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Coordinated Transactions Scheduling (CTS) Training

Using CTS as an ISO New England (ISO-NE) Market Participant



Topics

- Background
- Summary and examples of CTS process
- Prices, Constraints, and Publishing
- Settlements
- Submitting external transactions
- Day-ahead market (DAM) example
- Interface bid example



Background

Background

Coordinated Transaction Scheduling (CTS):

- Result of joint New York and New England stakeholder process to improve the market efficiency of external transactions between the NY and NE regions
- Inefficient scheduling root causes were identified:
 - **Latency delay:** Time delay between when tie is scheduled and when power flows, during which time system conditions and LMPs may change
 - **Non-economic clearing:** ISOs evaluate tie schedule requests without economic coordination, producing inefficient schedules
 - **Transaction costs:** Fees and charges levied by each ISO on external transactions serve as a disincentive to engage in trade, impeding price convergence, and raising total system costs



Background, *continued*

Coordinated Transaction Scheduling (CTS):

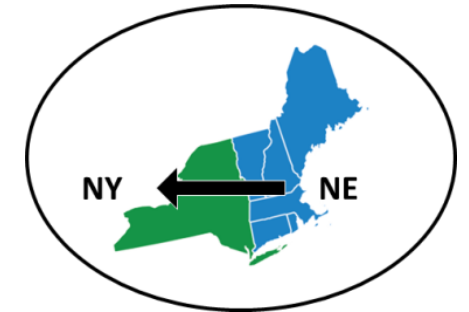
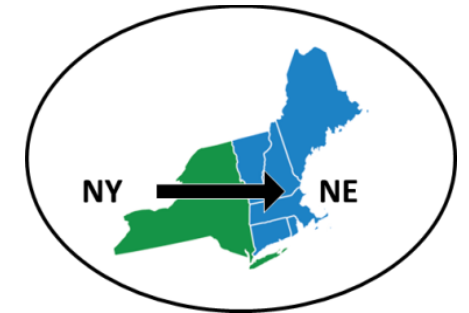
- CTS features:
 - Scheduling every 15 minutes
 - New external transaction format, interface bid
 - Coordinated economic clearing
 - Eliminates fees and charges for interface bids
- Implemented on NY Northern AC external interface (.I.ROSETON 345)



Background, *continued*

Interface bid

- “A unified real-time bid to simultaneously purchase and sell energy on each side of an external interface for which the enhanced scheduling procedures...” are implemented
 - Eliminates requirement for separate transactions to be submitted to each ISO in real time
 - Contains direction, bid quantity, and bid price
 - Bid price indicates the price between the two regions that the participant is willing to accept



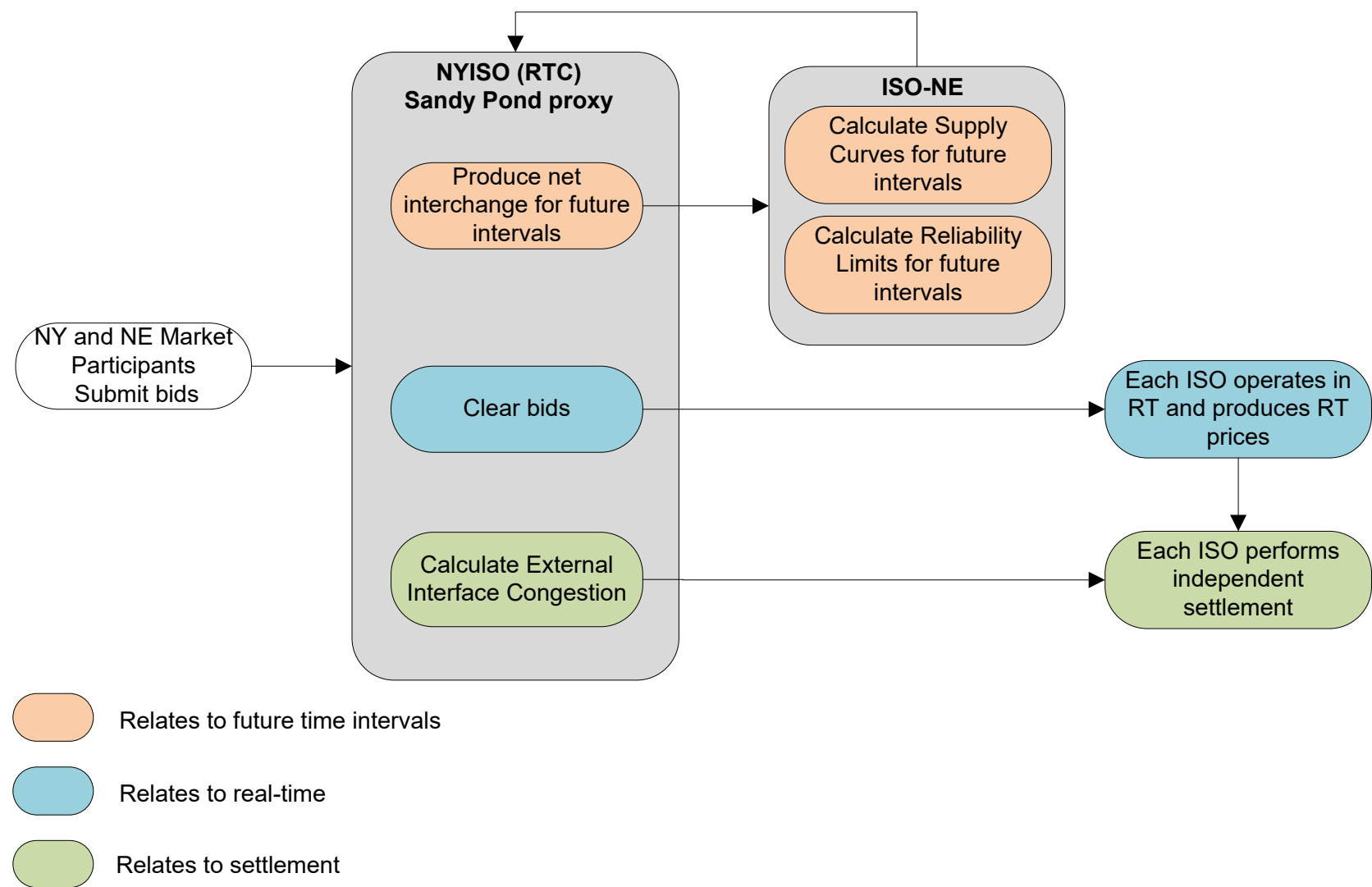
Coordinated economic clearing between the two regions

- Facilitates flow of power from the region with the lower LMP to the region with the higher LMP
- NYISO performs clearing of interface bids, which includes forecasted price of ISO-NE supply

Summary and Examples of CTS Process



General Iterative Process



CTS Process, ISO-NE Data Provided to NYISO

ISO-NE calculates and provides data every 15 minutes to NYISO including:

- Forecasted prices at Roseton representing the sensitivity to change in flow on the CTS interface
- Forecasted reliability limits representing constraints that cannot be modeled directly by NYISO
 - Indicates limit on ability export, or a required import, considering reserve requirements
 - Indicates limit on ability to import considering back down room on internal generation

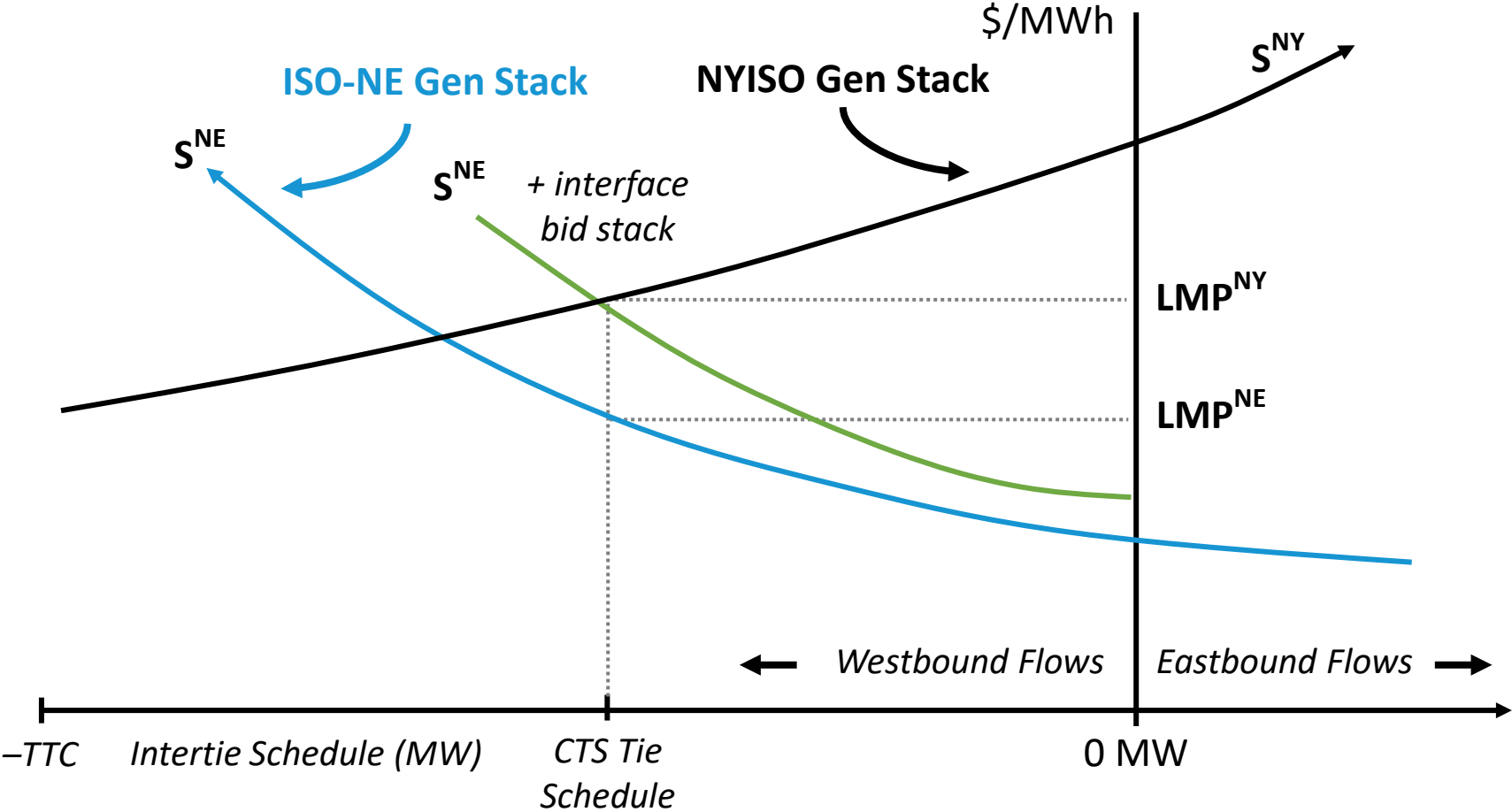


CTS Process, NYISO RTC Clearing

- NYISO RTC runs every 15 minutes for 2.5 hour duration (ten 15-minute intervals)
- Optimizes economics combining CTS interface bids with ISO-NE forecasted supply prices
- Limitations on economic solution
 - Transfer limits considered are most restrictive of normal transfer limits and reliability limits sent by ISO-NE
 - Ramp limits
 - CTS interface limit = 300 MW every 15 minutes
 - NYISO system wide limit = 700 MW every hour



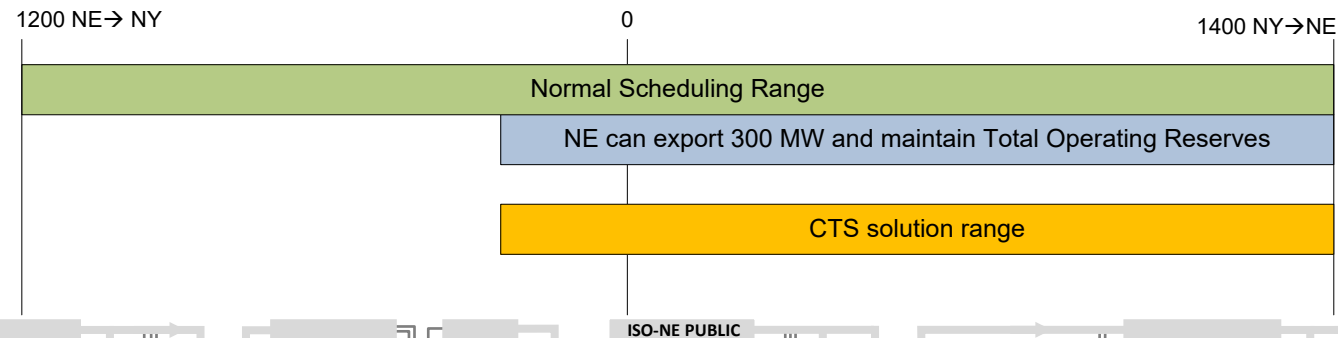
CTS Process General Example



ISO Data Provided to NYISO, Reliability Limits

Example considering one interval in time

- Input:
 - NYISO forecasted net interchange = -500 MW (into NE)
 - At that net interchange, ISO-NE total operating reserve surplus = 800 MW
 - Surplus = total operating reserve available - total operating reserve required
- Reliability Limit = $-500 + 800 = 300$ MW
 - ISO-NE can support up to 300 MW of export to NYISO and still maintain total operating reserve requirements
- RTC solution range = 300 MW export to 1400 MW import



External Interface Congestion

- If a constraint binds on the CTS interface in the NYISO RTC solution, the resulting congestion is split between the two ISOs depending on the constraint that is binding

Constraint	Split
Normal transfer limits	50/50
CTS interface ramp limit	50/50
NYCA ramp limit	100% NY
Reliability limits	100% NE

- ISO-NE incorporates this congestion into the Roseton LMP

External Interface Congestion, Flow at TTC Example

Scenario: Price cannot be equalized at full TTC

RTC results:

- Scheduled flow = -1400 MW to NE
- Marginal interface bid = \$4/MWh
- NYISO Sandy Pond LBMP = \$61/MWh
- ISO-NE imputed price = \$65/MWh
- Assume external congestion due to flow limit = \$12/MWh

Settlement and application of congestion apply to RT prices:

- NYISO RT Sandy Pond LBMP = $48 + \$12/2 = \$54/\text{MWh}$
- ISO-NE RT LMP = $\$65 - \$12/2 = \$59/\text{MWh}$
- All bids have net settlement of $\$59 - \$54 = \$5/\text{MWh}$

Note: External congestion is due to a normal transfer limit, split 50/50



External Interface Congestion, Reliability Limit Example

Scenario: ISO-NE sends a reliability limit for minimum generation with a maximum import to NE of -400 MW

RTC results:

- Scheduled flow = -400 MW to NE, constrained by reliability limit
- Marginal interface bid = \$2/MWh
- NYISO Sandy Pond LBMP = \$21/MWh
- ISO-NE imputed price = \$23/MWh
- External congestion due to flow limit = -\$8/MWh
 - External congestion is due to a reliability limit, 100% to ISO-NE

Settlement and application of congestion apply to RT prices:

- NYISO RT Sandy Pond LBMP = \$29 + 0 = \$29/MWh
- ISO-NE RT LMP = \$23 – (-\$8) = \$31/MWh
- All bids have net settlement of \$29 - \$31 = -\$2/MWh





Questions

Prices, Constraints, and Publishing



Roseton Real-Time Price Calculation and Finalization

- Preliminary and final data exist for:
 - External constraints and associated shadow price
 - 5 min prices
 - Hourly prices
- All data are available from both ISO Express and web services



Web Publishing of *Preliminary* External Constraints and Roseton Prices

- Preliminary constraint data is published as soon as information is received from NYISO
- 5-min prices ***do not*** reflect preliminary constraint data
- Hourly prices ***do*** reflect preliminary constraint data
- If constraint shadow price exceeds the ISO-NE established thresholds
 - No constraint information is published for that interval
 - No hourly prices are published for *any location*
- If no data is received from NYISO for an interval, ISO-NE posts assuming no congestion



Web Publishing of *Final* External Constraints and Roseton Prices

- Publishing includes final 15-minute external constraint records and associated shadow price
- 5 min and hourly prices include final constraint congestion adder
- Final data are published as soon as they are approved
- ISO-NE may delay finalizing prices if NYISO indicates they are reviewing market results

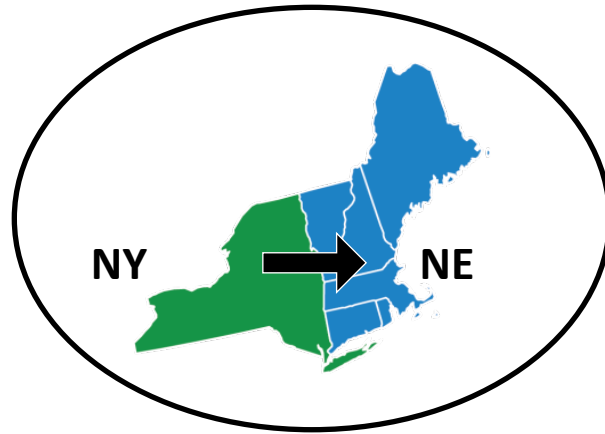


Settlements

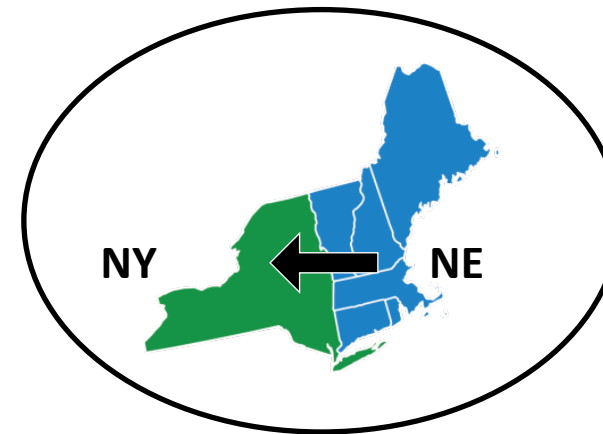


Coordinated External Transaction (CET)

CET in RTM is an interface bid between NYISO and ISO-NE energy markets



**New York Export &
New England Import**

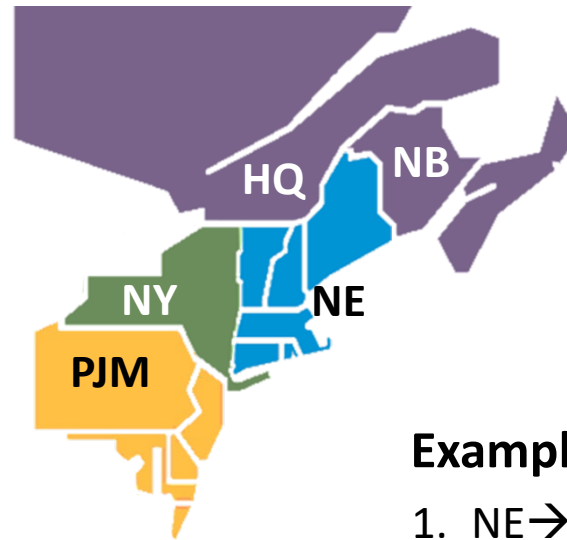


**New England Export
& New York Import**

Non-CET

Non-CET: A wheeling transaction through one or more control areas

- New England may be source, sink, or “in the middle”

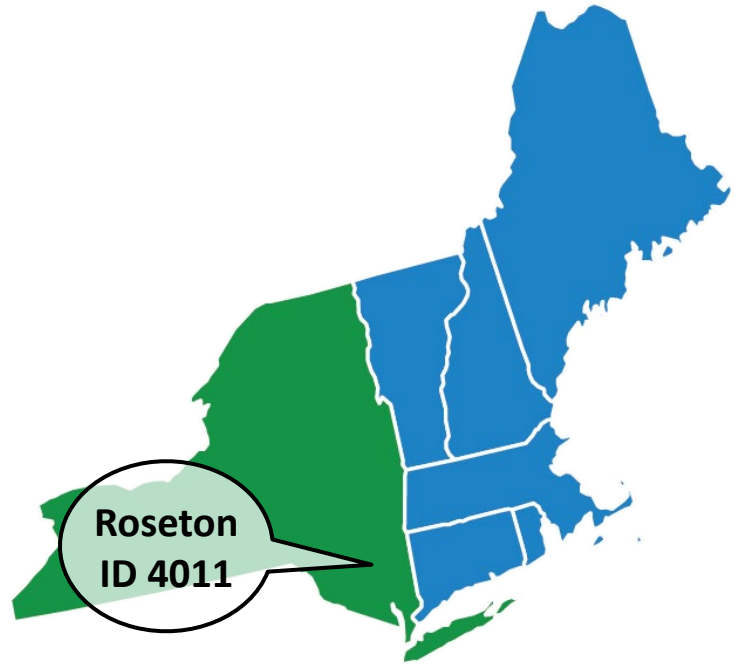


Examples:

1. $NE \rightarrow NY \rightarrow PJM$
2. $HQ \rightarrow NY \rightarrow NE$
3. $NB \rightarrow NE \rightarrow NY$

Settlement Facts for CTS

- CETs are not eligible for Net Commitment Period Compensation (NCPC) payments
- CETs are exempt from cost allocation in the energy and ancillary services market
- CETs are exempt from the cost allocators for ISO Tariff



CTS – Market Settlement Impacts

Cost Allocation Exclusion – Energy and Ancillary Services Markets

CET exclusion from market cost allocations

- Energy Market
 - Inadvertent Energy, Marginal Loss Revenue, Emergency & Security Energy
- Net Commitment Period Compensation (NCPC)
 - Day-Ahead and Real-Time
 - Economic, Local Second Contingency Protection Resource, Voltage Support (VAR)
 - Posturing/Cancelled Starts/Hourly Shortfall
- Regulation
- Inadvertent energy, marginal loss revenue, and emergency energy transactions
- MIS reports have columns for cost allocation determinants
- Inventory Energy Program (IEP)



CTS – Market Settlement Impacts

Cost allocation exclusion - ISO Tariff

- ISO Self Funding Tariff
 - Schedule 1, CET MW excluded from Through or Out (TOUT)
 - Schedule 2, CET hourly blocks excluded from Transaction Units
 - Schedule 2, CET import/export energy excluded from Volumetric charges
 - Schedule 3, CET MW excluded from TOUT
- Mystic Cost of Service CET excluded from RTLO for Mystic Charges
- Open-Access Transmission Tariff (OATT)
 - Schedule 2, CET excluded from TOUT for VAR charges
 - Schedule 17, CET excluded from average TOUT for IROL-CIP charges
- MIS reports display determinants calculated with CET exclusion



Questions

Submitting External Transactions



Day-Ahead Market Transactions

- Transactions are submitted to NY and NE separately
- All ISO-NE DAM transactions must continue to be submitted to New England External Transaction Tool (NEXXT)
- For CTS interface, DAM transactions require:
 - eTag ID
 - Import resource, if applicable





Real-Time Market Transactions

- On CTS interface, all transactions must be submitted into NYISO Joint Energy Scheduling System (JESS)
- For imports and exports on CTS interface, transactions cannot be submitted into NEXTT
- Transactions wheeling through ISO-NE are submitted in both NEXTT and JESS



Transaction Submittal Software

	<div> NEXTT</div>		<div> JESS</div>
	DAM	RTM	RTM
CTS Interface	ALL Include: eTag ID, Import Capacity Resource ID	Wheeling through ISO-NE	ALL
Non-CTS Interface	ALL	ALL	not applicable

Access to JESS

- NYISO hosts the JESS bidding platform
- ISO-NE digital certificate provides comparable access to JESS
 - No separate NYISO JESS application access is required in CAMS
- NYISO JESS access is determined from New England External Transactions Tool (NEXTT) role in CAMS
 - 10 digit phone number (no extension) required to setup NYISO JESS password
- User must establish a password upon initial entry into NYISO JESS



High Level JESS Features

- Either ISO-NE or NYISO participant can create/modify bid
- All submittals require confirmation by other company
 - If confirmation is not received, the bid is not evaluated
- Trust relationships can be setup between ISO-NE or NYISO companies to 'auto confirm'



RTM Bids in JESS

- JESS bid types

Bid Type	Flow
15 Min CTS	NY → NE, NE→NY
Hourly CTS	NE Wheel
Hourly LBMP	NY Wheel

- 15 minute CTS bids must be one hour long
 - MW and price may vary at 15 minute level
 - Normally evaluated every 15 minutes
- Hourly CTS, hourly LBMP must be one hour long
 - MW and price must be constant over the hour
 - Evaluated once an hour

RTM Bids in JESS, *continued*

- Price for all bids in JESS must be between -\$1000 and \$1000
- Generation Information System (GIS) ID field in JESS allows entry of GIS ID
 - Comparable to “Generation Information System” option in NEXTT on non-CTS interfaces
- Customers with ISO-NE capacity market obligations must submit data into JESS to identify that obligation as required by NYISO
- Submittal deadline for all bids in JESS is 75 minutes prior to the start of the hour



RTM Bids in JESS, continued

- Bids and resulting schedules can be downloaded directly from JESS
 - Information available in JESS for 10 days
- The day after the operating day, the NYISO JESS are visible in NEXTT on the CTS Organizer display

CTS Organizer

Date:02/27/2024

Customer:--- Select ---

Direction:

eTag ID:

Search

							Bid MW				Cleared MW			
Customer	eTag ID	ISONE ID	JESS ID	GIS ID	Direction	Hour End	00	15	30	45	00	15	30	45
					EXPORT	02/27/2024 11	25	25	25	25	25	25	25	25
					EXPORT	02/27/2024 12	25	25	25	25	25	25	25	25
					EXPORT	02/27/2024 13	25	25	25	25	25	25	25	25
					EXPORT	02/27/2024 19	25	25	25	25	25	25	25	25
					EXPORT	02/27/2024 20	25	25	25	25	25	25	25	25
					EXPORT	02/27/2024 01	80	80	80	80	80	80	80	80

Questions

Day-Ahead Market (DAM) Example

DAM Clearing

- Transactions on CTS interface are submitted to NYISO and ISO-NE separately
- NYISO and ISO-NE clear their respective DAM independently
- Pricing for a binding constraint is handled differently for CTS and non-CTS interfaces

CTS Interface	Non-CTS Interfaces
<ul style="list-style-type: none">• Bids/offers at the node DO set the LMP• Does not create specific NCPC associated with that external node	<ul style="list-style-type: none">• Bids/offers at the node DO NOT set the LMP• Can create Net Commitment Period Compensation (NCPC) credits and charges to all participants with obligations at that external node



DAM Clearing **Import** Example

- Import transfer limit 800 MW
- System LMP (no internal constraints) = \$40 /MWh

Submitted to DAM (MW)	Non-CTS Interface					CTS Interface				
	Cleared MW	Ext Node LMP \$/MWh	Energy Settlement	NCPC Settlement	Total Energy + NCPC	Cleared MW	Ext Node LMP \$/MWh	Energy Settlement	NCPC Settlement	Total Energy + NCPC
Total self-scheduled Imports 1000	1000	40	\$40,000	\$(28,000)	\$12,000	1000	-100	\$(100,000)	\$ -	\$(100,000)
Counterflow Export -200 @ -\$100/MWh	-200	40	\$(8,000)	28,000	\$20,000	-200	-100	\$20,000	\$ -	\$20,000

- Self-scheduled imports are treated as -\$150/MWh in DAM clearing

Settlement MIS Report Sign Convention			
Import = + MWh	Export = - MWh	Payments = + \$	Charges = - \$

DAM Clearing **Export** Example

- Export transfer limit 700 MW
- System LMP (no internal constraints) = \$50 /MWh

Submitted to DAM (MW)	Non-CTS Interface					CTS Interface				
	Cleared MW	Roseton LMP \$/MWh	Energy Settlement	NCPC Settlement	Total Energy + NCPC	Cleared MW	Roseton LMP \$/MWh	Energy Settlement	NCPC Settlement	Total Energy + NCPC
Total self-scheduled Exports -1000	-1000	50	\$(50,000)	\$(135,000)	\$(185,000)	-1000	500	\$(500,000)	\$ -	\$(500,000)
Counterflow Import 300 @ \$500/MWh	300	50	\$15,000	\$135,000	\$150,000	300	500	\$150,000	\$ -	\$150,000

- Self-scheduled exports are treated as \$2000/MWh in DAM clearing

Settlement MIS Report Sign Convention			
Import = + MWh	Export = - MWh	Payments = + \$	Charges = - \$



Questions

Interface Bid Example



Interface Bid Example

Scenario: Transaction from NYISO to ISO-NE only in RTM

Pre-CTS	Post-CTS
Participants submit: <ul style="list-style-type: none">• ISO-NE participant submits fixed export to ISO-NE RTM• NYISO participant submits priced import to NYISO RTM, say \$28	Participants submit: <ul style="list-style-type: none">• CTS Interface Bid NE→ NY at price = \$3
RTC results: <ul style="list-style-type: none">• Forecasted NYISO price = \$30, transaction clears, scheduled in RT	RTC results: <ul style="list-style-type: none">• Forecasted ISO-NE price = \$26• Forecasted NYISO price = \$20
Possible financial outcome: <ul style="list-style-type: none">• ISO-NE RTM price = \$34• NYISO RTM price = \$30• Net = -\$4 [NYISO clearing does not take into account ISO-NE prices]	Outcome: <p>$\\$20 - \\$26 = -\\$6 < \\3</p> <p>Transaction would not be cleared by NYISO RTC</p>



Interface Bid Scenario

Scenario: CTS bids from NYISO to ISO-NE only in RTM

Participants submit:

- CTS Interface Bid NY → NE at price = \$3/MWh

RTC results for one interval:

- Forecasted NYISO price = \$20/MWh, forecasted ISO-NE price = \$25/MWh
 - Forecasted price difference = \$25 – \$20 = \$5/MWh
- Transaction is cleared by NYISO RTC

Settlement outcome examples:

- Settlement based on final RTM prices in both ISO-NE and NYISO

	RTM Prices as Forecasted <i>15 Minute LMP (\$/MWh)</i>	RTM Prices Not as Forecasted <i>15 Minute LMP (\$/MWh)</i>
NYISO RTM prices	\$20	\$24
ISO-NE RTM prices	\$25	\$25
Net	25 – 20 = \$5	25 – 24 = \$1



Questions

Contact Participant Support and Solutions



Submit a request via Ask ISO *(preferred)*
<https://askiso.force.com/>

Email AskISO@iso-ne.com

Phone

(413) 540-4220 (call center)

(833) 248-4220

Pager *(for emergency inquiries outside of business hours)*

(877) 226-4814

**Business hours and
additional contact details
are available from the
Participant Support page**

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