



# 2016 RTEP Assumptions

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- Update of standard RTEP assumptions
- New for 2016 RTEP
  - TPL-001-4
- Modeling
  - MOD-032 (GOs and TOs)
    - <http://pjm.com/planning/rtep-development/powerflow-cases/mod-032.aspx>
    - Siemens PSS®MOD - Model On Demand (TOs)
    - PJM.com Online Tool – coming soon (GOs)
    - Powertech SDDDB – System Dynamics Database (GOs)
- RTEP Proposal Windows

- Load Flow Modeling
  - Power flow models for world load, capacity and topology will be based on the 2021 summer peak case from the 2015 ERAG MMWG series power flow base case
  - Update of adjacent areas with latest topology
  - PJM topology will be based on the 2020 RTEP case that was used in the 2015 RTEP
    - Include all PJM Board approved upgrades through the December 2015 PJM Board of Manager approvals as well as all anticipated February 2016 PJM Board approvals



# Locational Deliverability Areas (LDAs)

- Includes the existing 27 LDAs
- Total of 27 LDAs
  - All 27 to be evaluated for the 2019/2020 delivery year RPM base residual auction planning parameters
  - Also to be evaluated for the 2021 Summer RTEP case

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

- Summer Peak Load
  - Summer Peak Load will be modeled consistent with the 2016 PJM Load Forecast Report
  - The final load forecast data is expected to be available late December 2015
  - Include Demand Response (DR) and Energy Efficiency (EE) that cleared in the 2018/19 BRA
  
- Winter Peak Load
  - Winter Peak Load will be modeled consistent with the 2016 PJM Load Forecast Report
  
- Light Load
  - Modeled at 50% of the Peak Load forecast per M14B
    - Will continue to pursue a load adjustment through the Planning Committee
  - 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 2016 Load Forecast Report
  - Used in LDA under study in load deliverability analysis

- Firm Commitments
  - Long term firm transmission service will be consistent with operations
- 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

- **Base Case**
  - TO updates incorporated
  - Updated queued generation information incorporated
- **In progress**
  - Contingency update and check
  - Update interchange
  - Update generation dispatch
    - Machine list will be presented at February TEAC
  - Update load per latest 2016 load forecast

- End of January 2016
  - Incorporate final TO feedback and updates
  - Finalize case and associated files
- February 2016
  - Exercise the model using analysis, coordinate quality control check and benchmark
- February 2016 - March 2016
  - Begin formal RTEP analysis



- Load forecast
  - Latest 2016 load forecast for 2021 50/50 summer peak load
- Interchange
  - Based on latest reservations for 2021 in OASIS
- External topology
  - MMWG 2015 series 2021 summer peak
- Internal topology
  - Include all PJM Board approved upgrades through the December 2015 PJM Board of Manager approvals

- Machine list
  - Updated Capacity Interconnection Rights (CIR's) for existing units
  - Queues with an executed FSA or higher as of October 1, 2015 will be included in the base model
    - Consult posted machine list for exact modeling assumption
    - FSA will be turned off but allowed to contribute to problems in Generator Deliverability
    - Any identified network upgrades driven by included queue projects will also be modeled
    - Any exceptions will be reviewed with TEAC
  - Units that cleared in previous RPM auctions that do not yet have an executed FSA or higher will be modeled
  - 2021 RTEP machine list will be presented at February 2016 TEAC

- 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 2018/19 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 Facility Study Agreement (FSA) will be modeled along with any associated network upgrades.

- Generation with an FSA will be modeled consistent with the procedures noted in manual 14B
  - Exceptions to those procedures will be vetted with stakeholders at a future TEAC
- Generation with an executed FSA will be modeled off-line but will be allowed to contribute to problems in the 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 when developed.

- 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.

- As part of the 24-month RTEP cycle, a year 8 (2024) base case will be developed and evaluated as part of the 2016 RTEP
- The year 8 case will be based on the 2020 case that was developed as part of this year's 2015 RTEP
  - The case will be updated to be consistent with the 2016 RTEP assumptions.
- Purpose: To identify and develop longer lead time transmission upgrades

- NERC Transmission Planning Standards
- TPL-001-4 Implementation
  - Manual 14B language is approved and effective 1/1/2016
  - 2016 RTEP will comply with TPL-001-4
  - Notable Changes
    - Dynamic load modeling
    - Dynamic voltage recovery criteria
    - Increased focus on the evaluation of extreme events
    - Short circuit requirements



- TPL-001-4 R2.4.1:

System peak Load levels shall include a Load model which represents the expected dynamic behavior of Loads that could impact the study area, considering the behavior of induction motor Loads. An aggregate System Load model which represents the overall dynamic behavior of the Load is acceptable.

- Enforceable – January 1, 2016

- All TOs have submitted dynamic load models.
- PJM has completed a sanity check and found several simulation issues with:
  - Negative equivalent loads.
  - Small (near zero MW) loads.
  - High equivalent distribution network impedance (R&X) for low voltage level loads (e.g. below 34.5kV), etc.
- Sensitivity studies are in progress to better understand the impact of the submitted dynamic load models.

- PJM is developing recommendations to resolve the identified issues and will notify the TOs soon
- PJM will develop an implementation plan that includes:
  - Stability study scenarios to evaluate the impact of dynamic load models.
  - Validation and mitigation process for potential stability issues due to dynamic load models.
  - Dynamic load model update and submission procedure
- Please send your comments to [MOD-032@pjm.com](mailto:MOD-032@pjm.com) regarding the dynamic load modeling.

- MOD-032-1 Data for Power System Modeling and Analysis is enforceable on 7/1/2016
- All modeling requirements and procedures are documented on PJM.com
  - <http://www.pjm.com/planning/rtep-development/powerflow-cases/mod-032.aspx>
  - Model on Demand
  - SDDDB (final implementation is in progress)

- Similar to the 2015 RTEP and per the PJM Operating Agreement, a proposal window will be conducted for all reliability needs that are not Immediate Need reliability upgrades.
- Implementation will be similar to the 2015 RTEP.
  - Advance notice and posting of potential violations
  - Advance notice of window openings
  - Window administration

- FERC approved the Order No. 1000 Project Proposal Window Fee on 11/3/2015
- Tiered, upfront, non-refundable per project fee
  - No fee (\$0) for any proposed projects (upgrade and greenfield) with estimated costs below \$20M
  - \$5,000 fee for any proposed projects (upgrade and greenfield) with estimated costs greater than \$20M and less than \$100M
  - \$30,000 fee for any proposed projects (upgrade and greenfield) with estimated costs greater than \$100M

- Assumptions Next Steps
  - TOs to notify PJM of any planned Supplemental Upgrades
  - PJM to post the final machine list
  - PJM to finalize and quality control check models

# Questions?

Email: [RTEP@pjm.com](mailto:RTEP@pjm.com)