

CTS with ISO-NE



CTS Workshop (MIWG)

February 12, 2015

NYISO KCC Conference Center

Background, Timeline & Overview

Mike DeSocio

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New York Independent System Operator

What is CTS?

- ◆ **Coordinated Transaction Scheduling (CTS)**

A new protocol that allows market participants to schedule energy based on projected price differences between market areas.

Benefits of CTS with ISO-NE

◆ Coordinated Transaction Scheduling (CTS)

The objective of CTS is to improve efficiency of energy scheduling with neighboring ISOs.

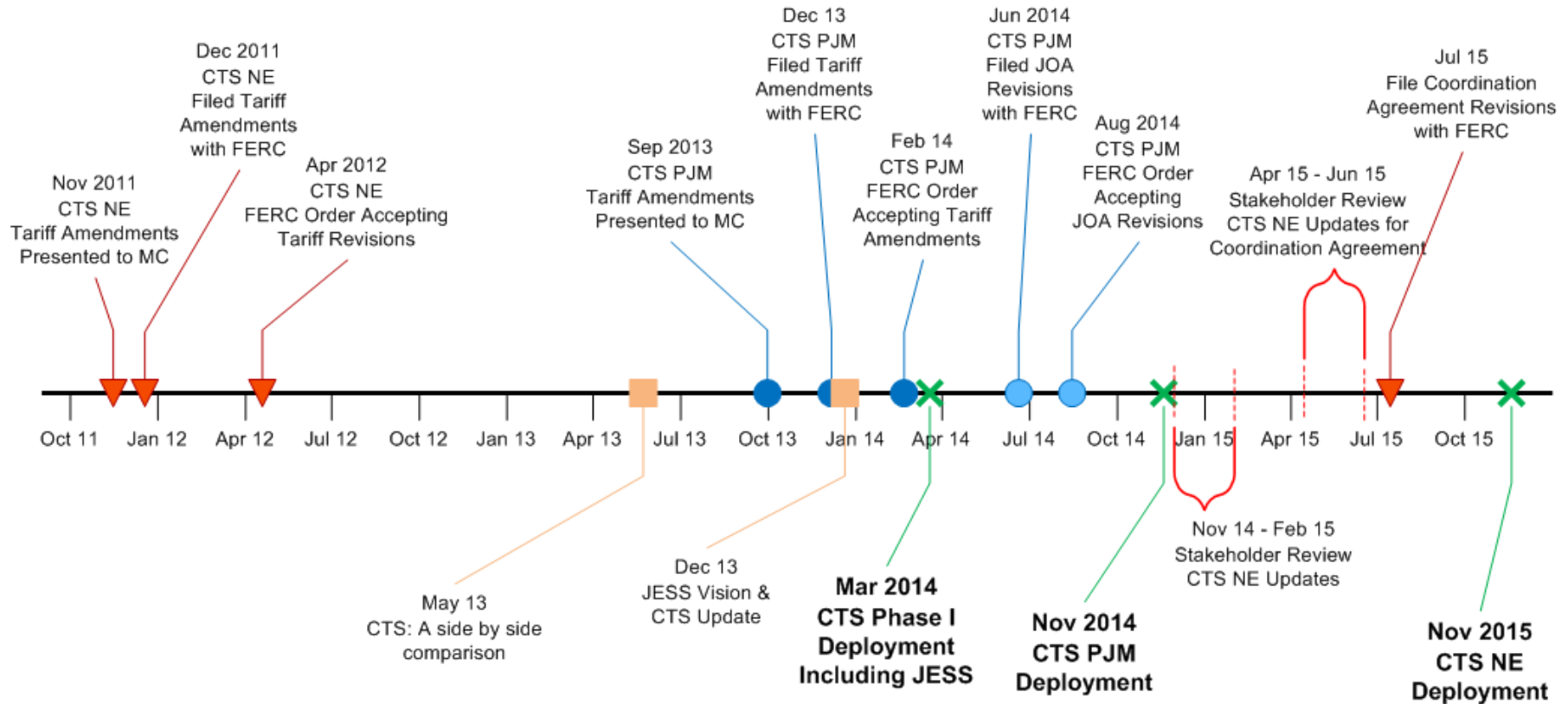
◆ Efficiency Impact

CTS will allow market participants to schedule based on the price difference between the NYISO and the neighboring ISOs, thereby:

- *improving the arbitrage opportunities available;*
- *improving the convergence of energy prices throughout the regions resulting in more efficient utilization of existing transmission capability; and*
- *allowing more efficient access to lower cost resources throughout the regions.*

In addition, the NYISO and ISO-NE will make quarter-hour scheduling available at the Sandy Pond Proxy Generator Bus when CTS is implemented.

CTS with ISO-NE Timeline



CTS Overview

- ◆ **Only at the Sandy Pond Proxy**
- ◆ **Transaction Offers**
 - *CTS offers will be required for 15min Transactions offers*
 - *15min offers are single pt bid curves*
 - *CTS hourly offers are only permitted for Wheel-Through Transactions through NE beginning or ending at the Sandy Pond Proxy (e.g. New Brunswick -> ISO-NE -> NYISO)*
 - *Decremental or Sink Price Cap hourly offers will continue to be required for Wheel-Through Transactions through NY (e.g. OH -> NYISO -> ISO-NE)*
 - *All transaction offers will be entered into the Joint Energy Scheduling System (JESS)*
 - The same process as is used today.

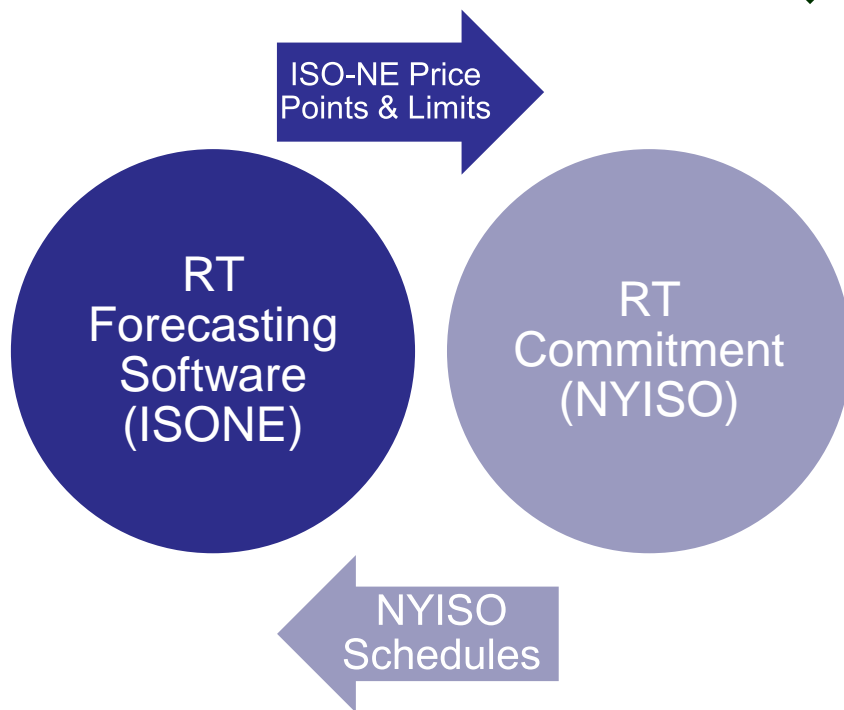
CTS Overview

◆ ISO-NE Supply Price Points

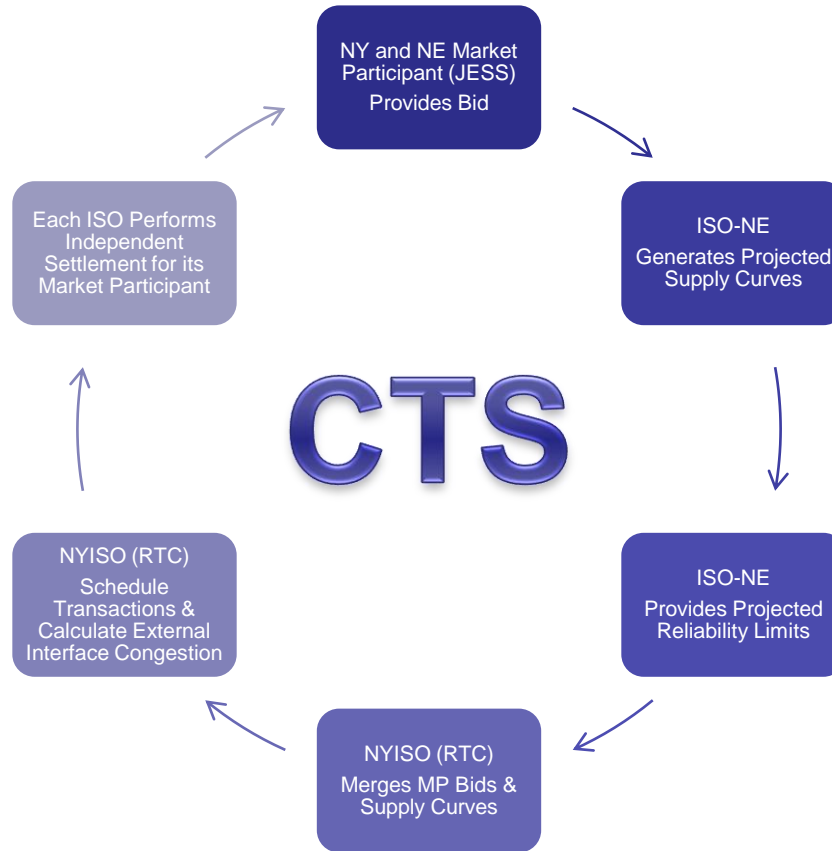
- *ISO-NE will provide Supply Price Points to NYISO to enrich CTS offers for evaluation by RTC*

◆ ISO-NE Reliability Limits

- *ISO-NE will provide the NYISO with Transfer Limits to be used by RTC in it's evaluation of Transaction bids that reflect ISO-NE transfer limitations due to:*
 - **ISO-NE Minimum Generation**
 - **ISO-NE 30 minute Reserves**
 - **ISO-NE 10 minute Reserves**
- *These limits will restrict the interchange schedules between the NYISO and ISO-NE*



CTS Overview



Bidding-Joint Energy Scheduling System (JESS)

Chris Brown

Product Business Lead Analyst

New York Independent System Operator

Common Bid Platform—JESS

- ◆ The NYISO's Joint Energy Scheduling System (JESS) will be the common bid platform for all real time market transactions at the CTS enabled proxy bus with ISO-NE
 - *Instead of submitting separate bids to NYISO and ISO-NE, MP will enter a single bid in JESS*

New Fields on the Transaction Contract

- ◆ **NYISO Organization**
 - *Identifies NYISO MP responsible for the contract*
 - *Allows ISO-NE MP to specify NYISO MP who is counterparty to the transaction*
- ◆ **Non-NYISO Organization**
 - *Identifies ISO-NE MP responsible for the contract*
 - *Allows NYISO MP to specify ISO-NE MP who is counterparty to the transaction*
- ◆ **All transactions at CTS proxy bus with ISO-NE must identify both organizations**
 - *DAM & RT bids*
 - *CTS & LBMP bid schedule types*

Transaction Bid Submission at CTS-NE Proxy Bus

- ◆ RT market bid can be entered by either NYISO MP or ISO-NE MP
 - *DAM bids will continue to be submitted separately in each ISO market*
- ◆ In order to pass bid validation, RT market bid must be confirmed by both the NYISO MP and the ISO-NE MP
 - *Applies to all RT market bids at the CTS-NE Proxy*
 - *Confirmation can be performed manually, or*
 - *CTS trust relationships can be established to automate the confirmation process (see next slide)*

CTS Trust Relationships

- ◆ **A NYISO MP can extend a CTS trust relationship to an ISO-NE MP**
 - *When this ISO-NE MP submits a bid with the NYISO MP as the counterparty, the NYISO FRP confirmation status will automatically be set to 'Y'*

- ◆ **An ISO-NE MP can extend a CTS trust relationship to a NYISO MP**
 - *When this NYISO MP submits a bid with the ISO-NE MP as the counterparty, the Non-NYISO FRP confirmation status will automatically be set to 'Y'*

Bid Type Option at CTS-NE Proxy

- ◆ **‘Hourly LBMP’ imports/exports will no longer be allowed once CTS is activated**
 - *Transactions wheeling through NYCA sourcing or sinking at the CTS-NE proxy will continue to use ‘Hourly LBMP’ bid type*
- ◆ **‘Hourly CTS’ bid type must be used to schedule import/export to NYISO associated with wheel through ISO-NE**
 - *Bid validation will confirm via NERC e-Tag information specified in bid*

Bid Curves at CTS-NE Proxy

- ◆ **All DAM bids will continue to allow for an up to 11 point (price-quantity pair) bid curve**
- ◆ **In RT market both ‘15-Min CTS’ and ‘Hourly CTS’ type bids will be restricted to a single point bid curve**
- ◆ **‘15-Min CTS’ type bids will have option to specify different (one point) bid curves for each quarter hour in RT**

Bid Options Comparison

Feature	ISO-NE	PJM
Hourly LBMP	Wheeling through the NYCA only	Wheeling through the NYCA only
15-Min LBMP	No	Yes
Hourly CTS	Wheeling through the NECA only	No
15-Min CTS	Yes	Yes
Multi-point CTS Bid Curves	No	Yes
15-Minute Bid Curves	Yes	Yes

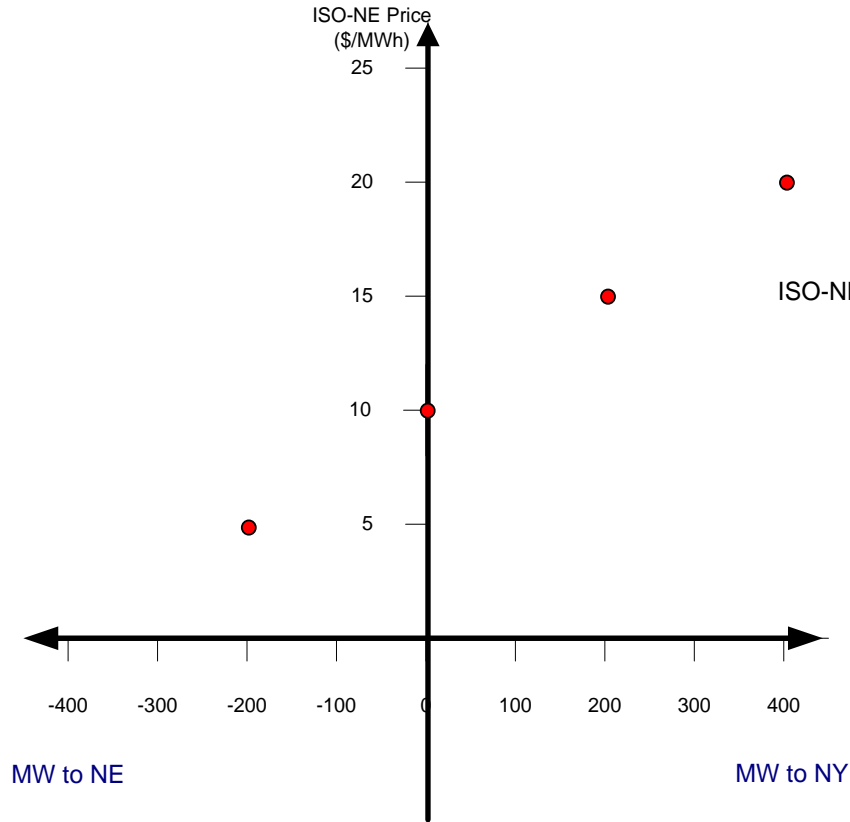
ISO-NE Projected Supply Curves

James Pigeon

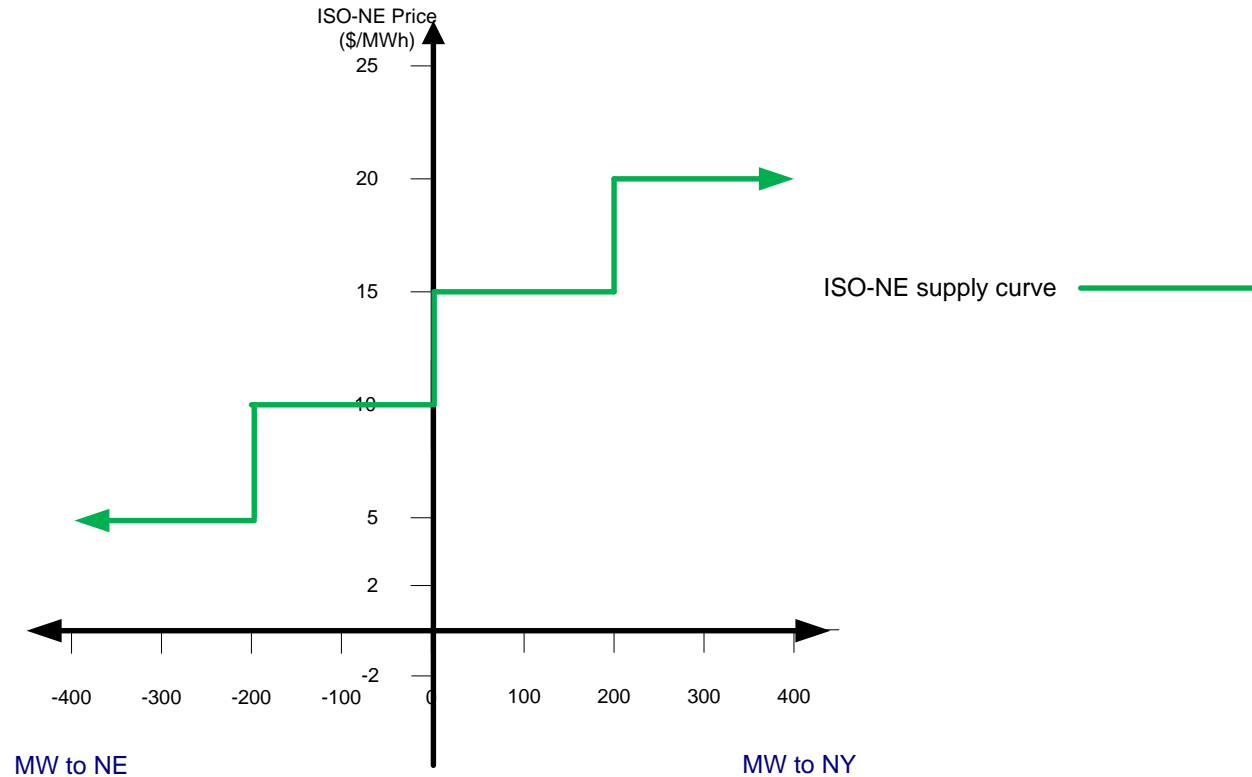
Market Product Specialist

New York Independent System Operator

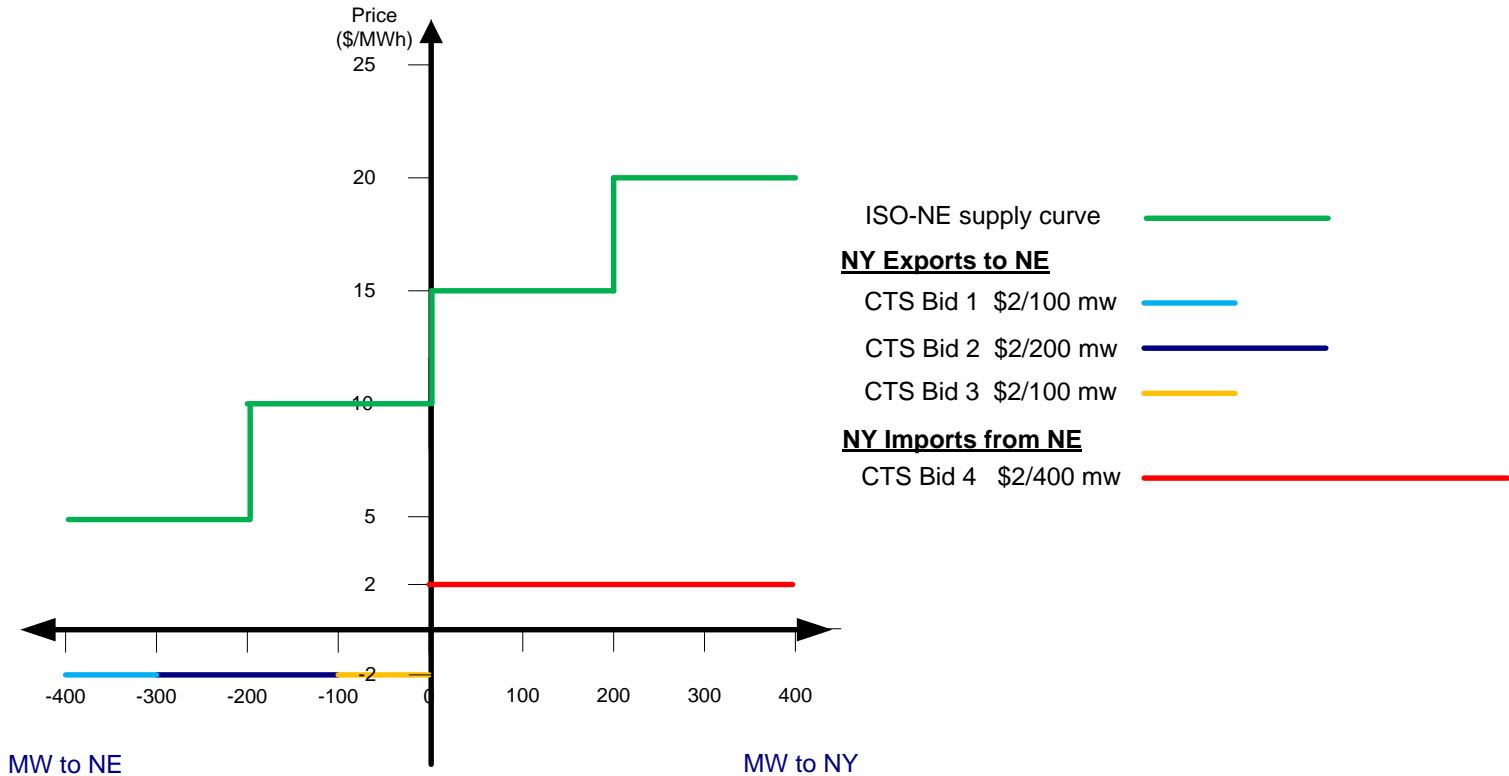
Enriched CTS Bid Curve Example



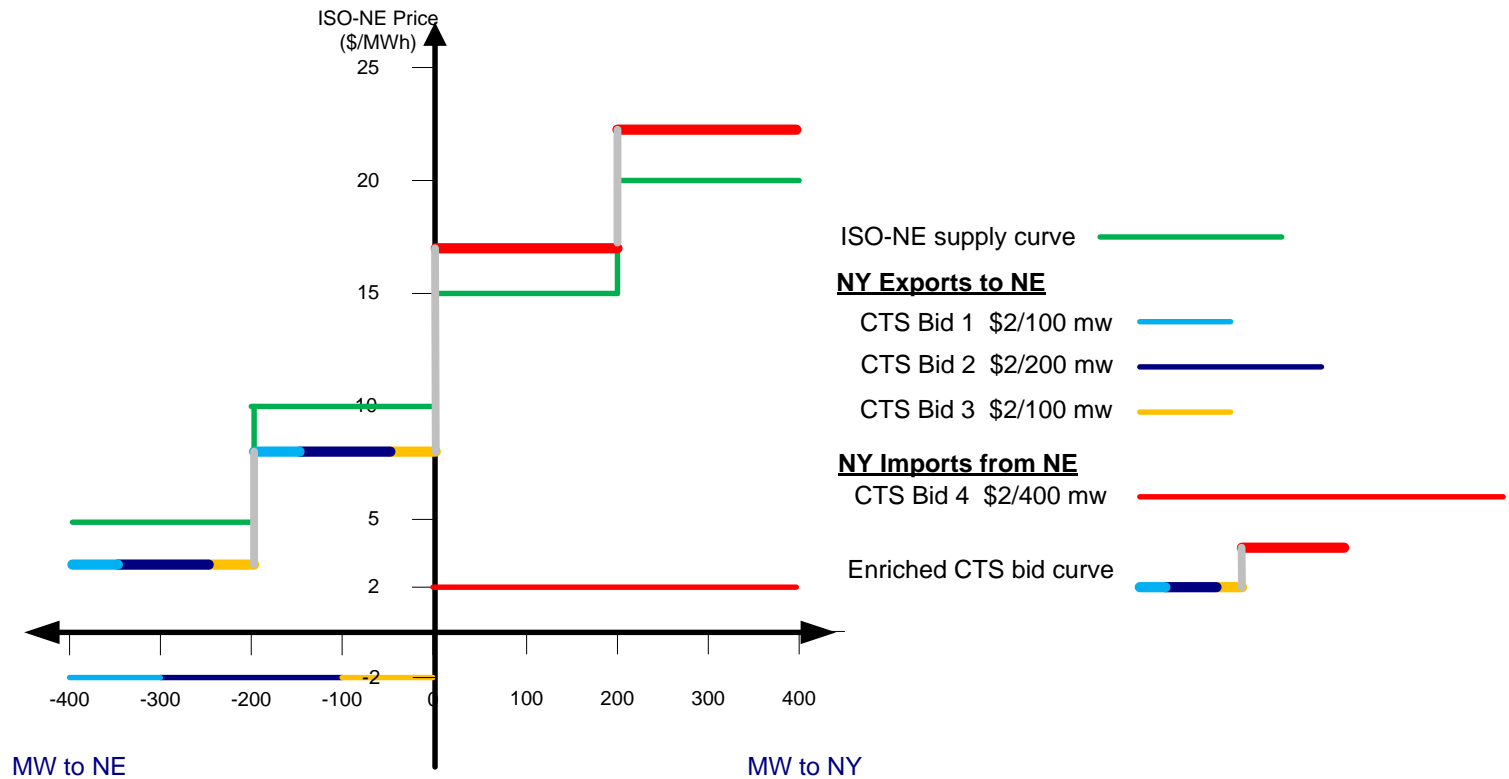
Enriched CTS Bid Curve Example



Enriched CTS Bid Curve Example



Enriched CTS Bid Curve Example



Ramp Limits & Reliability Flow Limits

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Market Product Specialist

New York Independent System Operator

Ramp Limits

◆ Ramp Limits

- *The NYISO does not expect changes to ramp limits to be implemented without mutual agreement. Any adjustments to the NY-NE AC ramp limits will require operations discussion and agreement before implementation.*
- *The NYISO and ISO-NE have agreed to implement a 200MW per quarter hour ramp limit and ISO-NE agrees to consider increasing that limit to 250MW per quarter hour after six months of real-time quarter hour scheduling.*
- *For hours when the NYISO Operator has selected the 'hourly scheduling' flag in RTC, the ramp for start of each hour being scheduled on an hourly basis will be existing NYISO hourly interface ramp values.*

Reliability Flow Limits

◆ Reliability Flow Limits

- *The purpose of Reliability Flow Limits is to reflect regional reliability needs into RTC in order to minimize operator adjustments to transaction schedules during checkout.*
 - *CTS with ISO-NE moves the NY/NE region to a single clearing of interchange transactions via RTC*
- *The NYISO and ISO-NE have agreed that one area going short a reserve product should not drive the other area short of that same reserve product. However, when possible the software should support the area in need as much as possible without causing the supplying area to also become short reserves by allowing flows to be forced into the area of greater need.*

Reliability Flow Limits

◆ Reliability Flow Limits

To effectuate this, the NYISO will attempt to enforce the most restrictive reliability limits provided by NE as is.

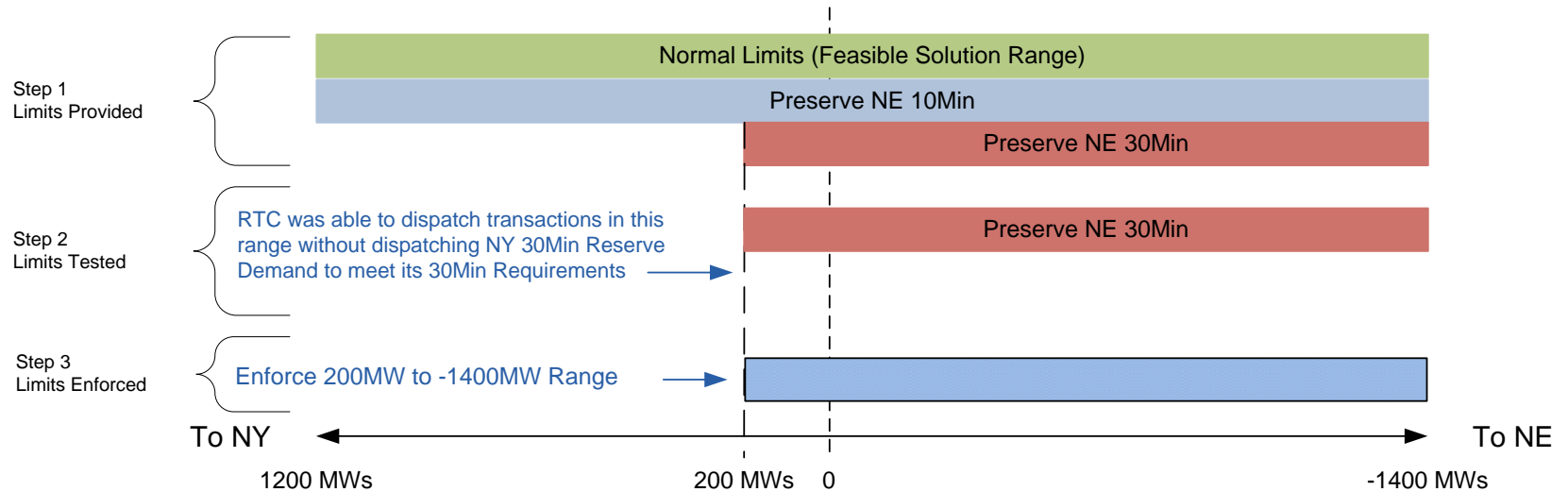
- *In the event that attempting to enforce these limits causes NY to go short 30 minute (Total) reserves then the software will relax the provided limits to the lesser of (i) preventing a NY 30 minute reserve shortage or (ii) a zero MW net interchange schedule.*
- *In the event that attempting to enforce these limits causes NY to go short 10 minute reserves and the most restrictive NE limit is a 30 minute limit, then the software will relax the provided limits to prevent a NY 10 minute reserve shortage.*
- *In the event that attempting to enforce these limits causes NY to go short 10 minute reserves and the most restrictive NE limit is a 10 minute limit, then the software will relax the provided limits to the lesser of (i) preventing a NY 10 minute reserve shortage or (ii) a zero MW net interchange schedule.*
- *In the event there is an ISO-NE Minimum Generation event, no further logic will be applied to the Low Limit and the software will use the provided Min Gen Low Limits. Min Gen Low Limits shall not require and interchange schedule greater than zero MW.*

All reserve limits are attempted to be enforced will first be adjusted to ensure that the agreed to ramp is not violated.

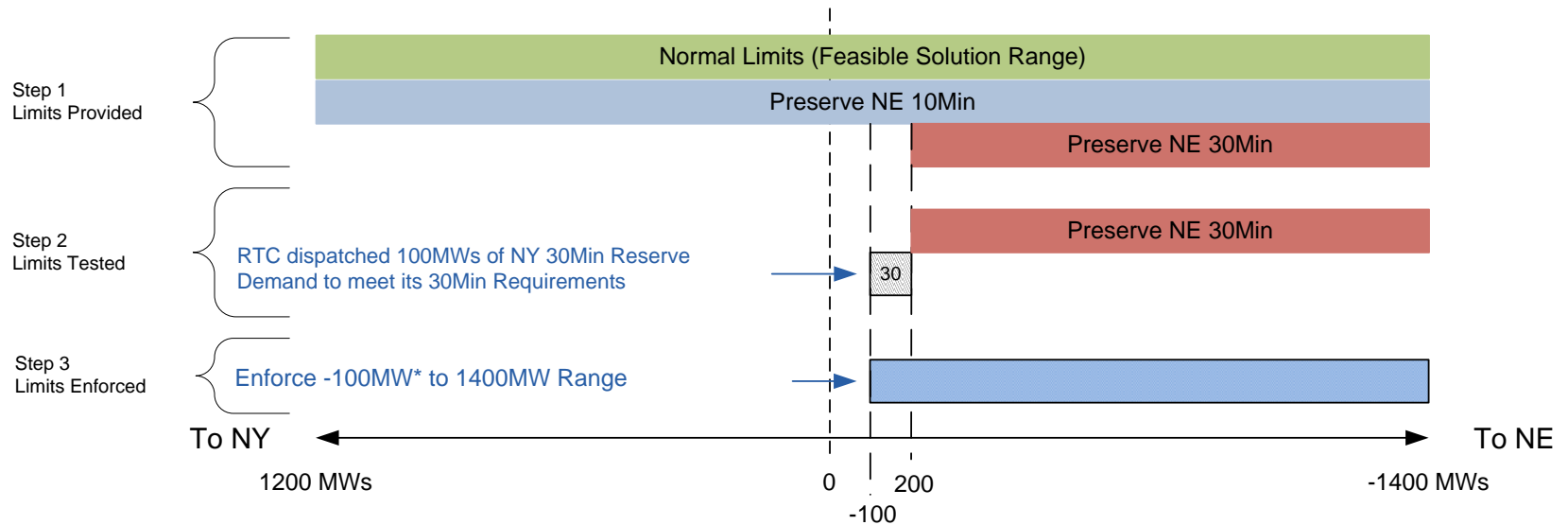
In the event no reliability limits are provided, then normal interface TTC limits and Ramp limit will be used by RTC without adjustment

Note: Capacity Limit rules are addressed later in the presentation

Reliability Flow Limits Example 1



Reliability Flow Limits Example



*-100MW comes from NE 30Min -200MW Limit plus NYISO 30Min 100MW Shortage

Price Formation & Congestion Sharing

James Pigeon

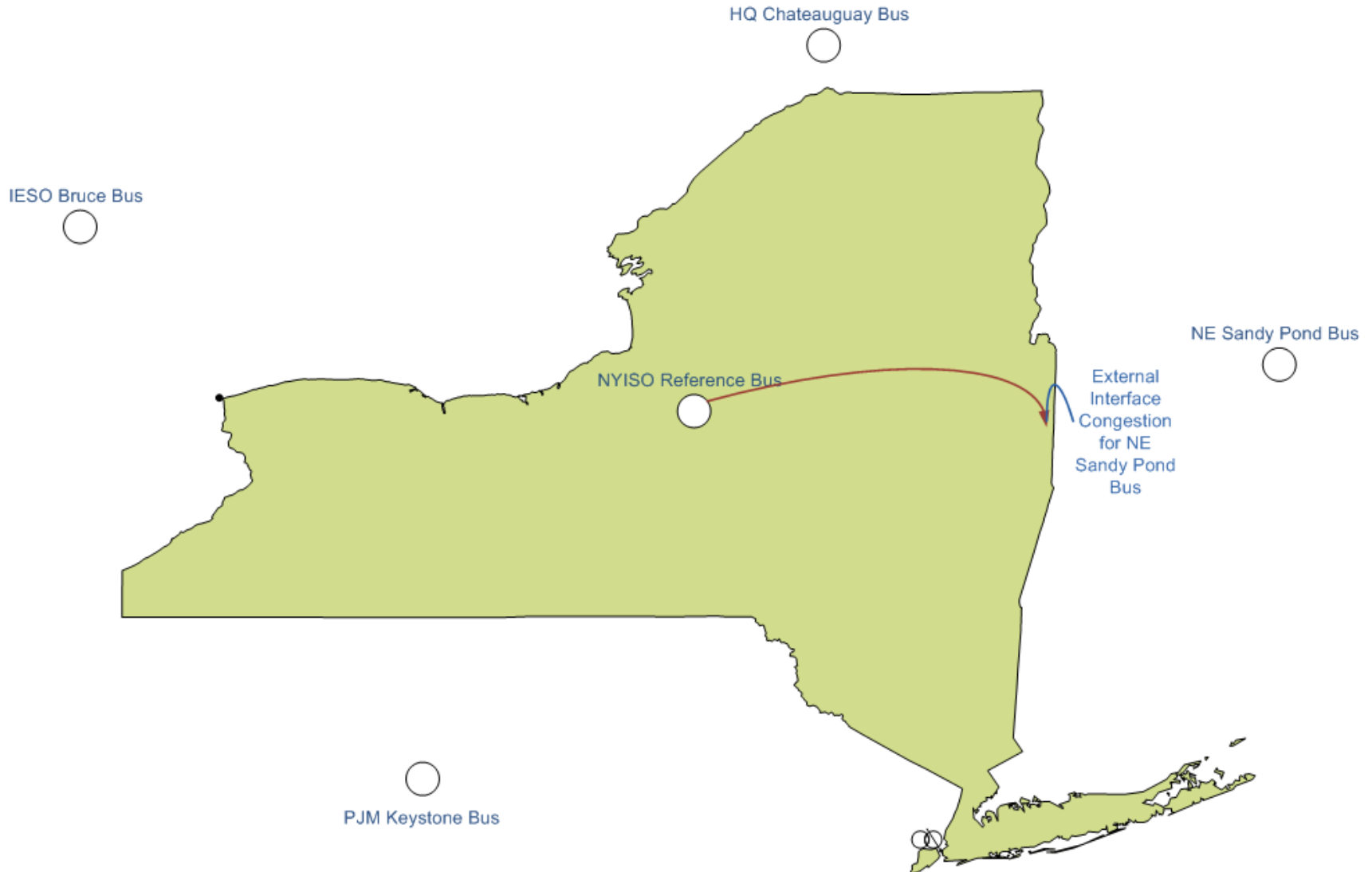
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CTS Congestion Sharing

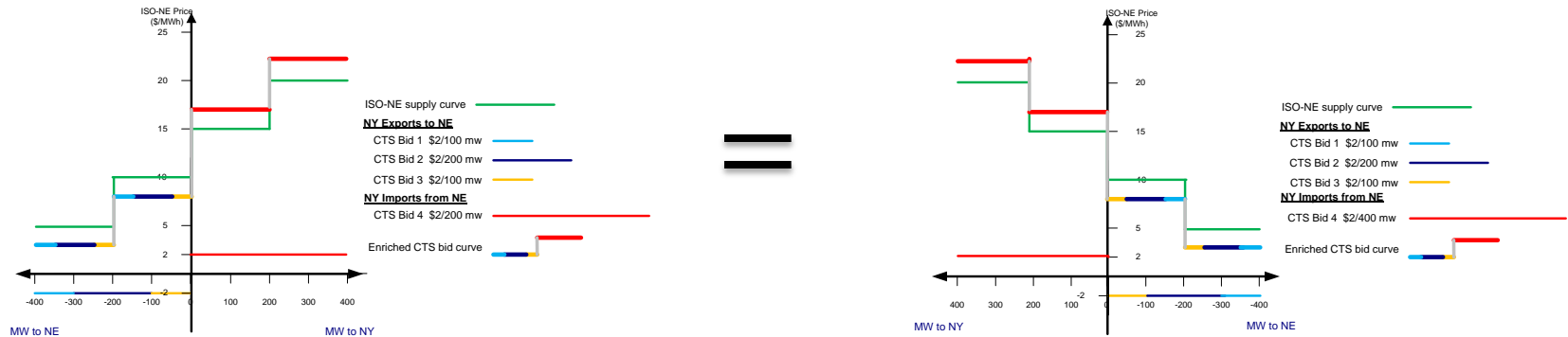
- *When RTC is attempting to enforce limits based on a defined set of ISO-NE reliability needs, congestion costs resulting from enforcing those limits will be borne solely by ISO-NE.*
- *When RTC is attempting to enforce a set of limits based on NYCA-wide ramp limits, congestion costs resulting from enforcing those limits will be borne solely by NYISO.*
- *The congestion costs associated with enforcement of all other limits will be borne by both ISOs equally using a 50%/50% split.*
- *The congestion costs that sharing is applied to are the External Interface Congestion Costs only*

CTS Congestion Sharing



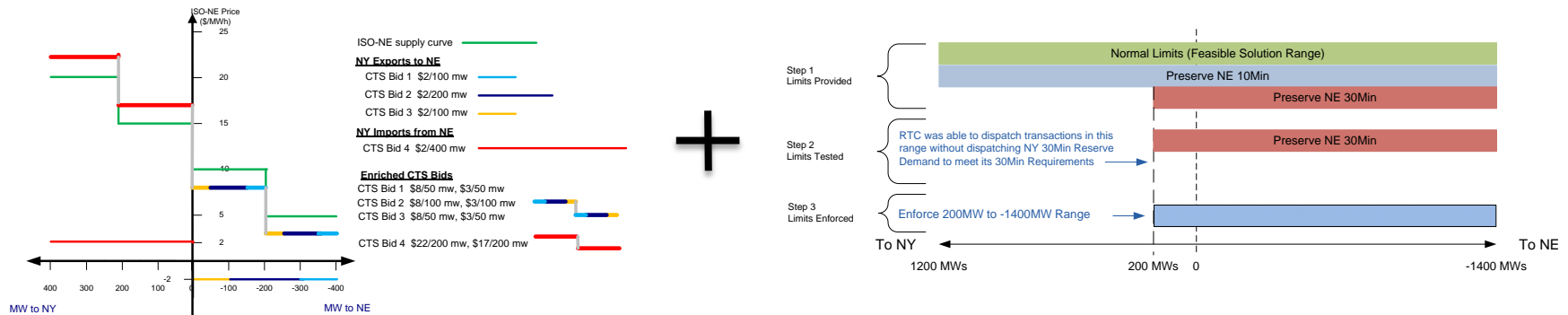
CTS Congestion Sharing

- ◆ First convert the Enriched CTS Bid Curve supply curve to a demand curve (flip over Y-axis) for comparison with flow limits direction and geographical (west to east) representation

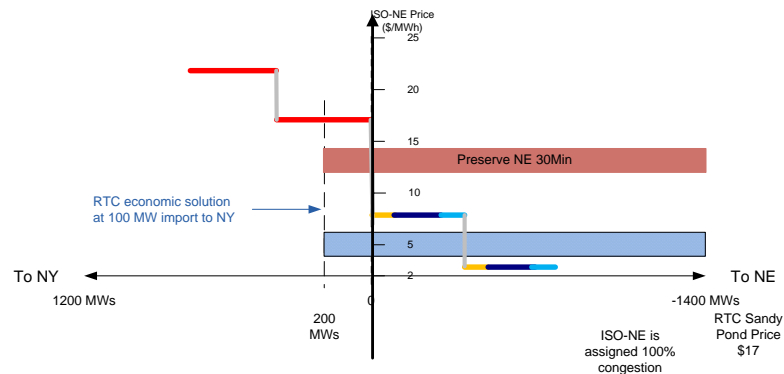


CTS Congestion Sharing Ex. 1

- ◆ Next overlay the Enriched CTS Bid Curve on the Reliability Limits

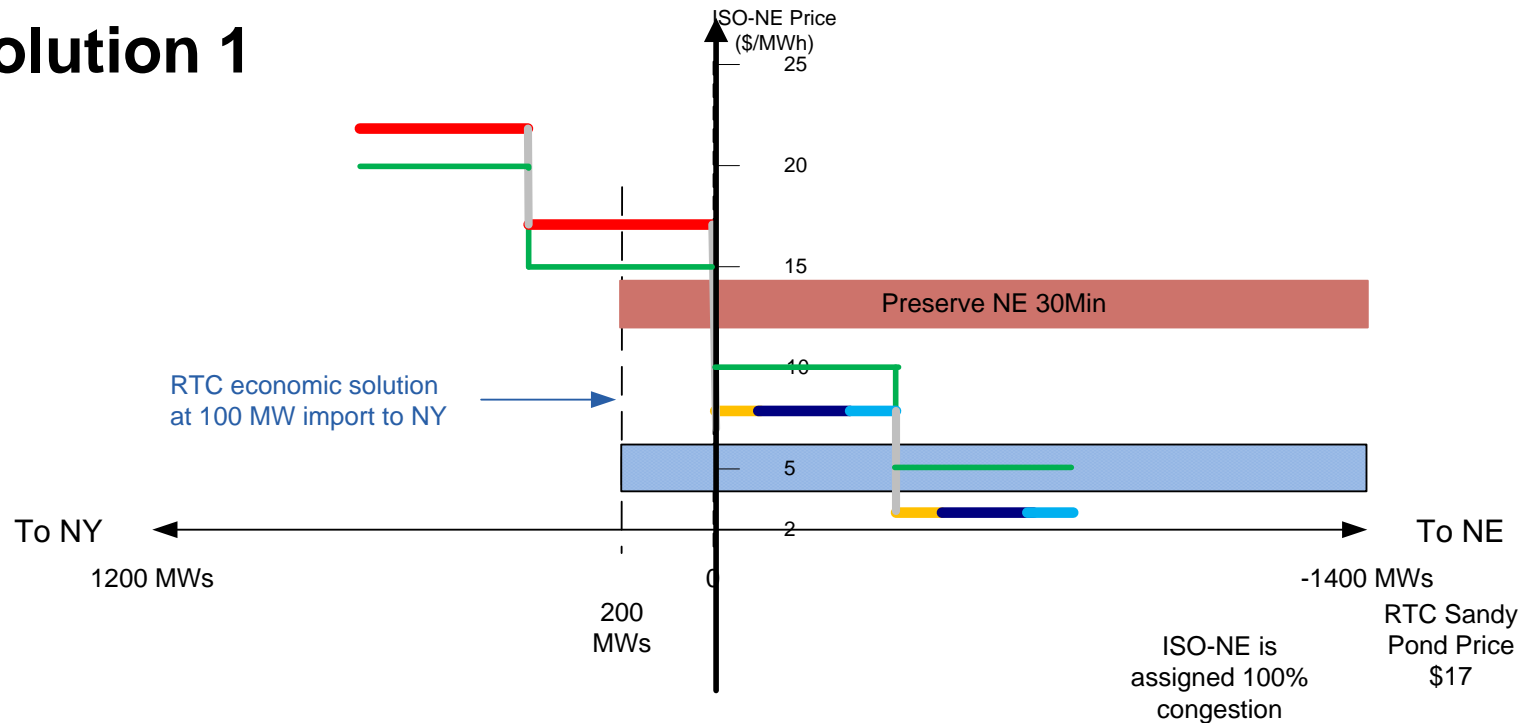


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CTS Congestion Sharing Ex. 1

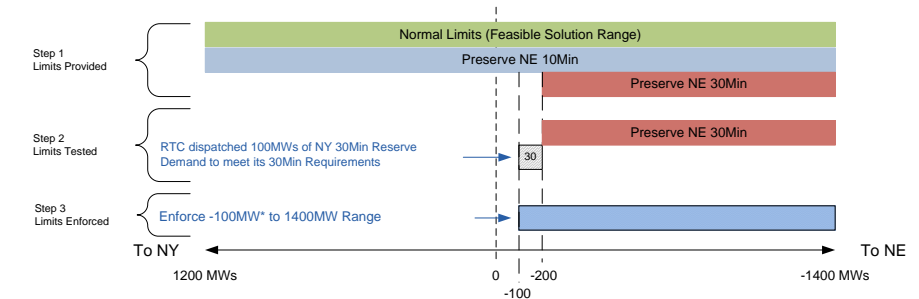
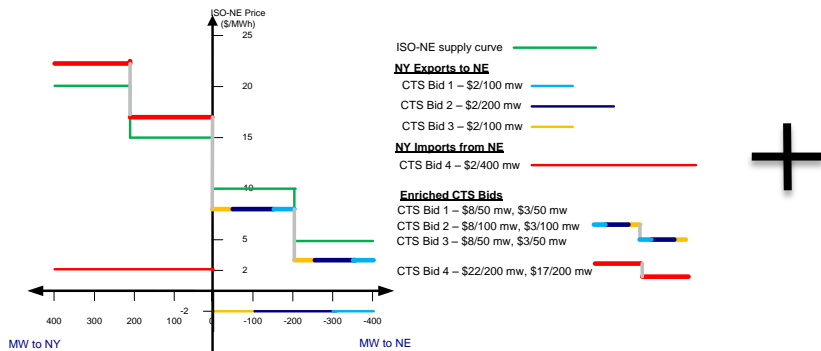
◆ Solution 1



- ◆ External Transactions for this example will settle based on
 - ◆ The NYISO RTD LBMP and;
 - ◆ The ISO-NE 5-minute LMP including 100% of the RTC determined External Interface Congestion

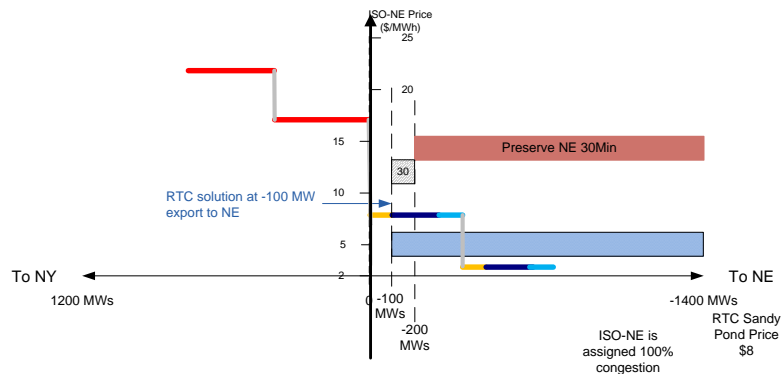
CTS Congestion Sharing Ex. 2

- ◆ Overlay the Enriched CTS Bid Curve on the Reliability Limits



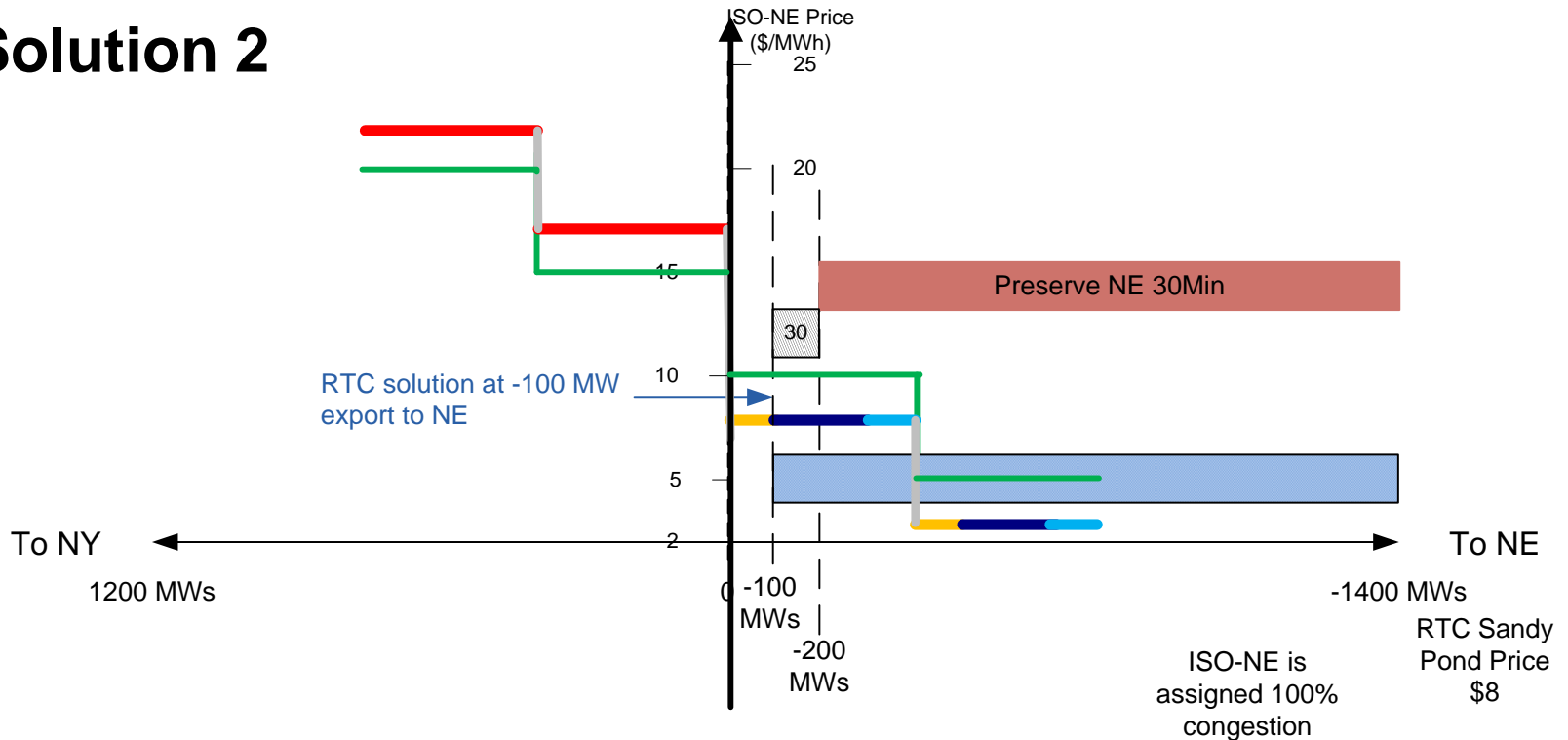
*-100MW comes from NE 30Min -200MW Limit plus NYISO 30Min 100MW Shortage

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CTS Congestion Sharing Ex. 2

◆ Solution 2



◆ External Transactions for this example will settle based on

- ◆ The NYISO RTD LBMP and;
- ◆ The ISO-NE 5-minute LMP including 100% of the RTC determined External Interface Congestion

CTS Congestion Sharing Ex. 2



Capacity Requests

James Pigeon

Market Product Specialist

New York Independent System Operator

NYISO Capacity Requests

- ◆ **The process will remain the same as today where NYISO will provide notification to ISO-NE MPs that they must get transactions scheduled for their ICAP obligations to NYISO**
- ◆ **The notification will be done via a web posting**

ISO-NE Capacity Requests

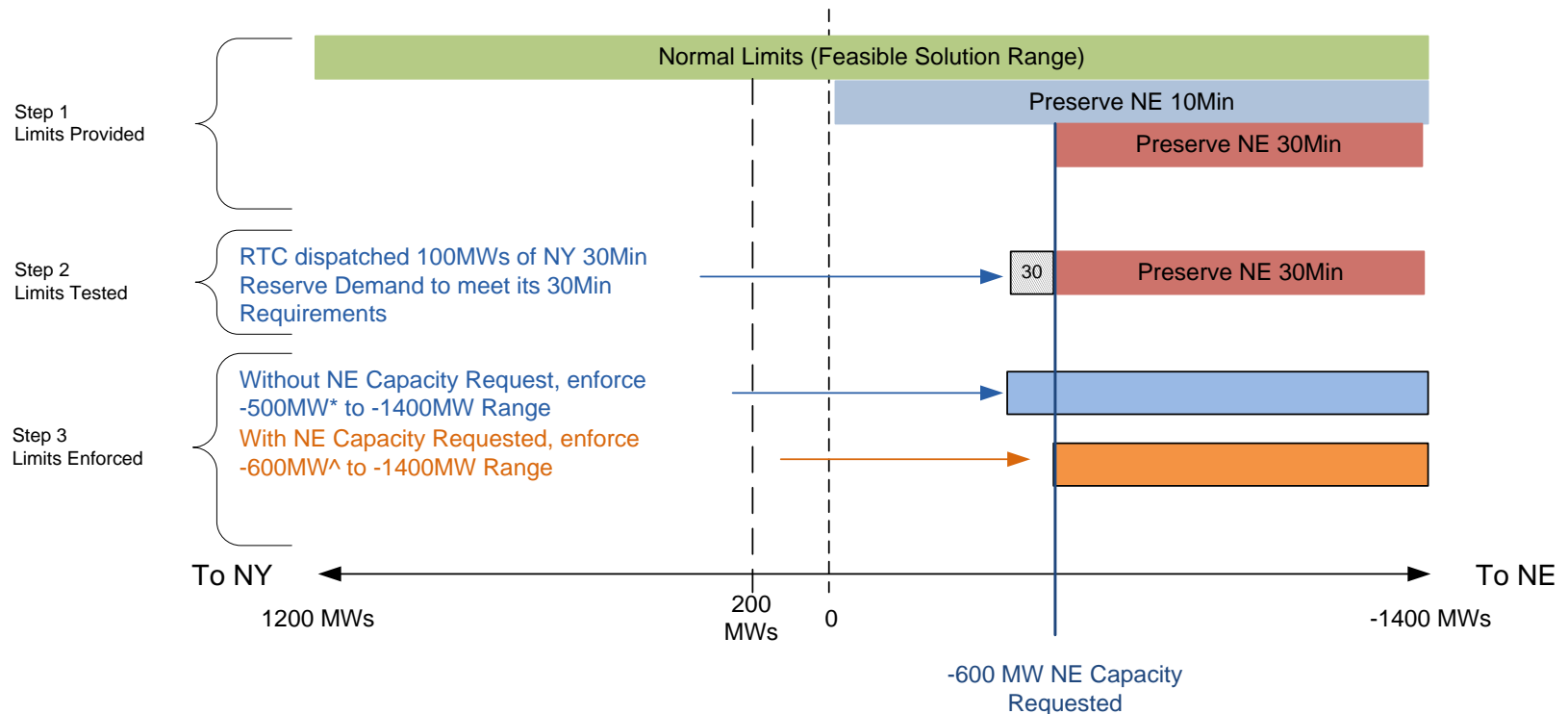
- ◆ **ISO-NE will notify NYISO of a capacity request, NYISO will inform ISO-NE of the capacity that is available to ISO-NE, the lesser of the two will be used for the Capacity limit**
 - *The capacity available will be calculated based any NY generators that have capacity obligations to ISO-NE that are available for scheduling*

Netting of Capacity Requests

- ◆ If ISO-NE and NYISO issue capacity requests at the same time the interchange will reflect the net value of both capacity requests

Capacity Request Example 1

- ◆ Full amount of ISO-NE requested capacity is available

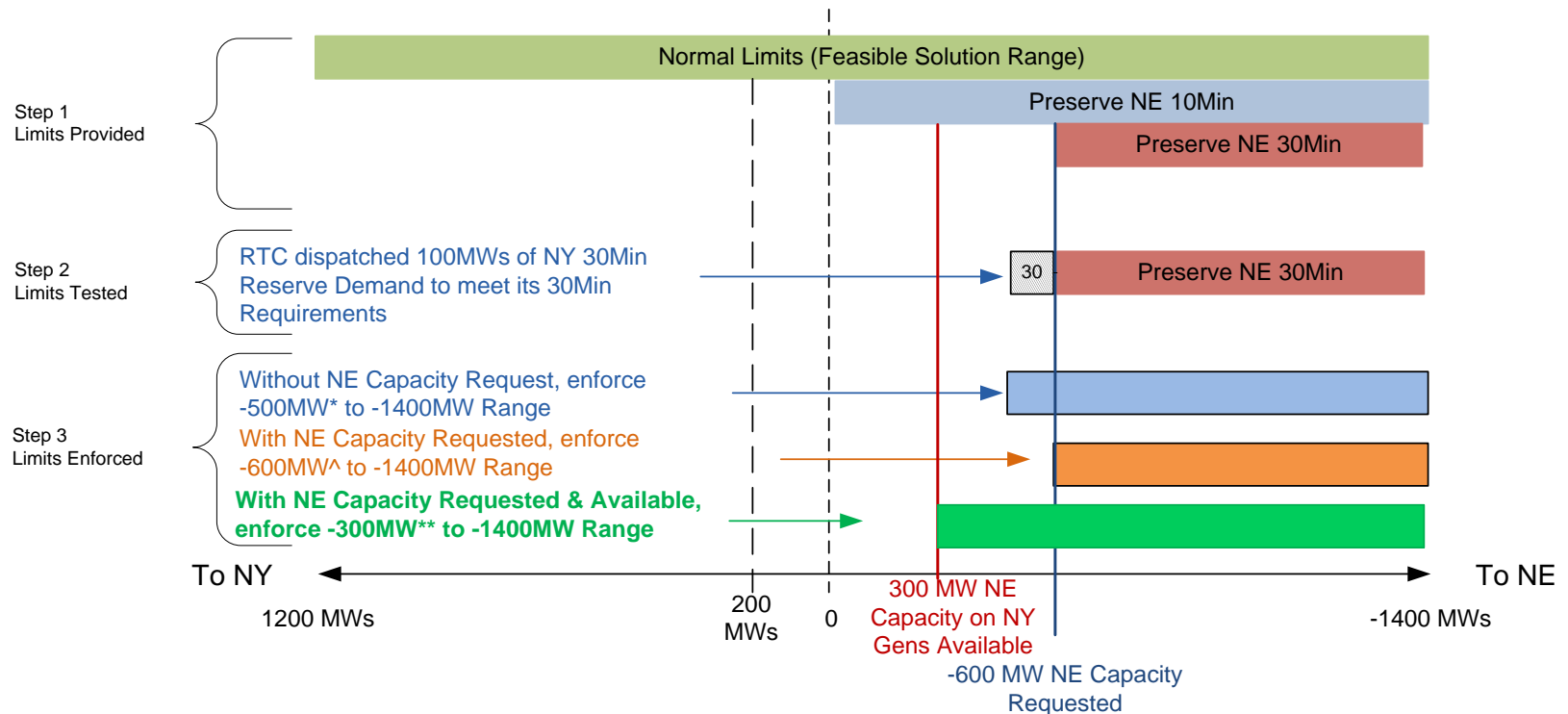


* -500MW comes from NE 30Min -600MW Limit + NY 30Min Shortage of 100MW

^ -600MW comes from NE Capacity Request -600MW Limit

Capacity Request Example 2

- ◆ Partial amount of ISO-NE requested capacity is available



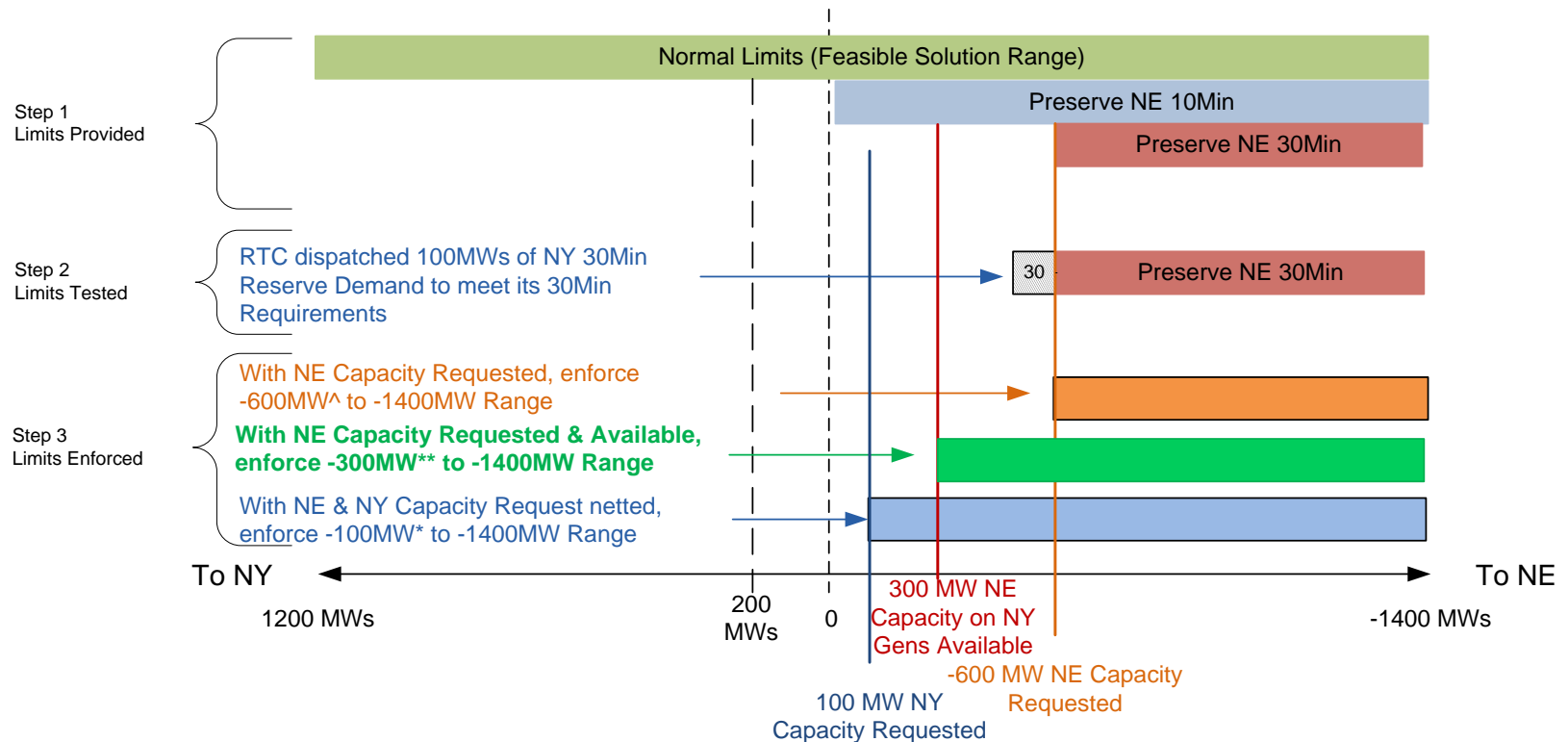
* -500MW comes from NE 30Min -600MW Limit + NY 30Min Shortage of 100MW

^ -600MW comes from NE Capacity Request -600MW Limit

** -300MW comes from NE Capacity Request -600MW Limit + 300 MW of NE Capacity Available

Capacity Request Example 3

◆ Netting of NYISO & ISO-NE capacity requests

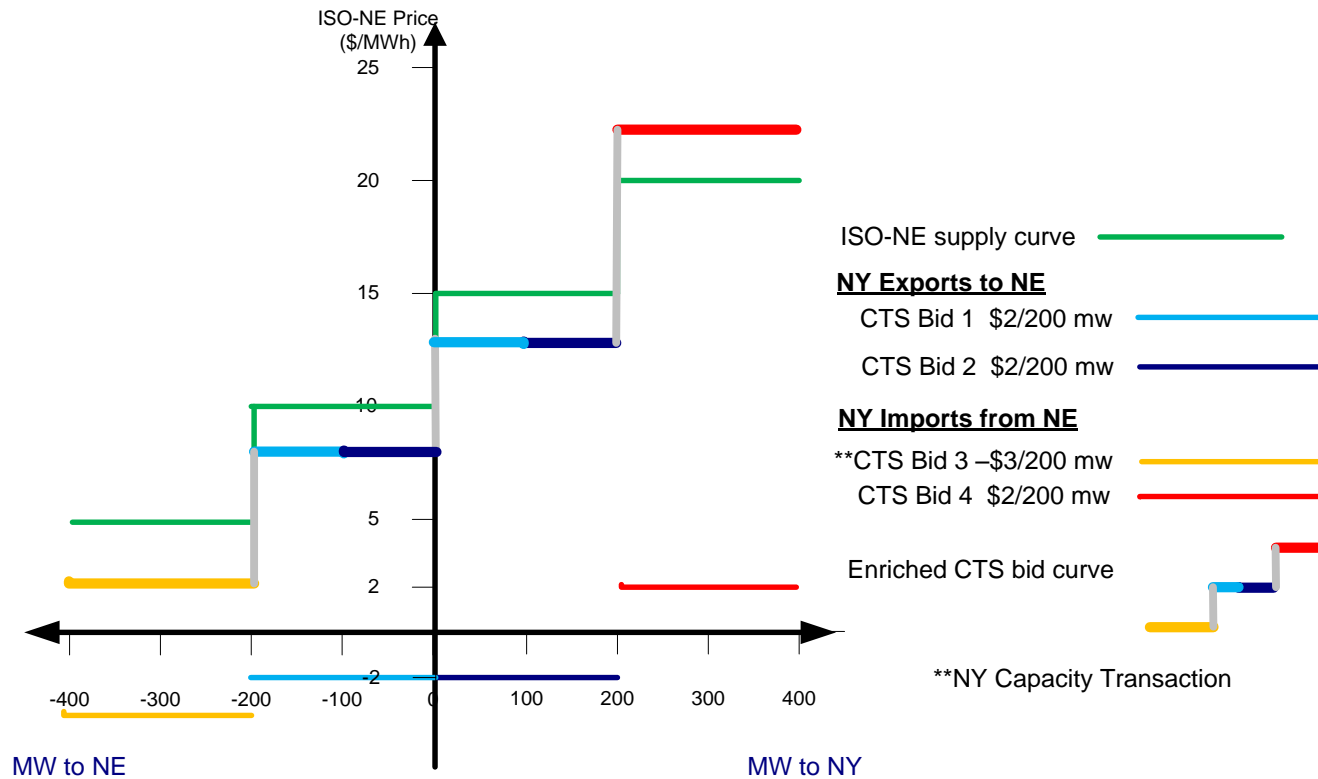


^ -600MW comes from NE Capacity Request -600MW Limit

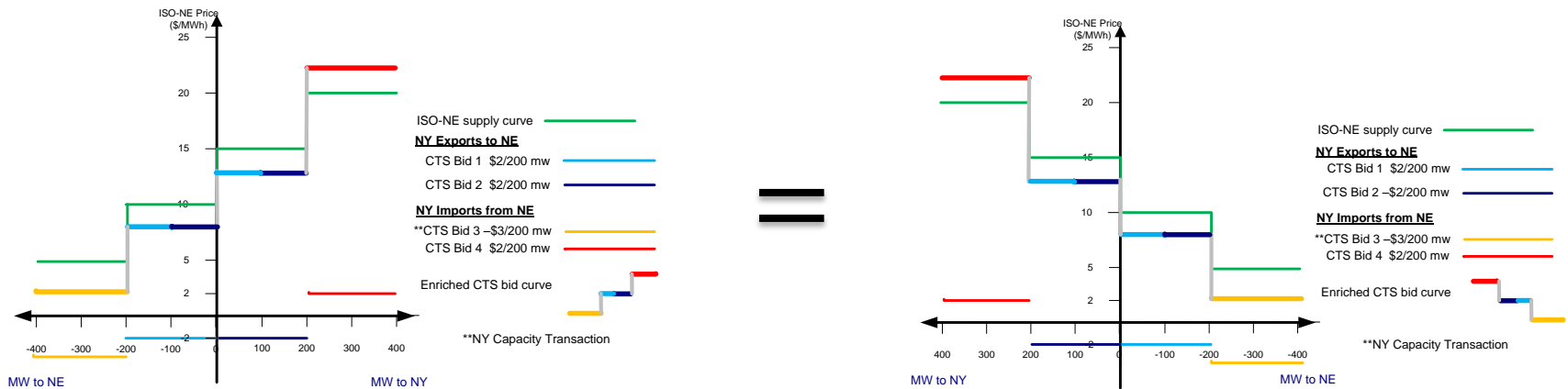
** -300MW comes from NE Capacity Request -600MW Limit + 300 MW of NE Capacity Available

* -100MW comes from NE Capacity Request -600MW + NE Capacity Available 300MW + 200MW NY Capacity Request

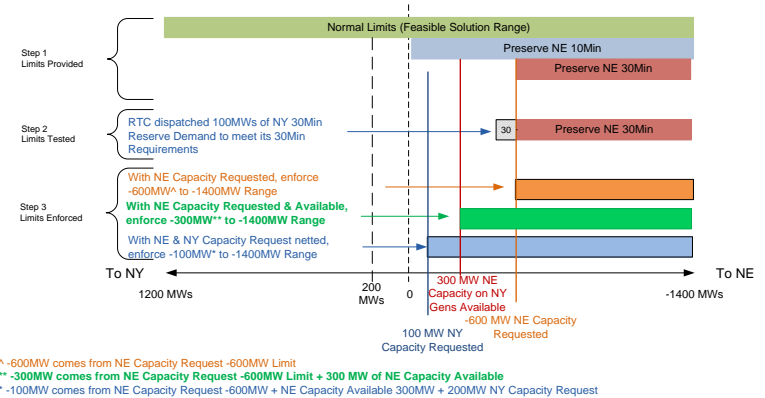
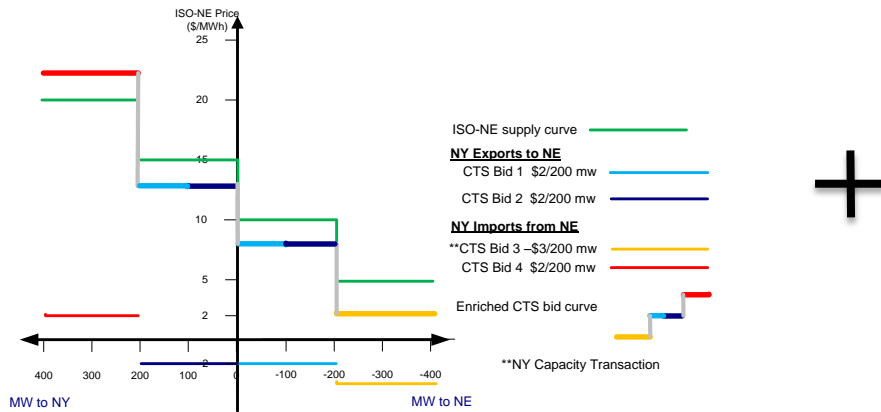
Capacity Bids & Bid Curve



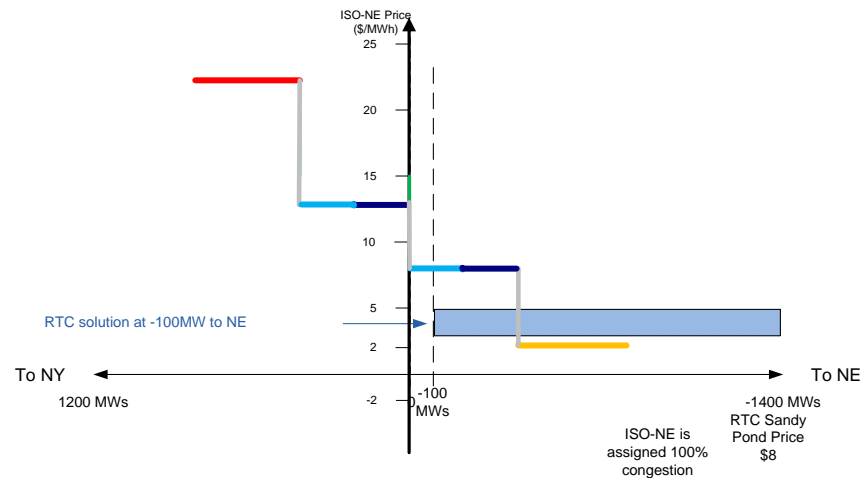
Capacity Bids & Bid Curve



Capacity Bids & Bid Curve

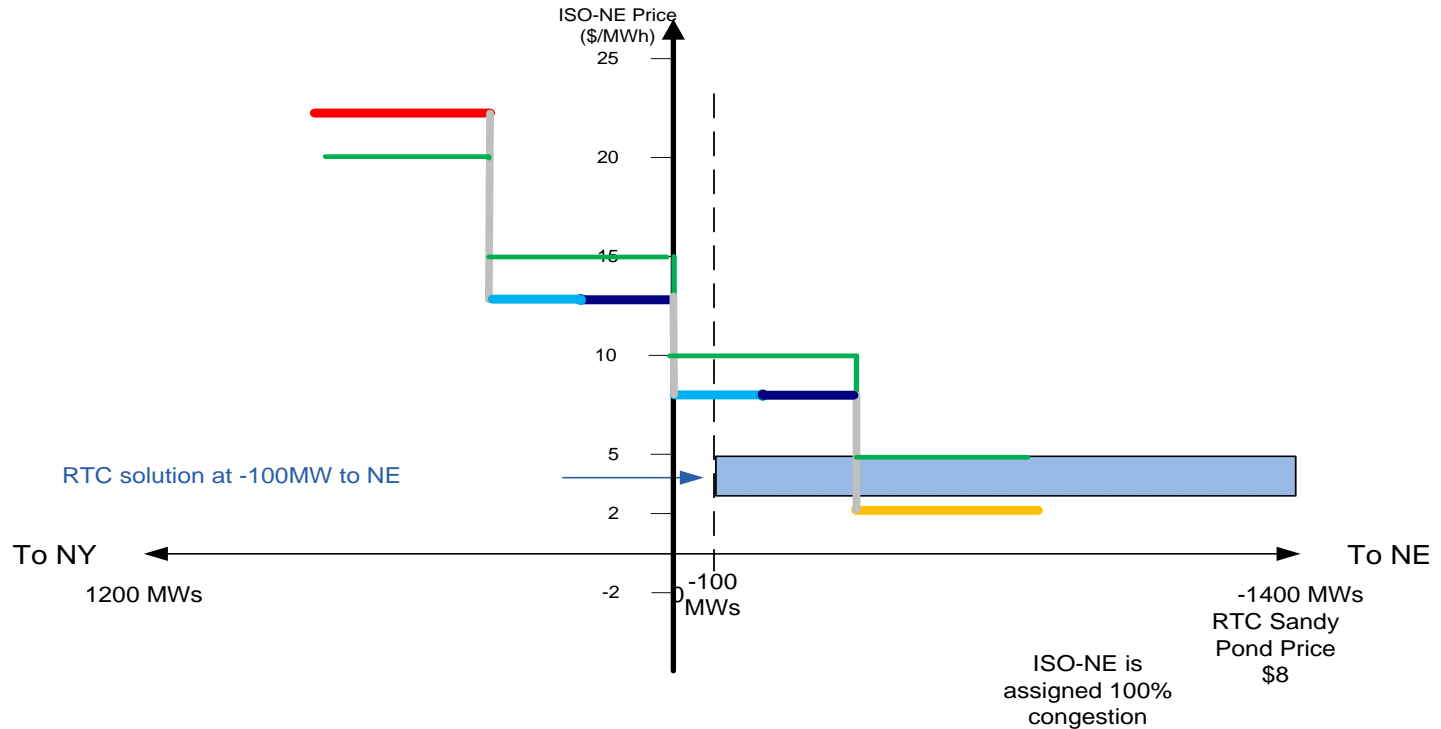


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Capacity Request Example

- ◆ Netting of NYISO & ISO-NE capacity requests



- ◆ External Transactions for this example will settle based on
 - ◆ The NYISO RTD LBMP and;
 - ◆ The ISO-NE 5-minute LMP including 100% of the RTC determined External Interface Congestion

Settlements & Fee Elimination

Chris Brown

Product Business Lead Analyst

New York Independent System Operator

Settlements

- ◆ **NYISO and ISO-NE will eliminate settlement fees allocated to external transactions at the CTS NE proxy bus on a reciprocal basis**
- ◆ **This is a continuation of earlier efforts which resulted in the elimination of NTAC and TSCs fees for transactions at the NY-NE border implemented in 2004**

Fee Elimination

- ◆ **Fees eliminated for CTS transactions at the CTS-NE proxy:**
 - *NYISO Cost of Operations; both injections and withdrawals*
 - *Bid Production Cost Guarantees*
 - *Residuals*
 - *Margin Assurance Payments*
 - *Operating Reserves*
 - *Voltage Support*

Make Whole Payments

- ◆ **Transactions at CTS enabled proxies are ineligible for RT BPCG**
 - *RT BPCG for import transactions at all proxies was eliminated in April 2014*
- ◆ **Transactions at CTS enabled proxies are ineligible for Import Curtailment Guarantees**

Next steps

Vinh Le

Project Manager

New York Independent System Operator

Next Steps

- ◆ **Coordination Agreement & Tariff**
 - *MIWG (March 2015 – May 2015)*
 - *BIC (June 2015)*
 - *MC (July 2015)*
 - *BOD (August 2015)*
 - *Filing (August 2015)*
 - *FERC Approval (October 2015)*

Next Steps

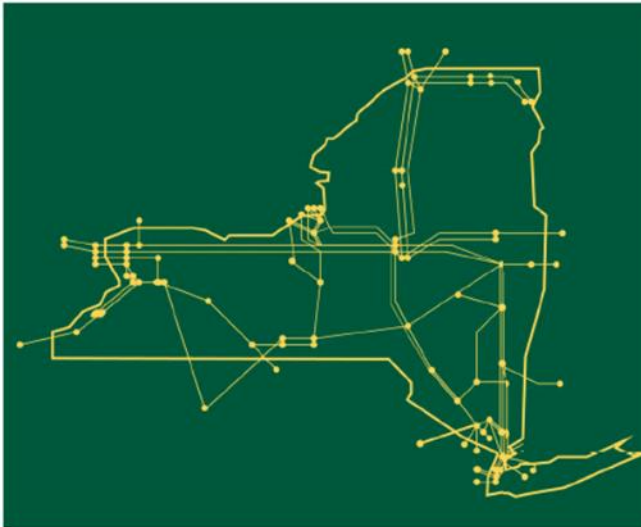
- ◆ **Training and Sandbox Testing**
 - *There will be three training sessions occurring in July, August and September 2015*
 - *Sandbox testing will follow each training sessions*

- ◆ **Manuals and User Guides Updates**
 - *MIWG – August 2015*
 - *BIC – September 2015*

Next Steps

- ◆ **Production Deployment (October 2015)**
- ◆ **Activation (Q4 2015)**
- ◆ **MMU to review results of CTS one year after the protocol has been activated (See Attachment P of the MST)**

The New York Independent System Operator (NYISO) is a not-for-profit corporation responsible for operating the state's bulk electricity grid, administering New York's competitive wholesale electricity markets, conducting comprehensive long-term planning for the state's electric power system, and advancing the technological infrastructure of the electric system serving the Empire State.



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