

## Joint Stakeholder Meeting

# ISO-NE and NYISO Inter-Regional Interchange Scheduling (IRIS)

March 7, 2011 / Springfield, MA

# Agenda

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## Today:

- Welcome and Overview
- External Interface: Congestion and FTRs
- Cross-Border Fee Impacts
- Capacity Import Issues
- Q & A Generally
- DBD Summary

# Joint Stakeholder Meetings

## Purpose:

- **Discuss** white paper's options, pros/cons, how they work, rationale, & likely impact on the markets
- **Gather stakeholder input** on merits, concerns, questions
- **Forge consensus** on a design option the ISOs can implement

## Joint ISO white paper:

- **Presents** in-depth analysis of problems, solution options, rationales, and joint ISO recommendations for reforms.

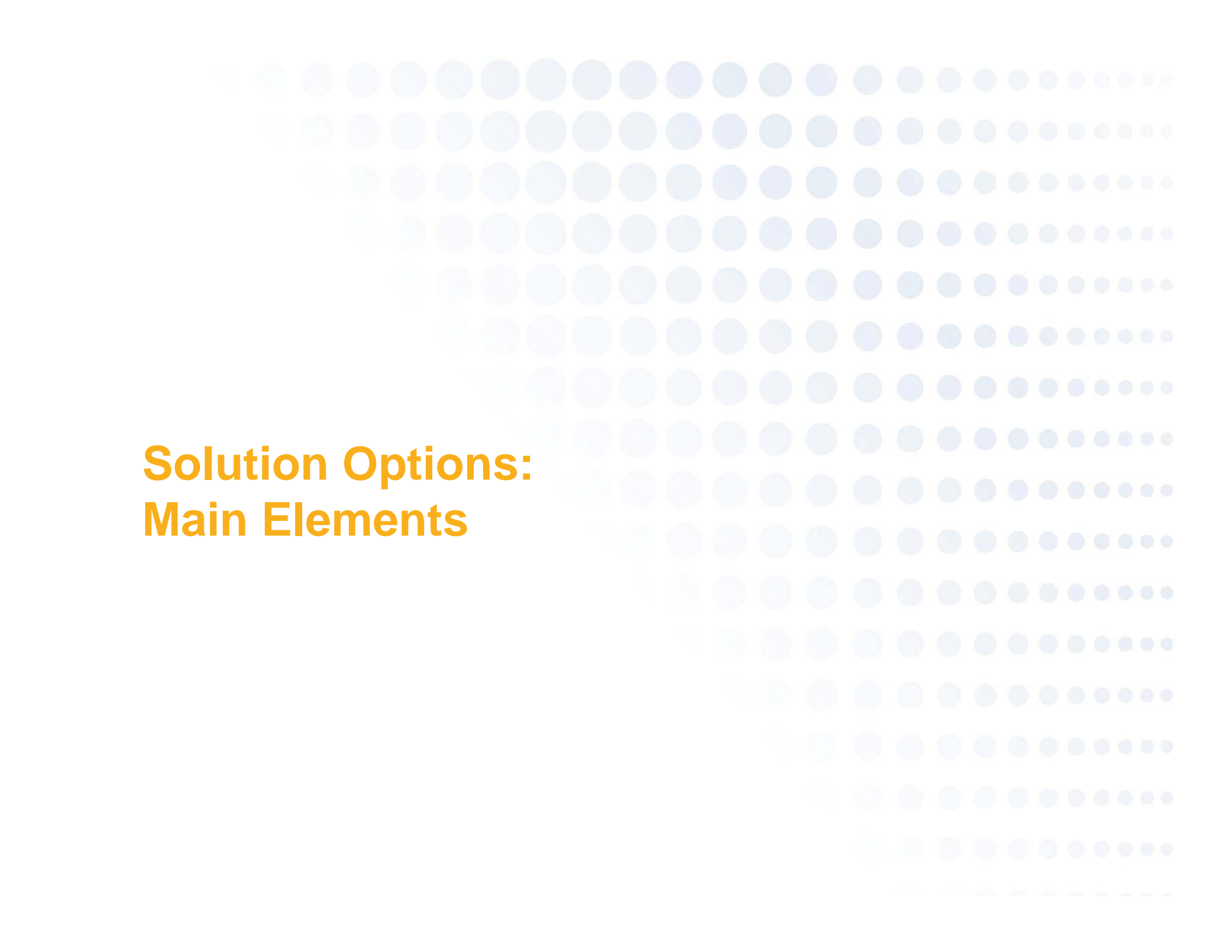
# Presentation Plan for Element Details

**Day 1** (1/21, AM): Current system and IRIS benefit analysis  
(1/21, PM): RT scheduling system (Tie Opt & CTS)

**Day 2** (2/14): RT Scheduling (CTS), DA & RT market linkages;  
DA external transactions; interface settlements & pricing

**Day 3** (3/7): FTRs and congestion, NCPC & fee  
recommendations, conforming capacity rule changes

**Day 4 & 5** (3/28, 4/28): Q&A, follow-up's on additional detail  
as requested, discussion of DBD elements



## **Solution Options: Main Elements**

# Solution Options: Six Key Elements

1. **New RT Inter-Regional Interchange System (IRIS)**
  - *Two IRIS options for stakeholder consideration (next).*
2. **Higher-frequency** schedule changes (15 min)
3. **Eliminate NCPC** credits/debits & fees on ext. txns
4. **DA market:** External txn remain similar to today, *plus:*
5. **Congestion pricing** (DA & RT) at external nodes
6. **FTRs** at external interfaces (NY/NE)

# Real-Time Interface Scheduling (IRIS)

- **Design Objectives:**
  1. **Equalize LMPs** at interface at time schedule is set;
  2. **Update** real-time schedule as frequently as feasible.
- **Two design options** for real-time interface scheduling with greatest potential for efficiency improvement:
  - **Tie Optimization (TO)**
  - **Coordinated Transaction Scheduling (CTS)**
- **Both are market-based solutions, but differ** in the market information they require of market participants.



# DA Congestion and TCC/FTRs



## The Main Points

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- **NY and NE Day-Ahead markets clear separately**
  - DA market offers submitted *separately* to each ISO's market
- **Each DA market will establish a congestion price at the external interface** (a component of the LMP)
  - DA congestion price set same way under either IRIS option
- **Each ISO's DA congestion revenue** flows to holders of its FTR/TCCs to/from the external interface and internal locations

## Day Ahead Congestion Examples

- **Next:** An example of **DA market clearing** and **congestion pricing** at the external interface.
- **This will show** how money flows between:
  - **Participants scheduling DA** at a congested interface
  - The **TCC/FTR holders** to/from interface in each ISO.
- **Then: Use DA examples** to show **RT congestion pricing** and settlements under IRIS

## About Day Ahead Examples

- The following DA market examples show clearing at the external interface **separately for each ISO.**
- Examples show how clearing with DA congestion would work **under IRIS** (either design option)
  - **Process differs** from how it works today in NE (a lot)
  - **Process similar** to how it works today in NY
- Examples assume **no losses and no *internal* congestion** (for simplicity)

# NYISO DA Congestion Example: Offers

Gen ID NY	Gen MW NY	Gen \$/MW NY
123	100	\$48.00
234	190	\$48.25
345	210	\$48.75
456	100	\$48.85
567	325	\$49.00
678	200	\$50.00
789	100	\$53.00
890	275	\$55.00
901	150	\$56.00
912	290	\$58.00

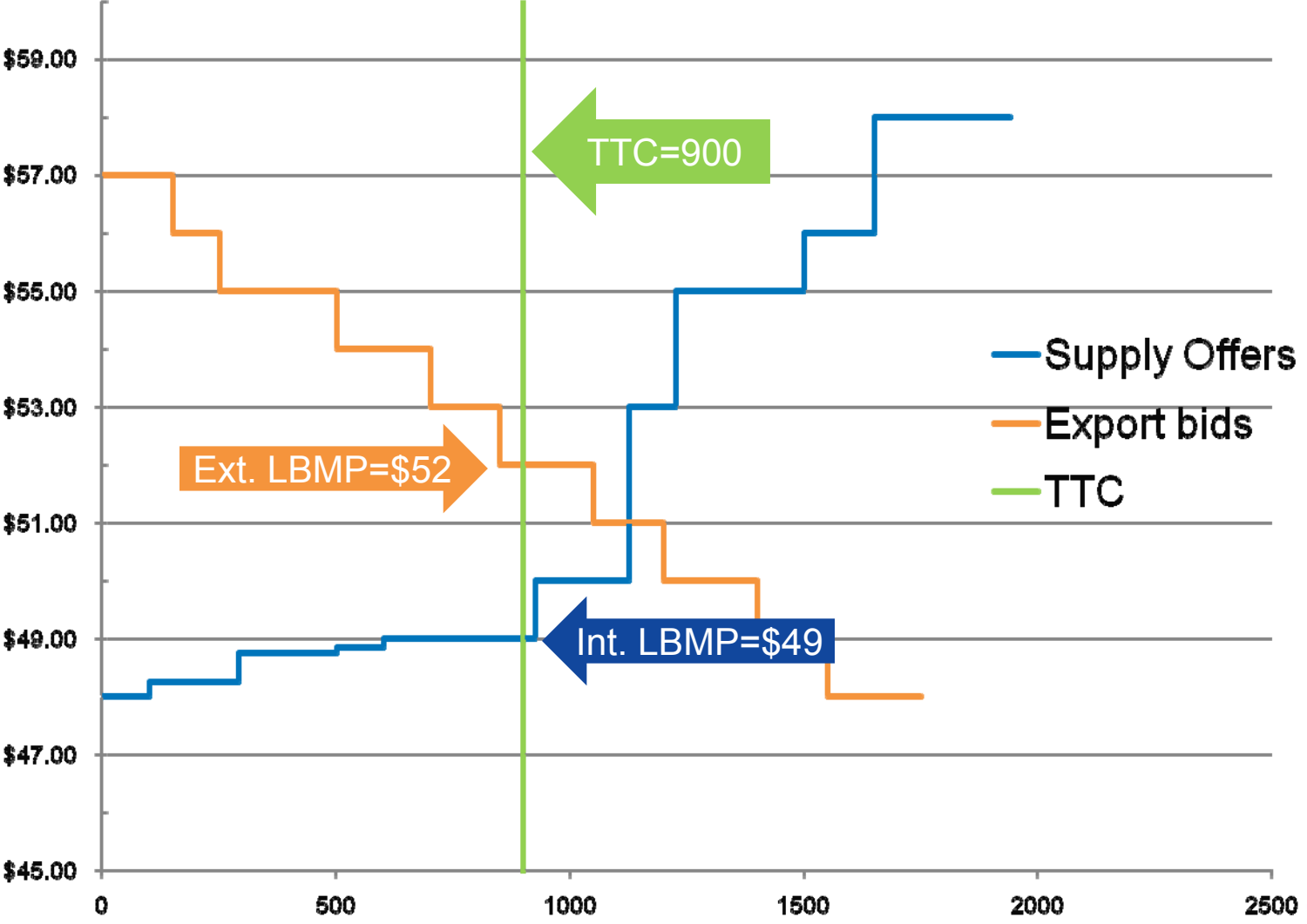
**Note:**  
 NY gen stack shown  
 is *above* the gen  
 needed to meet  
 NY DA load

**TTC = 900 MW**

Exp. Part. ID	Exp. MW	Exp. \$/MW
A	150	\$57.00
G	100	\$56.00
C	250	\$55.00
D	200	\$54.00
E	150	\$53.00
F	200	\$52.00
X	150	\$51.00
H	200	\$50.00
I	150	\$49.00
J	200	\$48.00

**What clears? What is LMP?**

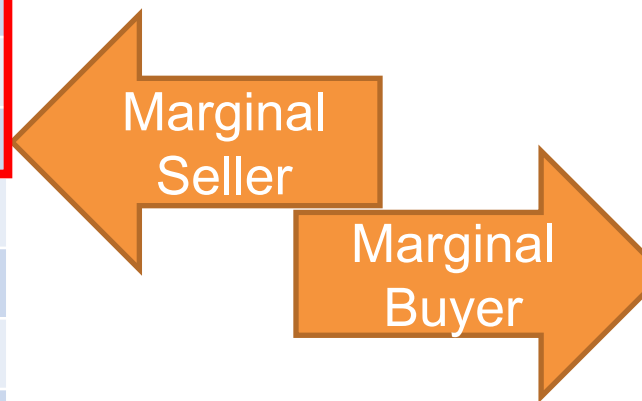
# NYISO DAM: External Interface Clearing



# NYISO DA Example – What Cleared?

Gen ID NY	Gen MW NY	Gen \$/MW NY
123	100	\$48.00
234	190	\$48.25
345	210	\$48.75
456	100	\$48.85
567	325	\$49.00
678	200	\$50.00
789	100	\$53.00
890	275	\$55.00
901	150	\$56.00
912	290	\$58.00

Exp Part Id	Exp. MW	Exp. \$/MW
A	150	\$57.00
G	100	\$56.00
C	250	\$55.00
D	200	\$54.00
E	150	\$53.00
F	200	\$52.00
X	150	\$51.00
H	200	\$50.00
I	150	\$49.00
J	200	\$48.00



NY Internal LBMP = \$49

NY External LBMP = \$52

# NYISO DA Example - Summary

- **The economic principle:**
  - External node congestion charge (\$/MWh) = difference in marginal buyer and sellers' offer prices (at TTC limit)
- **This example:**
  - External node NY DA LMP = \$52 / MWh (*marginal buyer*)
  - Internal NY DA LMP = \$49 / MWh (*marginal seller*)
  - NY DA congestion charge = \$ **3** / MWh at interface
- **NY DA congestion surplus at external interface?**
  - \$3 / MWh x 900 MW net export [TTC] = **\$2700** / hr

## A Second DA Example: ISO-NE side

- **DA clearing at the other ISO's external interface:**
  - Need to see credits/charges of a participant in other ISO DA market to walk-thru its net financial position
- **In general: DA market results at the same external interface can differ in NYISO and ISO-NE:**
  - Each ISO's DA market clears its External Transactions against a different internal generation stacks
  - Can produce different DA congestion prices



# ISO-NE DA Congestion Example – Offers

Imp Part ID	Imp. MW	Imp. \$/MW
G	100	\$50.00
H	250	\$51.00
I	200	\$51.25
J	200	\$51.50
K	250	\$52.00
L	200	\$52.50
M	150	\$52.75
N	200	\$53.00
O	150	\$54.00
A	200	\$55.00

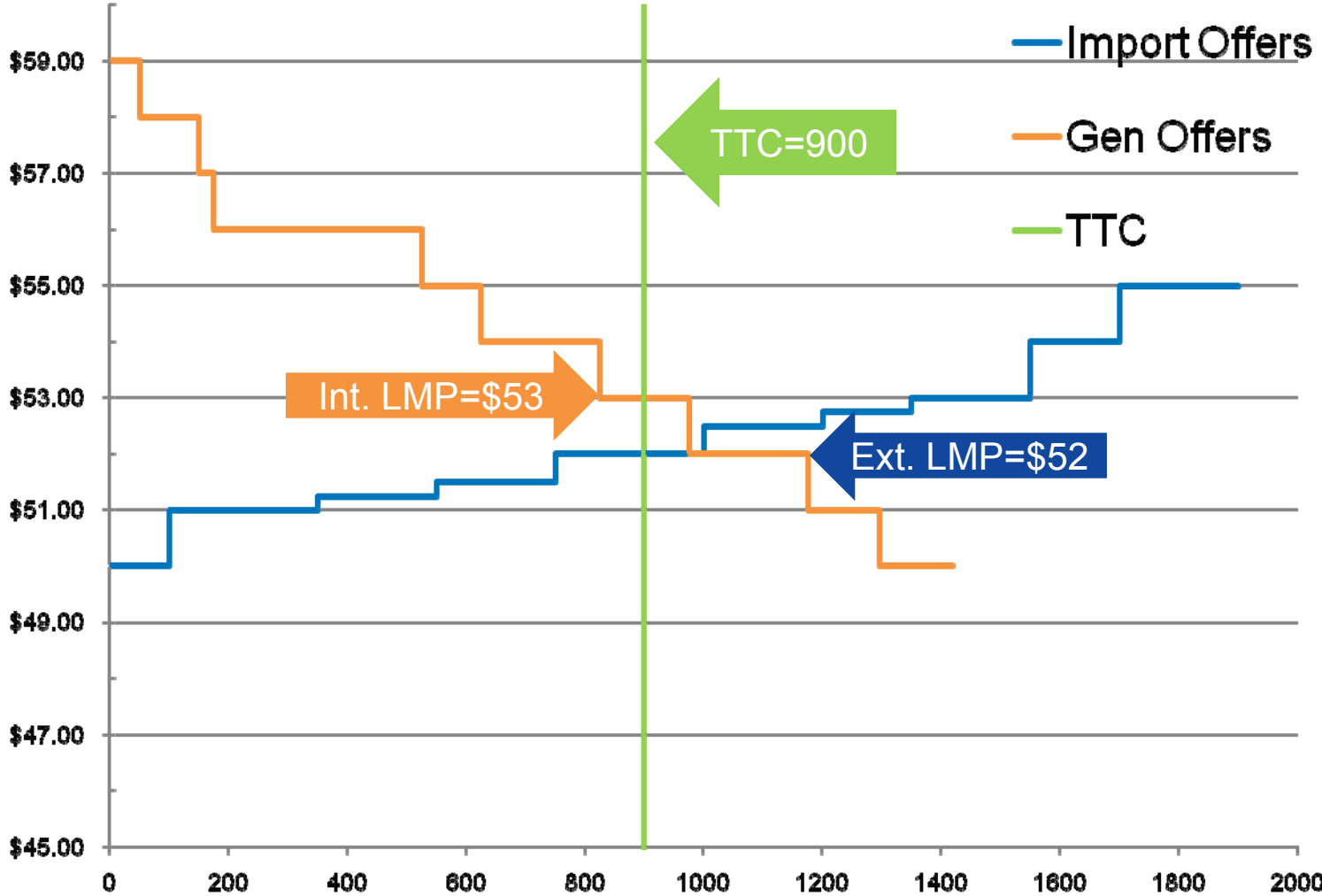
**Note:**  
Offers shown compete to meet top portion of NE day-ahead load (infra-marginal gen stack is omitted)

**TTC = 900 MW**

Gen ID NE	Gen MW NE	Gen \$/MW NE
999	125	\$50.00
944	120	\$51.00
888	200	\$52.00
777	150	\$53.00
666	200	\$54.00
555	100	\$55.00
444	350	\$56.00
333	25	\$57.00
222	100	\$58.00
111	50	\$59.00

**What clears? What is LMP?**

# ISO-NE DAM: External Interface Clearing



# ISO-NE DA Example – What Cleared?

Imp. Part. ID	Imp. MW	Imp. \$/MW
G	100	\$50.00
H	250	\$51.00
I	200	\$51.25
J	200	\$51.50
K	250	\$52.00
L	200	\$52.50
M	150	\$52.75
N	200	\$53.00
O	150	\$54.00
A	200	\$55.00

Gen ID NE	Gen MW NE	Gen \$/MW NE
999	125	\$50.00
944	120	\$51.00
888	200	\$52.00
777	150	\$53.00
666	200	\$54.00
555	100	\$55.00
444	350	\$56.00
333	25	\$57.00
222	100	\$58.00
111	50	\$59.00



**TTC = 900 MW**

NE External LMP = \$52

NE Internal LMP = \$53

# ISO-NE DA Example - Summary

- **This example:**
  - External node NE DA LMP = \$52 / MWh (*marginal seller*)
  - Internal NE DA LMP = \$53 / MWh (*marginal buyer*)
  - NE DA congestion charge = \$ -1 / MWh at interface
- **NE DA congestion surplus** at external interface?
  - \$ -1 / MWh x -900 MW net import [TTC] = **\$900** / hr
- **Now:** Who pays what?
- **And:** Where does that congestion money go?

# Settle a Participant Across Markets: Part I

- What does a participant get paid (or pay) in each ISO's DA market settlement?
- Let's consider Participant G's position in detail
  - **In DA markets:**
    - It offered to buy (export) 100 MW in NY
    - It offered to sell (import) 100 MW in NE
    - **Both offers cleared**
- What happens in DA market settlements?

## Example: Participant “G” DA transaction

- **DA Settlements:**
  - In NY: “G” Bought 100 MW @ \$52 = **(\$5200)** charge
  - In NE: “G” Sold 100 MW @ \$52 = **\$5200** credit
  - A net credit of \$0 DA on the external transaction
- **DA internal LMPs (energy): \$49 in NY, \$53 in NE**
  - Did “G” get a \$4 / MWh profit by “moving power” from lower → higher cost region with its external transaction?
  - **No.** It was charged \$4 / MWh to move power across the congested interface into NE.

## Summary Points *So Far*

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- **Parties that wish to schedule DA external transactions do so like today.**
- **Each DA market will establish a congestion price at the external interface (a component of the LMP)**
  - In general, DA LMPs and congestion charge at external interface **could be different** in each ISO's DA market
- **Each ISO's DA congestion revenue flows to holders of its FTR/TCCs to/from the external interface and internal locations (*NEXT...*)**



**TCC / FTR at External Interface:  
How the money flows**



## Main Points

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- **Today:** Each ISO (separately) issues TCC/FTRs between its external nodes and internal locations
- **A TCC/FTR holder** is paid (or pays) the difference in the DA LMP congestion component (CC) between:
  - The external node v. the internal location (node/hub/zone)
  - **This is true today** and under IRIS (either design option)
- **What changes?** If DA CC at ext. interface changes, the value of a TCC/FTR to/from it will change.

## Links from DA LMP to FTR/TCC at Interface

### TCC/FTR Examples:

- **Next:** We again consider a (simple) example at the level of an individual participant with a DA position.
- **Then:** We consider how congestion surplus accrues at the level of ISO settlements in each ISO
- There is no “common” congestion revenue fund under IRIS: Each ISO’s separate FTR/TCC rules apply.

## Settle a Participant Across Markets: Part II

- **What if Participant G held a TCC/FTR to/from the external interface to “cover” its DA ext. transaction?**
- Let's now assume Participant G holds:
  - **100 MW TCCs** in NYISO that sink at the interface
  - **100 MW FTRs** in ISO-NE that source at the interface
- **What is “G”'s net position?**

# Settlements of Participant “G”

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- **In NY:**

- “G” Bought (exported) 100 MW @ \$52 = **(\$5200)** charge
- “G” credited for 100 MW of TCC @ \$3 = **\$300** credit
- **Net NY settlement** = **(\$4900)** charge

- **In NE:**

- “G” Sold (imported) 100 MW @ \$52 = **\$5200** credit
- “G” debited for 100 MW of FTR @ \$-1 = **\$100** credit
- **Net NE settlement** = **\$5300** credit

- “G”s net position = **\$400** credit
- FTR/TCC ‘covered’ the interface congestion charges

# ISO-Level Settlement Examples

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- **Purpose:** Show how DA congestion surplus at external interface flows thru to TCC / FTR holders
- Work through some of the previous examples to show the **how the money balances** between all participants
- **Same assumptions:**
  - DA prices and cleared MW same as previous examples
  - No losses or *internal* congestion (for simplicity)  
... *Internal congestion adds a lot more numbers, no insights*

# NYISO DAM Settlements Overview

	<b>DA External LMP</b>	<b>\$52</b>
1	Export MW (From NY DAM Example)	-900
2	Charges to Exports (@ DA energy + CC = \$52/MWh)	(\$46,800)
	<b>DA Internal LMP</b>	<b>\$49</b>
3	Internal Load MW (Assumed)	-20,000
4	Charges to Internal Load	(\$980,000)
5	Internal Generator MW	20,900
6	Credits to Internal Generators	\$1,024,100
7	Congestion Surplus to TCC holders	\$2700
8	<b>Net Settlement (Credits – Charges)</b>	<b>\$0</b>

**NY DA market net settles to zero, as required**

# ISO-NE DAM Settlements Overview

	<b>DA External LMP</b>	<b>\$52</b>
1	Import MW (From NE DAM Example)	900
2	Credits to Exports (@ DA energy + CC = \$52/MWh)	\$46,800
	<b>DA Internal LMP</b>	<b>\$53</b>
3	Internal Load MW (Assumed)	-16,000
4	Charges to Internal Load	(\$848,000)
5	Internal Generator MW	15,100
6	Credits to Internal Generators	\$800,300
7	Congestion Surplus to FTR holders	\$900
8	<b>Net Settlement (Credits – Charges)</b>	<b>\$0</b>

**NE DA market net settles to zero, as required**

## Summary Points

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- Each ISO's DA market sets a **congestion component** of the market-clearing LMP at **external interface**
- **DA congestion revenue** flows to TCC/FTR holders
- **Issuance and admin** of TCC/FTRs **same as today**
  - **Separately administered** by each ISO
  - **Defined** between external node and internal locations
- **Value of TCC/FTR will change**, b/c value of congestion component at external interface may change





# RT Congestion Prices Under IRIS

# The Big Picture

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- **Most congestion revenue** accrues in DA markets
  - RT congestion residuals (revenue) are relatively small
- **Setting correct RT congestion prices** matters:
  - **Affects DA market** bids and prices
  - **Signals (marginal) value** of transmission capacity in RT
  - **Affects RT settlements** in specific situations
    - E.g., RT transmission constraints bind, and the participant's DA cleared MW  $\neq$  RT cleared MW)

# The Problem Today

## At External Interfaces:

- Each ISO **does not have info necessary** to determine (economically efficient) RT congestion prices
  - NE doesn't even try (no external congestion component at all)

## Why? Setting (econ-efficient) RT congest. Prices requires

- RT marginal resource(s) on each side of the interface;
- Coordinated clearing/dispatch that identifies the '*shadow cost*' of binding Transmission constraint(s) at an external interface.

# IRIS Solutions

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- **Economic principle:** Total RT congestion price should equal difference in RT LMPs of marginal resource on each side of the transmission constraint
  - **Why?** That is marginal value of transmission capacity in reducing total system production costs.
- **Tie Optimization** can set economically-correct RT congestion charges across NY/NE interfaces
- **CTS** sets “approx. correct” RT congestion charges.
  - “Approx” becomes “correct” if interface bids are zero.

# Practicalities

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- **Suppose** total RT congestion cost equals difference in RT LMPs of marginal resource on each side
- **Practice:** Can't have each ISO charge this total – it would charge participants using interface *twice*.
- **Issue:** How should each ISO set the congestion component of its RT LMP at external node so that:
  - a) No double-counting issues arise, and
  - b) Total (sum of ISO's) congestion charges equals the economically correct total congestion cost across interface?

# Practicalities, Resolved

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## Simplest Option

- Each ISO sets an LMP congestion component equal to  $\frac{1}{2}$  of the total RT congestion cost across interface.
- **Why this approach?**
  - Simple, transparent, efficient (under Tie Optimization)
  - Gets total congestion charge economically correct
  - Equal allocation of any RT congestion revenue to each region
- **Some examples will illustrate this, next.**



**RT Congestion Prices:**

**Tie Optimization Examples**

## Tie Optimization RT Examples

- **Two examples** show how RT congestion prices are set with Tie Optimization of NY/NE interface.
- **Same assumptions:**
  - DA prices, gen stacks, and cleared MW as previous examples
  - No losses or *internal* congestion (for simplicity)
- **Example 1:** RT and DA constrained, at same TTC
- **Example 2:** RT TTC < DA TTC (e.g. RT de-rating)



## RT Congestion Examples: Gen Stacks in NY & NE

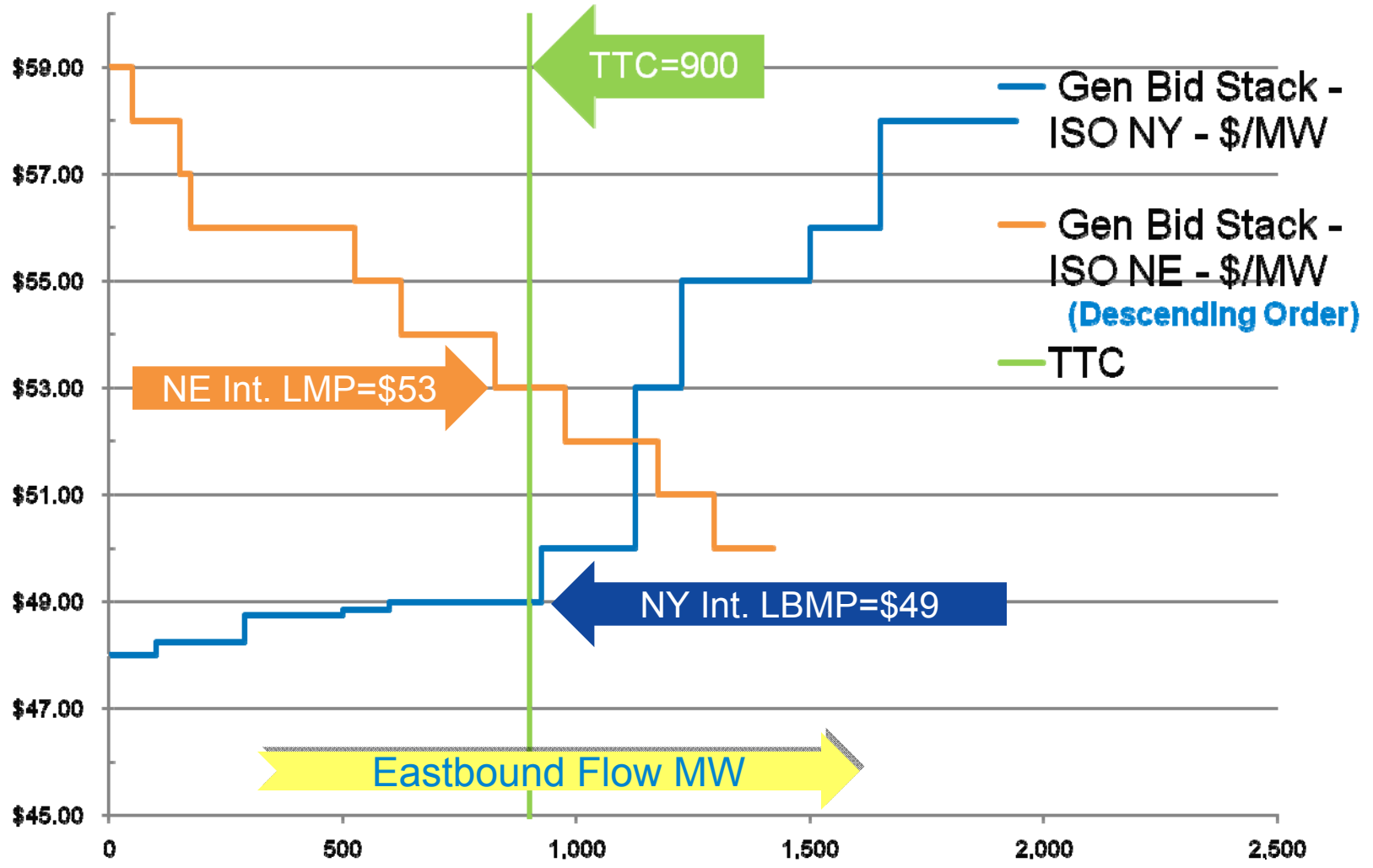
Gen ID NY	Gen MW NY	Gen \$/MW NY
123	100	\$48.00
234	190	\$48.25
345	210	\$48.75
456	100	\$48.85
567	325	\$49.00
678	200	\$50.00
789	100	\$53.00
890	275	\$55.00
901	150	\$56.00
912	290	\$58.00

**RT TTC  
= 900 MW**

Gen ID NE	Gen MW NE	Gen \$/MW NE
111	50	\$59.00
222	100	\$58.00
333	25	\$57.00
444	350	\$56.00
555	100	\$55.00
666	200	\$54.00
777	150	\$53.00
888	200	\$52.00
944	120	\$51.00
999	125	\$50.00

### *What are LMPs and Congest. Prices?*

# RT Congestion Example 1: Tie Optimization



# RT Congestion Example 1: Tie Optimization

Gen ID NY	Gen MW NY	Gen \$/MW NY
123	100	\$48.00
234	190	\$48.25
345	210	\$48.75
456	100	\$48.85
567	325	\$49.00
678	200	\$50.00
789	100	\$53.00
890	275	\$55.00
901	150	\$56.00
912	290	\$58.00

NY Internal LMP = \$49

RT TTC = 900 MW  
Quantity Cleared at Interface = 900 MW

Partially Cleared

Partially Cleared

**Congestion Prices?**

Gen ID NE	Gen MW NE	Gen \$/MW NE
111	50	\$59.00
222	100	\$58.00
333	25	\$57.00
444	350	\$56.00
555	100	\$55.00
666	200	\$54.00
777	150	\$53.00
888	200	\$52.00
944	120	\$51.00
999	125	\$50.00

NE Internal LMP = \$53

## RT Congestion **Example 1** - Summary

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- **This example:**
  - Internal NE RT LMP = **\$53** / MWh (*marginal resource*)
  - Internal NY RT LMP = **\$49** / MWh (*marginal resource*)
  - “True” RT congestion cost = **\$ 4** / MWh at interface
- **Congestion component** of RT LMP at external nodes:
  - NY RT Congest Price = **\$ 2**, External NY RT LMP = **\$51**
  - NE RT Congest Price = **\$-2**, External NE RT LMP = **\$51**
- **Now:** Who pays what?
- **And:** How do these prices affect RT settlement?

## Example 1: RT Settlements – Tie Optimization

- **In Example 1:**
  - Quantity that cleared DAM (both) at interface = **900 MW**
  - Quantity that is scheduled in RT by Tie Optim = **900 MW**
  - With Tie Optimization, all participants' DA external transactions (that clear both markets) are **deemed to flow** for RT settlement purposes.
- **With zero deviations?** RT settlements are all zeros
- This illustrates how **congestion accrues in DA** markets, not in RT settlements (typically).

## Example 2: RT TTC changes from DA

When do RT congest. prices affect RT settlement?

- **If (and only if):**
  - a) RT TTC is **binding** @ interface; and
  - b) RT TTC **differs** from DA cleared MW at interface
- **Example:** Change the previous example from **900 MW TTC** → **500 MW RT TTC** (*de-rating*)
- **Only in RT** we see changes in participants' cash flows.
- RT congestion revenue can be **positive or negative**

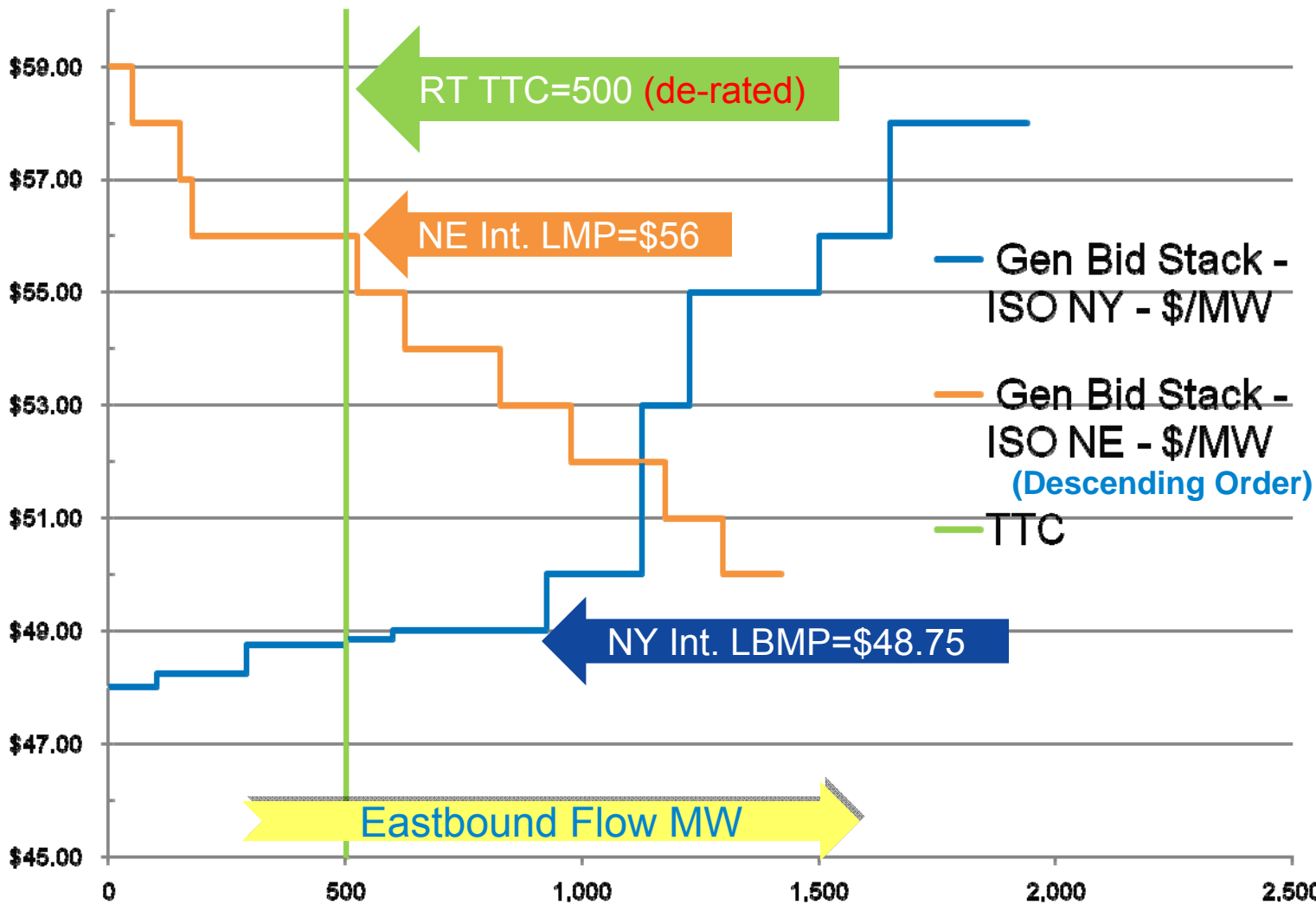
## RT Gen Stacks in NY & NE – Same as Previous

Gen ID NY	Gen MW NY	Gen \$/MW NY
123	100	\$48.00
234	190	\$48.25
345	210	\$48.75
456	100	\$48.85
567	325	\$49.00
678	200	\$50.00
789	100	\$53.00
890	275	\$55.00
901	150	\$56.00
912	290	\$58.00

**TTC = 500 MW**

Gen ID NE	Gen MW NE	Gen \$/MW NE
111	50	\$59.00
222	100	\$58.00
333	25	\$57.00
444	350	\$56.00
555	100	\$55.00
666	200	\$54.00
777	150	\$53.00
888	200	\$52.00
944	120	\$51.00
999	125	\$50.00

# RT Congestion Example 2 – Tie Optimization



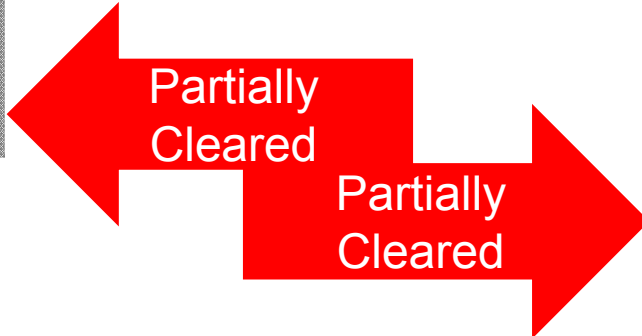


# RT Prices – under Tie Optimization –Congestion

Gen ID NY	Gen MW NY	Gen \$/MW NY
123	100	\$48.00
234	190	\$48.25
345	210	\$48.75
456	100	\$48.85
567	325	\$49.00
678	200	\$50.00
789	100	\$53.00
890	275	\$55.00
901	150	\$56.00
912	290	\$58.00

RT TTC = **500 MW**  
 Quantity Cleared  
 Interface = **500 MW**

Gen ID NE	Gen MW NE	Gen \$/MW NE
111	50	\$59.00
222	100	\$58.00
333	25	\$57.00
444	350	\$56.00
555	100	\$55.00
666	200	\$54.00
777	150	\$53.00
888	200	\$52.00
944	120	\$51.00
999	125	\$50.00



**Congestion Prices?**

NY Internal LMP = **\$48.75**

NE Internal LMP = **\$56**

## RT Congestion **Example 2** - Summary

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- **This example:**
  - Internal NE RT LMP = **\$56** / MW (*marginal resource*)
  - Internal NY RT LMP = **\$48.75** / MWh (*marginal resource*)
  - “True” RT congestion cost = **\$ 7.25** / MWh at interface
- **Congestion component** of RT LMP at external nodes:
  - NY RT Congest Price = **\$ 3.625**, External NY RT LMP = **\$52.375**
  - NE RT Congest Price = **\$-3.625**, External NE RT LMP = **\$52.375**
- **Now: How do these prices affect RT settlements?**

## RT Congestion **Example 2** – RT Settlements

- **Assume:** De-rating of TTC in RT (to 500 MW) from DA (900 MW) is only cause of RT deviations from DA
- **RT Generation changes** due to the reduced flow:
  - **Down in NY** by 400 MW due to the **reduced exports**
  - **Up in NE** by 400 MW due to the **reduced imports**
- **Under Tie Optimization:** All DA cleared external transactions are “deemed to flow” in RT, no deviations
- **400 MW reduced flow settles as counterflow** of scheduled in RT by Tie Optimization.

## NYISO RT Settlements: Tie Optimization

	<b>RT External LMP</b>	<b>\$52.375</b>
1	Tie Optimization Incremental RT Import MW	+400
2	Inter-ISO Settlement Account Credit (for RT Import)	\$20,950
3	DA External Transactions that Flow-Thru MW Deviations	0
4	Charges to External Transactions Deviations	\$0
	<b>RT Internal LMP</b>	<b>\$48.75</b>
5	Internal Load MW Deviations (Assumed)	0
6	Charges to Internal Load Deviations	\$0
7	Internal Generator MW Deviations	-400
8	Charges to Internal Generators	(\$19,500)
9	NYISO RT Congestion Fund Charge	(\$1450)
10	Net Settlement (Credits – Charges)	\$0

## ISO-NE RT Settlements: Tie Optimization

	<b>RT External LMP</b>	<b>\$52.375</b>
1	Tie Optimization Incremental RT Export MW	-400
2	Inter-ISO Settlement Account Charge (for RT Export)	(\$20,950)
3	DA External Transactions that Flow-Thru MW Deviations	0
4	Charges to External Transactions Deviations	\$0
	<b>RT Internal LMP</b>	<b>\$56.00</b>
5	Internal Load MW Deviations (Assumed)	0
6	Charges to Internal Load Deviations	\$0
7	Internal Generator MW Deviations	+400
8	Credit to Internal Generators	\$22,400
9	ISO-NE RT Congestion Fund Charge	(\$1450)
10	<b>Net Settlement (Credits – Charges)</b>	<b>\$0</b>

# Key Observations

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## 1. RT congestion prices under Tie Optimization:

- **Simple and transparent** (relative to today, that is)
- **Economics right:** Total RT congestion cost is correct
- Allocates RT congestion accruals (if any) in equal measure to each ISO

## 2. Who pays/receives RT congestion **within each ISO?**

- **No change to ‘within ISO’ allocations:** Each ISOs existing (and different) rules for allocating RT congestion accruals to participants can stay same.



**RT Congestion Prices:**

**CTS Option Examples**



## RT Congestion Example 3: Interface Bids

- **Example 3** shows how RT congestion prices are set with Interface Bidding at NY/NE interface.
- **Issue:** RT congestion prices must change to account for Interface Bids, even if all else is same
- **Affects:** DA ETs that do not clear an Interface Bid in RT (even if RT TTC does not change from DA)
- **Assumptions:**
  - DA prices, gen stacks, and cleared MW as previous examples
  - No losses or *internal* congestion (for simplicity)
  - RT and DA constrained, at same TTC (like RT Example 1)



# RT Congestion Examples: With Interface Bids

Gen ID NY	Gen MW NY	Gen \$/MW NY
123	100	\$48.00
234	190	\$48.25
345	210	\$48.75
456	100	\$48.85
567	325	\$49.00
678	200	\$50.00
789	100	\$53.00
890	275	\$55.00
901	150	\$56.00
912	290	\$58.00

IB ID	IB MW NY>NE	IB \$/MW
AAA	100	\$0.50
BBB	200	\$0.60
CCC	250	\$0.70
DDD	200	\$1.00
EEE	100	\$1.75
FFF	100	\$2.00
GGG	200	\$2.75
HHH	150	\$3.15
III	100	\$3.50
JJJ	100	\$5.00

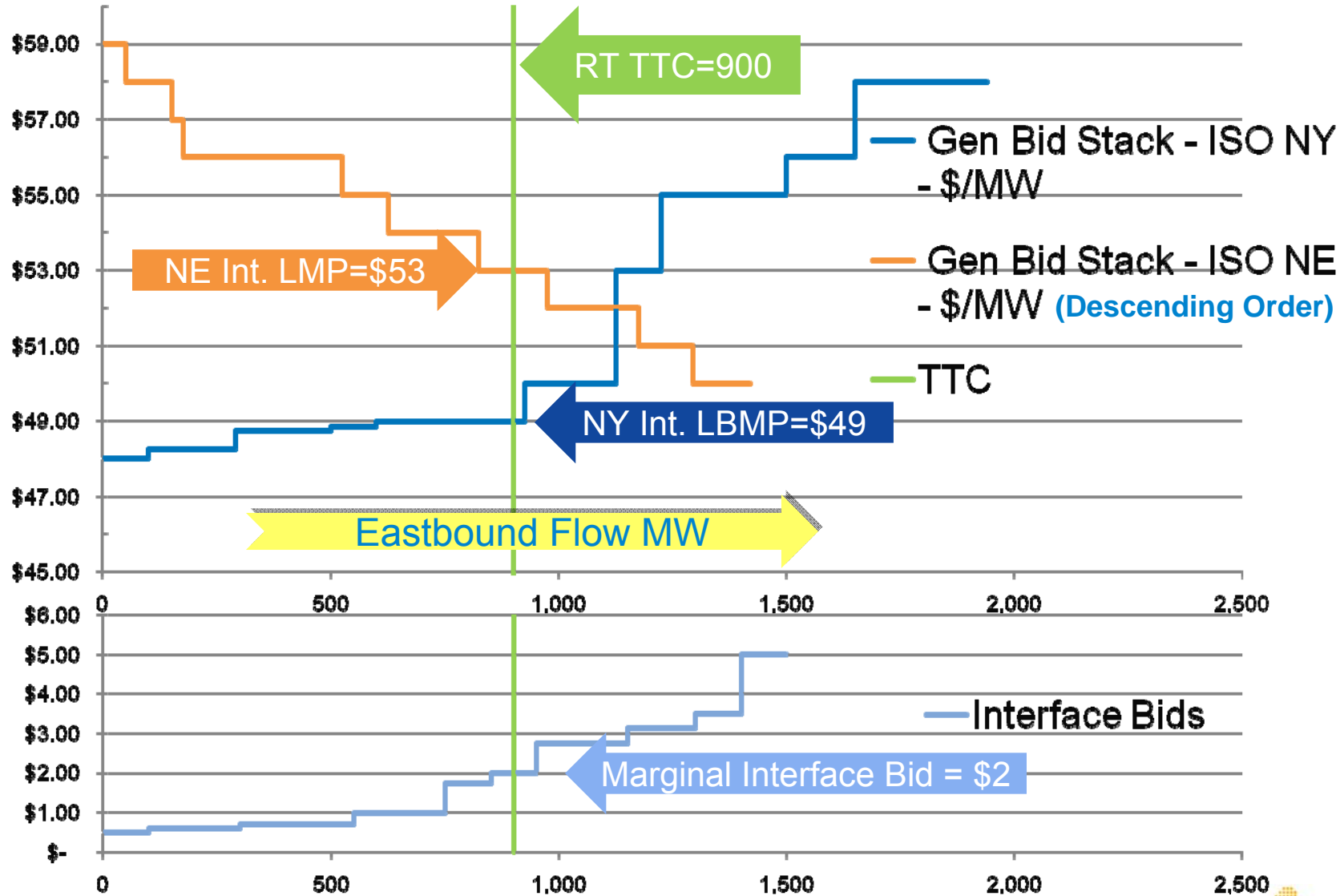
Gen ID NE	Gen MW NE	Gen \$/MW NE
111	50	\$59.00
222	100	\$58.00
333	25	\$57.00
444	350	\$56.00
555	100	\$55.00
666	200	\$54.00
777	150	\$53.00
888	200	\$52.00
944	120	\$51.00
999	125	\$50.00

**RT TTC = 900**

**MW**

*Draft for discussion purposes only*

# RT Example – CTS – Congestion



# RT Congestion Example 3 – CTS

Gen ID NY	Gen MW NY	Gen \$/MW NY
123	100	\$48.00
234	190	\$48.25
345	210	\$48.75
456	100	\$48.85
567	325	<b>\$49.00</b>
678	200	\$50.00
789	100	\$53.00
890	275	\$55.00
901	150	\$56.00
912	290	\$58.00

Int ID	Int MW NY>NE	Int \$/MW
AAA	100	\$0.50
BBB	200	\$0.60
CCC	250	\$0.70
DDD	200	\$1.00
EEE	100	\$1.75
FFF	100	<b>\$2.00</b>
GGG	200	\$2.75
HHH	150	\$3.15
III	100	\$3.50
JJJ	100	\$5.00

Gen ID NE	Gen MW NE	Gen \$/MW NE
111	50	\$59.00
222	100	\$58.00
333	25	\$57.00
444	350	\$56.00
555	100	\$55.00
666	200	\$54.00
777	150	<b>\$53.00</b>
888	200	\$52.00
944	120	\$51.00
999	125	\$50.00

**NY Internal LBMP = \$49**  
**NY External LBMP =**

**TTC = 900**

**NE Internal LMP = \$53**  
**NE External LMP =**

\$50



Partially Cleared

*Draft for discussion purposes only*

\$52



59

### Example 3: How are congestion prices set?

- **“True” RT congestion cost is \$4 / MWh**
- **Interface Bids that was Marginal = \$2 / MWh**
- **Under CTS, \$2 times the RT cleared MW needs to be “set aside” to pay the cleared Interface Bids**
- **Means: Only \$2 in total remains for RT congestion (“true” RT congestion cost, less interface bid pmts)**
- **Each ISO sets its RT congestion price = \$1 / MWh**
- **External LMP = Energy LMP + Congestion, as always.**

## RT Congestion **Example 3** – The #s, again

- **This example:**
  - Internal NE RT LMP = **\$53** / MWh (*marginal resource*)
  - Internal NY RT LMP = **\$49** / MWh (*marginal resource*)
  - “True” RT congestion cost = **\$ 4** / MWh at interface
- **But: We must “set aside” \$2 to pay Interface Bids**
  - **Leaves: \$2** total congestion charge, with ½ by each ISO
- **Congestion component** of RT LMP at external nodes:
  - NY RT Congest Price = **\$ 1**, External NY RT LMP = **\$50**
  - NE RT Congest Price = **\$-1**, External NE RT LMP = **\$52**

## Example 3: Settle a Participant

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- **Let's continue to follow Participant G's** settlement between markets into RT
- **Recall:** "G" cleared 100 MW both DAMs, NY → NE
- **G must clear a matching Interface Bid** to avoid RT balancing charges
- **If G submitted the IB identified as AAA (cleared):** 100 MW NY RT export position & NE RT import pos'n
- **No deviations in position** between DA and RT, so "G" has **\$0 net charges** in either ISO's RT settlements.

## But Wait... Settle a Participant, Part II

- **What if G did not submit an IB**, or submitted IB identified as JJJ (which did not clear)?
- **If G did not clear an IB**, then it would have RT export MW of 0 in NY and import MW of 0 in NE
- **The NY 0 creates a RT deviation of +100 MW**, credited at the NY RT price of **\$50 = \$5000**
- **The NE 0 creates a RT deviation of -100 MW**, debited at the NE RT price of **\$52 = (\$5200)**
- **Participant “G” net RT charges are (\$200).**

## CTS – Key Observations

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- RT congestion prices with Interface Bids are **not simple, nor transparent.**
- CTS RT congestion prices **do not reflect “true” economic cost of congestion** at external interface
  - Congestion prices are ‘distorted’ by interface bids
- If DA markets predict RT prices (on avg), then **TCC/FTR** holders will tend to receive **less congestion revenue under CTS** than under Tie Optimization
  - Expected profit of IB’s tends to reduce congestion revenue





# Cross Border Fee Impacts

## Cross-Border Transaction Fees

- **Proposal to eliminate fees** allocated to external transactions at Roseton/Sandy Pond and 1385 nodes
- **Why?** Reciprocal elimination of charges will lower barriers to economically efficient interchange
- **Applies** to both Tie Optimization (TO) and Coordinated Transaction Scheduling (CTS) proposals

## A Road Map

- **Next slides detail:**
  - **ISO-NE** fees and charges impacted
  - **NYISO** fees and charges impacted
  - **Rationale** for eliminating allocation of these fees and charges to NY/NE external transactions

## What ISO-NE Fees are Affected?

### **Four Main Elements:**

#### **1. DA NCPC** at NY/NE interfaces (Roseton & 1385 nodes)

- *Includes 'in lieu of congestion' credits/debits at these nodes*

#### **2. RT NCPC** at NY/NE interfaces (Roseton & 1385 nodes)

#### **3. ISO Self-Funding Tariff Fees** (Roseton & 1385 nodes)

#### **4. Two Ancillary Services Costs** (Roseton & 1385 nodes)

## About ISO-NE Fees and Charges

- **Allocation:** Each of these fees/charges are allocated to (slightly) different ‘pools’ of market participants
- **Next slides** indicate for ISO-NE:
  - Applicable participant ‘pool’ for each affected fee or charge
  - 2010 dollar amounts for (1) the two NY/NE external nodes; and (2) the total pool (ISO-NE), if applicable
- **If eliminated at NY/NE nodes:** Most affected fees & charges fall to remaining ‘pool’ of participants under current cost allocation rules.

# ISO-NE Cross Border Fees

## 1. DA Net Commitment Period Compensation

- *Two types:*

### 1.A. “Economic” DA NCPC (Pool-wide)

- Covers unrecovered startup, no-load, costs of suppliers in DAM
- Presently allocated to total DA load obligations
- “Economic” NCPC is small DA in NE (most incurred in RT)
- **2010 total DA “Economic” NCPC charges allocated to:**
  - All nodes and Participants pool-wide: <\$5.7 M
  - ETs at NY/NE interface (Roseton & 1385 nodes) : <\$200K

## ISO-NE Cross Border Fees – *continued*

*DA NCPC, Second Type:*

### **1.B. “Non-Economic” DA NCPC (External nodes only)**

- Arises from the way the external transactions clear in the *absence of a congestion component* in ISO-NE’s external node LMP.
- “Non-Economic” DA NCPC is charged and credited to ET and VT at these nodes only, **not market participants generally**
- **DA congestion pricing** at the NY/NE external nodes **will replace** this category of NCPC.
- 2010 total “Non-Economic” DA NCPC allocated to:
  - ETs at all ISO-NE external nodes: **\$4.6 M**
  - ETs at NY/NE interface (Roseton & 1385 nodes only) : **\$3.5 M**



## ISO-NE Cross Border Fees – continued

### 2. RT “Economic” NCPC

- **RT NCPC** arises because of unrecovered startup, no-load, and other (e.g. canceled start) costs of suppliers
- Presently allocated to total RT **deviations** from DA cleared MW positions (primarily load; but also VT, uninstr gen dev, etc)
- **2010 total RT NCPC charges** allocated to:
  - All nodes and participants pool-wide: **\$74 M**
  - ETs at NY/NE (Roseton & 1385 nodes): **\$6.5 M\***

*\* Value is overestimated. Netting and “other elements” forgiveness not accounted for.*



## ISO-NE Cross Border Fees – *continued*

### 3. ISO Self-Funding Tariff Fees

- Fund ISO operations
- Presently allocated (primarily) to load (Sch. 1), exports (Sch. 1 & 3), and energy mkt transactions (Sch. 2)
- **2010 total charges** allocated to:
  - All participants & nodes pool-wide: **\$146.5M**
  - ETs at NE/NY (Roseton & 1385 nodes): **\$4.8M (3.3% of total)**

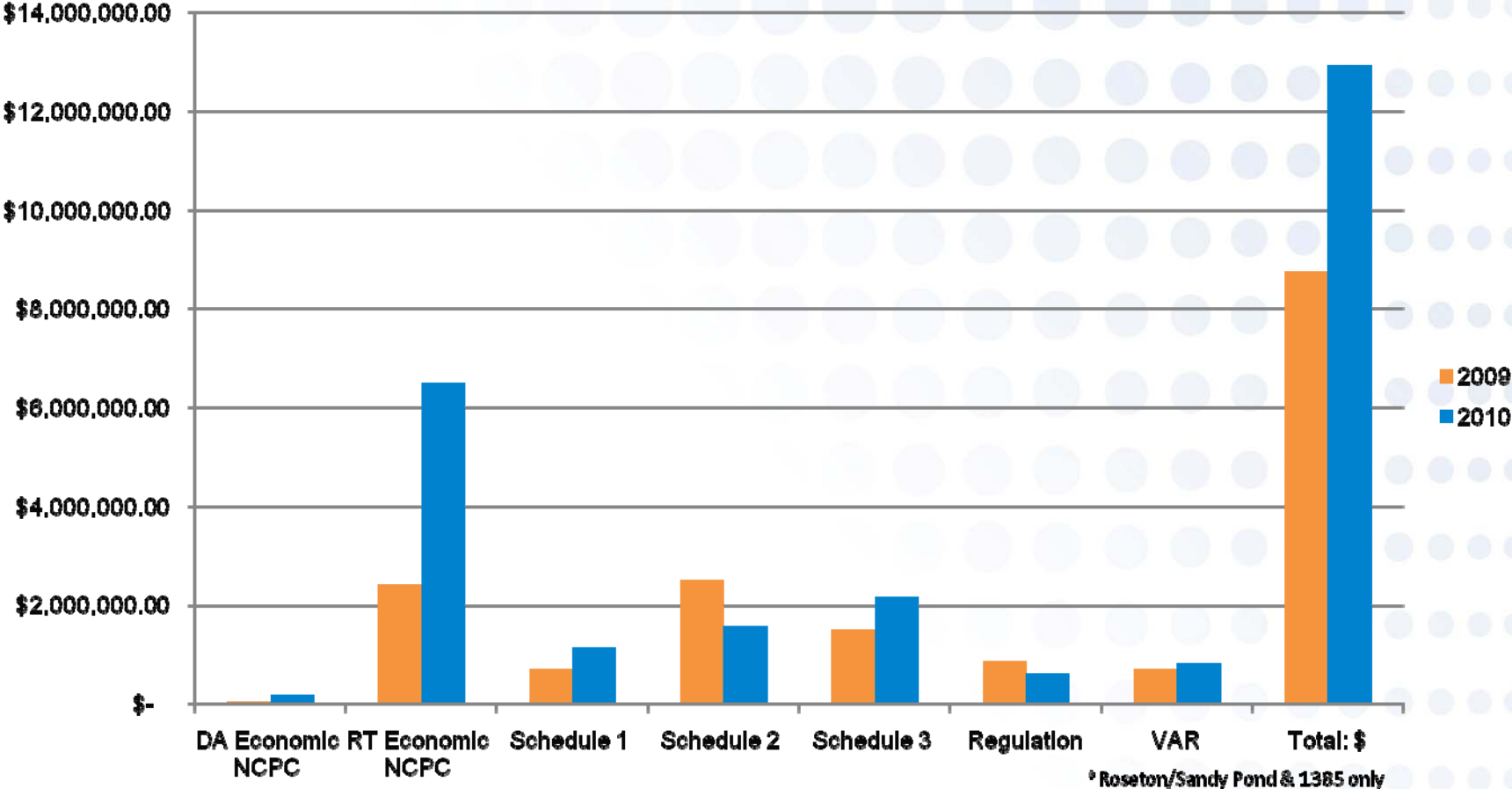
## ISO-NE Cross Border Fees – *continued*

### 4. **A/S Costs Allocated to External Transactions**

- **Exports** are allocated a portion of two pool-wide A/S costs:
  - Regulation service
  - VAR costs
- **Combined 2010 charges** (Reg + VAR) allocated to:
  - All participants & nodes pool-wide: **\$42.2 M**
  - ETs at NE/NY (Roseton & 1385 nodes): **\$1.4M (3% of total)**
  - Breakdown by type shown in tables/graph slides (below)

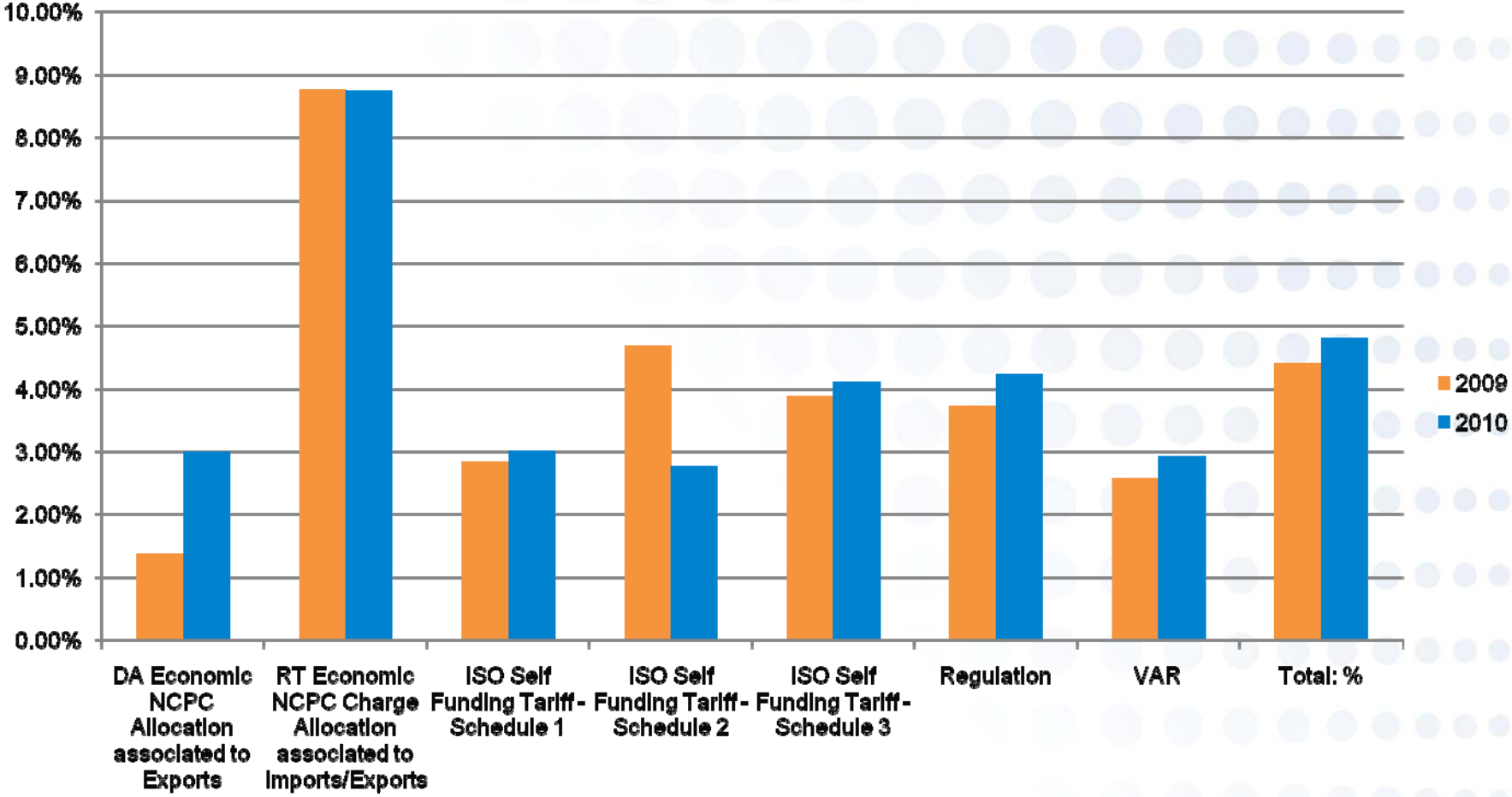
# Historic ISO-NE Cross Border Fees – Total \$

**ISO-NE Cross Border Charges at NY-NE Interface:\***  
**Total Annual \$**



# ISO-NE Cross Border Fees in Proportion

**% of ISO-NE Fees Allocated to NY-NE Transactions**



## ISO-NE: RT NCPC Impact in \$/MWh

### Interpretation

- Largest ISO-NE affected fee/charge is RT NCPC
- **If eliminated at NY/NE Interfaces (Roseton & 1385):**

What would be the impact on a  
“\$ per MWh of RT Deviation” basis?

- 2010:     **\$2.10** → **\$2.30**; overall a \$0.201 increase
- 2009:     **\$0.71** → **\$0.77**; overall a \$0.068 increase

## NYISO Cross Border Fees

- Bid Production Cost Guarantees (BPCG)
  - Generators and Importers are guaranteed to receive Bid Costs over the Service Day
  - Comparable to ISO-NE “economic” NCPC
  - 2010: \$1.2 M (Roseton/Sandy Pond & 1385 only)
- Margin Assurance Payments
  - Protection to suppliers for ISO instructed real-time deviations from day-ahead position
  - 2010: \$530 K (Roseton/Sandy Pond & 1385 only)

## NYISO Cross Border Fees -continued

- Operating Reserves
  - Availability payment to suppliers to maintain capacity available for conversion to energy
  - 2010: \$786 K (Roseton/Sandy Pond & 1385 only)
- Voltage Support (VSS)
  - Availability payment to suppliers to maintain capability to provide voltage support to grid
  - 2010: \$1.7 M (Roseton/Sandy Pond & 1385 only)



## NYISO Cross Border Fees -continued

- Non-ISO Facilities Charge
  - Operating costs for Ramapo PAR, Station 80 Capacitor Bank
  - 2010: \$77 K (Roseton/Sandy Pond & 1385 only)
- NYISO Cost of Operations:
  - Pay for NYISO annual budget and FERC fees
  - Withdrawals allocated 80% of NYISO cost of operations; includes internal load, exports, wheels (out)
  - Injections allocated 20% of NYISO cost of operations; includes internal generation, imports, wheels (in)
  - 2010: \$3.8 M (Roseton/Sandy Pond & 1385 only)

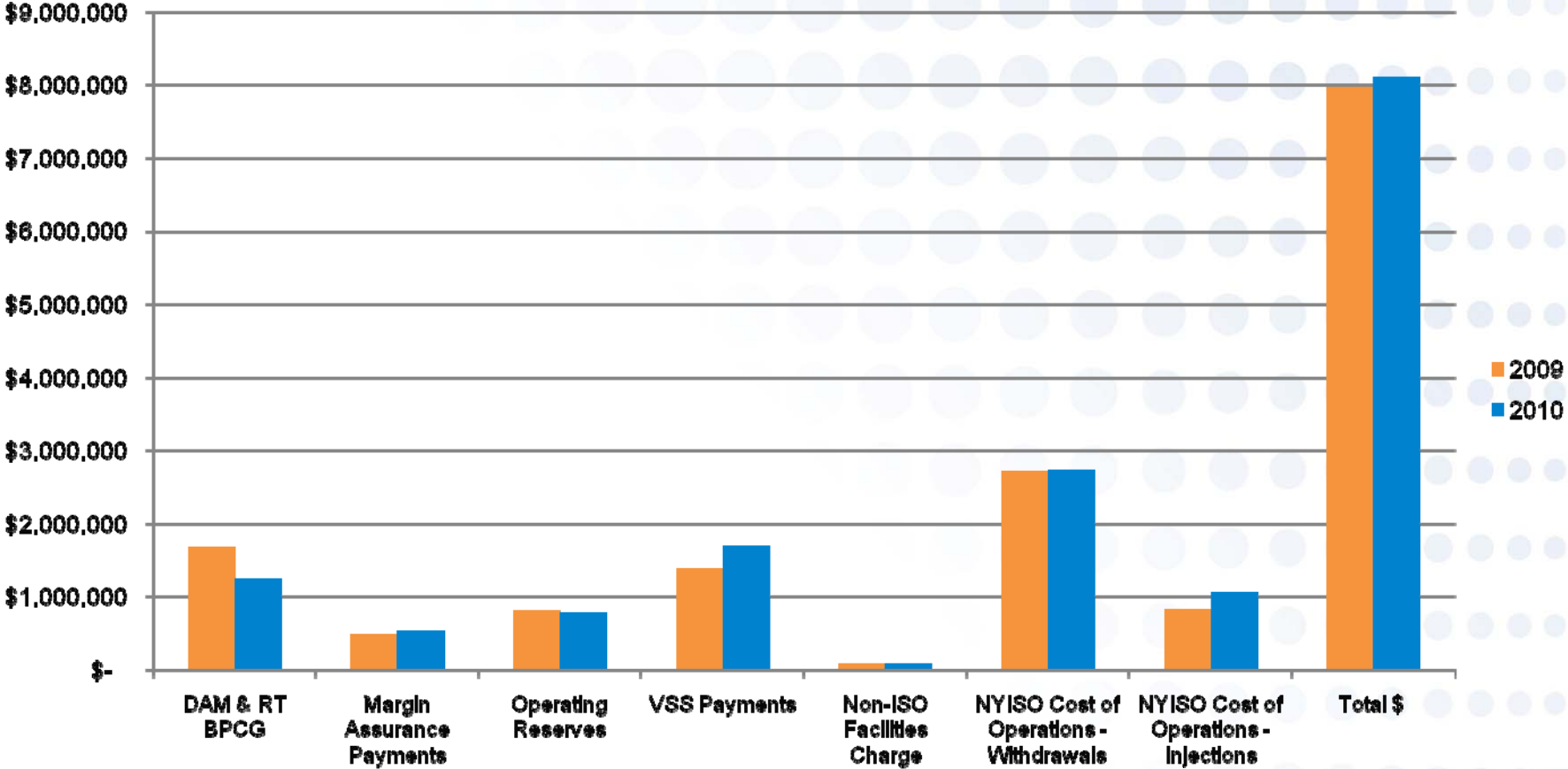


## How are NY Cross-Border Fees Allocated?

- Pro-rata share of MWh: internal load, exports, wheels
  - BPCG, Margin Assurance
- Pro-rata share of MWh: internal load, exports
  - Operating Reserves
- Fixed annual rates:
  - VSS –internal load, exports, wheels
  - Non-NYISO Facility Charges –internal load, exports, wheels
  - NYISO cost of operations
    - internal load, exports, wheels (out): 80%
    - internal generation, imports, wheels (in): 20%

# Historic NYISO Cross Border Fees – Total \$

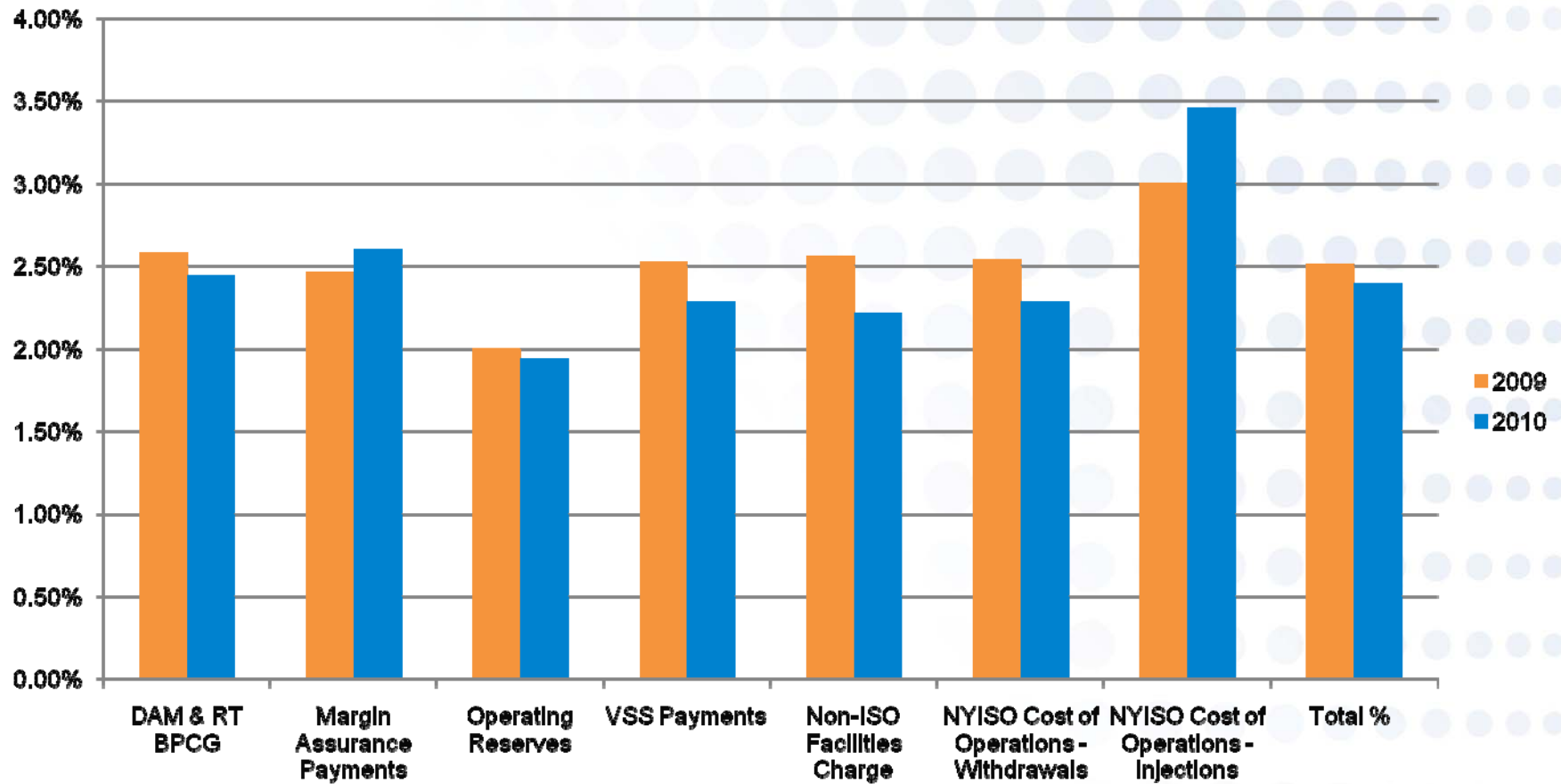
**NYISO Cross Border Charges at NY-NE Interface:\***  
**Total Annual \$**



\*Roseton/Sandy Pond & 1385 only

# NYISO Cross Border Fees in Proportion \*

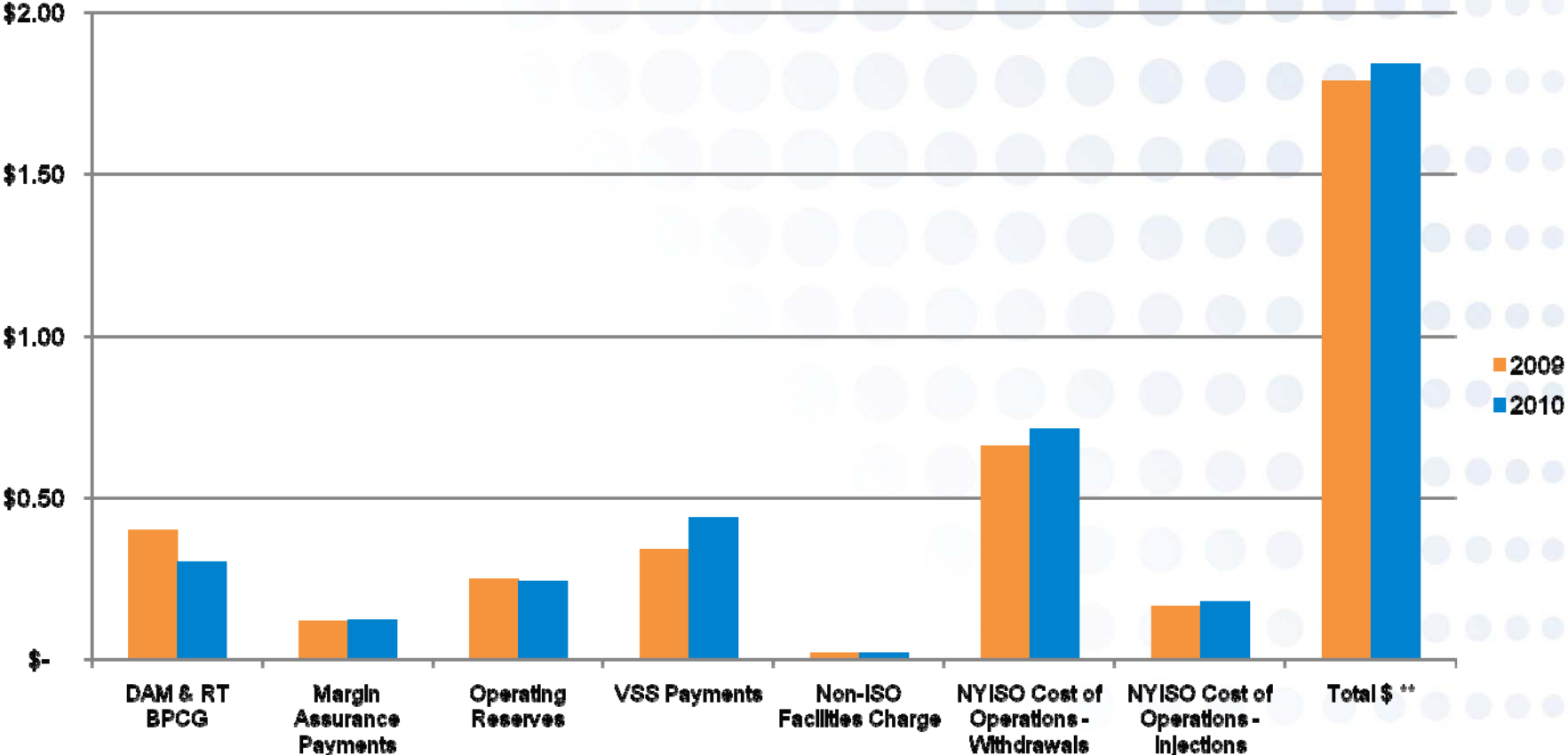
## % of NYISO Fees Allocated to NY-NE Transactions



\*Roseton/Sandy Pond & 1385 only

# Historic NYISO Cross Border Fees –\$/MWh\*\*

**NYISO Cross Border Charges at NY-NE Interface:\***  
\$/MWh



\* Roseton/Sandy Pond & 1385 only

\*\* Does not include NYISO Cost of Operations -Injections

## How Much Could Fees be Expected to Increase?

- For NYISO fees
- \$/MWh total adjusted for elimination at NY-NE border
  - 2010: \$1.84 → \$1.88; overall a \$0.042 increase
  - 2009: \$1.79 → \$1.83; overall a \$0.045 increase

## Bottom Line: Interpretation

- **Total affected fees and (net) charges** on external transactions were approximately:
  - **\$8M** (2009, 2010) in **New York**
  - **\$8M** (2009), **\$12M** (2010) in **NE** (*excl. 'in lieu of congestion'*)
  - Under current rules, this would instead be allocated to other participants (in large part, but not entirely, to loads)
- **Re-allocation** would reduce the individual benefits of IRIS to some participants (by the costs reallocated)
- For loads: Potomac Economics estimate of near-term annual benefit under IRIS is **\$100M+**

## Why Eliminate Fees at Border?

- Reciprocal fee elimination
  - Removal of offsetting charges
  - Removal of fee impacts from LBMPs
- Fee elimination is a continuation of efforts originally pursued with the removal of transaction wheeling charges in 2004.

## Why Eliminate Fees at Border?

- Markets are more efficient when prices converge
  - Fees result in a price spread between markets to cover the expected allocation
  - Market will operate to a higher total production cost and under utilize the transmission system
  - Uplift allocations can be highly variable, resulting in significant trading risk and greater price divergences (more likely at times when significant interface scheduling is desired)





# Capacity Imports under IRIS

## Capacity Imports under IRIS

- IRIS fundamentally changes how energy transfers between the NY and NE areas are determined.
  - The real time external transaction functionality in place today is eliminated under TO and replaced with an alternative economic construct under CTS.
- This necessitates corresponding changes to the existing capacity import rules to complement TO and CTS.
- Goal of capacity-related changes is to maintain both ISO and Participant requirements for managing capacity imports.

# Capacity Imports Impacts

- ISOs Operational Requirements
  - External transactions are the mechanism that the ISOs use to access energy from external capacity.
- Market Participant Capacity Requirements
  - External transactions are the mechanism that participants use to meet the requirements to offer and deliver energy from capacity imports. Requirements vary by market.
  - The status of a Real Time external transaction is an input into capacity market penalty assessment.

# ISO Operational Requirements

- Today, during capacity deficient conditions, each ISO can gain access to energy backed by import capacity through real-time external transactions
  - In ISO-NE, can request import transactions backed by Import Capacity Resources
  - In NYISO, can request market participants to make capacity available and offer import transactions into the real-time market.

# ISO Operational Requirements

- ISOs must continue to have real-time visibility and access to external capacity under IRIS.
- Mechanism attributes include:
  - ISO access to summary and status of external capacity resources
  - Ability to ensure delivery of external capacity when necessary to ensure reliability.

# Market Participant Capacity Requirements

- Today, a Market Participant with an import capacity obligation must submit both DA and RT ETs into ‘sink’ market and schedule energy when requested.
  - In ISO-NE, obligation to offer applies to both DA and RT
  - In NYISO, obligation to offer applies to DA, and when requested for capacity deficiencies in RT

# Market Participant Capacity Requirements

- Under IRIS:
  - Market Participant must continue to offer DA ETs into ‘sink’ market.
  - Market Participant RT obligations must be adjusted to coordinate with scheduling practices, under either IRIS option
- The ISOs are evaluating potential requirement changes in order to meet the capacity market obligations. Details will be discussed in future stakeholder meetings.



# Summary: Design Basis Document





## Summary for Today

# RT Scheduling Under IRIS

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- **Tie Optimization & CTS** use market-based bids to:
  - **Increase** gen in **lower-cost** region in RT, and
  - **Decrease** gen in **higher-cost** region in RT.
- **Tie Optimization does more** of this, CTS does **less**
- Both set RT flows in **economically-efficient direction**
  - **ISOs have the information** needed to optimize **physical power flows**; traders cannot see bid stacks, transm. in RT.

## Congestion and TCC/FTRs

- **Each ISO (separately) issues TCC/FTRs** for paths in their area, including the External Interface, as they do today
- **Each ISO will continue to pay TCC/FTR holders DA** congestion revenue based upon DA clearing prices
- **ISO New England will enable congestion pricing** to occur at the interface under IRIS (not allowed today)
- **RT congestion** accrues in equal measure in each ISO and flows thru according to existing tariff provisions

# Cross-Border Fee Elimination

- **Reciprocal elimination of fees & charges at the external interface** will lower barriers to economically efficient interchange
  - Markets are more efficient when prices converge
- **Applies to both** Tie Optimization (TO) and Coordinated Transaction Scheduling (CTS) proposals

# Capacity Import Conforming Changes

- Due to elimination of Real-Time Transactions (as submitted today), Tie Optimization option will require changes to allow Capacity Imports to continue to meet their RT requirements.
- ISOs will amend and improve, as appropriate, protocols governing information and communication regarding capacity import availability and delivery during (actual or predicted) capacity deficiencies.



**Final Points:**

**Upcoming Joint Schedule and Logistics**

# Stakeholder Review & Discussion

## Next joint stakeholder meetings:

- Understand options in detail, gather feedback, refine into preferred design basis document (DBD) by April-May.
- ISOs need *common DBD* on IRIS due to coordination issue
- **Next Meeting Schedule:**
  - Feb 14 (ISO-NE hosting)
  - March 7 (ISO-NE hosting)
  - March 28 (NYISO hosting)
  - April 28 (NYISO hosting)

# Remaining Presentation Plan

**March 28:** Q&A, follow-up's on additional detail as requested, stakeholder discussion of draft DBD

**April 28:** Q&A, follow-up's on additional detail as requested, stakeholder discussion of draft DBD



## Next Steps: 2011+ Schedule

- **Jan-Apr:** Joint stakeholder meetings
- **Apr-May:** Advisory votes on design options (DBD) *from both NEPOOL and NYISO stakeholders*
- **June-Oct:** Stakeholder tariff & market rule processes (separate but parallel timing)
- **Dec 2011:** Target FERC filings (ISO-NE & NYISO)
- **Spring 2013 (est):** Implementation complete

# Questions?



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