Market Efficiency Update

Transmission Expansion Advisory Committee

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FERC Orders on Generation Assumptions and Benefit/Cost Ratio Calculations

Background and PJM Filings

- Market Efficiency Process Enhancement Task Force (MEPETF) was approved in January 2018
  - Address challenges and opportunities for improvements to the Market Efficiency process since implementing Order 1000 processes in two phases

- The MEPETF proposal "G" and the associated Manual 14B and Operating Agreement (OA) revisions were endorsed as follows *(see Appendix A for PJM Proposal G details)*
  - At the August 9th 2018 meeting by PJM Planning Committee
  - At the August 23rd 2018 meeting by PJM Markets & Reliability Committee in a sector-weighted vote with 3.87 in favor
  - At the September 27th 2018 meeting by PJM Members Committee

Background and PJM Filings (cont'd)

- On October 10, 2018, pursuant to section 205 of the Federal Power Act (FPA), PJM filed proposed revisions to the benefit/cost analysis it conducts in its evaluation of economic-based enhancements or expansions as part of its regional transmission expansion plan (RTEP) process.

- On December 14, 2018, pursuant to section 205 of the Federal Power Act (FPA), PJM filed revisions to its economic transmission planning process (market efficiency process) to address the generation assumptions that go into PJM's market efficiency analysis.

FERC Orders

- On Feb. 12, 2019 FERC accepted PJM's proposed Operating Agreement (OA) revisions to address the generation assumptions that go into PJM's market efficiency analysis, effective Feb. 13, 2019

- On Feb. 19, 2019 FERC accepted PJM's proposed revisions to the benefit/cost analysis, effective Dec. 10, 2018

FERC Ruling for PJM Filing on Generation Assumptions (Docket No.ER19-562-000)

Item	PJM Modification	FERC Ruling	FERC Reasoning
FSA Modeling	Consider all FSA and Suspended ISA resources at time of case build	FERC accepted PJM's proposed Operating Agreement (OA) change.	Record evidence supports PJM's proposal to change the default treatment of generation with executed FSAs or executed ISAs under suspension. PJM has a reasonable basis to exclude those generation projects as a default in conducting its market efficiency analysis.
FSA Exception	If FSA /Suspended ISA units are included in the base case, TEAC will be notified and the assumptions will be reviewed at TEAC on an as needed basis.	FERC accepted PJM's proposed Operating Agreement (OA) change.	
Annual Information Filling	N/A	PJM to file with the Commission an annual informational filing regarding executed FSAs, executed ISAs under suspension, and executed ISAs. Filling required for a total of three years.	Improves transparency for stakeholders as PJM gains additional information and experience utilizing the new assumptions. Addresses concerns raised regarding generation trends and visibility of the analysis.

FERC Ruling for PJM Filing on Benefit/Cost Analysis (Docket Nos. ER19-80-000 and ER19-80-001)

Item	PJM Modification	FERC Ruling	FERC Reasoning
Regional and Lower Voltage Benefits Calculation Period	15 years from in-service year, capped at RTEP+14	FERC accepted PJM's proposed Operating Agreement (OA) changes.	PJM's proposal to use the same 15-year planning period for evaluating all projects is just and reasonable and not unduly discriminatory modification to PJM's existing benefit/cost ratio calculation, given that the data for periods outside of the planning period are less accurate.
Project Cost Calculation Period	15 years of annual revenue requirements from in-service year, capped at RTEP+14	FERC accepted PJM's proposed Operating Agreement (OA) changes.	

2018/19 Long Term Window Update

2018/19 24-Month Market Efficiency Cycle

- Long term proposal window (extended): Nov. 2nd 2018 – Mar. 15th 2019
- Mid-cycle update of major assumptions: Jan. 2019 – Apr. 2019
  - Demand Forecast, Fuel Prices, Generation Expansion, Network Topology, etc.
  - Only updating the most significant changes, not a full update
- Analysis of proposed solutions: May. 2019 – Oct. 2019
  - Independent consultant review of cost and ability to build
  - Review of analysis with TEAC: Jun. 2019 – Nov. 2019
- Determination of final projects: Dec. 2019
  - Final review with TEAC and Board approval
  - Projects may be approved earlier if analysis and review complete

Market Efficiency Modeling Data

- To reflect the FERC Order on generation assumptions, PJM posted the Retooled no-FSA Base Case to account for
  - Inclusion of generator units that have changed status from FSA or Suspended ISA to ISA
  - Any other topology changes to-date
- Posted the updated FSA Sensitivity model
- Other posted files
  - Updated congestion results (simulated years 2023 and 2026)
  - Updated procedure for running PROMOD simulations
  - Updated B/C Ratio Evaluation Tool to reflect the FERC Order on benefit/cost analysis

Model Updates

Updates since last posted database on Dec. 26, 2018

- OVEC integration
- 2019 Load Forecast
- Generator status updates to create No-FSA Base Case (See Appendix B)
- Event file changes – rating updates and additional events

Updated Element				Previous Rating				Updated Rating			
Name	From Bus	To Bus	ID	Summer Normal	Summer Emergency	Winter Normal	Winter Emergency	Summer Normal	Summer Emergency	Winter Normal	Winter Emergency
HE Hubble - Sunman Weisburg	248831	249914	1	261	261	287	287	291	291	388	388
HE Hubble - Batesville	248831	249691	1	287	287	287	287	291	291	378	378
Marblehead Transformer	347515	347516	1	280	287	287	287	300	300	300	300

2018/19 Long Term Window Update
Eligible Drivers Update

Updated List of Eligible Congestion Drivers

2018/19 RTEP Market Efficiency Window Eligible Congestion Drivers*				Simulated Annual Congestion ($million)		Hours Binding				
FG#	Constraint	FROM AREA	TO AREA	2023 Simulated Year	2026 Simulated Year	2023 Simulated Year	2026 Simulated Year	Line is Conductor Limited?	Comment	Potential Upgrades
ME-1	Hunterstown to Lincoln 115 kV	METED	METED	$ 20.77	$ 29.62	1720	1832	yes	Internal Flowgate	A PJM/MISO TMEP has been approved for this facility
ME-2	Monroe 1&2 - Wayne	MISOE	MISOE	$ 1.44	$ 0.61	45	30	miso	M2M	
ME-6	Marblehead North Bus 1 138/161	MISOC	MISOC	$ 1.41	$ 1.18	195	138	miso	M2M	
ME-7	Bosserman to Trail Creek 138 kV	AEP	MISOE	$ 1.47	$ 1.69	66	89	Yes	M2M	

*Market Efficiency Base Case without FSA/Susp ISA units

- Eligible Congestion Drivers updated due to FERC Order, issued on February 12, 2019, accepting PJM's filed revisions to exclude from its Market Efficiency assumptions, with exceptions, generation with an executed Facilities Study Agreement (FSA) or an executed Interconnection Service Agreement (ISA) under suspension
- The following constraints are no longer eligible congestion drivers:
  - He Hubble to Sunman Weisburg 138 kV (MISOC)
  - E Frankfort (R) to Goodings (R) 345 kV (COMED)
  - Cumberland TR2 to Juniata Bus 1 230 kV (PLGRP)

Impact of FERC Orders on AP-South Transource Project 9A

Impact of FERC Orders on 9A Transource Project Reevaluation

- PJM presented at the September 2018 TEAC the conclusions of the reevaluation process for Project 2014/15_1-9A (b2743.1-8, b2752.1-7)
  - Project was reevaluated in September 2018 - Benefit/Cost ratio: 1.42
  - Capital cost $366.17M
- At the November TEAC, PJM updated the B/C Ratio based on Transource cost update from October 2018
  - The updated B/C ratio is 1.40
  - Capital cost $372.2M
- During February 2019, PJM updated the 9A B/C Ratio to reflect the FERC Orders from February 12th and 19th, 2019
  - Used the Market Efficiency database from Sept 2018 reevaluation
  - The updated B/C ratio is 2.17
  - Capital cost $372.2M

Next Steps

Step	Timeline
Long Term Proposal Window	November 2nd 2018 – March 15th 2019
Base Case Mid-Cycle Update	January – April 2019
Analysis of Proposed Solutions	May – October 2019
Final TEAC Review and Board Approval	November – December 2019

Appendix A
MEPETF Phase 1 – PJM Proposal “G”

Package G Overview

Component	Status Quo	PJM Modification	PJM Reasoning
FSA Modeling	Consider all FSA and Suspended ISA resources at time of case build	By default, exclude from the base case the FSA and Suspended ISA resources, and their associated network upgrades at time of case build. FSA sensitivity studies will be used for proposal evaluations, but not for B/C ratio test.	Including FSAs in the Market Efficiency Base Case can result in unrealistic estimates of specific benefits for any system reinforcement due to having significantly more generation than the reserve requirement.
FSA Exception	If FSA or Suspended ISA resources are excluded from the base case at time of case build, TEAC should be notified.	If FSA or Suspended ISA resources are included in the base case at time of case build or mid-cycle update, TEAC will be notified and the assumptions will be reviewed at TEAC on an as needed basis.	In the case of including FSA or suspended ISA resources in the base case, TEAC will be notified and the assumptions will be reviewed at TEAC
Criterion to Include FSAs	Not defined. PJM practice includes all.	In case of a reserve deficiency, include FSA and Suspended ISA resources (as well as the expected network upgrades) ranked by their commercial probability, until the reserve requirement is met.	In the case of including FSA or suspended ISA resources in the base case, TEAC will be notified and the assumptions will be reviewed at TEAC

Package G Overview

Component	Status Quo	PJM Modification	PJM Reasoning
Benefit Adjustment for in-Service Date*	N/A	Energy benefits of projects that are proposed to be in service later than the RTEP year will be adjusted to account for any savings forgone due to later in-service date.	It is PJM's goal to address Market Efficiency constraints via transmission solutions by the RTEP year, and to incentivize projects that are designed and proposed to be in service by the RTEP year. Therefore, PJM will adjust energy benefits of projects that are proposed to be in service later than the RTEP year to account for any savings forgone due to later in-service date.
Sensitivities	For informational purposes only	Mandatory sensitives are conducted yearly with the inclusion of FSA units, only if FSA units are excluded from base case analysis. Sensitivities are not used to B/C ratio test but are considered when reviewing a proposals robustness and sizing. (Documents Status Quo)	Enhance Transparency

** Includes the 15-year cap.*
Will be used as a sensitivity if only one proposal per target congestion driver.

Package G Overview

Component	Status Quo	PJM Modification	PJM Reasoning
Sensitivity Parameters	N/A	Mandatory sensitivities parameters are decided prior to beginning of window.	Enhance Transparency
Generator Retirement Plan	Aligned with simulation year	In all simulated years, generation and transmission topology are set at RTEP year level	Mitigate benefit uncertainty driven by topology and generation

Appendix B
Updated Generation Modeling Assumptions

No FSA Base Case Generator Changes

- No-FSA Base Case Generator Changes from December 26th No-FSA case
- Only status updates, no new queue units added to the database
- Removed withdrawn units (mid-January cut-off date)
- Updated status to include FSA/Suspended ISA to ISA changes (mid-January cut-off date)
- Generation retirements and associated topology changes
- Detailed generation changes for PROMOD modelers can be found at:
  - https://www.pjm.com/planning/rtep-development/market-efficiency/economic-planning-process.aspx

Revision History

- Revision History
  - V1 – 03/04/2019 – Original Version Posted to PJM.com