CTS with ISO-NE Additional Examples

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CTS Workshop Follow up (MIWG)
March 10, 2015
NYISO KCC Conference Center

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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:
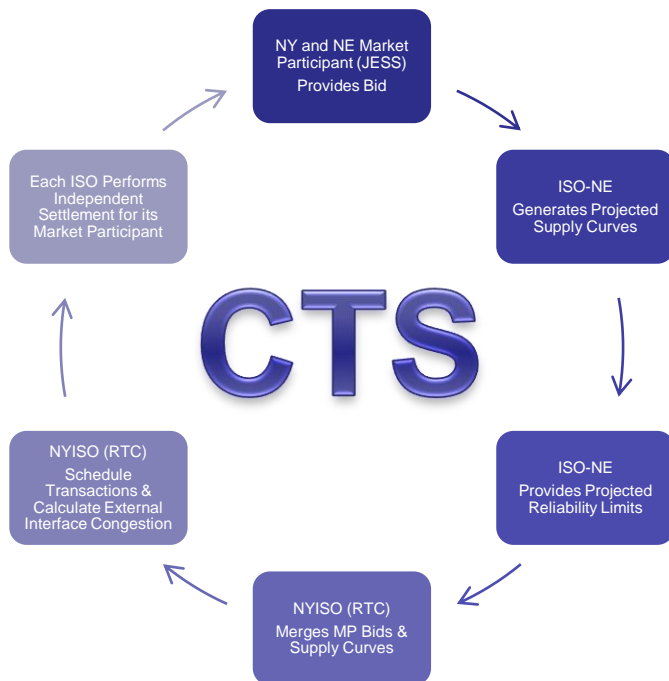
    - *improving the arbitrage opportunities available;*

    - *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.

Benefits of CTS with ISO-NE

◆ **Today**

- ▪ *RTC schedules interchange without any knowledge of ISO-NE reliability limits.*
- ▪ *Any reductions in the normal Reliability Limits after RTC has produced an interchange schedule can result in transaction cuts by operators during the checkout process, potentially resulting in a less economic interchange schedule.*

NY and NE Market Participant (JESS) Provides Bid

ISO-NE Generates Projected Supply Curves

Each ISO Performs Independent Settlement for its Market Participant

CTS

ISO-NE Provides Projected Reliability Limits

NYISO (RTC) Schedule Transactions & Calculate External Interface Congestion

NYISO (RTC) Merges MP Bids & Supply Curves

◆ **Tomorrow (post CTS w/ ISO-NE activation)**

- ▪ *RTC will be supplied with reliability limits as inputs, allowing RTC to schedule the most economic interchange possible within the range of the limits.*
- ▪ *Transaction cuts after RTC has scheduled interchange should be minimized.*

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LBMP

- LBMP Review

  LBMP   = Reference Bus Price

       + Marginal Cost of Congestion

       + Marginal Cost of Losses

- Marginal Cost of Congestion can be broken down into congestion from internal constraints and congestion from external interface constraints

  Marginal Cost of Congestion

       = Marginal Cost of Internal Congestion

       + Marginal Cost of External Interface Congestion

CTS Pricing

- Therefore, the Proxy Generator Bus LBMP is

$LBMP_{RTC}$ = Reference Bus Price$_{RTC}$

+ Marginal Cost of Internal Congestion$_{RTC}$

+ Marginal Cost of External Interface Congestion$_{RTC}$

+ Marginal Cost of Losses$_{RTC}$

- Finally, the settlement LBMP for the Proxy Generator Bus is

$LBMP_{RTD}$ = Reference Bus Price$_{RTD}$

+ Marginal Cost of Internal Congestion$_{RTD}$

+ Marginal Cost of External Interface Congestion$_{RTC}$ *
Congestion Sharing Factor$_{RTC}$

+ Marginal Cost of Losses$_{RTD}$

CTS Pricing

HQ Chateauguay Bus

IESO Bruce Bus

External Interface
Congestion for NE
Sandy Pond Bus

NE Sandy Pond Bus

NYISO Reference Bus

PJM Keystone Bus

CTS Pricing

External Interface
Congestion for NY
Roseton Proxy Bus

NY Roseton Bus
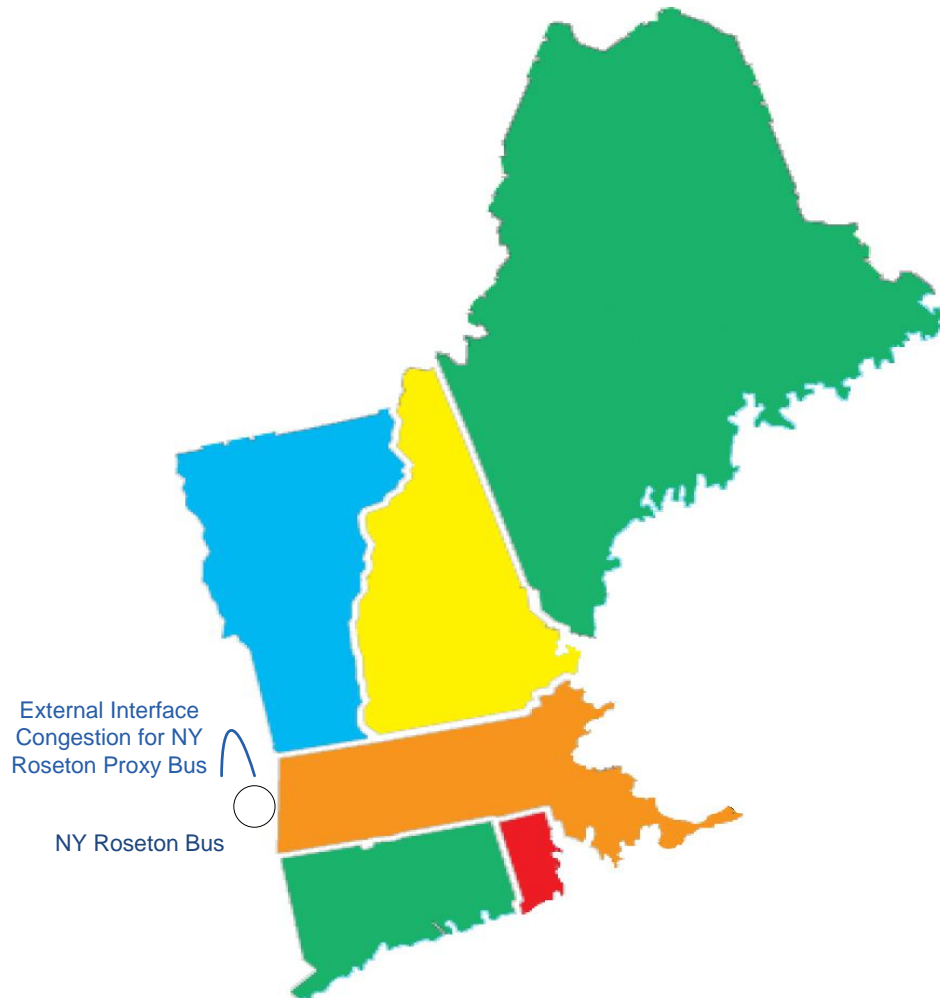
Enriched CTS Bid Curve Example

Bid Preparation					Scheduling					Settlements						
MWs	Bid	Direction	NE Supply Curve	CTS Bid for RTC Scheduling 'Enriched CTS Bid'	RTC Internal NY Price	RTC Sandy Pond Price	RTC External Interface Congestion at Sandy Pond	CTS Bid Scheduled MWs	Congestion Sharing Factor (Allocation to NE)	NE 5min Roseton Proxy Price	NE 5min Roseton Proxy Price with Allocated Congestion (NE Settlement Price)	NE Energy Settlement for CTS Bid	NY RTD Sandy Pond Price	NY RTD Sandy Pond Price with Allocated Congestion (NY Settlement Price)	NY Energy Settlement for CTS Bid	Net Final
1000	$2	NY->NE	$51	$49	$48	$49	$1	1000	50%	$51	$50.50	$50,500.00	$48	$48.50	$48,500.00	$2,000.00
1000	$2	NY->NE	$51	$49	$48	$49	$1	1000	50%	$54	$53.50	$53,500.00	$47	$47.50	$47,500.00	$6,000.00
1000	$2	NY->NE	$51	$49	$48	$49	$1	1000	50%	$48	$47.50	$47,500.00	$50	$50.50	$50,500.00	-$3,000.00
1000	$2	NY->NE	$51	$49	$48	$49	$1	1000	100%	$51	$50.00	$50,000.00	$48	$48.00	$48,000.00	$2,000.00
1000	$2	NY->NE	$51	$49	$48	$49	$1	1000	100%	$54	$53.00	$53,000.00	$47	$47.00	$47,000.00	$6,000.00
1000	$2	NY->NE	$51	$49	$48	$49	$1	1000	100%	$48	$47.00	$47,000.00	$50	$50.00	$50,000.00	-$3,000.00
1000	$2	NY->NE	$51	$49	$48	$49	$1	1000	0%	$51	$51.00	$51,000.00	$48	$49.00	$49,000.00	$2,000.00
1000	$2	NY->NE	$51	$49	$48	$49	$1	1000	0%	$54	$54.00	$54,000.00	$47	$48.00	$48,000.00	$6,000.00
1000	$2	NY->NE	$51	$49	$48	$49	$1	1000	0%	$48	$48.00	$48,000.00	$50	$51.00	$51,000.00	-$3,000.00
1000	$5	NE->NY	$40	$45	$60	$45	$15	1000	50%	$40	$47.50	$47,500.00	$60	$52.50	$52,500.00	$5,000.00
1000	$5	NE->NY	$41	$46	$61	$46	$15	1000	50%	$43	$50.50	$50,500.00	$59	$51.50	$51,500.00	$1,000.00
1000	$5	NE->NY	$42	$47	$62	$47	$15	1000	50%	$45	$52.50	$52,500.00	$58	$50.50	$50,500.00	-$2,000.00
1000	$5	NE->NY	$40	$45	$60	$45	$15	1000	100%	$40	$55.00	$55,000.00	$60	$60.00	$60,000.00	$5,000.00
1000	$5	NE->NY	$41	$46	$61	$46	$15	1000	100%	$43	$58.00	$58,000.00	$59	$59.00	$59,000.00	$1,000.00
1000	$5	NE->NY	$42	$47	$62	$47	$15	1000	100%	$45	$60.00	$60,000.00	$58	$58.00	$58,000.00	-$2,000.00
1000	$5	NE->NY	$40	$45	$60	$45	$15	1000	0%	$40	$40.00	$40,000.00	$60	$45.00	$45,000.00	$5,000.00
1000	$5	NE->NY	$41	$46	$61	$46	$15	1000	0%	$43	$43.00	$43,000.00	$59	$44.00	$44,000.00	$1,000.00
1000	$5	NE->NY	$42	$47	$62	$47	$15	1000	0%	$45	$45.00	$45,000.00	$58	$43.00	$43,000.00	-$2,000.00
500	$2	NY->NE	-1000, $49	A1 - 500, $47	$46	$50	$4	1000	50%	$53	$51.00	$25,500.00	$47	$49.00	$24,500.00	$1,000.00
500	$1		-300, $51	B1 - 200, $48 / B2 - 300, $50								$25,500.00			$24,500.00	$1,000.00

*Note: Assumes a NY to NE Transfer Limit and a NE to NY Transfer Limit of 1000MWs. For illustrative purposes.
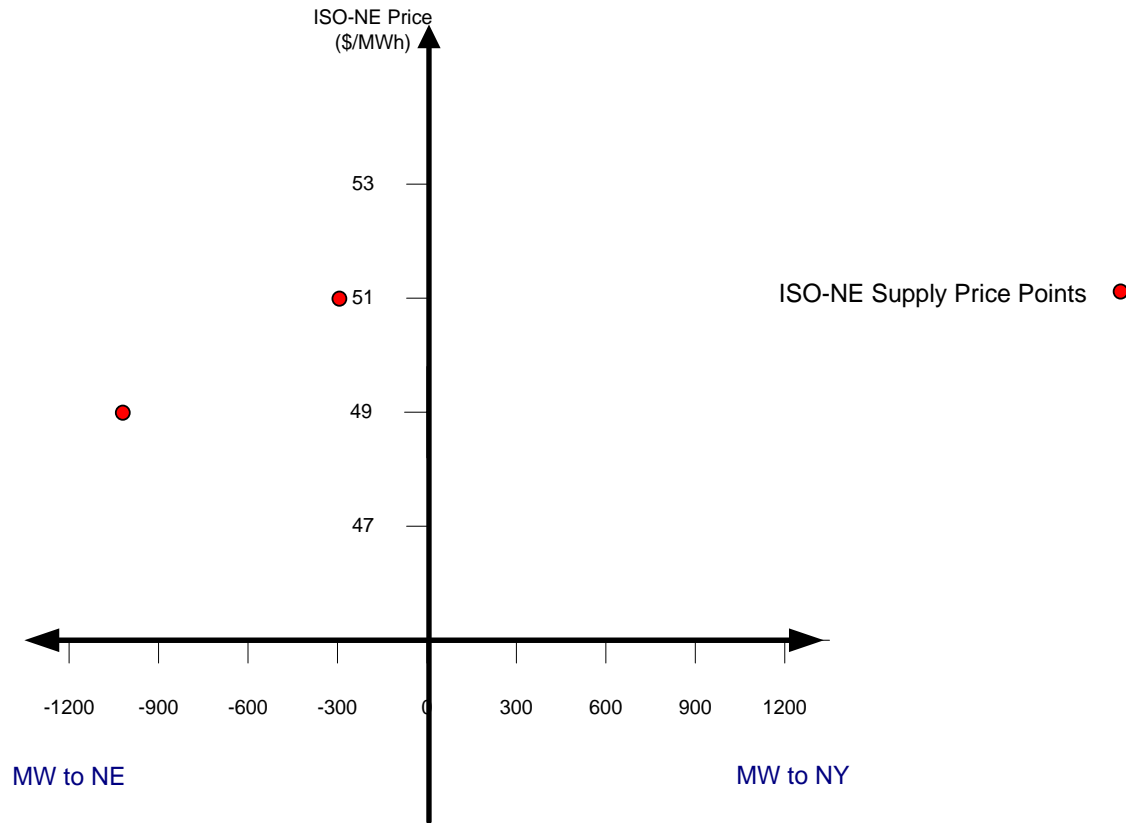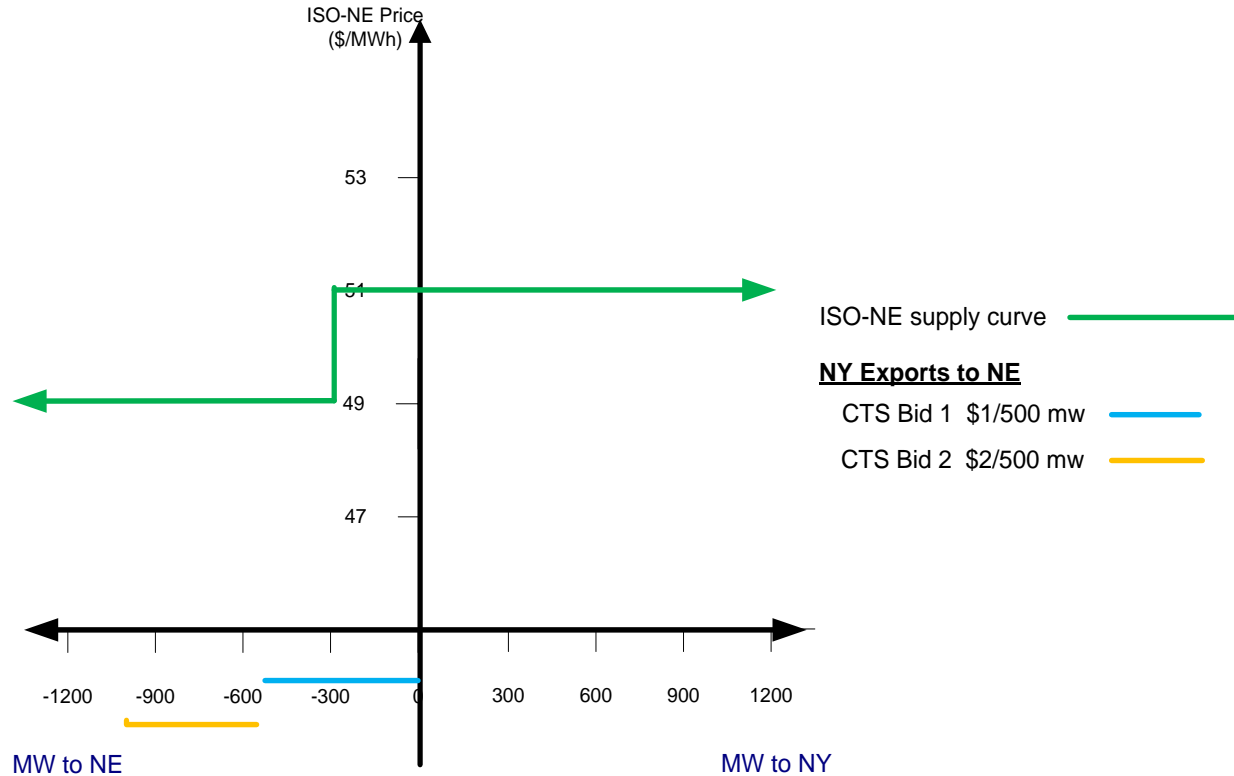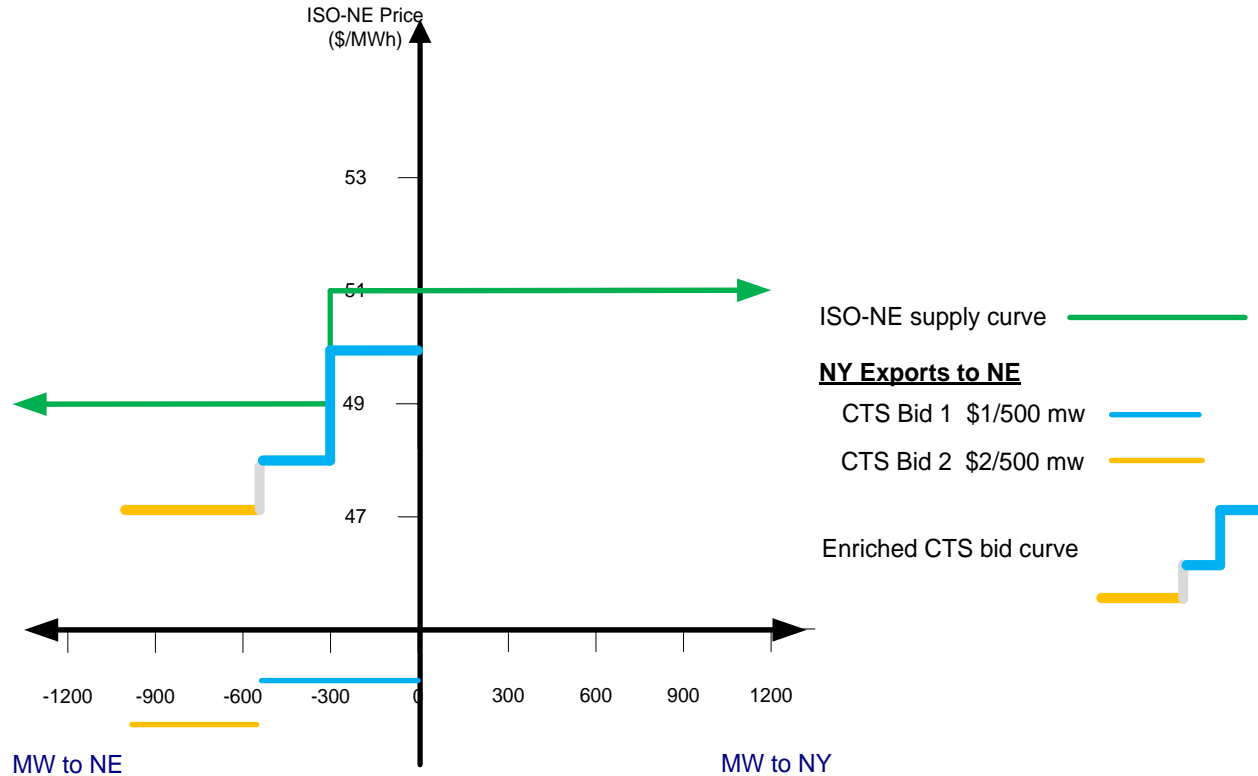
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Enriched CTS Bid Curve Example

Enriched CTS Bid Curve Example

Enriched CTS Bid Curve Example

ISO-NE Price ($/MWh)

53

51 — ISO-NE supply curve ————

NY Exports to NE

CTS Bid 1 $1/500 mw ————

CTS Bid 2 $2/500 mw ————

49

47

-1200 -900 -600 -300 0 300 600 900 1200

MW to NE   MW to NY
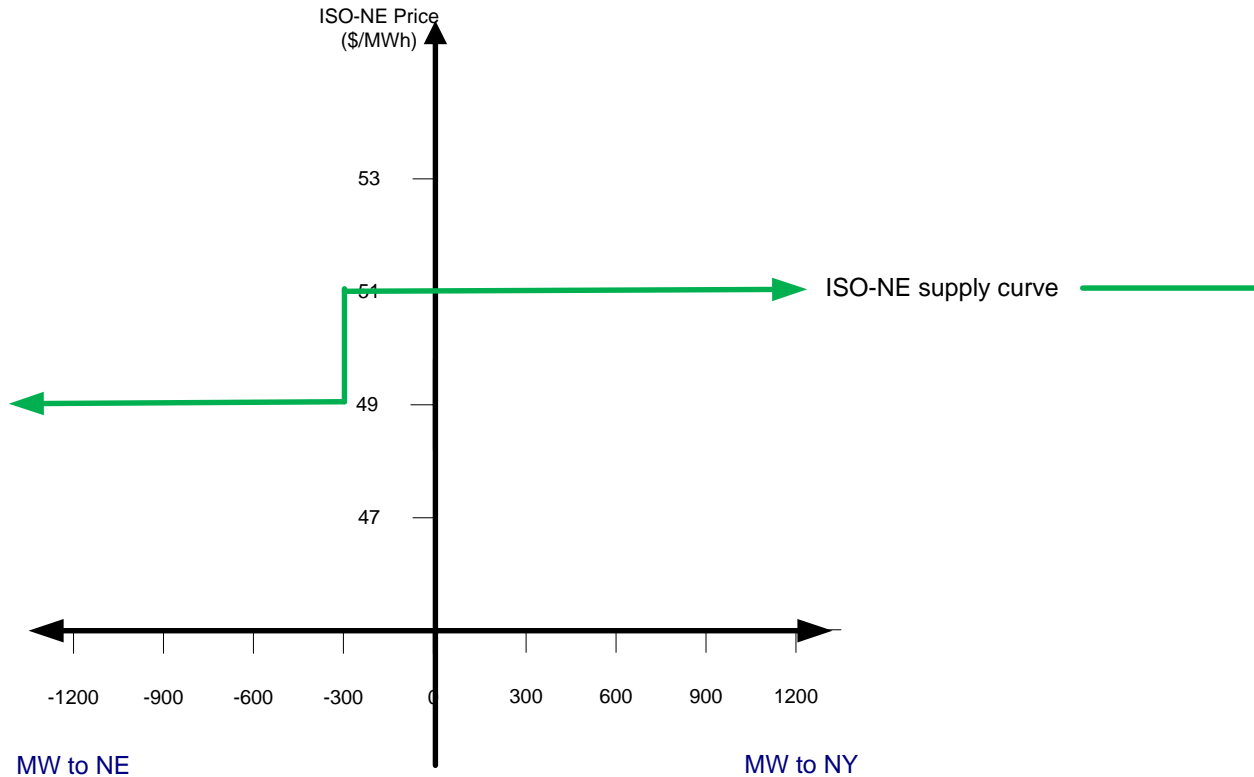
Enriched CTS Bid Curve Example

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)*

APPENDIX 1

The following slides are from the February 12, 2015 CTS with ISO-NE MIWG Workshop

Background, Timeline & Overview

Mike DeSocio

Manager, Energy Market Design
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
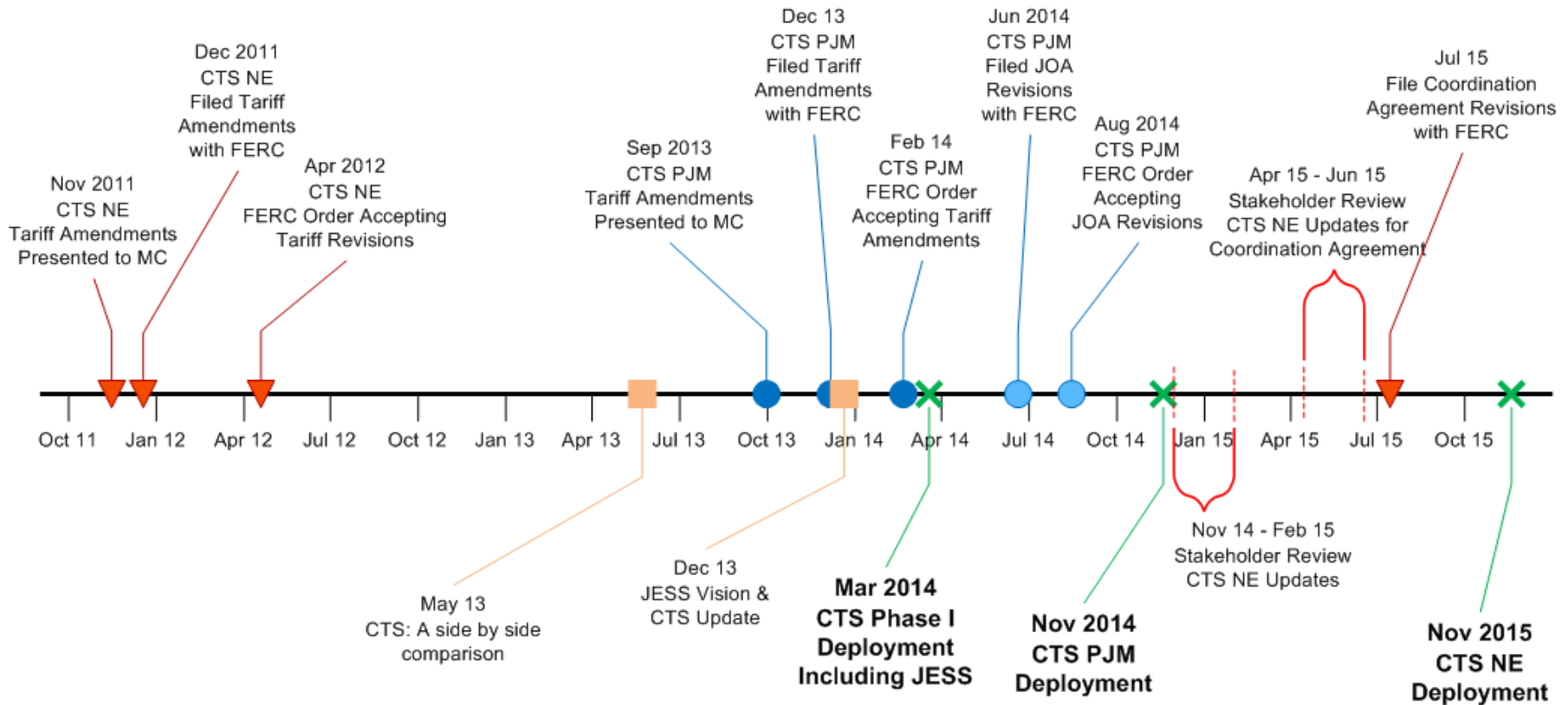
CTS Overview

- ## 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)*
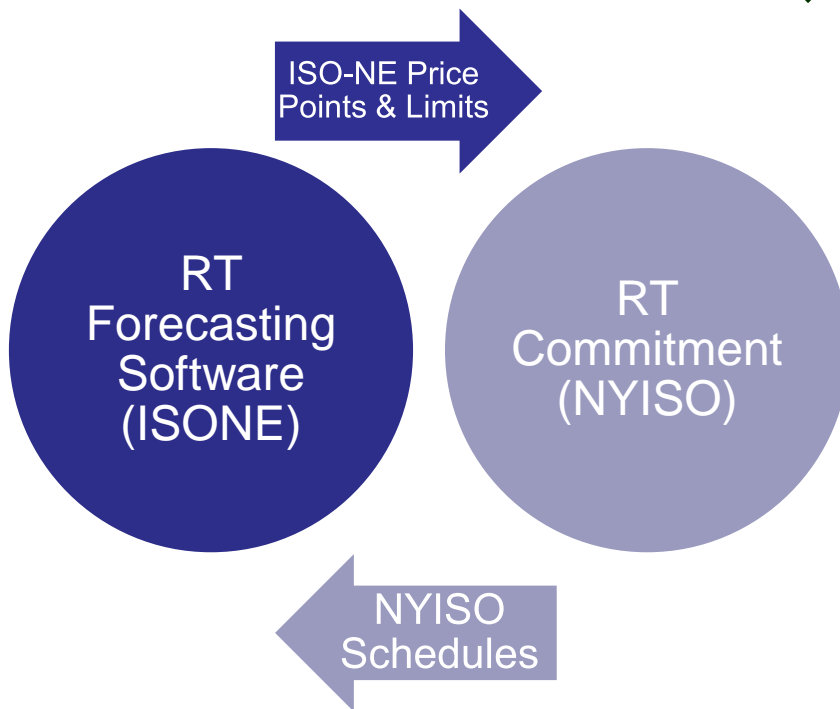   - The same process as is used today.

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 Price Points & Limits →

RT Forecasting Software (ISONE)

RT Commitment (NYISO)

← NYISO Schedules

   ▪ *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

NY and NE Market Participant (JESS) Provides Bid

ISO-NE Generates Projected Supply Curves

ISO-NE Provides Projected Reliability Limits

NYISO (RTC) Merges MP Bids & Supply Curves

NYISO (RTC) Schedule Transactions & Calculate External Interface Congestion

Each ISO Performs Independent Settlement for its Market Participant

CTS

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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*

- **<u>All</u> 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

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Market Product Specialist
New York Independent System Operator

Enriched CTS Bid Curve Example
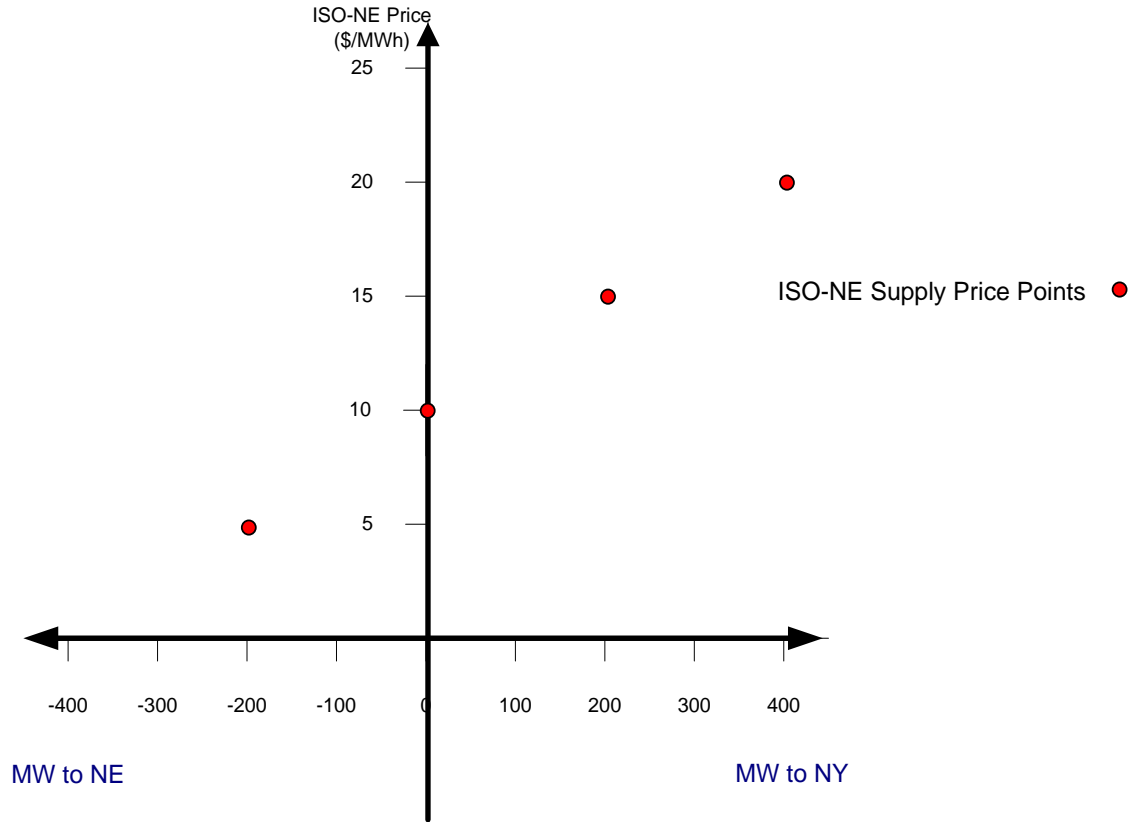
Enriched CTS Bid Curve Example

Enriched CTS Bid Curve Example

Price ($/MWh)

ISO-NE supply curve

NY Exports to NE

CTS Bid 1 $2/100 mw
CTS Bid 2 $2/200 mw
CTS Bid 3 $2/100 mw

NY Imports from NE

CTS Bid 4 $2/400 mw

MW to NE   MW to NY
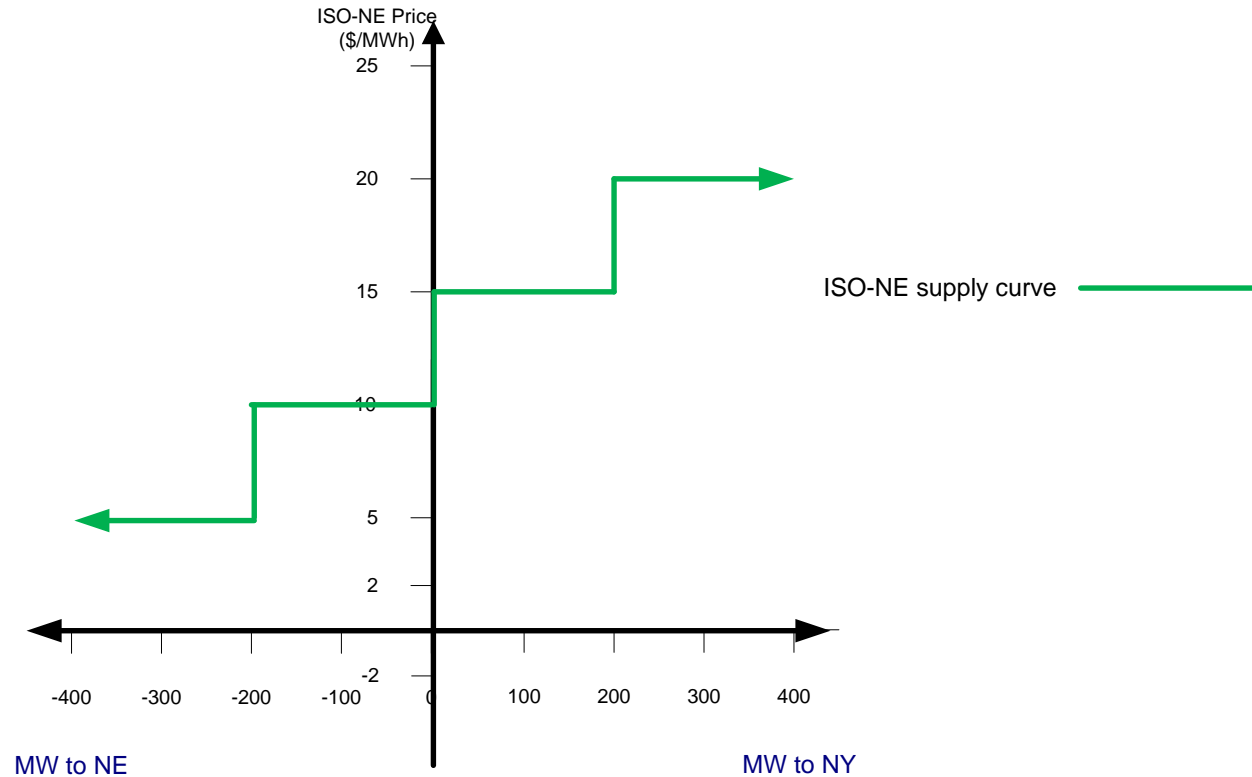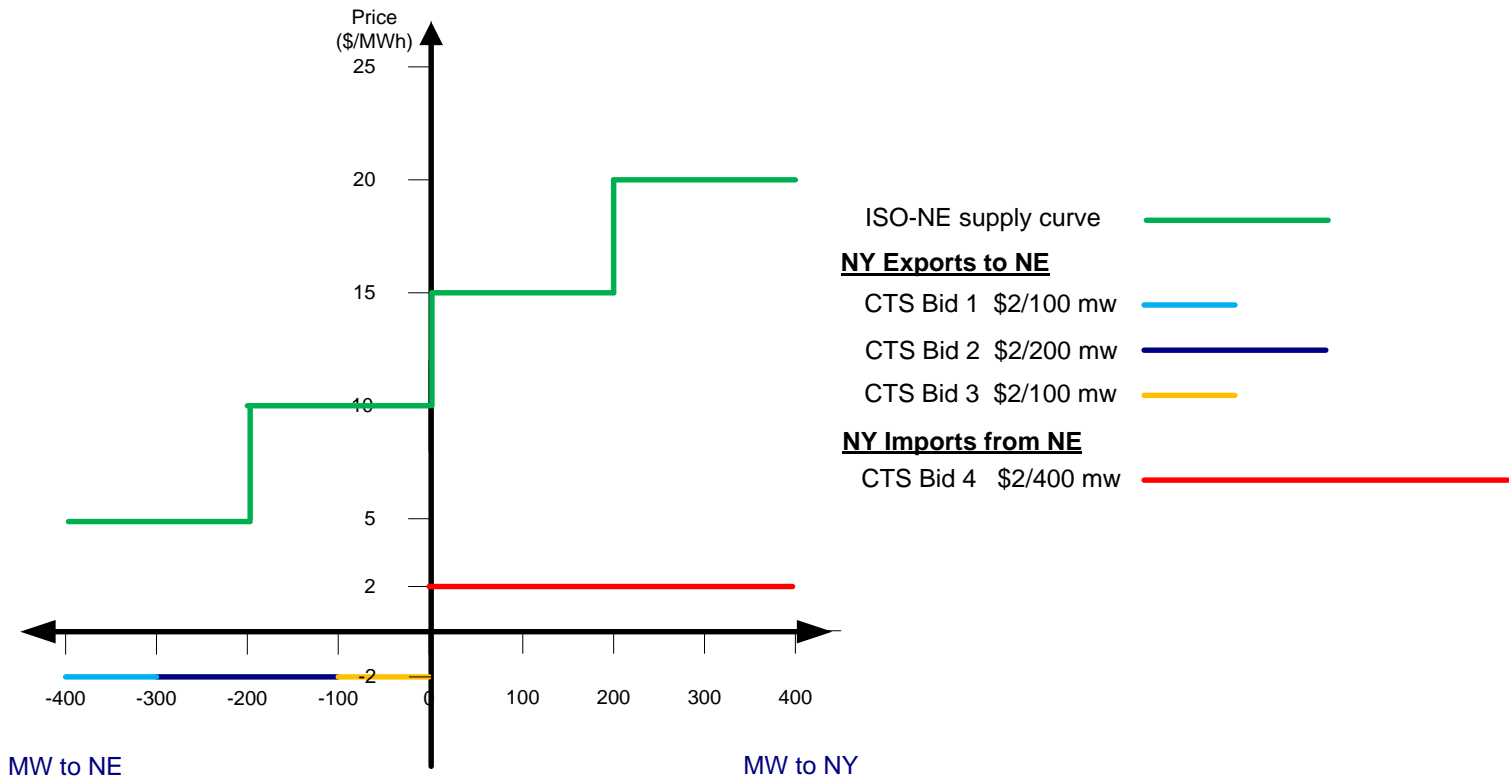
Enriched CTS Bid Curve Example
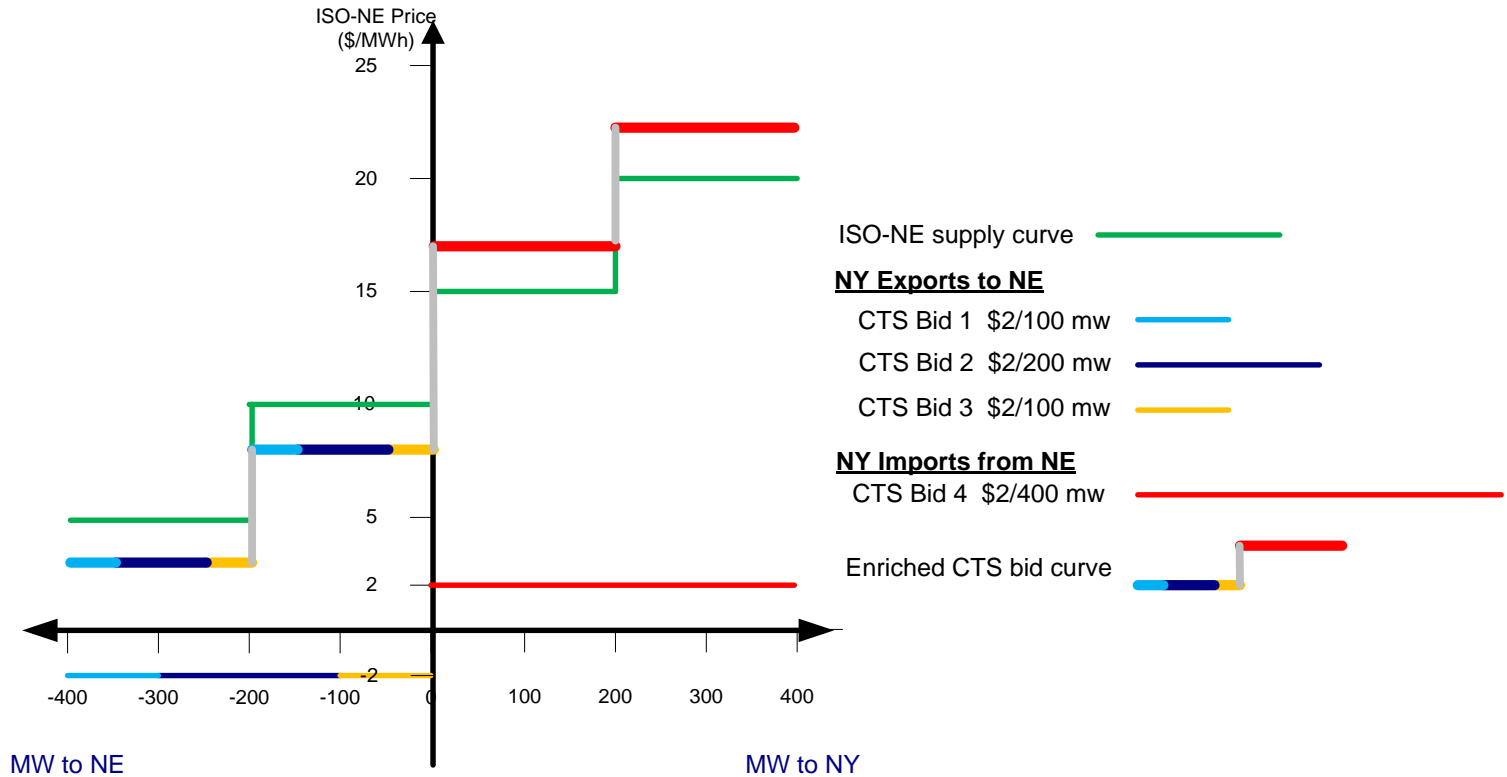
Ramp Limits & Reliability Flow Limits

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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

Note: Positive Limit values represent flow to NY and Negative Limit values represent flow to NE

Reliability Flow Limits Example 1

Step 1
Limits Provided
- Normal Limits (Feasible Solution Range)
- Preserve NE 10Min
- Preserve NE 30Min

Step 2
Limits Tested
- RTC was able to dispatch transactions in this range without dispatching NY 30Min Reserve Demand to meet its 30Min Requirements → Preserve NE 30Min

Step 3
Limits Enforced
- Enforce 200MW to -1400MW Range →

To NY ← ————————————— → To NE

1200 MWs   200 MWs   0   -1400 MWs

Reliability Flow Limits Example

Step 1
Limits Provided

Normal Limits (Feasible Solution Range)

Preserve NE 10Min

Preserve NE 30Min

Step 2
Limits Tested

RTC dispatched 100MWs of NY 30Min Reserve
Demand to meet its 30Min Requirements

Preserve NE 30Min

30

Step 3
Limits Enforced

Enforce -100MW* to 1400MW Range

To NY

To NE

1200 MWs

0

-200

-1400 MWs

-100

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

Price Formation & Congestion Sharing

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Market Product Specialist
New York Independent System Operator

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*

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CTS Congestion Sharing
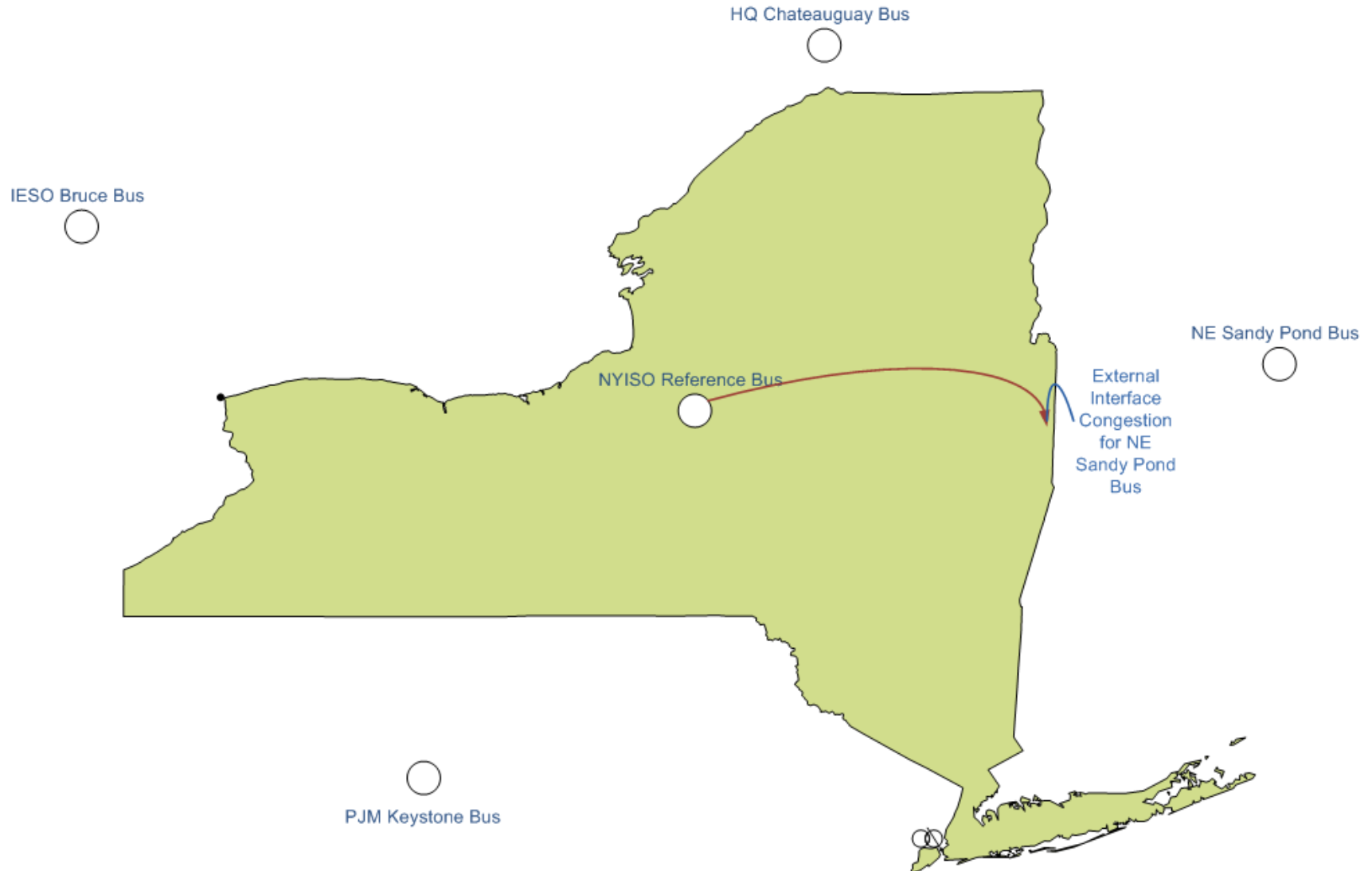
CTS Congestion Sharing

- **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**
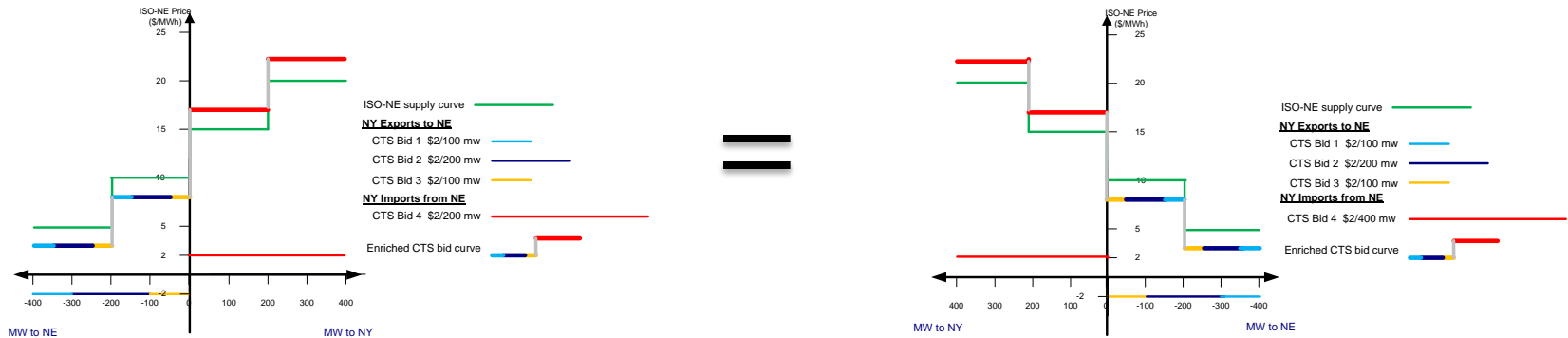
CTS Congestion Sharing Ex. 1

- ◆ **Next overlay the Enriched CTS Bid Curve on the Reliability Limits**
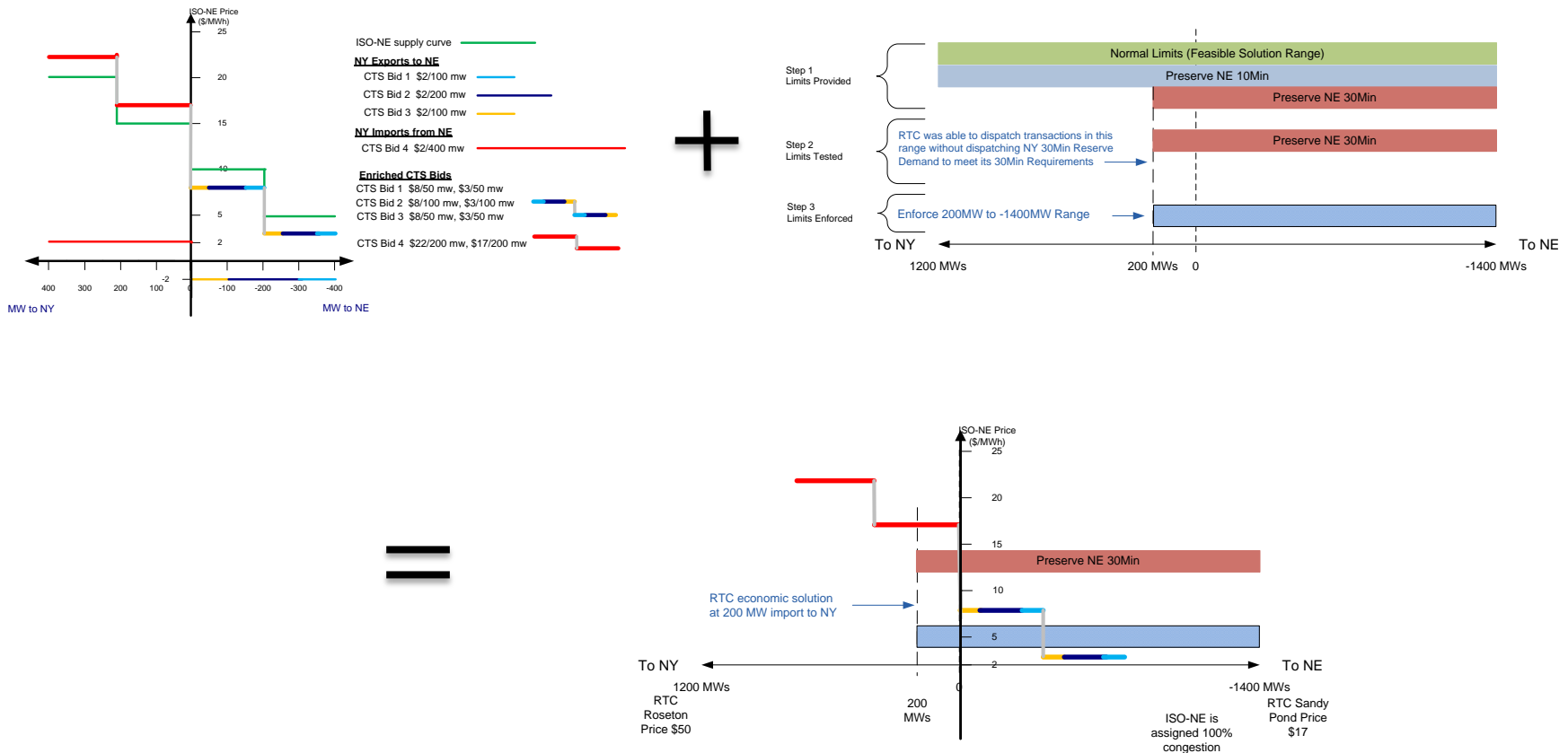
CTS Congestion Sharing Ex. 1

◆ **Solution 1**
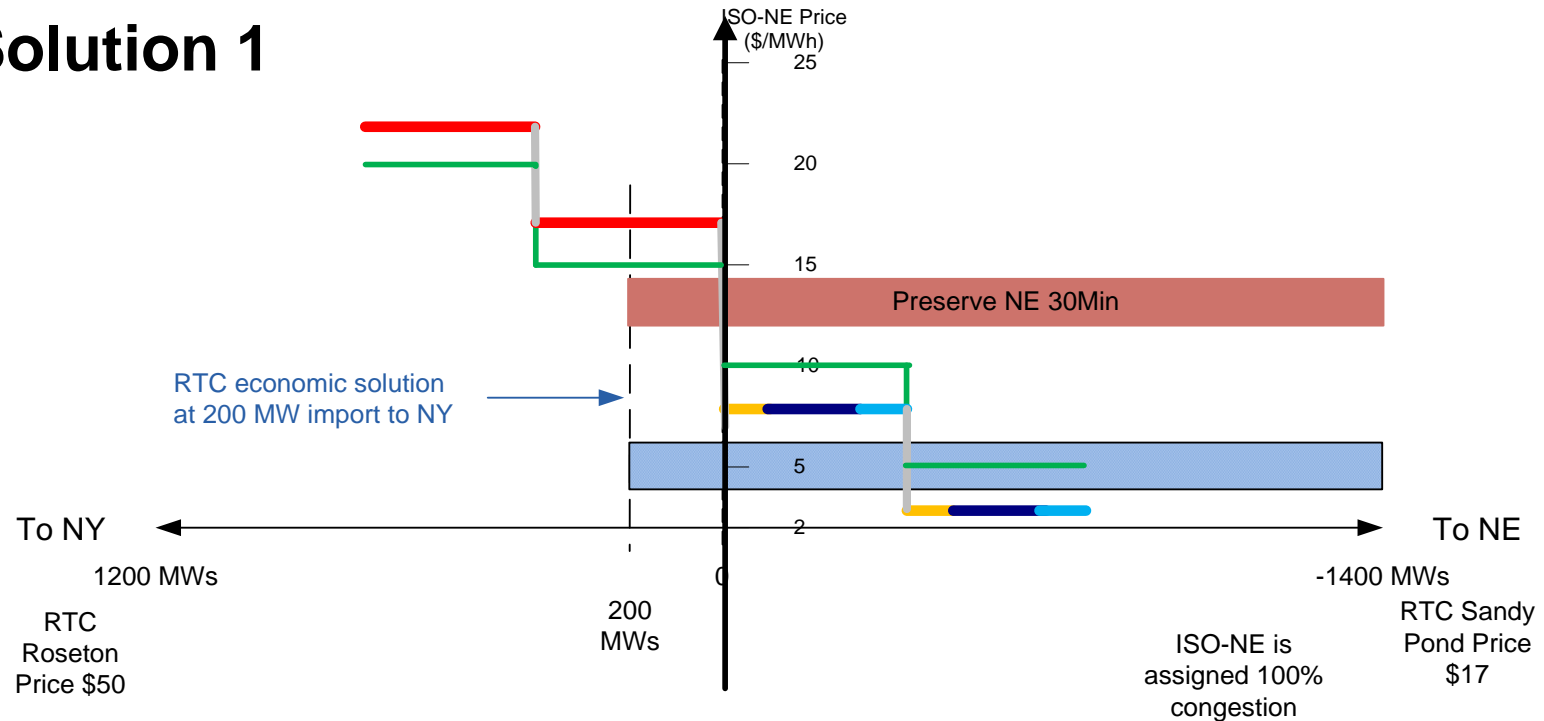
◆ **External Transactions for this example will settle based on**

- ◆ **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**

ISO-NE Price ($/MWh)

ISO-NE supply curve

NY Exports to NE
CTS Bid 1 – $2/100 mw
CTS Bid 2 – $2/200 mw
CTS Bid 3 – $2/100 mw

NY Imports from NE
CTS Bid 4 – $2/400 mw

Enriched CTS Bids
CTS Bid 1 – $8/50 mw, $3/50 mw
CTS Bid 2 – $8/100 mw, $3/100 mw
CTS Bid 3 – $8/50 mw, $3/50 mw
CTS Bid 4 – $22/200 mw, $17/200 mw

MW to NY   MW to NE

+

Step 1 Limits Provided — Normal Limits (Feasible Solution Range) / Preserve NE 10Min / Preserve NE 30Min

Step 2 Limits Tested — RTC dispatched 100MWs of NY 30Min Reserve Demand to meet its 30Min Requirements / Preserve NE 30Min / 30

Step 3 Limits Enforced — Enforce -100MW* to 1400MW Range

To NY   To NE
1200 MWs   0   -200   -1400 MWs
          -100

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

=

ISO-NE Price ($/MWh)

Preserve NE 30Min
30

RTC solution at -100 MW export to NE

To NY   To NE
1200 MWs   0 -100   -1400 MWs
          MWs
          -200
          MWs

ISO-NE is assigned 100% congestion

RTC Sandy Pond Price $8

CTS Congestion Sharing Ex. 2
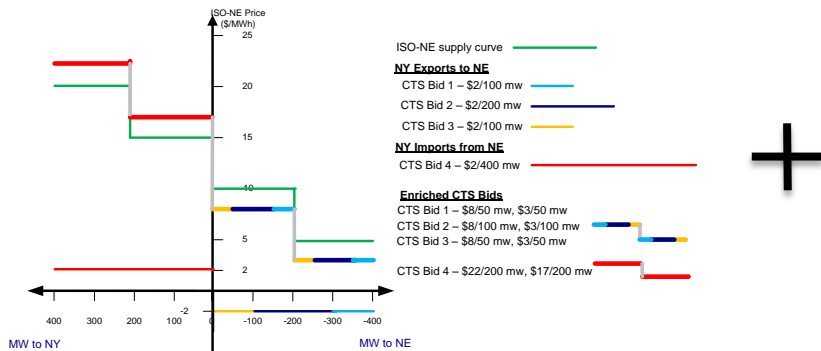
- ◆ **Solution 2**
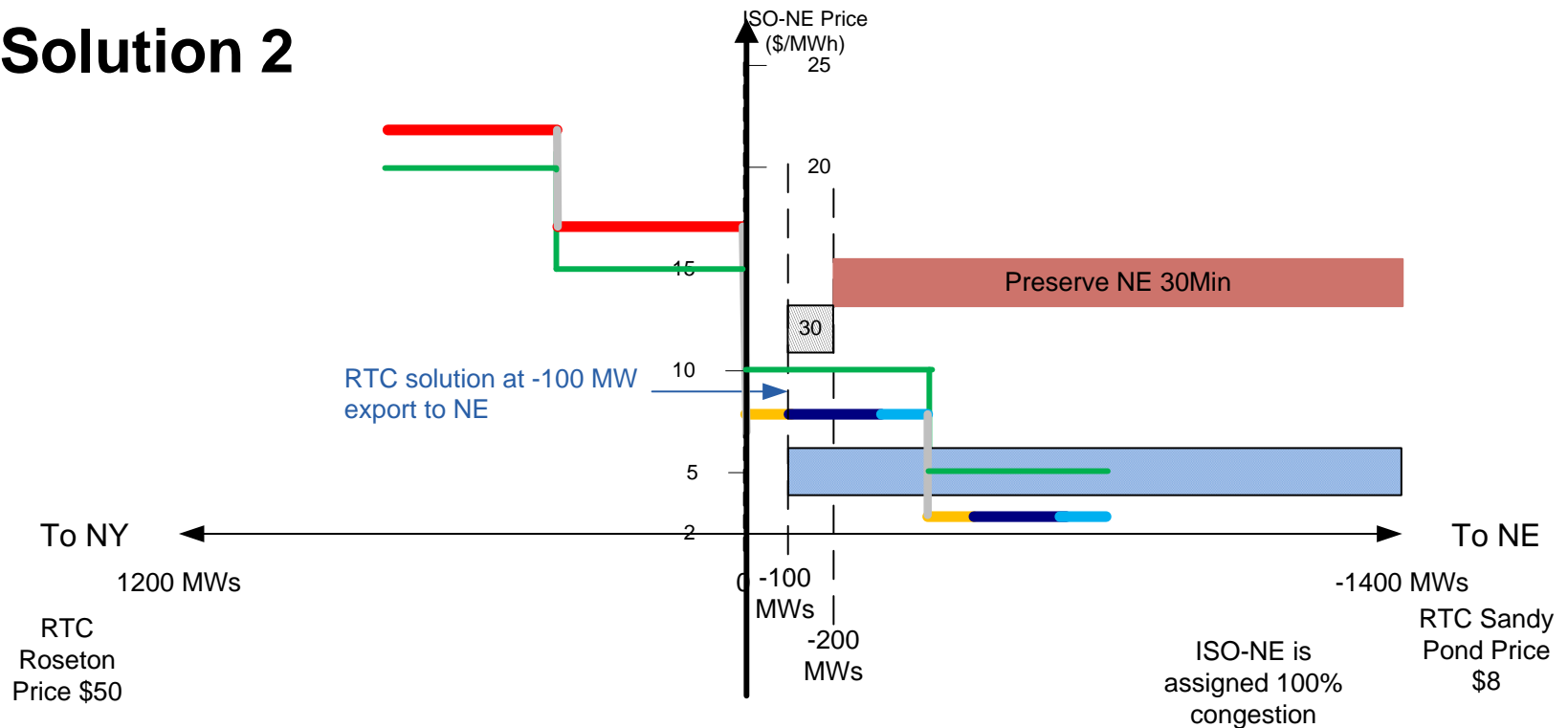
External Transactions for this example will settle based on
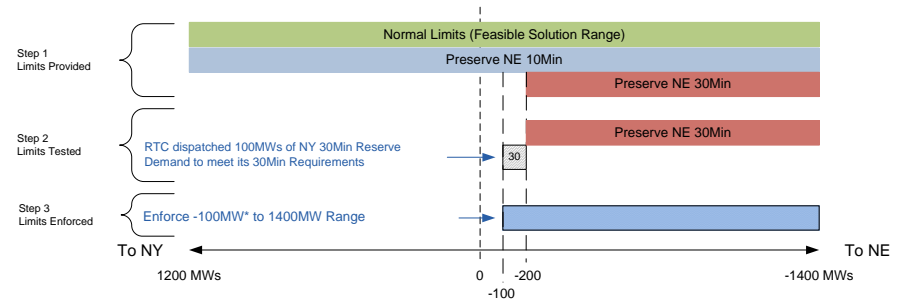- ◆ **The NYISO RTD LBMP and;**
- ◆ **The ISO-NE 5-minute LMP including 100% of the RTC determined External Interface Congestion**

CTS Congestion Sharing Ex. 2

HQ Chateauguay Bus

IESO Bruce Bus

NE Sandy Pond Bus

Example 2 = $8.00

External Interface Congestion for NE Sandy Pond Bus

Example 2 = $2.00

NYISO Reference Bus

Example 2 = $6.00

PJM Keystone Bus

Capacity Requests

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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**
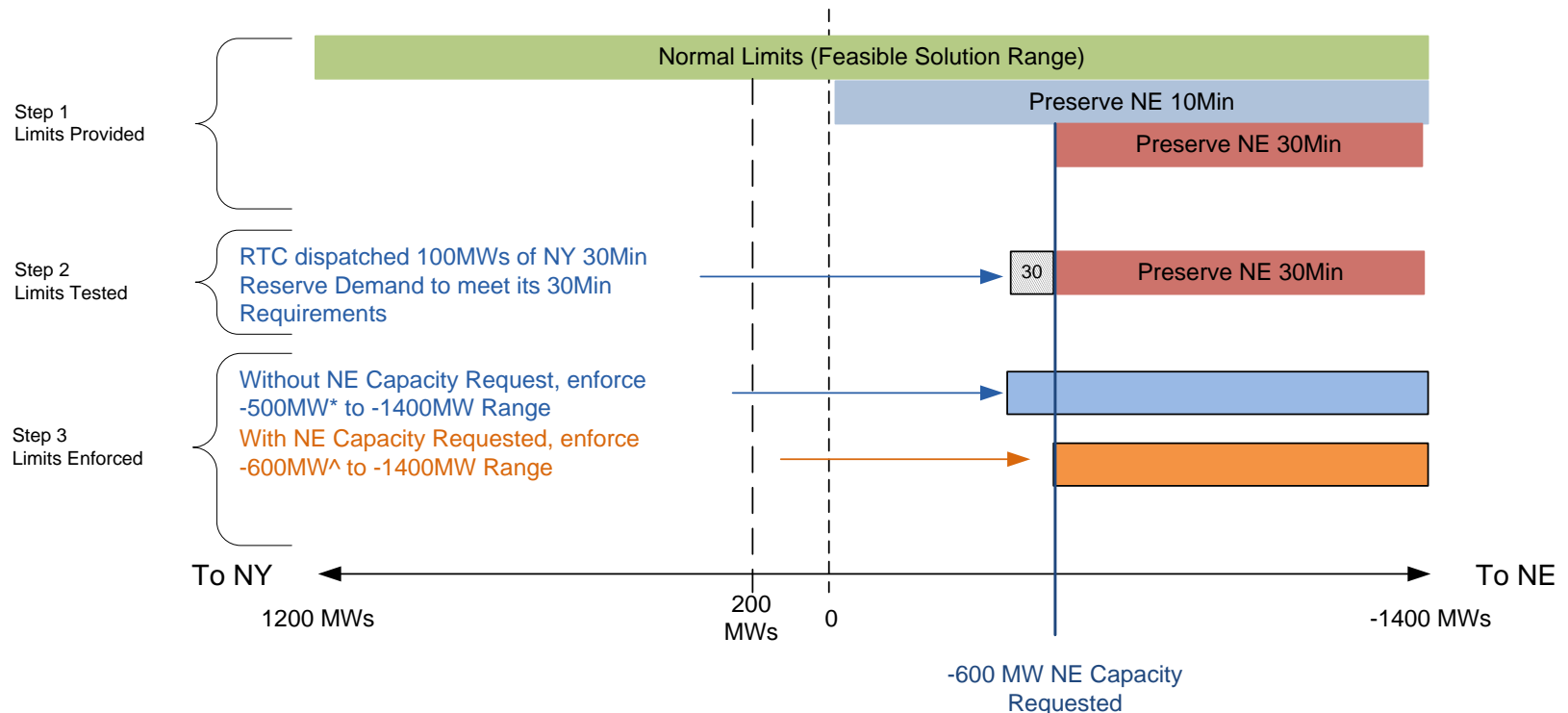
Step 1
Limits Provided

Normal Limits (Feasible Solution Range)

Preserve NE 10Min

Preserve NE 30Min

Step 2
Limits Tested

RTC dispatched 100MWs of NY 30Min Reserve Demand to meet its 30Min Requirements

30   Preserve NE 30Min

Step 3
Limits Enforced

Without NE Capacity Request, enforce -500MW* to -1400MW Range

With NE Capacity Requested, enforce -600MW^ to -1400MW Range

To NY

1200 MWs

200 MWs

0

To NE

-1400 MWs

-600 MW NE Capacity Requested

* -500MW comes from NE 30Min -600MW Limit + NY 30Min Shortage of 100MW
^ -600MW comes from NE Capacity Request -600MW Limit
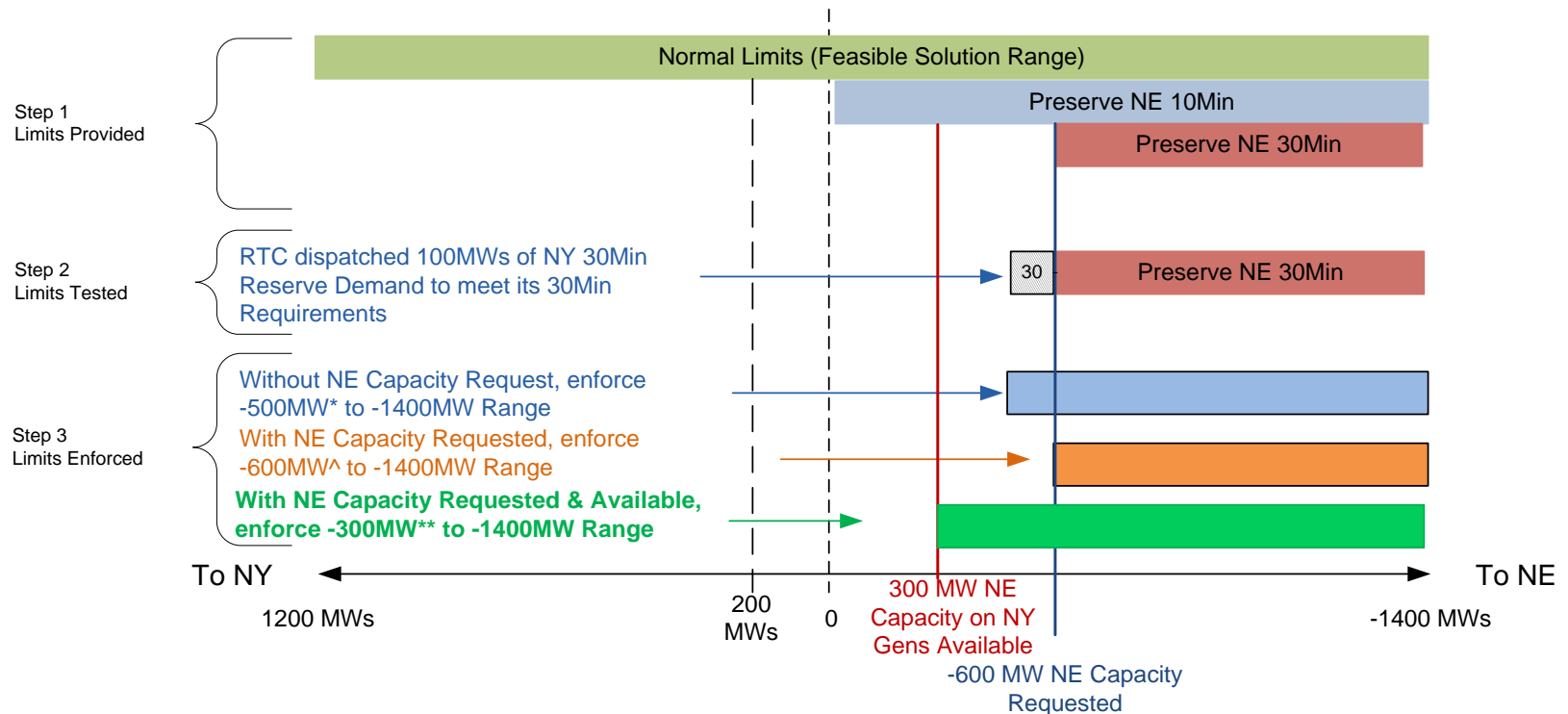
Capacity Request Example 2

♦ **Partial amount of ISO-NE requested capacity is available**

Step 1 Limits Provided

Normal Limits (Feasible Solution Range)
Preserve NE 10Min
Preserve NE 30Min

Step 2 Limits Tested

RTC dispatched 100MWs of NY 30Min Reserve Demand to meet its 30Min Requirements
30 Preserve NE 30Min

Step 3 Limits Enforced

Without NE Capacity Request, enforce -500MW* to -1400MW Range

With NE Capacity Requested, enforce -600MW^ to -1400MW Range

With NE Capacity Requested & Available, enforce -300MW to -1400MW Range**

To NY ← → To NE
1200 MWs   200 MWs   0   300 MW NE Capacity on NY Gens Available   -1400 MWs
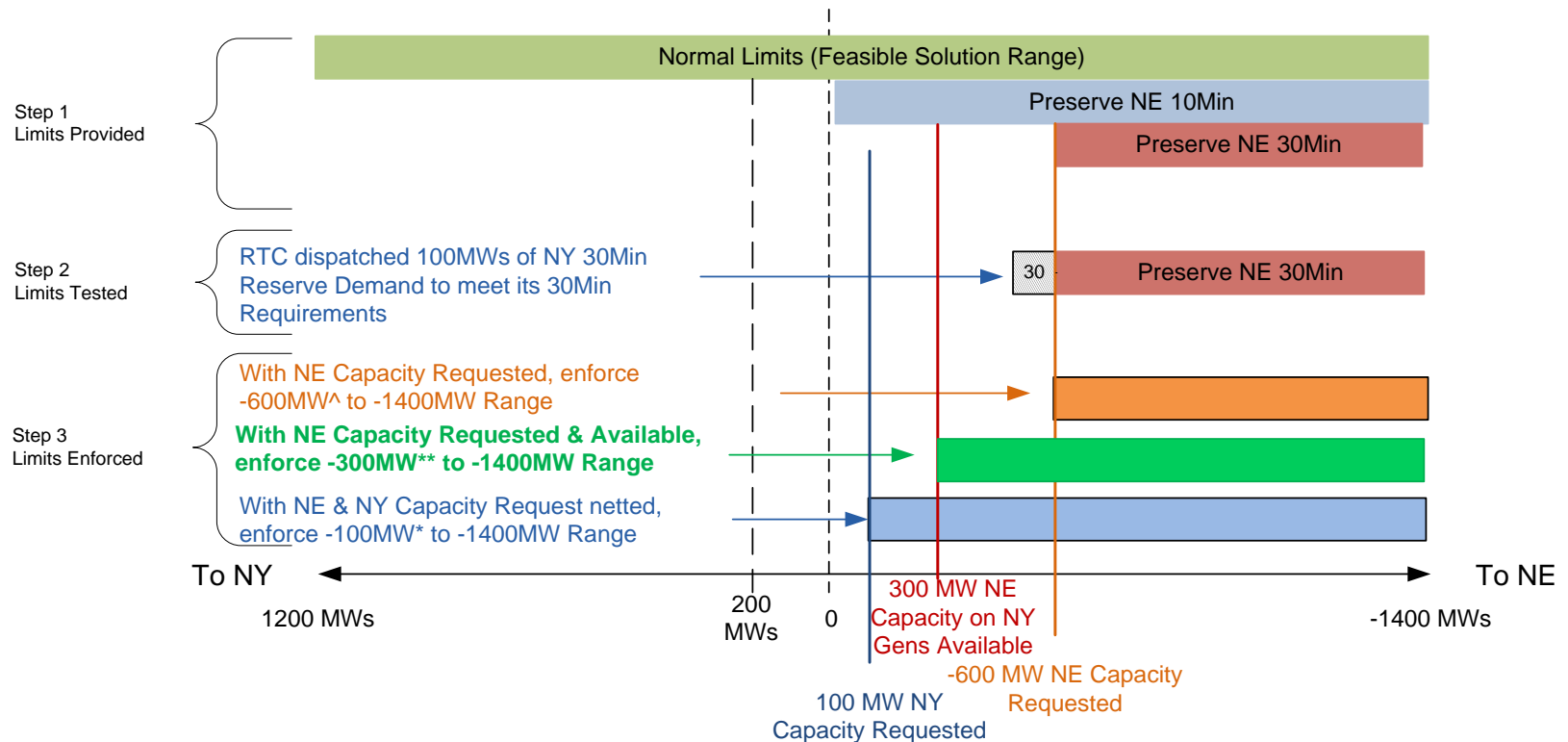
-600 MW NE Capacity Requested

* -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**

Step 1 Limits Provided

Normal Limits (Feasible Solution Range)
Preserve NE 10Min
Preserve NE 30Min

Step 2 Limits Tested

RTC dispatched 100MWs of NY 30Min Reserve Demand to meet its 30Min Requirements

30 Preserve NE 30Min

Step 3 Limits Enforced

With NE Capacity Requested, enforce -600MW^ to -1400MW Range

With NE Capacity Requested & Available, enforce -300MW to -1400MW Range**

With NE & NY Capacity Request netted, enforce -100MW* to -1400MW Range

To NY ← → To NE

1200 MWs   200 MWs   0   -1400 MWs

300 MW NE Capacity on NY Gens Available
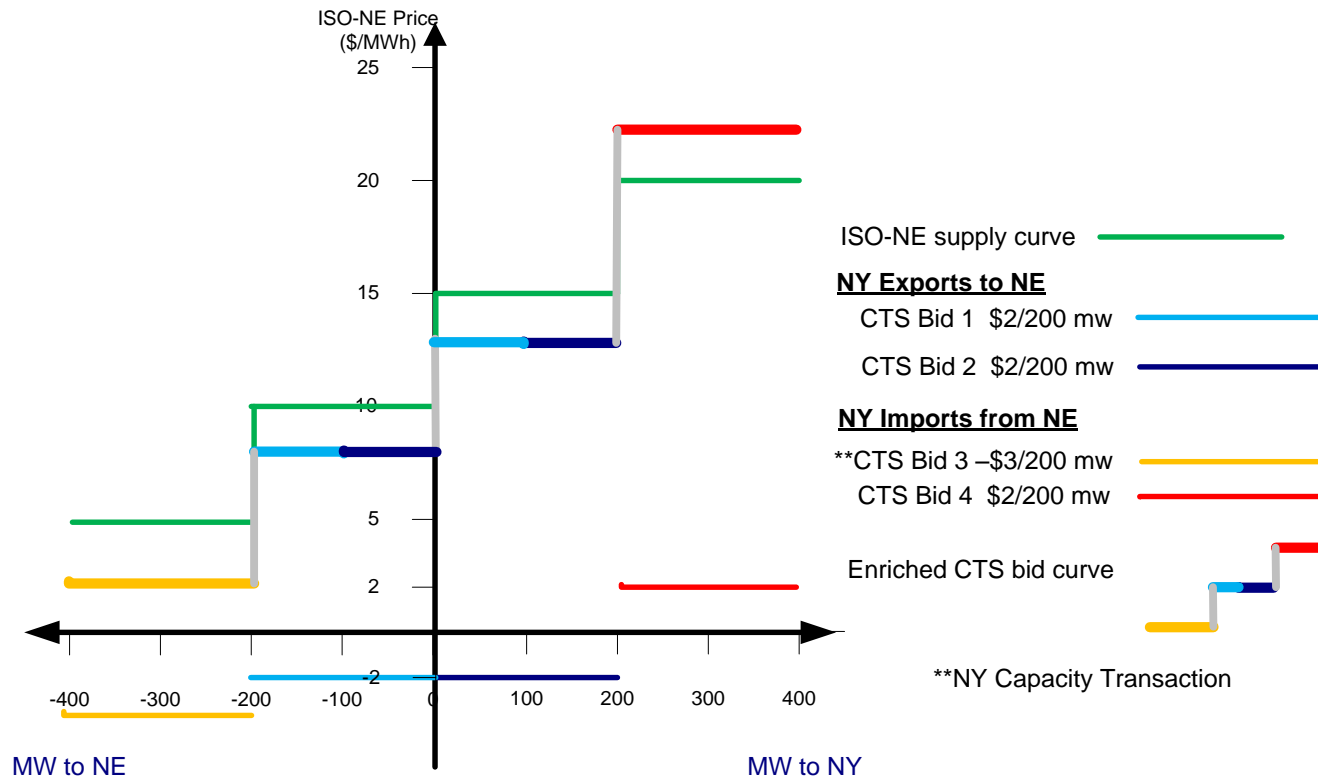
-600 MW NE Capacity Requested

100 MW NY Capacity Requested
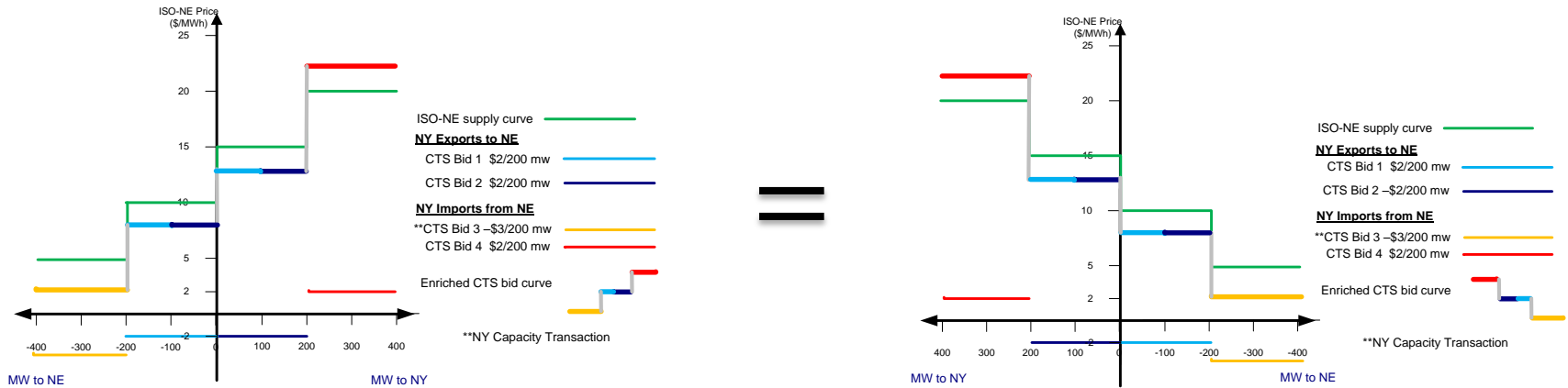
^ -600MW comes from NE Capacity Request -600MW Limit
** **-300MW comes from NE Capacity Request -600MW Limit + 300 MW of NE Capacity Available**
* -100MW comes from NE Capacity Request -600MW + NE Capacity Available 300MW + 200MW NY Capacity Request

Capacity Bids & Bid Curve

ISO-NE Price ($/MWh)

ISO-NE supply curve

NY Exports to NE
CTS Bid 1 $2/200 mw
CTS Bid 2 $2/200 mw

NY Imports from NE
**CTS Bid 3 –$3/200 mw
CTS Bid 4 $2/200 mw

Enriched CTS bid curve

**NY Capacity Transaction

MW to NE

MW to NY

Capacity Bids & Bid Curve

Capacity Bids & Bid Curve

ISO-NE Price ($/MWh)

25
20
15
10
5
2

ISO-NE supply curve

NY Exports to NE
CTS Bid 1 $2/200 mw
CTS Bid 2 $2/200 mw

NY Imports from NE
**CTS Bid 3 –$3/200 mw
CTS Bid 4 $2/200 mw

Enriched CTS bid curve

**NY Capacity Transaction

400 300 200 100 0 -100 -200 -300 -400

-2

MW to NY   MW to NE

+

Normal Limits (Feasible Solution Range)

Step 1
Limits Provided

Preserve NE 10Min
Preserve NE 30Min

Step 2
Limits Tested

RTC dispatched 100MWs of NY 30Min
Reserve Demand to meet its 30Min
Requirements

30 Preserve NE 30Min

Step 3
Limits Enforced

With NE Capacity Requested, enforce
-600MW^ to -1400MW Range

**With NE Capacity Requested & Available,
enforce -300MW** to -1400MW Range**

With NE & NY Capacity Request netted,
enforce -100MW* to -1400MW Range

To NY   To NE
1200 MWs   200 MWs 0   -1400 MWs

300 MW NE
Capacity on NY
Gens Available
-600 MW NE Capacity
Requested
100 MW NY
Capacity Requested

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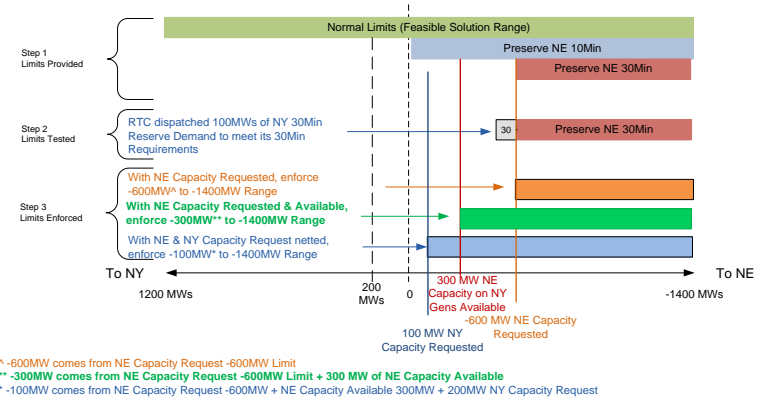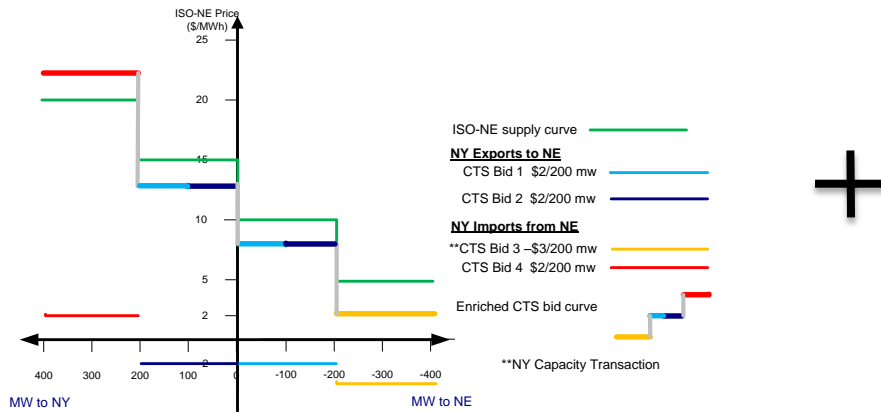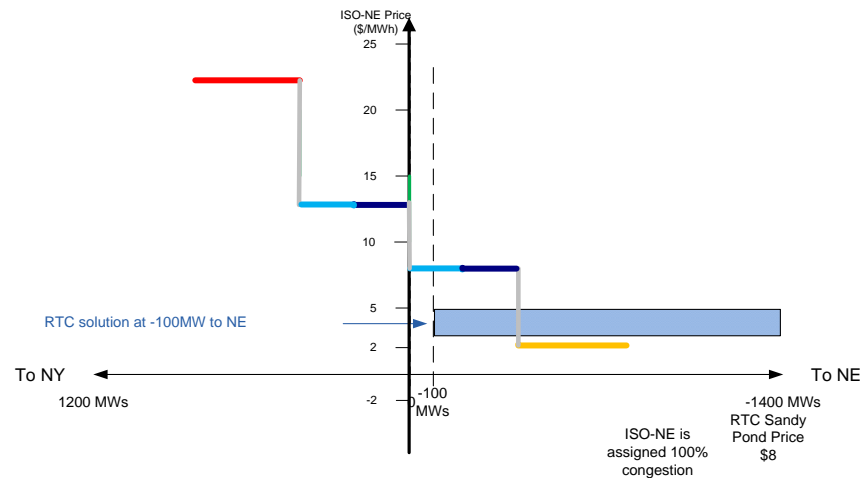* -100MW comes from NE Capacity Request -600MW + NE Capacity Available 300MW + 200MW NY Capacity Request

=

ISO-NE Price ($/MWh)

25
20
15
10
5
2

RTC solution at -100MW to NE

To NY   To NE
1200 MWs   -100 MWs   -1400 MWs
                                 RTC Sandy
                                 Pond Price
                                 $8

-2

ISO-NE is
assigned 100%
congestion

Capacity Request Example

- **Netting of NYISO & ISO-NE capacity requests**
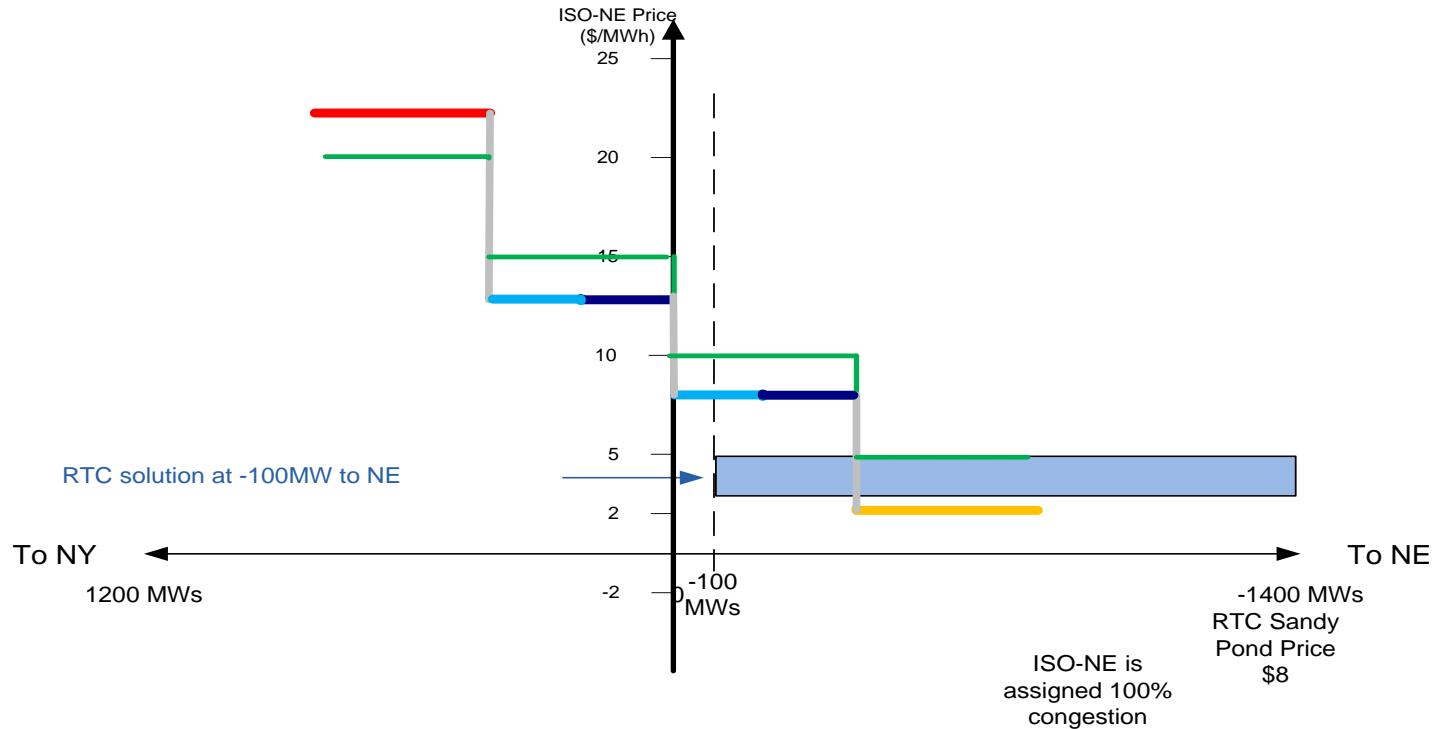
ISO-NE Price ($/MWh)

RTC solution at -100MW to NE

To NY — 1200 MWs

-100 MWs

To NE — -1400 MWs RTC Sandy Pond Price $8

ISO-NE is assigned 100% congestion

- **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)**

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