



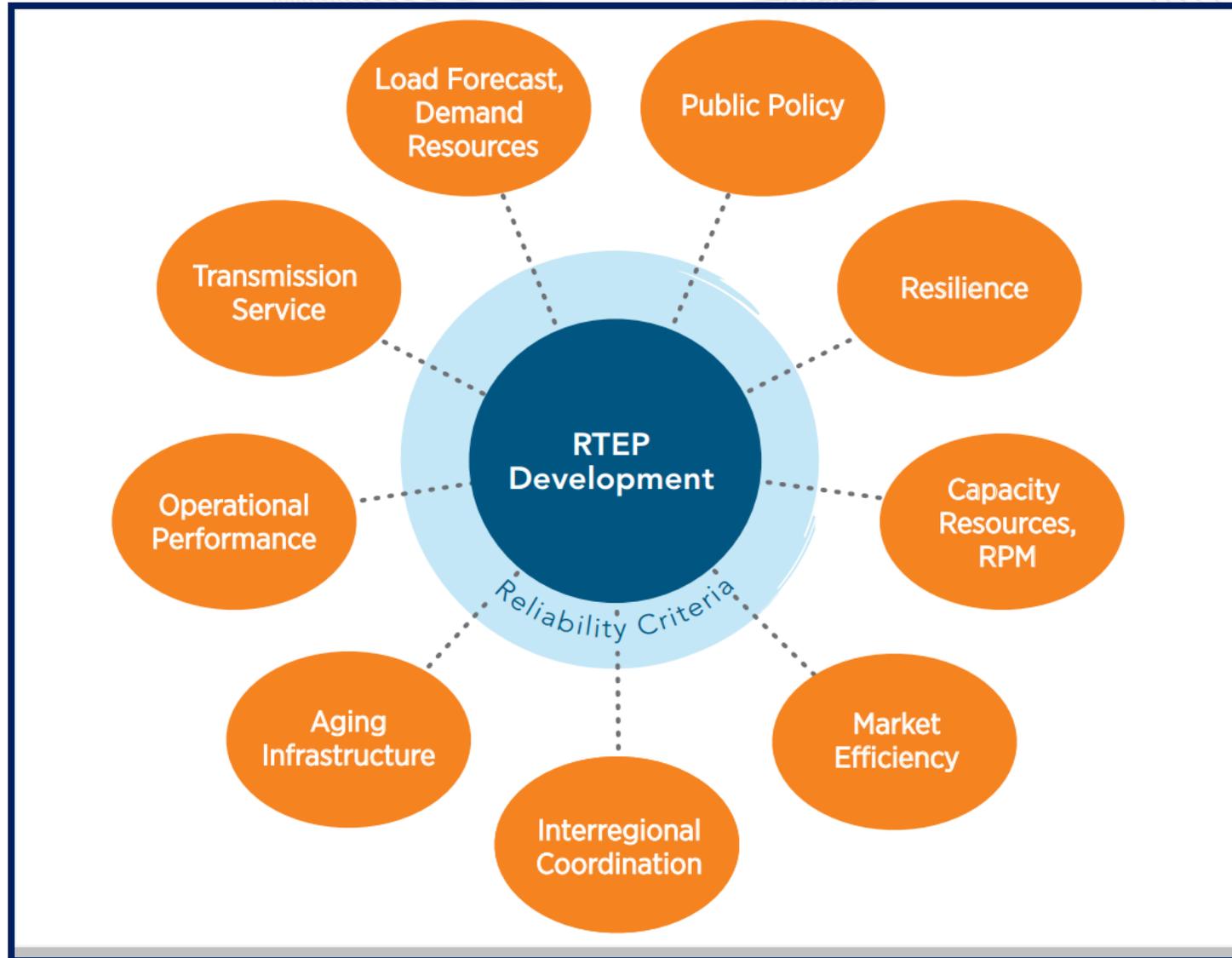
# PJM Regional Transmission Expansion Planning (RTEP) Process

IPSAC  
May 15, 2020

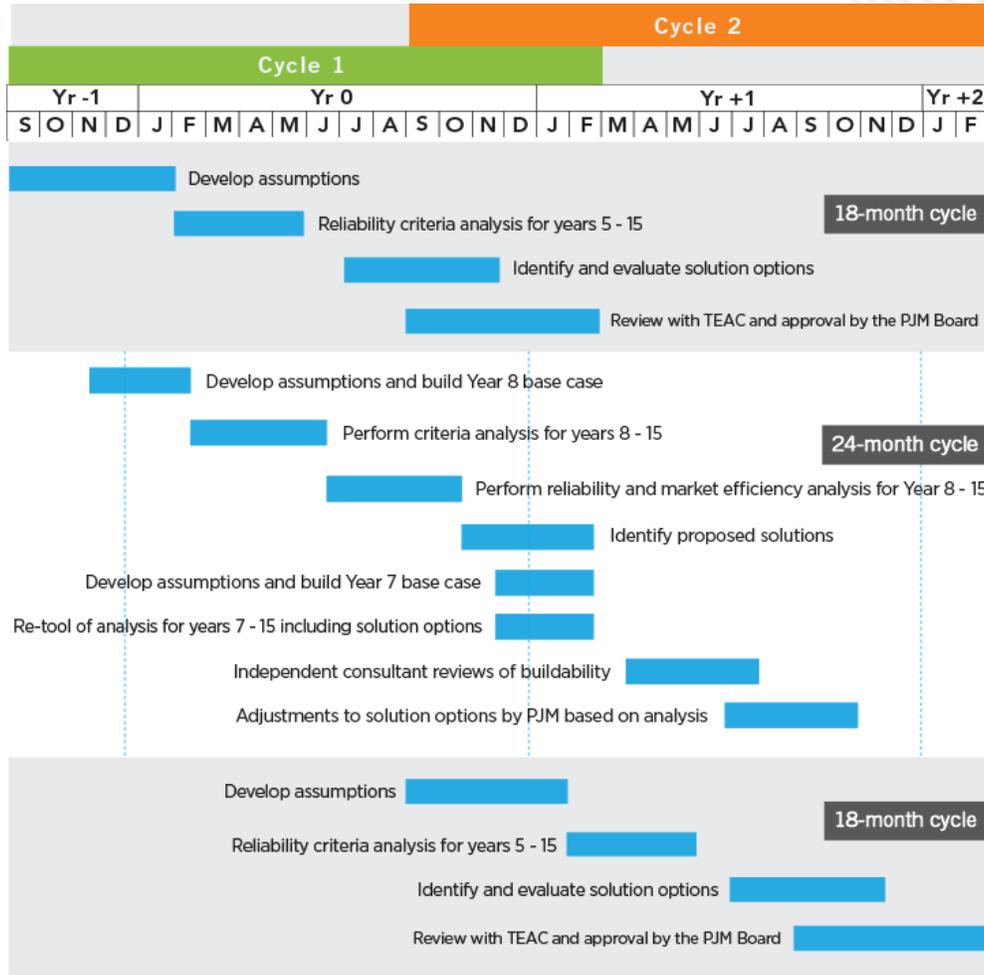
- Planning Committee (PC)
  - <http://www.pjm.com/committees-and-groups/committees/pc.aspx>
- Transmission Expansion Advisory Committee (TEAC)
  - <http://www.pjm.com/committees-and-groups/committees/teac.aspx>
- Interregional Planning
  - <http://www.pjm.com/planning/interregional-planning.aspx>
- Services and Requests
  - <http://www.pjm.com/planning/services-requests.aspx>
- RTEP Development
  - <http://www.pjm.com/planning/rtep-development.aspx>
- Manual 14B
  - <http://www.pjm.com/-/media/documents/manuals/m14b.ashx>



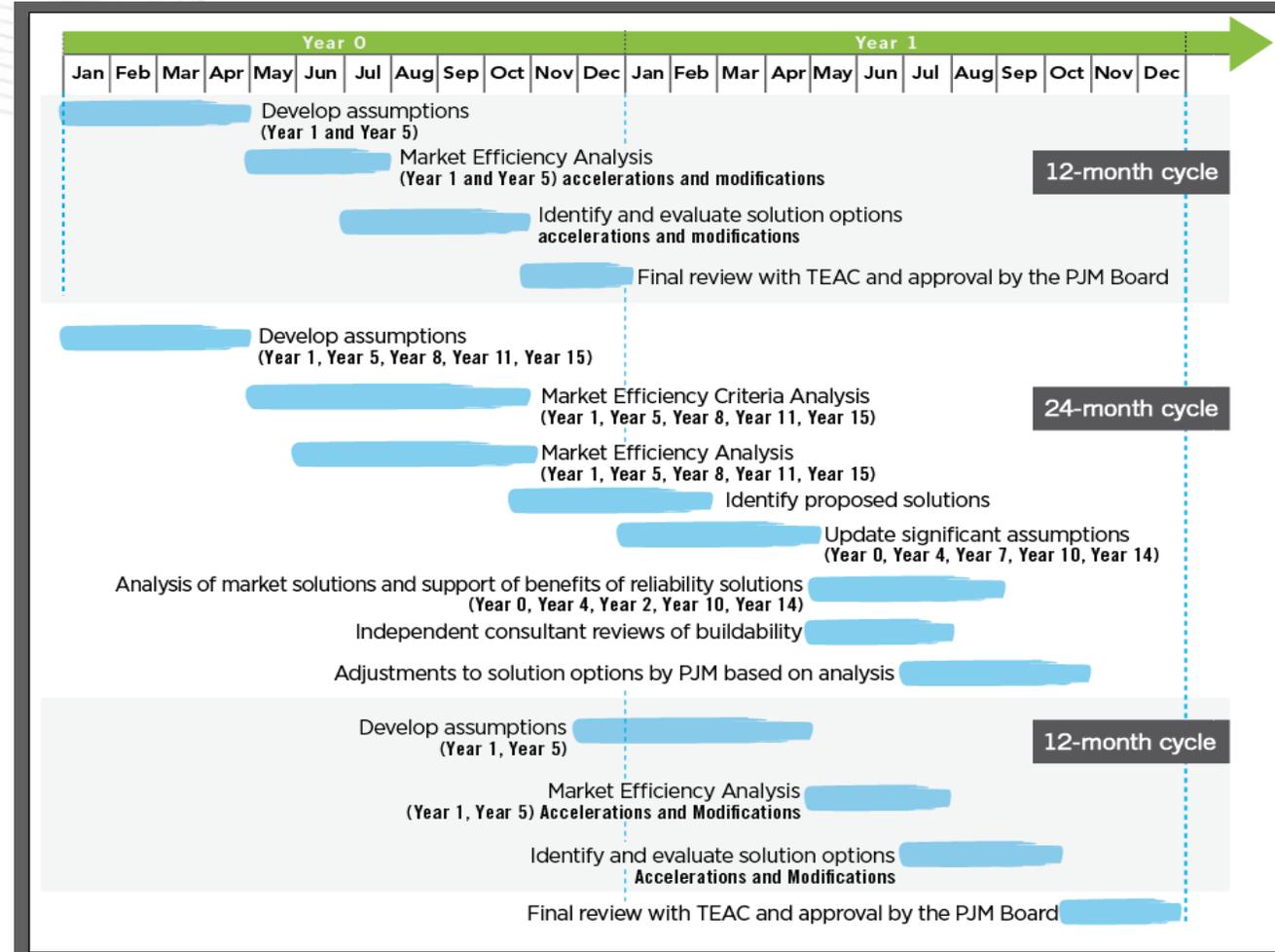
# PJM RTEP Planning Cycles



## PJM's 2-year Reliability



## PJM's 2-year Market Efficiency





# PJM 2020 RTEP Assumptions

- 2020 RTEP
  - TPL-001-4
- Modeling
  - MOD-032 (GOs and TOs)
    - <https://pjm.com/planning/services-requests/planning-modeling-submission-mod-032.aspx>
    - Siemens PSS®MOD - Model On Demand (TOs)
    - PJM.com Planning Center Online Tool (Gen Model) – GOs
- RTEP Proposal Windows
  - Includes FERC Form 715 violations

- **Load Flow Modeling**

- Power flow models for outside world load, capacity, and topology will be based on the following 2019 Series MMWG power flow cases
  - 2019 Series 2024SUM MMWG outside world for
    - 2020 Series 2025SUM RTEP, 2023SUM RTEP
  - 2019 Series 2024SLL MMWG outside world for
    - 2020 Series 2025LL RTEP
  - 2019 Series 2024WIN MMWG outside world for
    - 2020 Series 2025WIN RTEP
- PJM to work with neighbors to identify any updates to topology/corrections
- PJM topology for all cases sourced from Model On Demand
  - Include all PJM Board approved upgrades through the December 2019 PJM Board of Manager approvals as well as all anticipated February 2020 PJM Board approvals



# Locational Deliverability Areas (LDAs)

- Includes the existing 27 LDAs
- Total of 27 LDAs
  - All 27 to be evaluated for the as part of the 2020 RTEP

LDA	Description
<b>EMAAC</b>	Global area - PJM 500, JCPL, PECO, PSEG, AE, DPL, RECO
<b>SWMAAC</b>	Global area - BGE and PEPSCO
<b>MAAC</b>	Global area - PJM 500, Penelec, Meted, JCPL, PPL, PECO, PSEG, BGE, Pepco, AE, DPL, UGI, RECO
<b>PPL</b>	PPL & UGI
<b>PJM WEST</b>	APS, AEP, Dayton, DUQ, Comed, ATSI, DEO&K, EKPC, Cleveland, OVEC
<b>WMAAC</b>	PJM 500, Penelec, Meted, PPL, UGI
<b>PENELEC</b>	Pennsylvania Electric
<b>METED</b>	Metropolitan Edison
<b>JCPL</b>	Jersey Central Power and Light
<b>PECO</b>	PECO
<b>PSEG</b>	Public Service Electric and Gas
<b>BGE</b>	Baltimore Gas and Electric
<b>PEPCO</b>	Potomac Electric Power Company
<b>AE</b>	Atlantic City Electric
<b>DPL</b>	Delmarva Power and Light
<b>DPLSOUTH</b>	Southern Portion of DPL
<b>PSNORTH</b>	Northern Portion of PSEG
<b>VAP</b>	Dominion Virginia Power
<b>APS</b>	Allegheny Power
<b>AEP</b>	American Electric Power
<b>DAYTON</b>	Dayton Power and Light
<b>DLCO</b>	Duquesne Light Company
<b>Comed</b>	Commonwealth Edison
<b>ATSI</b>	American Transmission Systems, Incorporated
<b>DEO&amp;K</b>	Duke Energy Ohio and Kentucky
<b>EKPC</b>	Eastern Kentucky Power Cooperative
<b>Cleveland</b>	Cleveland Area

- Firm Commitments
  - Long term firm transmission service consistent with those coordinated between PJM and other Planning Coordinators during the 2019 Series MMWG development
- Outage Rates
  - Generation outage rates will be based on the most recent Reserve Requirement Study (RRS) performed by PJM
  - Generation outage rates for future PJM units will be estimated based on class average rates

- Generic EEFORD values developed for 2025 RTEP base case
  - To be posted with TEAC materials
- Capacity weighted by fuel type
  - Each unit within a given generator class is assigned the average EEFORD for that class

Gen Class	MW	Avg EEFORD
Fossil Steam	59,695	10.48%
Nuclear	30,939	1.49%
Combustion Turbine	26,440	8.45%
Combined Cycle	68,233	4.44%
Hydro	2,904	7.48%
Pumped Storage	5,609	3.16%
Diesel	982	12.62%
Wind	1,765	0.00%
Solar	3,186	0.00%

- **Summer Peak Load**
  - Summer Peak Load will be modeled consistent with the 2020 PJM Load Forecast Report
  - The final load forecast released in December 2019
- **Winter Peak Load**
  - Winter Peak Load will be modeled consistent with the 2020 PJM Load Forecast Report
- **Light Load**
  - Modeled at 50% of the Peak Load forecast per M14B
  - The Light Load Reliability Criteria case will be modeled consistent with the procedure defined in M14B
- **Load Management, where applicable, will be modeled consistent with the 2020 Load Forecast Report**
  - Used in LDA under study in load deliverability analysis

- All existing generation expected to be in service for the year being studied will be modeled.
- Future generation with a signed Interconnection Service Agreement, or that cleared in the 2020/21 BRA, will be modeled along with any associated network upgrades.
  - Generation with a signed ISA will contribute to and be allowed to back-off problems.
- Generation with an executed Facilities Study Agreement (FSA) will be modeled offline and will be examined separately.

- Generation with an FSA will be modeled consistent with the procedures noted in Manual 14B
- Generation with an executed FSA will be modeled offline but will be allowed to contribute to problems in the long-term generation deliverability testing.
  - Generation with an executed FSA will not be allowed to back-off problems.
- Additional generation information (i.e., machine lists) will be posted to the TEAC page.

- Queue projects with an FSA or ISA but are not included in 2020 Series RTEP cases
  - Y3-092 (MTX)
    - 1000 MW Capacity Transmission Injection Rights
    - 500 MW Firm Transmission Withdrawal Rights and 500 MW Non-Firm Transmission Withdrawal Rights

- Generation that has officially notified PJM of deactivation will be modeled offline in RTEP base cases for all study years after the intended deactivation date
- RTEP baseline upgrades associated with generation deactivations will be modeled
- Retired units Capacity Interconnection Rights are maintained in RTEP base cases for 1 year after deactivation at which point they will be removed unless claimed by an interconnection queue project

- At a minimum, all PJM bulk electric system facilities, all tie lines to neighboring systems and all lower voltage facilities operated by PJM will be monitored.
- At a minimum, contingency analysis will include all bulk electric system facilities, all tie lines to neighboring systems and all lower voltage facilities operated by PJM.
- Thermal and voltage limits will be consistent with those used in operations and those specified in the Form 715 planning criteria. In all cases, the more conservative value will be used.

- PJM/NYISO Interface
  - B & C cables will be modeled out of service consistent with NYISO modeling
- Linden VFT
  - Withdrawal : Modeled at 330 MW Non-Firm Transmission Withdrawal Rights & Modeled 330 MW Long-Term Firm Transmission Service (PJM-NYISO)
  - Injection : Modeled at 315 MW Capacity Transmission Injection Rights
- HTP
  - Modeled at 673 MW Non-Firm Transmission Withdrawal Rights

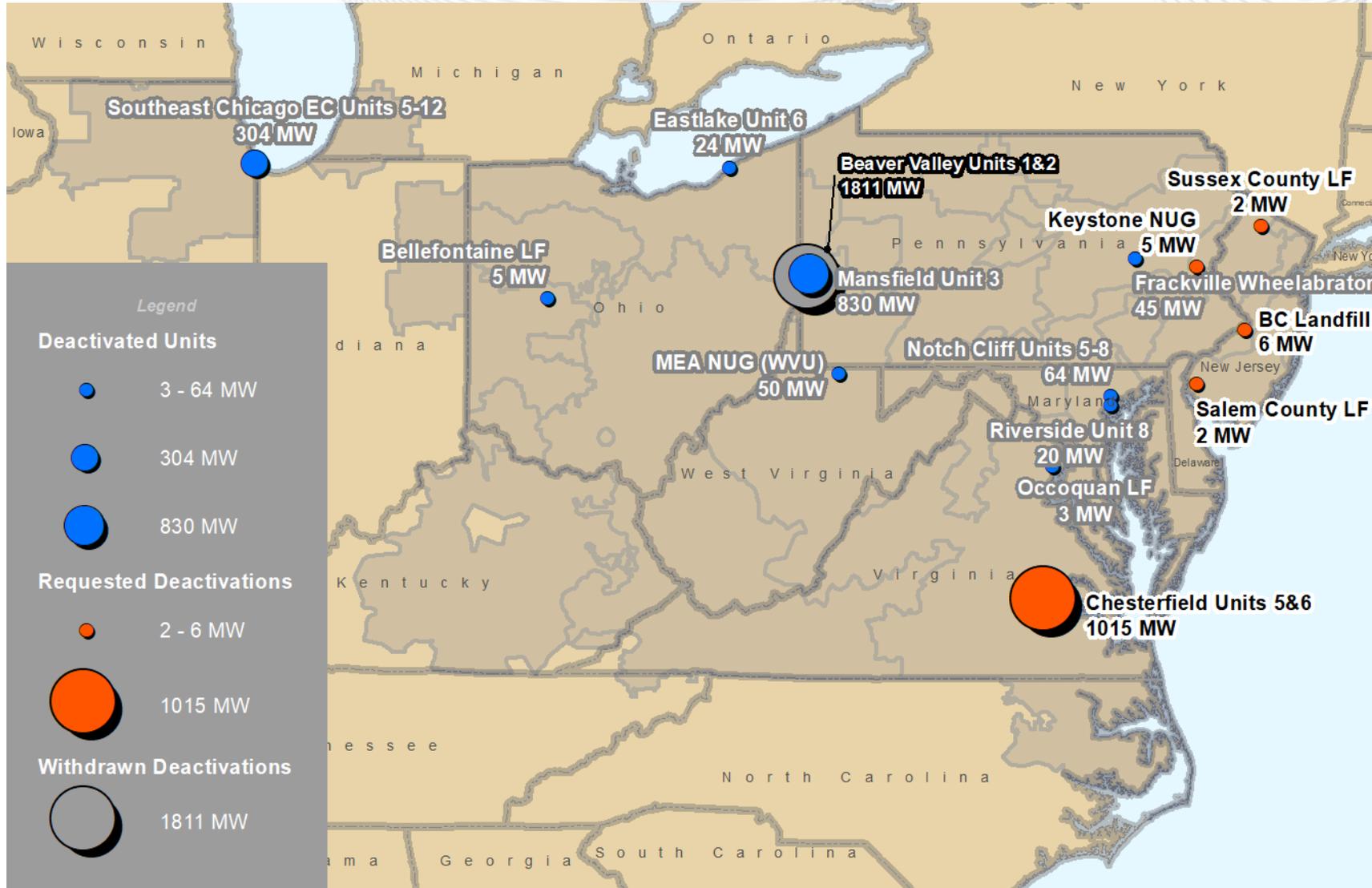
- As part of the 24-month RTEP cycle, a year 8 (2028) base case will be developed and evaluated as needed as part of the 2020 RTEP
- The year 8 case will be based on the 2025 Summer case that will be developed as part of this year's 2020 RTEP
  - The case will be updated to be consistent with the 2020 RTEP assumptions.
- Purpose: To identify and develop longer lead time transmission upgrades

- Similar to the 2019 RTEP and per the PJM Operating Agreement, a proposal window will be conducted for all reliability needs that are not Immediate Need reliability upgrades or are otherwise ineligible to go through the window process.
- FERC 1000 implementation will be similar to the 2019 RTEP.
  - Advance notice and posting of potential violations
  - Advance notice of window openings
  - Window administration



# Generation Deactivation Notification Update (Between 11/1/2019 and 4/1/2020)

# Generation Deactivation Update Since 11/1/2019



Unit(s)	Transmission Zone	Requested Deactivation Date	PJM Reliability Status
Sussex County LF (2 MW)	JCPL	4/26/2020	Reliability analysis complete. No violation identified
Salem County LF(1.7 MW)	AEC	4/26/2020	Reliability analysis complete. No violation identified
BC Landfill (6 MW)	PSEG	5/31/2023	Reliability analysis complete. No violation identified
Chesterfiled 5 and 6 (1015 MW)	Dominion	5/31/2023	Reliability analysis Underway.
Keystone NUG (4.9 MW)	PPL	5/31/2020	Reliability analysis Underway.

Unit(s)	Transmission Zone	Actual Deactivation Date	PJM Reliability Status
Southeast Chicago CT5 – CT12 (304 MW)	ComEd	12/17/2019	Reliability analysis complete. No impacts identified.
Notch Cliff GT5 –GT8 (64 MW)	BGE	3/1/2020	Reliability analysis complete. No impacts identified
Mansfield 3 (830 MW)	ATSI	11/7/2019	Reliability analysis complete. New baseline upgrade was issued to resolve the identified issue.
Frackville Wheelabrator 1 (45.1 MW)	PPL	3/1/2020	Reliability analysis complete. No impacts identified.
Riverside 8 (20 MW)	BGE	12/1/2019	Reliability analysis complete. No impacts identified.

Unit(s)	Transmission Zone	Actual Deactivation Date	PJM Reliability Status
Bellefontaine Landfill Generating Station (5 MW)	Dayton	12/31/2019	Reliability analysis complete. No impacts identified.
MEA NUG (WVU) (50 MW)	APS	12/30/2019	Reliability analysis complete. No impacts identified
Eastlake 6 (24 MW)	ATSI	2/18/2020	Reliability analysis complete. No impacts identified
Occoquan 1 LF (3.2 MW)	Dominion	11/7/2019	Reliability analysis complete. No impacts identified.

## The Beaver Valley generators Reinstatement Announcement

- The Beaver Valley U1 Nuclear Unit (909 MW) and Beaver Valley U2 Nuclear Unit (902 MW), announced their withdrawal of deactivation. PJM is working on the studies to determine which of the upgrades identified due to the Beaver Valley units deactivation can be canceled.

# RTEP Projects Electrically Near the PJM-NYISO Interface As of April 2020

-No projects or upgrades identified in the PJM-NYISO Interface Since the December meeting



# PJM Market Efficiency Update

Nick Dumitriu  
Sr. Lead Engineer, PJM Market Simulation



# PJM Market Efficiency Process Enhancement Task Force Update

- 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
  - MEPETF Phase 1 and Phase 2 completed
- At the end of 2018, PJM filed proposed revisions to
  - Benefit/cost analysis it conducts in its evaluation of economic-based projects as part of its regional transmission expansion plan (RTEP) process
  - Generation assumptions that go into PJM's market efficiency analysis
- In February 2019, FERC accepted PJM's proposed revisions\*

*\*Benefit/Cost Analysis Docket Nos. ER19-80-000 and ER19-80-001; Generation Assumptions Docket No.ER19-562-000*

- MEPETF Phase 3 authorized by Planning Committee in June 2019
  - Address concerns with the coupling of energy and capacity benefits
  - Discuss Regional TMEP concept and explore any necessary alternatives
  - Evaluate alternative method for the benefits summation
- PJM is proposing three changes to the market efficiency process
  - Create stand-alone process to address RPM drivers independent of energy driver analysis
  - Modify calculation inputs for RPM benefits
  - Create a backwards looking “quick hit” market efficiency process to address persistent congestion not identified in the forward looking planning model
- Next Steps
  - Planning Committee vote May 2020
  - MRC first read (if necessary) June 2020, vote (if necessary) July 2020
  - File OA changes with FERC August 2020 effective for 20/21 window

# 2018/19 Market Efficiency Window

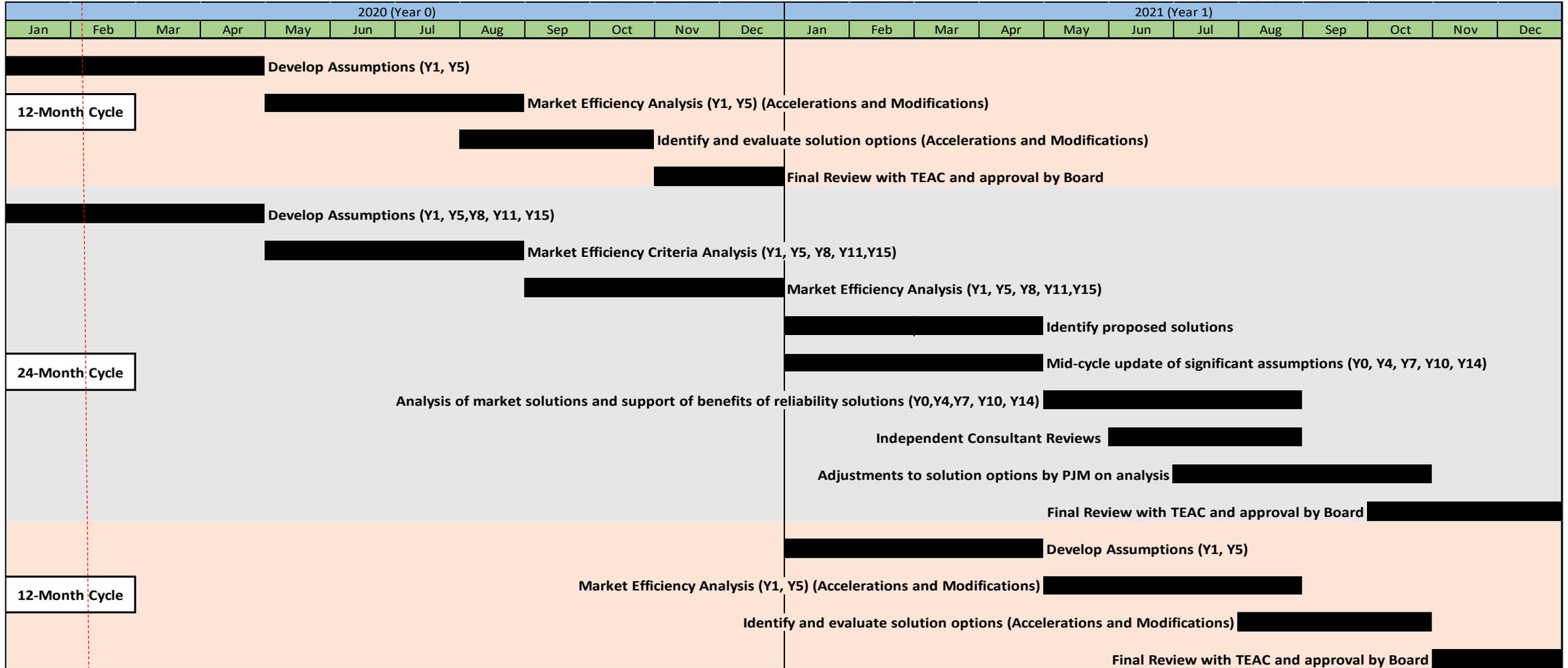
- Four drivers identified:
  - Hunterstown – Lincoln 115 kV
    - HL\_622, baseline b3145, rebuild the Hunterstown-Lincoln 115 kV line, was approved by the PJM Board of Managers for inclusion in the RTEP
  - Marblehead N 161/138 kV Transformer
    - No proposed project met B/C criteria in either region
  - Monroe – Wayne 345 kV
    - No proposed project effectively resolved congestion
  - Bosserman – Trail Creek 138 kV
    - BT\_481, baseline b3142, rebuilding Michigan City to Trail Creek to Bosserman 138 kV lines, received provisional approval by the PJM Board of Managers, pending approval by the MISO Board as well
- Analysis is completed, concluding the 2018/19 Market Efficiency Cycle

# 2018/19 PJM-MISO Interregional Market Efficiency Project Study

- In parallel with the 2018/19 RTEP Window, PJM and MISO have conducted a two-year Interregional Market Efficiency Project (IMEP) study
- Issues identification and benefit determination conducted in each regional process consistent with current effective JOA
- Interregional proposals must:
  - Address at least one identified issue in each region (could be same issue if identified by both RTOs)
  - Be submitted to both regional processes

- Study is complete, concluding 2019 Coordinated System Plan
- Three drivers identified:
  - Marblehead N 161/138 kV Transformer
    - No proposed project met B/C criteria in either region
  - Lallendorf – Monroe 345 kV
    - No proposed project effectively resolved congestion
  - Bosserman – Trail Creek 138 kV
    - Rebuilding Michigan City to Trail Creek to Bosserman 138 kV pending regional approvals

# 2020/2021 Long-Term Window



Step	Timeline
Develop PJM Assumptions	January – April 2020
Build Draft ME Base Case	May – August 2020
Post Draft ME Base Case	August 2020
Interregional Data Update	September – October 2020
Identify Congestion Drivers	September – December 2020
Post Base Case and Congestion Drivers	End of December 2020
Long-Term Window	January 2021 – April 2021
Analysis of Proposed Solutions	May – October 2021
Final TEAC Review and Board Approval	October – December 2021

# Questions?

