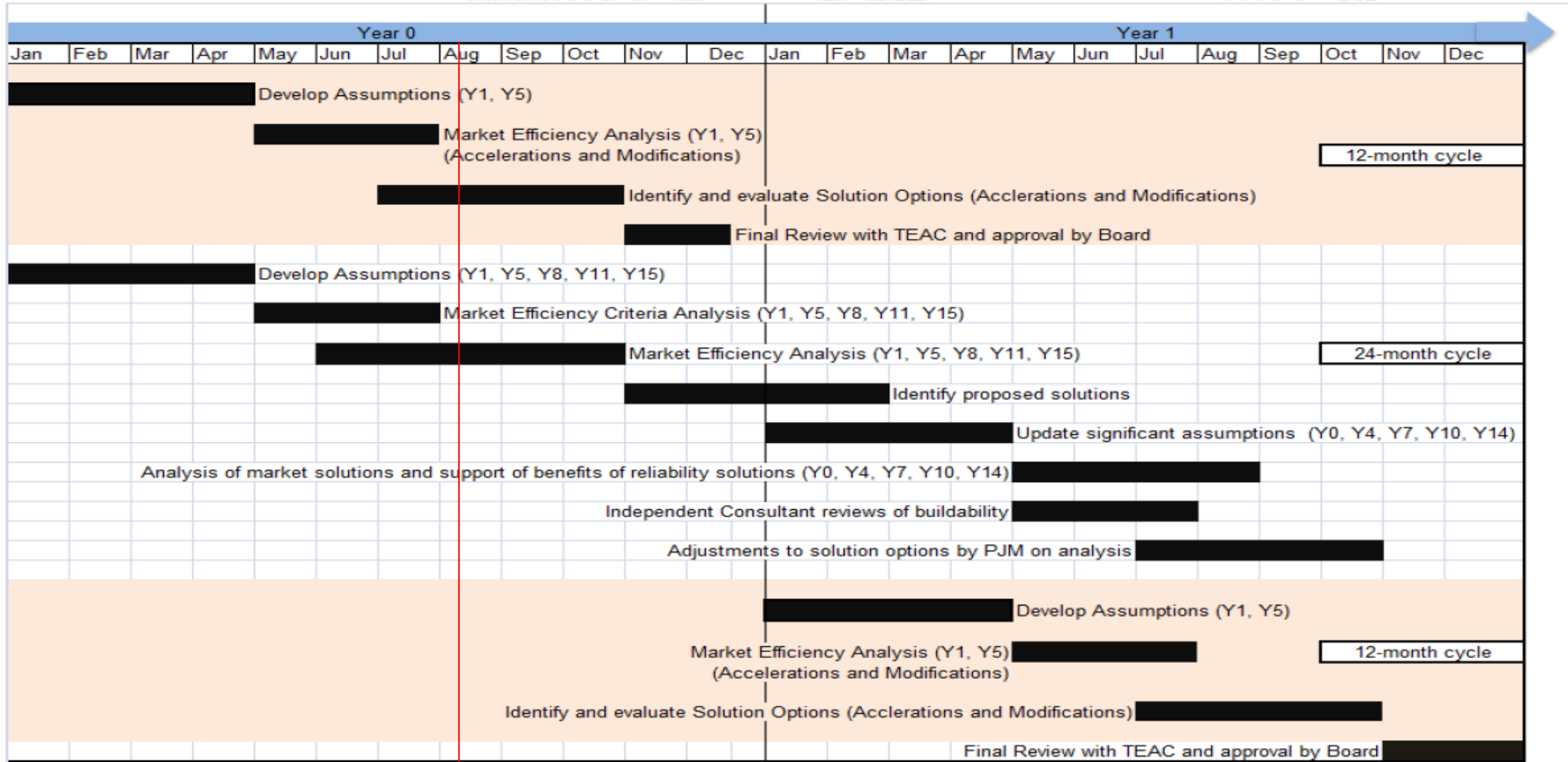




# Market Efficiency Update

Transmission Expansion Advisory Committee  
August 9, 2018



# 2018/19 RTEP Long Term Window

- Total market congestion for 2017 was about \$697.6 million
- Top 25 constraints account for about 55.8% of total congestion in 2017
- Future RTEP upgrades will help reduce most 2017 historical congestion



# Top 25 Congestion Causing Constraints in 2017

Rank	Constraint	Type	Location	Approximate total Market Congestion (Millions)*	% of Total Congestion*	Comment
1	Braidwood - East Frankfort	M2M	ComEd	\$43.4	6.2%	RTEP upgrades expected to reduce congestion (s0756 breaker replacement).
2	Conastone - Peach Bottom	PJM Line	500	\$39.5	5.7%	RTEP upgrades expected to reduce congestion (b2766 - upgrade substation equipment at Conastone 500 kV and Peach Bottom 500 kV).
3	Emilie - Falls	PJM Line	PECO	\$25.1	3.6%	RTEP upgrades expected to reduce congestion (b2774 Emilie - Falls 138 kV line reconductoring). Partial congestion is outage related (work on Alburdis-Branchbu, Bustleto-Crosswic, Emilie-Roll, Crosswic-Wardav).
4	Graceton - Safe Harbor	PJM Line	BGE	\$23.9	3.4%	RTEP upgrades expected to reduce congestion (b2690 Graceton - Safe Harbor 230 kV line reconductoring). Partial congestion is outage related (work on Conaston-Ottcrkpl, Conaston-Peachbot, Manor-Safe Harb, Conaston-Hunterst).
5	5004/5005 Interface	Interface	500	\$22.5	3.2%	West - East Transfers.
6	AP South	Interface	500	\$21.6	3.1%	RTEP upgrades expected to reduce congestion (b2752, b2743 – Project 9A Transource).
7	Westwood	M2M	MISO	\$19.6	2.8%	
8	Cherry Valley Transformer	M2M	ComEd	\$18.7	2.7%	RTEP upgrades expected to reduce congestion (s0900 parallel xfmr).
9	Carson - Rawlings	PJM Line	Dominion	\$18.2	2.6%	
10	Conastone - Otter Creek	PJM Line	PPL	\$15.1	2.2%	RTEP upgrades expected to reduce congestion (s0233 Otter Creek - Conastone 230 kV line rebuild). Partial congestion is outage related (work on Manor-Safeharb, Conaston-Hunterst).

\*Data from 2017 State of Market Report



# Top 25 Congestion Causing Constraints in 2017 (Cont'd)

Rank	Constraint	Type	Location	Approximate total Market Congestion (Millions)*	% of Total Congestion*	Comment
11	Conastone - Northwest	PJM Line	BGE	\$14.1	2.0%	RTEP upgrades expected to reduce congestion (b2752.7 Conastone - Northwest 230 kV lines reconductor/rebuild). Partial congestion is outage related (work on Conaston-Northwest, Brighton-Conaston).
12	Three Mile Island	Transformer	500	\$13.3	1.9%	Impacted by Three Mile Island retirement.
13	Butler - Shanorma	PJM Line	APS	\$11.4	1.6%	RTEP upgrades expected to reduce congestion (b2696 substation equipment upgrade at Butler, Shanor Manor and Krendale substations).
14	Lakeview - Greenfield	PJM Line	ATSI	\$10.8	1.5%	Partial congestion is outage related (work on Beaver-Davisbes, Hayes_FE-Davisbes, Lemoyne2 - Wfremont)
15	Alpine - Belvidere	M2M	MISO	\$10.8	1.5%	RTEP upgrades expected to reduce congestion (b2141 Construct Byron - Wayne 345 kV line).
16	Bedington - Black Oak	Interface	500	\$9.5	1.4%	West - East Transfers. Future reactive upgrades expected to reduce congestion.
17	Person - Sedge Hill	PJM Line	Dominion	\$9.3	1.3%	Partial congestion is outage related (work on Carson4-Rogersrd)
18	Lake George - Aetna	M2M	MISO	\$9.2	1.3%	
19	Batesville - Hubble	M2M	MISO	\$8.9	1.3%	RTEP upgrades expected to reduce congestion (b2634 Convert Miami Fort 345 kV substation to a ring bus).
20	Byron - Cherry Valley	M2M	MISO	\$8.0	1.1%	RTEP upgrades expected to reduce congestion (b2141 Construct Byron - Wayne 345 kV line).

\*Data from 2017 State of Market Report



# Top 25 Congestion Causing Constraints in 2017 (Cont'd)

Rank	Constraint	Type	Location	Approximate total Market Congestion (Millions)*	% of Total Congestion*	Comment
21	AEP - DOM	Interface	500	\$7.8	1.1%	West - East Transfers. Future reactive upgrades expected to reduce congestion.
22	Brunner Island - Yorkanna	PJM Line	Met-Ed	\$7.5	1.1%	RTEP upgrades expected to reduce congestion (b2691 Reconductor Brunner Island - Yorkanna 230 kV line).
23	Brokaw - Leroy	M2M	MISO	\$7.3	1.0%	
24	Loretto - Vienna	PJM Line	DPL	\$6.9	1.0%	Partial congestion is outage related (work on Nsalisbur-Pemberton)
25	Pleasant View - Ashburn	PJM Line	Dominion	\$6.8	1.0%	
<b>Top 25</b>				<b>\$389.2</b>		
<b>Total Congestion</b>				<b>\$697.6</b>		

\*Data from 2017 State of Market Report

- Preliminary 2023 Base Scenario posted (XML format)
  - <http://www.pjm.com/planning/rtep-development/market-efficiency.aspx>
  - requires CEII access and active PROMOD license with ABB
  - Also posted the version without FSA units (see slide 6 for details)
- Posted Files
  - XML files compatible with PROMOD 11.1.13
  - Preliminary event file
- Feedback from stakeholders due August 31<sup>st</sup>
- Final Base Scenarios to be posted before the Long-Term Window





## Market Efficiency Preliminary Base Case (cont.)

- Powerflow consistent with the 2018 RTEP Proposal Window 1
  - Includes network upgrades for First Energy nuclear retirements
  - Includes approved market efficiency upgrade 5E, BGE zone (reconductoring Conastone – Graceton – Bagley)
- Load Forecast based on PJM 2018 Load Forecast Report
- Demand Response consistent with the 2018 Load Forecast Report
- Fuel/Emissions Price Forecasts from ABB, May 2018 update
  - Does not include anticipated RGGI programs for Virginia and New Jersey

- Generation Expansion consistent with the machine list included in the Planning 2023 SP Powerflow
  - Posted Market Efficiency base case includes all ISA, FSA and Suspended ISA units
  - Posted a second case, “NoFSA”, that only includes ISA units ( FSA and Suspended ISA units removed from this scenario).
  - Generator construction status updated as of end of May 2018.
- Financial parameters, Discount Rate and Carrying Charge, NSPL based on the Transmission Cost Information Center spreadsheet
  - <http://www.pjm.com/planning/rtep-upgrades-status/cost-allocation-view.aspx>

- Finalize interregional updates based on feedback from MISO and NYISO
- Finalize event file
  - TO feedback
  - PAT Analysis
  - 2023 M2M constraints
- Finalize sensitivities
- Create 15-years Monte Carlo outage library
- Finalize emissions assumptions
  - Decision on modeling RGGI Virginia, RGGI NJ

- Market Efficiency Web Page located at <http://www.pjm.com/planning/rtep-development/market-efficiency.aspx>
- During October 2018, PJM will post
  - Market Efficiency Base Case Files for all study years
    - Access requires CEII confirmation (PJM and MISO)
    - Access requires PROMOD vendor (ABB) confirmation
    - XML Format
  - Reference Files
    - Input Assumptions Summary
    - Updated Modeling Document will provide details of setup and modeling methods

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# 2018 Reevaluation Approved Market Efficiency Projects

- In accordance with the PJM Operating Agreement, Schedule 6, section 1.5.7(f), PJM annually reviews the costs and benefits of constructing new, previously approved market efficiency projects included in the RTEP.
- Reevaluation process applies to market efficiency projects approved during the 2014/15 and 2016/17 RTEP Windows
- Specifically, in its reevaluation, PJM reviews:
  - changes in construction cost estimates for approved market efficiency projects.
  - anticipated resource development, including merchant transmission, generation and demand response.
  - changes in system conditions, including but not limited to, changes in the load forecast.

- Analysis performed individually, one project at a time
- Reevaluation Study Process (in-progress)
  - Create a new base case by removing/reversing the topology related to the approved market efficiency project
  - Quantify the impacts of adding back the approved market efficiency project
  - Measure energy benefits for 15-year period starting with the in-service date
  - For RPM projects also measure the capacity benefits
  - Calculate the new B/C ratios
- To remain an approved market efficiency project, upon reevaluation, each project must meet or exceed a benefit-to-cost ratio of 1.25.
- PJM anticipates completing its reevaluation by the September 2018 TEAC meeting.



Step	Timeline
Stakeholders Feedback	August – September 2018
Identify Congestion Drivers	September 2018
Post Final Base Case and Target Congestion Drivers	October 2018
Long Term Proposal Window	November 2018 - February 2019
2018 Reevaluation Analysis	September – October 2018
2018 Acceleration Analysis	November – December 2018
Analysis of Proposed Solutions	March - November 2019
Final TEAC Review and Board Approval	November - December 2019

- Revision History
  - V1 – 8/06/2018 – Original Version Posted to PJM.com