Designing Solicitations To Mitigate RMR Agreements

ON BEHALF OF SIERRA CLUB, ET AL

ANDREW LEVITT
HANNES PFEIFENBERGER
ANIRUDDH MOHAN

PJM DESTF

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Brattle

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Rationale and Scope of RMR Mitigation/Avoidance

Objective: mitigate or avoid Reliability Must Run (RMR) agreements and enhance reliability

- RMRs are contracted payments that temporarily retain retiring generation units until reliability upgrades triggered by the retirement are completed.

Benefits of mitigating RMRs:

- Enhance affordability, efficiency, and reliability
- Achieve policy goals
- Avoid non-competitive, cost-of-service based “uplift” payments

Scope of RMR Mitigation

- Solutions that minimize the MW (or units) under RMR; reduce the duration of the RMR; or reduce the RMR cost and/or operational run hours
- Partial solutions should be allowed (consistent with IMM package)

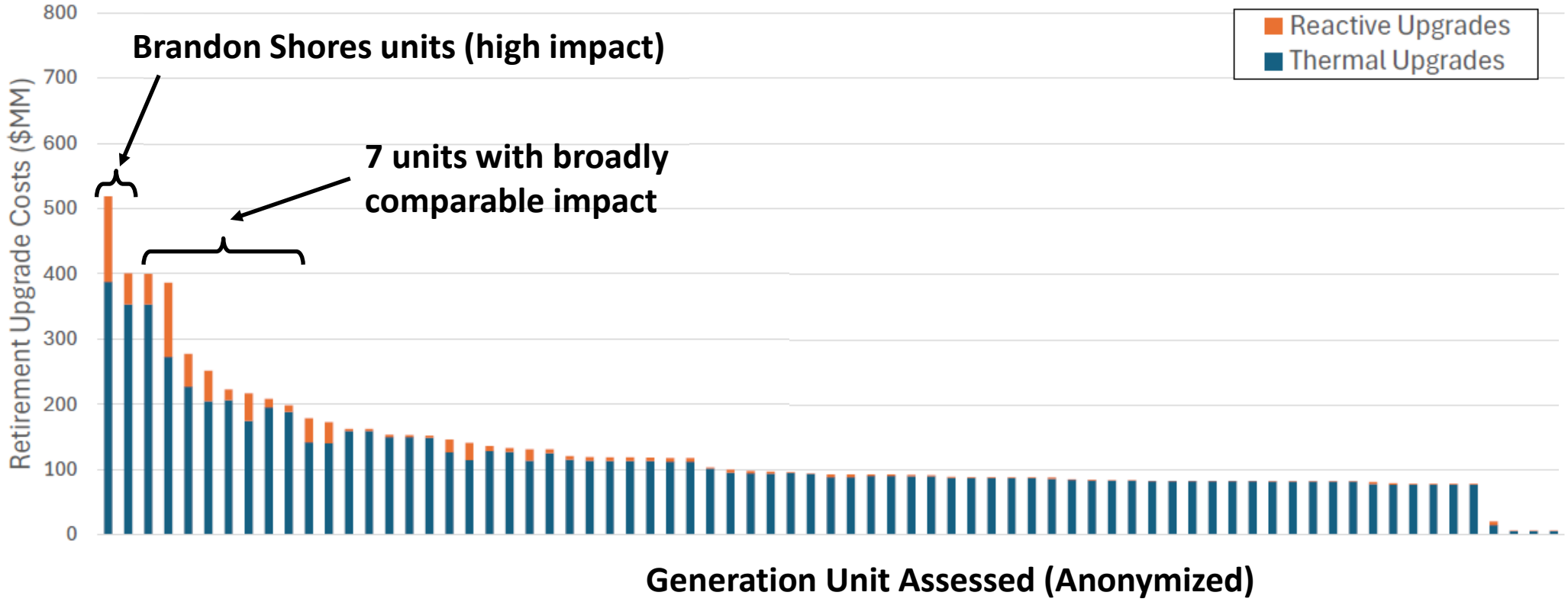
Approaches to RMR Mitigation

Because PJM already avoids RMR with fast-deployed, targeted solutions, **RMRs are largely driven by major impacts (such as evidenced at Brandon Shores), which are solved by long-lead time infrastructure projects**

Approach to RMR Mitigation	Reliability Impacts Addressed	Lead Time	Examples (Likely Utilized Today)	Mitigates RMR for Applicable Impacts?
Temporary protocols	Small impacts	Minimal lead time	Post-contingency switching, Remedial Action Schemes (RAS), Operating Procedures, careful outage scheduling	**Yes**, already avoids RMR where possible (minimal lead time matches planning)
Minor infrastructure investments	Medium impacts	Short lead time	Upgrades to substation components, new capacitors or STATCOMs, etc.	**Yes**, may already avoid RMR where possible (short lead time)
Major infrastructure investments	Major impacts	Long lead time	Line reconductoring, voltage uprate, substation expansion, new transmission circuits	**No** (lead time exceeds deactivation notice period)

More Retirements with Major Impacts Likely Exist

Potential Deactivation Impacts of Currently Operating Legacy Generators in PJM (Plus Brandon Shores)



Source: unpublished Telos Energy analysis, January 2026 (used with permission)

Historical Case Study of Multi-Year Advance Retirement Planning when Major Impacts are Anticipated

Case study takeaway: 5-year advance planning reduced RMR duration when major infrastructure was needed for retirement solution

- New 500 kV line planned to accommodate planned deactivation of ~330 MW of generation in a load pocket
- Utility initiated permitting and RTEP development 5 years before planned deactivation date
- New transmission line was delayed until after planned deactivation, requiring 2 years of RMR
  - RMR required DOE 202(c) authority to run outside limitations of emission restrictions
- Location: Dominion Energy (Yorktown units 1 and 2)

Recommendations to Mitigate RMRs

RMR mitigation is best improved with deactivation planning further ahead of time plus inclusion of higher-speed solutions (such as replacement supply resources)

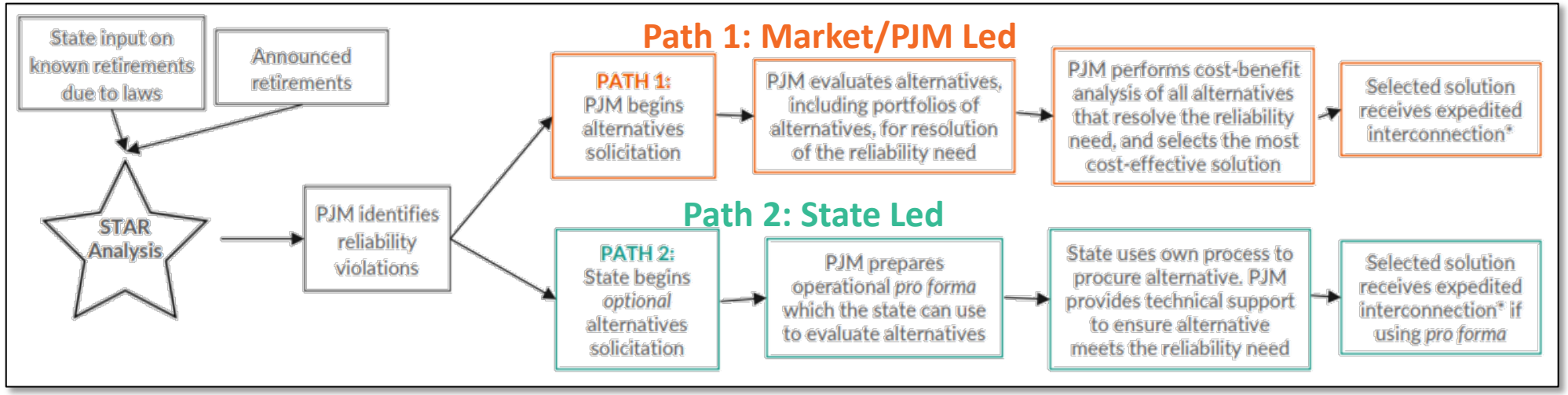
Approach to RMR Mitigation	Reliability Impacts Addressed	Shortcoming of Status Quo	Recommendations to Improve RMR Mitigation	RMR Mitigation Score
Temporary protocols	Small impacts	Some advanced solutions not evaluated	Add topology optimization to evaluated solutions, expand use of dynamic line ratings and RAS	**Moderate** (most RMR are likely due to need for major infrastructure)
Minor infrastructure investments	Medium impacts	Some advanced solutions not evaluated	Expand use of advanced solutions in evaluation (such as dynamic flow control, advanced conductors)	**Moderate** (most RMR are likely due to need for major infrastructure)
Major infrastructure investments	Major impacts	Solution lead time exceeds deactivation notice period; limited solution space	Plan several years before retirement; expand eligible solutions to include those with fast deployment (e.g., supply resource solutions)	**High**

Building on Illinois CUB, NRDC, and Roselle STAR proposal

Illinois CUB, NRDC, and Roselle proposed a Short-Term Analysis of Reliability (STAR) process (distinguishing PJM-led vs. state-led retirement processes) to avoid RMRs by evaluating competing alternatives ahead of deactivation.

We build on the STAR proposal :

- **Replacement planning process triggered multiple years in advance** of potential retirement (prior to deactivation announcement)
- Interconnection process runs in parallel with proposal evaluation
- Timings specified for each step



Source: Illinois CUB, NRDC, and Roselle, Avoiding RMRs in PJM, presented to PJM DESTF, November 13, 2025

Sketch of Potential Solution for Advance Deactivation Planning

3 yrs ahead of deactivation: legacy unit fails to clear capacity market; initial replacement planning starts

- PJM publishes reliability needs analysis*
- Gen owner has option to notice deactivation to initiate replacement planning; may propose a market-based (i.e., no contract) replacement sol'n

**Including required storage capability*

Deactivation notice

Yes → Solution proposed

Yes → PJM evaluation of owner's solution

Accepted → Build 3 years ahead of deactivation

Rejected → PJM Opens Replacement Solicitation Window for Major Infrastructure Based on Prior Needs Analysis (1 yr duration)

Solution proposed → No → PJM Opens Replacement Solicitation Window for Major Infrastructure Based on Prior Needs Analysis (1 yr duration)

No → **2 yrs ahead of deactivation**: legacy unit fails to clear capacity market again; replacement solicitation process started

2 yrs ahead of deactivation: legacy unit fails to clear capacity market again, replacement solicitation process started → PJM Opens Replacement Solicitation Window for Major Infrastructure Based on Prior Needs Analysis (1 yr duration)

3+ yrs ahead of deactivation: state process finalizes generator deactivation date

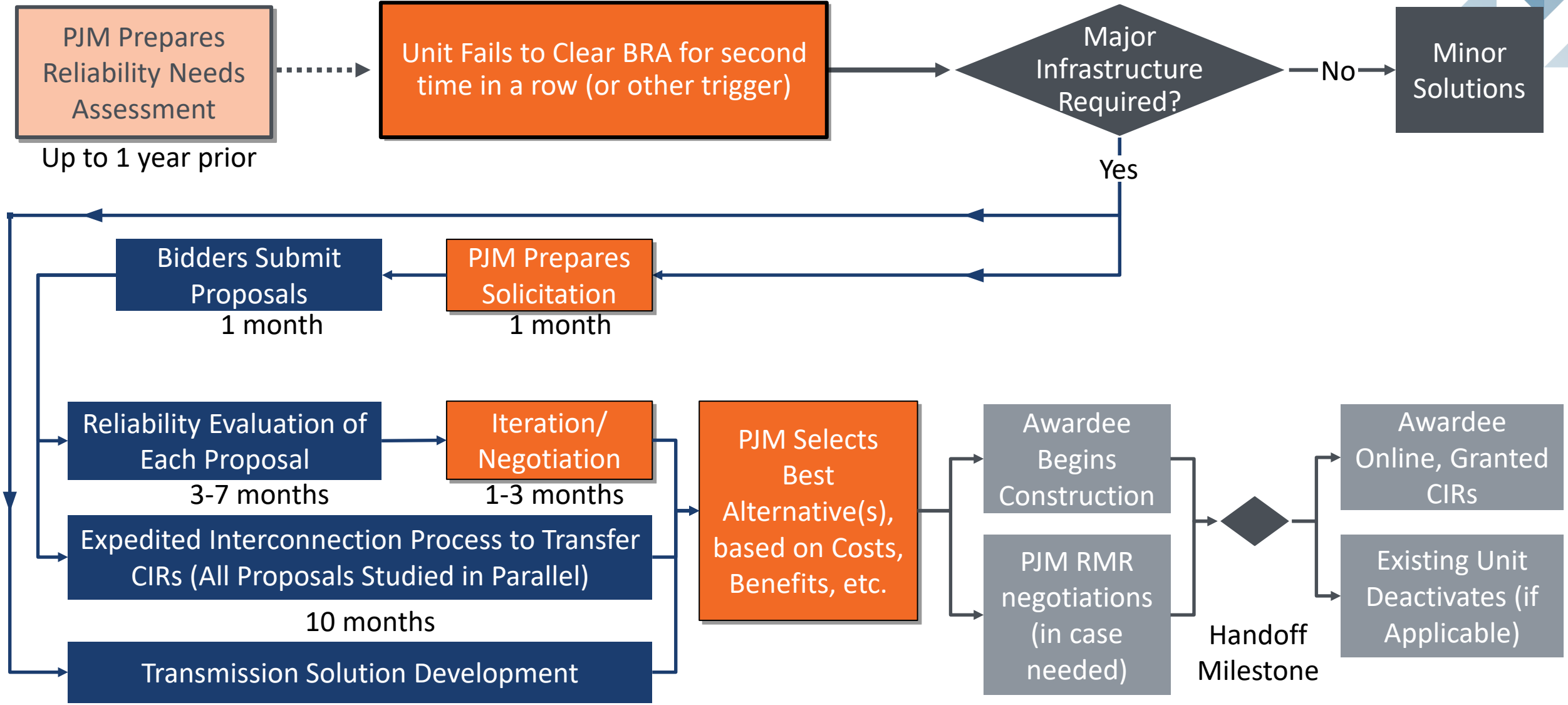
- PJM publishes reliability needs analysis, opens solicitation window for major impacts

PJM Opens Replacement Solicitation Window for Major Infrastructure Based on Prior Needs Analysis (1 yr duration)

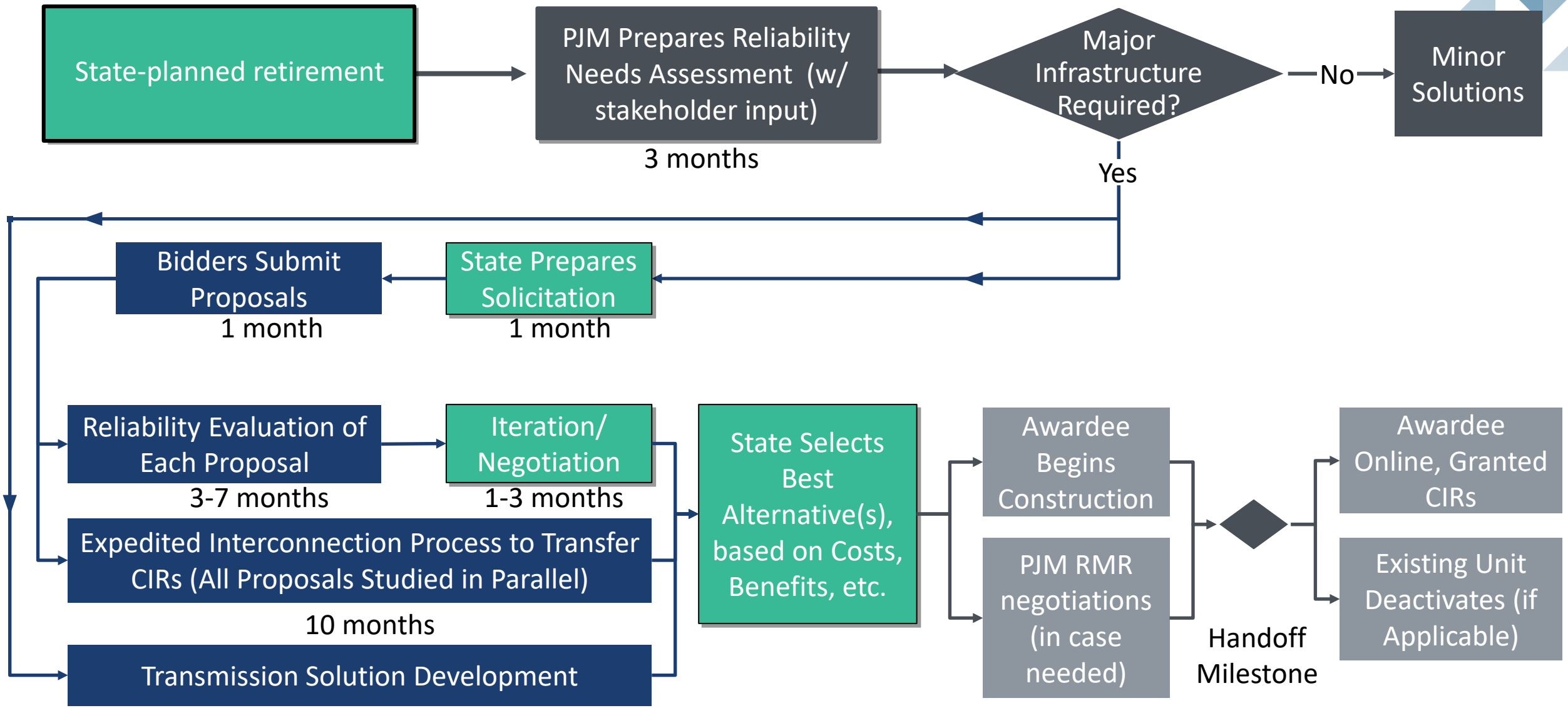
- Proposers (including retiring generator) bid solutions with standardized, market-incentive-compatible contracts
- Studies assess whether solutions address reliability need
- Accelerated interconnection window for generator solutions opens in parallel with solicitation evaluation; winner uses CIRs from existing generator
- Winner selected based on benefits, cost (including expected RMR cost in case of slower deployment)
- State may run the solicitation process w/ PJM support

→ Build (1+ years ahead of deactivation)

Details of Potential PJM-Led Replacement Solicitation Process **(12 months)**



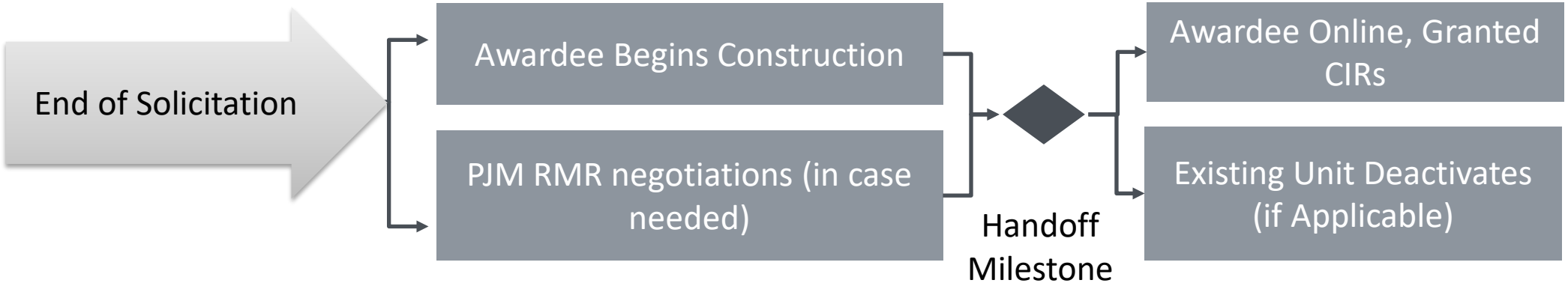
Details of Potential State-Led Replacement Solicitation Process **(15 months)**



RMR Ensures Reliable Handoff to Replacement Resource

- The STAR process contemplates initiation of the RMR development process ahead of the anticipated deactivation date, in case the replacement resource is delayed in coming online
  - In many cases, the RMR will not need to cover operations after deactivation
- The deactivating unit is retained as necessary until the replacement resource is fully commissioned according to provisions in the Interconnection Service Agreement and otherwise to the satisfaction of PJM (at which time the CIRs are finally transferred)

Detail from Prior Slide



Win-Wins

Legacy Gen Owner

- First opportunity to propose market-rate RMR mitigation
- Opportunity to compete for RMR mitigation contract with new project (or contract to retain existing generator)

Consumers

- Potential for efficiency enhancement and lower cost via longer-term planning, competition, and all-source solution procurement (i.e., including supply resources)

Reliability

- Needed infrastructure investments initiated earlier and more predictably, with broader range of solution options (including those that provide resource adequacy as well as transmission security)
- Reduced need to rely on legacy units with potentially higher forced outage rates, lower flexibility

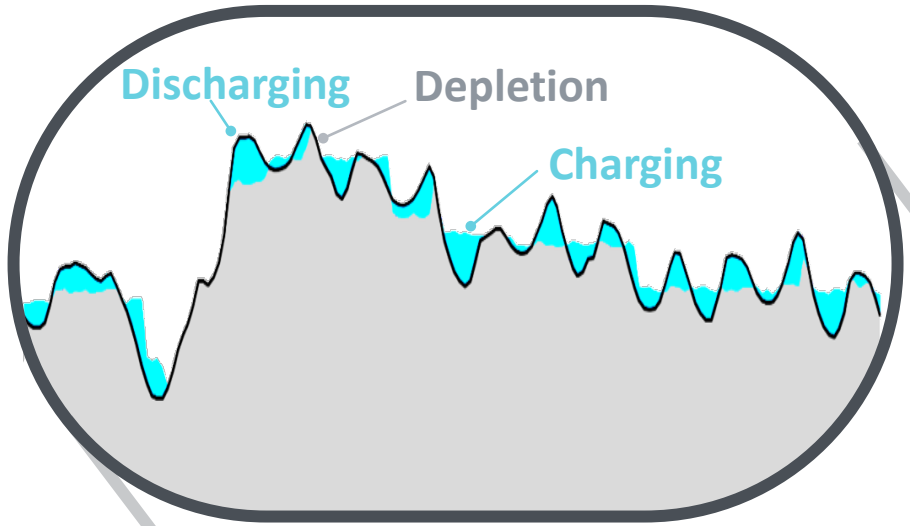
Energy Storage Resource Evaluation and Operation

- As part of the initial reliability needs assessment report, PJM will specify the hourly profile of the local transmission security need (including projected MW shortfall and duration in hours), and the capability of energy storage solutions that would be required to meet it
  - See appendix for example of data involved in such hourly needs assessment
  - Like other steps of the STAR and replacement solicitation, this will involve a draft report, stakeholder comment period, and final report
- Hourly need includes multi-event days (e.g., in winter) and multi-day events, assuming conservative storage operations
- During operations, storage awardees must follow PJM dispatch instructions regarding state of charge, expect more conservative operations during potential emergencies (like Capacity Storage Resources today)

Appendix

Appendix: Example of Energy Storage Resource Evaluation and Operation

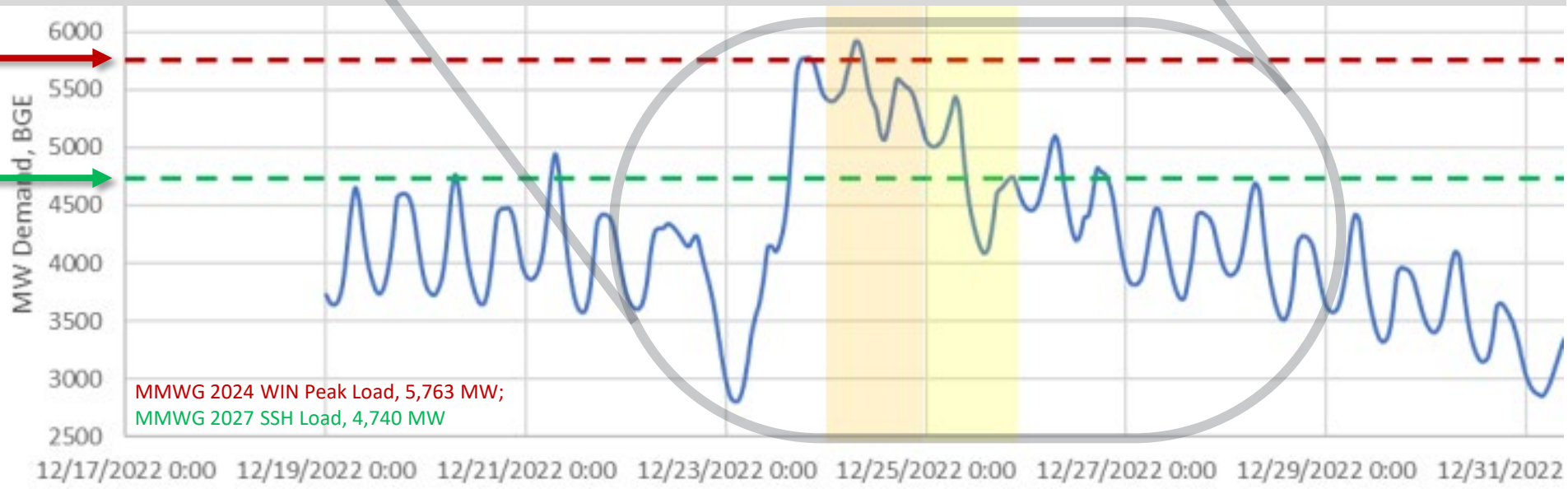
Hourly analysis shows realistic profiles of charging, discharging, depletion, etc., for building scenarios for power flow studies



Power flow study validates reliability at this load level without battery output (i.e., because depleted)

Power flow study validates load plus battery charging

Peak BGE Demand During Winter Storm Elliott, December 2022



Sources: Telos Energy and GridLab, Brandon Shores Retirement Analysis Project Update, February 2024; Brandon Shores Retirement Analysis May 2024 Update, May 2024

Recent Evidence of Reliability Assessment Timing

Analysis of retirement induced reliability violations

- Brandon Shores deactivation notice received by PJM – April 2023
- PJM presented first assessment of reliability violations – June 2023
- Total time taken < 2 months

Analysis of Alternatives for Brandon Shores

- GridLab/Telos present alternative solution – Feb 2024
- PJM analysis of Telos/GridLab – May 2024
- Total time taken < 3 months