Joint Stakeholder Meeting

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

February 14, 2011 / Springfield, MA

Agenda

Today:

- Welcome and Overview
- CTS Option: RT Bids and Scheduling
- Day-Ahead External Transactions & Linking to RT
- External Interface: Pricing/Settlement
- Latency & Price Separation

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
  - Request written comments by Feb 21st
- **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, 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 (3/28): Q&A, follow-up's on additional detail as requested, discussion of draft DBD structure

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.

Tie Optimization Solution Option:

Concept and Clearing

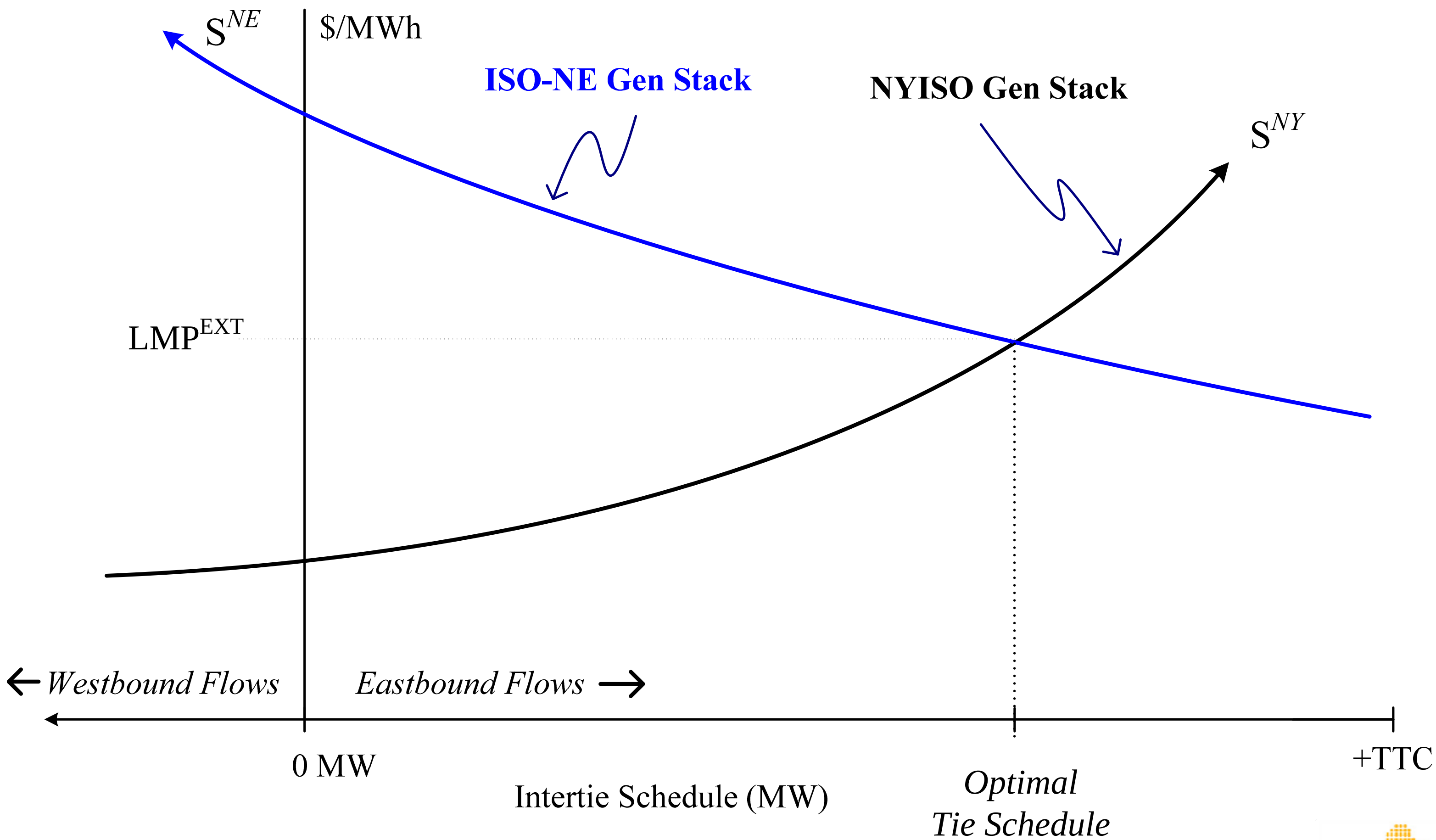
Solution Option A: Tie Optimization

Core concept: ISOs manage transmission ties between regions in same way ISOs manage transmission internally.

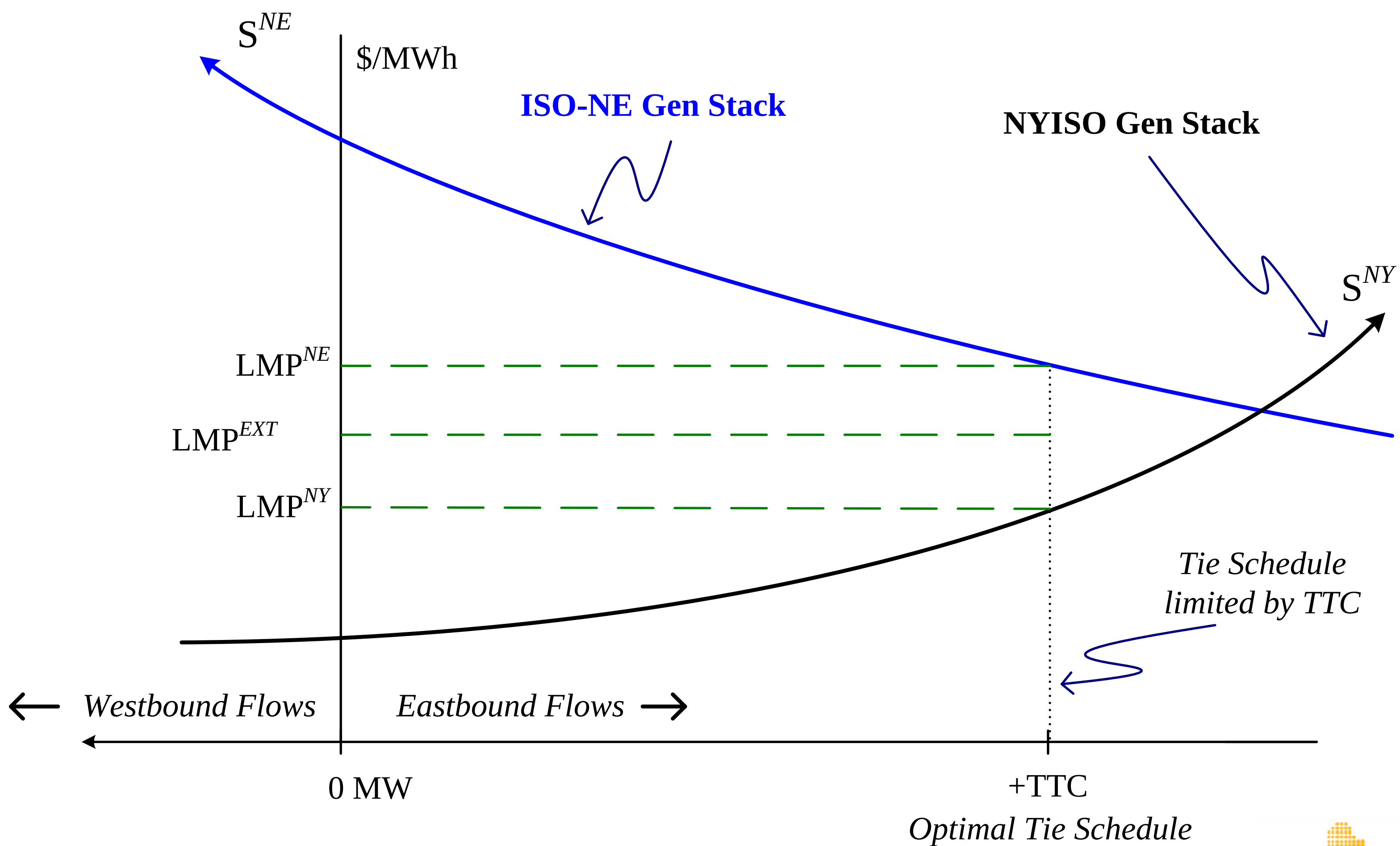
- Effectively, a coordinated dispatch using bid-based supply offers from all dispatchable resources sets real-time tie schedule every 15 min.
- There are no RT external offers (export/import)

- **ISOs would use the same market-based, economic dispatch** logic that underlies competitive energy market design in each ISO.
  - Each ISO currently optimizes all *internal* transmission flows to minimize total bid-based production costs
  - Tie Optimization simply extends process by adding the (7) external ties *between* ISO-NE & NYISO.

Optimal Schedule w/o TTC Limits



Optimal Schedule w/ TTC Limits



CTS Solution Option:

Concept

Solution Option B: Coord. Trans. Scheduling

Core concept: ISOs set interface schedule using offers to buy and sell across the interface in real-time energy market

Two major innovations:

1. A new RT bid format, called an **interface bid**
2. **Coordinated clearing** (scheduling) of RT interface bids

- **Total cleared interface bids** determine the RT interface schedule
- **Both CTS and Tie Opt'n** update the schedule every 15 min.

Interface Bids

An interface bid (IB): An offer to simultaneously buy and sell at each side of the interface.

- A price, quantity (MW), and a direction (where to import/export)
- **Ex:** An interface bid of $3/MWh for 20MW eastbound is:
  - an offer to **buy** at NY-side and **sell** at NE-side of interface
  - if the expected interface LMP difference (always sink – source) is $3/MWh or greater when the offer is cleared.
- Bidders receive RT LMP difference at NY/NE interface.

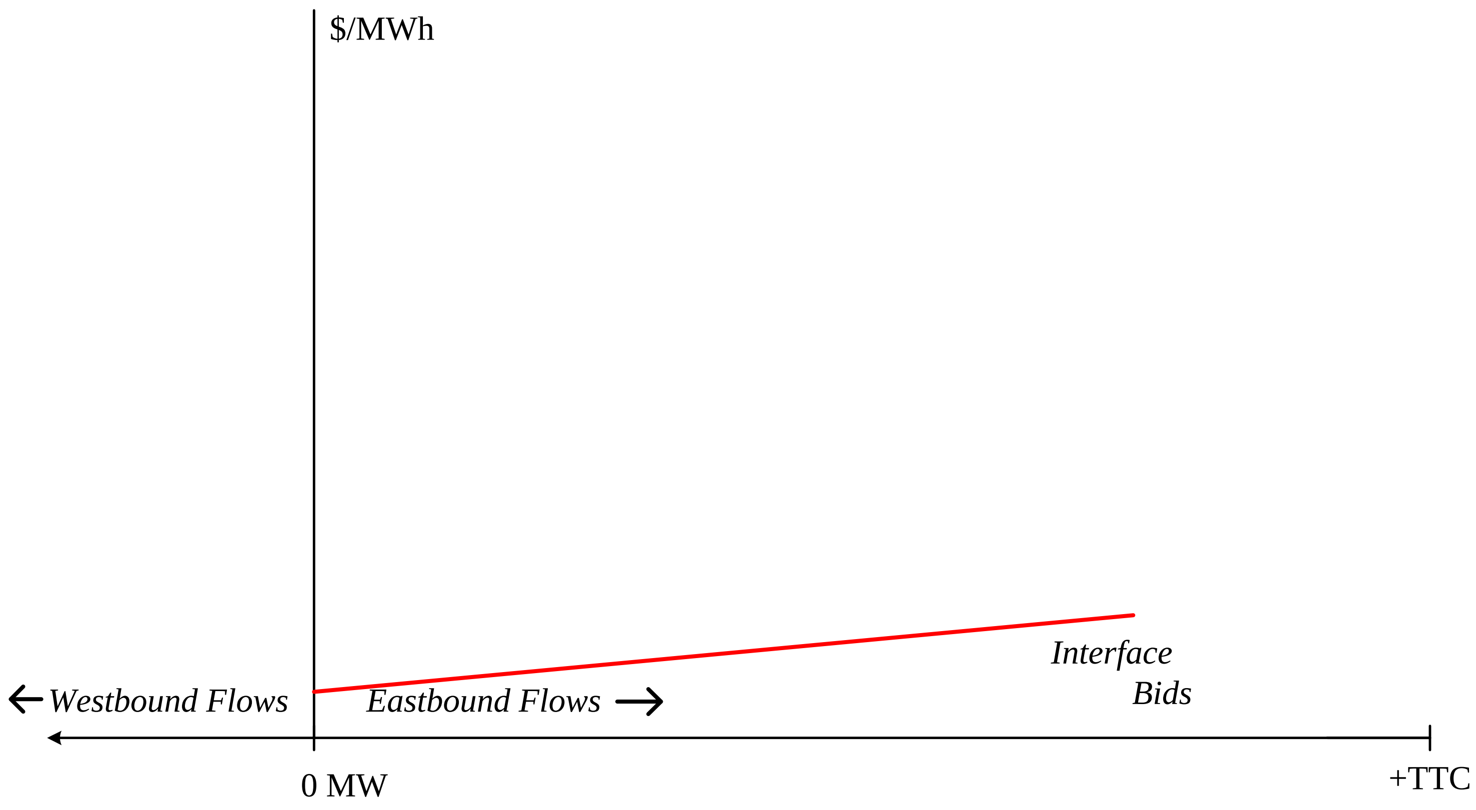
IB Submission & Features

- **Submission to common portal** for both NYISO & ISO-NE
  - *Eliminates today's 'check-out' failures with RT ext. transactions.*
- Can submit **multiple bids** (price-quantity-direction triples)
- Can submit for any **'block' of 15-minute** intervals
  - *Bids clear every 15 min against expected RT LMP difference at interface for the upcoming 15-min interval*
- Can submit new IBs **up to 75 min before an interval starts**

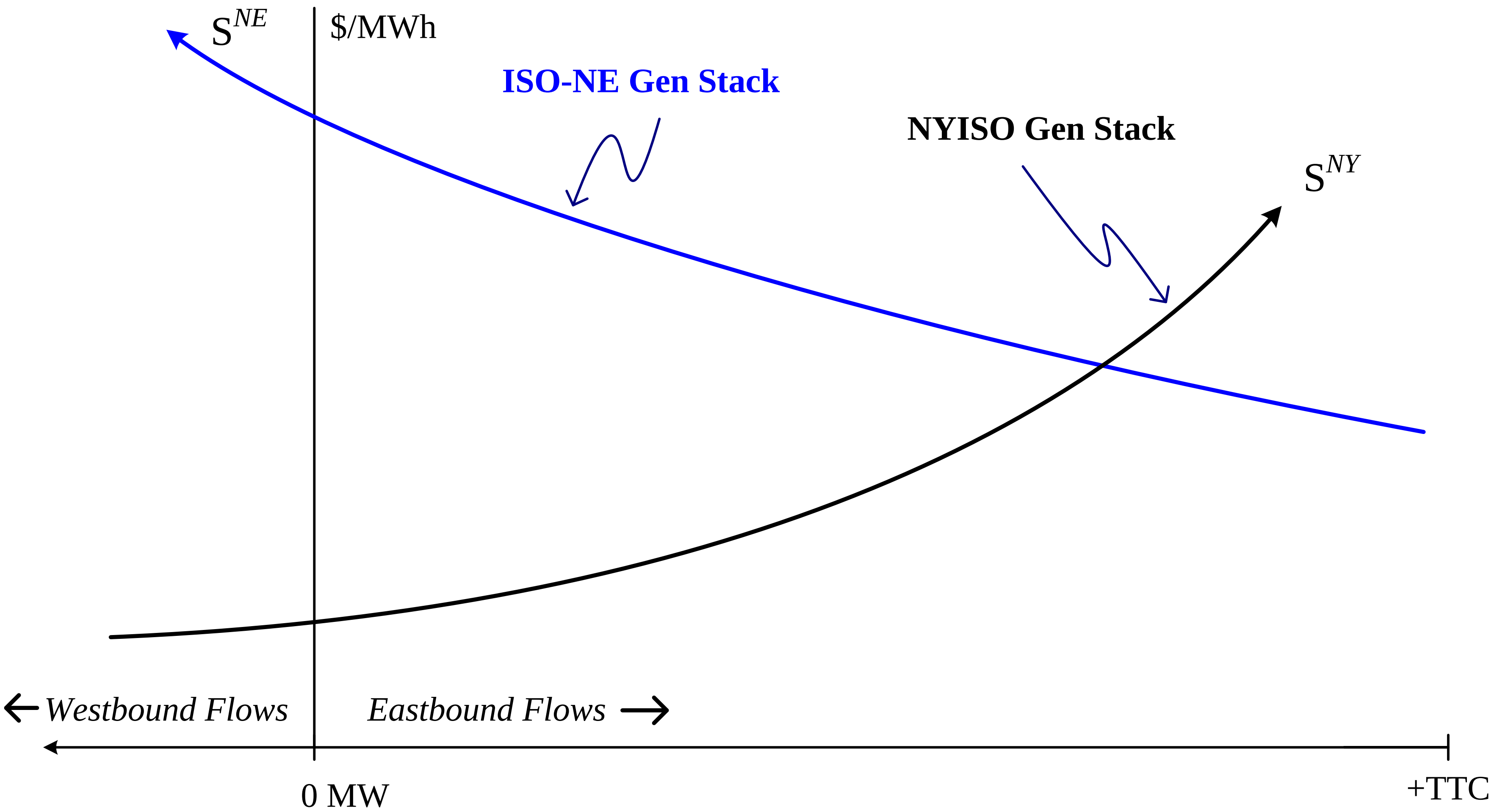
CTS Design Option

Interface Bid Clearing

CTS Scheduling – Interface Bids



CTS Schedule w/o TTC Limits



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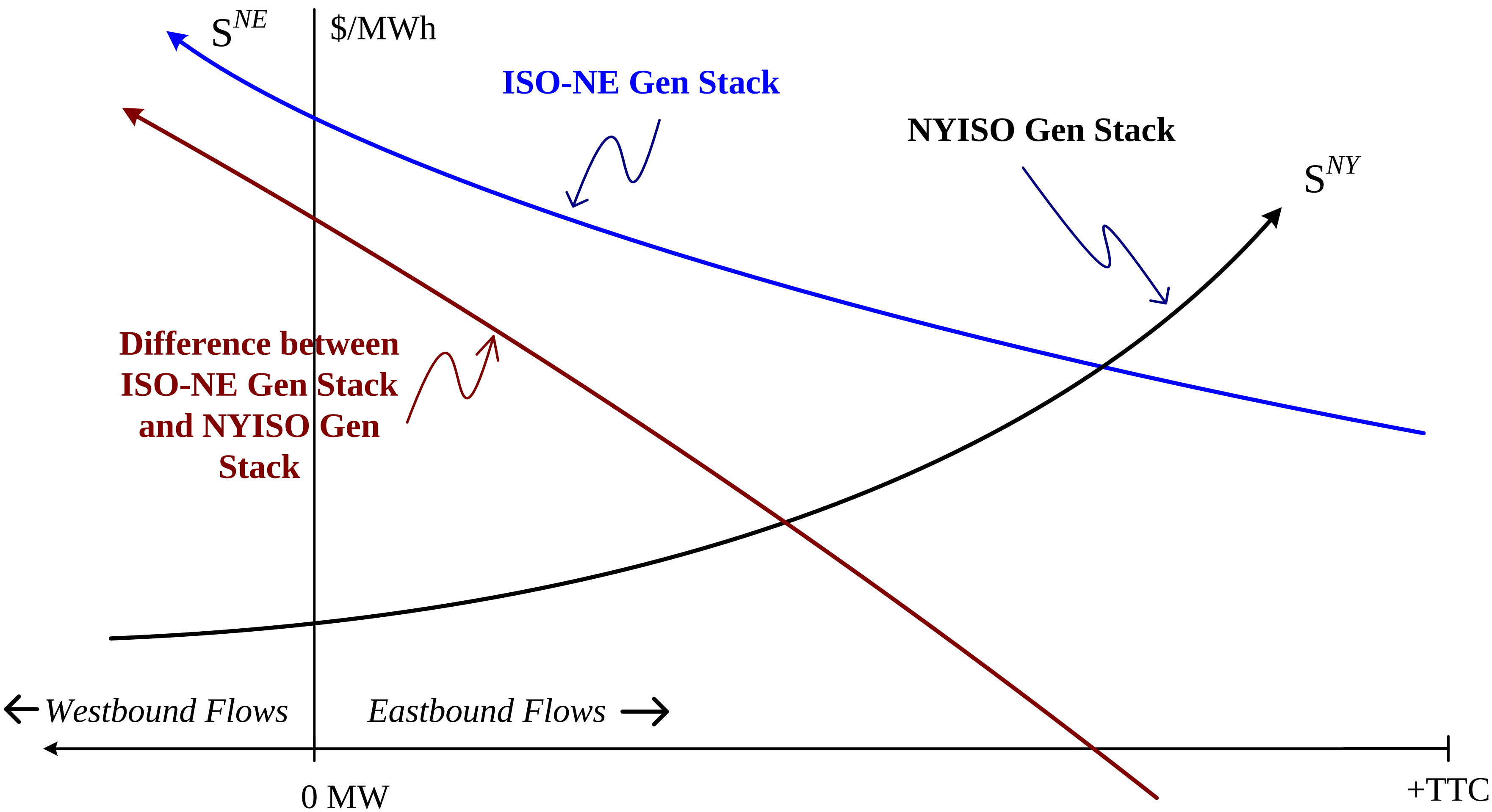

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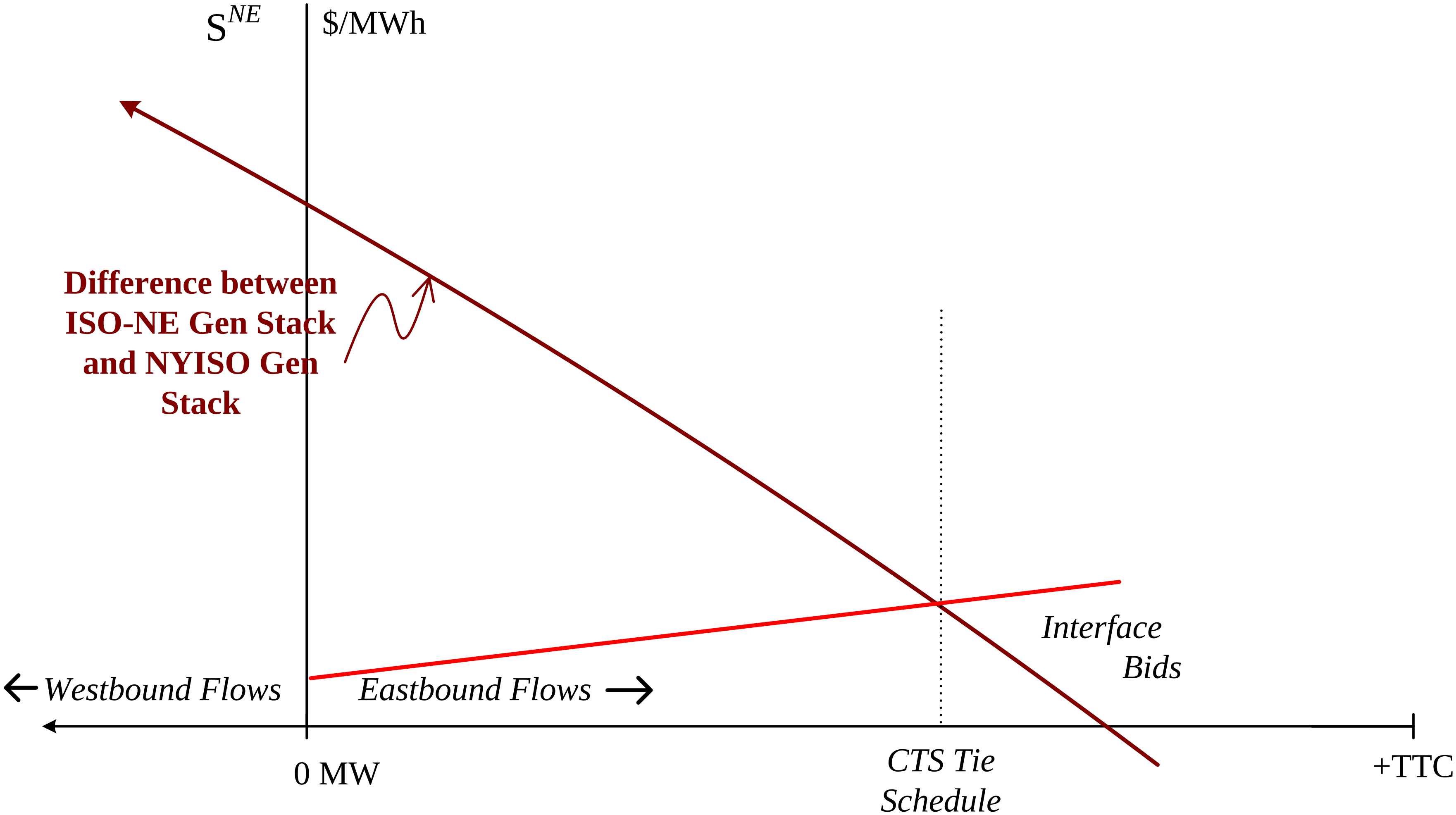

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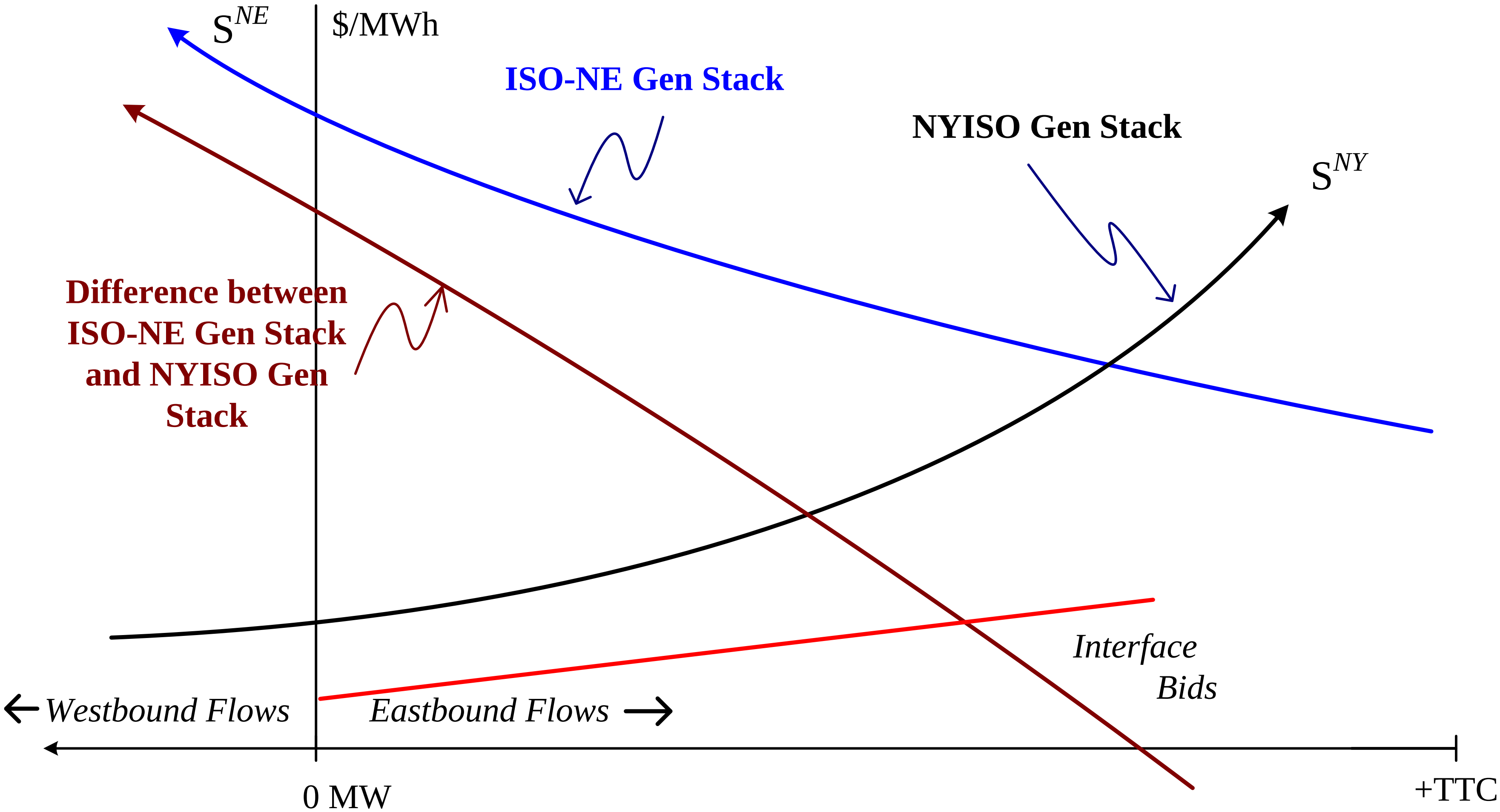

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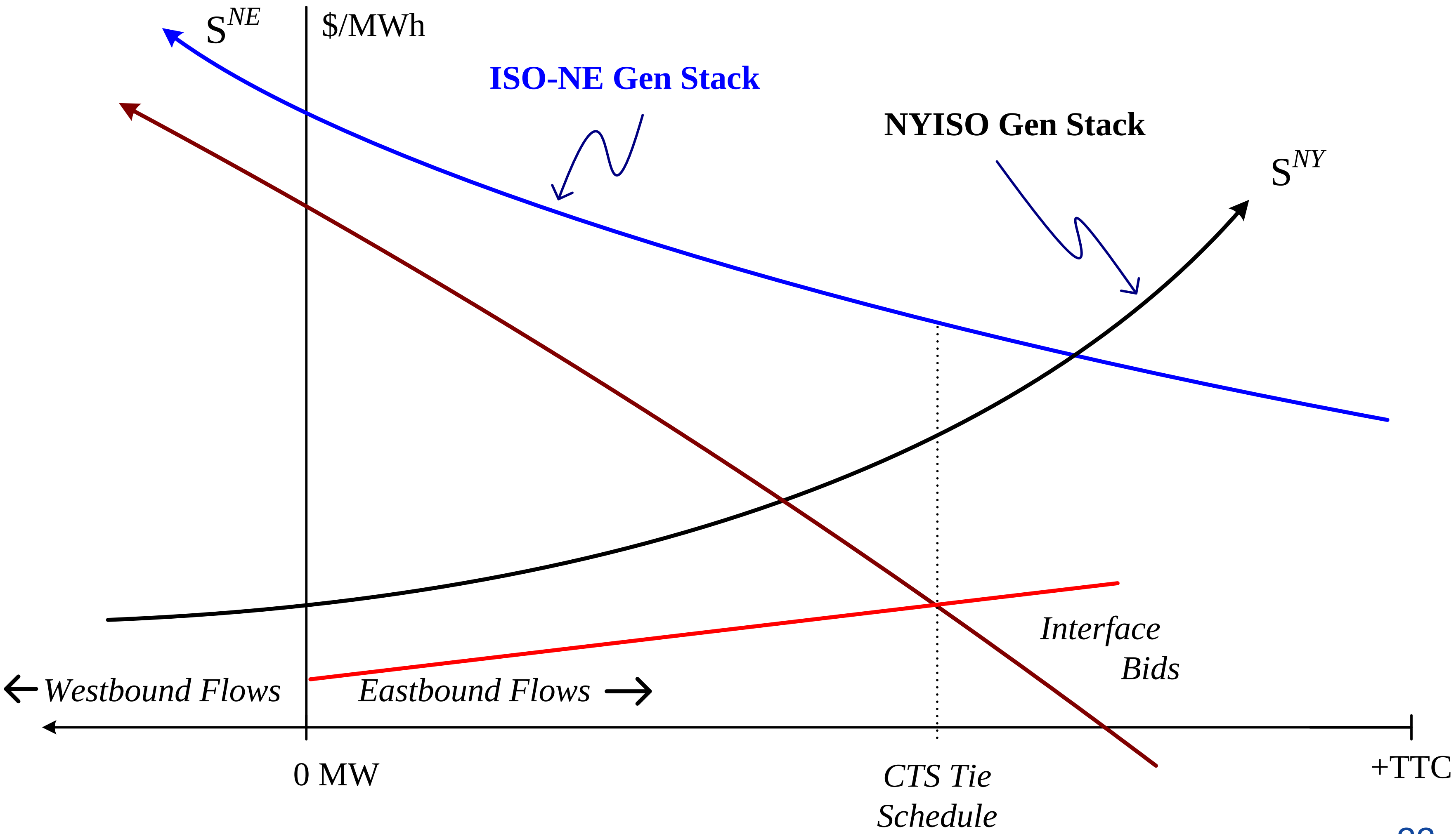
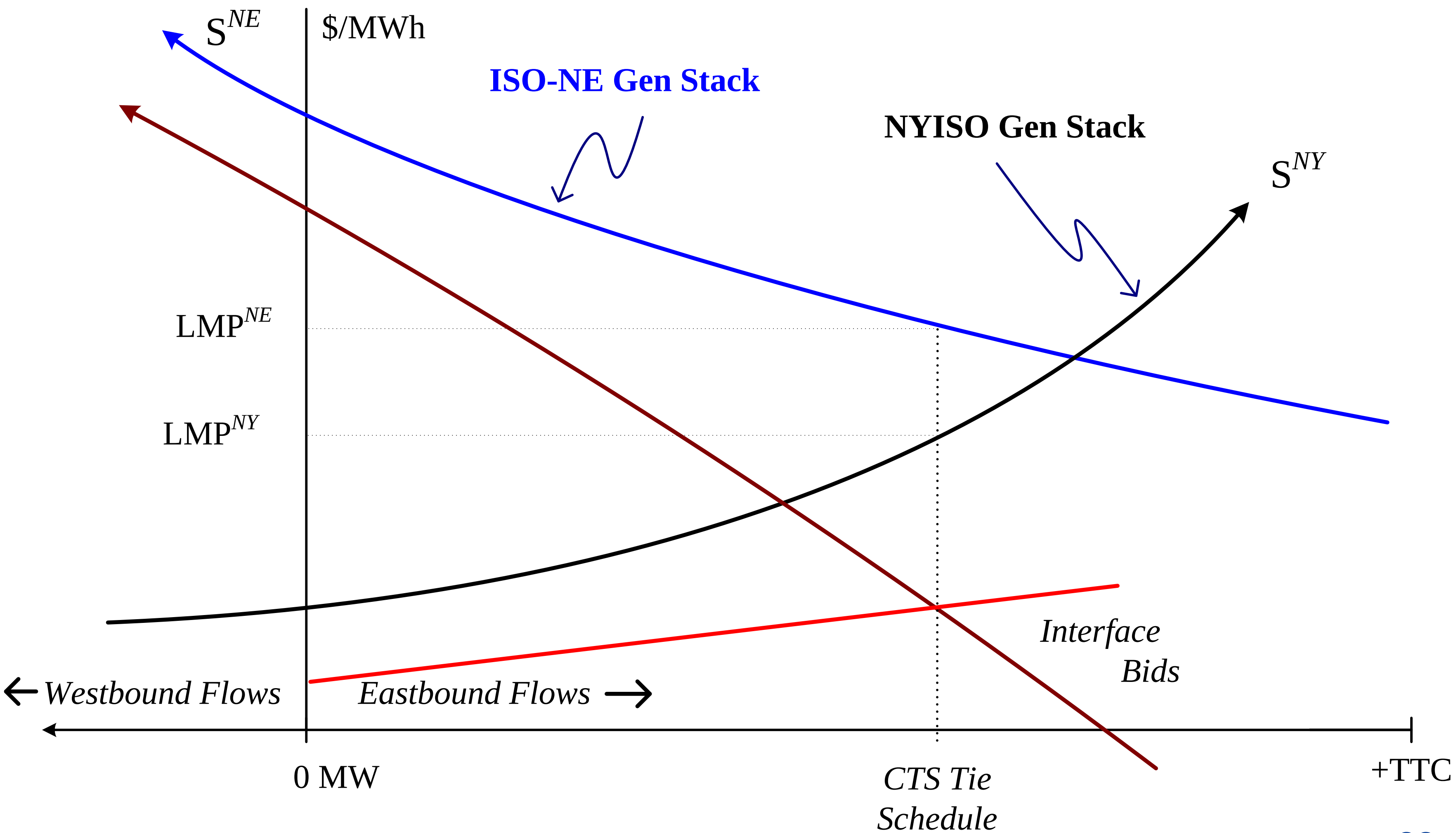
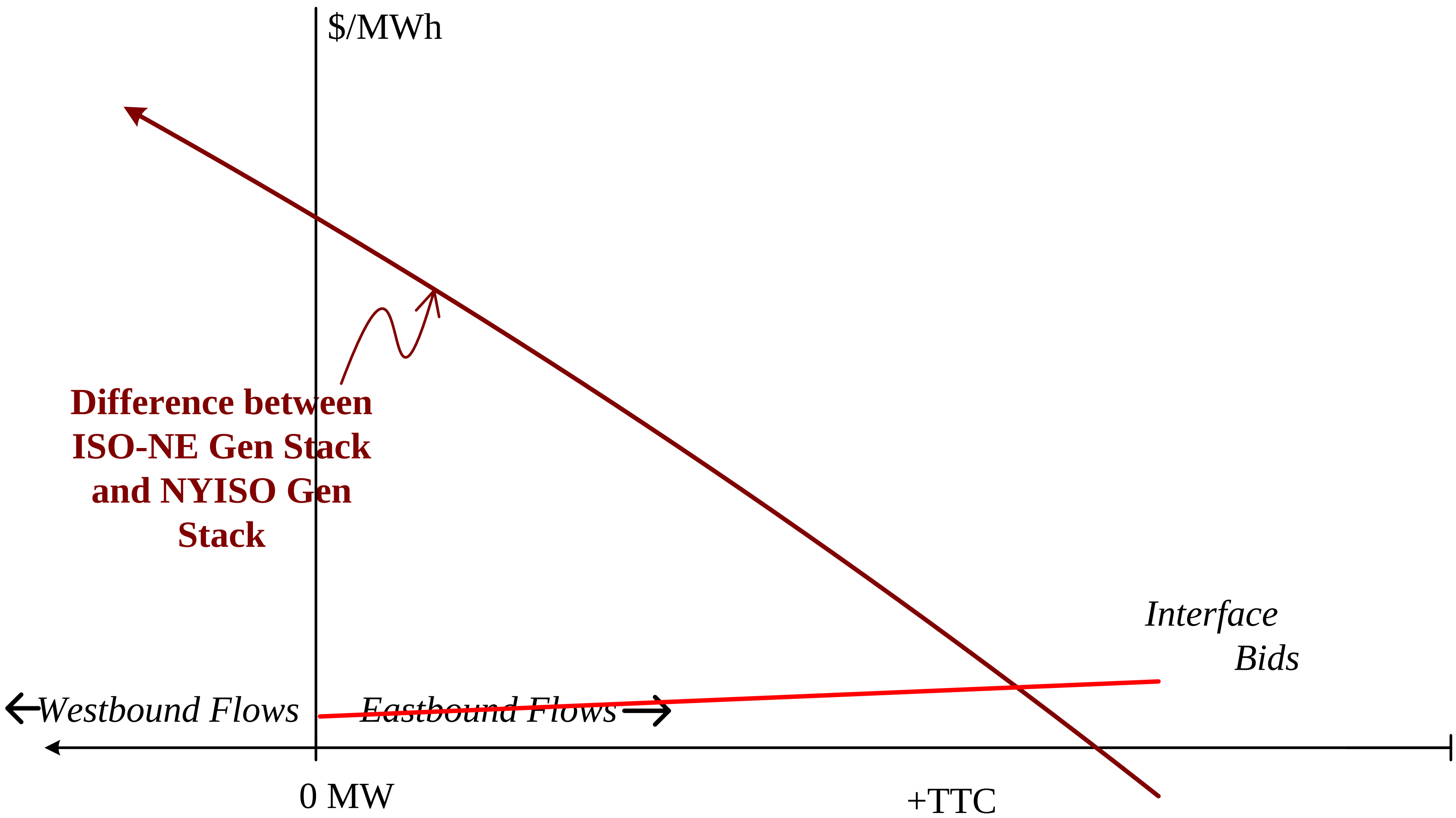


CTS Schedule w/o TTC Limits



CTS Schedule w/ TTC Limits



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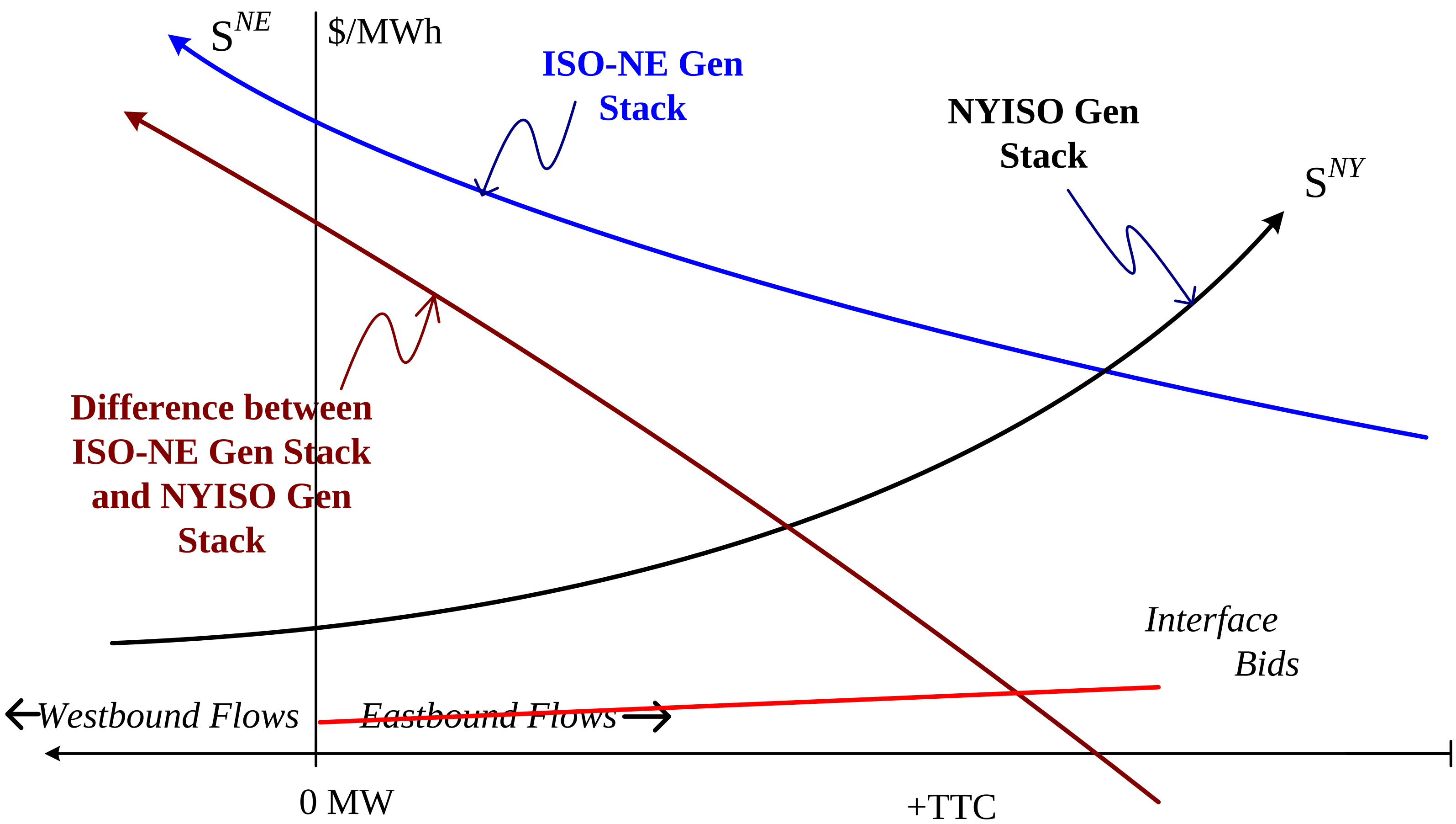

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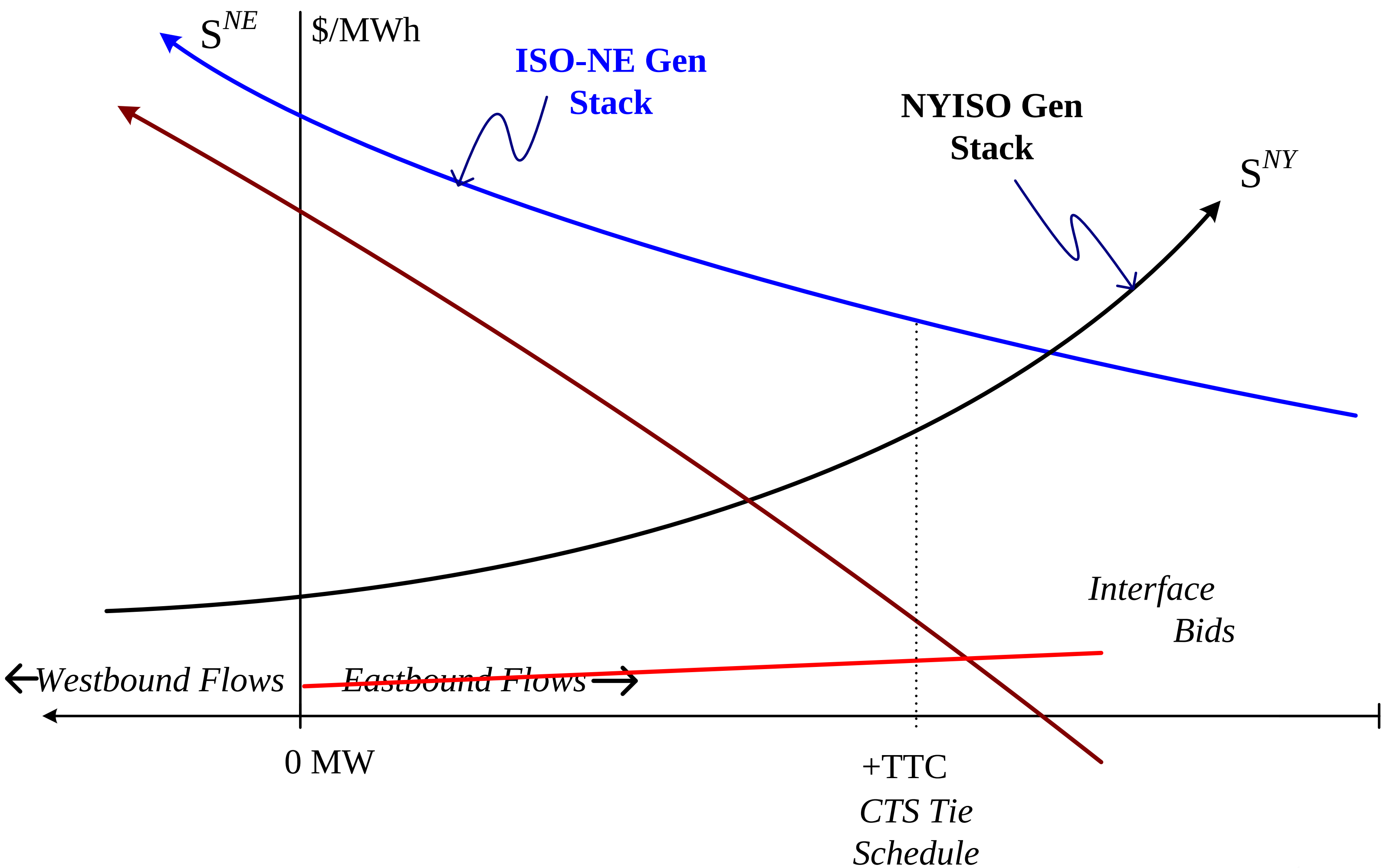

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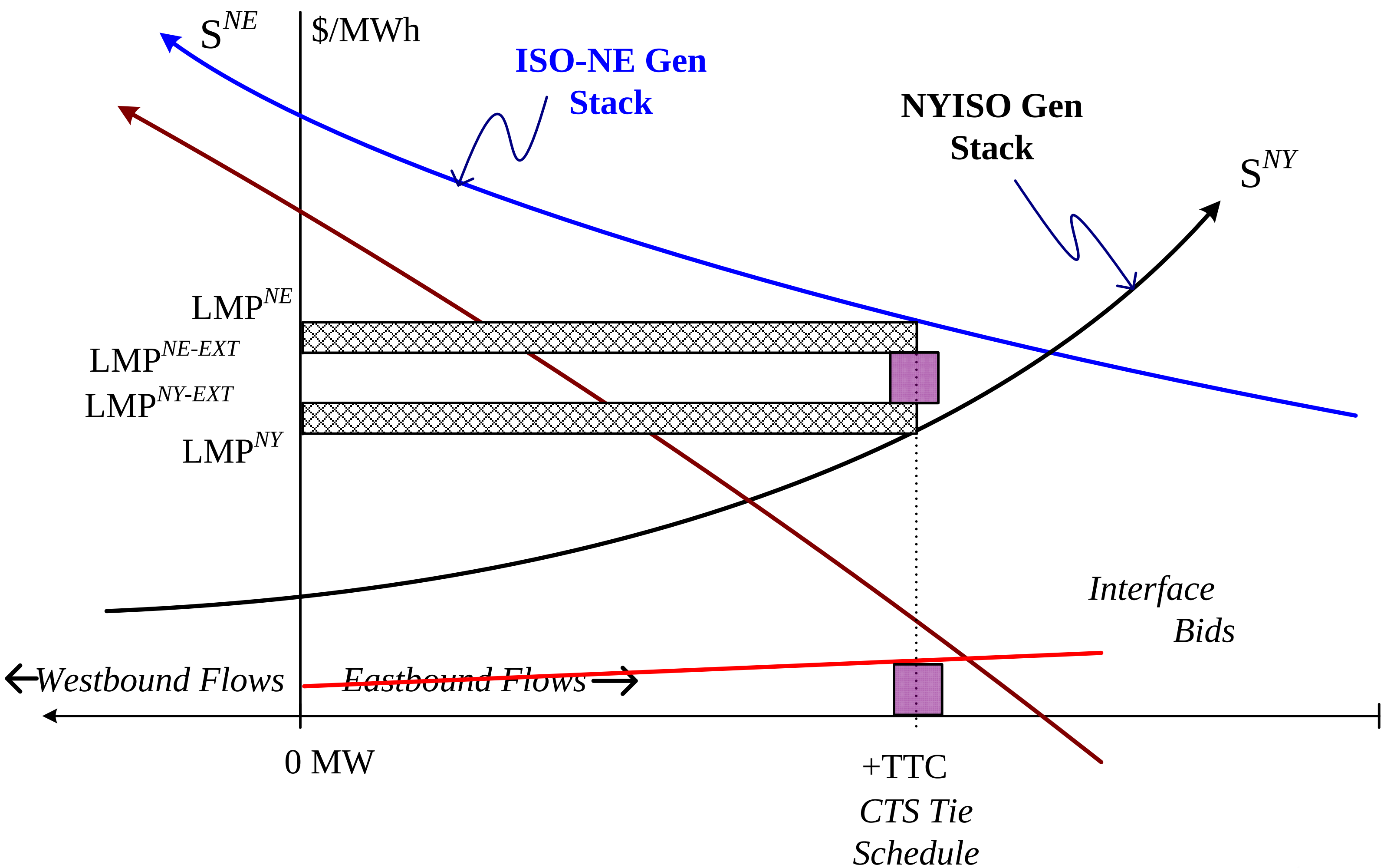


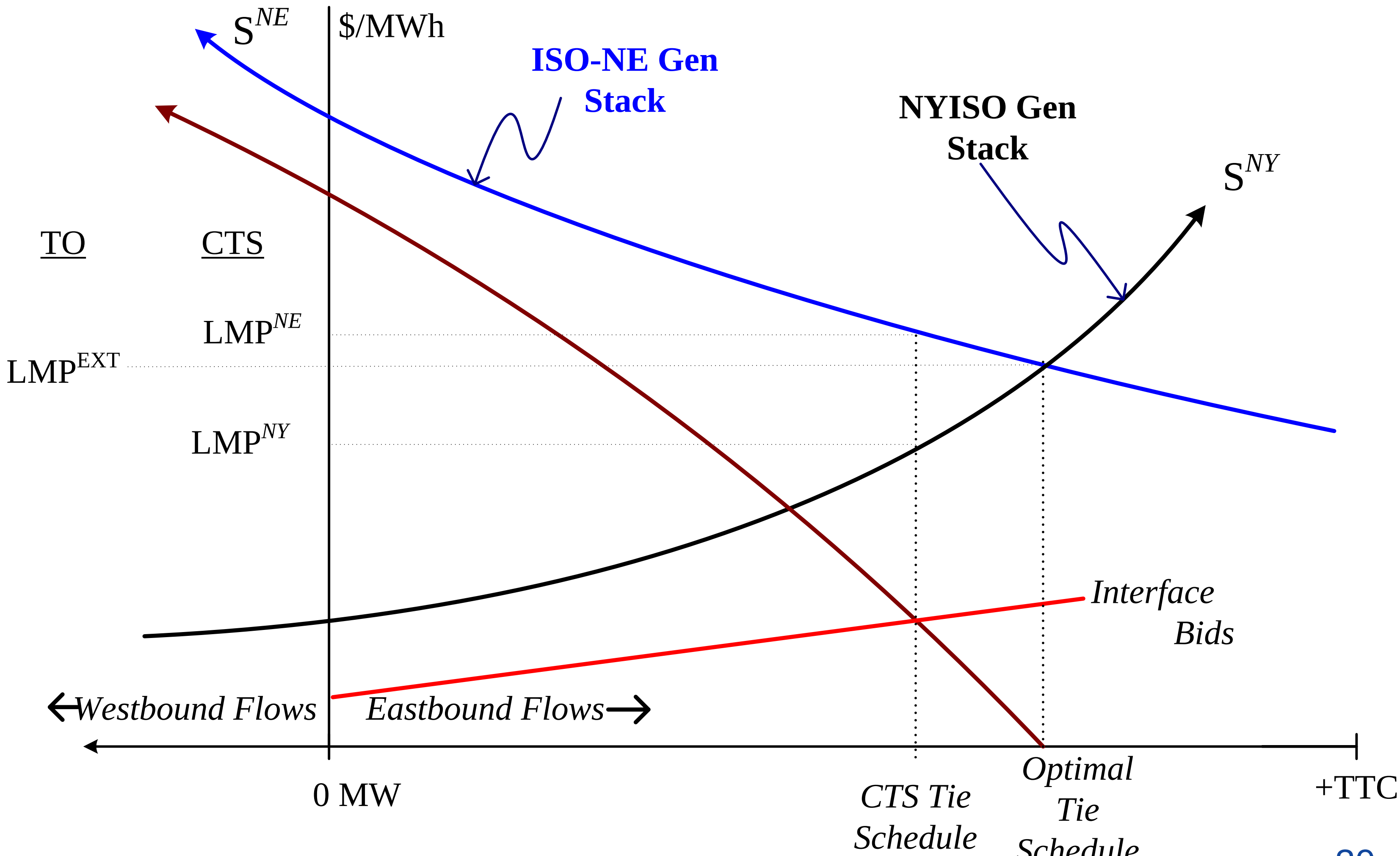
Distinctions between CTS & TO

- The optimization **steps** to determine the desired interchange schedule are **functionally identical** between CTS and TO.
- The resulting interchange schedule will be different under CTS than under TO **if** the interface is not limited by TTC constraints.

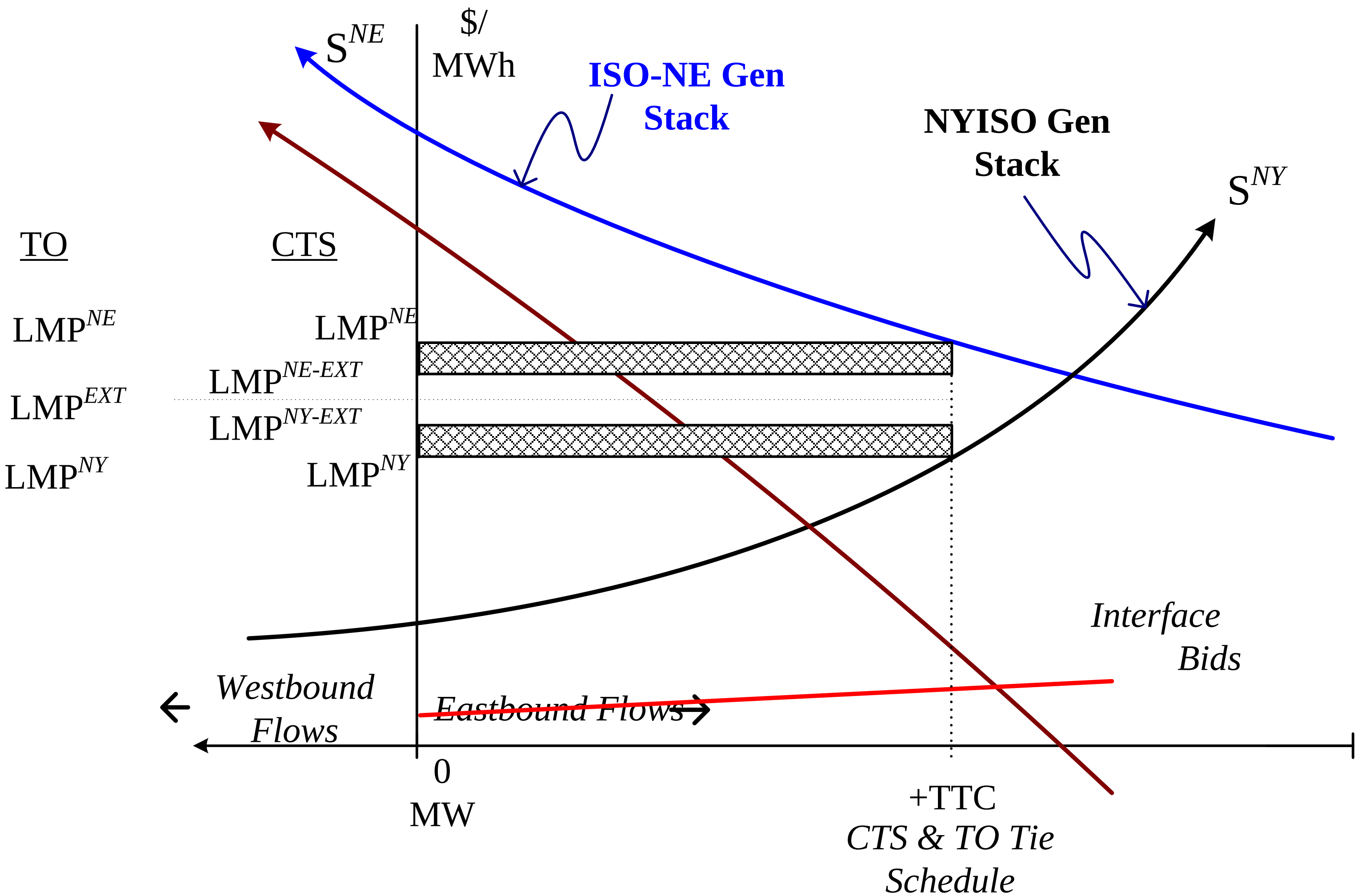
Distinctions between CTS & Tie Opt.

Higher Frequency Scheduling Step	TO	CTS
@T-20 : Step Pre-Schedule *ISO-NE performs a set of "pre-scheduling" unit-dispatch system evaluations to determine the (bid-based) cost of energy at the interface proxy bus at time T, incorporating any operation constraints on interface flows into the evaluation. ISO-NE passes the completed resource supply stack to NYISO, including any constraints governing interface flows.*	✓	✓
@T-15 : Step TieOpt *ISOs incorporate Interface Bid (IB) information into the resource supply stack* *NYISO incorporates NYISO integrates the ISO-NE resource supply stack into its Real-Time dispatch (RTD) optimization as an incremental cost incurred (by ISO-NE) or decremental cost avoided (by ISO-NE) by additional power flows across the interface. The RTD optimization determines desired interface flow for the upcoming 15 minute period, incorporating any NYISO or ISO-NE constraints.*	N/A ✓	✓ ✓
@T-10 : Step RTD *Each ISO performs its internal dispatch, taking the optimized interface schedule as an input.*	✓	✓
@T-5 : Step RTD *Each ISO performs its internal dispatch, taking the optimized interface schedule as an input.*	✓	✓
@T-5 : Step Pre-Schedule *Process initiates for next 15 minute schedule horizon*	✓	✓

Tie Schedule w/o TTC Limits



Tie Schedule w/ TTC Limits



External Transactions

The Main Points

- **DA External Transactions** work similar to today
  - DA market offers submitted *separately* to each ISO's market
- **Both Tie Optimization and CTS options** enable DA External Transactions to 'flow thru' to RT for for settlement purposes.
  - Reduces potential for RT energy market balancing charges
- **Simpler.** The process to 'flow thru' into RT should be as easy or easier to achieve than in today's market.

Day Ahead External Transactions

- **Next**: We provide an example of **DA market clearing** and pricing at the external interface.
  - Same as today, unless there is DA congestion at external interface (about 3% of the year).
- **Then: Use DA examples to show** how DA External Transactions 'flow thru' to Real-Time settlements:
  - CTS Option for RT scheduling
  - Tie Optimization option for RT scheduling

About NY and NE Day Ahead Markets

- **NY and NE Day-ahead markets clear separately today** (and at different times of the day)
  - This will not change under IRIS (either design option)
- So the DA market examples show clearing at the external interface **separately for each ISO.**
- Next examples assume **no congestion or losses** (for simplicity)
  - Congestion (& FTRs) to be reviewed in Day 3 presentation

NYISO DA Example: Offers

Part	Export MW	Export $/MW
F	110	$79
G	200	$69
H	225	$63
I	100	$62
J	50	$60
K	150	$58
L	165	$51
M	250	$48
N	275	$47

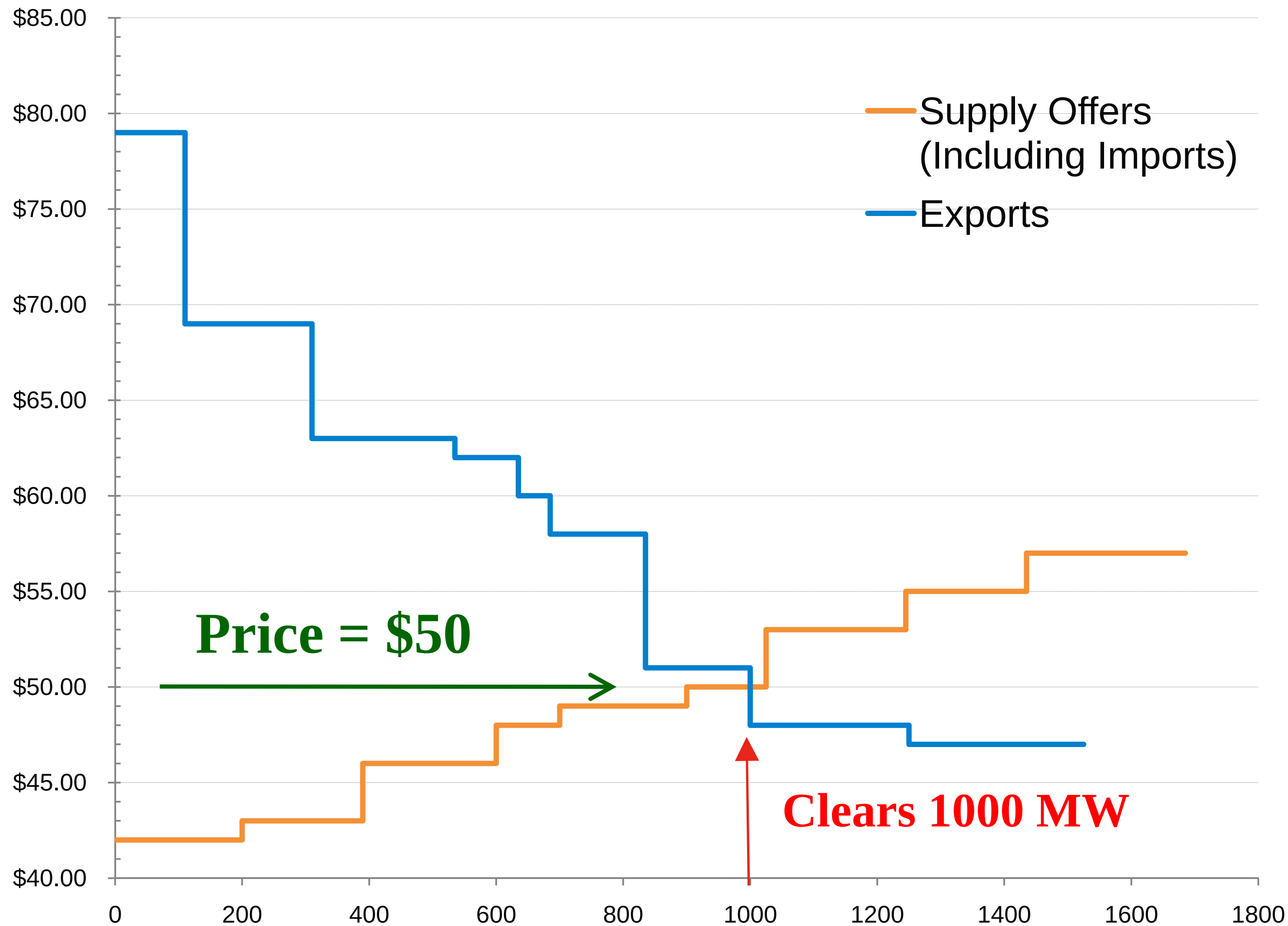
Part	Import MW	Import $/MW
A	220	$53
B	190	$55

Gen ID	Gen MW	Gen $/MW
111	200	$42
222	190	$43
333	210	$46
444	100	$48
555	200	$49
666	125	$50
777	250	$57

What clears? What is LMP?

Assume: System LMP would be $42 (w/o transactions)

NYISO DAM: External Interface clearing



NYISO DA Example –*What Cleared?*

Part	Export MW	Export $/MW
F	110	$79
G	200	$69
H	225	$63
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J	50	$60
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Gen ID	Gen MW	Gen $/MW
111	200	$42
222	190	$43
333	210	$46
444	100	$48
555	200	$49
666	125	$50
777	250	$57

Partially Cleared

NY clears 1000 MW exports (to NE)

Marginal Price in NYISO is now $50

A Second (ISO-NE) DA Example

- **DA market results at the same external interface can differ** in NYISO and ISO-NE:
  - **Participants can (and do) submit different offers** to each ISO
  - Each ISO's DA market clears its External Transactions **against a different internal generation stacks**
- **This can produce different DA LMPs** between the markets, and between DA and RT markets

ISO-NE DA Example – Offers

Part	Export MW	Export $/MW
X	150	$52
Y	200	$48

Part	Demand MW	Demand $/MW
ABC	200	$60
DEF	500	$59
GHI	120	$58
JKL	220	$54

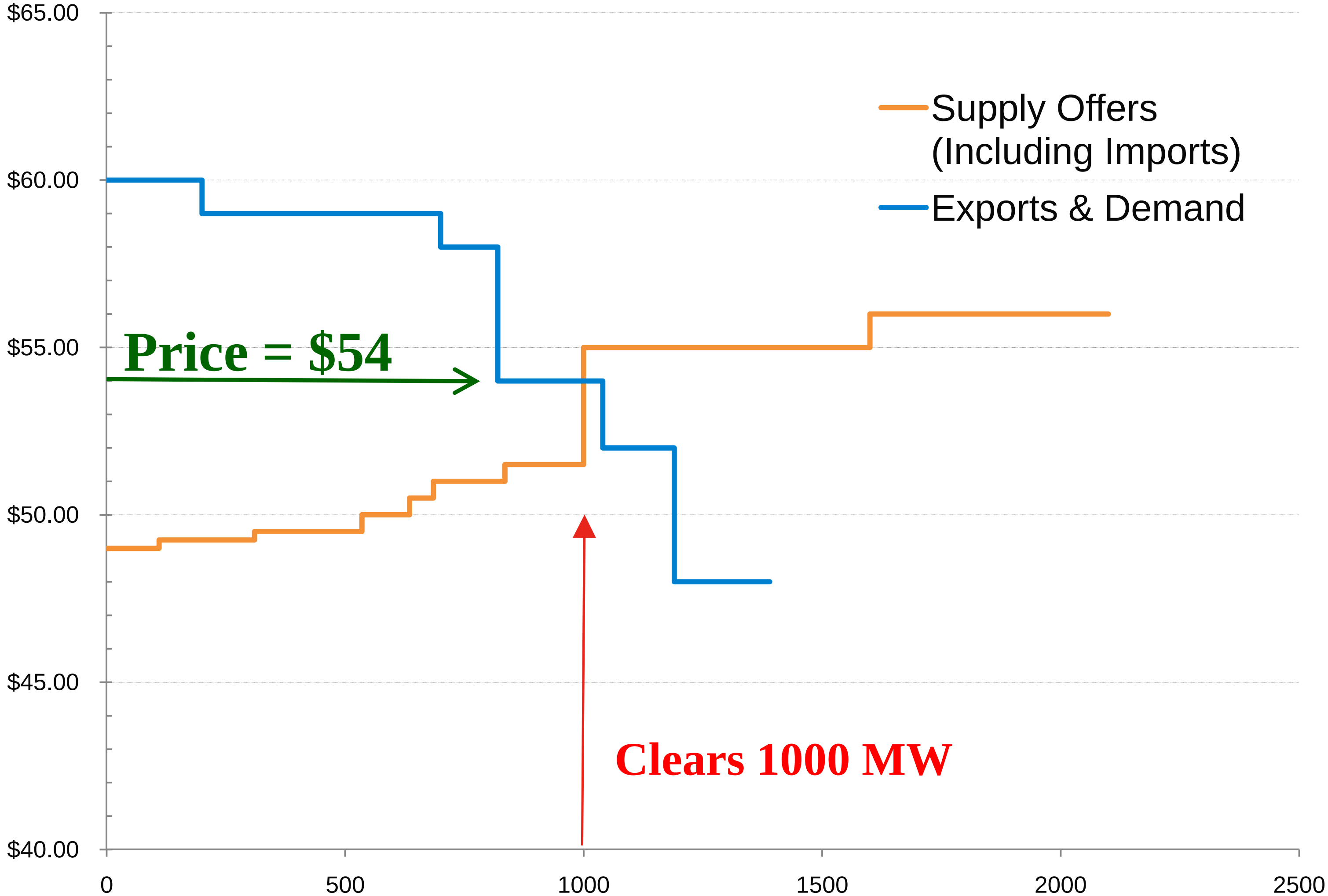
Part	Import MW	Import $/MW
F	110	$49
G	200	$49.25
H	225	$49.50
I	100	$50
J	50	$50.50
K	150	$51
L	165	$51.50

Gen ID	Gen MW	Gen $/MW
123	600	$55
234	500	$56

What clears? What is LMP?

Assume: System LMP would be $56 (w/o transactions)

ISO-NE DAM: External Interface Clearing



DA Example – ISO NE – *What Cleared?*

Part	Export MW	Export $/MW
X	150	$52
Y	200	$48

Part	Demand MW	Demand $/MW
ABC	200	$60
DEF	500	$59
GHI	120	$58
JKL	220	$54

Partially Cleared

Part	Import MW	Import $/MW
F	110	$49
G	200	$49.25
H	225	$49.50
I	100	$50
J	50	$50.50
K	150	$51
L	165	$51.50

Gen ID	Gen MW	Gen $/MW
123	600	$55
234	500	$56

Dispatch of Generators Has been displaced by Imports

Marginal Price in ISO NE is now $54

Summary Points

- **Parties that wish to schedule** DA external transactions do so like today.
- **DA transactions reduced the LMP difference** between regions, but not completely:
  - Example: NY DA LMP is **$50**, and NE DA LMP is **$54**
  - In general, DA markets can produce different cleared MW as well as different LMPs at an external interface.
- **Now: How do transactions 'flow thru' to RT?**

Linking DA Transactions to RT:

CTS Design Option

Main Question

- How does a participant with a cleared DA transaction avoid RT energy balancing (deviation) charges?
- **Under CTS:**
  - **Submit and clear** a matching Interface Bid in RT market
  - Interface Bids (IB) are submitted to a common portal, not separately to each ISO.
  - IB clearing is economically coordinated by NYISO and ISO-NE to set RT interface schedule.

Example: CTS Linkage to DA Transaction

- Let's consider Participant G's position in detail

- **In DA markets:**
  - It offered to buy (export) 200 MW in NY for $69 / MWh
  - It offered to sell (import) 200 MW in NE for $49 / MWh
  - **Both offers cleared**

- What happens in RT market and settlement?

DA Example – ISO NY – *From Previous*

Part	Export MW	Export $/MW
F	110	$79
G	200	$69
H	225	$63
I	100	$62
J	50	$60
K	150	$58
L	165	$51
M	250	$48
N	275	$47

Part	Import MW	Import $/MW
A	220	$53
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Gen ID	Gen MW	Gen $/MW
111	200	$42
222	190	$43
333	210	$46
444	100	$48
555	200	$49
666	125	$50
777	250	$57

Partially Cleared

Marginal Price in NYISO is $50

DA Example – ISO NE – *From Previous slide*

Part	Export MW	Export $/MW
X	150	$52
Y	200	$48

Part	Demand MW	Demand $/MW
ABC	200	$60
DEF	500	$59
GHI	120	$58
JKL	220	$54

Partially Cleared

Part	Import MW	Import $/MW
F	110	$49
G	200	$49.25
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I	100	$50
J	50	$50.50
K	150	$51
L	165	$51.50

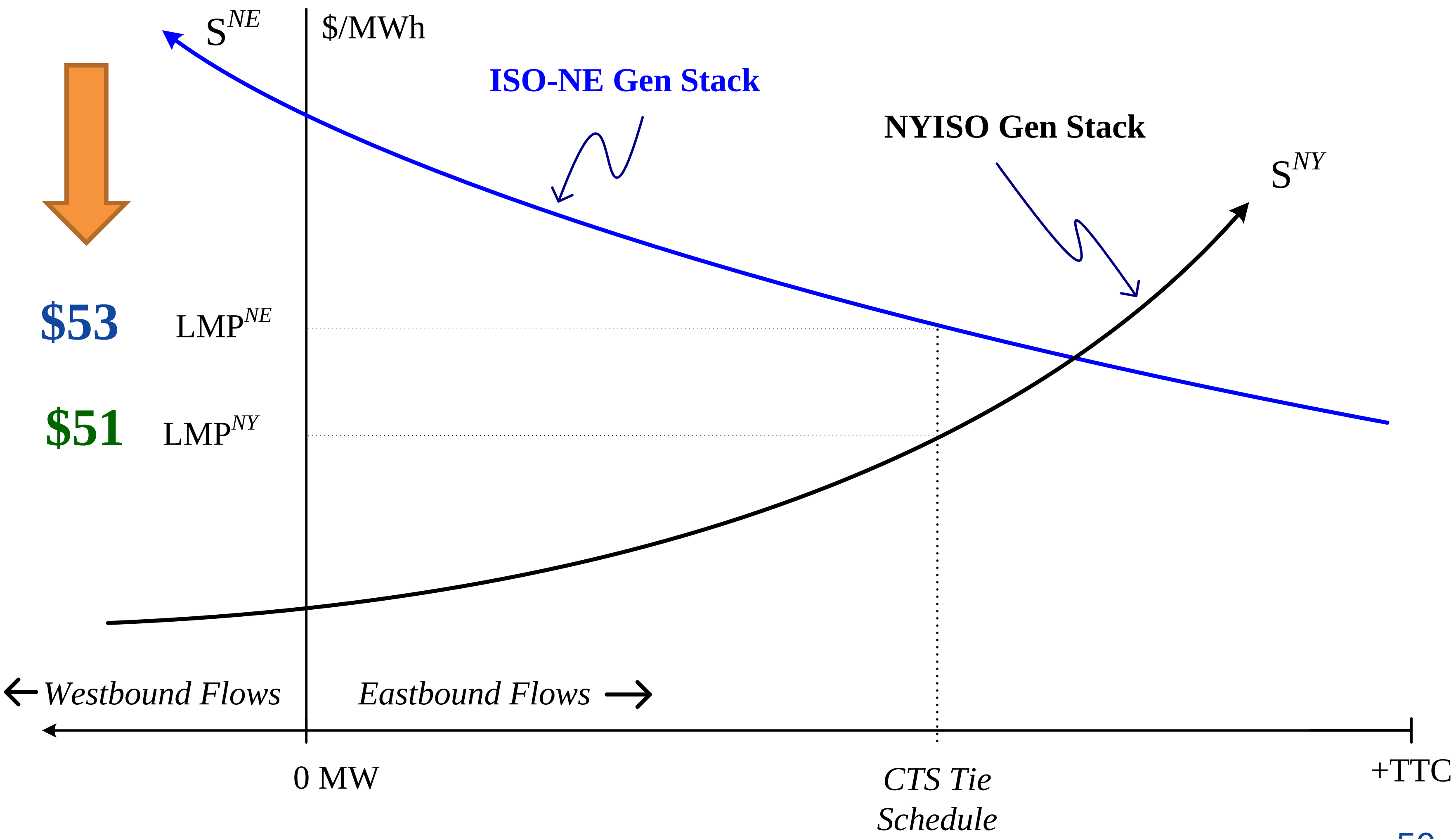
Gen ID	Gen MW	Gen $/MW
123	600	$55
234	500	$56

Marginal Price in ISO NE is $54

Example: CTS options for Participant G

- **DA Settlements:**
  - In NY: "G" Bought 200 MW @ $50 = ($10,000) charge
  - In NE: "G" Sold 200 MW @ $54 = **$10,800** credit
- **A net credit of $800 DA.** How do they keep it?
- **To avoid RT balancing debit/credit from each ISO:**
  - "G" needs to clear a matching Interface Bid (200MW from NY into NE).

Real Time LMPs with CTS clearing



Interface Bids: "G" offers $1

- **Assume:** Expected RT LMP is $53 in NE, and $51 in NY.
- "G" submits an **Interface Bid @ $1** for 200MW (NY→NE)
  - Expected LMP spread (NE–NY) exceeds $1, so **Interface Bid CLEARS**
  - RT Settlement in NY market :
    - DA Export 200 MW at Interface, RT Export 200 MW at Interface
    - 0 MW Deviation (No RT $)
  - RT Settlement in NE market :
    - DA Import 200 MW at Interface, RT Import 200 MW at Interface
    - 0 MW Deviation (No RT $)

$0 Net charge in RT

Interface Bids: If "G" offers $4?

- **Assume again:** RT LMP is $53 in NE, and $51 in NY.
- "G" submits an **Interface Bid** @ **$4** for 200MW (NY→NE)
  - Expected LMP spread of $2 is less than $4, **the Interface Bid does NOT CLEAR**
  - RT Settlement in NY market :
    - DA Export 200 MW at Interface, RT Export 0 MW at Interface
    - 200 MW Deviation (Sold in RT 200 MW x $51 RT LMP = $10,200 credit)
  - RT Settlement in NE market :
    - DA Import 200 MW at Interface, RT Import 0 MW at Interface
    - 200 MW Deviation (Buy in RT 200 MW x $53 RT LMP = ($10,600) debit)

$400 Net Charge in RT

Three Observations

1. Submitting an Interface Bid in RT does not require a DA position

2. The smaller the Interface Bid, the more likely to clear.

   - CTS design could allow negative Interface Bids, to ensure an IB clears even when net RT schedule is in opposite direction

3. If a participant clears a DA transaction in **only one market,** it will have a RT debit/credit in one RT market

   - **True today**, under CTS, and under Tie Optim. options.

Linking DA Transactions to RT:

Tie Optimization Option

Main Question

- **Recall: There are no RT transaction offers** with Tie Optimization (ISOs optimize physical tie flows).
- How does a participant with a cleared DA transaction avoid RT energy balancing (deviation) charges?
- **Under Tie Optimization:**
  - **All paired DA transactions would 'flow thru**' for RT settlement purposes.
  - **Should be much simpler for participants.**

Links from DA to RT settlements

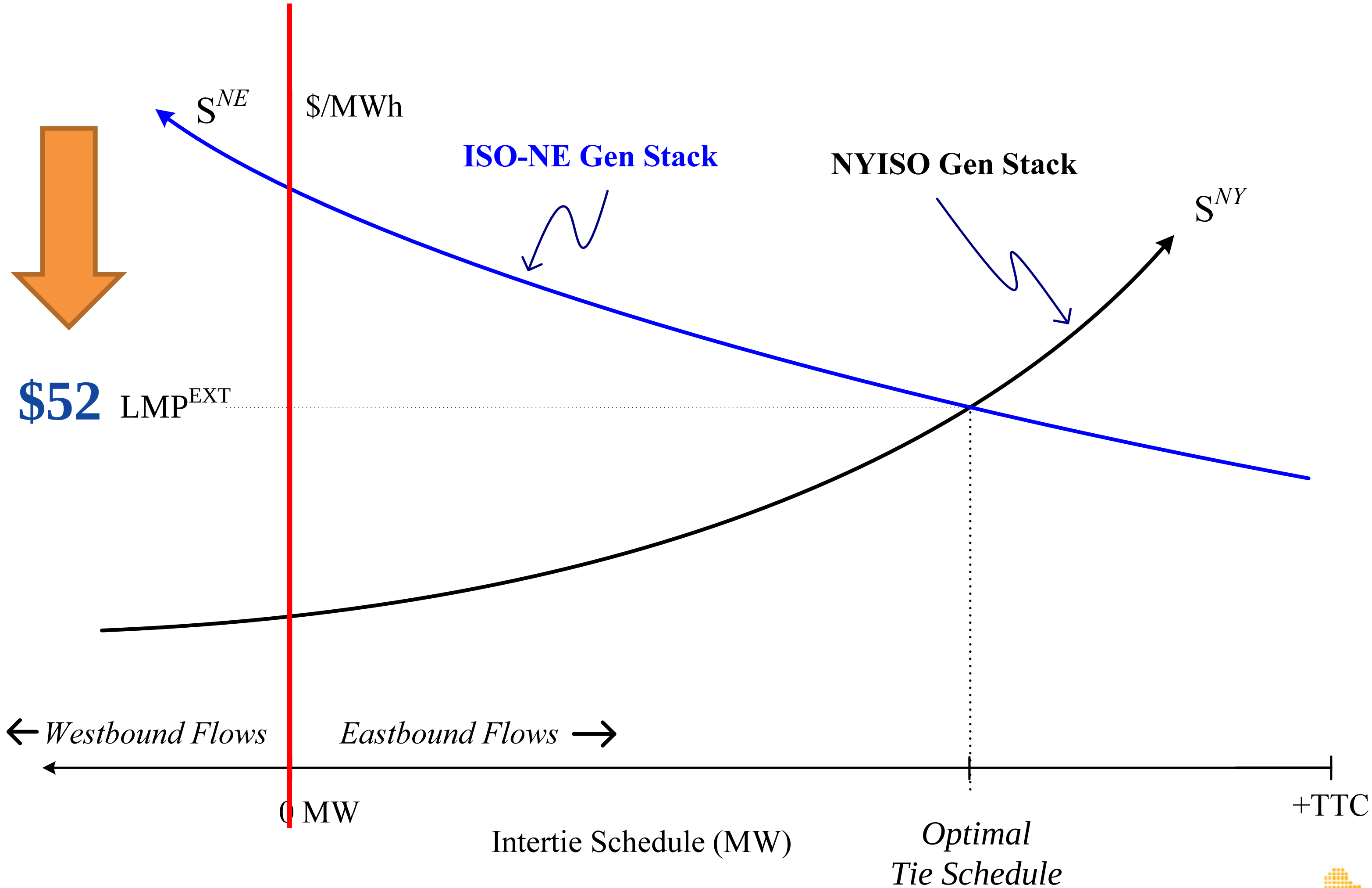
Tie Optimization Examples:

- **Next**: We again consider a (simple) example at the level of an individual participant with a DA position.
- **Then:** We consider several examples of automatic ‘flow-thru’ at the level of ISO settlements, to show ***why* this works*.***

Example: Participant G under Tie Optim.

- **Recall Participant "G"'s DA Position:**
  - In NY: "G" Bought 200 MW @ $50 = ($10,000) charge
  - In NE: "G" Sold 200 MW @ $54 = **$10,800** credit
  - Cleared 200 in both markets, net credit of: **$800** DA.
- **Design is all paired DA transactions 'flow thru'** during RT settlements (no impact on tie optimization)
  - No requirement for "G" to make additional transactions
  - **Benefit?** Limits risk of "not clearing" in RT

Example: RT LMP with Tie Optimization



RT Settlement for Participant G

- What happens to "G" in RT under Tie Optimization?
  - Transactions for 200 MW 'flow thru' to both RT market settlements (export in NY, import in NE)
  - **RT Settlement in NY market:**
    - DA Export 200 MW at Interface, RT Export 200 MW at Interface
    - 0 MW Deviation (No RT $)
  - **RT Settlement in NE market:**
    - DA Import 200 MW at Interface, RT Import 200 MW at Interface
    - 0 MW Deviation (No RT $)

$0 Net charge in RT

ISO-Level Settlement Examples:

How does the money flow?

The Big Picture

- Tie Optimization models **between-ISO** settlements like existing **within-ISO** settlements.

- **One ISO:** If ISO-NE increases RT gen in **MA** to meet load in **CT**, ISO-NE must ensure the gen is paid at its LMP for the energy "exported" from MA → CT.

- **Two ISOs:** If two ISOs increase RT gen in **NY** to meet load in **CT**, the two ISOs must ensure the gen in NY NY is paid its LMP for the energy exported NY→ CT.

The Big Picture, Re-focused a Bit

- **With multi-settlement markets**, the credits/debits are typically a little more complicated.
- **For instance,** suppose:
  - Load has **no** RT dev from DA cleared MW (in either ISO);
  - In RT, Tie Optimization: Increases gen in **NY by 200 MW,** and Decreases gen in **NE by 200 MW.**
- **Then:** ISOs need to transfer **$ to NY gen** with the (+) RT deviation, **from NE gen** with (-) RT deviations**.**
- A few examples will help explain why.

ISO-Level Settlement Examples

- Work through some of the previous examples to show the **how the money balances** between all participants
- Use the DA Examples first, and then RT Examples
- Assume nothing causes RT deviations other than external schedules between NY/NE (for simplicity)
  - We could incorporate virtuals, load deviations, etc.
    …. A lot more numbers, no additional insights.
  - DA & RT prices are same as previous settlement examples

NYISO DAM Settlements Overview

DA LMP	**$50**
Export MW (*From NY DAM Example)*	-1000
Charges to Exports	($50,000)
Internal Load MW (*Assumed)*	-20,000
Charges to Internal Load	($1,000,000)
Internal Generator MW	21,000
Credits to Internal Generators	$1,050,000
Net Settlement (Credits – Charges)	**$0**

NY DA market net settles to zero, as required

ISO-NE DAM Settlements Overview

DA LMP	**$54**
Import MW (*From NE DAM Example)*	+1000
Credits to Imports	$ 54,000
Internal Load MW (*Assumed)*	-16,000
Charges to Internal Load	($864,000)
Internal Generator MW	15,000
Credits to Internal Generators	$810,000
Net Settlement (Credits – Charges)	**$0**

NE DA market net settles to zero, as required

RT Example 1: Tie Optimization

Assumptions:

- Tie Optimization sets a (net) RT schedule of **1200 MW from NY → NE.**
- **1000 MW (net)** was scheduled NY → NE by day-ahead transactions that cleared both markets.
- **Implies:** Tie Optimization sends an **additional 200 MW in RT**
- Tie Optimization **equalizes RT LMPs** in each ISO at **$52,** same as in previous RT examples.

- **How does the money flow?**

NYISO RT Settlements: Tie Optimization

RT LMP	$52
Tie Optimization Incremental Export MW	-200
Inter-ISO Settlement Account Charge (for Export)	($10,400)
DA External Transactions that Flow-Thru MW Deviations	0
Charges to External Transactions Deviations	$0
Internal Load MW Deviations	0
Charges to Internal Load Deviations	$0
Internal Generator MW Deviations	+200
Credits to Internal Generators	$10,400
Net Settlement (Credits – Charges)	**$0**

- NY RT market net settles to zero, as required.
- NY gen is paid $10.4K for RT 200 MW dev. **Where $ from?**

ISO-NE RT Settlements: Tie Optimization

RT LMP	**$52**
Tie Optimization Incremental Import MW	+200
Inter-ISO Settlement Account Credit (for Import)	$10,400
DA External Transactions that Flow-Thru MW Deviations	0
Charges to External Transactions Deviations	$0
Internal Load MW Deviations	0
Charges to Internal Load Deviations	$0
Internal Generator MW Deviations	-200
Charge to Internal Generators	($10,400)
Net Settlement (Credits – Charges)	**$0**

- NE RT market net settles to zero, as required.
- Inter-ISO Settle Acc't nets to zero. This paid the gen in NY.

Implications

- **How does this work generally?**
  - In RT, Tie Optimization will raise and lower generation in **equal amounts** (in MW) on each side of the interface.
  - **In RT settlement:** Gen in each ISO must be credited/debited at RT LMP for equal (but opposite sign) deviations from DA.
- **In essence:**
  - **The DA markets transfer $, at DA LMP,** from the importing to exporting region for MW that clear (both) DA markets.
  - **The RT markets transfer $, at RT LMP,** for the **additional** MW (in either direction) when the interface is optimized

One Issue to Preview Here

- **RT settlements are simple** in this example since Tie Optimization sets RT LMPs in each ISO equal.
- What if Tie Optimization ***can't*** equalize the LMPs?
  - **Today**: price separation at NY/NE occurs (nearly) all the time.
- **Under Tie Optim.** it can also happen, for two reasons:
  - Due to (e.g.) unexpected system changes – **see Latency and Price Separation** slides (coming next)
  - Due to **RT congestion** – To be reviewed on Day 3

RT Example 2: CTS and Interface Bids

Assumptions:

- Interface Bids clear a (net) RT schedule of **1100 MW from NY → NE.**
- CTS sets **NE RT LMP to $53, and NY RT LMP to $51.** Same as in previous CTS examples.

- **Recall:** DA external transactions cleared **1000 MW from NY → NE** (in each market).

- **How does the money flow?**

NYISO RT Settlements – CTS Example

RT LMP	**$51**
External Transactions MW Deviations (Export)	-100
Charges to Export Deviations (**IB *without* DA Export)**	($5,100)
Internal Load MW Deviations	0
Charges to Internal Load Deviations	$0
Internal Generator MW Deviations	+100
Credits to Internal Generators	$5,100
Net Settlement (Credits – Charges)	**$0**

- Interface bidders **with** DA positions have no RT charges.
- Interface bidders without DA trans. have $5100 RT charge in NY

ISO-NE RT Settlements – CTS Example

RT LMP	**$53**
External Transactions MW Deviations (Import)	+100
Credit to Import Deviations (**IB *without* DA Import)**	$5,300
Internal Load MW Deviations	0
Charges to Internal Load Deviations	$0
Internal Generator MW Deviations	-100
Charges to Internal Generators	($5,300)
Net Settlement (Credits – Charges)	**$0**

- Interface bidders without DA trans. have $5300 RT credit in NE
- They have a **net RT gain** of $200 across two markets.

Latency and Price Separation

What is it?

- **Latency** is the delay between when the interface is **scheduled** and when the power flows.
- **It can lead *expected* LMP** to differ from ***actual* RT LMP**, if system conditions change after schedule is set
- **Three questions:**
  - What problem does this cause **today**?
  - How would IRIS **improve** this situation?
  - Why might a participant care?

First: Today's situation

- **Today's scheduling process** may result in **uplift charges** (NCPC/BPCG) to ***other*** market participants
- **Example:**
  - ISO 1 clears 1000MW of RT exports, all bid in @ $50/MWh
  - Just after scheduling, a gen trips, RT LMP goes to $150/MWh for the entire hour.
  - At settlement: RT exports pay $150/MWh to ISO1, but get a 'make whole' payment of $100/MWh
  - That causes **$100K** (=1000MW x $100/MWh) in **uplift charges**
- **Who pays the uplift?** Loads (primarily)

Issues

- **Today: uplift** (make-whole payments) covers traders' latency-based risk of loss at external interface.
    - No one likes paying uplift.

Q: Can IRIS reduce latency-based uplift charges?

A: Yes – for two reasons:

1. 15 minute scheduling (will reduce latency risk)
2. Offsetting (+) and (-) impacts under Tie Optimization

Tie Optimization: Example 1 – Like Current

- Suppose Tie Opt. schedules **1000MW** across interface
- It sets expected LMPs at interface equal to **$50/MWh**
- Just after scheduling, a gen trips in **exporting ISO:** Its RT LMP rises to **$150/MWh**. Importing ISO still at $50/MWh.
- **This means:** For the 1000 MW export:
  - Load in importing ISO **paid only $50** (the LMP at its location)
  - Gen in exporting ISO **is paid $150** (the LMP at its location)
- **There is a revenue imbalance (uplift),** of $100K per hr
  - ***Note: May only last 15min before flow reverses…***

Interpretation

- **Latency (delay) can cause price inversion**, if system conditions change unexpectedly
- **Driver is fundamentally the same** under today's system or under IRIS (either CTS or Tie Optim.)
- **Economic issue: Price changes** (between schedule and real-time) may cause revenue imbalances.
- **IRIS can reduce** these revenue **imbalances** at the external interface, and therefore **reduce uplift charges**

(*How?* →)

Reducing Uplift, Part 1

15 minute schedule updates reduce price differences:

- Next tie update, Tie Optim. would send power in economically correct direction (that's the point)
- That reduces the **duration** of the price difference
- **Meaning**: 'uplift' cost is incurred for only 15 min (e.g.), instead of potentially a full hour—or more—today.
- **Total 'uplift' may become a fraction of what the ISOs incur** with today's external transaction system.

Tie Optimization Example 2: "Upside" case

- Suppose Tie Opt. schedules **1000MW** across interface
- It sets expected LMPs at interface equal to **$50/MWh**
- Just after scheduling, a gen trips in **importing ISO:** Its RT LMP rises to **$150/MWh**. Exporting ISO still at $50/MWh.
- **This means:** For the 1000 MW export:
  - Load in importing ISO **paid $150** (the LMP at its location)
  - Gen in exporting ISO **receives $50** (the LMP at its location)
- **There is excess revenue, of** $100K per hr * duration

Who receives the excess revenue?

Reducing Uplift, Part 2

- **Tie Optim. interface settlements can have:**
  - Excess revenue : Example 2, has gen trip in **importing** ISO
  - Insufficient revenue: Ex. 1, has gen trip in **exporting** ISO
- **The two situations tend to offset financially, which will tend to reduce total uplift costs**
- **Does this 'offsetting' occur in uplift today? <u>No.</u>**
  - Traders get 'make-whole' pmts for losses, **resulting in uplift**
  - Traders keep 'windfall' gains (from importing ISO price spikes), so **no reduction** in uplift.

What happens under CTS?

- **Does the impact of latency go away under CTS?**
- **No.** But it plays out differently:
  - Interface bidders get windfall, or losses, from any unexpected price changes after the interface is scheduled.
  - They respond to risk, by submitting higher interface bids.
  - **Higher interface bids** mean: - **less** energy interchange
    - **greater** production costs
    - **higher** average LMPs
- **So loads end up paying for latency under CTS, too.**

Implications

- **Best thing: Minimize latency risk** (price separation)
- **How?**
  - **HFS (15 min) means flows get re-set** to economic correct direction (much) faster than with today's system.
  - **With Tie Optim.,** price separation has **offsetting impacts** that will tend to reduce net uplift costs.
- Expect ISOs will tend to incur **lower uplift costs at the external interface,** relative to today's external transaction system.

Summary for Today

RT Scheduling Under IRIS

- **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-correct direction**
  - **ISOs have the information** needed to optimize **physical power flows;** traders cannot see bid stacks, transm. in RT.

DA External Transactions

- **DA external offers work similar to today**
- **Can 'flow thru' to RT settlements** to minimize balancing charges under both Tie Optim. and CTS
- **Process to 'flow thru'** should be simpler than today, particularly under Tie Optimization

Settlements

- **Between-ISO** energy settlements are modeled on **within-ISO** energy settlements used today:
  - Load pays LMP at its location, Gen paid LMP at its location
- **Latency (delay) can cause price separation,** but should to be less under IRIS than today.
- **Expect lower uplift costs** at external interface than under today's external transaction system.

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 7: FTRs and congestion, NCPC & fee recommendations, conforming capacity rule changes

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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