PJM Study For Brandon Shores Retirement and Telos Proposed Battery Energy Storage

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June 27th 2025

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Background

- Talen Energy notified PJM of the deactivation of the Brandon Shores generation facility (Announced deactivation on April 6, 2023 with requested deactivation date of June 1, 2025).
- PJM, per established process, conducted the BS deactivation study to determine the impact on the transmission system. The results showed the need for several upgrades with required in-service date as early as 2025.
- The projected in-service of the upgrades were estimated to be in 2027/2028 time frame. (The TO cannot have the facilities built before then)
- Due to imminent reliability risk, the Brandon Shores units would remain in-service (under Reliability Must Run – RMR) until the upgrades are completed
- Telos proposed a conceptual alternative solution for study in the form of Battery Storage (BESS) to potentially address the reliability needs driven by the Brandon Shores deactivation
    - BESS of 600 MW x 4 hours initially and was updated to 800 MW x 4 hours later

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Evaluation of the proposed BESS

- PJM reviewed and evaluated the alternative solution that was proposed by Telos; https://www.pjm.com/-/media/DotCom/library/reports-notices/special-reports/2024/20240503-bess-technical-viability-wagner-and-brandon-shores-retirements-study.pdf

- PJM analysis considered several factors

  - Technical feasibility: PJM evaluated the performance of the proposed battery solution using the originally submitted size of 600 MW x 4 hours and the updated size of 800 MW x 4 hours – using multiple scenarios

  - Construction Timeline: length of time it would take to select, procure and construct a battery storage project of this size

  - The estimated cost.

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Telos Assumptions on BESS replacement:

- Telos did not model a real proposed BESS system. Rather they kept “one Brandon Shores unit” online as a proxy for analysis
  - Doesn’t represent the technical characteristic of Battery (provides SC support/System Strength)
  - Assumes infinite availability
- Telos BESS solution is not sufficient on its own – additional transmission upgrades will be required, including reactive compensation
  - The 4 Hour duration may not be sufficient for system reliability and higher duration would reflect into cost, economic feasibility and potential impacts during charging (extended peak hours)
- Telos study assumes Wagner generators in-service (Wagner requested de-activation by October 16, 2023)
- Telos study only considered the 2025 system condition – No evaluation was done using the 2027 and later models (reflecting higher loads and different generation conditions
- Telos study didn’t consider load deliverability analysis

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Evaluation of the proposed BESS

PJM Evaluation for the 2025 system condition:

- Telos in their analysis modeled one of the Brandon Shores unit to represent the 600 MW battery. The study was conducted by switching off One Brandon Shores unit in the deactivation cases provided by PJM
  - Telos analysis revealed that additional transmission upgrades as well as reactive solutions are required
- PJM, part of the deactivation study already evaluated and confirmed the need for both Brandon Shores units to maintain reliability; given the heavy imports and lack of resources inside the MD system

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PJM Evaluation for the 2027/2028 system condition:

- PJM further evaluated the efficacy of the Telos proposed 800 MW x 4 hours upgraded (from the original 600 MW) BESS solution. Since the BESS solution will need to be proven effective to meet the reliability needs of the system immediately when it could be practically energized and at the same time be proven effective in meeting the evolving system needs, PJM conducted its analysis as well on the 2027/2028 system model.
- The 2028 PJM analysis focused on evaluating the adequacy of the planned reinforcements as well as the adequacy of maintaining a number of thermal units in BGE (as BESS proxies) to maintain reliability. The analysis considered the following:
  - Remove all upgrades associated with the Brandon Shores deactivation plus the High Ridge 500 kV circuit, except the reactive support (≈ 2000 MVAR)

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Evaluation of the proposed BESS

- 2027/2028 RTEP study Assumptions:
    - Start with the 2028 RTEP with 2022 window 3 upgrades included
    - Remove all upgrades associated with the Brandon Shores deactivation plus the High Ridge 500 kV circuit, except the reactive support (≈ 2000 MVAR)
    - 800 MW battery model at Brandon Shore (BESS with infinite duration)
        - Summer peak case → Battery generating (discharging) at full
        - Winter peak case → Battery generating (discharging) at full
        - Light Load peak case → Battery charging at full

– Scenario 1 - Both Brandon Shores and Wagner assumed retired
– Scenario 2 – Wagner units RMR – Brandon Shores Retired

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Evaluation of the proposed BESS

2027/2028 RTEP study Result:

- PJM identified a large number of reliability violations with the 800 MW BESS
  - Thermal overloads on several facilities including 500 kV transmission lines
  - Wide spread voltage violation as well as voltage collapse

- The reliability analysis revealed that the proposed 800 MW BESS battery is unable to meet the reliability needs of BGE and the surrounding area in 2027/2028 when the BESS could reasonably be assumed in service
  - This is even when assuming the BESS full capacity being available for reliability service and the additional 2,100 MVAR of reactive reinforcement

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Conclusion:

- The Battery on its own doesn't address the reliability violations (cannot replace the identified transmission upgrades) identified as a result of the Brandon Shores deactivation (2025 system condition)
- The expected in-service date of the battery is unknown due to the absence of a project sponsor and an unrealistic development timeline
- The reliability analysis indicates that, even with more than 2,000 MVAR of additional reactive power reinforcement, the proposed battery cannot address the violations even in 2027/28
- While a larger battery could reduce the severity of the reliability concerns in the BGE and larger PJM system following the retirement of the Brandon Shores and Wagner generation units, it does not replace the need for a Brandon Shores RMR nor address the reliability needs for the system in the near and longer term

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