

Operator Training, Procedures, and Acceptance Strategies

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WASA Phase 2 Success: Provide an advanced tool that will enable System Operators to use PMU data to provide vision and insight into daily operating scenarios

- In WASA Phase 1, System Operators used SynchroWave Central application
- Operator training was provided, and the tool was used to provide supplementary data for system event analysis
 - Statcom voltage oscillation event
 - Inverter based resource (IBR) voltage oscillation
 - 500kV line trip due to relay mis-operation
- System Operators saw the value in the WASA project



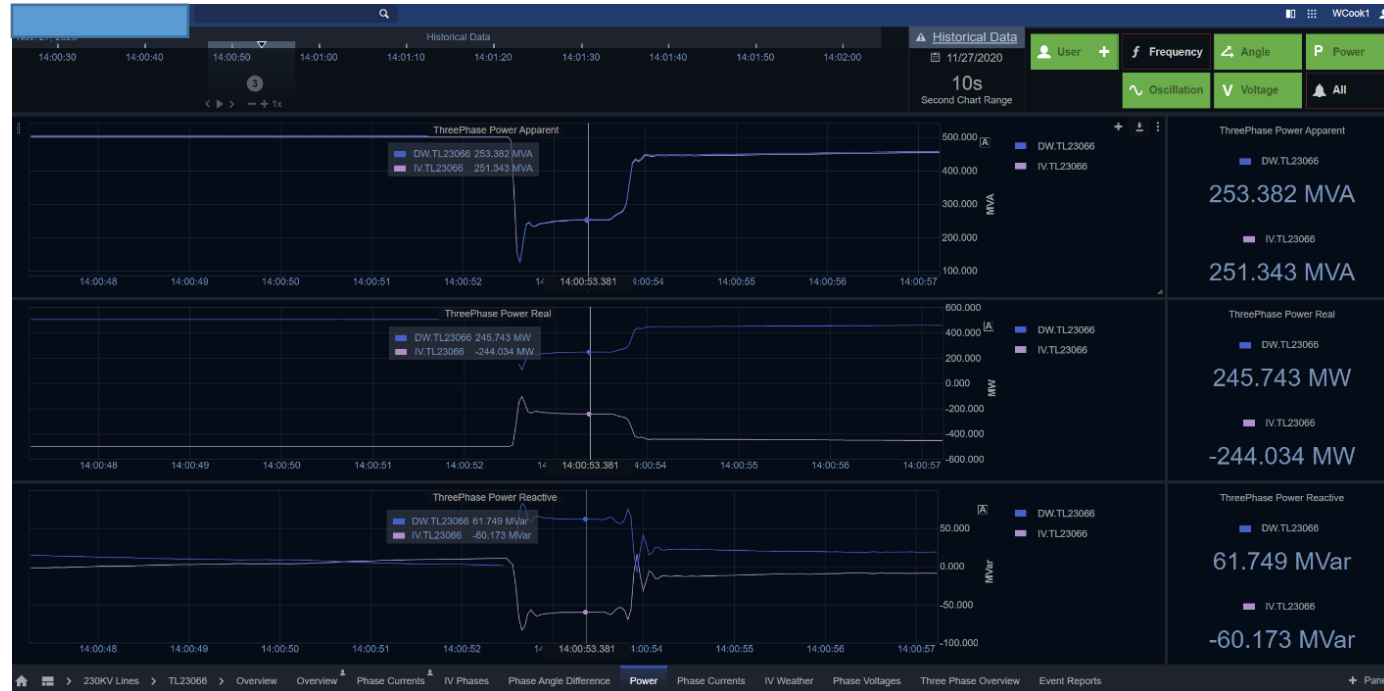
WASA Phase 2 project implementation

- Involve Operators early to discuss project goals- meetings, documentation
- During design, encourage operator feedback
 - Note: Pandemic impacted ability to train in person
- Prepare Use Case document to demonstrate the features of the new system
- Focus on the use of prepared dashboards for operator use- limited configuration need
- Provide initial overview training, make system available for operator use
- Encourage operator feedback, based on operator experience with new system
- Using Operator feedback, provide training classes, emphasizing use cases



Use case: 500kV line trip

- Actual system event
- IBR resource on 230kV line rejected 250 MW of load for two second duration
- Not visible via SCADA due to 4 second scan



System Operators have accepted the value of the new system

- SEL has provided a detailed instruction manual, which provides details on notification, timeline and dashboard applications
- Operator focus on using prepared dashboards, limit configuration requirement
- A standard operating practice is being developed to provide focus on key areas in the Instruction Manual
- Look for dashboard applications to enhance Operator experience
 - Example: Black start dashboard showing system restoration path
 - Operator feedback was used in developing dashboards



Black Start Path 1

- Black start units on left side
- Combined cycle plant on right
- System voltages, frequencies and line flows are shown

