Graduated Transmission Demand Curve (GTDC)

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KCC

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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**

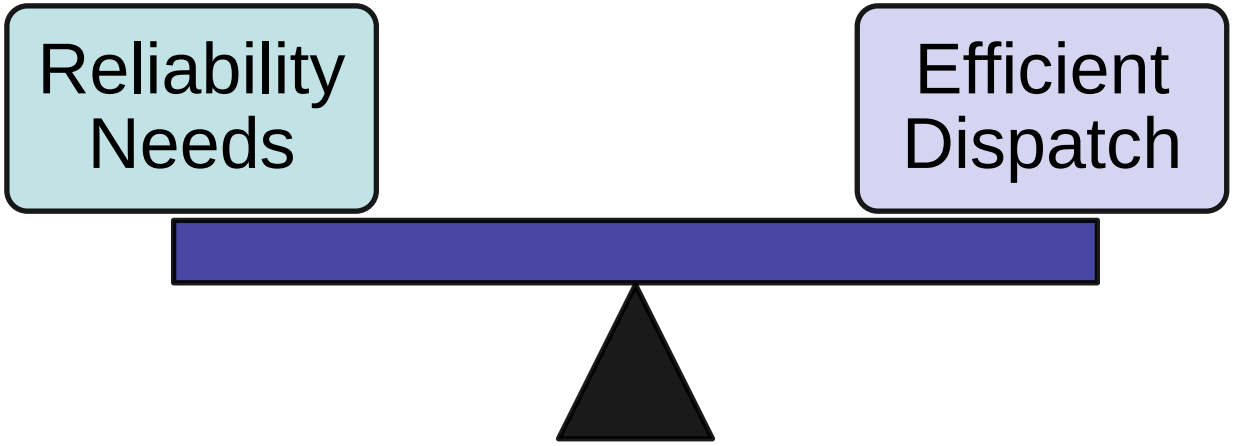
Background

- 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 ($/MWh)	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

Transmission Shortage	Constraint Shadow Price *Today*	Constraint Shadow Price *Proposed*
>0 to 5 MW Short	$4,000/MWh	$350/MWh
5 MW Short	$4,000/MWh	>=$350/MWh to <$1,175/MWh*
>5 to 20 MW Short	$4,000/MWh	$1,175/MWh
20 MW Short	$4,000/MWh	>=$1,175/MWh to <$4,000/MWh*
>20 MW Short	$4,000/MWh	$4,000/MWh

*Based on availability and costs of resources that could be dispatched to solve the constraint.

- **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 >=$350 Shadow Price where the event was at least 15 minutes in duration (1 event * 15 minutes, length of event B)	Percent of All minutes with >=$350 Shadow Prices where events were at least 15 minutes in duration (Total Consecutive Mins with >$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)

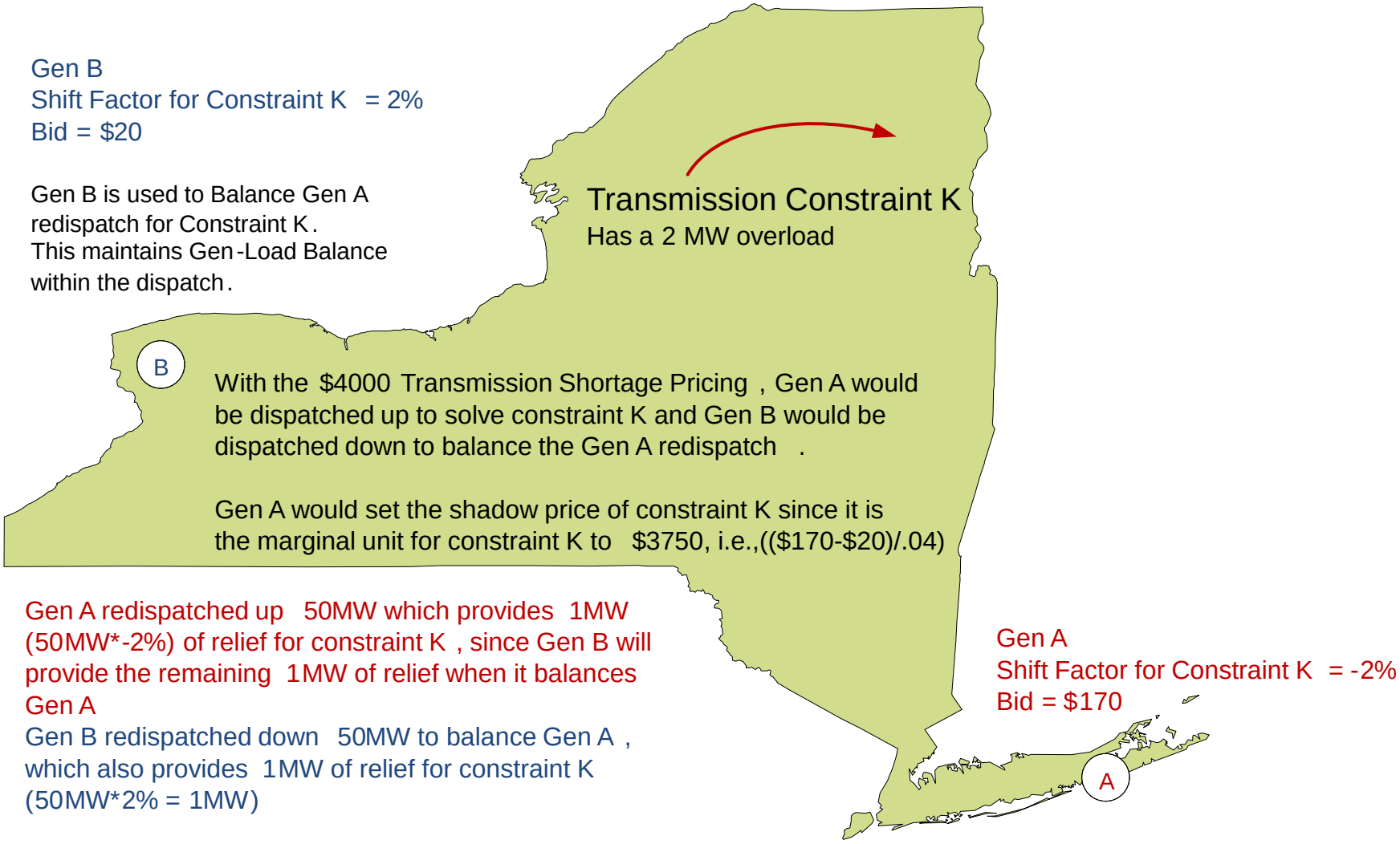
Appendix:

- 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.



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

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:**

ISO	MW Steps	Cost Steps
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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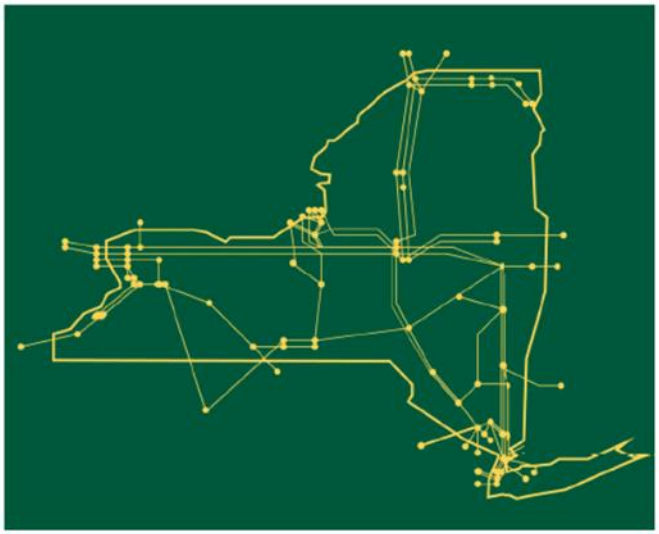

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