

# Constraint Specific Transmission Shortage Pricing: Market Design Proposal

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**Management Committee**

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# Agenda

- **Project Background**
- **Constraint Specific Transmission Shortage Pricing Proposal Summary**
- **Proposed Tariff Revisions**
- **Next Steps**
- **Appendix I: Previous Presentations**
- **Appendix II: Additional Details**

# Project Background

# A Grid in Transition – The Plan

- Carbon Pricing
- Comprehensive Mitigation Review
- DER Participation Model
- Energy Storage Participation Model
- Hybrid Storage Model

Aligning  
Competitive  
Markets and New  
York State Clean  
Energy Objectives



- Enhancing Energy & Shortage Pricing
  - Ancillary Services Shortage Pricing
  - Constraint Specific Transmission Shortage Pricing
  - Enhanced Fast Start Pricing
- Review Energy & Ancillary Services Product Design
  - More Granular Operating Reserves
  - Reserve Enhancements for Constrained Areas
  - Reserves for Resource Flexibility

Valuing Resource  
& Grid Flexibility



- Enhancements to Resource Adequacy Models
- Revise Resource Capacity Ratings to Reflect Reliability Contribution
  - Expanding Capacity Eligibility
  - Tailored Availability Metric
- Capacity Demand Curve Adjustments

Improving Capacity  
Market Valuation



# Project Background

- **This project seeks to develop enhancements to the current transmission constraint pricing (TCP) logic to better align the graduated transmission demand curve mechanism with the severity of transmission constraints**
  - The proposal includes assigning pricing values for shortages that exceed the applicable constraint reliability margin (CRM) value, thereby facilitating reduced reliance on the use of constraint relaxation
- **Project Deliverable: Market Design Complete in Q4 2021**

# Project Background (cont'd)

- **The NYISO will implement both the Constraint Specific Transmission Shortage Pricing proposal and proposed enhancements to be developed as part of the separate “Lines in Series” effort together**
  - In collaboration with stakeholders, the NYISO will separately discuss and develop proposed enhancements for the Lines in Series effort
    - Certain limitations to the current implementation and operation of graduated transmission demand curve mechanisms, together with interim actions taken in response thereto, were previously discussed with stakeholders at the September 10, 2019 ICAPWG/MIWG meeting
    - The Lines in Series effort will seek to develop enhancements to the current measures used for addressing the limitations arising out of the operation of graduated transmission demand curve mechanisms
    - Given the expanded scope of graduated transmission demand curves envisioned by the Constraint Specific Transmission Shortage Pricing proposal, the NYISO believes it is prudent to implement the enhancements developed as part of both efforts at the same time
  - The NYISO currently anticipates implementing these enhancements in 2023

# Proposal Summary

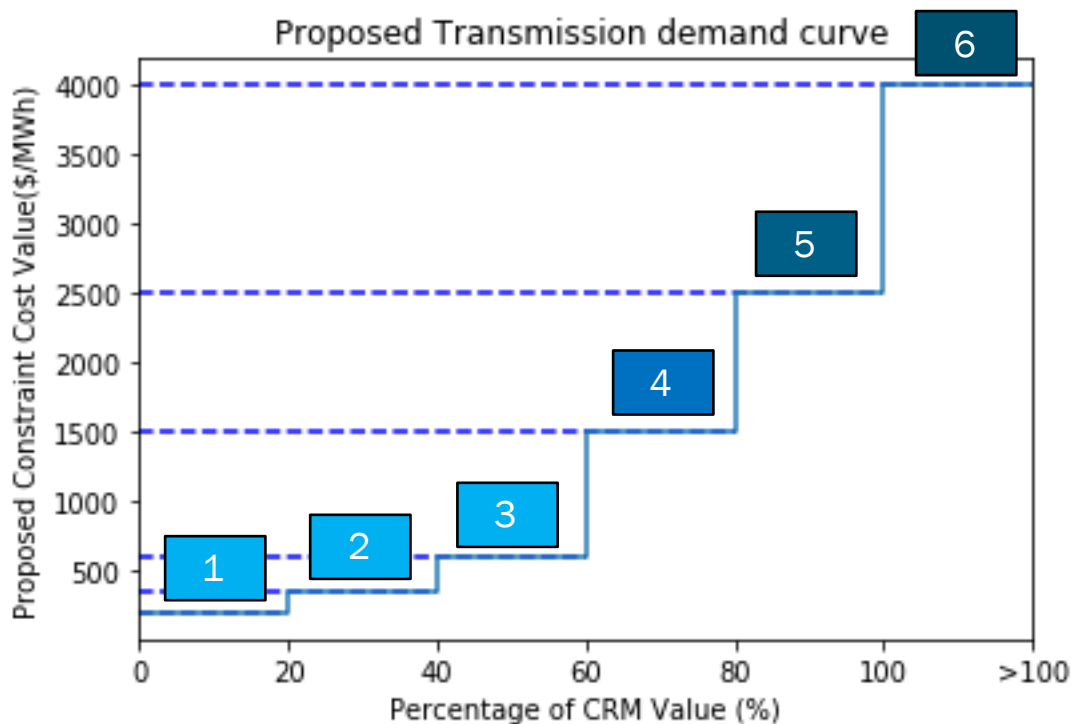
# Summary of NYISO's Proposal

- **The NYISO is proposing to implement a revised approach to the current TCP logic consisting of the following components (additional details and supporting justification is provided in Appendix II):**
  - Establish a revised six-step transmission shortage pricing mechanism for facilities currently assigned a non-zero CRM value (see Slides 9 and 10 and Appendix II for additional details)
    - Each step corresponds to a specified percentage of the applicable CRM value. The final step will price all shortages in excess of the applicable CRM value, thereby facilitating the ability to eliminate reliance on constraint relaxation
  - Apply a non-zero CRM value (e.g., 5 MW) to internal facilities currently assigned a zero value CRM, with a separate two-step transmission demand curve mechanism for such facilities (see Slide 11 and Appendix II for additional details)
    - First step is valued at \$100/MWh. This step would price transmission shortages up to the proposed CRM value.
    - Second step is valued at \$250/MWh. This step would price all shortages in excess of the proposed CRM value, thereby facilitating the ability to eliminate reliance on constraint relaxation
  - Maintain the current single value \$4,000/MWh shadow price capping method for external interface facilities (zero value CRM) permitting the continued use of constraint relaxation for external interfaces (see Appendix II for additional details)



# Proposal for Non-Zero CRM Value Facilities

- The NYISO is proposing following transmission demand curve for facilities currently assigned a non-zero value CRM:



1

- Steps 1, 2 & 3 are priced at \$200, \$350 and \$600 per MWh, respectively

2

- These are based on historical constraint costs for these facilities (study period March 2018-March 2021)

3

4

- Step 4 is priced at \$1,500 per MWh
- This step is based on seeking to facilitate appropriate tradeoff between transmission constraints and reserve products

5

- Step 5 is priced at \$2,500 per MWh
- Provides transition step between Step 4 and 6

6

- Step 6 is priced at \$4,000 per MWh
- Sufficient value to facilitate efficient re-dispatch of higher cost physical resources
- Applies to all shortages in excess of the applicable CRM value

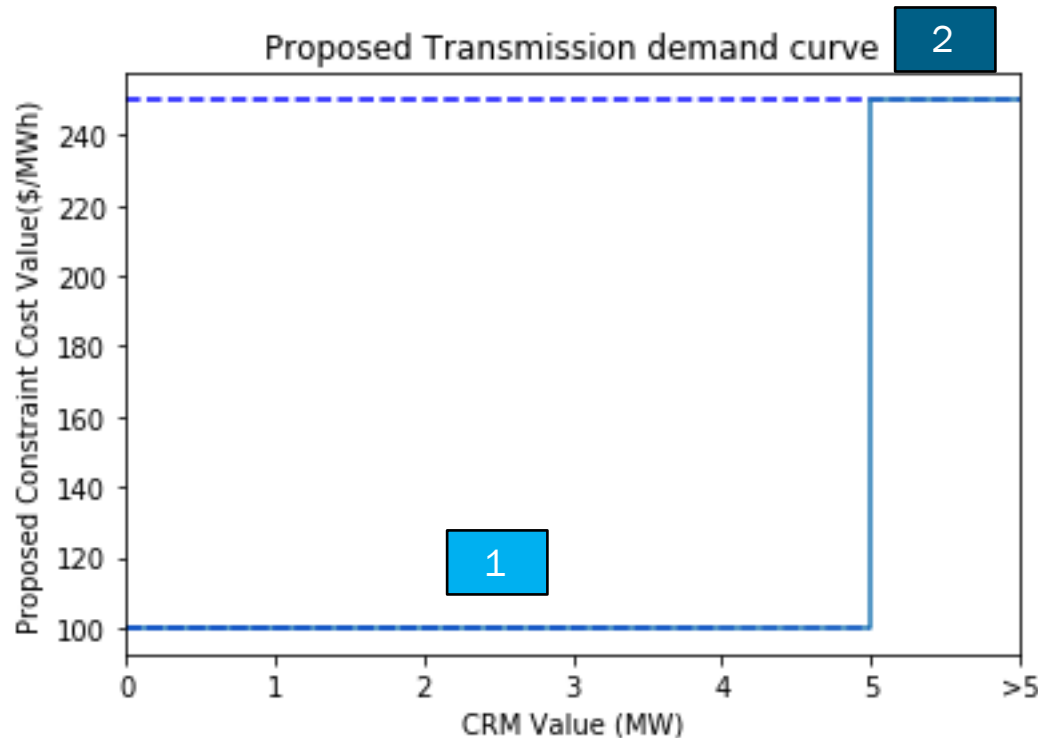
# Proposal for Non-Zero CRM Value Facilities (cont'd)

- The proposed 6-step transmission demand curve structure for various non-zero CRM values is represented in the table below:

CRM Value (MW)	Proposed Transmission Demand Curve steps											
	Step 1 (MW)	Step 1 (\$/MWh)	Step 2 (MW)	Step 2 (\$/MWh)	Step 3 (MW)	Step 3 (\$/MWh)	Step 4 (MW)	Step 4 (\$/MWh)	Step 5 (MW)	Step 5 (\$/MWh)	Step 6 (MW)	Step 6 (\$/MWh)
10	<=2	\$200	>2-4	\$350	>4-6	\$600	>6-8	\$1,500	>8-10	\$2,500	>10	\$4,000
20	<=4	\$200	>4-8	\$350	>8-12	\$600	>12-16	\$1,500	>16-20	\$2,500	>20	\$4,000
30	<=6	\$200	>6-12	\$350	>12-18	\$600	>18-24	\$1,500	>24-30	\$2,500	>30	\$4,000
50	<=10	\$200	>10-20	\$350	>20-30	\$600	>30-40	\$1,500	>40-50	\$2,500	>50	\$4,000
60	<=12	\$200	>12-24	\$350	>24-36	\$600	>36-48	\$1,500	>48-60	\$2,500	>60	\$4,000
65	<=13	\$200	>13-26	\$350	>26-39	\$600	>39-52	\$1,500	>52-65	\$2,500	>65	\$4,000
100	<=20	\$200	>20-40	\$350	>40-60	\$600	>60-80	\$1,500	>80-100	\$2,500	>100	\$4,000

# Proposal for Current Zero Value CRM Internal Facilities

- The NYISO proposes to apply a non-zero CRM value (*e.g.*, 5 MW) to internal facilities currently assigned a zero value CRM and apply the following transmission demand curve :



- Step 1 and 2 are priced at \$100 and \$250 per MWh, respectively
- These values are based on historical cost of solving the transmission constraints for these facilities (study period March 2018 – March 2021)
- Step 2 applies to all shortages in excess of the applicable CRM value

# Proposed Tariff Revisions

# Proposed Tariff Revisions

- **The NYISO proposes revisions to Section 17.1.4 of the Market Administration and Control Area Services Tariff to reflect the proposed enhancements to the current TCP logic**
  - The proposed revisions are posted as part of the material for today's meeting
    - The proposed tariff revisions incorporate stakeholder feedback
- **Proposed revisions to describe the TCP logic enhancements include:**
  - Describing the new six-step transmission demand curve mechanism applicable to all facilities assigned a non-zero CRM value other than certain internal facilities currently assigned a zero value CRM
  - Describing the new two-step transmission demand curve mechanism that will apply to internal facilities currently assigned a zero value CRM that would, as part of the proposal, be assigned a non-zero CRM value (e.g., 5 MW)
    - Tariff revisions specifically require the NYISO to identify the internal facilities subject to the new two-step transmission demand curve and the CRM value assigned to each such facility as part of its existing posting that lists facilities assigned a CRM value other than 20 MW
  - Revisions to the language describing constraint relaxation to limit its application to external facilities (assigned a zero value CRM) that remain subject to the single value \$4,000/MWh shadow price capping method

# Proposed Tariff Revisions (cont'd)

- **The NYISO also proposes revisions to clarify that the TCP logic does not override the rules for real-time market-to-market (M2M) coordination with PJM in circumstances requiring the NYISO to evaluate the ability to provide more economic redispatch of resources in the NYCA to assist with relieving a real-time constraint in PJM's market**
  - In these cases, the M2M procedures specify that the NYISO use a single value pricing mechanism in its software for the PJM constraint to determine whether redispatch by NYISO in real-time is available at a cost lower than the shadow price calculated by PJM for its constraint
  - Please refer to Section 35.23 of Attachment CC of the Open Access Transmission Tariff for additional details regarding the procedures for M2M coordination

# Next Steps

# Next Steps

- ✓ **October 13, 2021 BIC**
  - Seek stakeholder approval
- **October 27, 2021 MC**
  - Seek stakeholder approval
- **Subject to obtaining all required approvals (stakeholders, NYISO Board of Directors, and FERC) and as further described on Slide 6, the NYISO currently anticipates implementing the proposed enhancements in 2023**



# Questions?

# Our mission, in collaboration with our stakeholders, is to serve the public interest and provide benefit to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policymakers, stakeholders and investors in the power system



# Appendix I : Previous Presentations

# Previous Presentations

Date	Working Group	Discussion points and links to materials
September 14, 2021	Market Issues Working Group (MIWG)	<a href="#"><u>Consumer Impact Analysis: Constraint Specific Transmission Shortage Pricing</u></a>
September 14, 2021	Market Issues Working Group (MIWG)	<a href="#"><u>Constraint Specific Transmission Shortage Pricing</u></a>
August 26, 2021	Market Issues Working Group (MIWG)	<a href="#"><u>Constraint Specific Transmission Shortage Pricing</u></a>
June 17, 2021	Market Issues Working Group (MIWG)	<a href="#"><u>Constraint Specific Transmission Shortage Pricing: Updated Analysis and Proposal</u></a>
May 19, 2021	Market Issues Working Group (MIWG)	<a href="#"><u>Constraint Specific Transmission Shortage Pricing: Project Kickoff</u></a>
Nov 21, 2019	Market Issues Working Group (MIWG)	<a href="#"><u>Constraint Specific Transmission Shortage Pricing</u></a>
Feb 15, 2019	Market Issues Working Group (MIWG)	<a href="#"><u>Constraint Specific Transmission Shortage Pricing - Market Design Concept Proposal</u></a>

# Previous Presentations

Date	Working Group	Discussion points and links to materials
October 2, 2018	Market Issues Working Group (MIWG)	<a href="#"><u>Constraint Specific Transmission Shortage Pricing – Study Review</u></a>
August 7, 2018	Market Issues Working Group (MIWG)	<a href="#"><u>Constraint Specific Transmission Shortage Pricing – High Level Design Considerations</u></a>
June 25, 2018	Market Issues Working Group (MIWG)	<a href="#"><u>Constraint Specific Transmission Shortage Pricing – Analysis Update</u></a>
April 10, 2018	Market Issues Working Group (MIWG)	<a href="#"><u>Constraint Specific Transmission Shortage Pricing – Study Approach</u></a>

# Appendix II: Additional Details

# Proposal for Non-Zero CRM Value Facilities

# Rationale for the First Three Steps

- **The first three steps are proposed to be structured to facilitate reliance on as much efficient physical redispatch as possible prior to utilizing relief provided by the transmission demand curve mechanism**
  - Constraint shadow cost represents the marginal cost of resolving a constraint and is assumed to be a proxy for the cost of physical redispatch
- **The steps of the transmission demand curve shall be graduated to help reduce unnecessary pricing volatility while reflecting an increasing constraint cost based on the severity of constraint**



# Rationale for the First Three Steps (cont'd)

- **The NYISO analyzed the historical binding RTD transmission constraints for non-zero CRM value facilities**
  - Study period for the analysis is March 2018 - March 2021
  - RTD constraints with Shadow Price of less than \$0.04 per MWh were removed from the dataset
    - Only constraints with a Shadow Price greater than \$0.04 per MWh are considered as active constraints (see MST Section 23.3.1.1.1.2)
  - Historic transmission constraint cost at various percentage level thresholds is calculated
    - Represents the historic cost associated with resolving the specified percentage value of transmission constraints
  
- **The table below summarizes the RTD transmission constraint cost at various percentage level thresholds for non-zero CRM value facilities**

Percentiles	90%	91%	95%	97%	98%	99%
Historic Constraint cost (\$/MWh)	160	180	350*	350*	583	1175*

\* These values correspond to the current steps of the graduated transmission demand curve mechanism

# Rationale for the First Three Steps (cont'd)

- **The NYISO is proposing to base the first three steps of the graduated transmission demand curve for non-zero value CRM facilities on >90 percentile of historic transmission constraint cost for these facilities**
  - These three steps will price flows corresponding to “0-20%”, “20-40%” and “40-60%” of the applicable CRM value for the transmission facility
- **To provide a more graduated transmission demand curve, the NYISO proposes the following values for the first three steps:**
  - First step valued at \$200/MWh (informed by 91 percentile of historic transmission constraint cost)
  - Second step valued at \$350/MWh (95 percentile of historic transmission constraint cost)
  - Third step valued at \$600/MWh (informed by 98 percentile of historic transmission constraint cost)

# Rationale for the First Three Steps (cont'd)

- **Supplemental analysis of base case constraints vs post-contingency constraints**

- This analysis was requested by stakeholders to assess the appropriateness of the first three steps based on historic costs across base case and post-contingency constraints for non-zero value CRM facilities

	Percentage of constraints having historic constraint cost less than \$600 /MWh
Base Case Constraints	98.9%
Post-Contingency Constraints	97.6%

- The results above show that the third step captures ~98 percentile of historic constraint costs across both types of thermal constraints supporting the NYISO's proposal to not differentiate pricing values by constraint type

# Rationale for the Fourth Step

- **The fourth step of the transmission demand curve is proposed to be \$1,500 per MWh**
  - It is structured to assist with maintaining appropriate tradeoffs with meeting other market constraints, such as Operating Reserves
  - This step will price flows corresponding to “60-80%” of the applicable CRM value for the transmission facility
- **A simulation was used to determine the price level at which the economic dispatch would begin going short of the 1,300 MW of SENY 30-minute reserves valued at \$500/MW and converting that reserve to energy to solve the transmission overload on Leeds-PV line**
  - This occurred at a value of approximately \$1,500 per MW considering an average shift factor of approximately 33% for SENY resources on the Leeds-PV constraint

# Rationale for the Fifth Step

- **The fifth step of the transmission demand curve is proposed to be \$2,500 per MWh**
  - Value for the fifth step is designed to provide for a graduated price increase between the fourth and final (sixth) step
  - This step will price flows corresponding to “80-100%” of the applicable CRM value for the transmission facility

# Rationale for the Final (Sixth) Step

- **The final (sixth) step of the transmission demand curve is proposed to be \$4,000 per MWh**
  - The proposed final step would provide pricing of transmission shortages in excess of the applicable CRM value, thereby facilitating the ability to eliminate reliance on constraint relaxation for facilities assigned a non-zero CRM value
  - This value is designed to be sufficient to facilitate efficient re-dispatch of higher cost physical resources
    - For example, this pricing value would be sufficient to facilitate redispatch of a resource with a 25% shift factor and a cost of \$1,000 per MWh
  - This step will price flows corresponding to “>100%” of the applicable CRM value for the transmission facility

# Proposal for Internal Zero CRM Value Facilities

# Rationale for the Proposed Steps

- **The steps are proposed to be structured to facilitate reliance on as much efficient physical redispatch as possible prior to utilizing relief provided by the transmission demand curve mechanism**
  - Constraint shadow cost represents the marginal cost of resolving a constraint and is assumed to be a proxy for the cost of physical redispatch
- **The NYISO analyzed the historical binding RTD transmission constraints for internal zero CRM value facilities**
  - Study period for the analysis is March 2018 - March 2021
  - RTD constraints with Shadow Price of less than \$0.04 per MWh were removed from the dataset
    - Only constraints with a Shadow Price greater than \$0.04 per MWh are considered as active constraints (see MST Section 23.3.1.1.1.2)
  - Transmission constraint cost at various percentage level thresholds is calculated
    - Represents the historic cost associated with resolving the specified percentage value of transmission constraints



# Rationale for the Proposed Steps (cont'd)

- The table below summarizes the RTD transmission constraint cost at various percentage level thresholds for internal zero CRM value facilities

Percentiles	90%	91%	95%	97%	98%	99%
Constraint cost (\$/MWh)	51	53	72	102	129	217

- The NYISO is proposing following values for the two steps
  - First step valued at \$100/MWh (informed by 97 percentile of historic transmission constraint cost)
  - Second step valued at \$250/MWh (informed by 99 percentile of historic transmission constraint cost)

# Rationale for the Proposed Steps (cont'd)

- **The proposed final step is informed by 99 percentile of historic transmission constraint cost, and would price transmission shortages beyond the CRM value to be assigned to these facilities (*e.g.*, 5 MW), thereby facilitating the ability to eliminate reliance on constraint relaxation for these facilities**
  - The proposed value is designed to facilitate reliance on as much efficient physical redispatch as possible prior to utilizing the final step that covers shortages beyond the proposed CRM value
  - The NYISO will continue to monitor and evaluate the pricing value of the final step based on operational experience in an effort to maintain alignment with the objective of facilitating efficient re-dispatch of higher cost physical resources providing relief on these facilities

# Proposal for External Interfaces

# Proposal for External Interfaces

- **The NYISO will continue use of the current single value \$4,000 per MW Shadow Price capping mechanism for external interfaces (*i.e.*, the current pricing logic for facilities assigned a zero value CRM)**
- **Rationale for the proposal**
  - NERC rules require external interfaces to be scheduled to the same limit as the neighboring control areas. Due to the need to schedule to the same limit with external interfaces a CRM is not applied