



S&P 500	2,171	+25	+1.09%
GlobalDow	11,104	+13	+1.14%
Gold	1,965	+30	+1.53%
Oil	77.56	+18	+1.56%
		0.09	0.12%



POWER SUPPLY | GENERATION | FINANCIAL | MEMBER SERVICES | RISK MANAGEMENT | SUSTAINABILITY

PJM Markets & Reliability Committee Meeting End of Life Projects

American Municipal Power

July 26, 2018



What TDUs and Customers Want?

Consistent with FERC direction and principles of coordination, openness, transparency, information exchange and comparability:

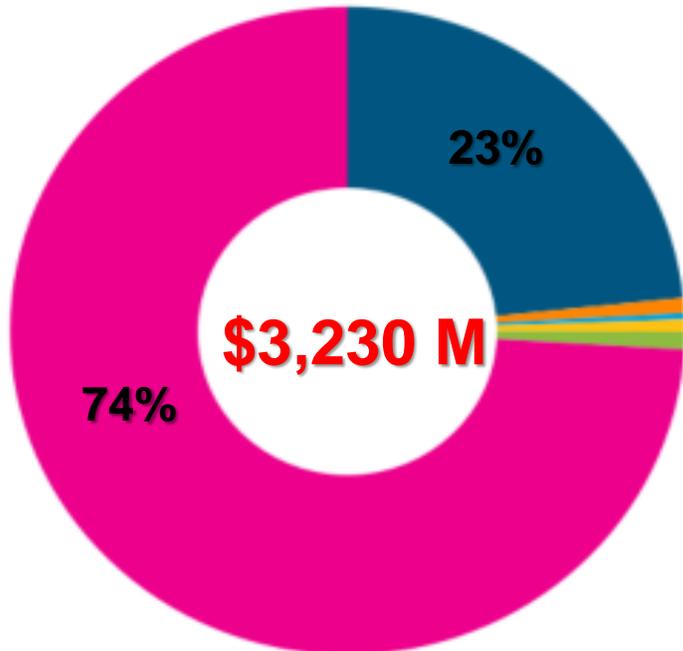
- 1) the ability to ensure that planned facilities are indeed necessary and economical
- 2) transparent criteria, assumptions and models
- 3) meaningful opportunity for review and input
- 4) consistency and uniformity to the extent practical

Why is this important?

- End of Life Projects Comprise Largest Category of Transmission Costs
- PJM Project Status:
 - <http://www.pjm.com/-/media/committees-groups/committees/teac/20180111/20180111-teac-information-only-project-statistics-updated.ashx>
 - Anticipated to be updated following PJM Board meetings along with PJM “TEAC Whitepaper” documents.

New Projects in 2017 Baseline Project Drivers

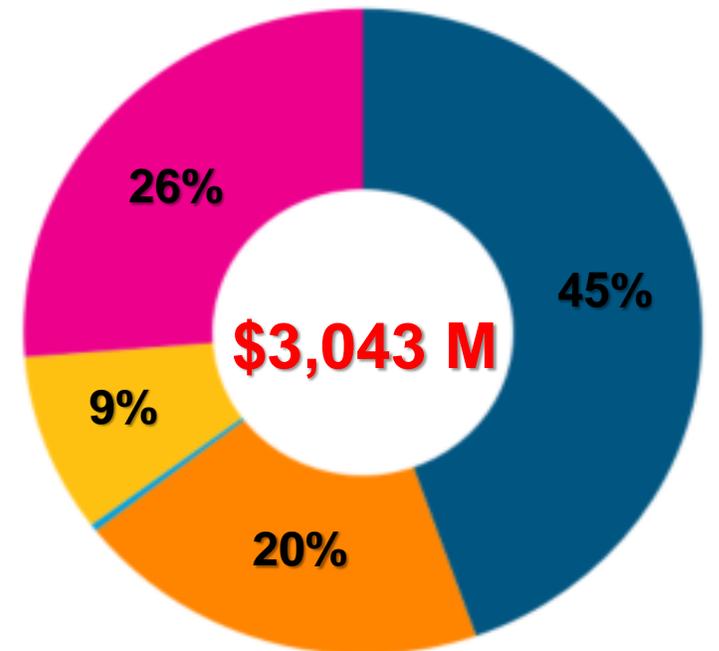
**Estimated Cost of Baseline Projects
Approved by PJM Board**



- **PJM's Baseline Projects** 13%
- **TO's Baseline Projects** 38%
- **TO's Supplemental Projects** 49%

Baseline Load Growth Deliverability & Reliability	\$755
Congestion Relief - Economic	\$24
Generator Deactivation	\$10
Operational Performance	\$21
Short Circuit	\$28
TO Criteria Violation	\$2,392

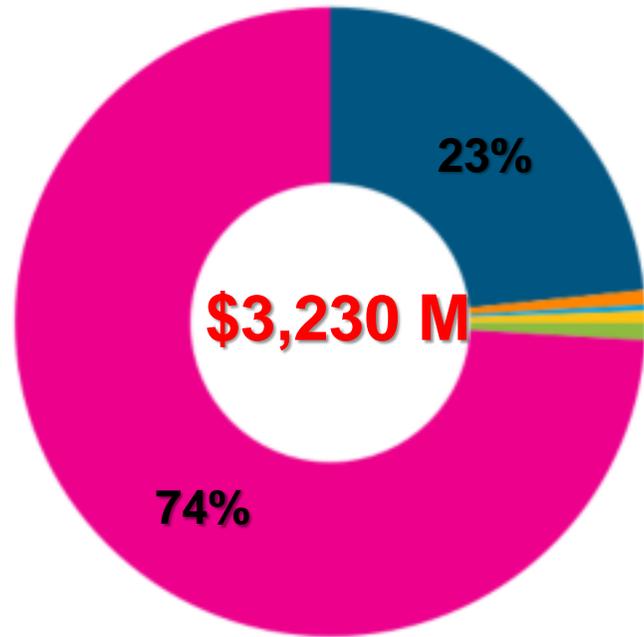
**Estimated Cost of Supplemental Projects
Presented by TOs to the TEAC**



Equipment Material Condition, Performance and Risk	\$1,358
Operational Flexibility and Efficiency	\$603
Infrastructure Resilience	\$11
Customer Service	\$273
Other	\$0
Multiple Drivers	\$798

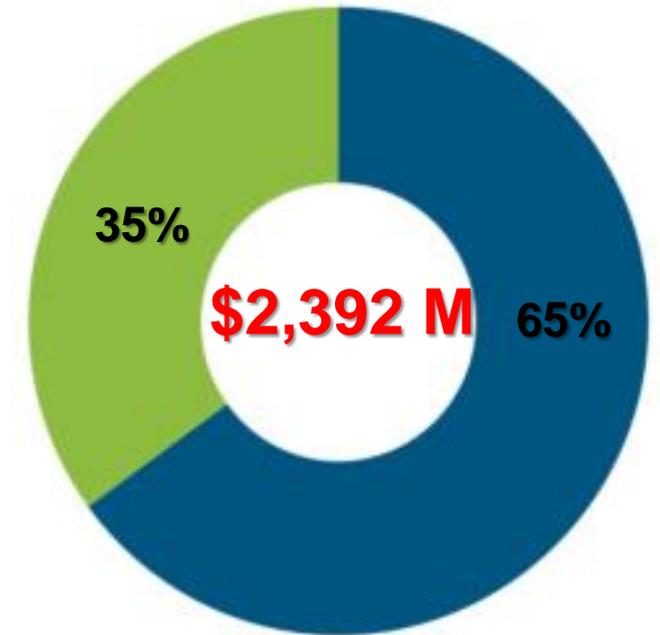
New Projects in 2017 Baseline Project Drivers

Estimated Cost of Baseline Projects
Approved by PJM Board



- **65% of TO “Criteria Violation” Baseline Projects were associated with End-of-Life Drivers**
- **48% of all Baseline Projects**

Estimated Cost of Baselines Projects
Driven by TO Criteria Violations

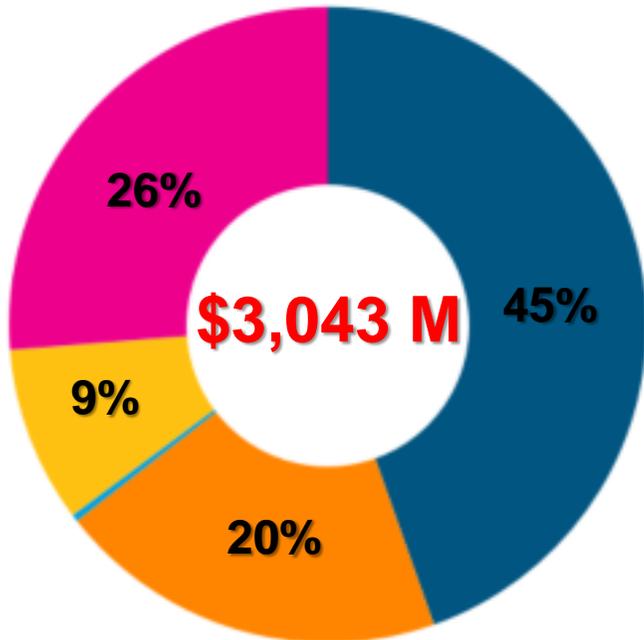


Baseline Load Growth Deliverability & Reliability	\$755
Congestion Relief - Economic	\$24
Generator Deactivation	\$10
Operational Performance	\$21
Short Circuit	\$28
TO Criteria Violation	\$2,392

Aging Infrastructure	\$1,554
Other TO Criteria	\$838

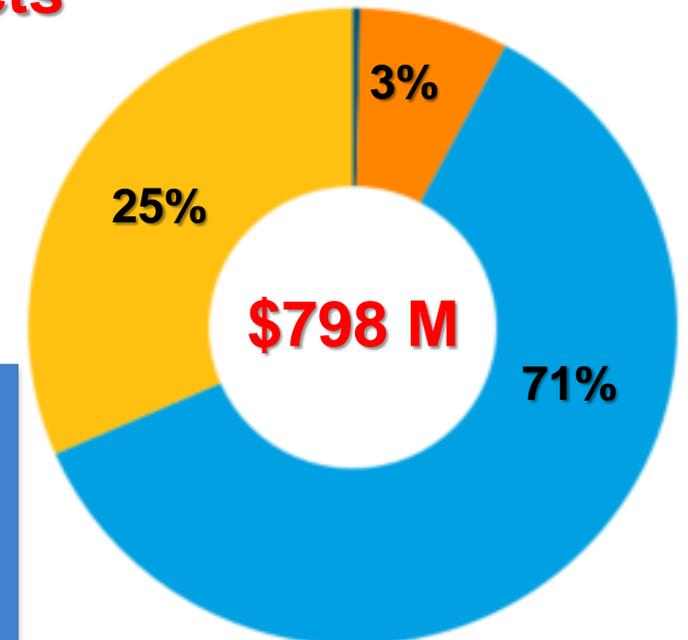
Note: Some values on this chart differ from the one published on 1/11/2018. 27 projects for a total of \$24.8M was misidentified as Load Growth rather than Short Circuit.

Estimated Cost of Supplemental Projects Presented by TOs to the TEAC



63% of TO Supplemental Projects were associated with End-of-Life Drivers

Estimated Cost of Supplemental Projects with Multiple Drivers



Equipment Material Condition, Performance and Risk	\$1,358
Operational Flexibility and Efficiency	\$603
Infrastructure Resilience	\$11
Customer Service	\$273
Other	\$0
Multiple Drivers	\$798

Equipment Material Condition, Performance and Risk / Customer Service	\$3
Equipment Material Condition, Performance and Risk / Infrastructure Resilience	\$59
Equipment Material Condition, Performance and Risk / Operational Flexibility and Efficiency	\$484
Operational Flexibility and Efficiency / Customer Service	\$252

Statistics

- 2017:
 - \$3B in Supplemental Projects
 - \$3.23B in Baseline
 - Extrapolates to \$4B in End of Life Projects
- 2018 to Date:
 - \$5B in Supplemental Projects
 - \$1.2B in Baseline
 - Extrapolates to \$3.9B in End of Life Projects

End of Life Projects Need to be Addressed

- The world is significantly different than when original transmission facilities were built
- Upcoming changes will be even more transformative
- We need to give serious thought as to how we replace aging infrastructure:
 - Load growth flat or negative
 - Increase in renewable resources
 - Increase in intermittent, \$0/MWh resources
 - Change in economic life of units due to accelerated obsolescence
 - Distributed generation
 - Smart Grids

AMP/ODEC EOL Proposal

- ***Nothing*** that contradicts or runs afoul of the TOs' M-3 compliance filing or FERC's Order
- ***Nothing*** proposed that would violate CTOA
- ***Not*** asking PJM to ***plan*** Supplemental EOL facilities
- ***Not*** asking PJM to ***approve*** Supplemental EOL Projects
- ***Not*** asking PJM to call balls & strikes
- ***Not*** asking PJM to modify their planning schedule
- Does ***not*** impose additional work on PJM Planning staff

AMP/ODEC Proposal

- Focus on ***End of Life*** Projects
- EOL projects are ***not*** Supplemental Projects to meet new unexpected load or to address emergency equipment failures
- EOL Projects are ***discretionary*** projects identified as part of TO's annual budgeting process and the Local Plan, well in advance of PJM's transmission planning year
 - Baseline and Supplemental

AMP/ODEC Proposal

- We are seeking compliance with Order 890's transparency and coordination principles
- In accordance with the Commission's February 15, 2018 Order (EL16-71: ER17-179), we are asking PJM to facilitate the process and ensure sufficient information is provided for EOL projects to "...enable customers, other stakeholders, or an independent third party **to replicate the results of planning studies** and thereby reduce the incidence of after-the-fact disputes regarding whether planning has been conducted in an unduly discriminatory fashion." (P74)

Current PJM Operating Agreement Requires Sufficient Information

- “The PJM Operating Agreement requires the PJM Transmission Owners to provide to the PJM Office of Interconnection, among other things, “all criteria, assumptions and models used in the current Local Plan,” which the PJM Office of Interconnection then posts to its website. ***However, the record in this proceeding indicates that the PJM Transmission Owners often provide models, criteria, and assumptions as part of the Supplemental Project transmission planning process that are vague or incomplete and do not allow stakeholders “to replicate the results of planning studies.” (P74)***

Commission's Order Clearly Expects Sufficient Information to be Provided

- “The record indicates that, in practice, the PJM Transmission Owners are providing **transmission planning information**, including models, criteria, and assumptions, that **is inadequate to allow stakeholders to replicate their planning studies, as Order No. 890 requires**. In addition, we find that this information is often provided too late in the transmission planning process for stakeholders to participate before the PJM Transmission Owners have taken significant steps toward developing Supplemental Projects. **As a result, stakeholders are unable to use this information in the manner that Order No. 890 required that they be able to use it, including to “replicate the results of planning studies** and thereby reduce the incidence of after-the-fact disputes regarding whether planning has been conducted in an unduly discriminatory fashion.” (P77)

Commission's Order Clearly Expects Sufficient Information to be Provided

- In particular, ***the record shows that the PJM Transmission Owners are either providing models, criteria, and assumptions that are insufficient to replicate the relevant planning studies*** or providing them too late in the transmission planning process for Supplemental Projects to provide stakeholders sufficient opportunities to provide input (P106)

Commission's Order Clearly Expects Sufficient Information to be Provided

- In particular, ***we find that such meetings are necessary to remedy the PJM Transmission Owners' failure to provide models, criteria, and assumptions for Supplemental Projects that are sufficient to permit stakeholders to “replicate the results of planning studies” and thereby identify for themselves the needs that underlie Supplemental Projects. (P107)***

- M-3 by its own language establishes the **minimum** number of Assumptions, Needs and Solutions meetings.
- M-3 by its own language says that PJM is to establish the schedule for Supplemental Project finalization and submittal of the Local Plan.
- M-3 by its own language states that, in accordance with sections 1.3(c) and (d) of Schedule 6 of the OA, the SRRTEP Committees
 - “shall facilitate the development and review of the Local Plans” and
 - “shall be responsible for the timely review of the criteria, assumptions and models used to identify reliability criteria violations, economic constraints, or to consider Public Policy Requirements, proposed solutions and written comments prior to finalizing the Local Plan, the coordination and integration of the Local Plans into the RTEP, and addressing any stakeholder issues unresolved in the Local Plan process.”
- This proposal is to memorialize the details necessary to facilitate the development and review of EOL projects that is missing from M-3.
- ***That PJM and the TOs submitted M-3 as part of the compliance filing should not and does not preclude the PJM Stakeholders from having the opportunity to identify information relevant to evaluate projects or how they would like PJM to facilitate its planning meetings.***

AMP/ODEC Proposal

- Developed, to the extent possible, in consultation with PJM planning staff
- Incorporates PJM proposed solution components as presented at TRPSTF
- Tracks TO OATT M-3 Compliance Filing
- Adds detail as to what information should be provided to ensure information as required by the OA is sufficient
- Adds additional process steps to accommodate transparency needs

AMP/ODEC Proposal

- Recognizes and accommodates the fact that each TO may approach asset end of life decisions differently
- In a nutshell, if a TO states it applies 5 tests in its EOL decision process, we'd like to see how those 5 tests have been applied to a specific project and how that project fits into the TO's work plan priority.
- Manual 14B Changes – no OA or OATT changes required

AMP/ODEC Proposal

General

1. The EOL process must fit within the PJM regional and local planning schedule
2. After EOL projects have been finalized, PJM, the TOs and the stakeholders shall coordinate regional and local planning for baseline projects to evaluate whether any finalized EOL project may contribute to solve a subsequently identified reliability violation in a least cost manner, and similarly, if an EOL reinforcement is identified which will eliminate the need for a previously, or subsequently, identified baseline violation, PJM and the TO's will work to find the least cost solution(s).

AMP/ODEC Proposal

Assumptions Meeting

1. TO's provide overview of asset management program as they relate to end of life projects. Include 5 year look ahead which will indicate whether there is the potential future replacements of specific equipment or group of equipment at a location, or any group of assets which may be the subject of concerns relating to specific equipment models, types, etc.
2. TOs provide (and PJM posts) all TO planning criteria, EOL **models**, criteria, and assumptions 20 calendar days in advance of scheduled SRRTEP meeting. The TOs shall provide enough information for stakeholders to be able to understand how assets will be prioritized for replacement, how the replacement versus maintenance decision is made, how assets rank relative to other assets on the system and the system average values. The level of detail will be sufficient to enable stakeholders to replicate the TO decision-making process for EOL facilities.

AMP/ODEC Proposal

Assumptions Meeting (continued)

2. Dependent on the TO's process, to the extent available:
 - a. Criteria must be quantifiable and include details about associated criteria thresholds. Each TO proposing EOL driven projects must have and share an established, company-approved, public set of quantifiable criteria that can be replicated by external entities.
 - b. Provide asset specific scoring criteria (to facilitate prioritization during needs meeting(s))
 - c. For developed criteria thresholds used to justify the replacement of an asset, the TO's will provide system level averages specific to that type/class of asset to support their established criteria threshold. These system level averages will include but not be limited to any data inputs used to rank and prioritize an individual asset's replacement against another asset of same type/class located on the TO's system.

AMP/ODEC Proposal

Assumptions Meeting (continued)

3. Stakeholders provide any written comments regarding the criteria, assumptions, and models posted for use in the EOL study process within 10 days of the assumptions and methodology meeting to be included in the TO review and consideration of all comments received for the assumptions and methodology meeting. The TOs *may* provide written responses within 10 days of stakeholder comments, such responses may include a response that there will be no response in regards to the comment(s) offered. ***PJM shall note that no written responses were provided if the TOs do not so provide.***
4. PJM shall schedule and facilitate all SRRTEP meetings.
5. With continued refinements, and to the extent possible, a uniform template shall be used by all TOs to convey the information above
6. PJM shall facilitate the SRRTEP in a timely fashion to support the progress of the planning process.

AMP/ODEC Proposal

System Needs Meeting

1. PJM schedule a minimum of one Subregional RTEP committee meeting no fewer than 25 days after the assumptions and methodology meeting to review the identified criteria violations and resulting system needs, if any, that may drive the need for an EOL project.
2. Needs meetings must occur prior to the individual TO finalizing its annual budget.

Order 890 Coordination Principle

- “The coordination principle requires public utility transmission providers to provide customers and other stakeholders with the opportunity to participate fully in the transmission planning process. The purpose of this requirement is to eliminate the potential for undue discrimination in transmission planning by opening appropriate lines of communication between public utility transmission providers, their transmission providing neighbors, affected state authorities, customers, and other stakeholders. The transmission planning process must provide for the ***timely and meaningful input and participation of customers and other stakeholders regarding the development of transmission plans.*** Customers must be included at the early stages of the development of the transmission plan and not merely given an opportunity to comment on transmission plans that were developed in the first instance without their input.” (P16, June 22, 2015 Order in ER13-198)

AMP/ODEC Proposal

System Needs Meeting (continued)

3. TO posts identified criteria violations and drivers no fewer than 10 days in advance of the Needs Meeting. Dependent on the TO's process, to the extent available:

- a. Criteria assessments must include at a minimum: asset scoring data inputs, analysis, and final results. All TO facilities need to continue to be part of the overall system level average.
- b. Drivers contributing to EOL determination (including performance, condition and risk) should be included. TOs will provide quantifiable values pertaining to what is driving facility selection. These values must include system level averages. As applicable, TOs shall provide documentation developed of condition assessments (e.g. photographs, engineer field reports, etc.).
- c. On an annual basis, the TOs must provide a complete list of all assets (CB, TF, Line, Station, etc.), and their relative ranking from highest priority to lowest priority, and the associated input data supporting their ranked priorities, in order to discuss prioritization rather than just dealing with individual projects.
- d. TOs provide annual forecast of end of life projects with current known information.
- e. TOs shall present identified system needs and drivers.
- f. TOs must also identify the specific company that owns the asset being assessed and if the asset is currently a transmission or distribution asset, as well as what entity will be owning, operating and maintaining the replacement facilities.
- g. When EOL transmission projects are replacing distribution assets, the TO also provides drivers to support a transmission improvement over a distribution improvement, including the supporting evidence that demonstrates the transmission alternative is lower in cost and/or the distribution alternative would not meet the needs. Finally, for any EOL project that is replacing a distribution facility, the TO must demonstrate that the distribution needs are imminent.

AMP/ODEC Proposal

System Needs Meeting (continued)

4. Stakeholders provide written comments no later than 10 days following the needs meeting for TO to review and consider so that the TO may respond or provide feedback as appropriate. TOs may provide written responses, including all additional information requested, prior to Solutions Meeting(s), ***such responses may include a response that there will be no response in regards to the comment(s) offered. PJM shall note that no written responses were provided if the TOs do not so provide. However,*** proposed projects will not be brought to a Solutions Meeting until the TO has responded to requested information.

5. Nothing precludes any TO from having additional stakeholder meetings or communications regarding a Local Plan that affects such stakeholders in addition to the Planning Meetings.

AMP/ODEC Proposal

Project Solutions Meeting(s)

1. PJM-facilitated Regional and Subregional Meetings on EOL Planning.
2. TOs shall share and post their potential solutions, as well as any alternatives identified by the TOs or stakeholders, at least 10 days in advance of the Solutions Meeting.
3. Dependent on the TO's process, to the extent available, only EOL solutions that include the following information will be brought forward for consideration:
 - a. Asset specific EOL scoring data inputs, analysis, and final results;
 - b. Asset specific EOL priority ranking relative to entire system under study; and,
 - c. Asset specific EOL Quantifiable values pertaining to what is driving the selection of the facility.
4. Projects not meeting this minimum criteria can be brought forward as part of a new, TO-specific Order 890 compliant planning process.

AMP/ODEC Proposal

Project Solutions Meeting(s) (continued)

5. No fewer than 25 days after the Needs Meeting but after all information requested at Needs Meeting is provided, each Regional TEAC or Subregional RTEP Committee shall schedule and facilitate a minimum of one Regional TEAC or Subregional RTEP Committee meeting to review potential solutions for the identified criteria violations (Solutions Meeting).
6. Stakeholders may provide comments on the potential solutions to the TO for consideration either prior to or by 10 days following the Solutions Meeting.
7. The TO shall review and consider comments that are received within 10 days of the meeting and shall may respond or provide feedback in writing no later than 20 days after the Solutions Meeting, ***such responses may include a response that there will be no response in regards to the comment(s) offered. PJM shall note that no written responses were provided if the TOs do not so provide.***

AMP/ODEC Proposal

Project Solutions Meeting(s) (continued)

Alternative Project Solutions Meeting

8. Only applies to those projects where alternatives have been identified.
9. PJM-facilitated Regional and Subregional Meetings on EOL Planning.
10. No more than 10 days after the initial Solutions Meeting, any stakeholder shall share and PJM shall post alternative solutions to the TO potential solutions.
11. No more than 20 days after the alternative solutions are posted, the Regional TEAC or subregional RTEP Committee shall schedule and facilitate another Solutions Meeting which would include the Alternative Project Solutions for review and discussion.

AMP/ODEC Proposal

Project Solutions Meeting(s) (continued)

Project Finalization

12. PJM-facilitated Regional and Subregional Meetings on EOL Planning.

13. No fewer than 20 days after the Alternative Solutions Meeting, the Regional TEAC or subregional RTEP Committee shall schedule another Solutions Meeting to review and discuss the TO's final decision on a solution and for the TOs to respond to questions.

14. The TOs shall share and post their proposed final solution no fewer than 10 days before the Final Solutions Meeting. TOs shall provide justification and documentation for their selected solution.

15. The Regional TEAC or subregional RTEP Committee shall facilitate the Solutions Meetings to review and discuss the TO's solution and for the TOs to respond to questions.

16. The TOs may respond or provide feedback in writing no later than 10 days prior to the Local Plan being submitted for integration into the RTEP. Such responses may include a response that there will be no response in regards to the comment(s) offered. PJM shall note that no written responses were provided if the TOs do not so provide.

AMP/ODEC Proposal

Finalization of Projects for Local Plan

1. Each TO will submit to PJM EOL Projects that were finalized through the Regional TEAC or subregional RTEP committees from January through May for inclusion in the finalized PJM RTEP base case for that planning year.
2. Projects for the Local Plan will not be final “finalized” until the conclusion of Dispute Resolution (if applicable).

Questions?