



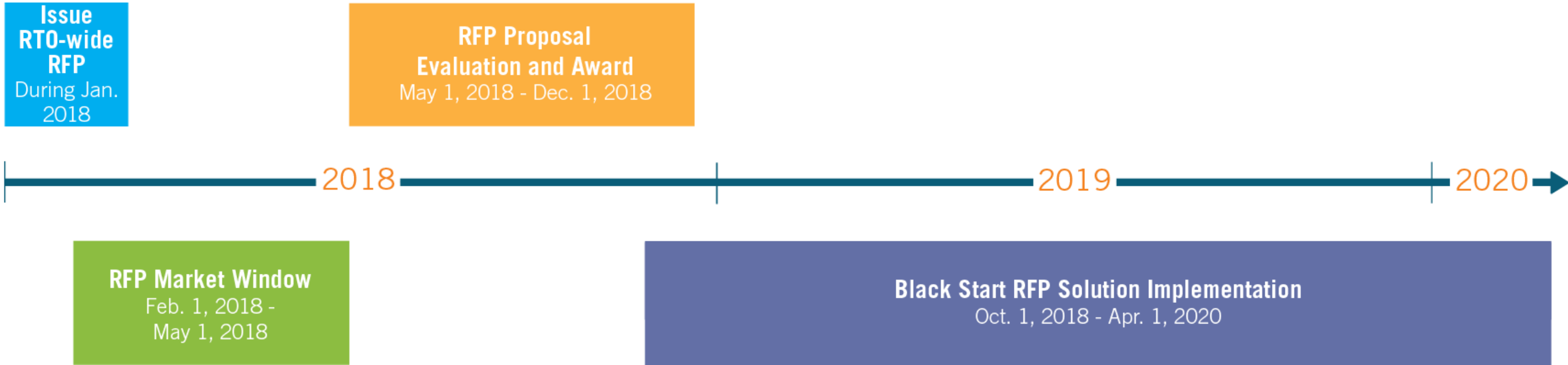
# PJM Black Start Replacement Process RTO Wide Black Start RFP Review Plan



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- PJM target for issuing next 5-Year RTO Wide Black Start RFP is Jan 2018
  - For any new black start units to be available by 4/1/2020
- Background on restoration methodology
- Review of black start replacement process
- Lessons Learned
  - 1<sup>st</sup> 5-Year RTO Wide RFP / Incremental RFPs since 2015
- Potential enhancements related to resilience

# RTO Wide Black Start RFP Milestone Timeline



PJM, in its role as Transmission Operator (TOP), is responsible for selecting Black Start resources for a system restoration plan, in accordance with NERC Std. EOP-005. PJM works closely with the TOs to identify these units based on:

- Critical Load requirements
- Available Black Start resources and technical evaluation of cranking paths between black start units and critical load
- Minimum number of Black Start resources allocated to a zone
- Possible cross zonal coordination opportunities

- Current restoration methodology was developed by System Restoration Sr. Task Force (SRSTF) stakeholder process (2012-2014)
- Black Start units / Critical Load requirements:
  - Black Start units (Manual M12, OATT Schedule 6A):
    - Ability to self start / close to a dead bus within 3 hours
  - Critical Load Criteria (Manual M36):
    - Units with hot start time of 4 hours or less
    - Nuclear safe shutdown loads
    - Critical gas infrastructure

- PJM Minimum Black Start Requirements (M36 Attachment A)
  - 2 Black Start resources allocated for each TO zone with a Critical Load Requirement
  - Required Black Start MW per TO zone = Critical Load Requirement + 10% margin
  - Actual number of black start units and MW driven by:
    - System topology in each TO zone
    - Capability of black start MW to serve critical load via identified cranking paths as determined by steady state and dynamic studies per NERC Std. EOP-005

- RTO Wide Black Start RFP
  - Issued every 5 years to align with EOP-005 studies requirements
  - Solicitation for new black start proposals across RTO
- Incremental Black Start RFP
  - Address Black Start shortage or reliability concern driven by retirements, termination of Black Start Service, or future critical loads
- Reliability Backstop
  - After 2 failed RFPs and no cross zonal and no RTEP solutions
  - 3<sup>rd</sup> RFP with TO solution submitted

- Feasibility of Steady State and Dynamic Analysis
- Geographic Diversity
- Within TO Zone or Cross-zonal
- Interconnection Voltage Level
- Operational Limitations
- Environmental Limitations
- Minimum Loading Requirements
- Historical Forced Outage Rates via GADs
- Special Black Start test exceptions
- Unit Type
- Fuel Diversity
- Dual Fuel
- Onsite Fuel Storage or firm gas
- Multiple Transmission Outlets
- Age of Unit
- Cost / Schedule
  - Capital Costs / Black Start MW
  - Net Present Value / Black Start MW
  - Black Start commitment period
  - Cost recovery method
  - Black Start in-service date



- Issue RFP earlier to allow sufficient time to meet 4/1/2020 implementation
- Enhance RFP communication to ensure stakeholder visibility
- Improve education upfront to ensure GO understanding of what needs to be done prior to providing Black Start Service
- Enhanced RFP technical questions/review

- Evaluate changes in critical load in each TO zone to optimize effectiveness of cranking paths from black start to critical load
- Consider opportunities for enhanced redundancy
- Evaluate cross zonal black start logistics effectiveness
- Consider giving higher priority to new black start proposals with dual fuel capability or firm gas
- Other.....

- PJM to conduct reviews with SOS-T, OC and TOA-AC
- State outreach for awareness
- Future updates to SOS-T / TOA-AC / OC as needed on process enhancements