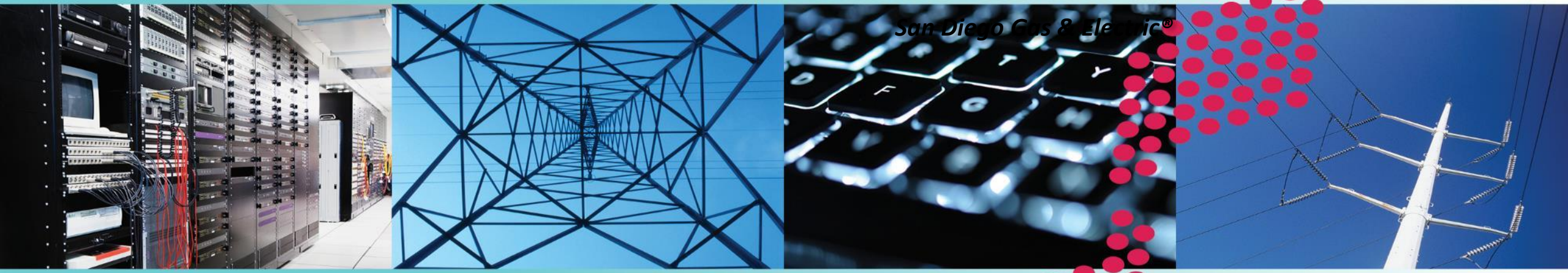
SDG&E – Impediments to Leveraging PMU and Synchrophasors

Ali Yari – Director, Grid Operations

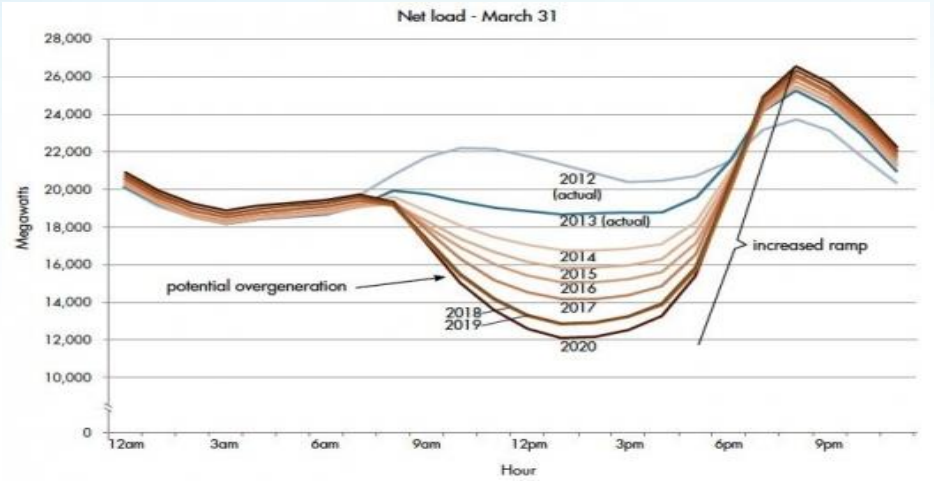


October 17, 2019

Carbon-Neutral Grid

- Approx. 45% SDG&E electric load is supplied by clean energy resources

- CPUC Renewable Portfolio Standard
  - 2030 - 60%
  - 2045 - 100%



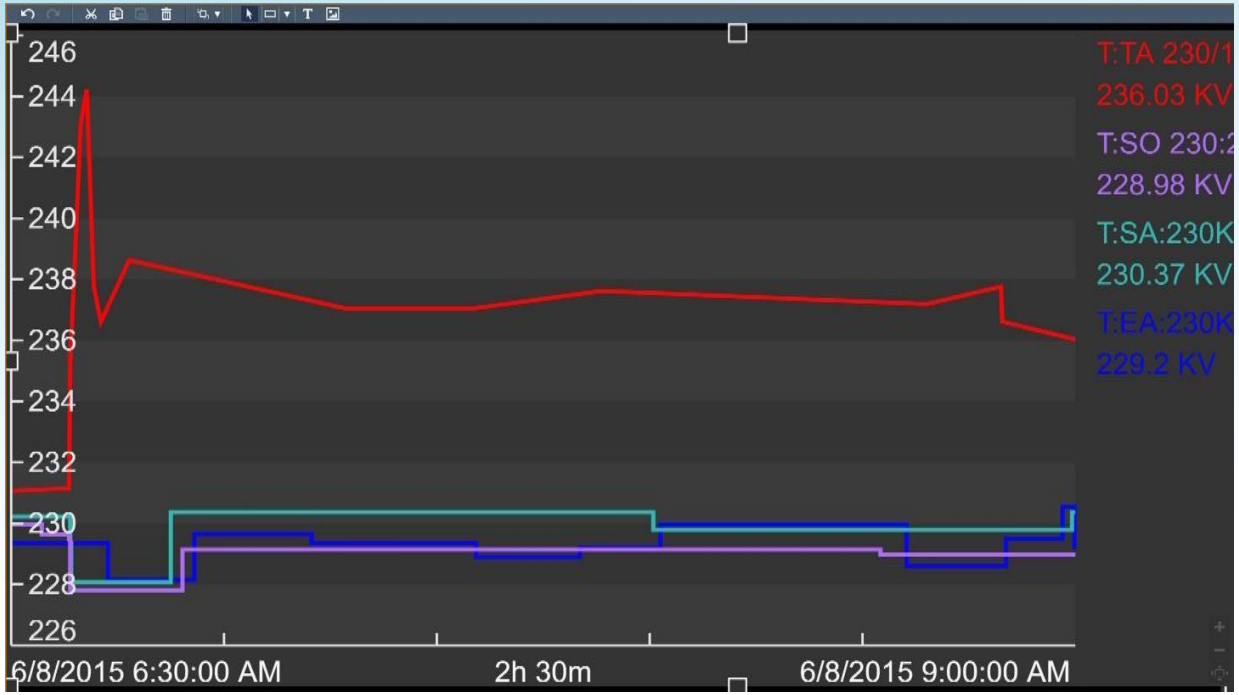
Grid Modernization

- Replace baseload power plant with quick-start gas turbines
- Build new transmission infrastructure
  - Transmission Lines
  - Substations
  - Phase shifting transformers
  - Synchronous condensers
  - SVC
- Integrate energy storage
- Increase Situational Awareness
- Develop/Utilize advanced applications using high speed data

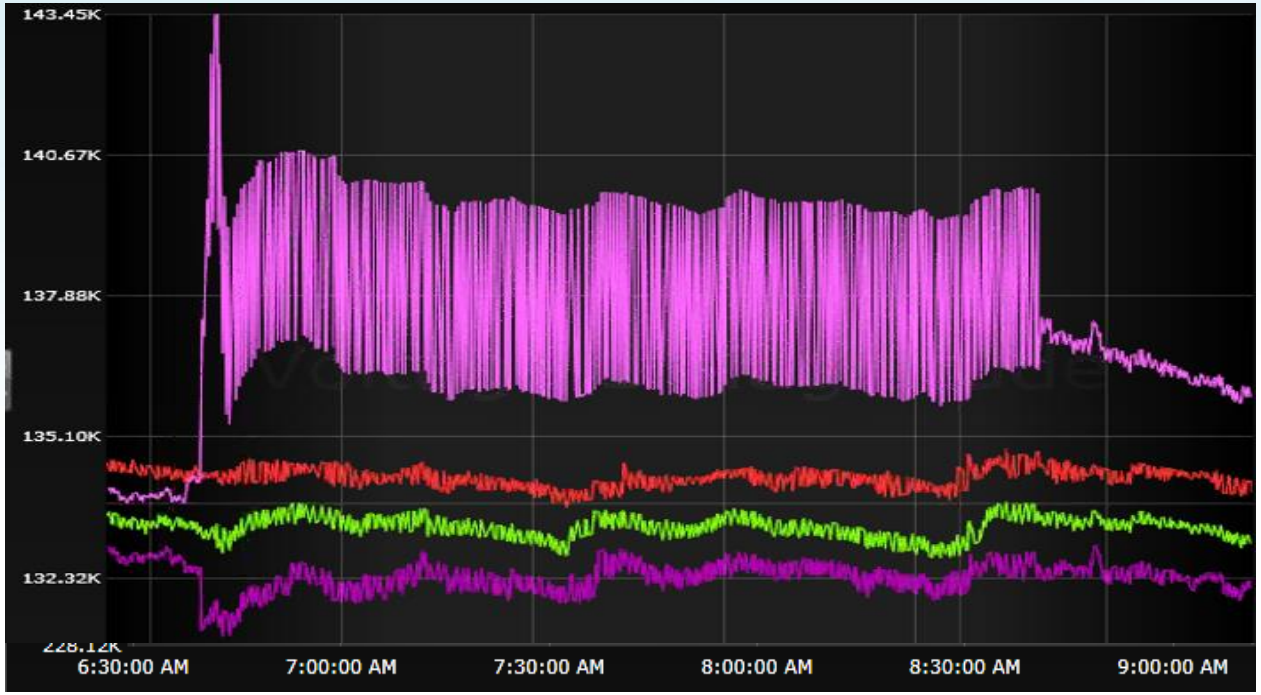
Situational Awareness Present/Future

- Orange County System Voltage Oscillation Detection – June 8, 2015

SCADA Data



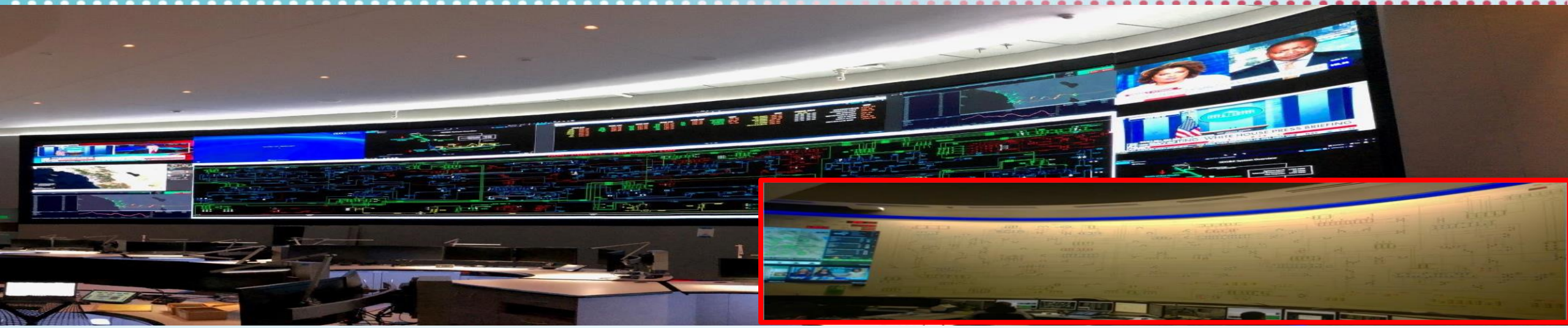
Synchrophasor Data



Industry Barriers

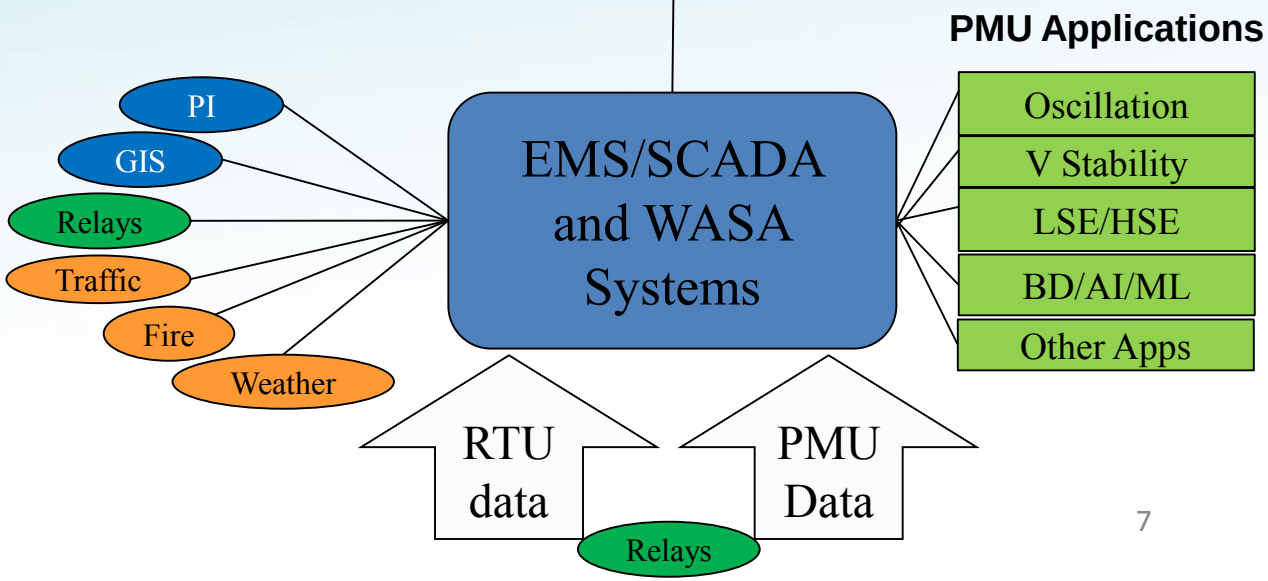
- R&D and operational readiness gap
- CIP complaint for operational decision making
- Communication infrastructure
  - Ability to remotely transfer data over a secure medium
- Integration with existing and future systems
  - EMS, GIS, Weather
  - Improved visualization
- Operator utilization training
  - Define use cases
- Regulatory requirements not developed
  - FERC recommendation focused on utilization

SDG&E Progress



- Installed a dynamic, interactive video wall for enhanced situational awareness
- Provided synchrophasor data to control room operators as an informational item
- EMS RFP with requirements for high sample rate phasor data integration
- Developing system architecture for CIP compliance
- Working with SEL to develop an operator focused application

WASA System Deployment

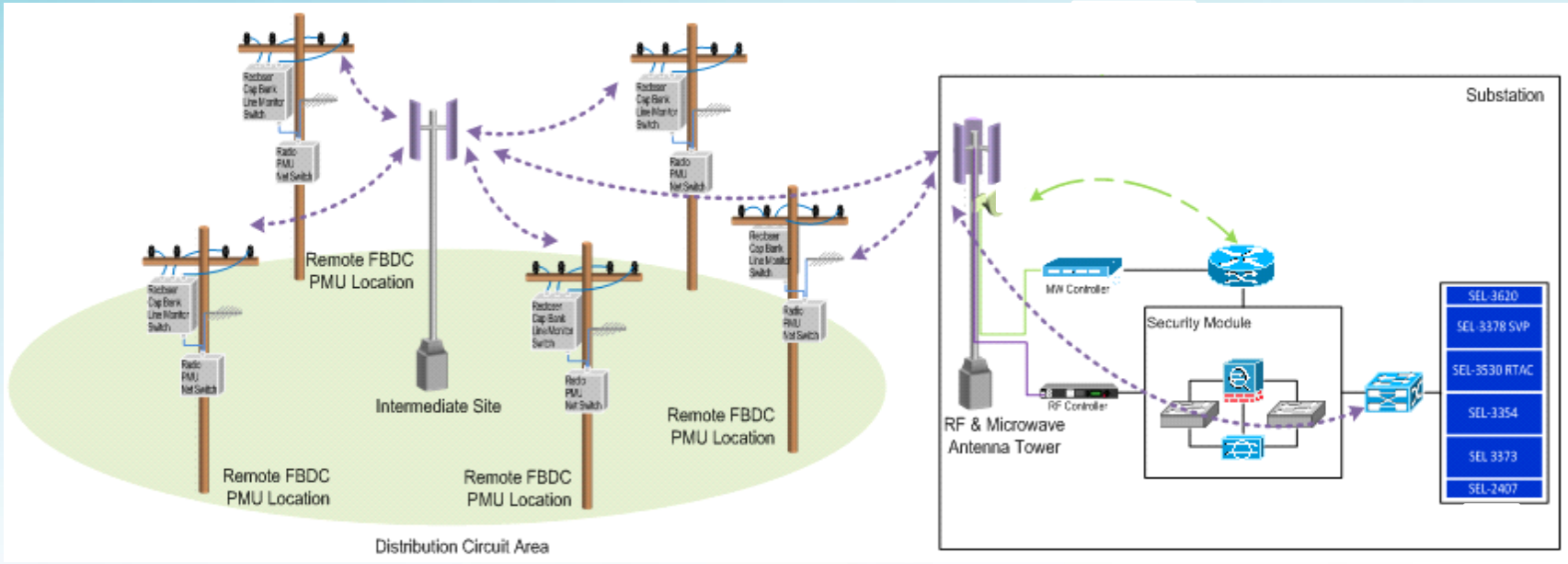


- Design and install hardware to meet CIP compliance criteria
- Ensure Operator involvement during application development
- Synchrophasor application with multi-layer geospatial displays
- Centralized intelligent event detection and alarm management
- Open Application Program Interface for integrating advanced 3rd party applications
- Develop use cases and deliver specific Operator training
- Increase system reliability

Accelerate Fault Restoration

Advanced Protection & Falling Conductor Protection (FCP)

- Advanced Protection includes Sensitive Ground Fault (SGF) and spike counting algorithms to detect high impedance ground fault and associated arcing of a wire down



- Utilizes algorithms, syncrophasors and high speed communication to detect a breaking/broken conductor and de-energize the area before the conductor hits the ground
- Requires substation and line syncrophasor devices (PMUs) throughout the circuit and high-speed communication between the substation and field devices