Contract.

Source:
Sink:

User Reference:
Multi-Hour Block Transaction: No

NYISO FRP:

Non-NYISO FRP:

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:

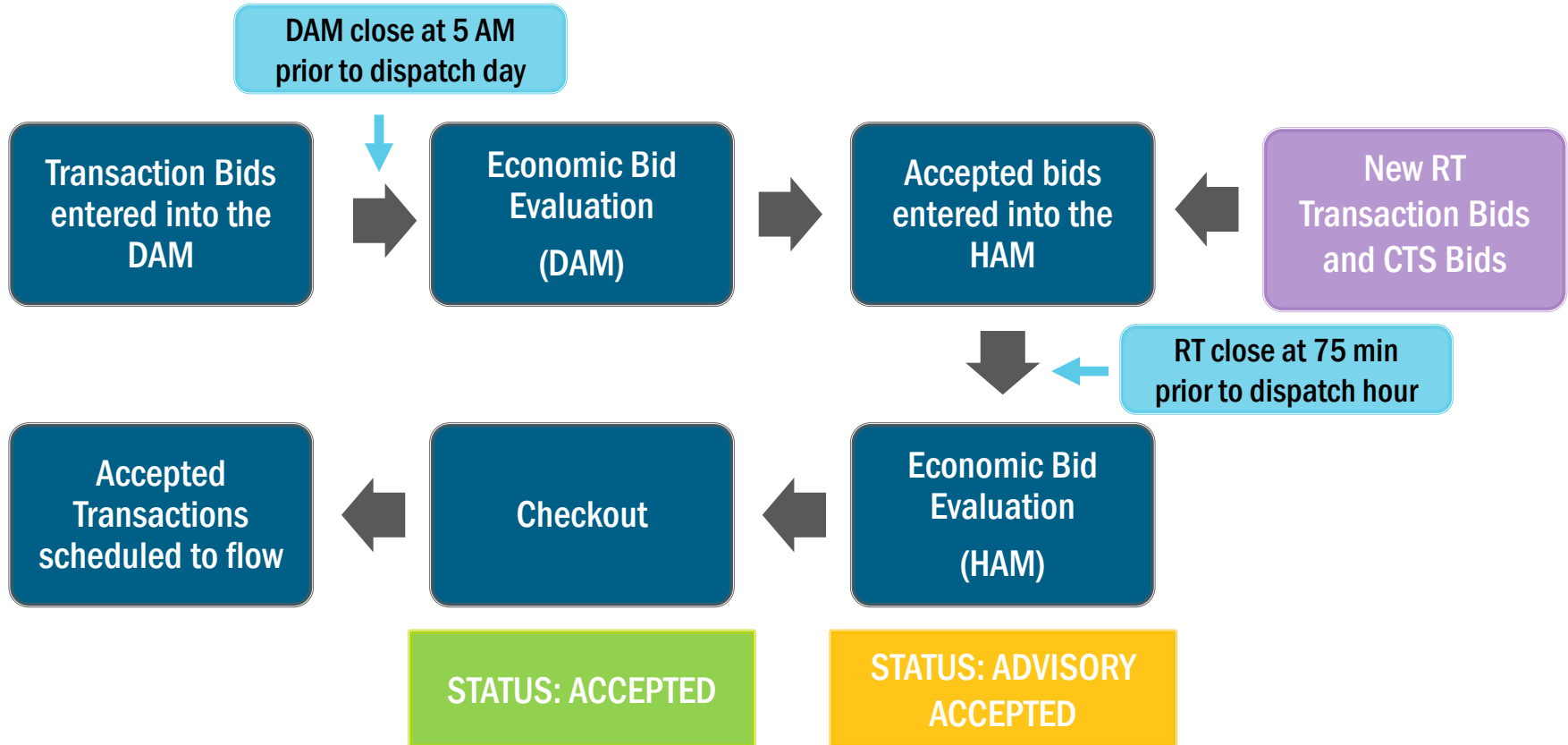
Point	1	2	3	4	5	6	7	8	9	10	11
MW	1										
\$ Price	999.7										

Clear Curve

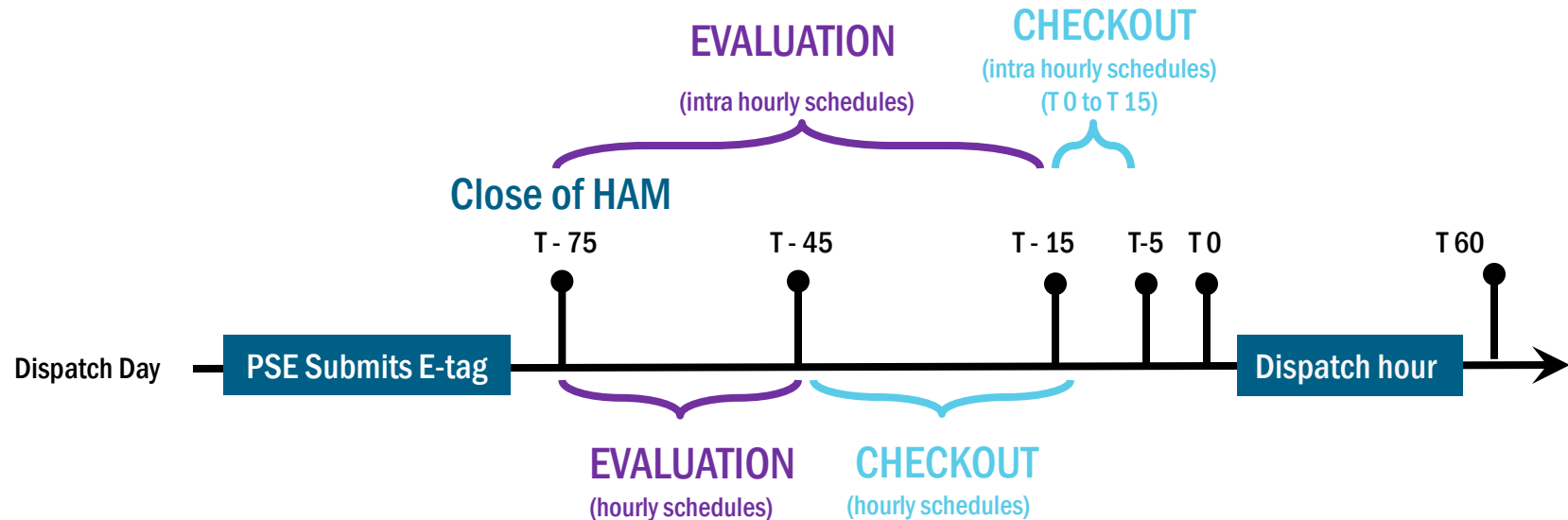
Reset Submit Bid

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Transaction Scheduling – Process Flow



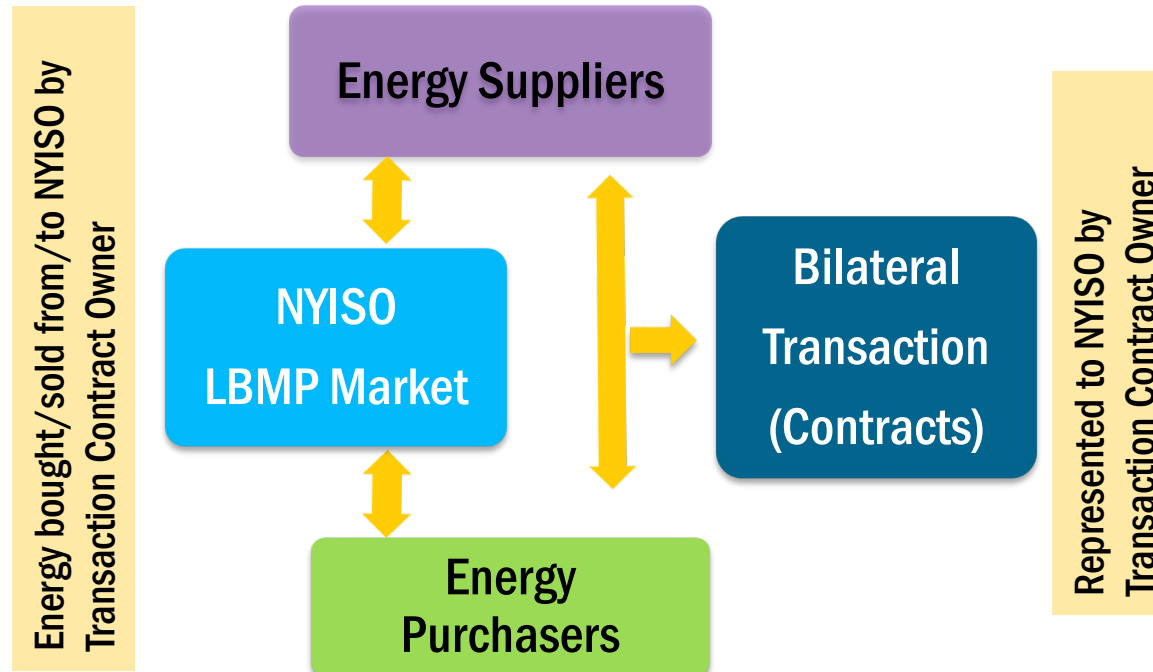
Transaction Scheduling, Process and Timeline, RT



Transactions- Settlements



Transaction Settlements



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)

Settlement of LBMP- Import and Export

- Purchasing or selling energy at the external proxy LBMP

DAM – Settle as follows:

$\text{DAM LBMP (proxy bus)} \times \text{DAM MWh}$

RT – Settle as follows:

$\text{RT LBMP (proxy bus)} \times \text{RT MWh}$
(~5-minute level)

Transmission Usage Charge (TUC)

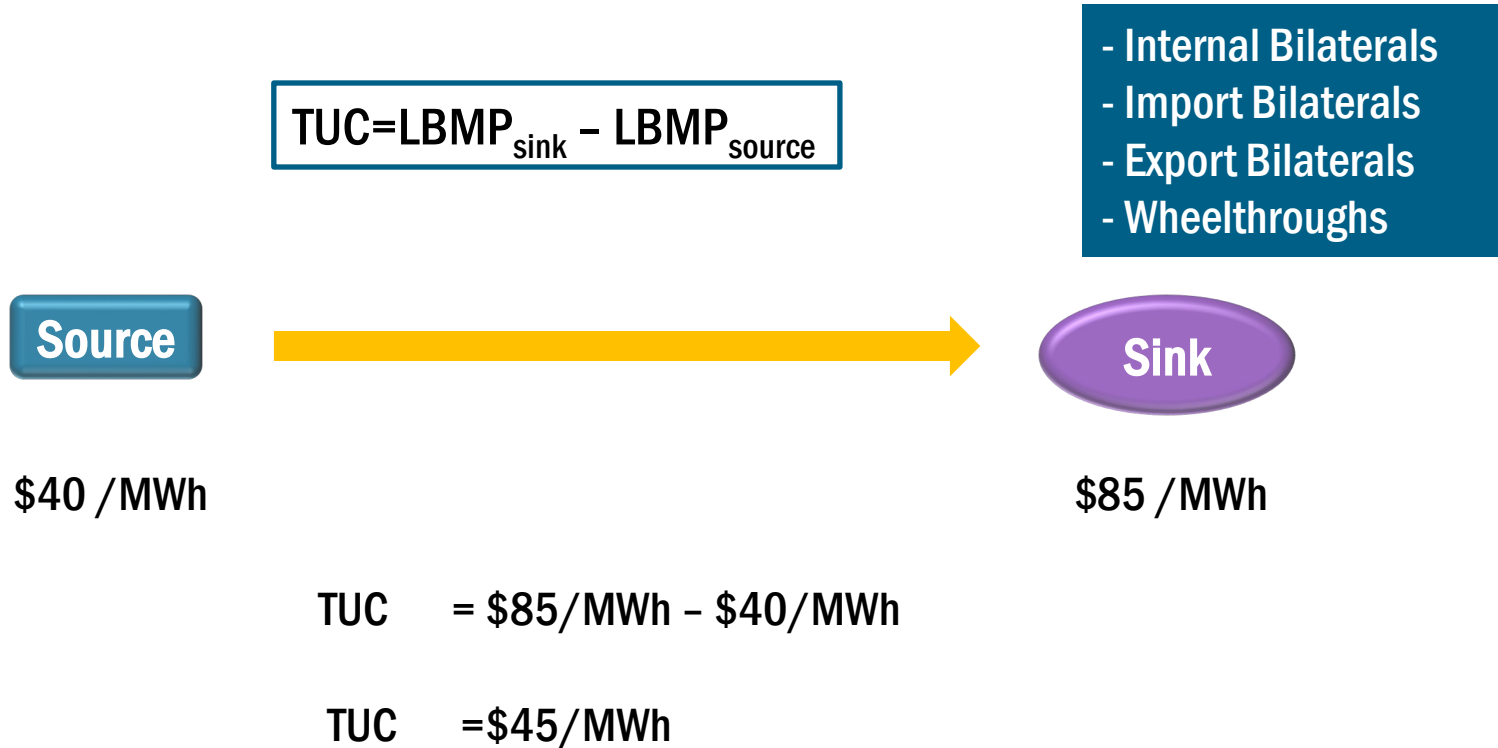
- Transmission Usage Charge (TUC) is the cost of moving the power from source to sink
- Component of LBMP

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

(Reference Bus Energy Price)

- For a transaction, TUC is calculated as
$$\text{TUC} = [\text{Sink LBMP (\$/MW)} - \text{Source LBMP (\$/MW)}] \times \text{MWs}$$

TUC Settlement for Bilateral Transactions



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)



Let's Review

Who is billed for the TUC on a bilateral transaction?

Generator

Load

Transaction Owner

Additional Settlement Charges

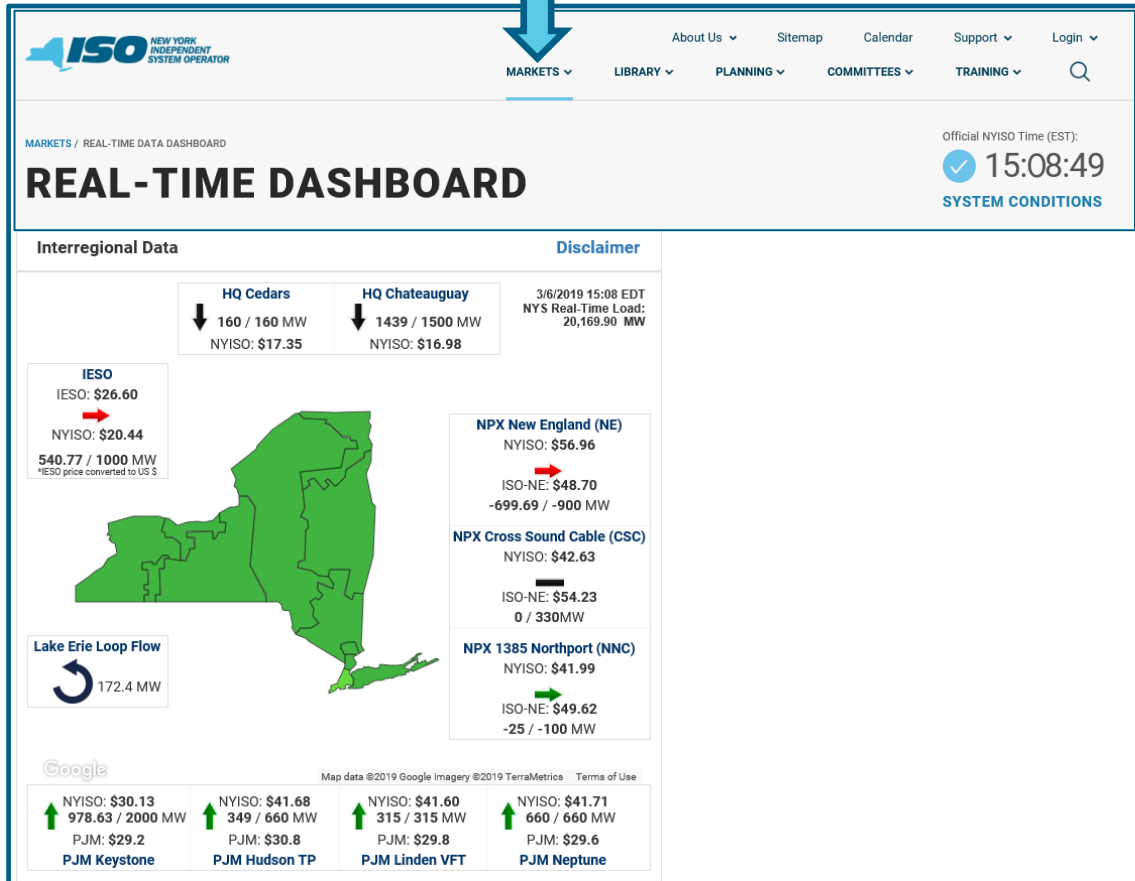
- **Financial Impact Charge (FIC)**
 - MPs may also be charged curtailment charges due to MPs actions
- **Ancillary Services Charges**
 - Scheduling System Control & Dispatch
 - Operating Reserve
 - Voltage Support
- **Transmission Charges ***
 - Transmission Service Charge (TSC)
 - NYPA Transmission Adjustment Charge (NTAC)

Quick Reference Sheet

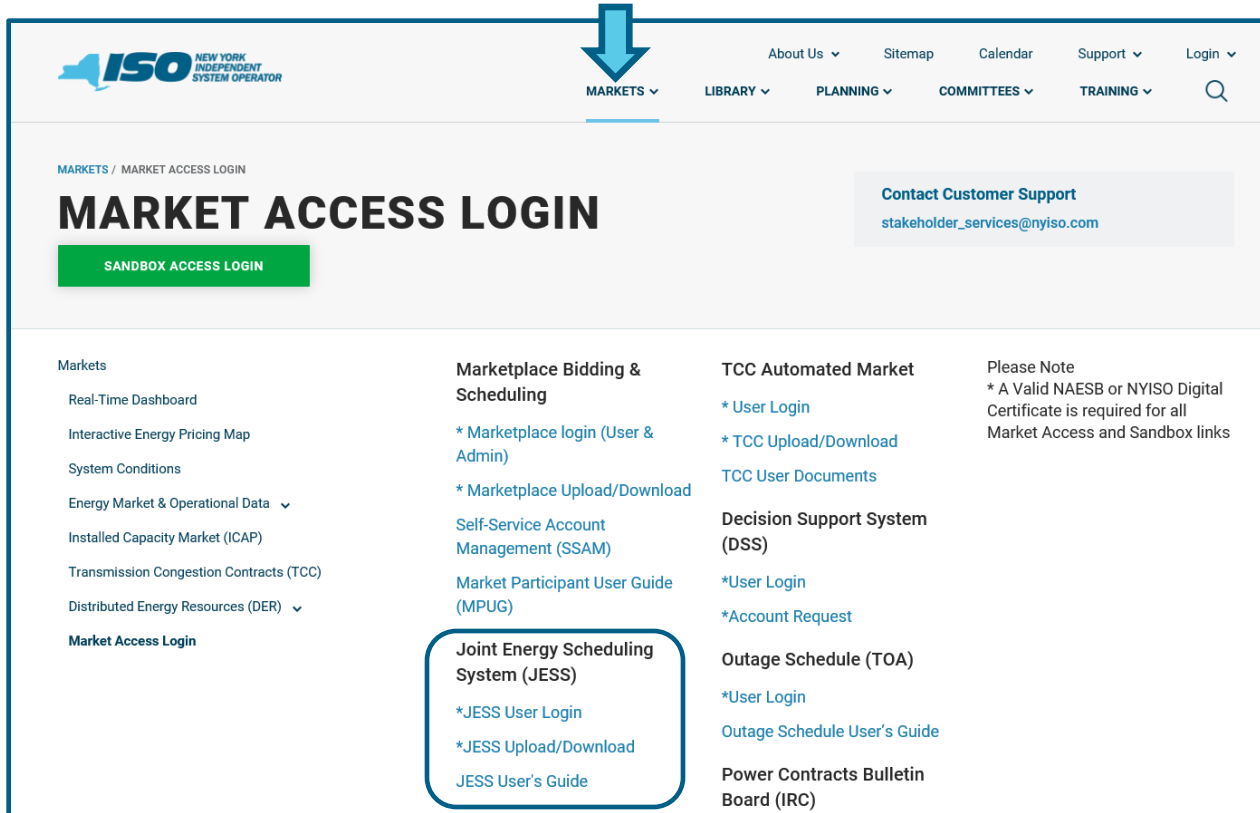
Transaction Type	LBMPs	TUCs
Import LBMP <i>Proxy to Marcy</i>	Transaction Owner/FRP - Receives proxy LBMP	N/A Built into the LBMP
Export LBMP <i>Marcy to Proxy</i>	Transaction Owner/FRP - Pays Proxy LBMP	N/A Built into the LBMP
Import Bilateral <i>Proxy to Internal Load</i>	For Replacement Energy only - 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 features a sidebar with links to various market-related pages, a main content area with links to bidding and scheduling systems, and a 'Please Note' section regarding digital certificates.

MARKETS / MARKET ACCESS LOGIN

MARKET ACCESS LOGIN

[Sandbox Access Login](#)

[Contact Customer Support](#)
stakeholder_services@nyiso.com

Markets

- Real-Time Dashboard
- Interactive Energy Pricing Map
- System Conditions
- Energy Market & Operational Data
- Installed Capacity Market (ICAP)
- Transmission Congestion Contracts (TCC)
- Distributed Energy Resources (DER)
- Market Access Login**

Marketplace Bidding & Scheduling

- * [Marketplace login \(User & Admin\)](#)
- * [Marketplace Upload/Download](#)
- [Self-Service Account Management \(SSAM\)](#)
- [Market Participant User Guide \(MPUG\)](#)

Joint Energy Scheduling System (JESS)

- * [JESS User Login](#)
- * [JESS Upload/Download](#)
- [JESS User's Guide](#)

TCC Automated Market

- * [User Login](#)
- * [TCC Upload/Download](#)
- [TCC User Documents](#)

Decision Support System (DSS)

- * [User Login](#)
- * [Account Request](#)

Outage Schedule (TOA)

- * [User Login](#)
- [Outage Schedule User's Guide](#)

Power Contracts Bulletin Board (IRC)

Please Note
* A Valid NAESB or NYISO Digital Certificate is required for all Market Access and Sandbox links

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
- 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

Let's Review



Learner Activity

Image provided by 'The Extend Activity Bank'
<https://extend-bank.ecampusontario.ca/>

Scenario

DAM Bilateral Import

MP Bid = \$50

- What does Bid \$ represent?
- Bid ACCEPTED or REJECTED?
- LBMP or TUC Settlement?
- How much is the Settlement?

(Assume 1MW transaction)

