DESTF Phase 2 Education: Alternative Technologies

Michael Herman

Jeff Goldberg

Chris Callaghan

Deactivation Enhancements Senior Task Force

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DESTF Phase 2 Education

- The DESTF revised Issue Charge requests
  - “education around the potential for alternative transmission technologies, such as reconductoring and grid enhancing technologies, as well as energy storage, to address reliability violations associated with generator deactivation, including the time for deployment and cost relative to conventional transmission solutions.

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Alternative Technologies

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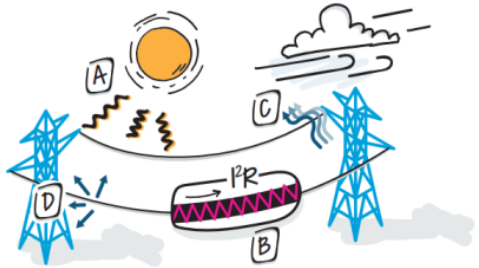
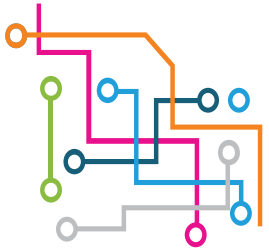
Individual Technology Details

- Advanced Conductors & Dynamic Line Ratings:
  - Proposed transfer capabilities via the use of advanced conductors or dynamic line ratings will be reflected in the necessary equipment ratings submitted to PJM in accordance with the PJM Manuals.



- Advanced Power Flow Controllers:
  - Will be evaluated through existing processes and in accordance with good engineering judgment for the identified scenario.

- Transmission Switching:
  - Will be evaluated to reduce economic impact and expedite timelines, or in concert with other proposed upgrades.



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Storage as a Transmission Asset (SATA) Phase 1 PJM Package Proposal – PC Endorsed Dec 2020

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Package Guiding Principles

- Phase 1 is limited to Storage as Transmission Asset only
- Phase 1 goal is to provide transparent evaluation rules:
  - to establish a review of SATA as a solution that could be evaluated “similar” to typical “wires solution”
  - to establish SATA RTEP requirements to ensure implementation maintains system reliability consistent with NERC standards
- Phase 1 reliability requirements will be a first step towards Phase 2: dual use applications that **do not** adversely impact reliability requirements.

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Background - SATA Phase 1 Stakeholder Material

- PC 04/07/2020 SATA Phase 1 Problem Statement
- PC 04/07/2025 SATA Phase 1 Issue Charge
- PC 06/05/2020 Special Session SATA Phase 1 Education
- PC 07/06/2020 Special Session SATA Phase 1 Education
- PC 08/06/2020 Special Session SATA Phase 1 Options Package
- PC 08/24/2020 Special Session SATA Phase 1 Options Package
- PC 09/25/2020 Special Session SATA Phase 1 Options Package
- PC 10/09/2020 Special Session SATA Phase 1 Options Package
- PC 11/04/2020 SATA Phase 1 First Read
- PC 12/01/2020 SATA Phase 1 Second Read Endorsed

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Background - PJM Package Proposal – Design Component 1

#	Category	Design Components	A
1	Reliability	Sensitivity cases to ensure compliance with Planning criteria	SATA sensitivity with it charging and discharging in the study case

- SATA model considerations
  - Appears in the Base Case – SATA in standby
  - Appears in Sensitivity cases – SATA as a generator and as a load

- These sensitivity cases would apply to the sections covering the following in M14B:
  - Baseline Thermal Analysis
  - Baseline Voltage Analysis
  - N-1-1 Reliability Analysis
  - Load Deliverability
  - Generator Deliverability
  - Long Term Deliverability Analysis
  - Light Load Reliability Analysis
  - Winter Peak Reliability Analysis

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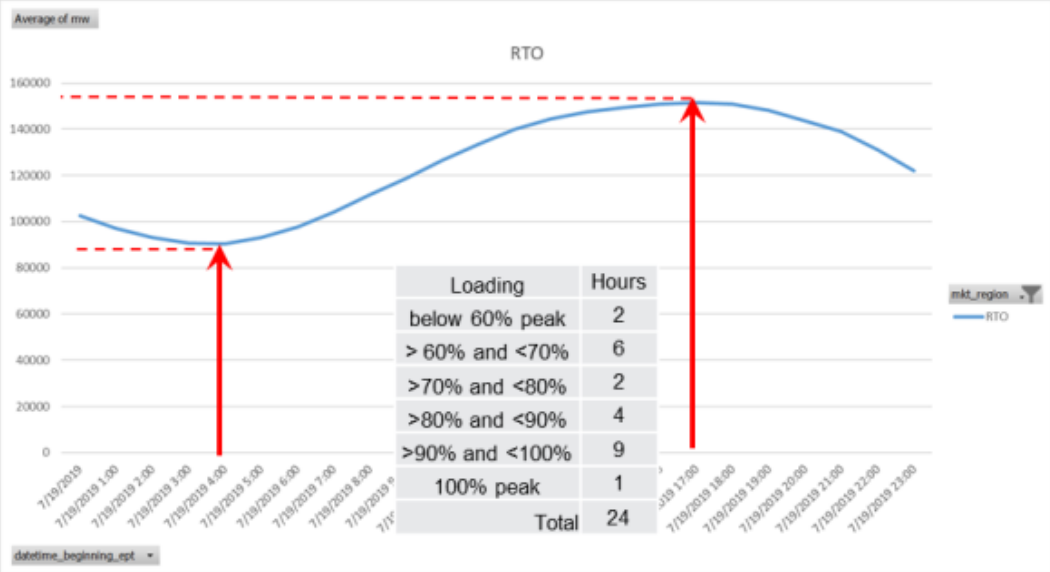
PJM Package Proposal – Design Component 2

#	Category	Design Components	A
2	Reliability	Forecast mechanism to model daily load curves to within an acceptable margin of error, in relation to 5-year planning studies	SATA must be sized appropriately to mitigate the reliability violation for a minimum duration based upon sensitivity analysis using granular load curves, as available. If granular load curves are not available, SATA must be sized to mitigate the reliability violation for a minimum of 4-hours, based on Long-term Emergency Rating.



In the absence of a granular load curve

- The seasonal Emergency Rating Limit is typically defined as a 4-hour continuous rating.
- The SATA solution, at a minimum, must maintain post-contingency flows and voltage magnitudes within the seasonal emergency rating limits for the most aggravated system condition

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PJM Package Proposal – Design Component 5

#	Category	Design Components	A
5	Reliability	Performance expectations requirements	Ensure SATA capability is able to meet performance requirements for the life of the facility, while recognizing the unavailability of asset while charging

- SATA state of charge and readiness must be maintained to ensure reliable violation mitigation.
- SATA unavailability during charging must be considered for suitability in violation mitigation.
  - SATA would be unsuitable to mitigate System-Normal violations.
- Lifespan of SATA major components (i.e. batteries, inverters, GSU transformers, etc.) must be considered such that the SATA system as a whole can meet performance requirements for the life of the facility.
  - Proposing entity must provide the details regarding asset renewal as required to meet nominal lifespan

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PJM Package Proposal – Design Component 6

#	Category	Design Components	A
6	Reliability	Allowable modes of operation	SATA must be at the desired state of charge and available to mitigate the violation as intended. SATA operating types may include: 1) Pre-contingency response (automatic) 2) Post-contingency response (automatic) 3) Local load security (automatic)

- All SATA facilities shall be configured for local automatic operation, and capable of responding to contingencies instantaneously.
- The facilities should also provide for local manual operational control.

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PJM Package Proposal – Design Component 7

#	Category	Design Components	A
7	Reliability	Charge and discharge schedules and responsibilities	PJM establishes timeframes when charge and discharge schedules can be accommodated and will be documented in operating procedures. Asset owners responsible for maintaining state of charge and submitting schedules to PJM. Submitted schedules would accommodate single peak and multi-peak days with allowance for off peak recharging.

- In consideration of RTO independence, PJM cannot directly control the SATA charge and discharge functions.
- PJM will provide the timeframes for charge and/or discharge functions for restoring state of charge.
    - Guideline for timeframes will be documented in operating procedures
- Asset owners are responsible for maintaining state of charge
    - Submit charge / discharge schedules to PJM for approval
    - SATA capacity and schedules must accommodate single or multiple daily peaks as necessary and allowing for recharging at off peak periods.

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Next Steps for SATA -> Phase 2 (Integration into Operations)

- MRC 09/25/2024 SATA Phase 2 (1st Read) Problem Statement
- MRC 09/25/2024 SATA Phase 2 (1st Read) Issue Charge
- MRC 10/30/2024 SATA Phase 2 (2nd Read) Problem Statement
- MRC 10/30/2024 SATA Phase 2 (2nd Read) Issue Charge
- OC 03/06/2025 SATA Phase 1 Review Education
- OC 04/03/2025 SATA Operations Education

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Contact

Facilitator:
Dave Anders,
David.Anders@pjm.com

Secretary: Tyler Arkatin
Tyler.Arkatin@pjm.com

SME/Presenter:
Michael.Herman@pjm.com

Christopher.Callaghan@pjm.com

Jeffrey.Goldberg@pjm.com

Member Hotline

(610) 666 – 8980

(866) 400 – 8980

custsvc@pjm.com

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