

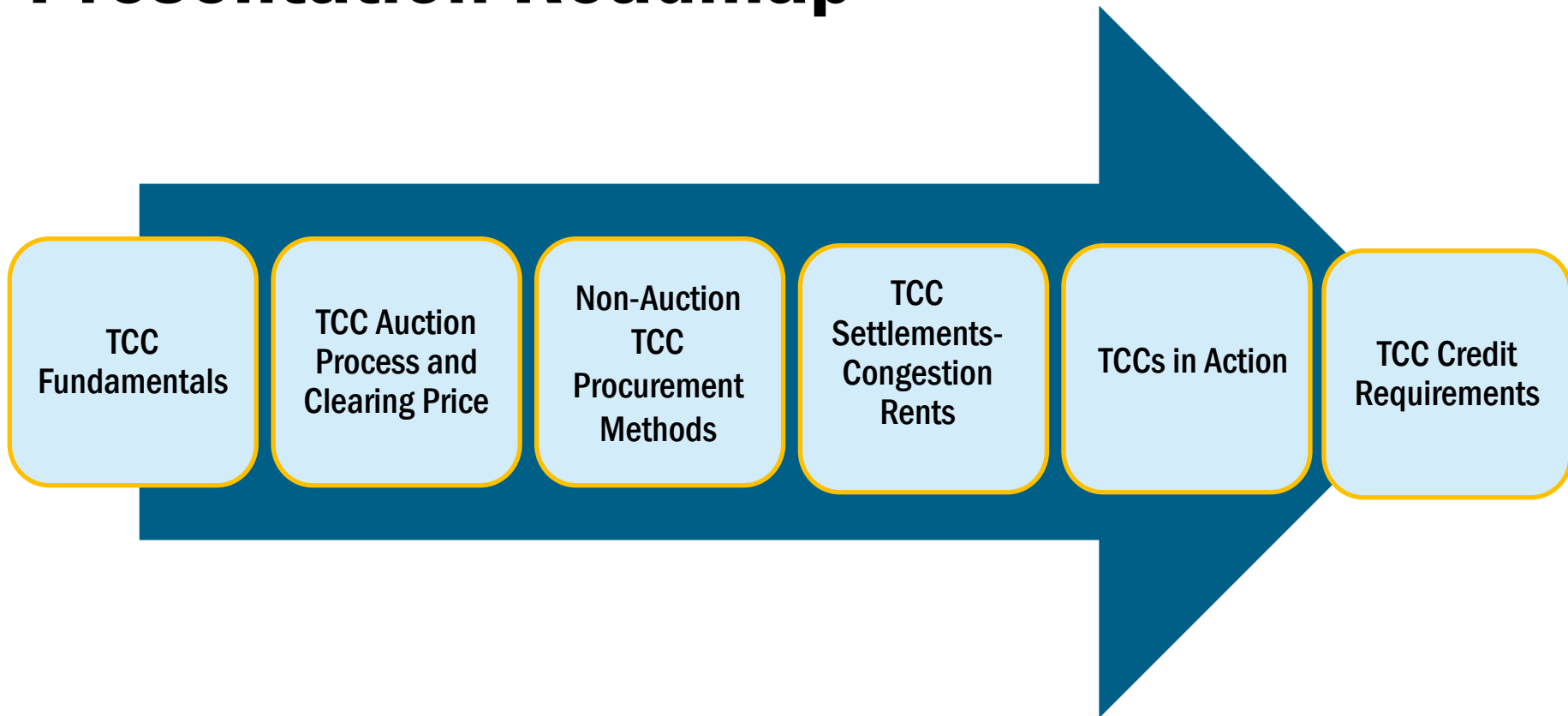
Transmission Congestion Contracts

E Learning Module

Transmission Congestion Contracts (TCCs)

- **Module OBJECTIVES:**
 - Describe the fundamentals of TCCs
 - Identify the process to obtain TCCs
 - Calculate TCC Congestion Rent and Settlement
 - Compare and Contrast the two roles of TCCs
 - Hedging against Day-Ahead (DA) congestion costs
 - Revenue opportunity
 - Explain the Credit Requirements associated with TCC participation

Presentation Roadmap



TCC Fundamentals

TCC Fundamentals: Defining TCCs

- A TCC is a Financial Instrument obtained through a NYISO Auction or Non-Auction procurement methods
 - Energy Market participation NOT required to hold a TCC
- TCCs can be used:
 - To hedge against Day-Ahead Market (DAM) congestion costs (price uncertainty)
 - Potential for revenue via congestion rents
- TCC Holders can include:
 - Power Suppliers
 - Transaction Holders
 - Transmission Owners
 - Load Serving Entities
 - Transaction Traders
 - Financial Institutions

TCC Fundamentals: Defining TCCs

One TCC = 1MW transmission flow between a Point of Injection (POI) and a Point of Withdrawal (POW)

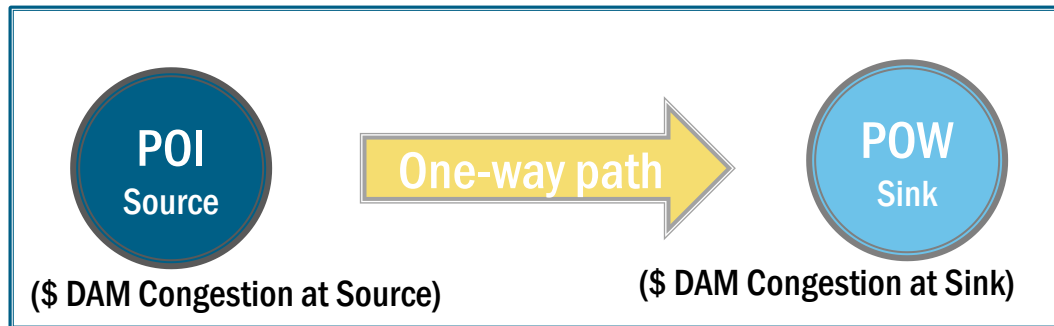
TCCs are Unidirectional



TCC Fundamentals: Defining TCCs

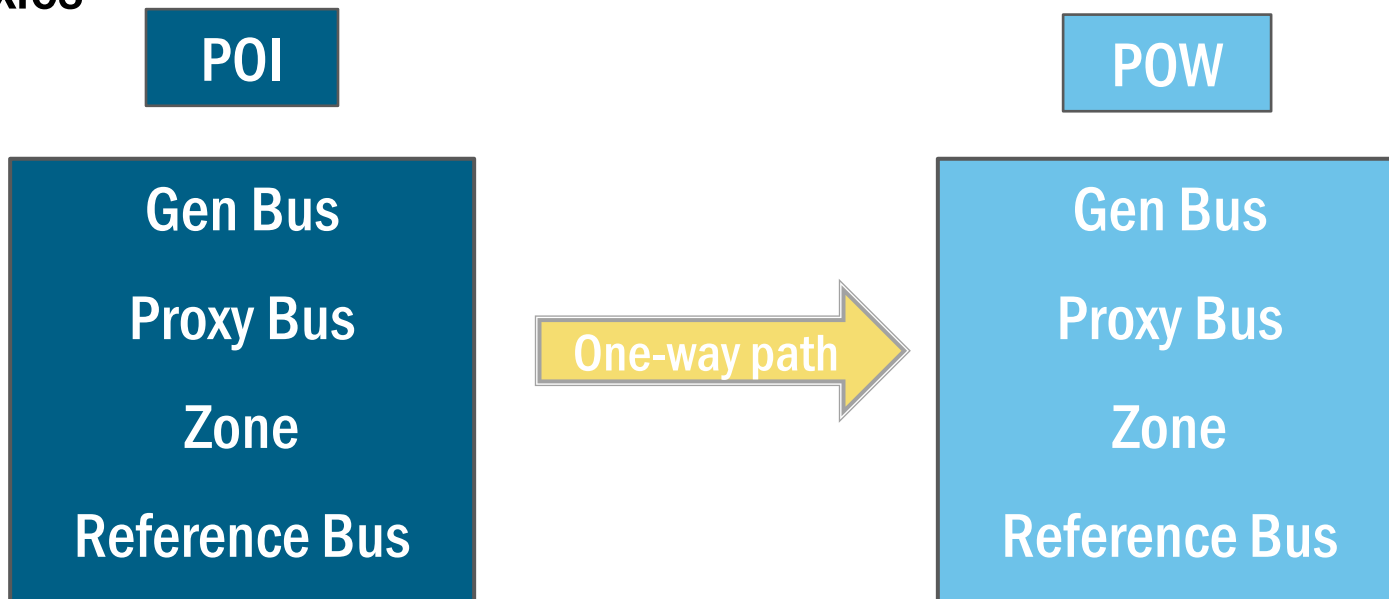
- A TCC represents a Right to Collect or Obligation to Pay DAM Congestion Rents going forward in time
 - Congestion Rents are:
 - Calculated using posted DAM LBMPs
 - The arithmetic difference in the congestion component of the DAM LBMPs between the sink and the source

$$\text{Congestion Rent (\$)} = (\$ \text{ Sink Congestion}) - (\$ \text{ Source Congestion})$$



TCC Fundamentals: Defining TCCs

- TCCs can be any combination of the below, except Scheduled Line Proxies



TCC Fundamentals – Defining TCCs

- Identifying the different POIs and POWs in an actual TCC Summary of Awards Document – example:

Zone

POI	POI Name	POI Zone	POW	POW Name	POW Zone
61758	HUD VL	HUD VL	24065	PJM_GEN_KEYSTONE	PJM
61752	WEST	WEST	24063	O.H._GEN_BRUCE	O H
61752	WEST	WEST	24010	AMERICAN_REF_FUEL	WEST
61752	WEST	WEST	24010	AMERICAN_REF_FUEL	WEST
61758	HUD VL	HUD VL	24065	PJM_GEN_KEYSTONE	PJM
61754	CENTRL	CENTRL	61752	WEST	WEST
23530	INDIAN POINT__2	MILLWD	61760	DUNWOD	DUNWOD
23535	RAVENSWOOD__3	N.Y.C.	323569	NYPA__ASTORIA_CC2	N.Y.C.
24008	NYISO_LBMP_REFERENCE	MHK VL	61752	WEST	WEST

Proxy Bus

Gen Bus

Reference Bus

TCC Fundamentals: Obtaining TCCs

- TCCs can be procured through:
 - NYISO TCC Auctions
 - Twice-annual Centralized TCC Auctions, or
 - Monthly Reconfiguration Auctions
 - Non-Auction Procurement Methods
 - Five alternate means of procuring TCCs described later

TCC Auction Process and Clearing Price

Pre-Auction Activities

MP Responsibilities



Pass TCC Competency Exam

- Before NYISO activates bidding rights for MP
- Self learning training available online



Establish Creditworthiness

- OATT Attachment W
- MST Attachment K



Post Collateral

- MST Attachment K
- TCC Manual Section 3.4.5

NYISO Responsibilities



Develop TCC Auction Model and update available capacity

- Optimal Power Flow



Post Auction Timeline, and Auction related information *

- Number of Rounds, Percentage Capacity to be sold/Round



Verify Scheduled Transmission Outages

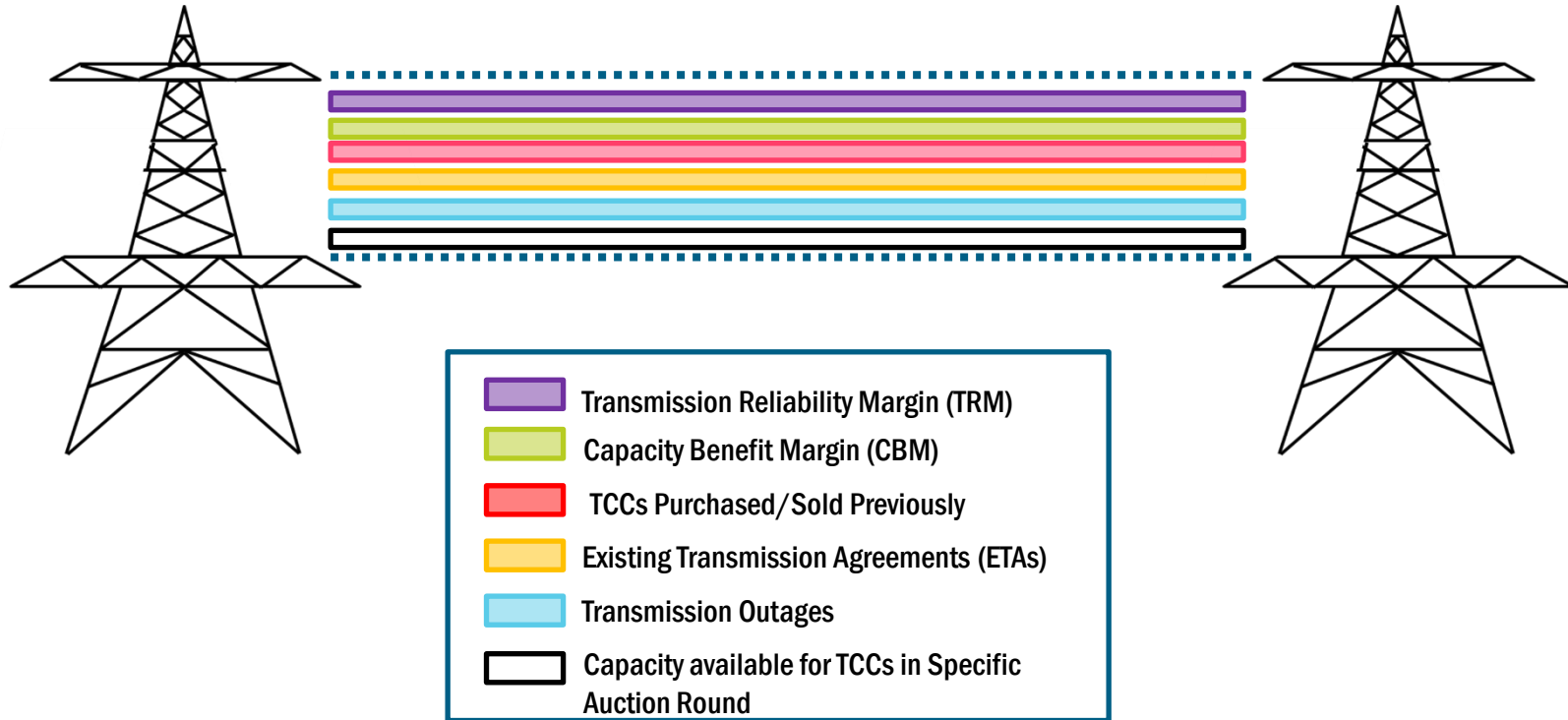


Include TCCs still valid for auction period as fixed injections and withdrawals

- Affects capacity available for sale in auction

* Additional Resources: Complete list of Auction related information and current TCC manual posted by NYISO

Factors Determining Availability of Capacity for Auction



ETAs – Tariff Listing

- Available Capacity

- Existing Transmission Agreements – Can be found in OATT Att. L

NYISO Tariffs: OATT Section 18, Attachment L – Transmission Agreements & Existing Transmission Capacity For Native Load Tables

Cont. #	FERC Rate Sch. Designat'n #	Transmission		Agreement				Cont. Est. Date	Cont. Exp./ Termination Date	Treatment (Refer to Attachment K)	Sum Cap. Per. MW (ISO)	Win Cap. Per. MW (ISO)
		Requestor and Primary Holder	Provider	Name	MW (Agmt)	POI	POW					
1	141	CHG&E	NMPC	Nine Mile Pt #2	101	NMP2	CHG&E	2/14/75	Ret. of Nine Mile Pt. #2	MWA-NMP2	101	101
1	141	CHG&E	NMPC	Nine Mile Pt #2	101	NMP2	CHG&E	2/14/75	Ret. of Nine Mile Pt. #2	MWA-NMP2	101	101
2	128	CHG&E	NMPC	Gilboa	100	Gilboa #1	CHG&E	5/10/73	6/30/2002	MWA-Gilboa Contract	100	100
3	N/A	CHG&E	NYPA	Marcy South Facility	300	CHG&E	Con Ed - North	12/7/83	Ret. of Roseton	Facility Agmt. - MWA	300	300
4	26	CHG&E	NYSEG	West Woodbourne	25	NYSEG - East	NMPC - East	6/24/64	Ret. of Nine Mile Pt. #2	Facility Agmt. - MWA	25	25
5	87	Con Edison	NYSEG	Mohansic - Wheeling	10	Bowline	Mohansic - CE No	8/23/83	Ret. of Bowline	Facility Agmt-MWA-Bowline	10	10
8	N/A	Con Edison	NYPA	Gilboa	125	Gilboa #1	Con Ed - Mid Hud	4/1/89	6/30/2004	MWA-Gilboa Contract	125	125
9	N/A	Con Edison	LIPA	Y50 Cable(1)	291	Con Ed - Cent.	Con Edison	4/4/75	Life of the facility	Facility Agmt - MWA	291	291

Interface Allocations - Summer Period										
DE	WC	VE	MoS	TE	US	UC	MS	DS	CE-LI	
		101		101	101					

Types of NYISO TCC Auctions

Centralized TCC Auctions

Long Term Auctions

- ❖ 2-Year Sub-Auction (or Duration):
Optional for NYISO to hold
- ❖ 1-Year Sub-Auction: Required to be held by NYISO
- ❖ 6-month Sub-Auction: Required to be held by NYISO
 - ❖ November - April (Winter Capability Period)
 - ❖ May - October (Summer Capability Period)

Reconfiguration Auctions

Short Term Auctions

- ❖ Balance-of-Period Auction *
 - ❖ Covers months or combination of months remaining in Capability Period
 - ❖ Begins month that follows month in which auction is conducted
 - ❖ Decoupled Mode: Simultaneous single-period solution within a single auction for all remaining months of the Capability Period
 - ❖ Multi-period bids/offers not currently allowed

* The Balance-of-Period Auction is the current type of Reconfiguration Auction being conducted

Types of NYISO TCC Auctions

Centralized TCC Auctions

- ❖ Usually, multiple rounds held per Sub-Auction
 - ❖ % of available capacity in each round
 - ❖ Allows for Price Discovery
 - ❖ Unanimous TO agreement typically required for any Sub-Auction proposed to include less than 4 rounds

Reconfiguration Auctions

- ❖ Monthly Reconfiguration Auction
 - ❖ Conducted in month preceding the first month for which TCCs will be effective
- ❖ Single Round per Reconfiguration Auction
 - ❖ Opportunity for TCC holders to adjust their position
 - ❖ Captures short term changes in capacity

Centralized TCC Auction - Example

~ 3 Months Prior to Capability Period, Eight Auction Rounds

	% System Capacity (S.C.) Offered	Sub-Auction (Duration)	Round #	% Split / Round
➔	5% of S.C.	2-Year	Round 1	100%
			Round 2	20%
➔	25% of S.C.	1-Year	Round 3	24%
			Round 4	28%
			Round 5	28%
➔	45% of S.C.	6-Month	Round 6	27%
			Round 7	33%
			Round 8	40%
➔	25% of S.C	System Capacity already spoken for from prior Centralized TCC Auctions' 2-Year and 1-Year TCCs (fixed injections)		
➔	100% of System Capacity			

Centralized TCC Auction – Example Timeline for One Auction Round

S	M	Tu	W	Th	F	Sa
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Offering and Bidding period

NYISO performs analysis

NYISO posts Awards on TCC Automation site

For training purposes only
Please refer to TCC Manual Attachment D for the posted timeline

Reconfiguration Auction – Example Timeline for Balance-of-Period Auction

S	M	Tu	W	Th	F	Sa
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	29	30	31	

Offering and
Bidding period

NYISO performs
analysis

NYISO posts Awards on
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For training
purposes only
Please refer to
TCC Manual
Attachment D
for the posted
timeline

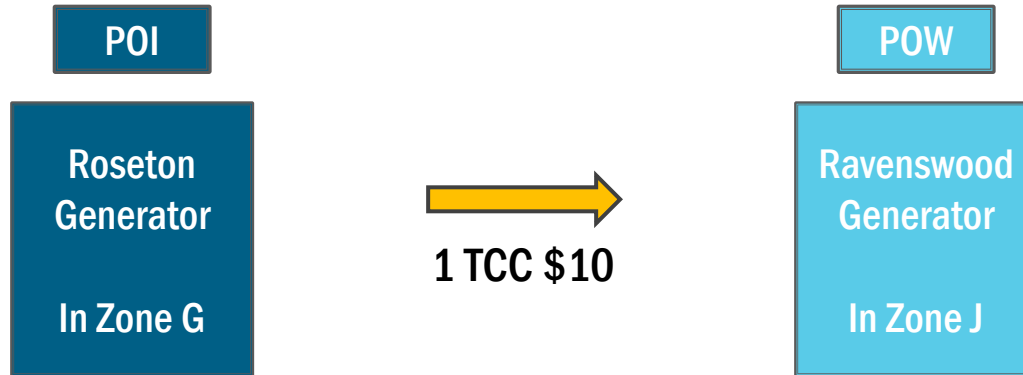
Buying and Selling TCCs

- Offer Parameters to Sell
 - MPs provide the following information per set of TCCs
 - Inventory ID (TCC Contract #)
 - # of TCCs Offered for Sale
 - Minimum Offer Price (\$/TCC)
 - Period ID for Balance-of-Period Auction

Buying and Selling TCCs

- **Bid Parameters to Buy**
 - **MPs provide the following information per set of TCCs**
 - **POI & POW**
 - **# of TCCs Desired**
 - **Maximum Bid Price (\$/TCC)**
 - **Bundle or Unbundle - next slide**
 - **Period ID for Balance-of-Period Auction**

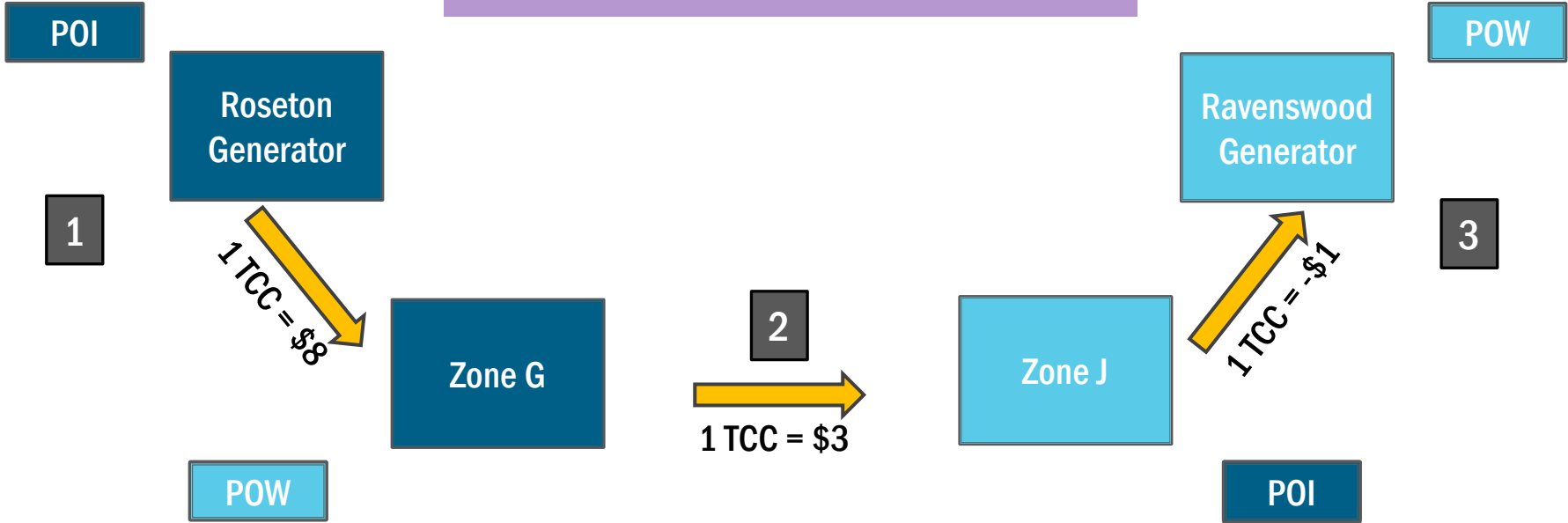
Buying TCCs: Bundle Option



1 TCC Bundled (between 2 Generators) = \$10 Rent

Buying TCCs: Unbundle Option

1 TCC Bundled = 1 TCC Unbundled



1 TCC Unbundled = \$8 + \$3 + (-\$1) = \$10 Rent

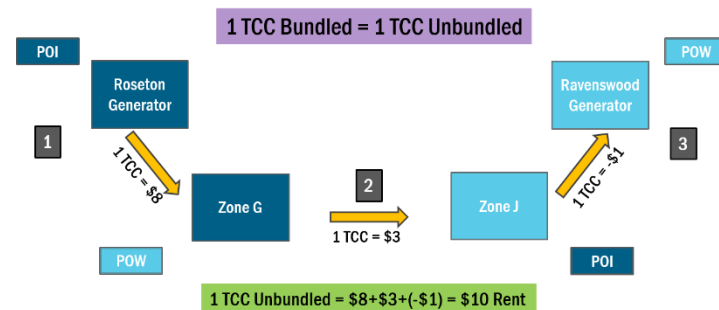
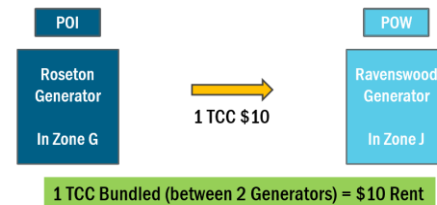
Buying TCCs: Bundle vs. Unbundle Option

- **Bundle vs. Unbundle does not change:**

- Capacity
- Value
- Market Clearing Price

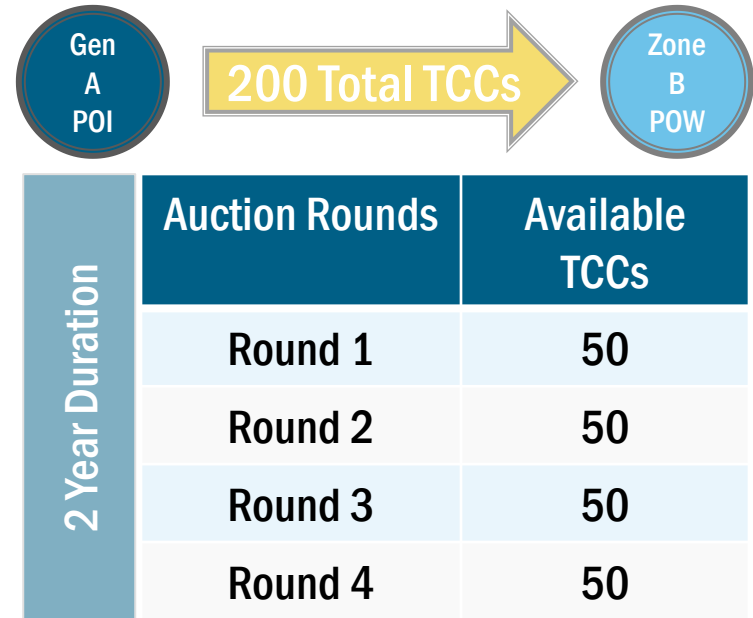
- **Unbundling Option**

- Allows TCC Holder to Sell Components of TCC at Future Auctions
- Has an impact on credit requirement at time of bidding and after if awarded



Establishing TCC Auction Clearing Price

- **Upfront Cost for Obtaining TCCs**
 - Established through Auction Clearing Price
- **Auction Clearing Price Example:**
 - Total Capacity Available from Gen A to Zone B = 200 MW
 - 200 MW of TCC to be offered for sale
 - Four rounds with capacity equally divided
 - 50 MW of TCCs per round



Establishing TCC Auction Clearing Price, cont.

For Round 1:

- Four MPs have requested a total of 60 MW from Gen A to Zone B
 - Bids are for \$/MW for the duration of the TCC

50 MW/Round – Requests for TCC from Gen A to Zone B		
Company	# MWs	Bid \$
Company A	20	\$5/MW for 2 yrs.
Company B	20	\$4/MW for 2 yrs.
Company C	15	\$3/MW for 2 yrs.
Company D	5	\$2/MW for 2 yrs.

Establishing TCC Auction Clearing Price, cont.

NYISO fills request from the highest price until available TCCs or requests are exhausted for the specific Round

Company	Bid \$	MW Requested	MW Awarded	MW remaining in the Round
Company A	\$5/MW	20	20	50-20=30
Company B	\$4/MW	20	20	30-20=10
Company C	\$3/MW	15	10	10-10=0
Company D	\$2/MW	5	0	

The Auction Clearing Price is the price of the next TCC

Auction Clearing Price

TCCs can be requested with negative bids; purchaser is paid to accept the TCCs, same Clearing Price rules apply

TCC Auction Process Re-Cap



Non-Auction TCC Procurement Methods

Non-Auction TCC Procurement Methods

1. Secondary Market TCCs

2. Direct Sale TCCs

3. Incremental TCCs

4. Historic Fixed Price TCCs

5. Non-Historic Fixed Price TCCs

6. ETAs

Non-Auction TCC Procurement Methods

1. Secondary Market TCCs

- Primary Holder arranges sale with a third party
- Primary Holder can change ownership to purchaser
- NYISO will settle with Primary Holder

Non-Auction TCC Procurement Methods

- Transmission owner (TO) can sell or purchase TCCs directly
 - Such offers must be posted on the NYISO OASIS

2. Direct Sale TCCs

Non-Auction TCC Procurement Methods

- Awarded at no cost to MPs that increase the transfer capability of the system by constructing new, or improving existing transmission facilities
 - Minimum of 20 years duration

3. Incremental TCCs

Non-Auction TCC Procurement Methods

4. Historic Fixed Price TCCs

- Awarded to LSEs with expiring Grandfathered TCCs or Rights with prices determined based on historic market data
 - LSEs can choose between an initial 10-year duration of the price or an initial 5-year duration with an opportunity to renew for another 5 years at reset price
 - 12-year initial duration available to certain LSEs with unexpired NYPA power contracts
 - Renewed on a yearly basis

Non-Auction TCC Procurement Methods

- LSEs with qualifying amounts of average load can purchase Non-Historic Fixed Price TCCs that sink in the load zone(s) where they serve load
- Original term is 2 years with prices based on 2-year TCC auction prices
 - LSE has opportunity to renew in 1 year increments up to a total maximum duration of 10 years
 - Renewal prices based on 1-year TCC auction prices

5. Non-Historic Fixed Price TCCs

Non-Auction TCC Procurement Methods

- **ETAs or Existing Transmission Agreements:**
Transmission agreements with Transmission providers arranged prior to the existence of NYISO (pre-December 1999)
 - Preserved through creation of Grandfathered Rights or Grandfathered TCCs
 - ETAs cover the same paths as the power deliveries that were decided upon in the pre NYISO transmission agreements
 - MW quantity and path associated with each ETA listed in the OATT, Att. L

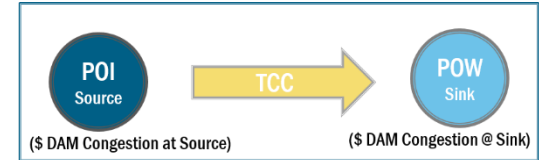
6. ETAs

TCC Settlements – Congestions Rents

TCC Settlements: Congestion Rents

- TCC holders have a Right to Collect or Obligation to Pay DAM Congestion Rents for duration of that TCC

- Congestion Rents are:
 - Settled only in the DAM; Calculated using posted LBMPs
 - For each hour, the arithmetic difference in the congestion component of the DAM LBMP between the sink and the source
- Congestion Rents for settlements are calculated as:

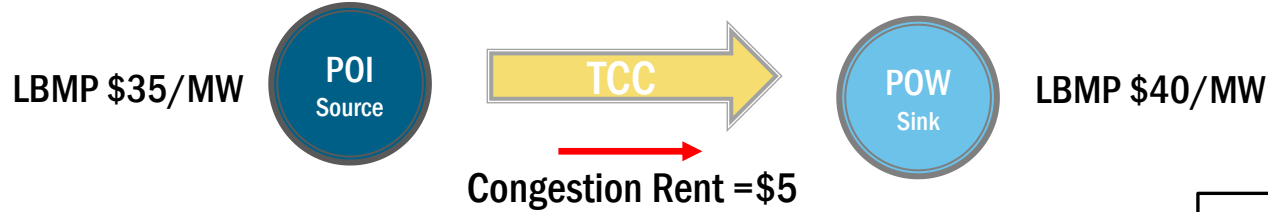


$$\text{Congestion Rent \$} = [(-1 \times \text{DAM Cong Sink Price \$}) - (-1 \times \text{DAM Source Price \$})] \times \# \text{ TCCs}$$

- DAM Congestion Rent Settlements paid/charged through the Consolidated Invoice process

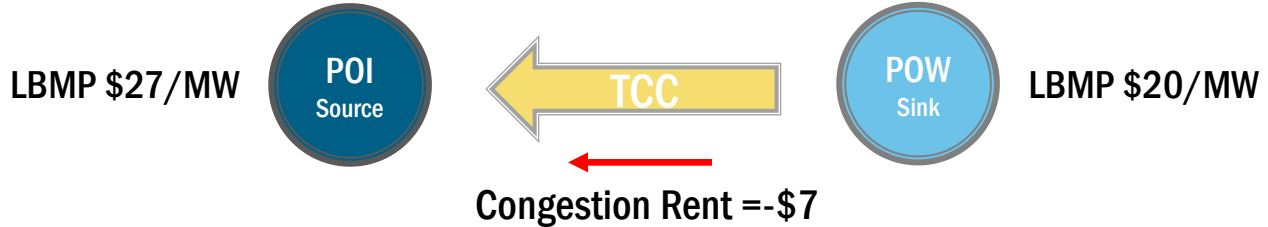
Flow vs. Counterflow TCCs

- “Flow” or positively priced TCCs
 - In direction of historical prevailing flow

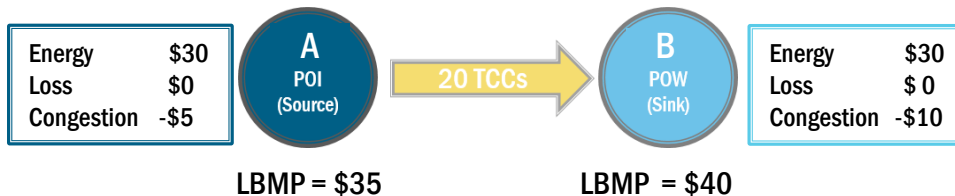


Note: LBMPs do not always reflect direction of the flow

- Counterflow TCCs or negatively priced TCCs
 - Opposite direction of historical prevailing flow



TCC Congestion Rent Calculation for One Hour - Example



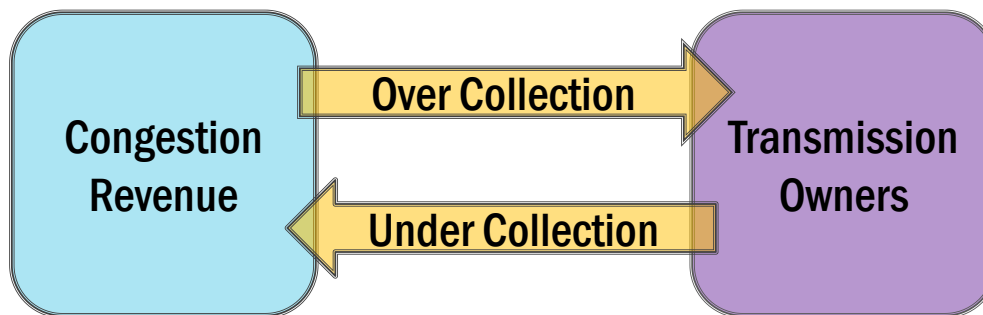
$$\text{Congestion Rent } \$ = [(-1 \times \text{DAM Cong Sink Price } \$) - (-1 \times \text{DAM Source Price } \$)] \times \# \text{ TCCs}$$

$$\begin{aligned}
 &= [(-1 \times -\$10) - (-1 \times -\$5)] \times 20 \\
 &= (\$10 - \$5) \times 20 \\
 &= \$5 \times 20 \\
 &= \$100
 \end{aligned}$$

The Holder collects \$100 rent for 1 hour

TCC Settlements: Congestion Revenue

- The TCC Market is always fully funded
 - Over collection or under collection is settled with certain TOs



TCCs in Action

TCCs in Action

- TCCs can be used:
 - To hedge against Day-Ahead Market congestion costs (price uncertainty)
 - As a financial instrument
 - Potential for revenue via congestion rents

TCCs in Action – As a Hedging Mechanism, Example

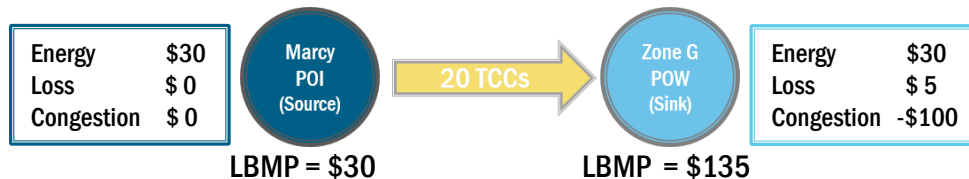
If TCC Holder is an LSE

Congestion Rent from the TCC maybe used to hedge against price of purchasing Energy from the Day-Ahead Market



MP buys 20 MW of TCCs from Marcy to Zone G

TCCs in Action – Example, cont.



LSE buys 20 MWh Energy in the Day Ahead Market at Zone G LBMP of \$135 for 1 Hr

Cost of 20 MWh DAM Energy:

Energy	[\$30 x 20 MW]	= \$600
Loss	[\$5 x 20 MW]	= \$100
Congestion	[(-\$100) x 20 MW]	= \$2,000

LSE pays LBMP for 1 Hr = \$2,700

LSE collects Congestion Rent for the 20 TCCs for 1Hr

$[(-1 \times \text{DAM Cong Sink Price } \$) - (-1 \times \text{DAM Source Price } \$)] \times \# \text{ TCCs}$

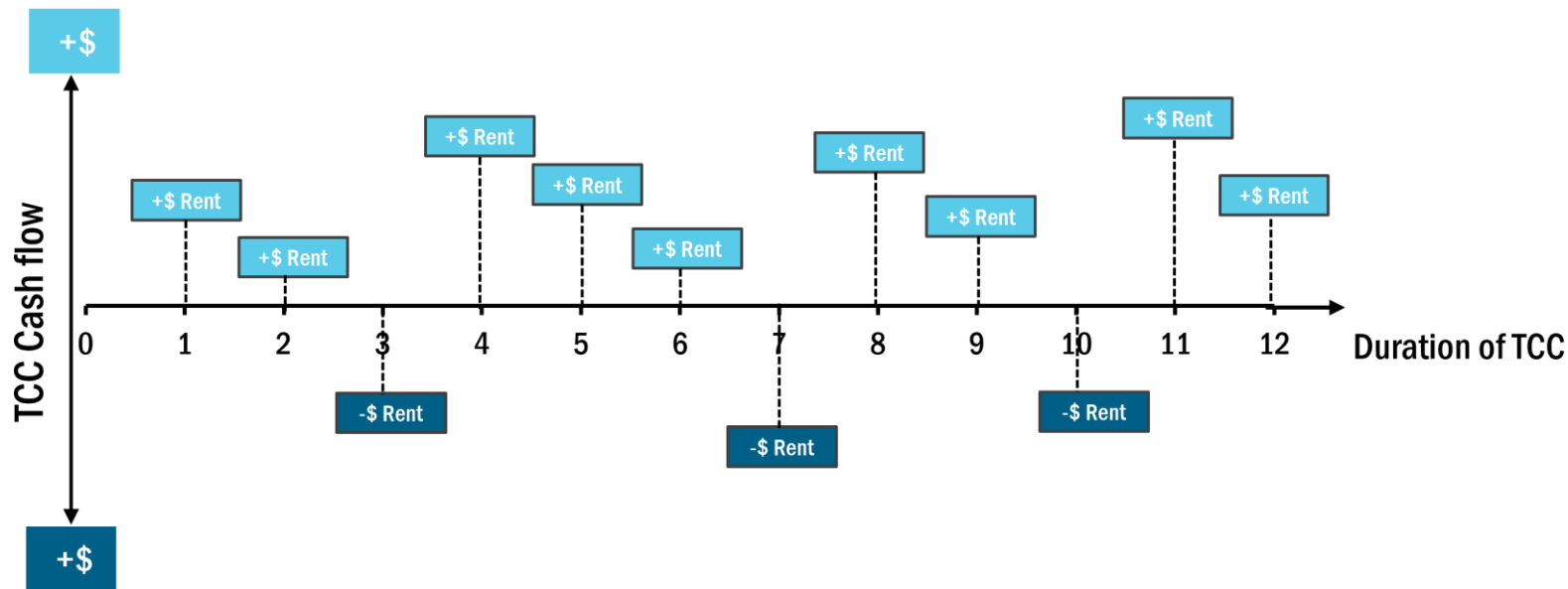
$= [(-1 \times \$100) - (-1 \times \$0)] \times 20$
 $= (\$100 - \$0) \times 20$
 $= \$100 \times 20$
 $= \$2,000$

TCC Holder collects \$2,000 Congestion Rent for 1 Hr

Net Cost/MWh* = \$2,700 - \$2,000 = \$700

* Always read the fine print, plus the cost of the TCC

TCCs in Action – Potential for Revenue

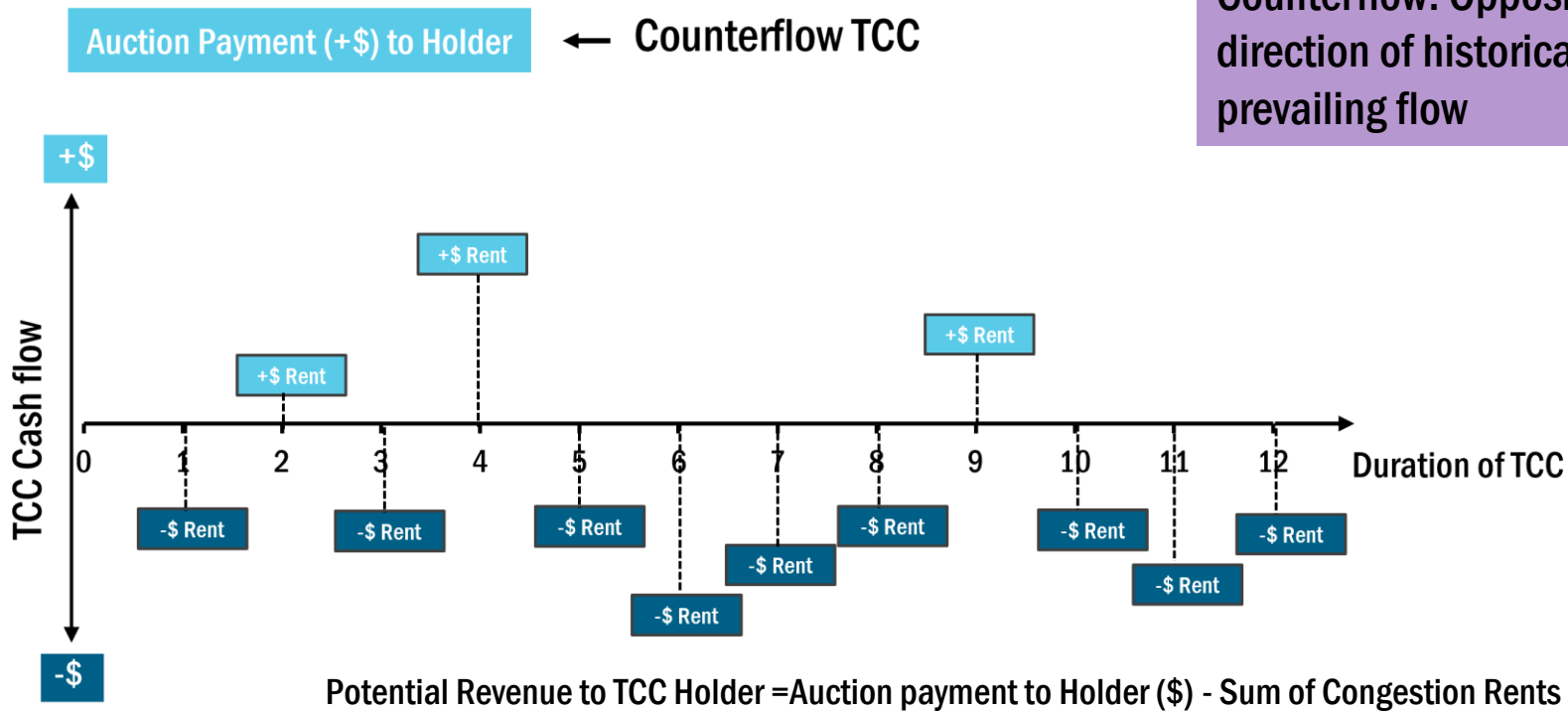


Auction Cost (-\$) to Holder

Potential Revenue to TCC Holder = Sum of Congestion Rents (\$) – Auction Cost to Holder (\$)

TCCs in Action – Potential for Revenue

Counterflow: Opposite direction of historical prevailing flow



TCC – Credit Requirements

TCC Credit Requirement

- Credit Requirement : MP's credit exposure for the TCC market
- Calculated based on
 - Bid/Offer Requirement
 - Auction Obligation (Part A), and
 - Part B Requirement
 - TCC Prepayment

TCC Credit Requirement

=

Bid/Offer Requirement

+

Max ((Max (Auction Obligation Part A Requirement, Part B Requirement) – TCC Prepayment), 0)

Credit Components: Bid/Offer Requirements

- **Bid Requirement:** MPs are required to have a sufficient amount of collateral allocated to the TCC market in order to successfully enter bids to purchase TCCs
- TCC bids are grouped by:
 - TCC Duration = Length of the TCC
 - POI = Point of Injection (the starting point of the TCC)
 - POW = Point of Withdrawal (the ending point of the TCC)
 - Period ID = the specific period of time for which the TCC is effective
- For each bid group, Bid requirement is the maximum cumulative amount of projected exposure

Credit Components: Bid/Offer Requirement

- Offer Requirement: MPs are required to have a sufficient amount of collateral allocated to the TCC market in order to successfully enter offers to sell TCCs
- Offers grouped by POI, POW and Period ID
- For each offer group, Offer Requirement is the highest amount of projected exposure

Credit Components: Bid/Offer Requirement

- Bid/Offer calculations performed on all bid/offer sets and amounts summed up to generate a total Bid/Offer Requirement
- Bid/Offer Requirement stays in place until the auction is settled and TCCs are awarded
 - Post TCC awards, Bid/Offer Requirement is replaced with the Auction Obligation (Part A) credit requirement

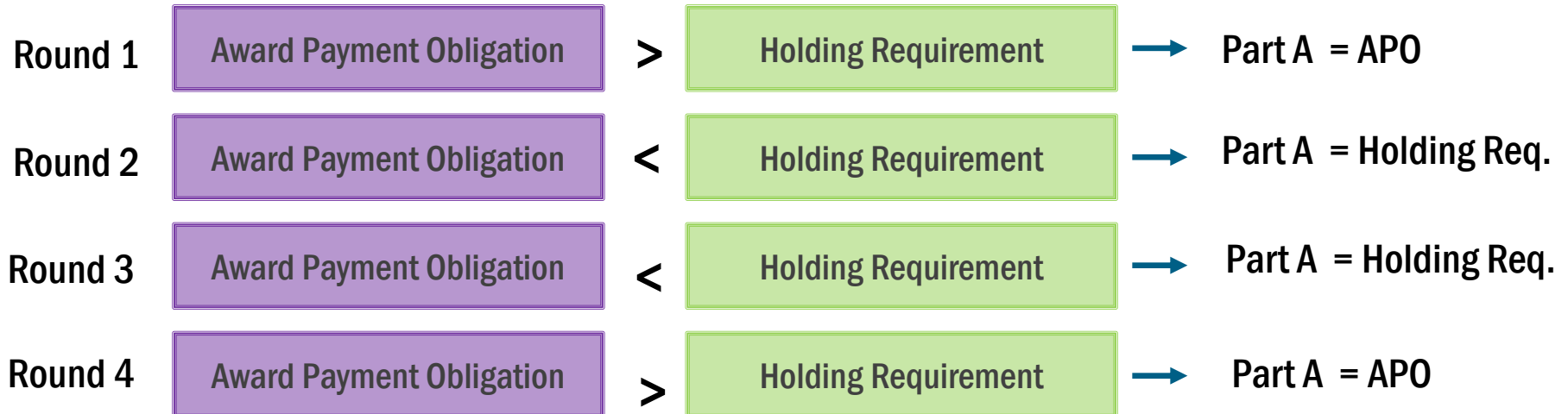
Auction Obligation – Part A

- **Auction Obligation (Part A):** Calculation designed to ensure that the Market Participant awarded the TCC has posted sufficient credit support to cover potential risk associated with the TCC, during the term of the TCC
- **Part A = Max (Award Payment Obligation, Holding Requirement)**
 - **Award Payment Obligation (APO):** Amount owed to (or from) NYISO for awarded TCCs, per round of auction
 - **Holding Requirement:** Calculated amount of collateral MP is required to post in order to cover the risk associated with owning the TCC
 - Calculated periodically over the life of the TCC
 - Specific calculations for TCCs awarded in a Centralized TCC Auction vs. monthly auction (Reconfiguration/Balance-of-Period Auction)

Auction Obligation (Part A)

Auction Obligation calculated for every round of a TCC auction

Example: A Sub-Auction of Centralized TCC Auction consisting of four rounds



At end of all the auction rounds, Award Payment Obligation = zero and
Part A = Holding Requirement

Part B Requirement

- **Part B: Calculation determines projected amount of the TCC holder's payment obligation to the NYISO, if any, considering the net "mark-to-market" value of all TCCs in the TCC holder's portfolio, plus current unpaid congestion rents**
- **Calculation uses historical TCC performance to estimate future TCC performance to potentially mitigate risk**
 - **Daily average congestion rent value, from a 90-day rolling calculation**

TCC Prepayment

- MP request that allows for the use of that MP's excess collateral to pay their TCC invoice
- When utilized, the TCC prepayment can be used to offset the TCC credit requirement

Suspension Policy

- **If the net congestion rents owed to the NYISO exceed 50% of Market Participant's collateral allocated to its TCC credit requirement, the NYISO will request payment or collateral in the amount of congestion rents owed**
 - If the NYISO's request is on a business day, the Market Participant has until 4:00 pm on the same day to comply. The NYISO may suspend trading privileges if the Market Participant fails to comply
 - If the NYISO's request is not on a business day, the Market Participant's bidding privileges may be immediately suspended

Transmission Congestion Contracts

■ Summary

- TCCs
 - Financial, not physical
 - Settled against DAM Only
- Procuring TCCs
 - Auction Process
 - Alternate Procurement Methods
- DAM Congestion Rent
 - Settled through invoice process
- Fully Funded
 - Over or Under Collection of congestion revenues
- TCCs in Action
 - Used as a hedging mechanism or financial instrument

Additional Resources

- **Open Access Transmission Tariff (OATT)**
 - OATT Attachment L
 - OATT Attachment W
- **Market Services Tariff (MST)**
 - MST Attachment K
- **TCC Manual and Attachments**
- **TCC AMS User's Guide**
- **Market Participants User's Guide (MPUG)**

Questions?

For any future assistance, please contact NYISO Stakeholder Services at stakeholder_services@nyiso.com or by phone at (518) 356-6060