PJM IBR Verification Process

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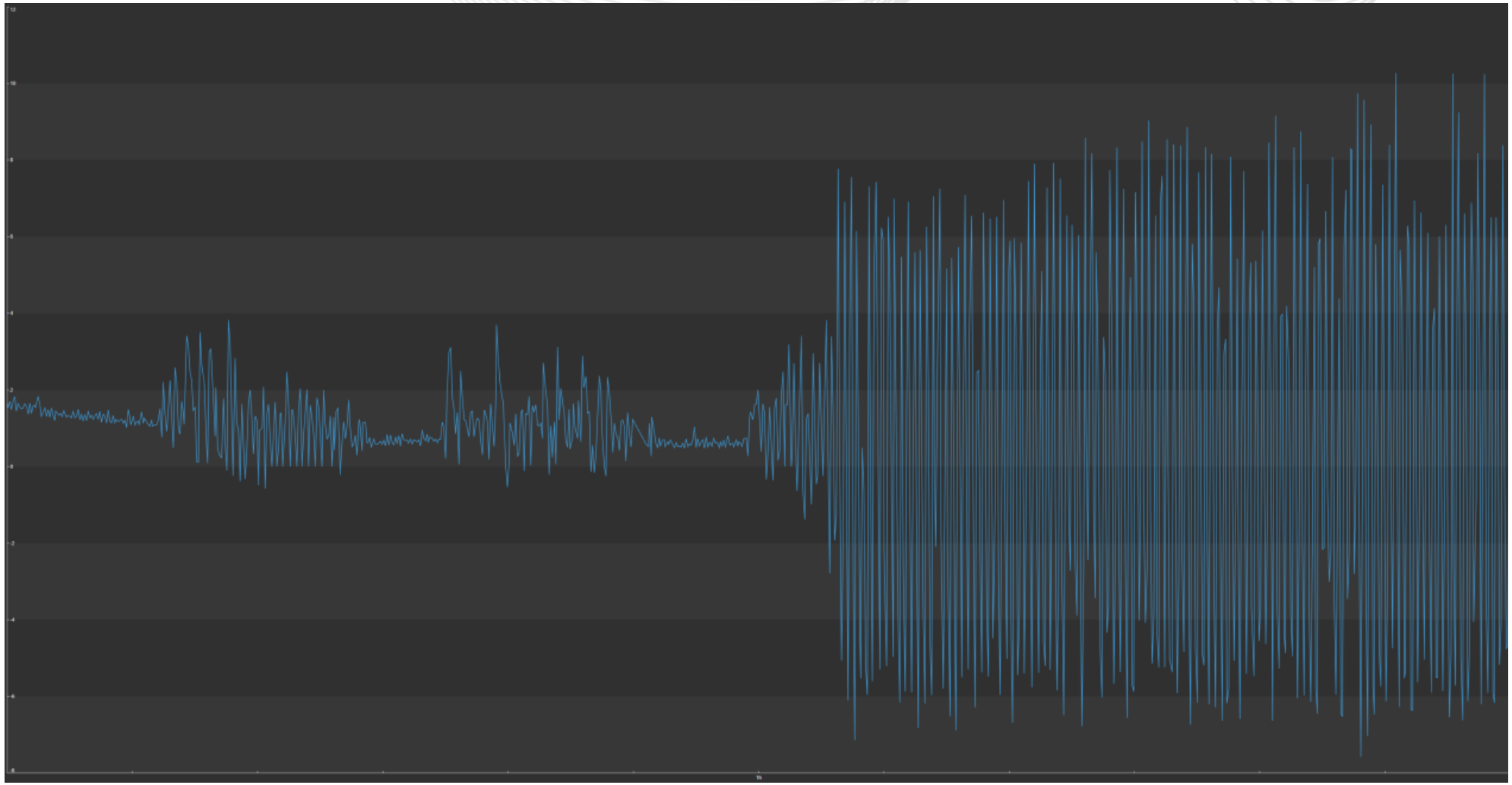
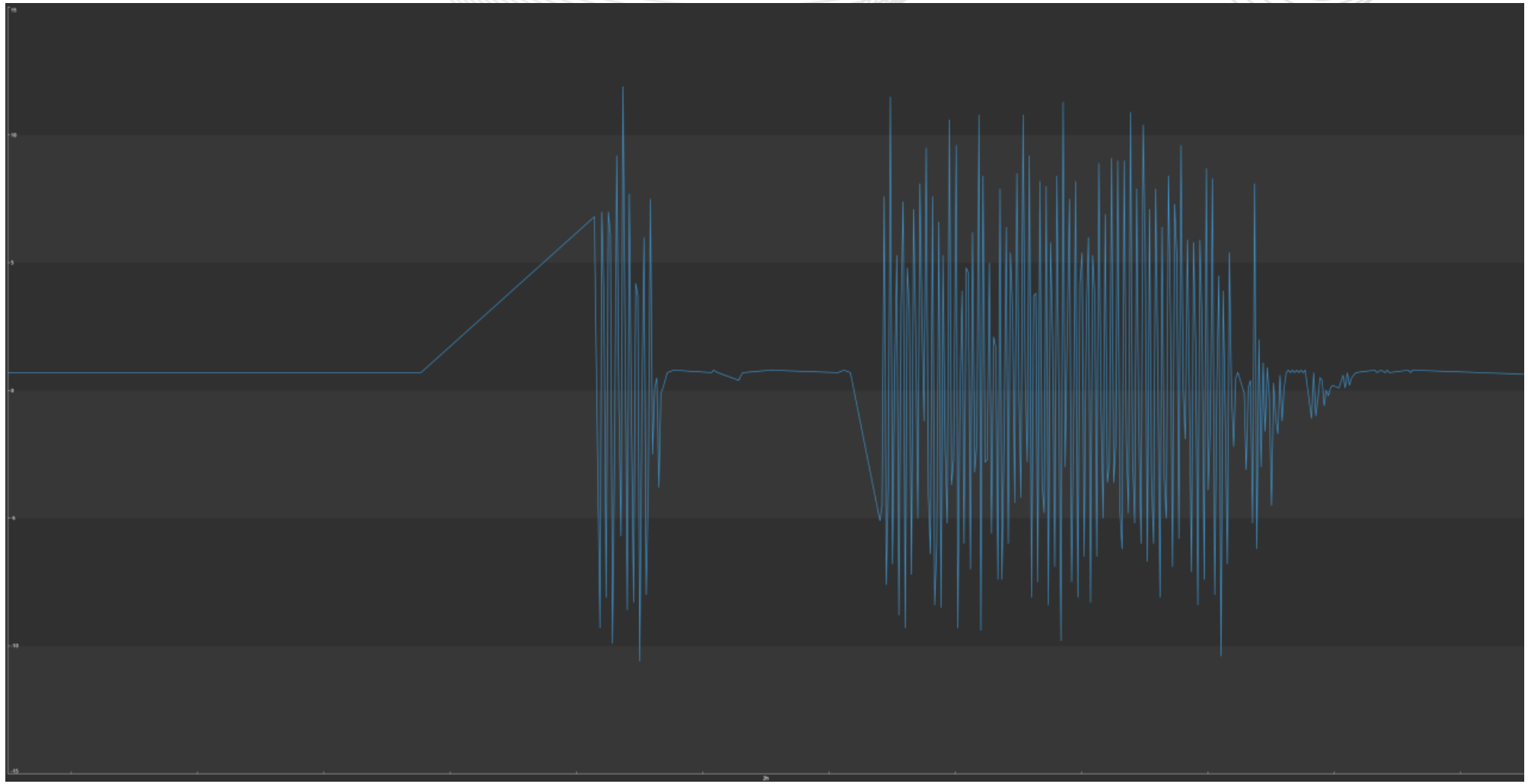
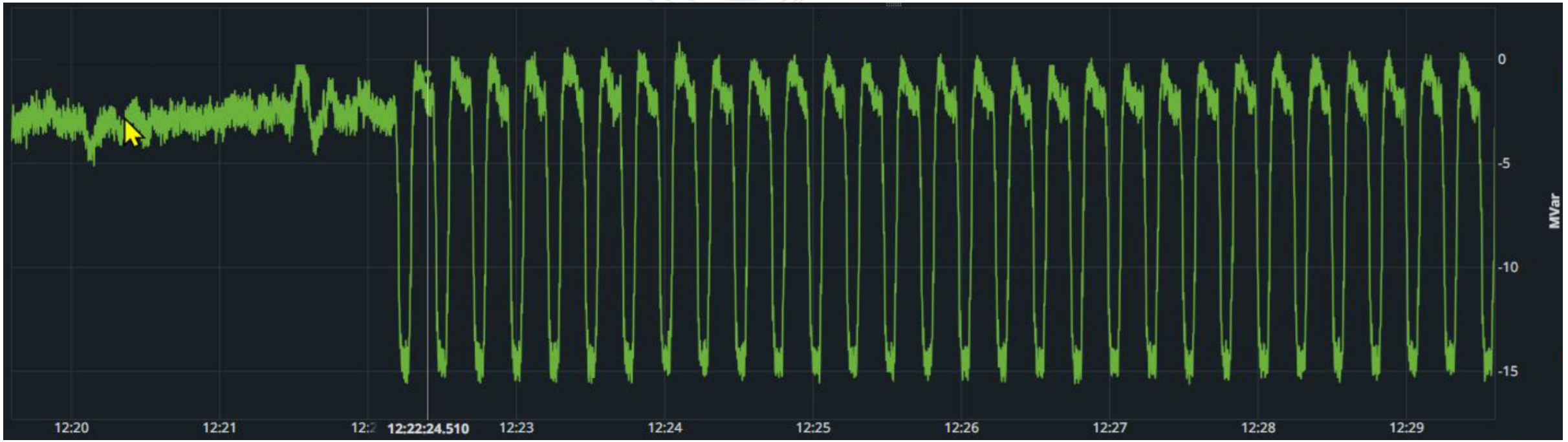
IBR Output Example



IBR Output Example

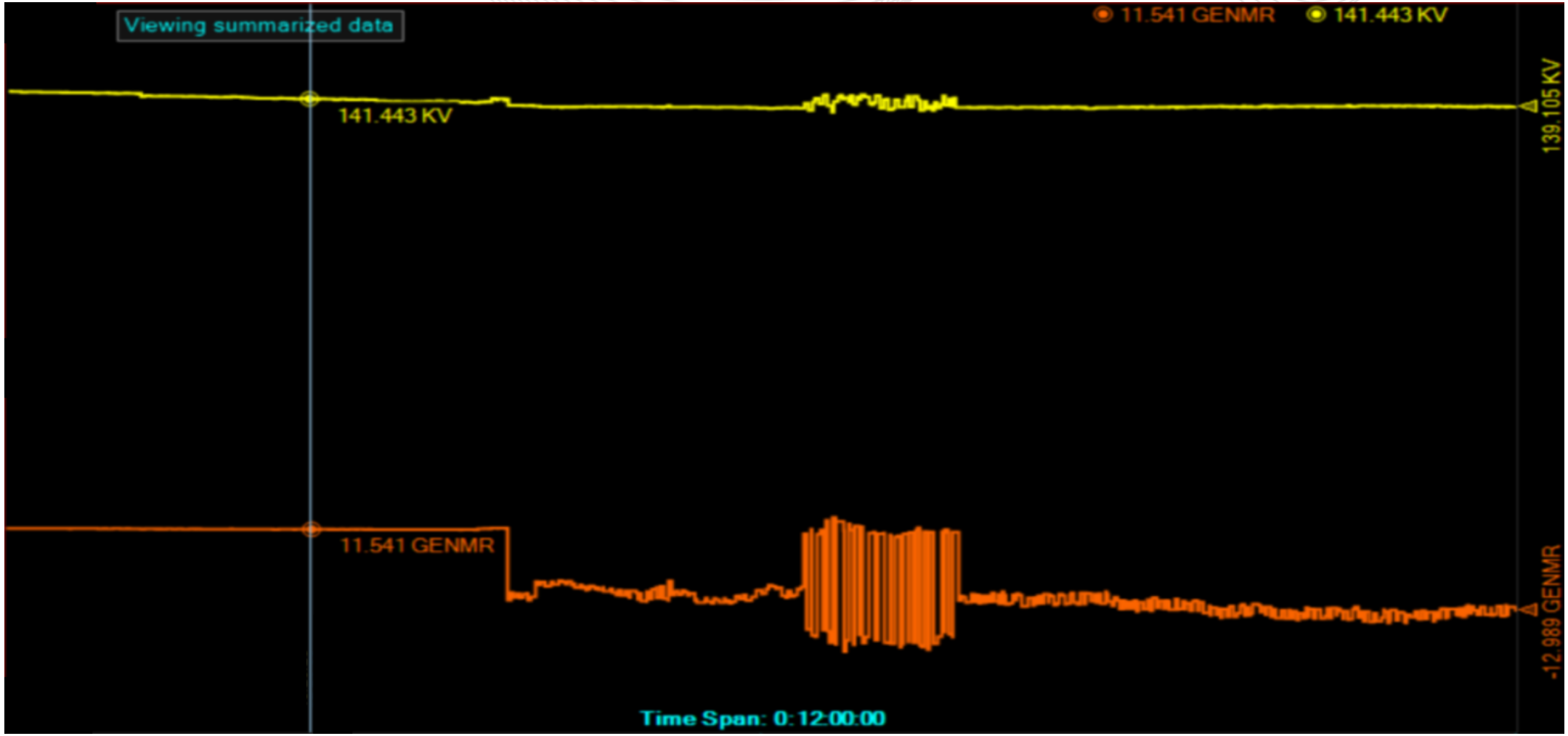


IBR Output Example

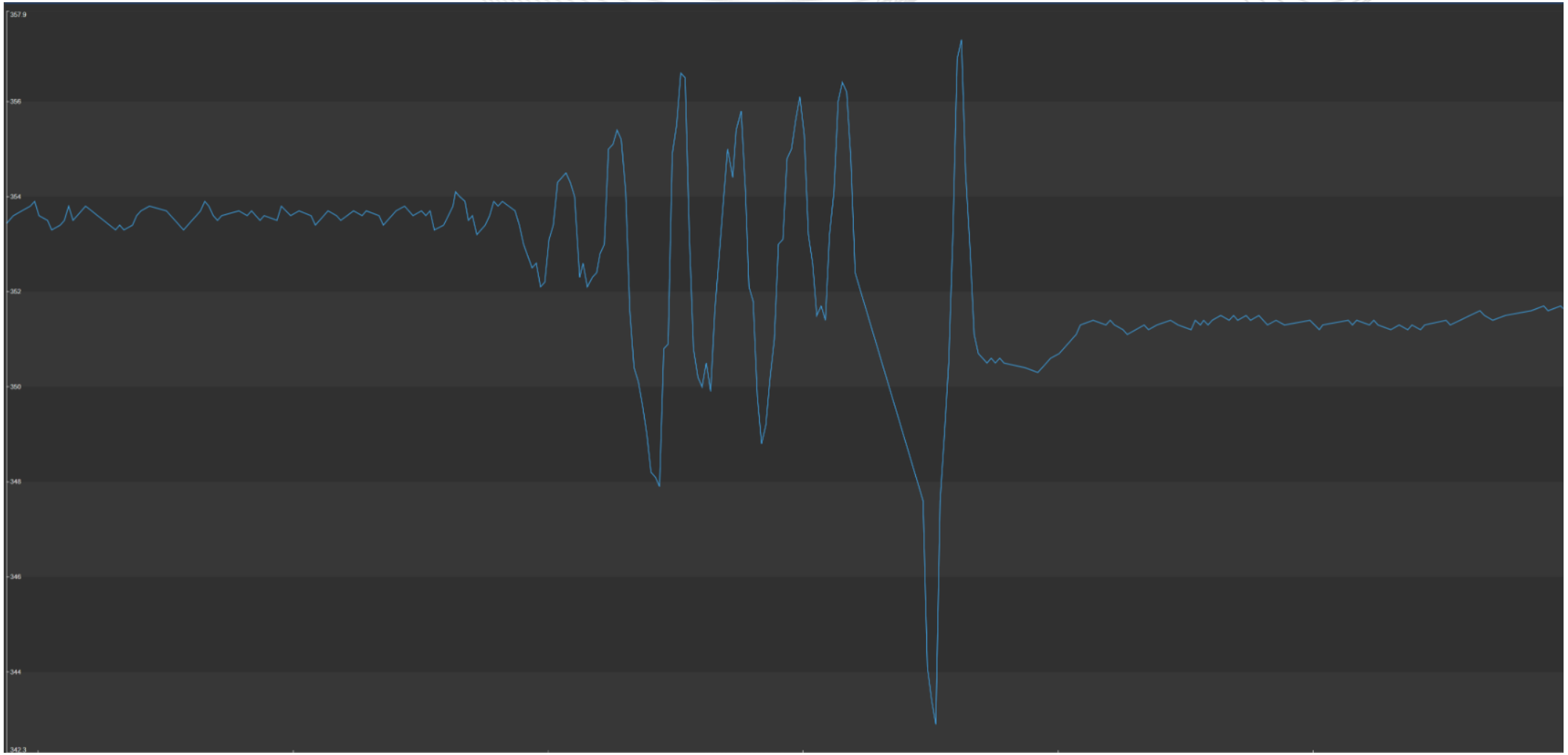


Reactive vs. Proactive

Voltage Impact Example



Voltage Impact Example



IBR Verification Program

More on the “Why?”

Significant influx of inverter-based resources (IBRs)

This program supports the continued reliability of the Bulk Electric System.

Real-time operations have experienced conditions requiring operators to remove units from service due to (but not limited to):

- Abnormal performance
- Oscillations
- Voltage excursions

Purpose

1. **Verify** the as-built inverter-based resource (IBR) plant meets the PJM requirements defined in the agreement(s).

2. **Ensure** the construction matches the provided design documentation.

3. **Confirm** the settings and controls meet the PJM capability and performance requirements.

The process includes IBR plant model verification to establish the IBR plant model(s) submitted to PJM matches the as-built IBR plant.

Key Verification Components

Documentation Evaluation	**Power Plant Controller (PPC) Demonstration**	**Commissioning Testing**
Site Walkdown	**IBR Plant Verification Report**	**IBR Plant Model Verification**

Benefits to Project Developers

Benefits
Reduces the risk of commissioning, safety and operational issues
Enhances the long-term reliability and performance of the IBR facility
Helps ensure the facility complies with applicable PJM requirements
Improves the accuracy and quality of IBR models submitted to PJM for system studies
Enables lessons learned from verification activities to be applied to future facilities

Regulatory Filings and Standards

Filing	Details
FERC Order 901:	Written to directly address IBR model validation and verification testing
NERC PRC-029-1:	Addresses frequency and voltage ride through characteristics for IBR resources
NERC Level 3 Alert:	Issued May 20, 2025, to the industry for essential action regarding IBR resources' performance and model validation and is intended to enhance IBR technical minimum requirements and study processes to mitigate risks posed by IBR resources during system disturbances
NERC MOD-032-1/2:	Addresses data for power system modeling and analysis
NERC MOD-033-3:	Addresses steady state and dynamic system model validations
NERC MOD-026-2:	Approved by FERC and has an effective date of April 1, 2026; more on this on the next few slides

NERC MOD-026-2

Introduces structured requirements for the verification and validation of dynamic models for inverter-based resources (IBRs), including both positive sequence and electromagnetic transient (EMT) models

Expected to apply to:

- All BES IBRs, and
- Non-BES IBRs connected at voltages above 60 kV and rated ≥ 20 MVA

Critically, PJM requires collection of verified and validated model data from new interconnections.

This will apply to legacy units, once effective.

PJM uses a contractor to perform IBR verifications.

Costs are charged to Project Developers, via PJM, consistent with PJM's other contractor uses, examples include:

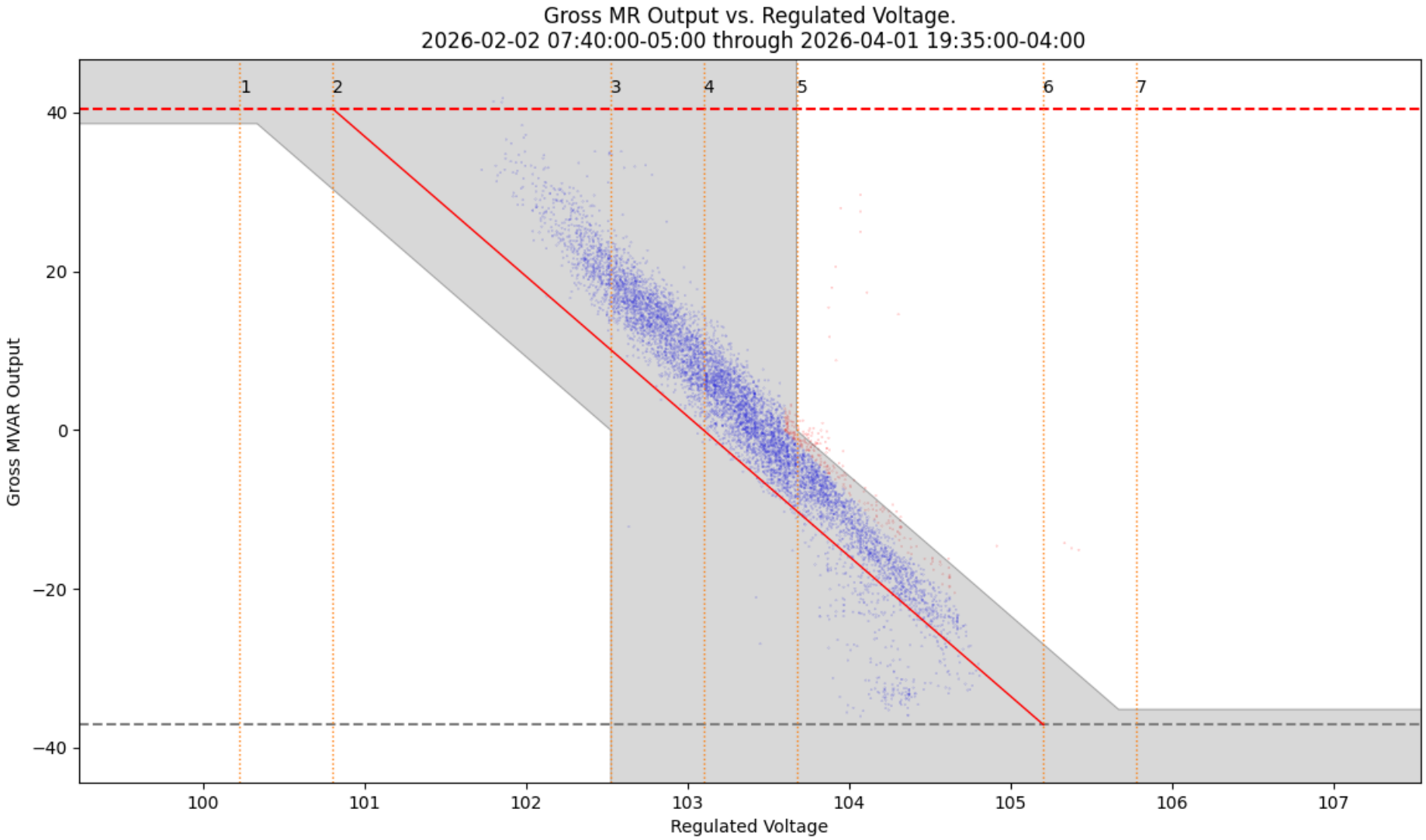
- Stability Cluster Studies
- Interim Deliverability
- Winter CIR Studies
- Necessary Studies
- As-Built Verifications

Section 3.3.1: Project Billing Process

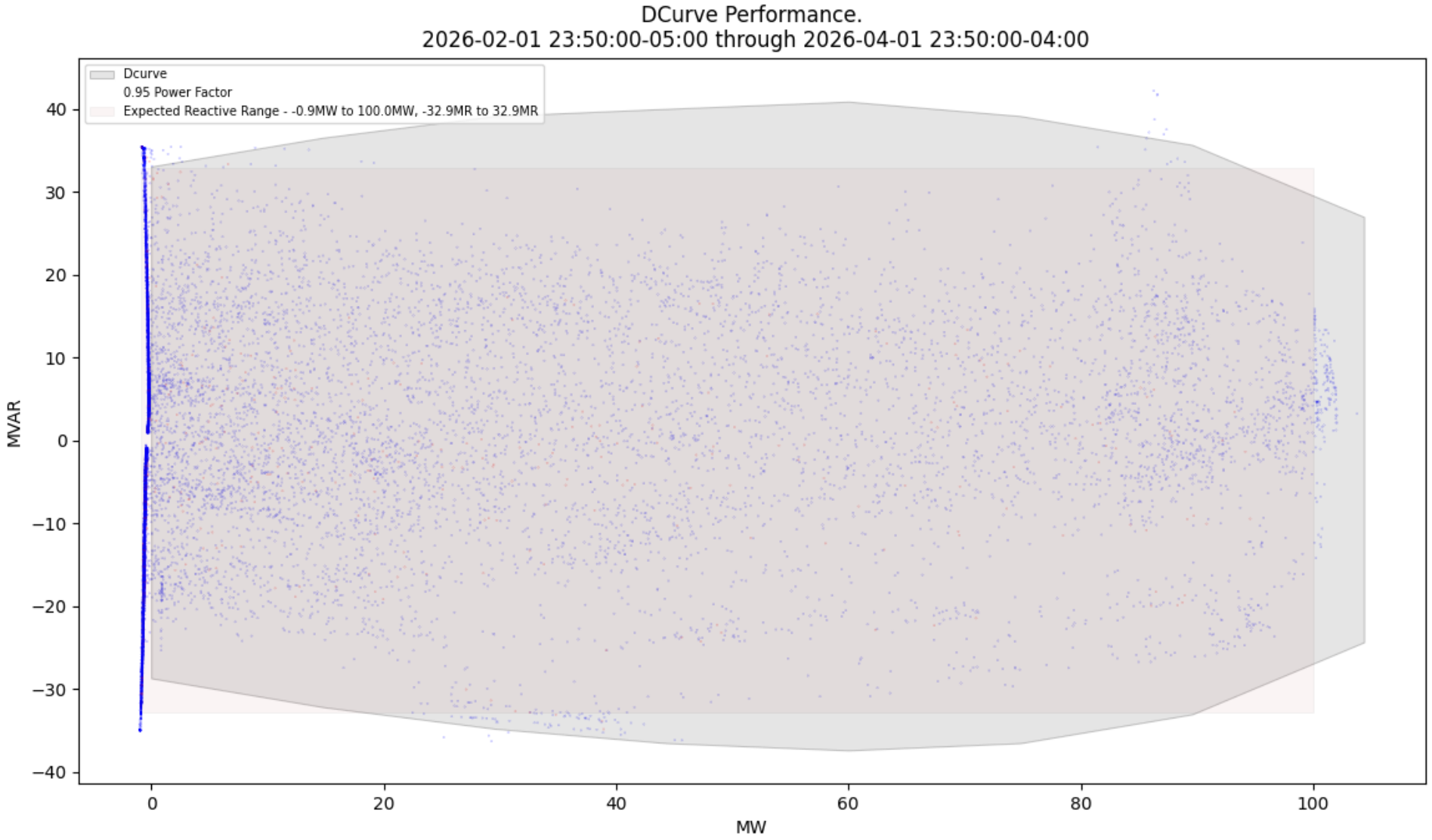
Cost Responsibility – The Project Developer is responsible for all of the costs associated with the interconnection of the Generating Facility as specified in the PJM Tariff, Part VII, Subpart D, section 307 A.5. These costs may include, but are not limited to, the Transmission Owner's work on Transmission Owner Interconnection Facilities and Network Upgrades. The Project Developer is also responsible for any costs incurred during the integration of the project into PJM Operations and Markets. This may include construction engineering support fees, and any legal and analysis fees for project activities.

Additional Concerns & Next Steps

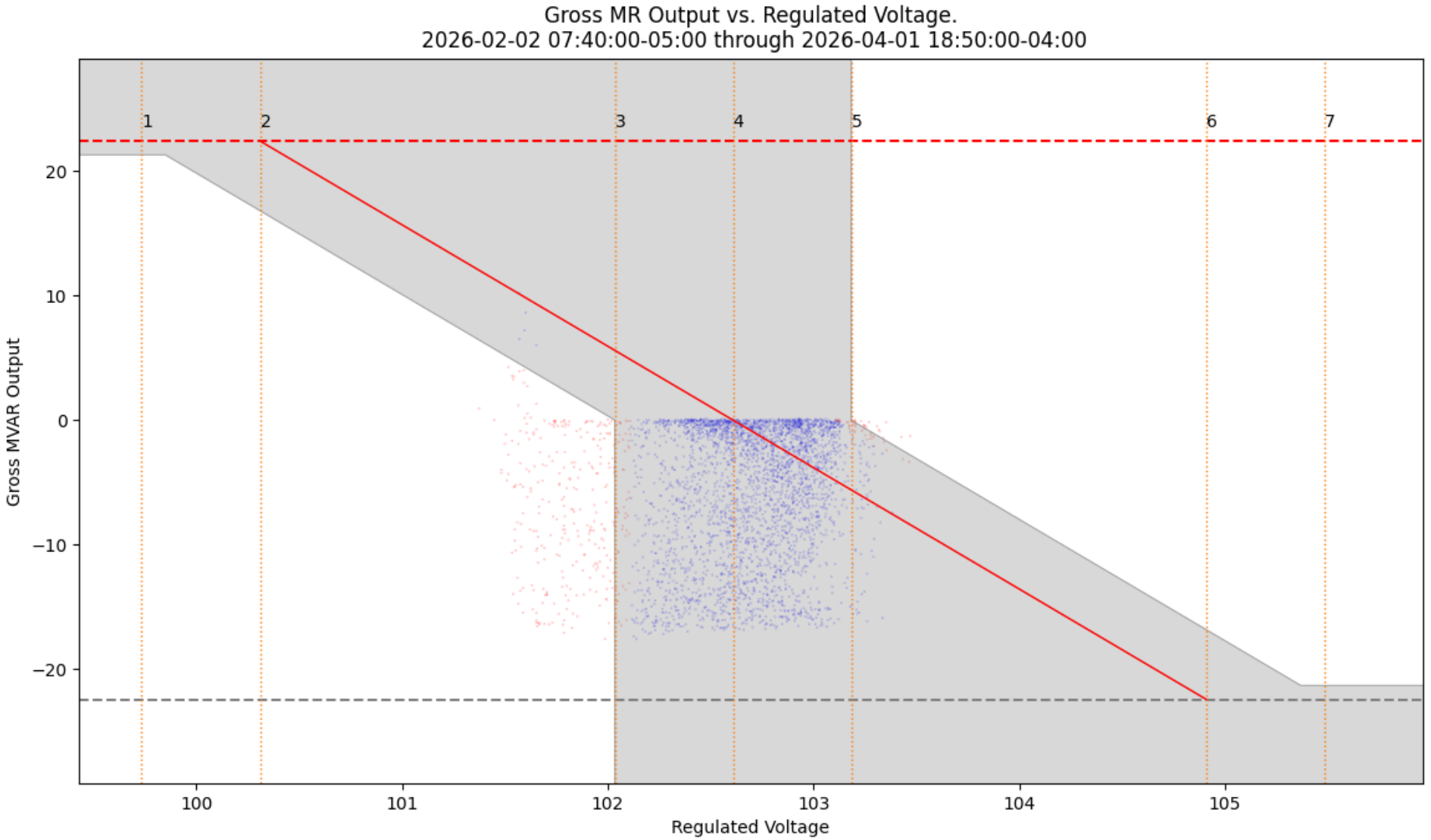
Desired Performance



Desired Performance



Likely No Performance



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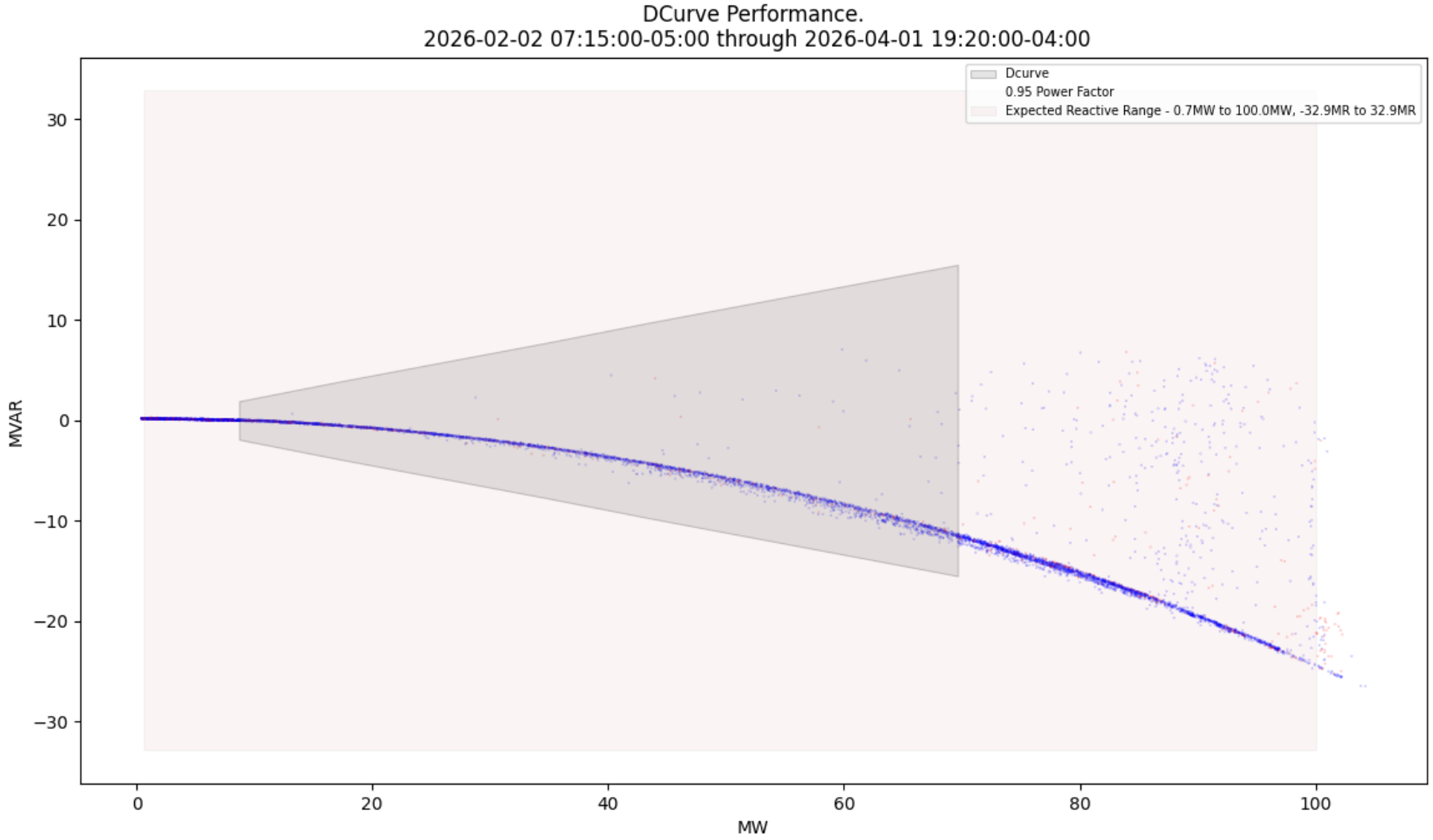
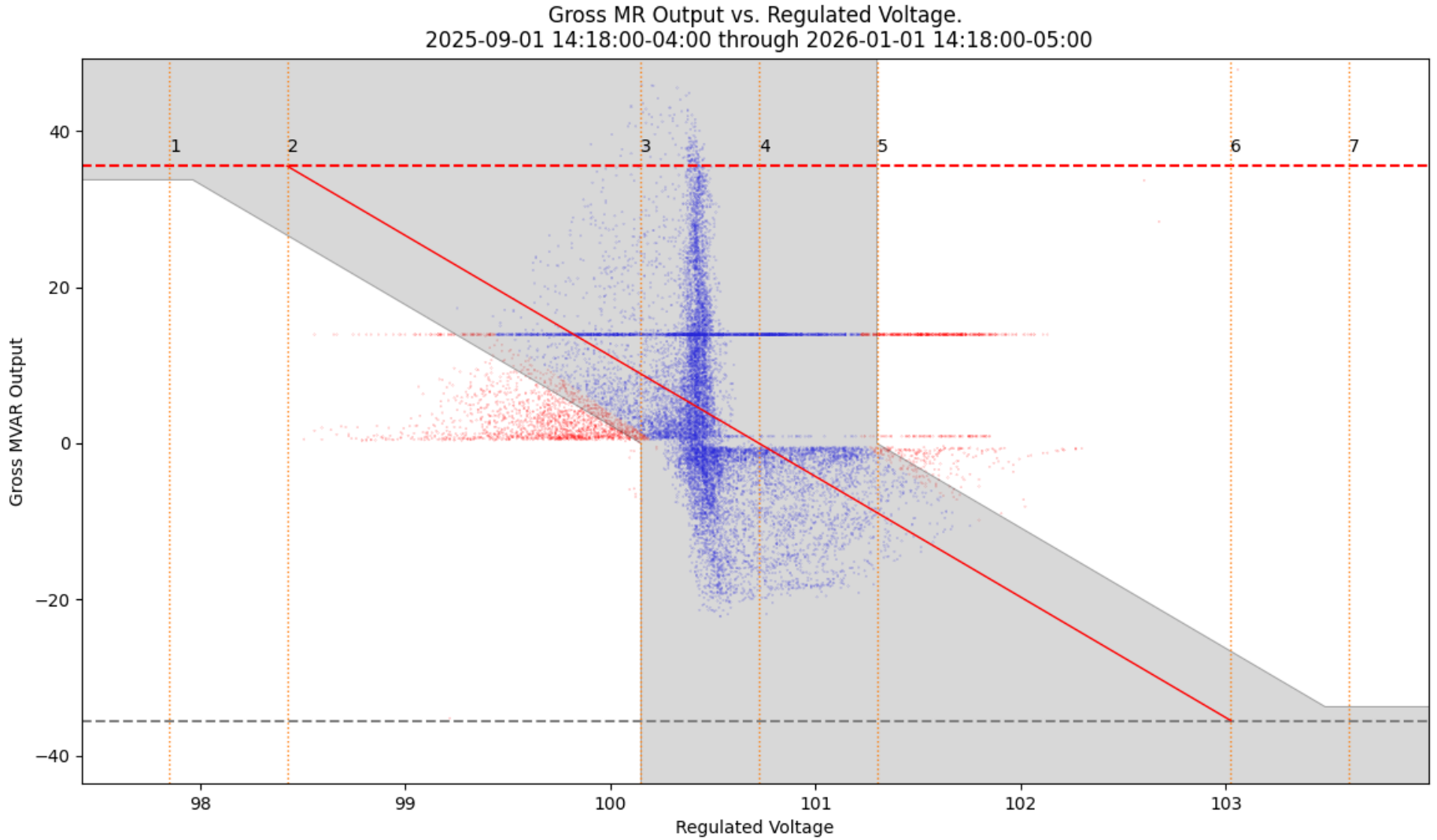


Attempting To Check a Box



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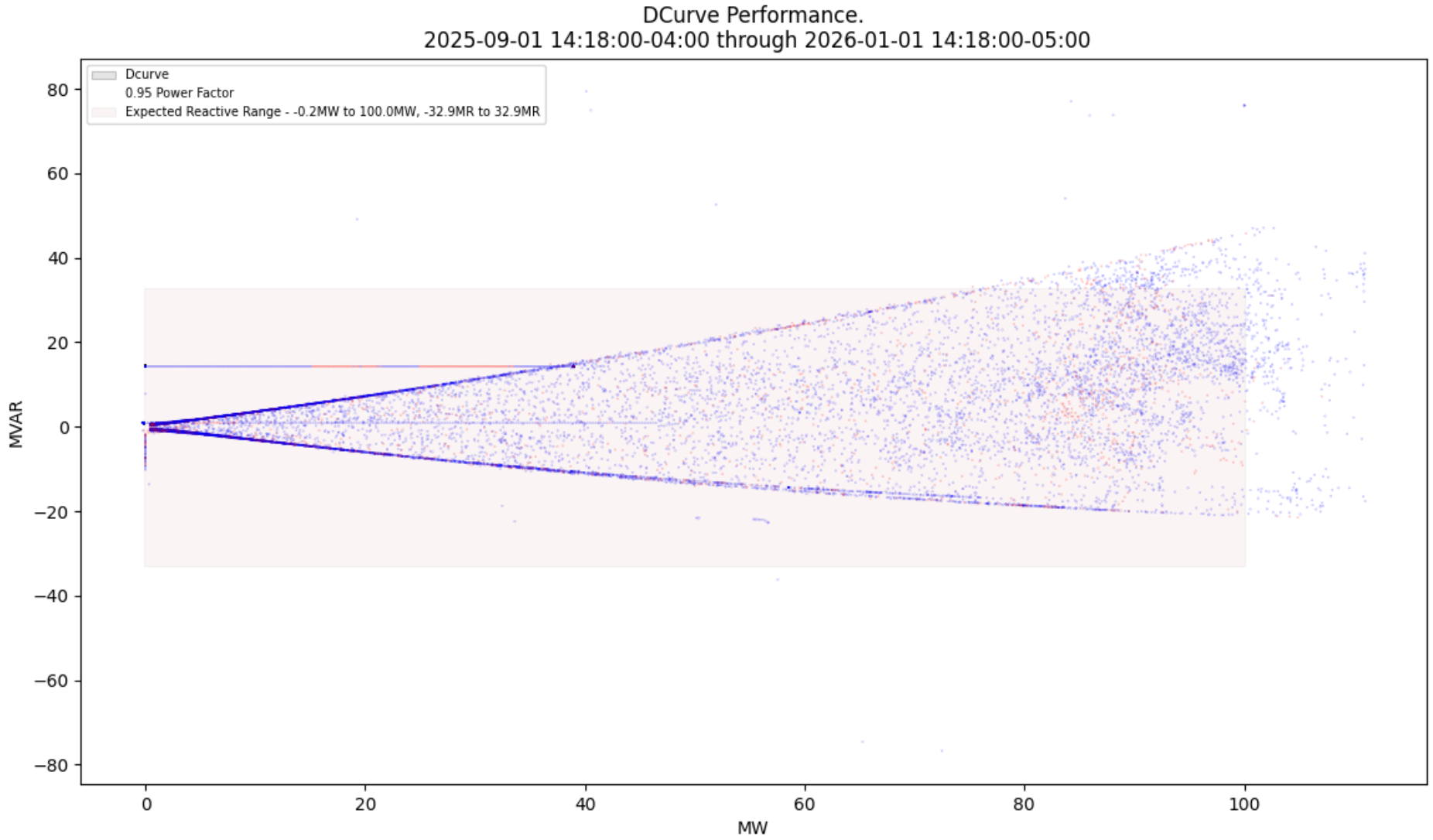

Contact

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PJM IBR Verification Process

Member Hotline

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custsvc@pjm.com

PROTECT THE POWER GRID

THINK BEFORE YOU CLICK!

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Report suspicious email activity to PJM.

Call (610) 666-2244 or email it_ops_ctr_shift@pjm.com