Energy Market Transactions

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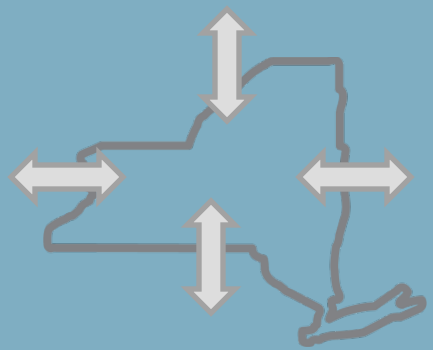
Remote Learning

Module Objectives

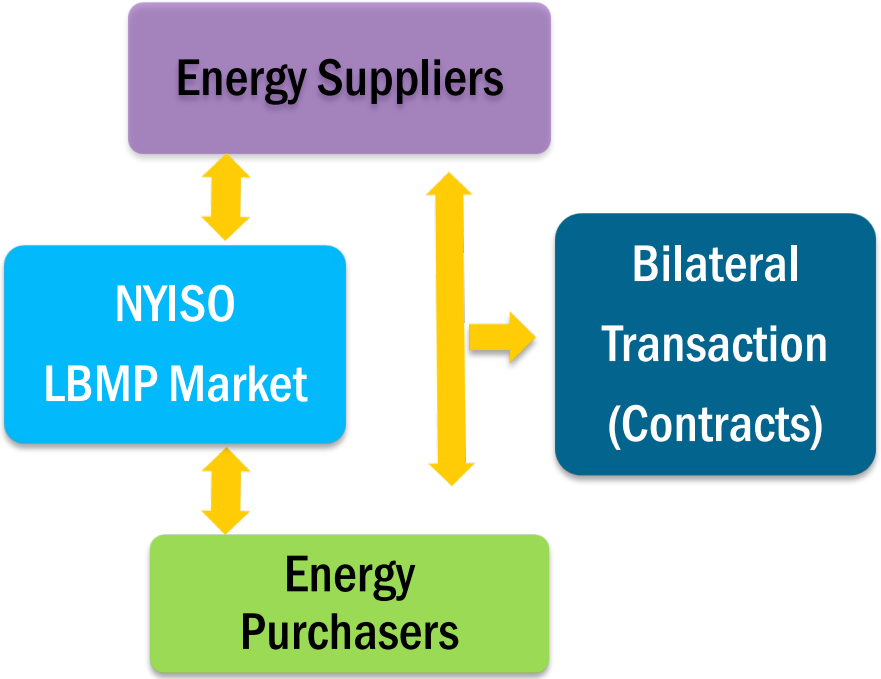
At the conclusion of this module, participants will be able to:

- 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

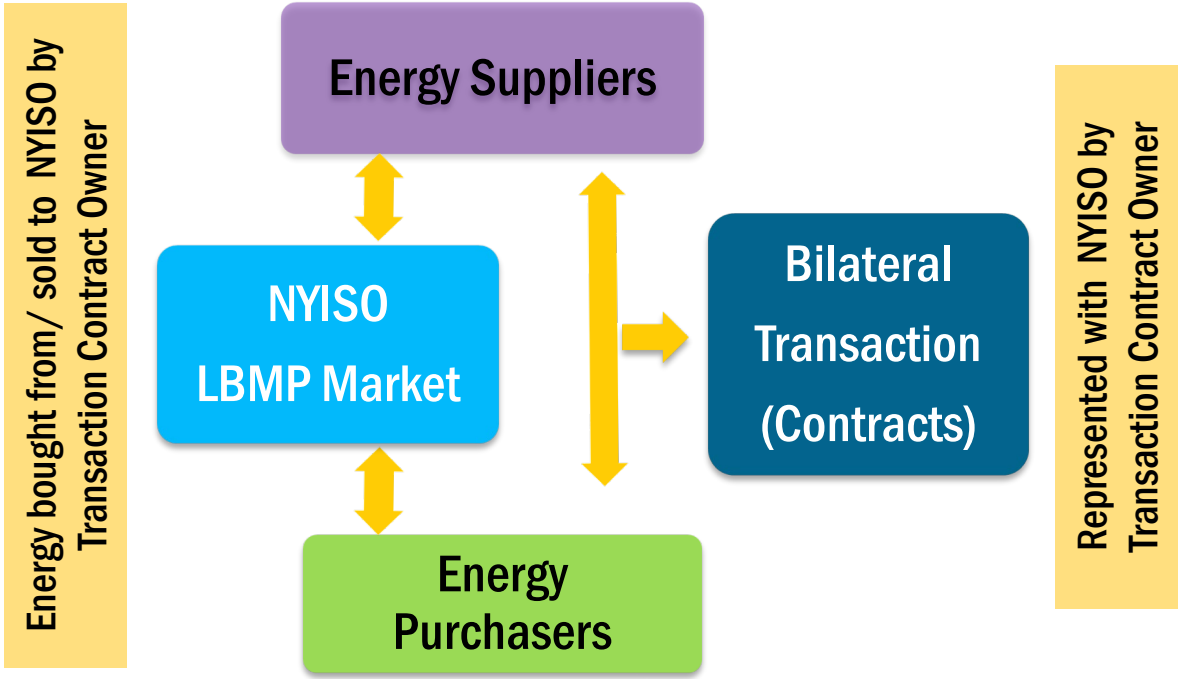
- Why would an MP choose the Transaction option?
  - Direct contract between supplier and purchaser with fixed long term price for energy
  - Makes financial sense: external supplier may get a better price for energy sold to NY than other control areas
  - Internal suppliers could get a better price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

Energy Market Transactions

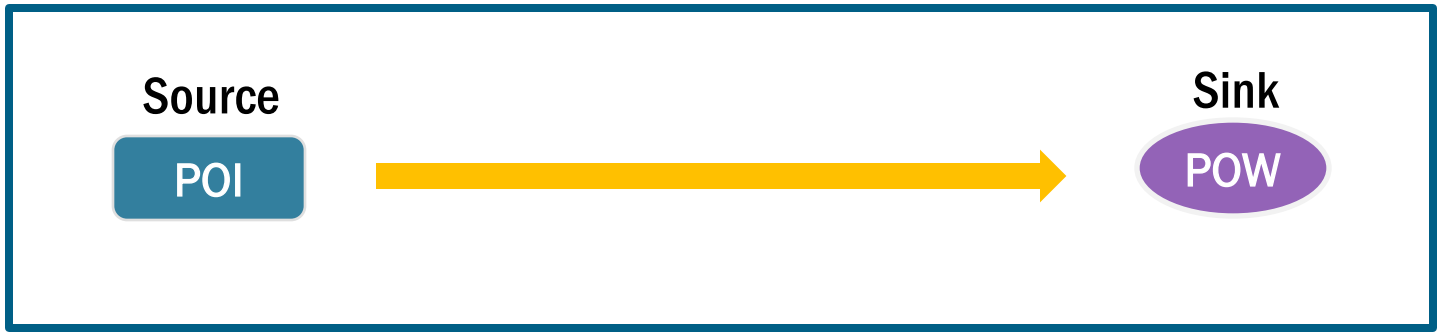
- **Why would an MP choose the Transaction option?**
  - Direct contract between supplier and purchaser with fixed long term price for energy
  - Makes financial sense: external supplier may get a better price for energy sold to NY than other control areas
  - Internal suppliers could get a better price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



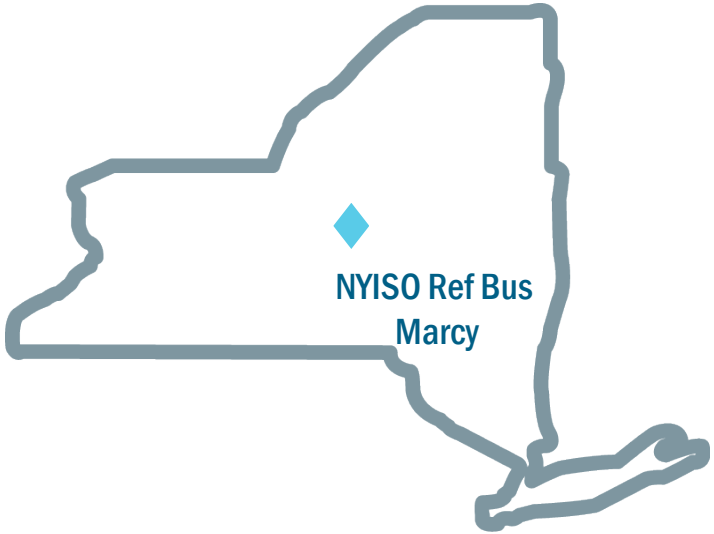
Source and Sink Points



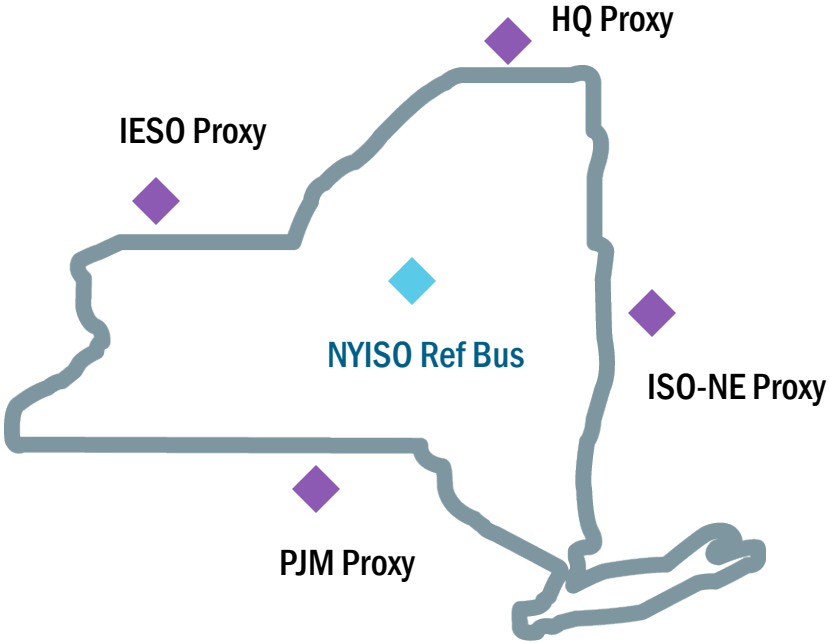
- Source: Point of Injection (POI); where the power is coming from, e.g., Generators
- Sink: Point of Withdrawal (POW); where the power is going to, e.g., Loads
- Important role in distinguishing transactions

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



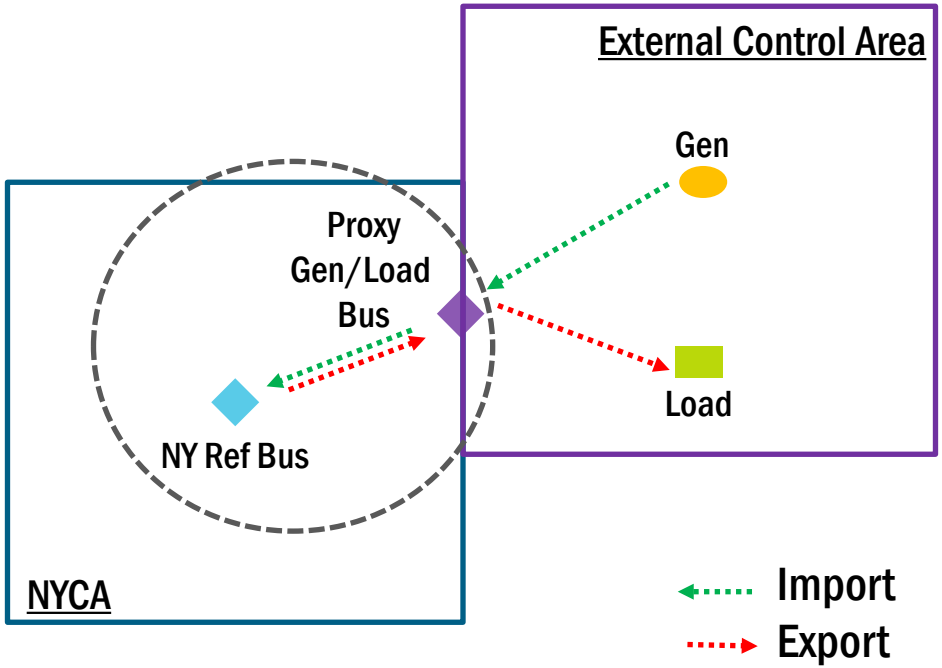
- Location outside the NYCA that is selected by the ISO to represent a load/gen bus in an adjacent Control Area
- LBMP prices for external proxy buses are calculated with reference to the NY reference bus
- NYISO designated for PJM, HQ, IESO, and ISO-NE

Control Area/Proxy Bus – Imports and Exports

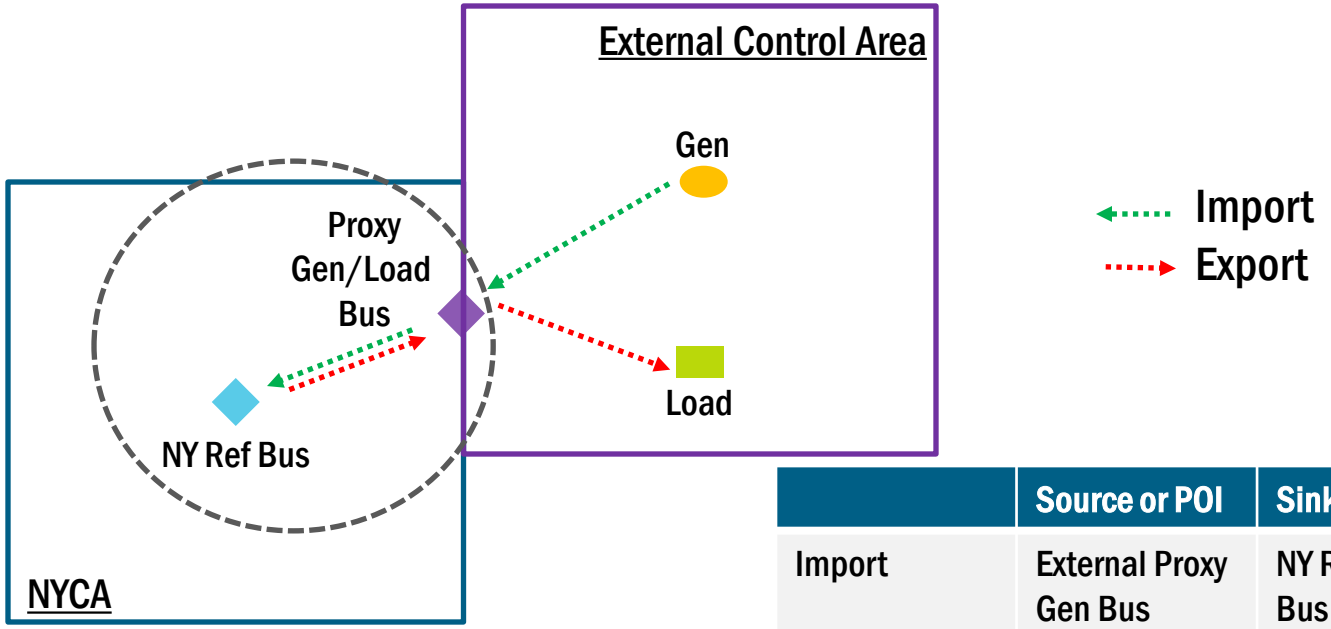
Control Area - Interface	Source Proxy Bus	Sink Proxy Bus
Hydro Quebec – Chateauguay Import/Export	HQ_GEN_IMPORT	HQ_LOAD_EXPORT
Hydro Quebec – Chateauguay Wheels-Through	HQ_GEN_WHEEL	HQ_LOAD_WHEEL
HQ – Dennison	HQ_GEN_CEDARS_PROXY	HQ_LOAD_CEDARS_PROXY
ISO New England	N.E._GEN_SANDY PD	N.E._LOAD_SANDY 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



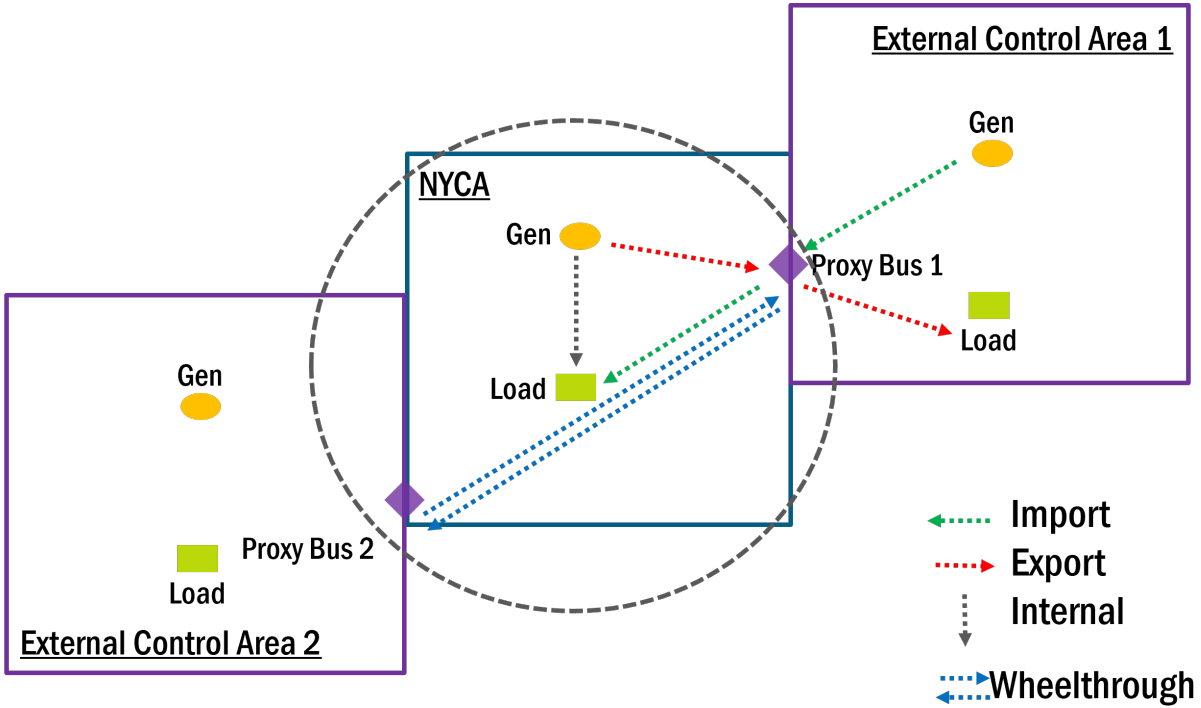
LBMP Transactions



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

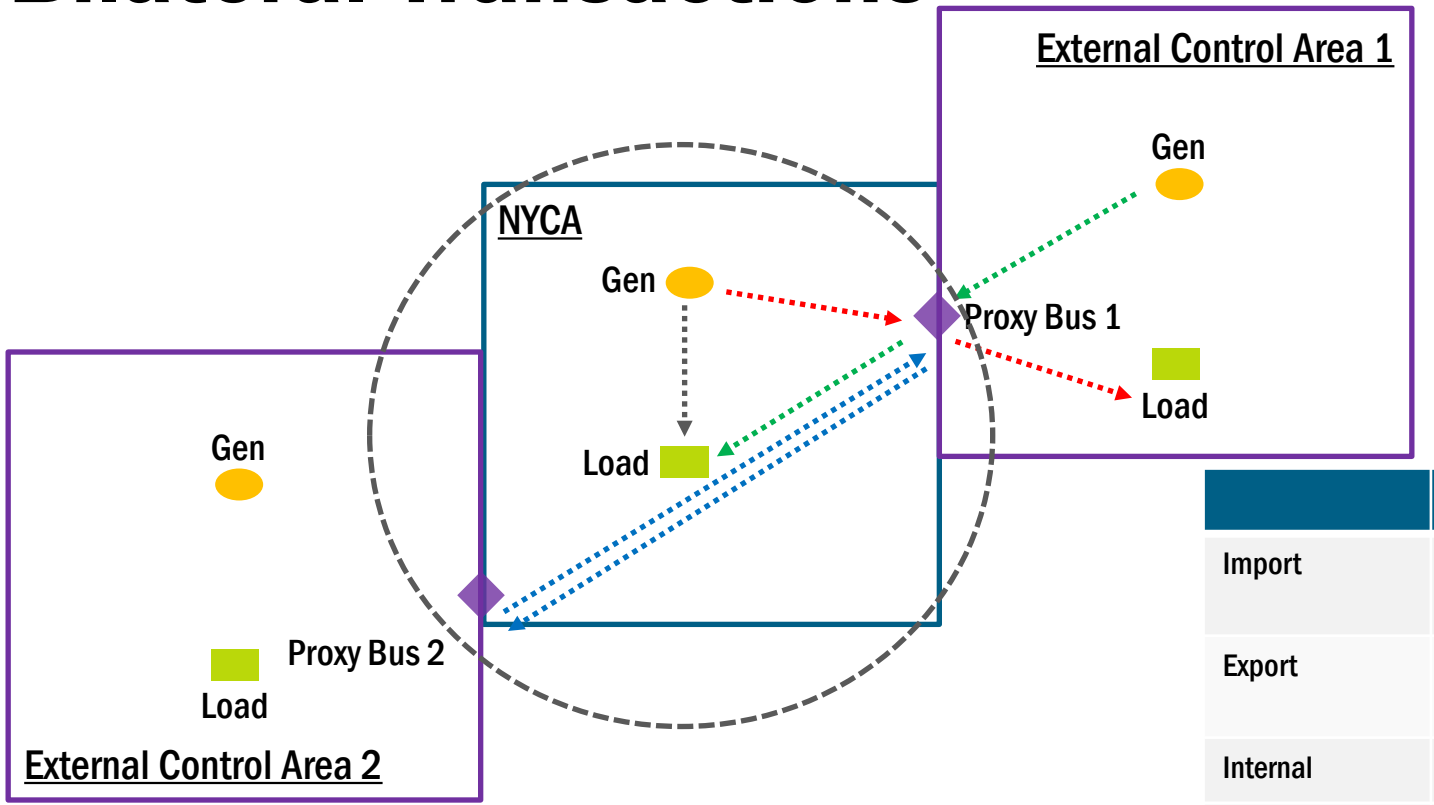
Bilateral Transactions

- 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

New York ISO



Import
Export
Internal
Wheelthrough

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

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?

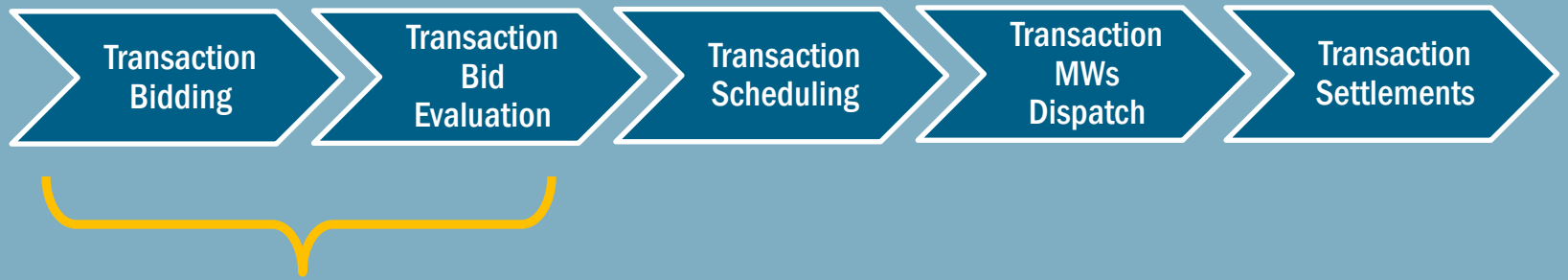
- Internal Bilateral
- Import Bilateral
- Export Bilateral
- Wheelthrough

Let's Review

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

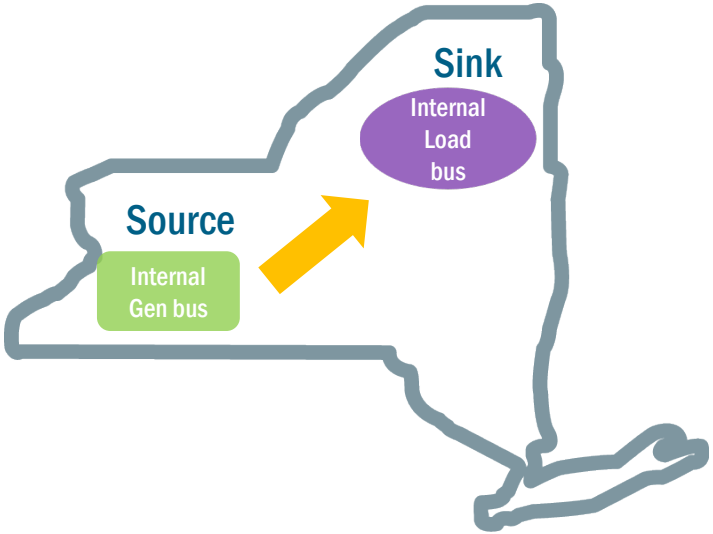
- Internal Bilateral
- Import Bilateral
- Export Bilateral
- Wheelthrough

Transactions – Bids and Evaluations



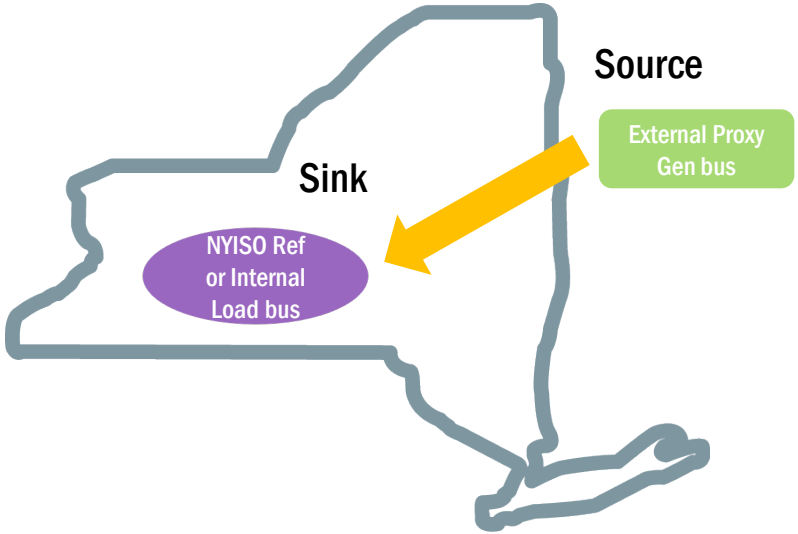
Internal Bilateral Transactions

- 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 Bid ≤ 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 ≤ 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 ≤ ISO-NE Proxy LBMP?	Bid Accepted/Rejected
LBMP Import	$50/MW	$45/MW	50 ≤ 45?	REJECTED

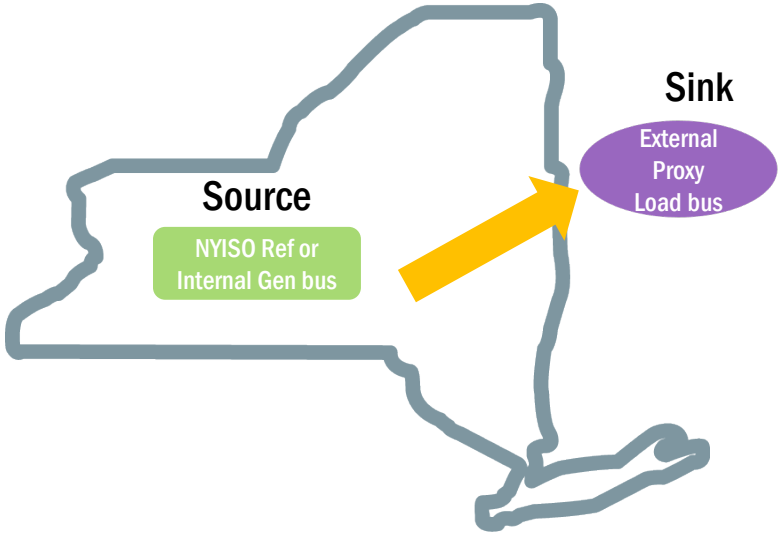
Import Bid Example

MP wants to be paid Min $50/MW				
NE Selling to NY	Min "Gen" Bid	ISO-NE Proxy LBMP	Bid ≤ ISO-NE Proxy LBMP?	Bid Accepted/Rejected
LBMP Import	$50/MW	$45/MW	50 ≤ 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 ≥ Proxy (Sink) LBMP

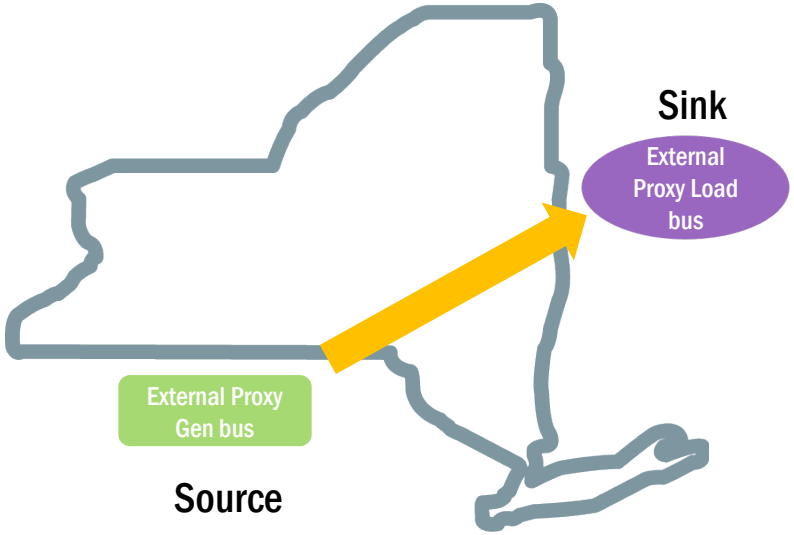
Export Bid Example

- 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 ≥ 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?

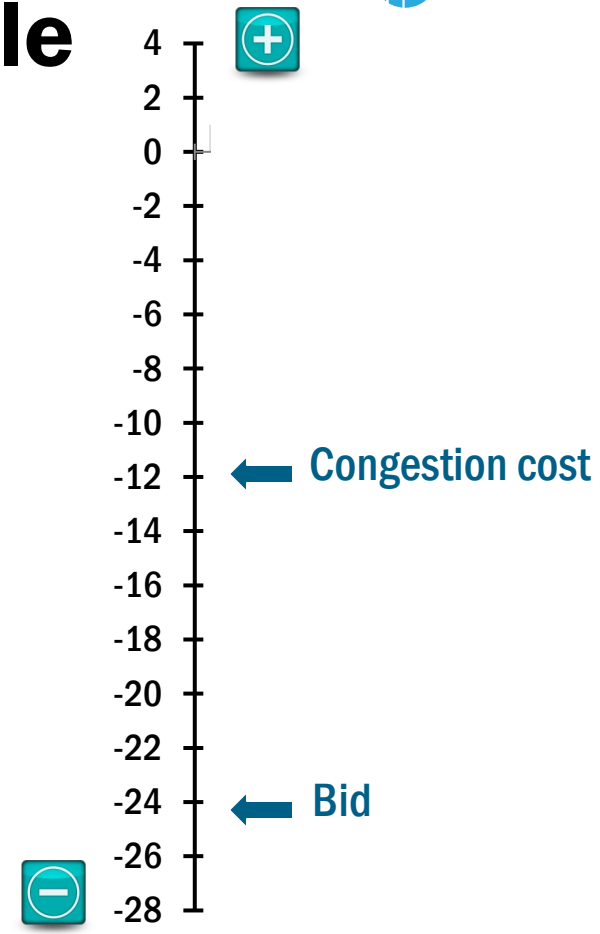
Transaction from NE to PJM (10 MW): Bid = $-24/MW

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/MW

Is - $24 < -$12 ?



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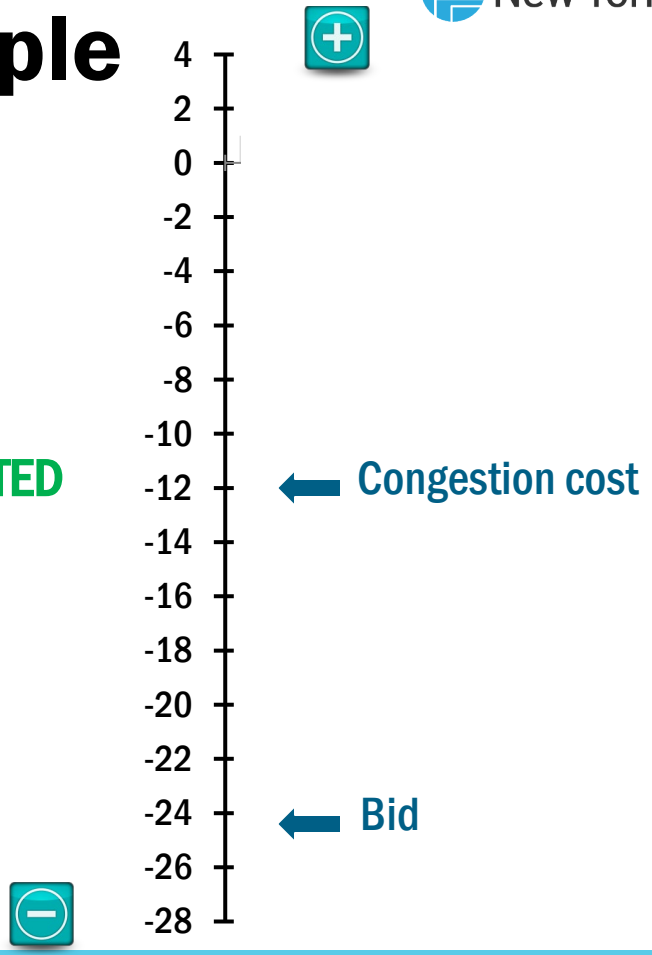
Congestion Cost = (-17) – (-5) = -12/MW

Is - $24 < -$12 ?

Bid is less than congestion cost

Bid is ACCEPTED



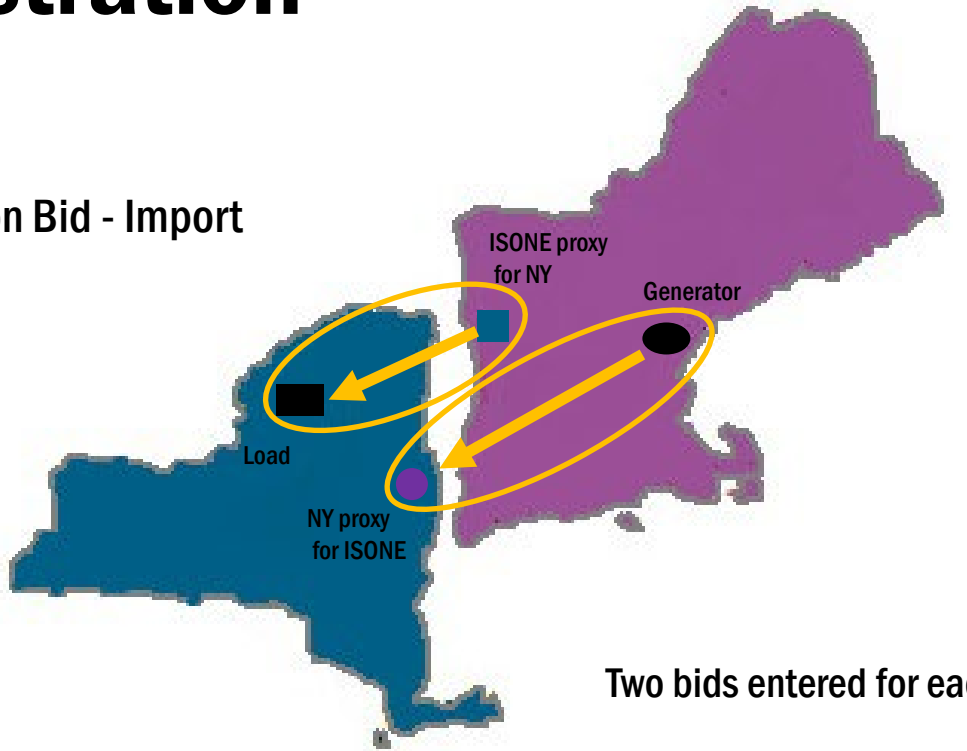
Coordinated Transaction Scheduling

- 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

New York ISO

Traditional Transaction Bid - Import



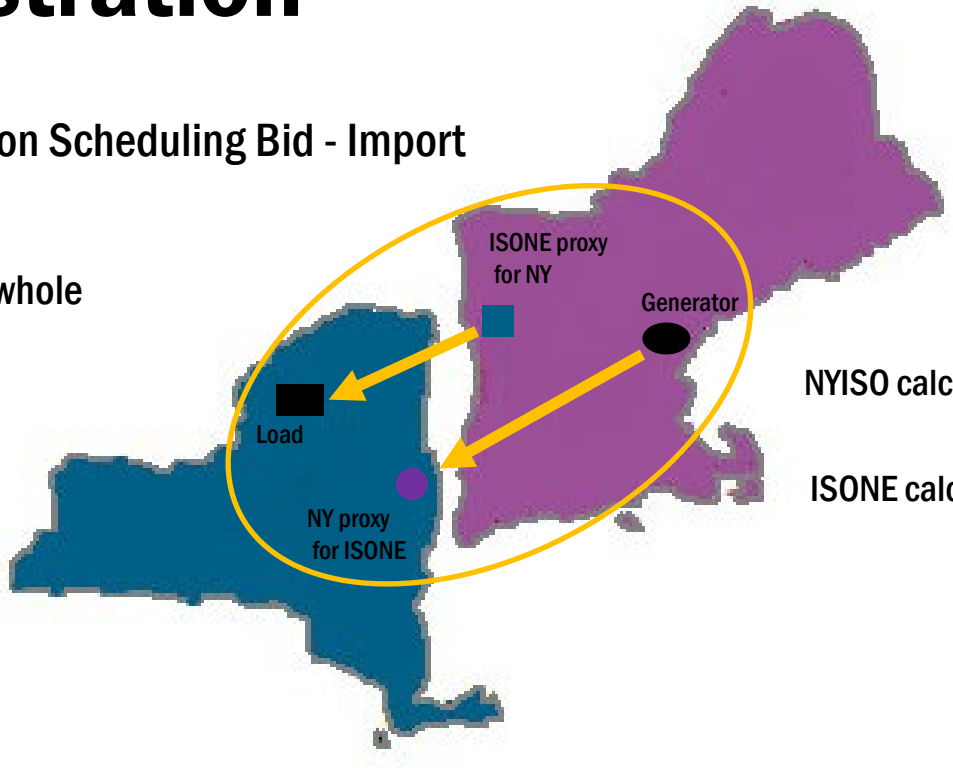
Two bids entered for each leg of transaction

Coordinated Transaction Scheduling (CTS) - Illustration

New York ISO

Coordinated Transaction Scheduling Bid - Import

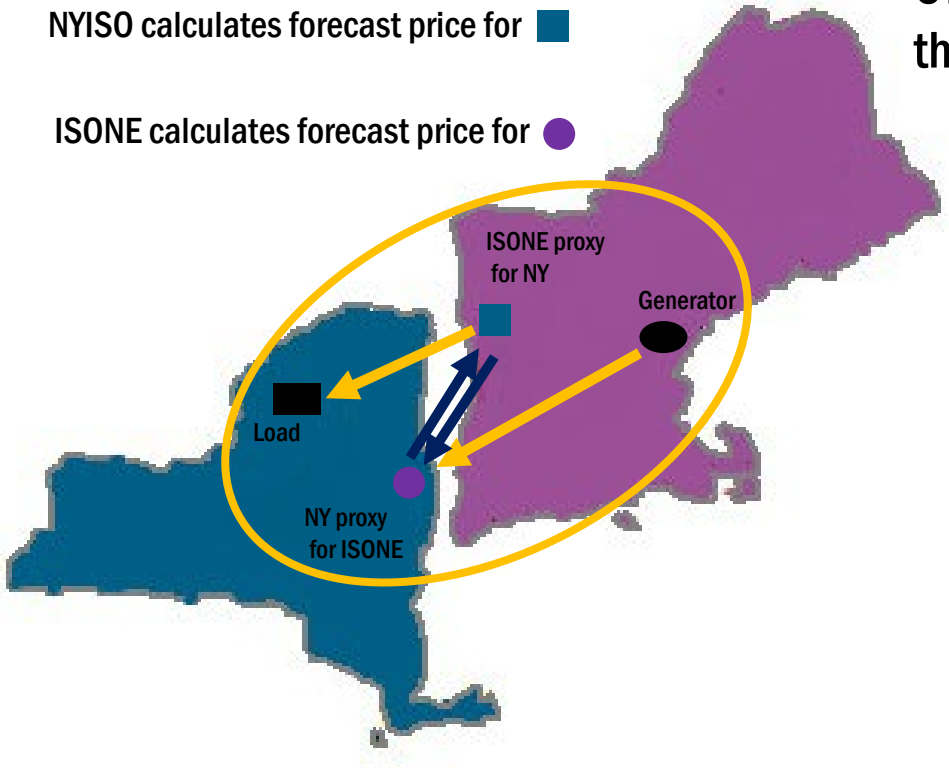
Only one bid entered for whole transaction



NYISO calculates forecast price for

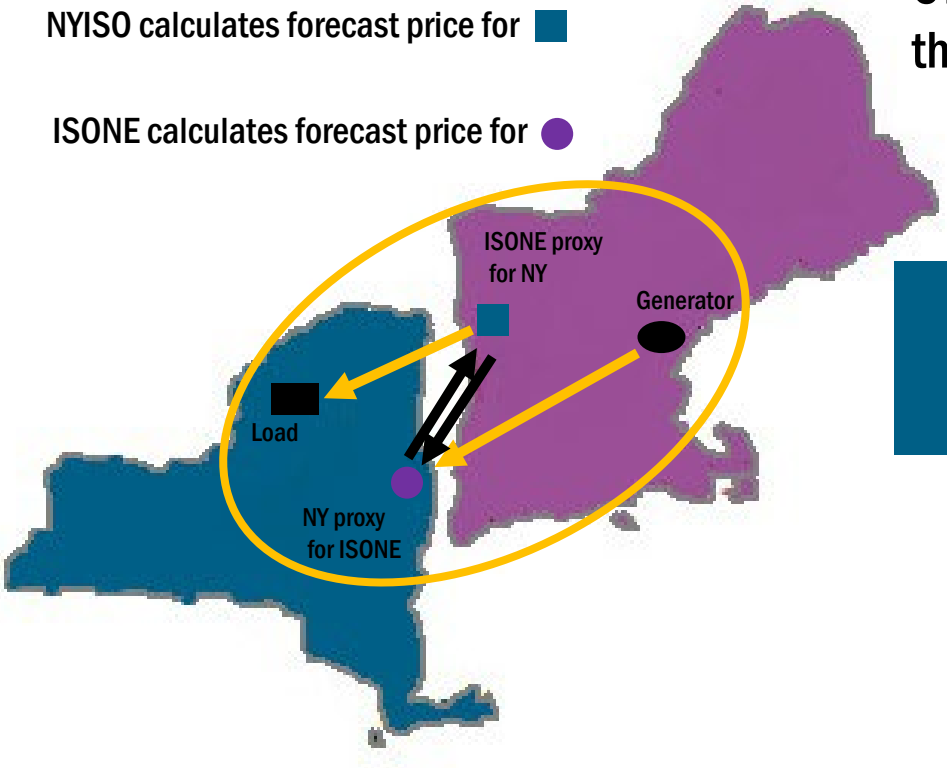
ISONE calculates forecast price for

CTS– Bid Evaluation



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

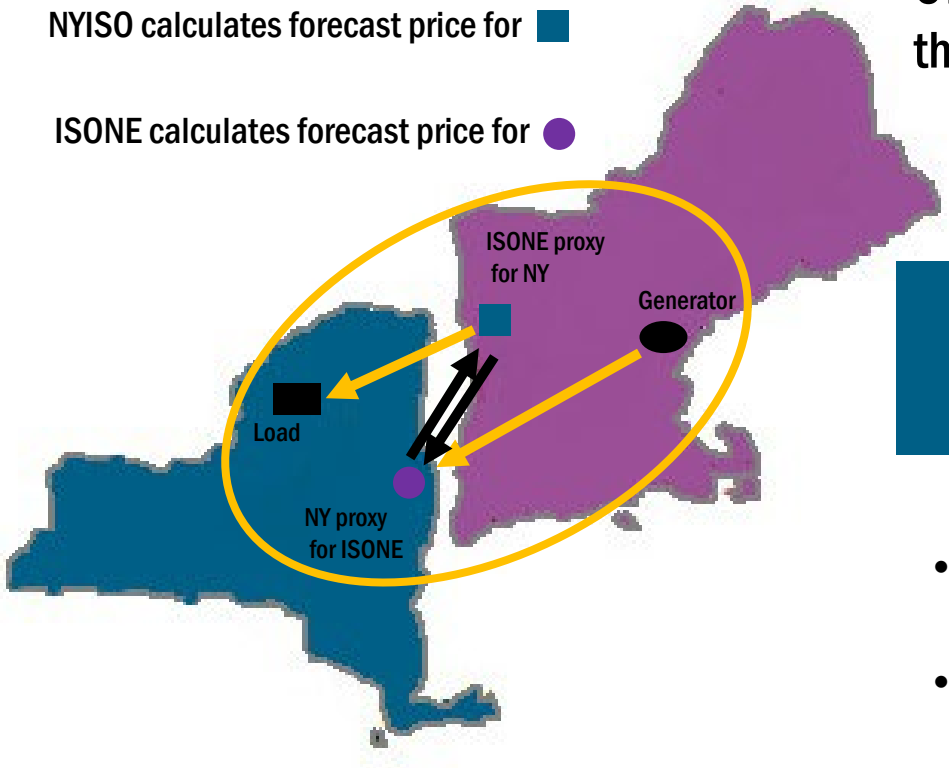
CTS– Bid Evaluation



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

If Bid ≤ Expected Spread	Bid is ACCEPTED
If Bid > Expected Spread	BID is REJECTED

CTS– Bid Evaluation

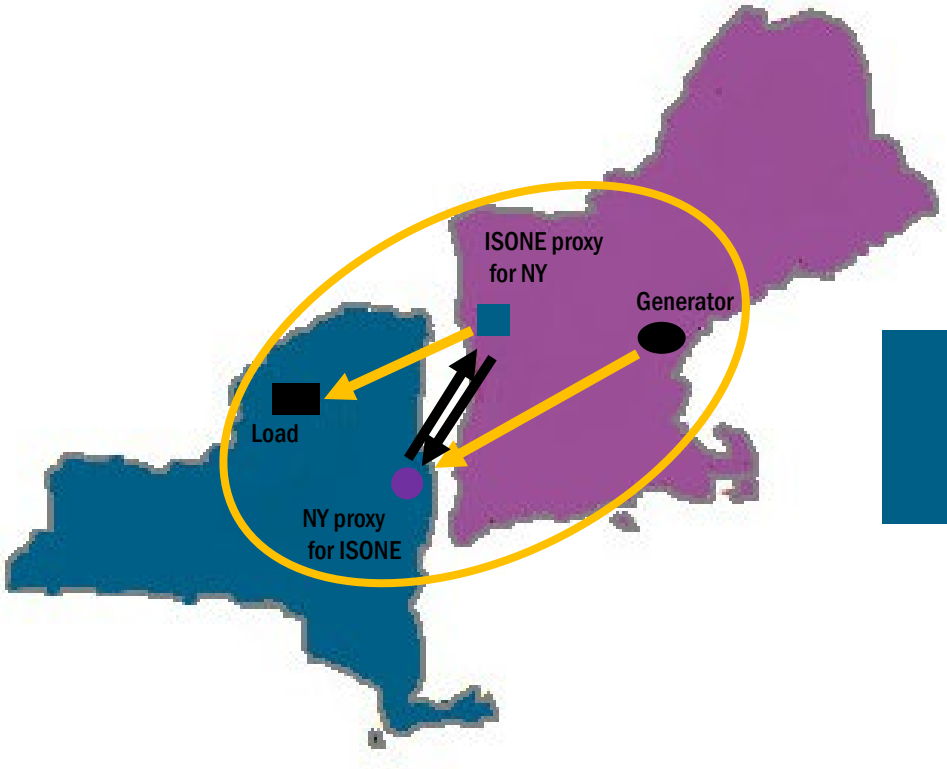


CTS Bid compared to delta between the two forecast prices (Expected Spread)

If Bid ≤ 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



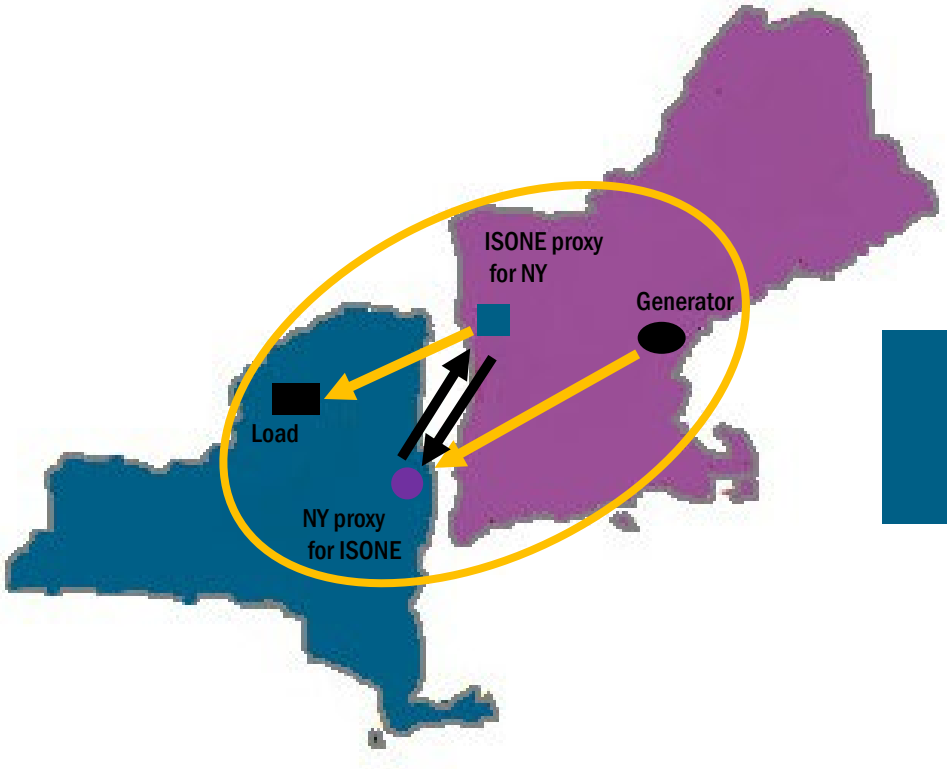
CTS Import from ISONE control area to NYCA

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

New York ISO

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

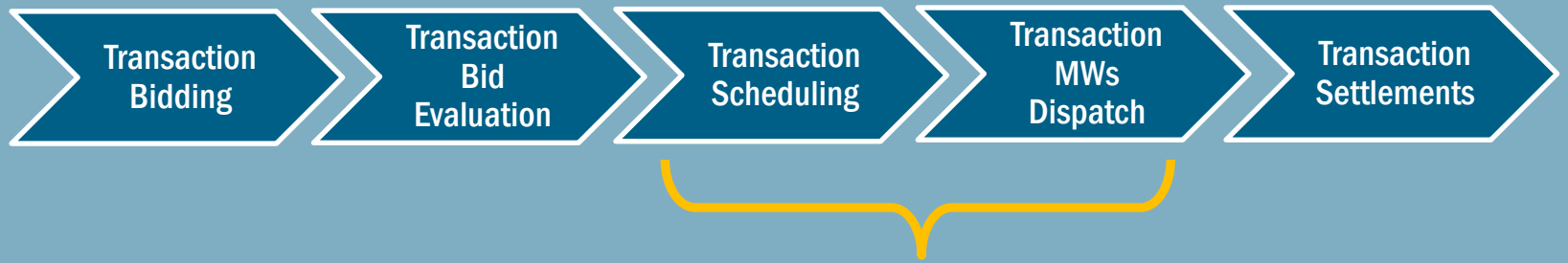
PJM Proxy Bus DAM LBMP = $50/MW

This bid is Accepted during evaluation

True

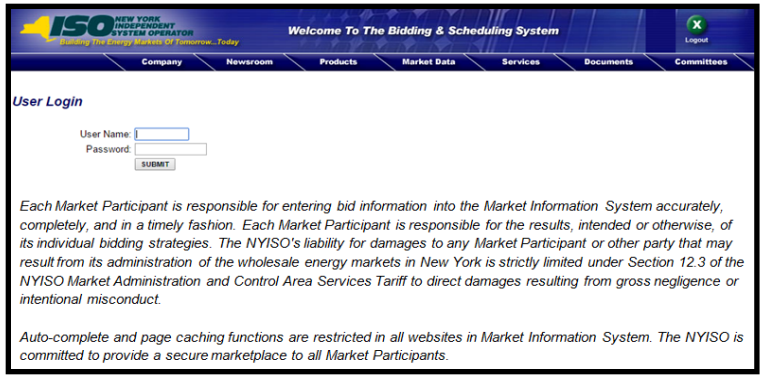
False

Market Mechanics



Entering Transactions into NYISO Web Interfaces

Market Information System (MIS)



Internal Bilateral Transactions

Joint Energy Scheduling System (JESS)

External Transactions

NERC Electronic-Tags (E-Tags)

New York ISO

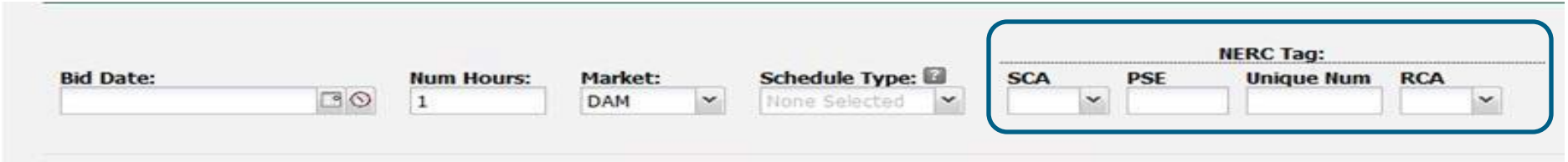
- All RT market External Transactions require a NERC E-Tag
  - Identifies a transaction to all appropriate Control Areas
  - E-Tag must be submitted at least 75 minutes prior to the dispatch hour (before HAM closes) or NYISO will not evaluate transaction

- 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

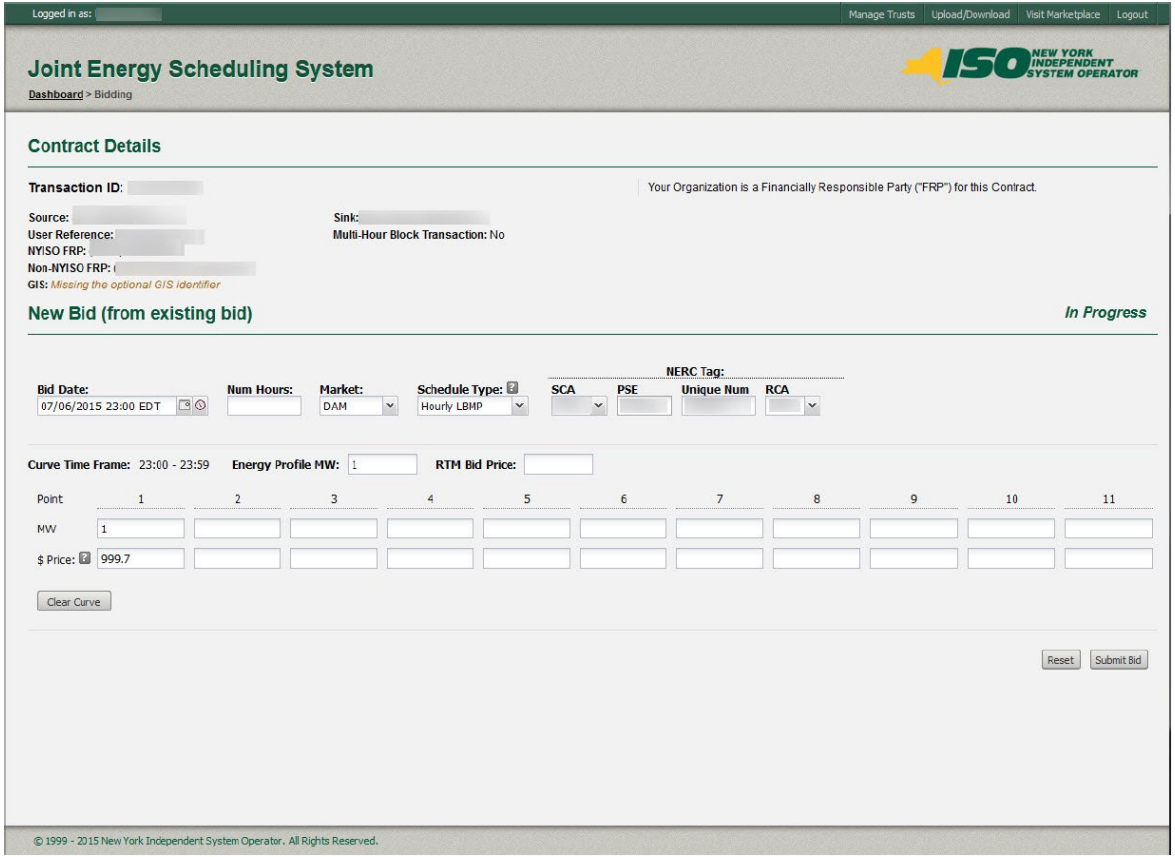
- Energy Profile in E-Tag and in MIS transaction schedule must match

E- Tag Identifier

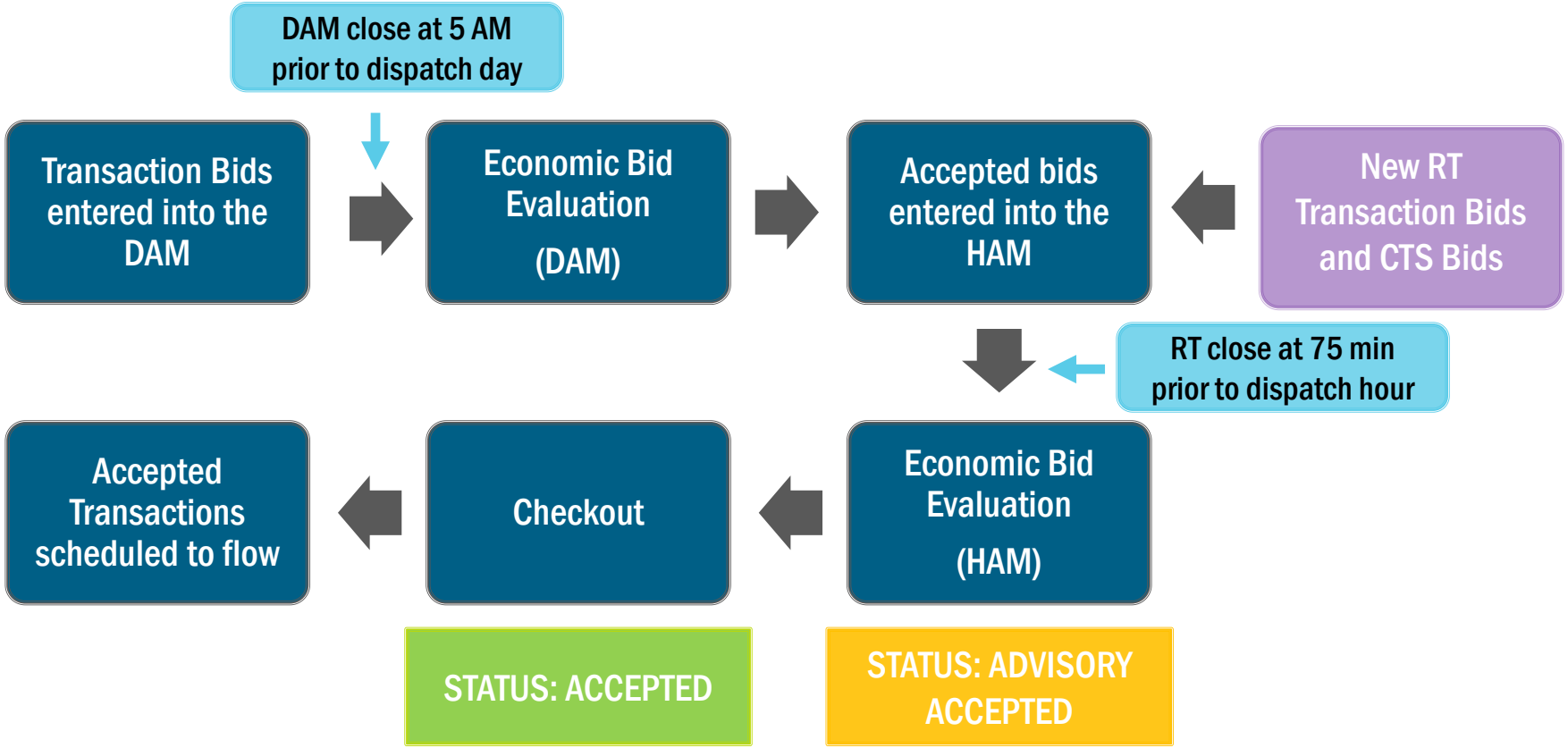
- Each E-tag is identified by a unique E-Tag Identifier
- The E-Tag Identifier contains
  - Source Balancing Authority Entity (SCA) Code
  - PSE Code (Tag Author PSE)
  - Unique Transaction identifier (e-tag Code/Unique)
  - Sink (Receiving) Balancing Authority Entity (RCA) Code



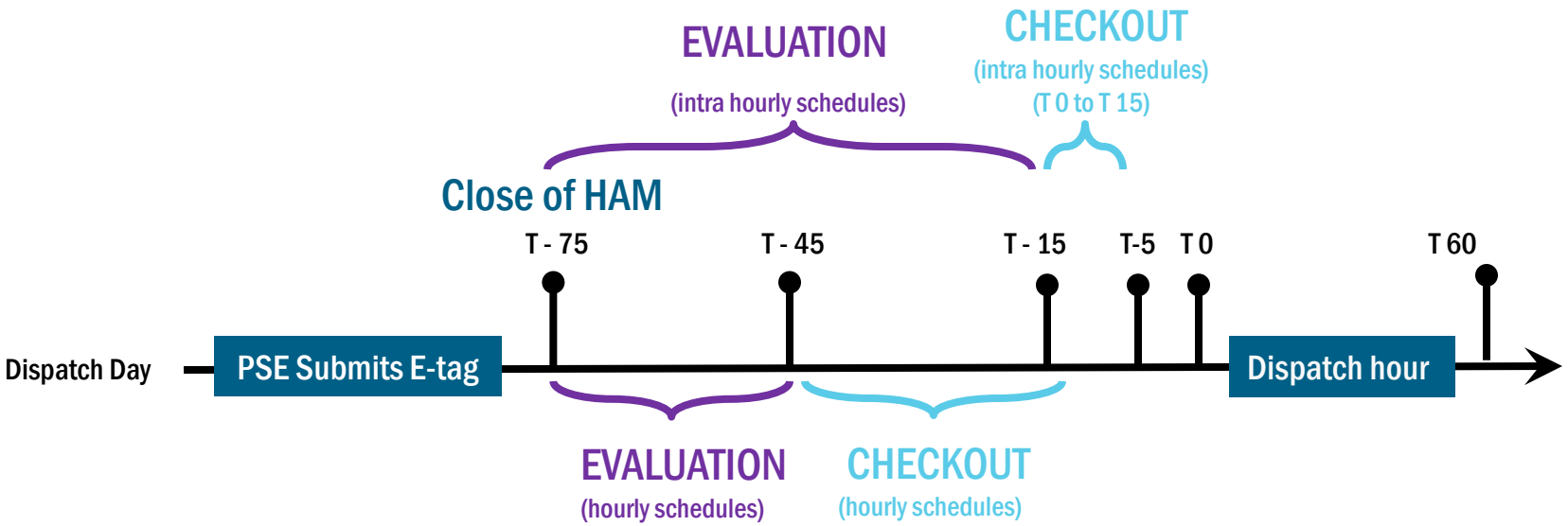
JESS Screen for Submitting an External Transaction



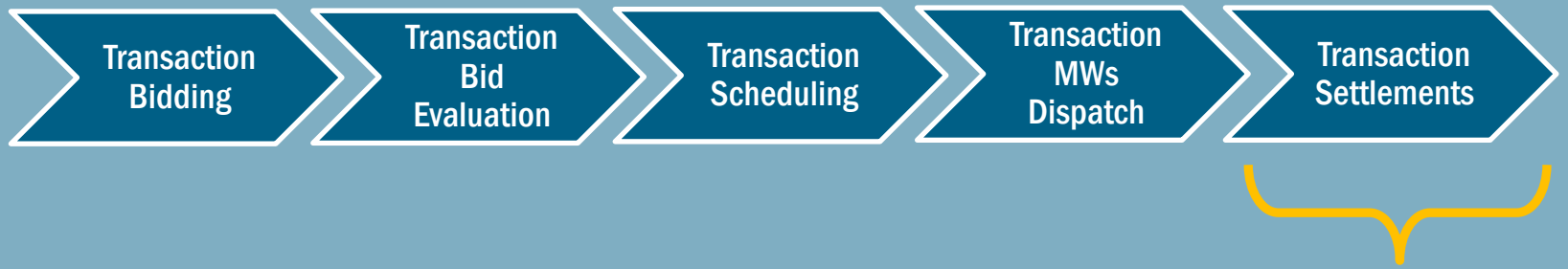
Transaction Scheduling – Process Flow



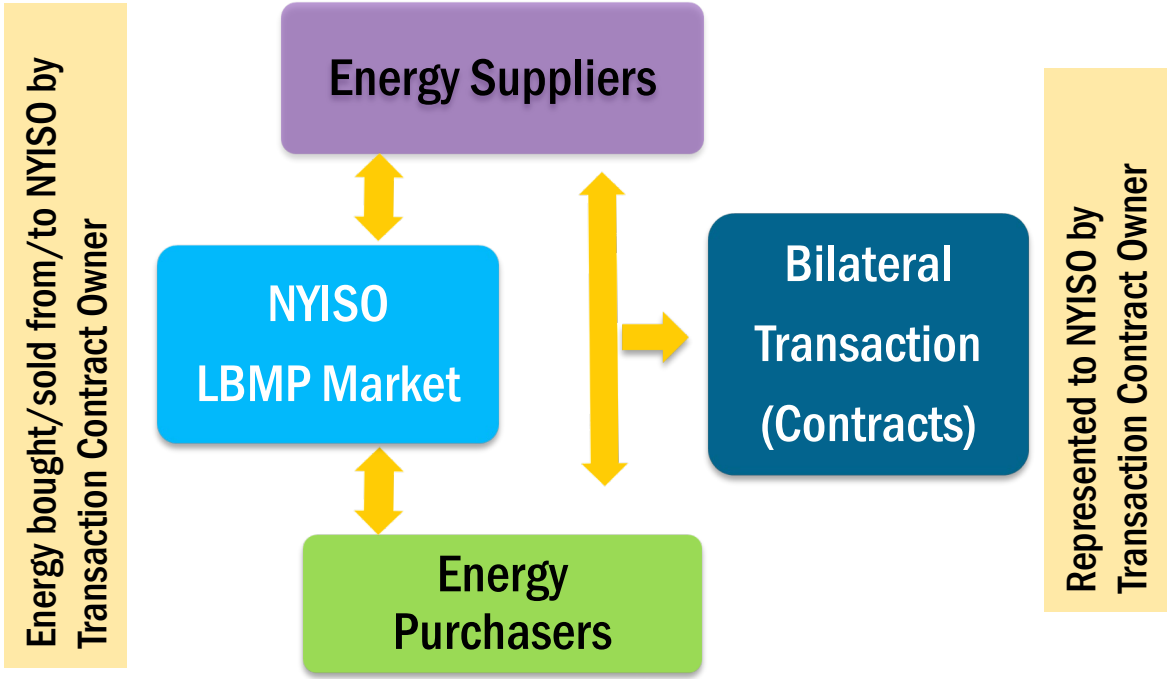
Transaction Scheduling, Process and Timeline, RT



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:

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

LBMP = Marginal Energy Price + (Loss) – (Congestion)

(Reference Bus Energy Price) TUC

- For a transaction, TUC is calculated as

TUC = [Sink LBMP ($/MW) – Source LBMP ($/MW)] x MWs

TUC Settlement for Bilateral Transactions

- Internal Bilaterals
- Import Bilaterals
- Export Bilaterals
- Wheelthroughs

$$TUC = LBMP_{sink} - LBMP_{source}$$

$40 /MWh

$85 /MWh

TUC = $85/MWh – $40/MWh

TUC =$45/MWh

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

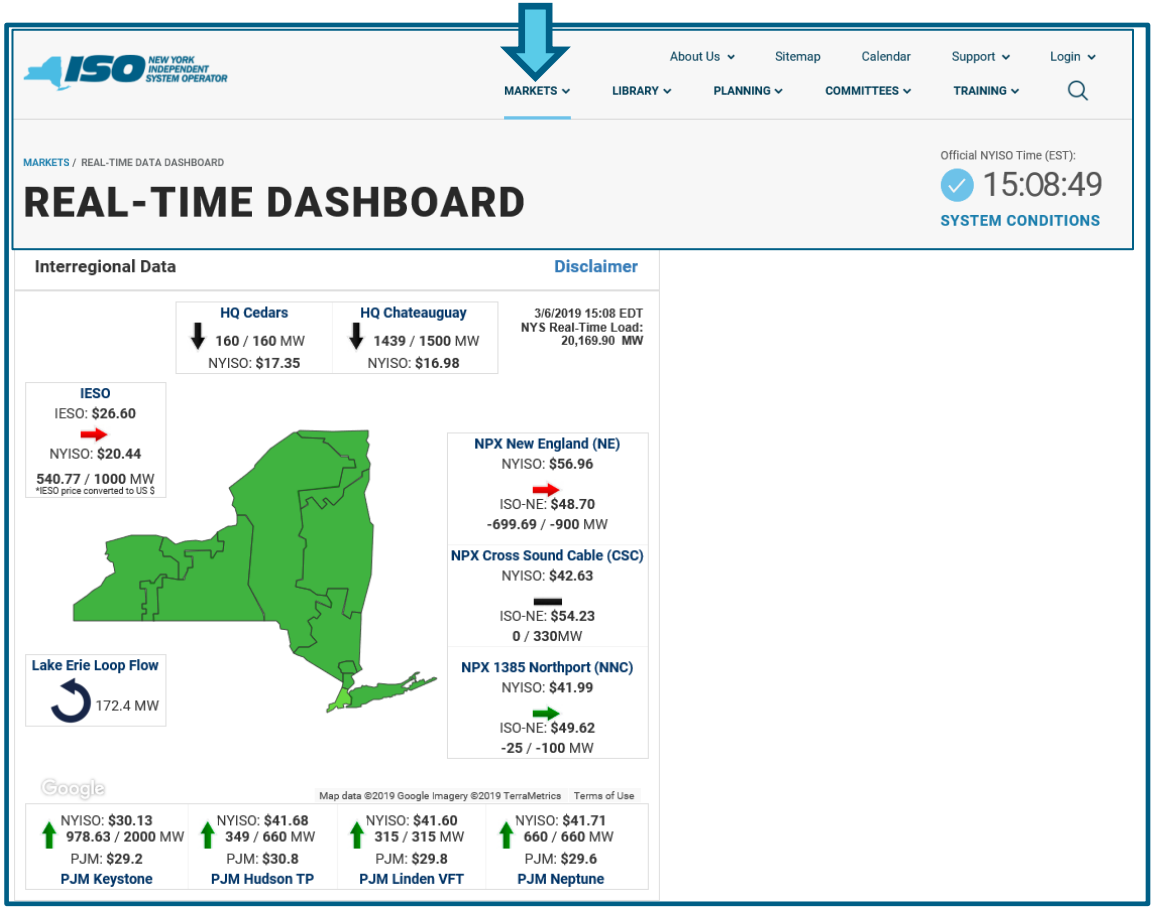
- Financial Impact Charge (FIC)
  - MPs may also be charged curtailment charges due to MPs actions
- Ancillary Services Charges
  - Scheduling System Control & Dispatch
  - Operating Reserve
  - Voltage Support
- Transmission Charges *
  - Transmission Service Charge (TSC)
  - NYPA Transmission Adjustment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

Quick Reference Sheet

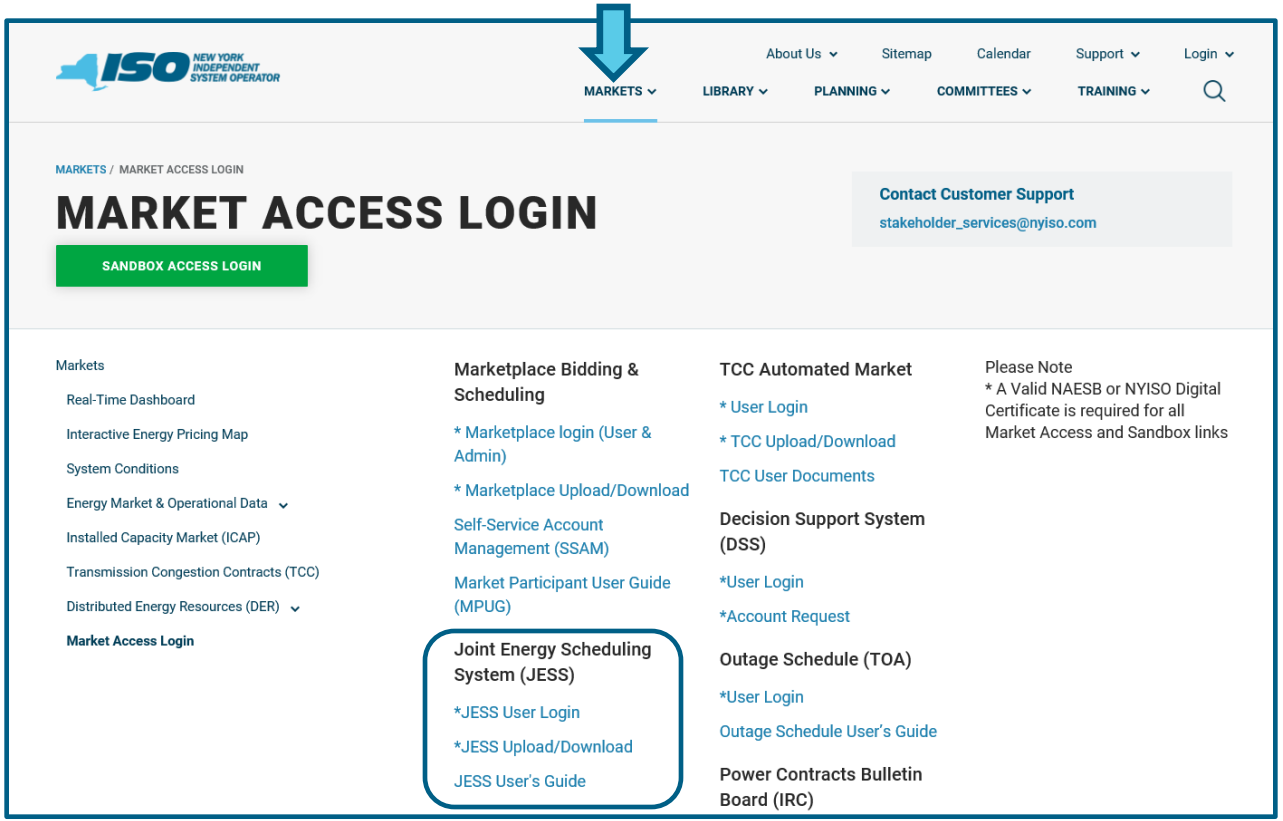
Transaction Type	LBMPs	TUCs
Import LBMP *Proxy to Marcy*	Transaction Owner/FRP - Receives proxy LBMP	N/A Built into the LBMP
Export LBMP *Marcy to Proxy*	Transaction Owner/FRP - Pays Proxy LBMP	N/A Built into the LBMP
Import Bilateral *Proxy to Internal Load*	For Replacement Energy only – Transaction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

Transactions– NYISO Website Data

Interregional Data – Imports and Exports



JESS- Market Access Login



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

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

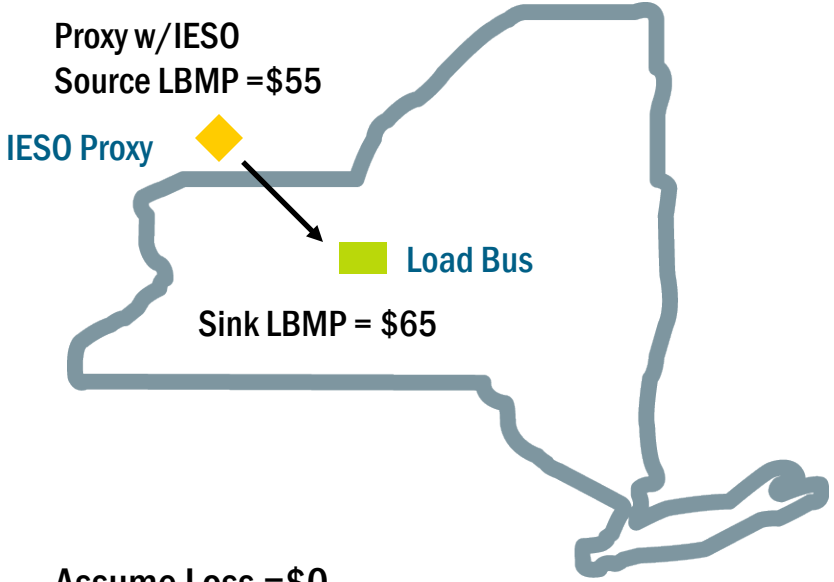
Scenario

<u>DAM Bilateral Import</u>

MP Bid = $50

(Assume 1MW transaction)

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



Assume Loss =$0