



PJM Price-Setting Changes

Reduce uplift where possible without removing consistency between LMP and dispatch signals.

- Incremental and no-load costs for units sitting at min for
 - Reactive/Voltage Support
 - Thermal Constraints
 - Blackstart
- Startup costs do not appear to be a large contributor

- Sensitive areas
 - BGE/PEP for APSOUTH/BED-BLA
 - Seneca area of PN when Seneca pumping
 - DPL actual high voltages
 - CLVLND Interface area of ATSI

- Extend existing logic for price-setting of inflexible units to generators sitting min for a transmission constraint (reactive/voltage or thermal) to set LMP
 - Already done for CTs that are not dispatchable
- Model and bind the constraints these generators are running for in real-time and day-ahead
 - Likely closed-loop interfaces
- Ensure these facilities are modeled appropriately in FTR Auctions

- More congestion on the system (DA and RT)
- Higher prices in areas where generation is running under these circumstances
 - Closed loop interface will avoid lowering generation
- Incremental costs will be removed from uplift as long as these constraints bind
 - Reduction in uplift

- Review Tariff/OA/Manual language to see if changes are required
 - Initial opinion is no. Still under review.
- Identify units and facilities to be addressed
 - Go after the heavy hitters first
- Identify and post facilities that will be bound in DA/RT for 14/15 FTR auction modeling
- PJM will need software changes to implement this

- Which facilities?
 - Use existing facilities but may need new interfaces
 - BC/PEPCO Interface
 - CLVLND Interface
 - DPL Interface
 - PN Interface
 - Not the complete set...just what's been discussed at PJM so far

- At what point is it better to have uplift instead of increased congestion?
- Should we only bind the facilities when there is a potential issue with the unit offline?
 - Binding just due to unit being on (min run time) even if not needed
- Others?

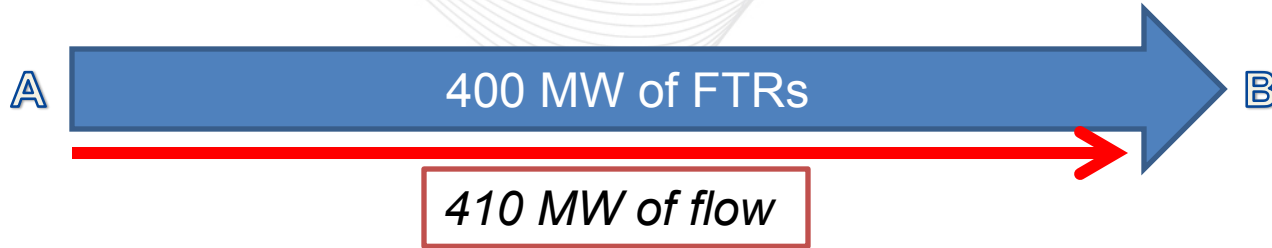
- Further discussion
 - Now
 - Jan/Feb MIC and EMUSTF
- February
 - Announce/post facilities to be modeled in FTR auction
- June 1, 2014
 - Implementation of new logic



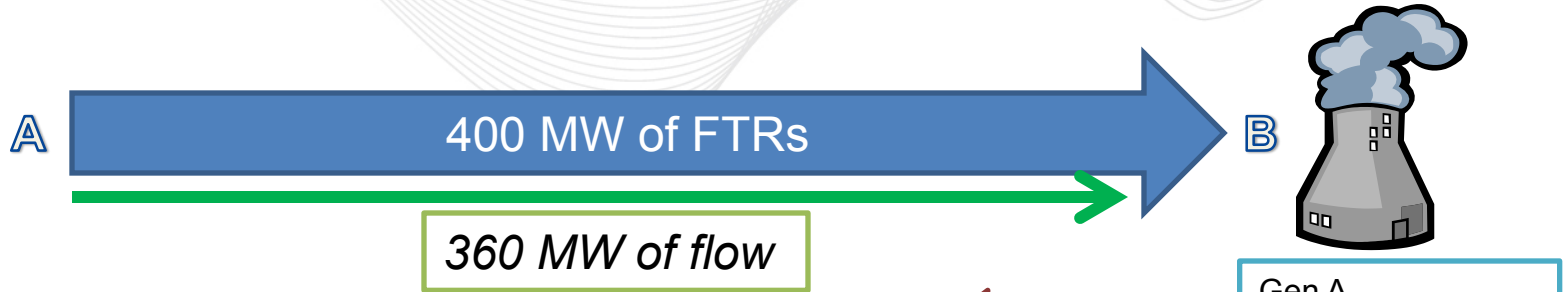
APPENDIX: EXAMPLES



- Line A→B
- 400 MW rating
- 400 MW of FTRs sold from A→B



- In real-time, absent the commitment of generation, the line would be overloaded
- PJM must take action to alleviate



- By running Gen A at min, it pushes back on A→B

- 50 MW push back
 - $250 * .25 = 50 \text{ MW}$
- Flow down to 90%
 - $(410 - 50) / 400 = 90\%$

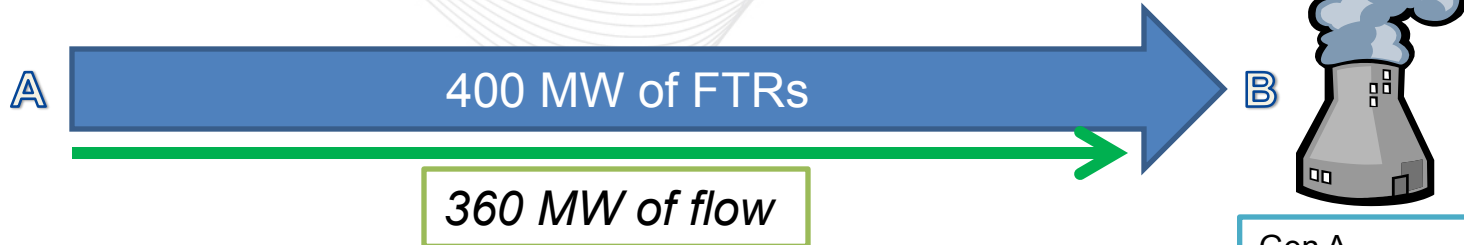
PJM does not normally bind facilities below 97%.

Today we would not bind this facility. Gen A would be made whole.

Gen A
 Min = 200
 Max = 400
 Cost = \$100/MWh
 dfax(A→B) = 25%

Energy Component of LMP = \$50/MWh

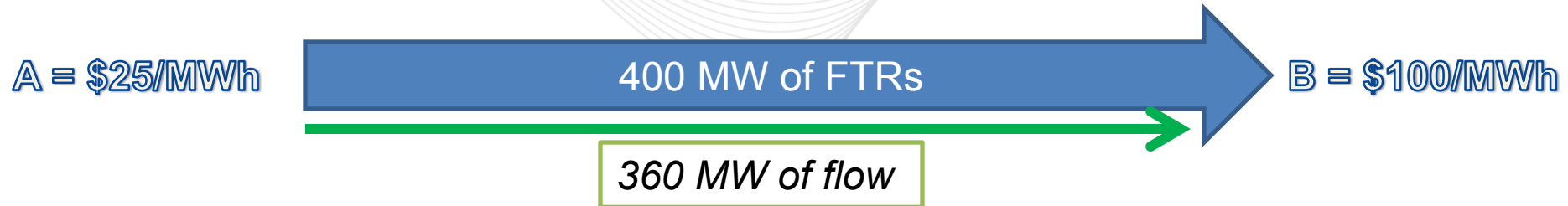
- Calculate a lower rating and control to it
 - Determine a lower rating such that Gen A is needed at 200.1 MW
 - 359.999 MW
- Based on this rating, Gen A needs to be dispatched above min and can therefore set LMP



Gen A
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 Max = 400
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 dfax(A→B) = 25%

**Energy
 Component of
 LMP = \$50/MWh**

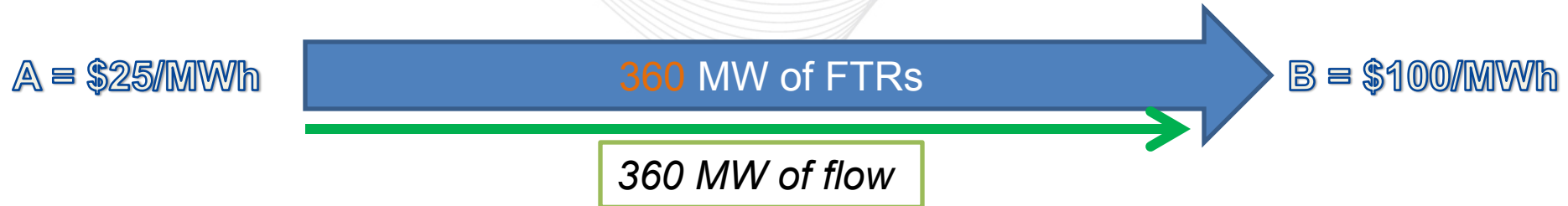
- To control another .001 MW, Gen A is dispatched to 200.004 MW
 - Flow down to 359.999 MW
- Gen A sets LMP
 - Shadow Price = $(\$50/\text{MWh} - \$100/\text{MWh}) / .25 = \$200/\text{MWh}$
 - Energy Component = \$50/MWh
 - Congestion Component (Bus B) = \$50/MWh
 - LMP @ B = \$50/MWh + \$50/MWh = \$100/MWh
- Gen A's uplift related to incremental cost = \$0



- Issue: Congestion on a facility for which there are more FTRs allocated than flow on the line
- FTR Credits = $400 \text{ MW} * (\$100/\text{MWh} - \$25/\text{MWh}) = \$30,000$
- Congestion Collected = $360 \text{ MW} * (\$100/\text{MWh} - \$25/\text{MWh}) = \$27,000$

REVENUE SHORTFALL = \$3,000

FTR Implications – New Allocation



- FTR Credits = **360 MW** * (\$100/MWh - \$25/MWh) = **\$27,000**
- Congestion Collected = 360 MW * (\$100/MWh - \$25/MWh) = \$27,000

REVENUE NEUTRAL