

Graduated Transmission Demand Curve (GTDC)

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MIWG

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KCC

Agenda

- ◆ **Background and Review**
- ◆ **Recommendation**
- ◆ **Potential Result of GTDC**
- ◆ **Management of Actual Shortages**
- ◆ **Next Steps**
- ◆ **Appendix**
 - *Review of Inefficiency*
 - *Overview of Shortage Pricing*
 - *Peer Comparison*
 - *Response to Stakeholder Feedback*

Background

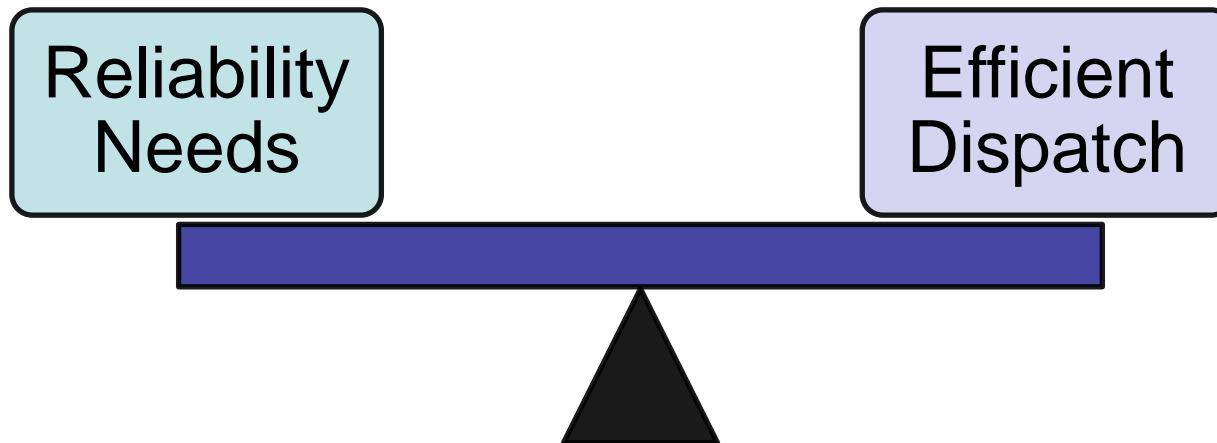
- ◆ **Energy Market Prices should accurately reflect the costs of securing the transmission system even under shortage conditions**
- ◆ **The NYISO's IMM has recommended that the NYISO pursue development of a graduated Transmission Demand Curve to improve the accuracy of Transmission Shortage costs**

Background

- ◆ During transmission shortage conditions, SCUC/RTC/RTD incurs a redispatch shadow cost up to a limit of \$4,000
- ◆ SOM suggests “...this [\$4,000] level may be higher than the true value of certain shortages...” *(2012 NYISO SOM Recommendation #10)*

Balancing Act

- ◆ **Efficient energy pricing balances system reliability needs and efficient dispatch**



Recommendation Review

Transmission Shortage (MW)	>0 to 5	>5 to 20	>20
Curve Price (\$)	\$350	\$1,175	\$4,000

- ◆ **A multipoint shortage cost curve for transmission constraints would lead to:**
 - *More efficient dispatch and commitment actions*
 - *More efficient pricing outcomes*

Sample Transmission Constraints

RTD	Today	Proposed
3 MW Short	\$4,000	\$350
5 MW Short	\$4,000	$\geq \$350, < \$1,175$
9 MW Short	\$4,000	\$1,175
20 MW Short	\$4,000	$\geq \$1,175, < \$4,000$
23 MW Short	\$4,000	\$4,000

- ◆ **Previously transmission shortages up to 20MWs would have resulted in \$4,000 shadow prices**
 - ◆ **The proposed graduated approach would result in lower shadow prices for similar shortages**

Potential Result of GTDC

◆ Sample Duration Analysis

Transmission Facility				
Event ID	Time Stamp	Redispatch (MW)	Demand (MW)	Shadow Cost
A	1/1/2013 10:00	1	0	\$400
B	1/12/2013 11:00	5	0	\$500
B	1/12/2013 11:05	10	0	\$2,000
B	1/12/2013 11:10	26	0	\$900
C	1/20/2013 11:50	0	2	\$4,000
D	1/20/2013 12:00	4	0	\$1,200

Example of a Calculation			
Number of Minutes between 1/1/2013 10:00 and 1/20/2013 12:00	Number of Events lasting at least 15 minutes (Event B)	Number of consecutive minutes with \geq \$350 Shadow Price where the event was at least 15 minutes in duration	Percent of All minutes with \geq \$350 Shadow Prices where events were at least 15 minutes in duration
		(1 event * 15 minutes, length of event B)	(Total Consecutive Mins with \geq \$350SP / All Minutes) (15minutes / 27,480 minutes)
27,480 minutes	1 event	15 minutes	0.05%

- ◆ Event A lasted 5 minutes with 1 MW of redispatch and a shadow cost of \$400 for that redispatch
- ◆ Event B counted as lasting 15 minutes with three separate shortages and shadow prices resulting from three separate RTD runs
 - *This data set shows .05% of all minutes between 1/1/2013 10:00 and 1/20/2013 12:00 had a shadow price greater than or equal to \$350 that lasted 15 minutes*
- ◆ Event C shows 2 MW of transmission demand being dispatched at \$4000

Potential Result of GTDC

- ◆ **Duration Analysis of East Garden City to Valley Stream facility**
 - ◆ *This facility was constraining more often than any other facility in the NYCA during the timeframe analyzed*

Duration	Percent of All Minutes
>15 minutes	0.89%
>30 minutes	0.54%
>60 minutes	0.30%
>120 minutes	0.14%

- ◆ **Results are cumulative**
- ◆ **Percent of all minutes between 10/20/12 and 8/13/13 with a shadow price greater than or equal to \$350, and lasting longer than the respective minute duration range**

Potential Result of GTDC

- ◆ **Redispatch Analysis of East Garden City to Valley Stream facility**

Duration	Average MW
>15 minutes	1.9
>30 minutes	2.1
>60 minutes	2.3
>120 minutes	1.4

- ◆ **Average MW of redispatch or demand needed for each duration range (in minutes)**
- ◆ **Table is based on data for all constraint costs greater than or equal to \$350**

Management of Actual Transmission Shortages

- ◆ **The NYISO's objective is to operate the NYS Transmission System within the Normal State**
 - *This objective would remain after implementation of the proposed graduated transmission demand curve*
 - Whenever outside the Normal State, operator action is taken to return to the Normal State
 - *When dealing with actual transmission overloads, time permitting, operators would align the market model with actual conditions through limit adjustments before relying on other actions to maintain reliability criteria*
- ◆ **Warning State Basics:** Source: (Transmission & Dispatching Operations Manual)
 - *Actual loading on any part of the transmission system is above Normal Rating and less than the LTE rating for not more than 30 minutes; or*
 - *Exceeds its Normal Rating by less than 5% and corrective actions are not effective within 10 minutes*
- ◆ **Alert State Basics:** Source: (Emergency Operations Manual)
 - *When a facility becomes loaded above its LTE rating, but below its STE rating for less than 5 minutes corrective action must be taken to return to the LTE rating or lower within 15 minutes*
- ◆ **Major Emergency State Basics:** Source: (Emergency Operations Manual)
 - *When a transmission facility becomes loaded above its LTE rating for greater than 5 minutes, immediately if system condition warrant immediate declaration of the Emergency State*
 - *Or when a transmission facility becomes loaded above its STE rating*

Document Revisions

- ◆ **Tariff** (*Actual Proposed Tariff Language can be found separately*)
 - ***MST 17 Attachment B***
 - Change reference to Transmission Shortage Cost
 - ***MST Definitions***
 - ***OATT Definitions***
- ◆ **Manuals**
 - ***Transmission & Dispatching Operations Manual***
 - Section 6.3.6 Demand Curve table will need to be updated
 - ***Day-Ahead Scheduling Manual***
 - Section 4.3.4 Demand Curve table will need to be updated
- ◆ **User Guides**
 - ***No Changes***
- ◆ **Technical Bulletins**
 - ***No Changes***

Next Steps

- ◆ Request endorsement of proposal at December 11, 2013 BIC
- ◆ Questions/Comments – Please provide feedback to Ethan Avallone (eavallone@nyiso.com) or Mike DeSocio (mdesocio@nyiso.com)

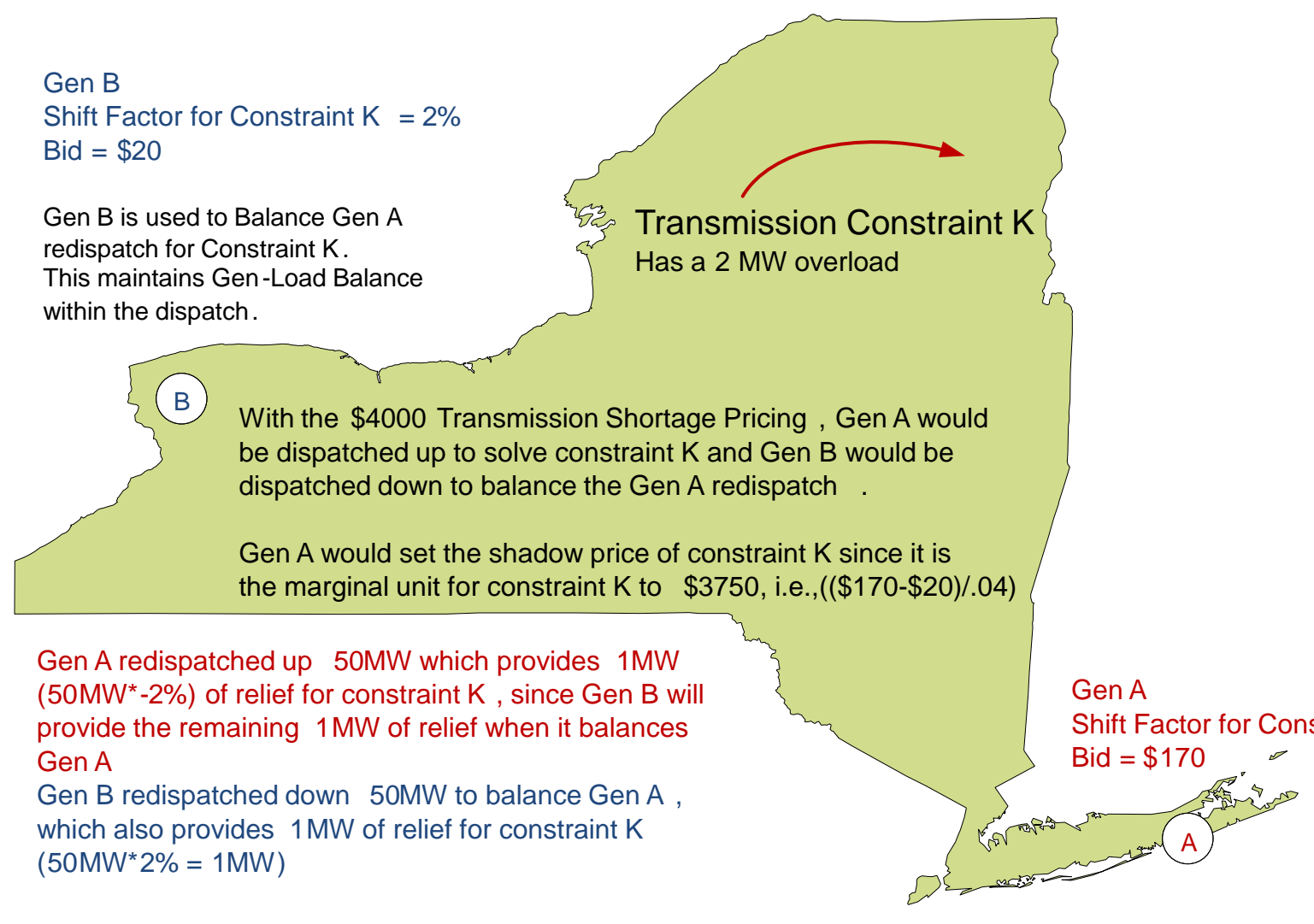
Appendix:

- ◆ **Review of Inefficiency**
- ◆ **Overview of Shortage Pricing**
- ◆ **Peer Comparison**
- ◆ **Analysis Supporting Recommendation**
- ◆ **Expected Impact of Recommendation**

Review of Inefficiency

Gen B
 Shift Factor for Constraint K = 2%
 Bid = \$20

Gen B is used to Balance Gen A
 redispatch for Constraint K.
 This maintains Gen-Load Balance
 within the dispatch.



Transmission Constraint K
 Has a 2 MW overload

B

With the \$4000 Transmission Shortage Pricing , Gen A would be dispatched up to solve constraint K and Gen B would be dispatched down to balance the Gen A redispatch .

Gen A would set the shadow price of constraint K since it is the marginal unit for constraint K to \$3750, i.e., $((\$170-\$20)/.04)$

Gen A redispatched up 50MW which provides 1MW (50MW*-2%) of relief for constraint K , since Gen B will provide the remaining 1MW of relief when it balances Gen A

Gen B redispatched down 50MW to balance Gen A , which also provides 1MW of relief for constraint K (50MW*2% = 1MW)

Gen A
 Shift Factor for Constraint K = -2%
 Bid = \$170

A

Review of Inefficiency

- ◆ **Small overloads can lead to inefficient use of NYCA resources**
 - *In the previous example, 100MW of redispatch was incurred to solve a 2MW overload that existed for only 5 minutes*
- ◆ **With the current single step \$4,000 transmission shortage cost, the NYISO must pursue this inefficient dispatch because the shortage-defined \$4000 threshold had not been met**
- ◆ **A graduated or stepped transmission shortage cost would allow us to set gradually increasing shortage prices as determined by the severity of the overload and improve the efficiency of the dispatch**

Overview of Shortage Pricing

- ◆ Shortage Pricing Hierarchy with Reserve Shortage Costs Cascaded

First
↓
Last

Product	Location	Shortage Amount (MW)	Shortage Cost (\$)
Regulation	NYCA	0 to 25	\$80
Regulation	NYCA	>25 to 80	\$180
30 Minute Total	West	ALL	\$200
30 Minute Total	East	ALL	\$225
30 Minute Total	LI	ALL	\$250
Transmission	ALL	0 to 5	\$350
Regulation	NYCA	>80	\$400
10 Minute Total	West	ALL	\$650
10 Minute Spinning	West	ALL	\$1,150
Transmission	ALL	> 5 to 20	\$1,175
10 Minute Total	East	ALL	\$1,175
10 Minute Total	LI	ALL	\$1,225
10 Minute Spinning	East	ALL	\$1,700
10 Minute Spinning	LI	ALL	\$1,775
Transmission	ALL	>20	\$4,000

Regulation
10 Minute Total
10 Minute Spinning
30 Minute Total
Transmission

Peer Comparison

- ◆ **Transmission Demand Curves at other ISOs:**

<u>ISO</u>	<u>MW Steps</u>	<u>Cost Steps</u>
CAISO	ALL	\$1,500
MISO	Varies by Voltage Level and Overload	\$400 to \$4,000
NYISO (Current)	ALL	\$4,000
NYISO (Proposed)	0 to 5, >5 to 20, >20	\$350, \$1,175, \$4,000
ISONE	No Transmission Shortage Costs	No Transmission Shortage Costs

Stakeholder Feedback

- ◆ **During the September 27, 2013 MIWG, the NYISO stakeholders provided the following feedback regarding the proposal:**
 - *Impact of Natural Gas Prices*
 - *The size of the first demand curve step and its impact on reliability*
 - *Consider revising the proposal to use percentage vs. whole MW*

Natural Gas Price Impact

- ◆ **The NYISO's Quarterly SOM Report will continue to analyze the efficiency of the NYISO Energy Markets which includes the impact of natural gas prices**
 - *Report will continue to address necessary refinements to the NYISO Energy Market to improve and/or maintain market efficiency*

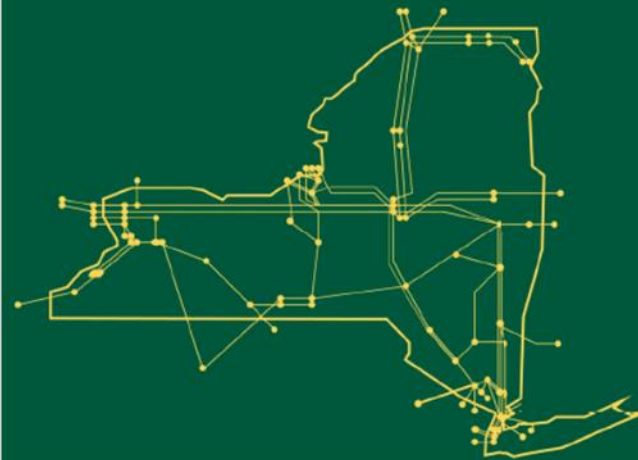
Demand Curve MW Step Size

- ◆ The demand curve MW step/dollar amount reflects the shortage price appropriate to maintain efficient dispatch when relaxing a transmission constraint the equivalent number of MWs
 - *These new MW steps are within the established reliability margin currently modeled in the market solution*
 - *Normal Margins are 20 MW for line constraints and 100MW for interface constraints*
- ◆ Historically, the NYISO has not observed sustained transmission overloads with large shadow prices
 - *Operators manage overloads impacting reliability through market model limit adjustments*
- ◆ The NYISO has the authority to update transmission demand curve with coordination from the IMM and its stakeholders, should the shortage pricing negatively impact NYCA **reliability** (MST Attachment B, 17.1.4)

MW Steps as a Percent

- ◆ **Some stakeholders suggested that a percentage basis (instead of MW basis) would be a more appropriate application of demand step size**
 - *The NYISO believes that an overload on any facility should be treated the same way regardless of the size of the facility*
- ◆ **Operational procedures are based on numeric MW Overloads**
 - *A percentage approach is inconsistent with current operational practices*

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