RELIABILITY | RESILIENCE | SECURITY

POWERING TODAY. PROTECTING TOMORROW.

NERC

Need for Testing IBR Integration

For Improved Grid Reliability

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Reliability Challenges with IBRs

Very fast IBR penetration rate

Limitations with existing modeling tools

Differing requirements for DERs and IBRs

Gaps in interconnection processes, commissioning, testing

Challenges

Lack of specificity in / misapplication of standards and requirements

Reliability Gaps

- BPS reliability depends on:
  - **W**hat **Y**ou **G**et **I**s **W**hat **Y**ou **S**tudied (WYG-I-WYS)
  - **W**hat **Y**ou **S**tudy **I**s **W**hat **Y**ou **G**ot (WYS-I-WYG)
- IBR performance issues and modeling deficiencies can be traced back to gaps in commissioning practices.

What was studied

What was installed

White Paper: Best Practices for Testing of IBR Integration

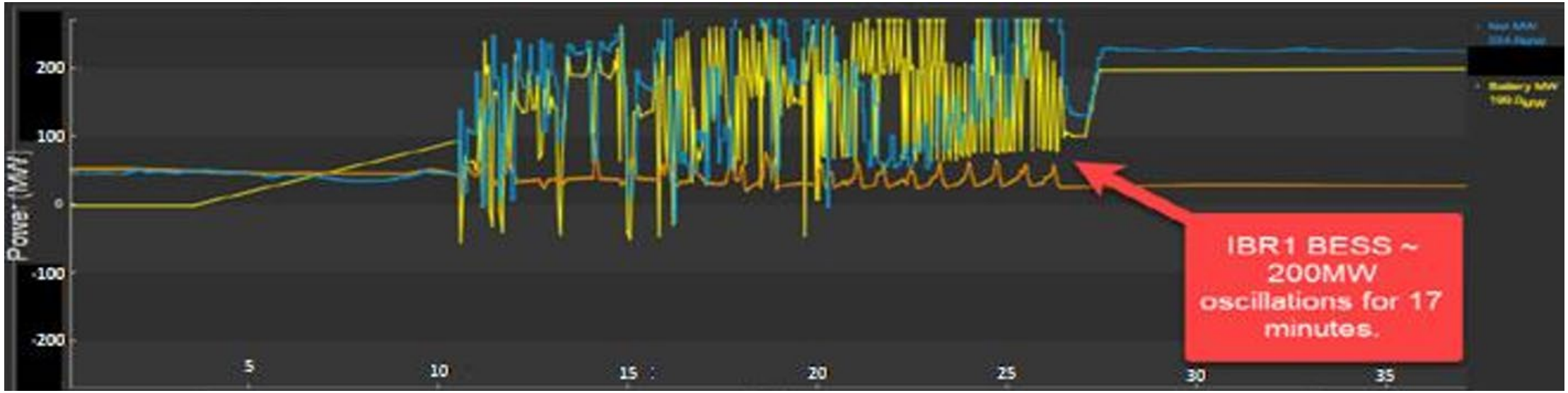
- Provide state of the art practices and solutions to derisk integration of IBR projects before commissioning.
- Hardware-in-the-loop testing with:
  - power plant controller (PPC),
  - IBR unit controller(s),
  - meters, auxiliary or supervisory controllers,
  - other supplementary device controllers (e.g., on-load tap changer, STATCOM)
- Support PRC-028, PRC-029, PRC-030

Call for Volunteer Contributors

Work Item #29
Inverter-based Resource Performance Subcommittee (IRPS)

Real Power Oscillation Due to Compensation Logic

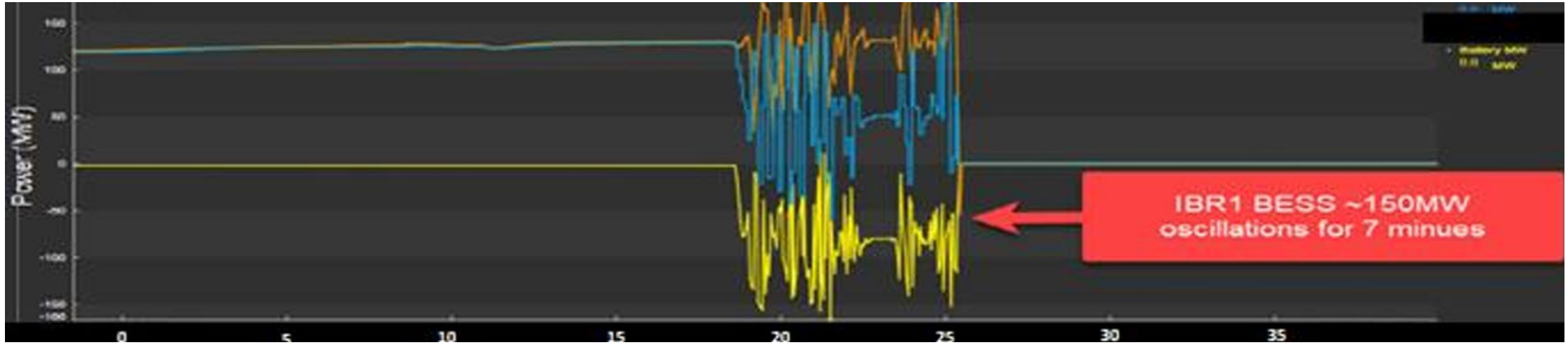
- PV + BESS
- Metering algorithm with loss compensation
- Approved by the operation and passed the operator's tests at commissioning
- Did not catch division-by-zero scenario



https://www.nerc.com/programs/event-analysis/lessons-learned
https://www.nerc.com/globalassets/programs/event-analysis/ll20250901_ibr_controls_oscillation_events.pdf

Real Power Oscillation Due to Plant Control

- Plant controller software updated and restarted
- Inverters were also taken off-line and restarted – not a standard protocol
- Some inverter controllers came back on with a wrong mode



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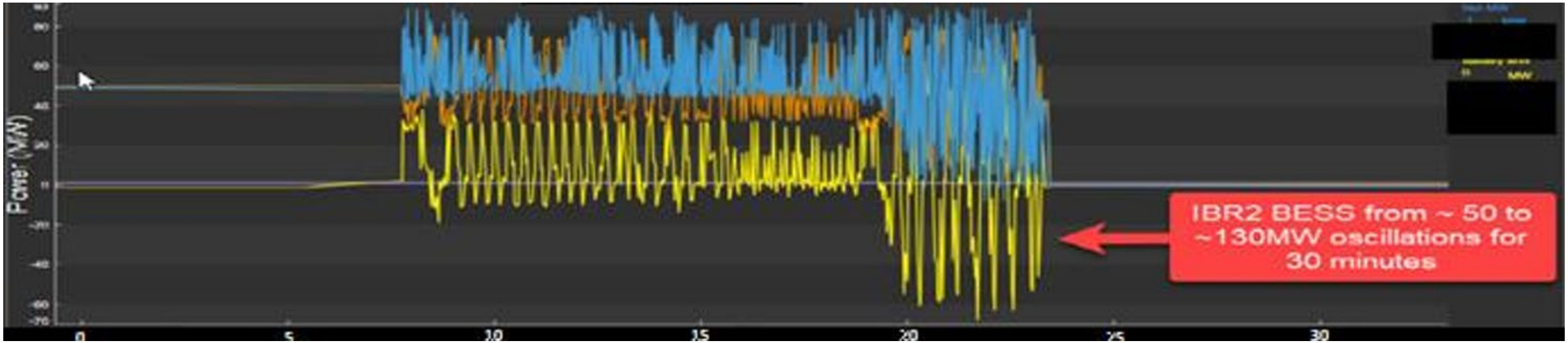
Real Power Oscillation Due to Meter Selection Logic

- Metering feedback to PPC's ID controller is switched depending on BESS output
- Flaw in the selection logic



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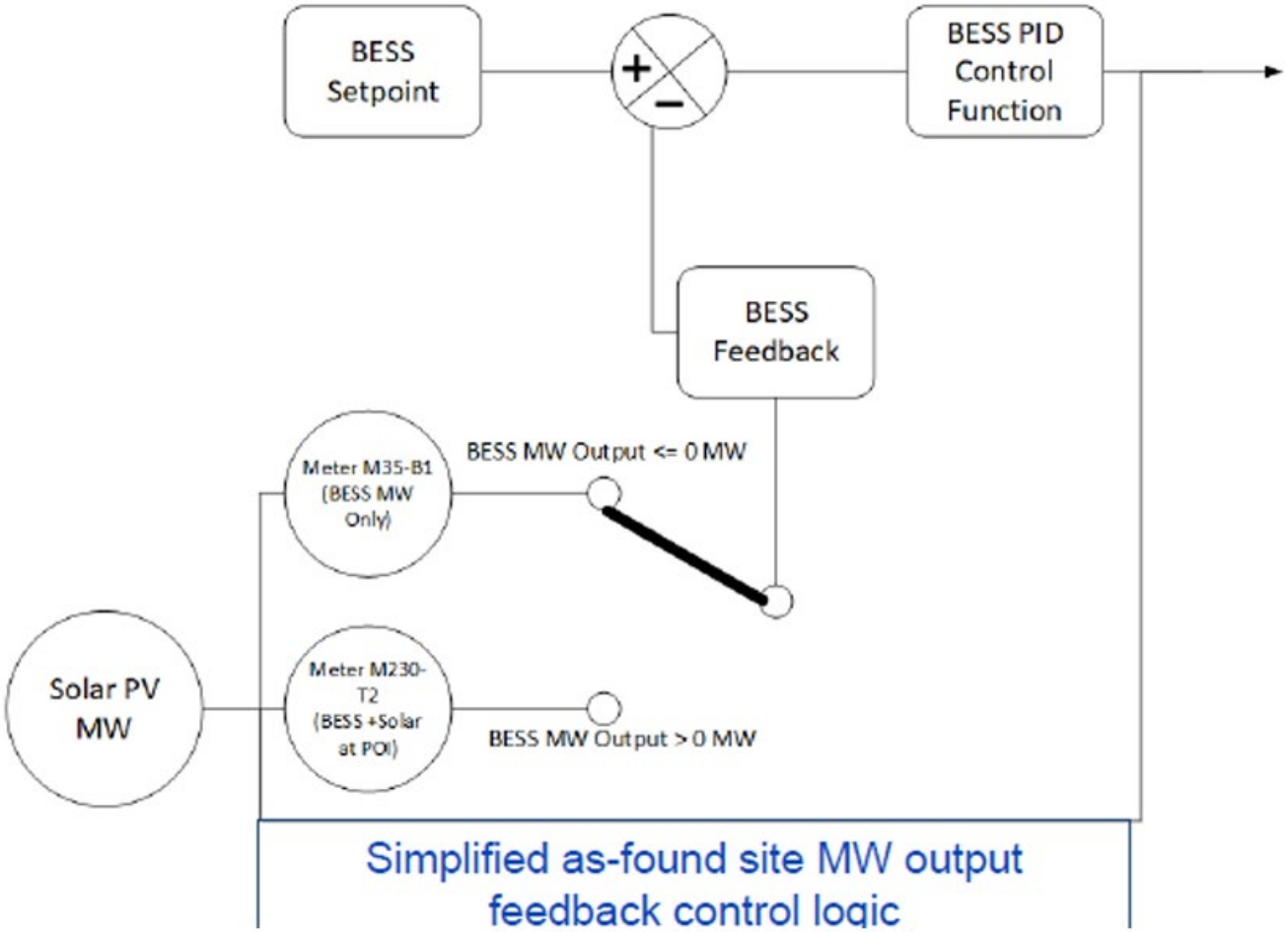
Real Power Oscillation Due to Meter Selection Logic



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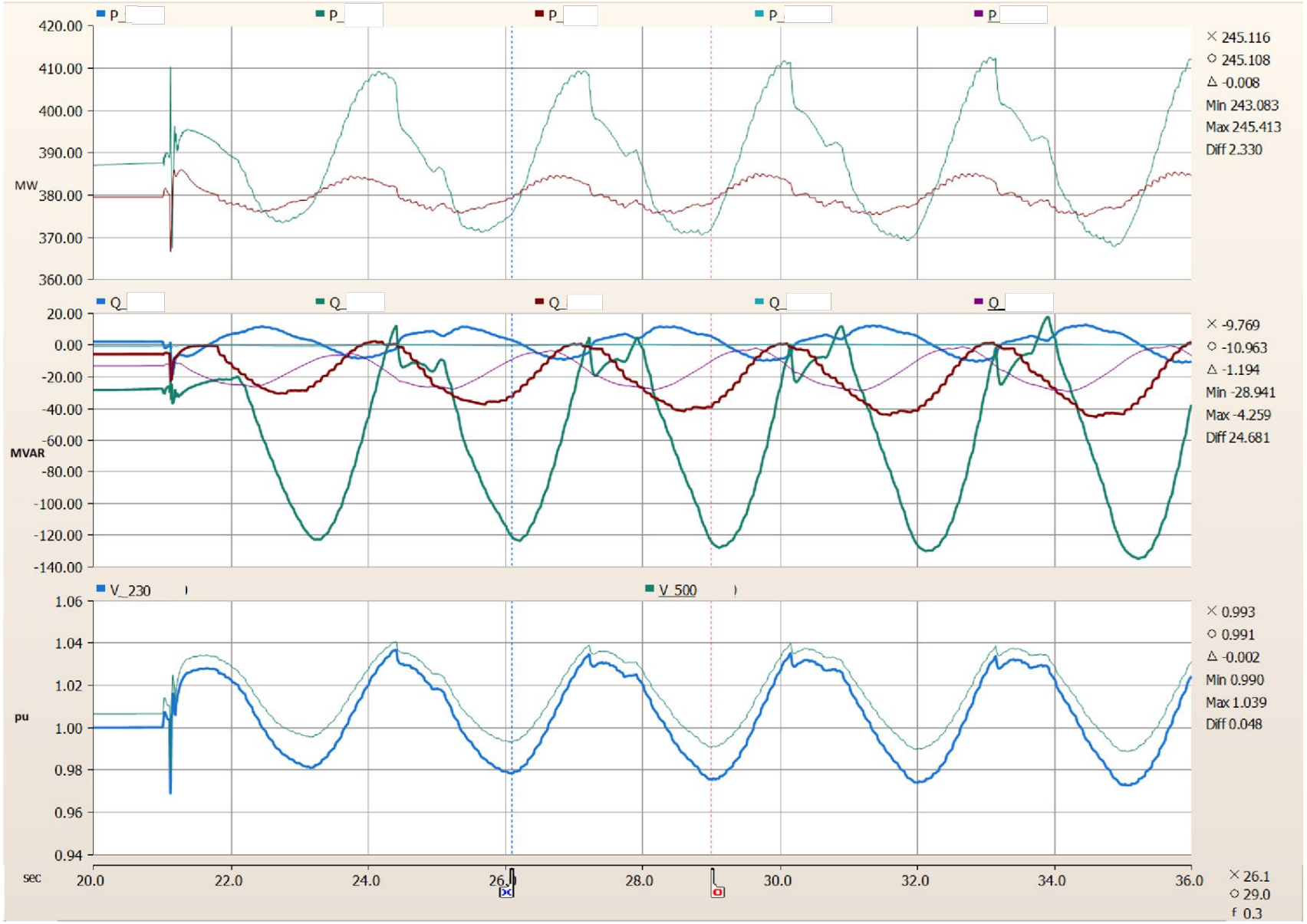
Voltage Oscillation due to Metering Delay



Discussion

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