



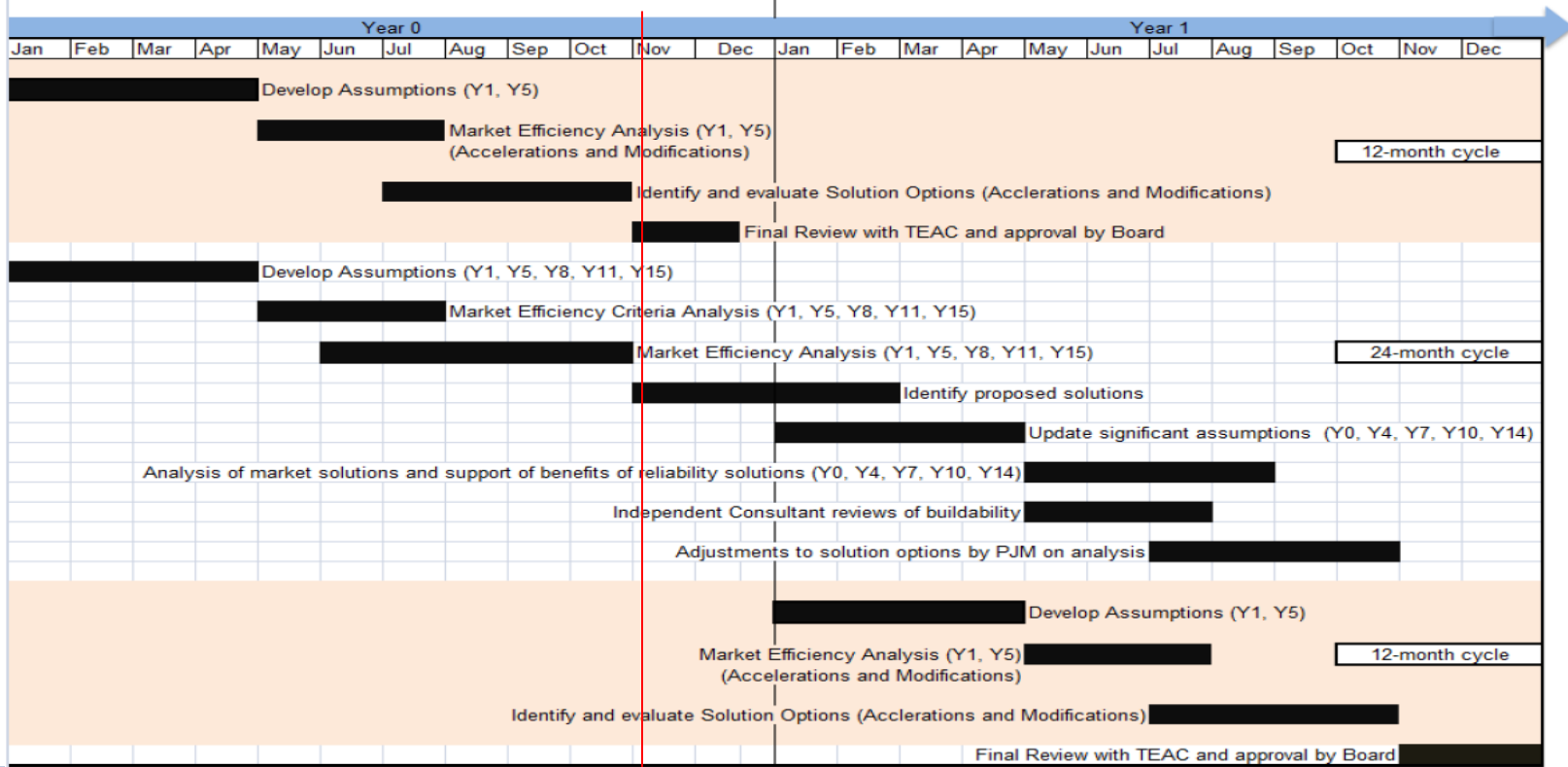
Transmission Expansion Advisory Committee Market Efficiency Update

November 3, 2016

- 2016/2017 Market Efficiency Congestion Drivers
- Acceleration Analysis Status
- Next Steps



Market Efficiency Timeline





2016-2017 Market Efficiency Cycle Timeline

Item	Schedule
Long Term Proposal Window	Nov 1, 2016 – Feb 22, 2017
Analysis of Proposed Solutions	March 2017 - November 2017
Determination of Final Projects	December 2017

- Market Efficiency cases were posted on 11/01/2016
 - PROMOD cases, and supporting documentation were posted on Market Efficiency Web page
 - <http://www.pjm.com/planning/rtep-development/market-efficiency.aspx>
- Proposal window opened on November 1, 2016
- Proposal window will close on February 22, 2017
- Market Efficiency Questions
 - Send to the RTEP e-mail distribution (rtep@pjm.com) with “Market Efficiency” in the subject line header

- 2016/17 Market Efficiency Base Case
- Problem Statement and Recommended Congestion Drivers
- Base Congestion results
- Additional Files*
 - Market Efficiency Benefit/Cost Evaluation Spreadsheet and Example
 - Setup Instructions

** the ARR modeling files to be posted in the following days*

Congestion Drivers

Simulated Base Case Congestion

- Includes congestion results for simulation years 2017, 2021, 2024 and 2027
- System congestion has declined due to RTEP enhancements, lower load forecast and fuel price impacts
- Base congestion results posted on Market Efficiency website at below link:
 - <http://pjm.com/~media/planning/rtep-dev/market-efficiency/2016-market-efficiency-analysis-base-congestion-results.ashx>

Recommended Congestion Drivers

- **Market Efficiency Criteria:**
 - **Lower Voltage Facilities:**
 - Minimum of \$1 million congestion in both 2021 and 2024 study years.
 - Annual simulated congestion frequency of at least 25 hours in both 2021 and 2024 study years.
 - **Regional Facilities:**
 - Minimum of \$10 million congestion in both 2021 and 2024 study years.
 - Annual simulated congestion frequency of at least 25 hours in both 2021 and 2024 study years.
 - **Interregional facilities:**
 - There will be no minimum threshold criteria for congestion or for frequency, since congestion is impacted by both regions

Recommended Congestion Drivers

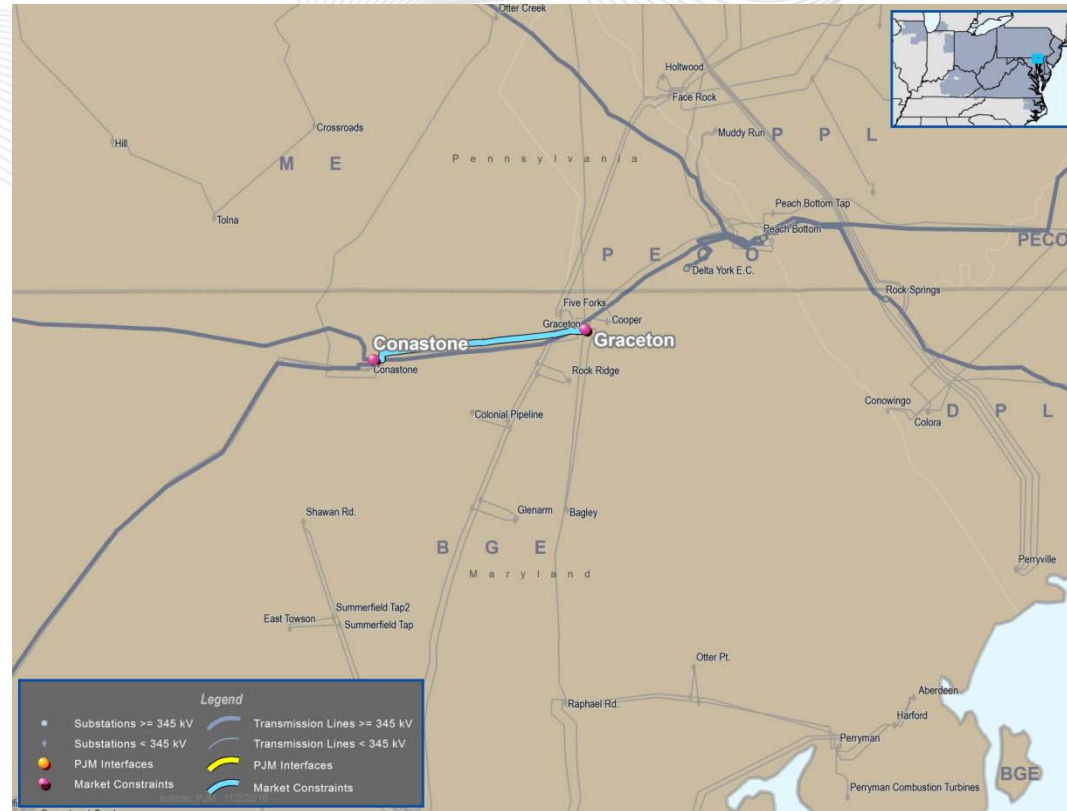
- Excepted facilities
 - Although Market Efficiency criteria are met, PJM may not recommend proposals for certain facilities due to exceptions
- Market Efficiency exceptions:
 - Nearby FSA Generator(s)
 - Congestion is significantly influenced by a FSA generator or a unique set of FSAs
 - Congestion already addressed
 - Majority of the congestion was already addressed in previous window(s)
 - Declining Congestion
 - Simulated congestion for future study years displays a declining trend

Recommended Congestion Drivers

<i>Facilities Recommended for Proposal</i>			<i>2021 Input Assumptions with 2021 Topology</i>		<i>2024 Input Assumptions with 2021 Topology</i>		
Facility Name	AREA	TYPE	Frequency (Hours)	Market Congestion (\$ Millions)	Frequency (Hours)	Market Congestion (\$ Millions)	Notes/Potential Upgrade
Conastone to Graceton 230 kV	BGE	LINE	896	\$55.1	931	\$61.6	
Graceton to Bagley 230 kV	BGE	LINE	1,131	\$30.0	1,420	\$43.5	
Susquehanna to Harwood 230 kV	PPL	LINE	173	\$3.7	193	\$5.1	
Bosserman to Olive 138 kV	AEP	LINE	5	\$0.2	56	\$1.7	Interregional Constraint

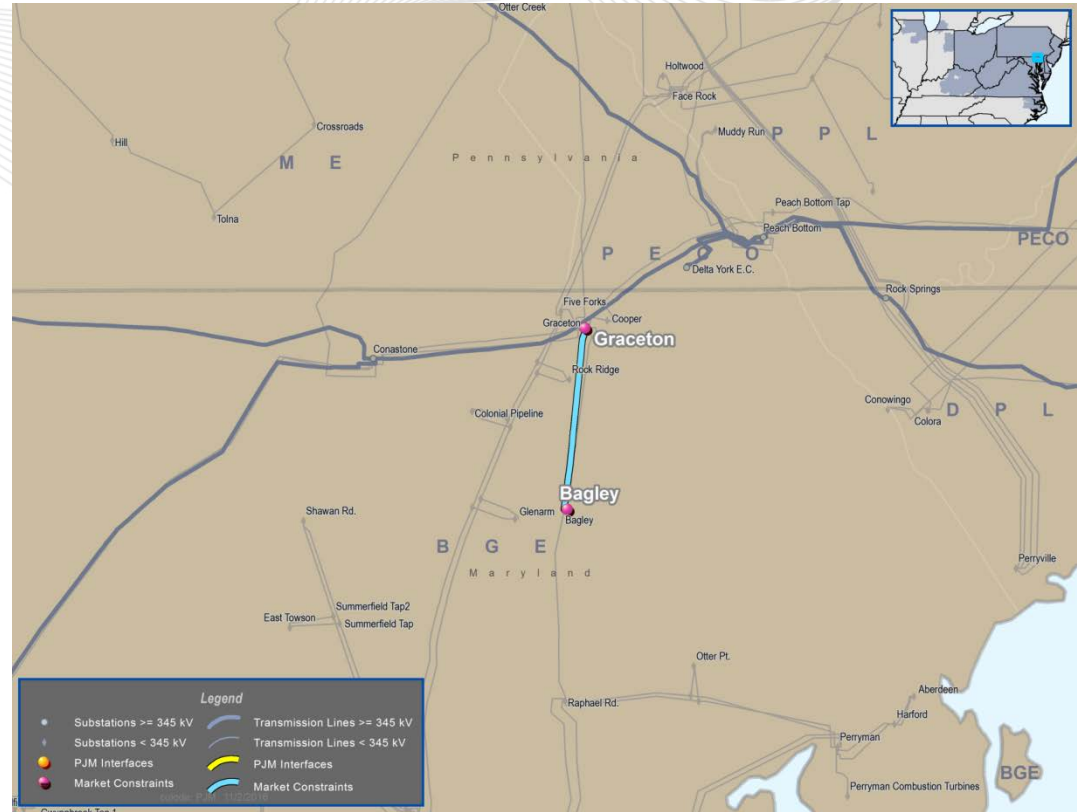
Conastone to Graceton

- Area: BGE
- Voltage: 230 kV
- Market Congestion
 - 2017 (\$mill): 55.1
 - 2021 (\$mill): 61.6



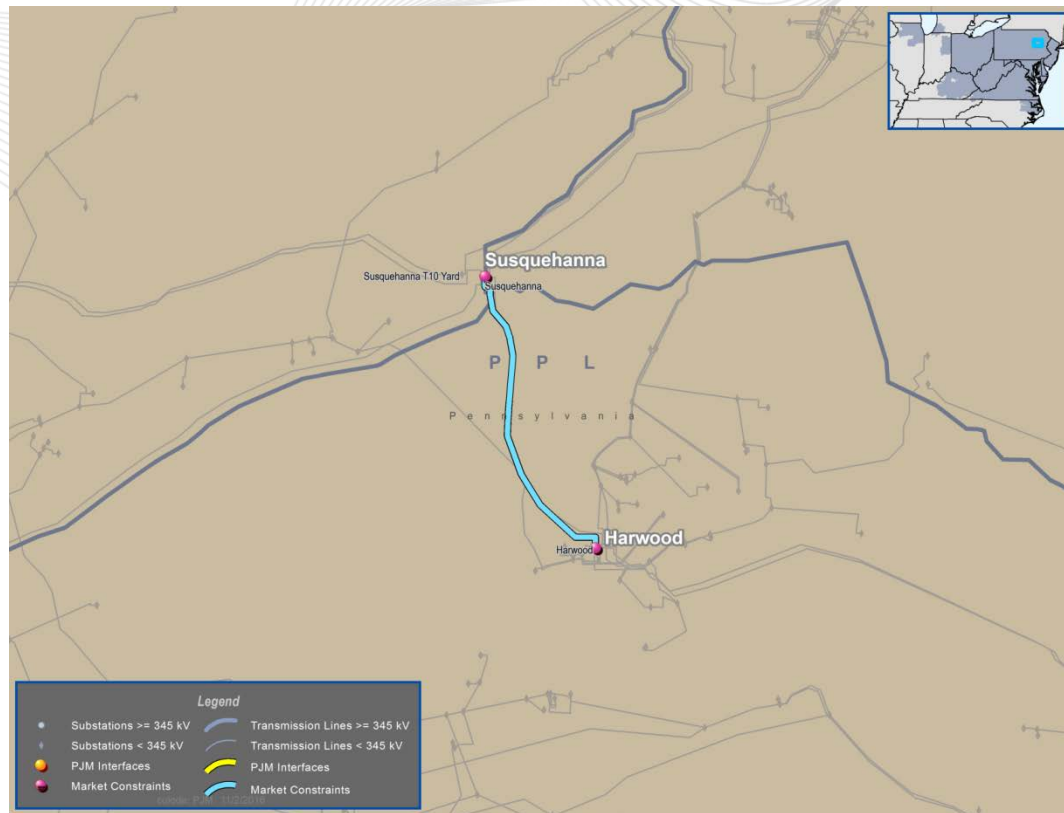
Graceton to Bagley

- Area: BGE
- Voltage: 230 kV
- Market Congestion
 - 2017 (\$mill): 30.0
 - 2021 (\$mill): 43.5



Susquehanna to Harwood

- Area: PPL
- Voltage: 230 kV
- Market Congestion
 - 2017 (\$mill): 3.7
 - 2021 (\$mill): 5.1



Bosserman to Olive 138 kV

- Area: AEP
- Voltage: 230 kV
- Market Congestion
 - 2017 (\$mill): 0.2
 - 2021 (\$mill): 1.7





Simulated Market Congestion Results

Constraint	kV	FromArea	ToArea	Type	Historical	2017 (\$mil)	2021 (\$mil)	2024 (\$mil)	2027 (\$mil)	Comment
GRACETON TO CONASTON 230kV	230	BGE	BGE	PJM FG		\$ 54.05	\$ 55.07	\$ 61.57	\$ 62.91	Solicit
BAGLEY TO GRACETON 230kV	230	BGE	BGE	PJM FG	Yes	\$ 23.34	\$ 30.02	\$ 43.52	\$ 55.01	Solicit
AP SOUTH INTERFACE				INTERFACE	Yes	\$ 34.22	\$ 36.54	\$ 31.93	\$ 37.40	Previous window approved project
5004/5005 INTERFACE				INTERFACE	Yes	\$ 25.15	\$ 31.34	\$ 19.94	\$ 15.62	Declining congestion trend
AEP-DOM INTERFACE				INTERFACE	Yes	\$ 0.32	\$ 3.39	\$ 8.17	\$ 14.67	Previous window approved project
Susquehanna to Harwood 230 kV	230	PLGRP	PLGRP	PJM FG			\$ 3.70	\$ 5.09	\$ 4.26	Solicit
CENTRAL INTERFACE				INTERFACE	Yes	\$ 4.39	\$ 4.13	\$ 3.14	\$ 4.05	Congestion lower than threshold
28R11RINGA TO 28RED OAKA 230kV	230	JCPL	JCPL	PJM FG			\$ 2.07	\$ 3.42	\$ 4.47	Congestion driven by FSA Generator
28RED OAKB TO 28RAR RVR 230kV	230	JCPL	JCPL	PJM FG		\$ 0.19	\$ 1.94	\$ 2.79	\$ 4.29	Congestion driven by FSA Generator
Peach Bottom to Conastone 500 kV	500	BGE	PECO	PJM FG	Yes	\$ 33.65	\$ 1.11	\$ 3.16	\$ 1.13	Baseline project fixes congestion
Maple to Hoytdale 138 kV	138	FE-ATSI	FE-ATSI	PJM FG		\$ 0.63	\$ 1.22	\$ 1.97	\$ 3.27	Congestion driven by FSA Generator
N Philadelphia 8 to Master 230kV	230	PECO	PECO	PJM FG			\$ 0.58	\$ 1.76	\$ 0.43	Congestion lower than threshold
Deans TR 500/138 kV	500/138	PENELEC	NYZK	PJM FG			\$ 0.98	\$ 1.29	\$ 1.73	Congestion lower than threshold
Edwards Ferry to Dickerson Station "D" 230 kV	230	PEPCO	DOM	PJM FG		\$ 2.06	\$ 1.17	\$ 1.02	\$ 0.40	Declining congestion trend
Bosserman to Olive 138kV	138	AEP	AEP	M2M			\$ 0.19	\$ 1.74	\$ 2.86	Solicit

Notes:

*Congestion shown for PJM constraints with average congestion for years 2021 and 2024 greater than \$1 million
Bosserman – Olive included as market to market constraint*

- Targeted Market Efficiency Projects (TMEP) are not included in the long term window
- Per PJM - MISO JOA, Interregional Proposals must be submitted to both PJM and MISO Regional Windows
- PJM and MISO will follow the effective JOA language when analyzing and recommending Interregional Proposals

Sensitivity	Range
Load Sensitivity	Plus or Minus 2%
Gas Sensitivity	Plus or Minus 20% of Henry Hub forecast
Potential FSA Sensitivity	To be decided

Acceleration Analysis

- Scope
 - Determine which reliability upgrades, if any, have an economic benefit if accelerated or modified.
- Study Years
 - 2017 and 2021 set of economic input assumptions used to study impacts of approved RTEP projects
- Process
 - Compare market congestion for near term vs. future topology
 - Estimate economic impact of accelerating planned upgrades

Acceleration Analysis Status

- Finalized PROMOD modeling work for 2017 and 2021 AS-IS cases
- Preliminary PROMOD runs completed
- Currently identifying projects responsible for congestion reductions
- Acceleration analysis results to be presented at the December TEAC

Milestone	Schedule 2016 - 2017
PJM Review for Acceleration Candidates	November-December
Proposal Window Closing	February 22, 2017
Base Case Update Significant Assumptions	March – April 2017
Project Analysis	March – November 2017
Final TEAC Review and Board Approval	December 2017

Questions?

Email: RTEP@pjm.com

Appendix A

Market Efficiency Data Posting

- Market Efficiency Web Page located at <http://www.pjm.com/planning/rtep-development/market-efficiency.aspx>
- Market Efficiency Case Files (posted on 11/01/2016)
 - Access requires CEII access approval (execute PJM CEII NDA and fill out PJM CEII Request Form)
 - Note: the access request must indicate “2016/17 RTEP Proposal Window”
 - Access requires Vendor (ABB) approval that the requester is a licensee of PROMOD confirmation
 - Access requires MISO CEII approval with access confirmed by PJM
 - No confidential data provided or used in analysis (i.e. actual bid data)
 - XML Format
- Market Efficiency Questions
 - Please send to the RTEP e-mail distribution (rtep@pjm.com) with “Market Efficiency” in the subject line header