SmartSacramento®

Distribution Automation

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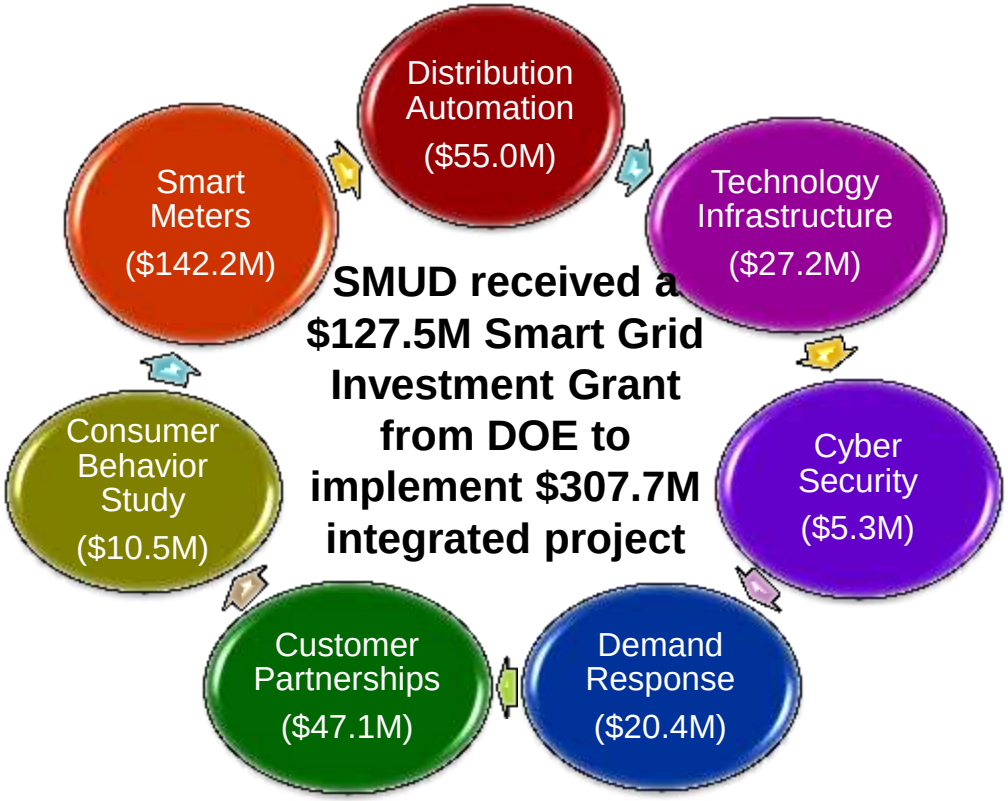
Agenda

1. About SMUD
2. Distribution Automation Project Overview
3. Data Requirements
4. Business Case
5. Current Use
6. Making Data Actionable

About SMUD

- 595,076 Customers
  - Residential accounts: 526,980
  - Commercial accounts: 68,096
- 2,007 employees
- 900 Square Mile service territory
- Seven member elected Board of Directors
- 6th largest community-owned electric utility in the nation
- Committed to a high level of customer satisfaction

SmartSacramento® ARRA Grant



DOE Disclaimer Requirement

- **Acknowledgement:** "This material is based upon work supported by the Department of Energy under Award Number OE000214."

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Distribution Automation

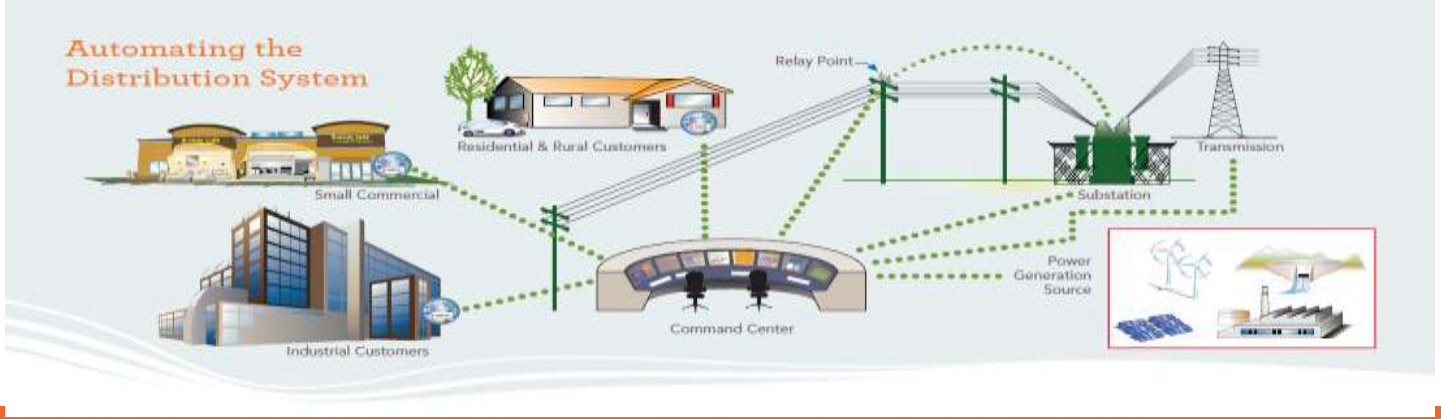
Goals:

- Automate Switching to reduce outage impacts
- Enable conservation voltage reduction for energy savings
- Implement Volt/Var Optimization to reduce system losses
- Provide tools and technology to Distribution System Operators that would make data actionable

Distribution Automation

Project includes:

- Upgrade 40 Distribution Substation Transformers with SCADA
- Install automated equipment on 118 of our 12kV circuits (18%)
  - CVR/VVO
  - ASR
- Automate Switching devices on 24 69kV circuits (22%)
- Situational Awareness and Visual Intelligence (SAVI)



Data Requirements

- SCADA & Line Automation
  - Doubled our data tag requirements
- Operational Smart Meter Data
  - >600,000 meters

Business Case

- Original contract with OSIsoft was based on a price per data tag
- Enterprise Agreement is a flat fee based on the size of our system
- Significant cost savings under new agreement
  - SCADA & Line Requirements (18%)
  - Operational meter data

Business Case – Operational Meter Data

- Customer load data
  - Transformer sizing
  - Delayed capital expenditures
  - System Operations
- Meter voltage information
  - Power Quality
  - Conservation Voltage Reduction

Current Usage – Transmission and Generation

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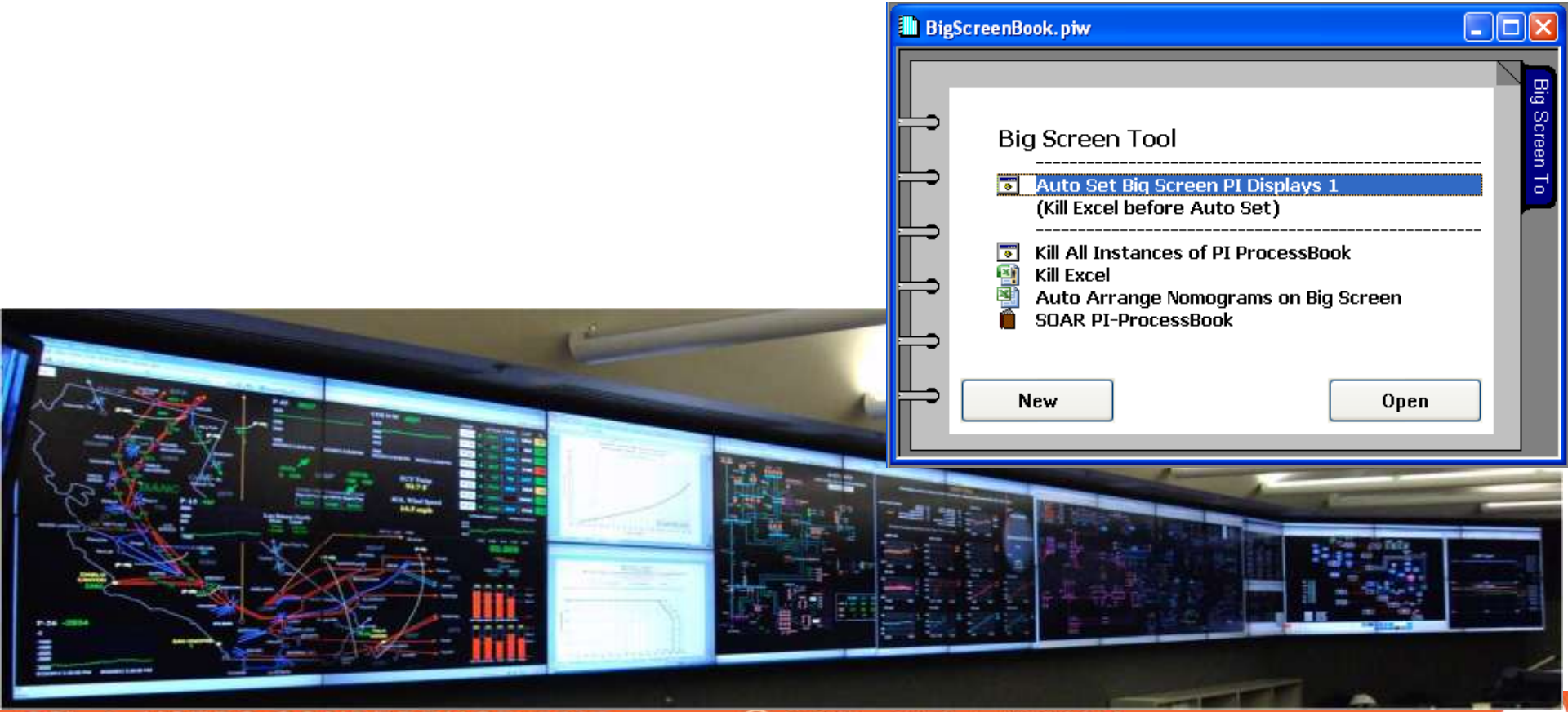
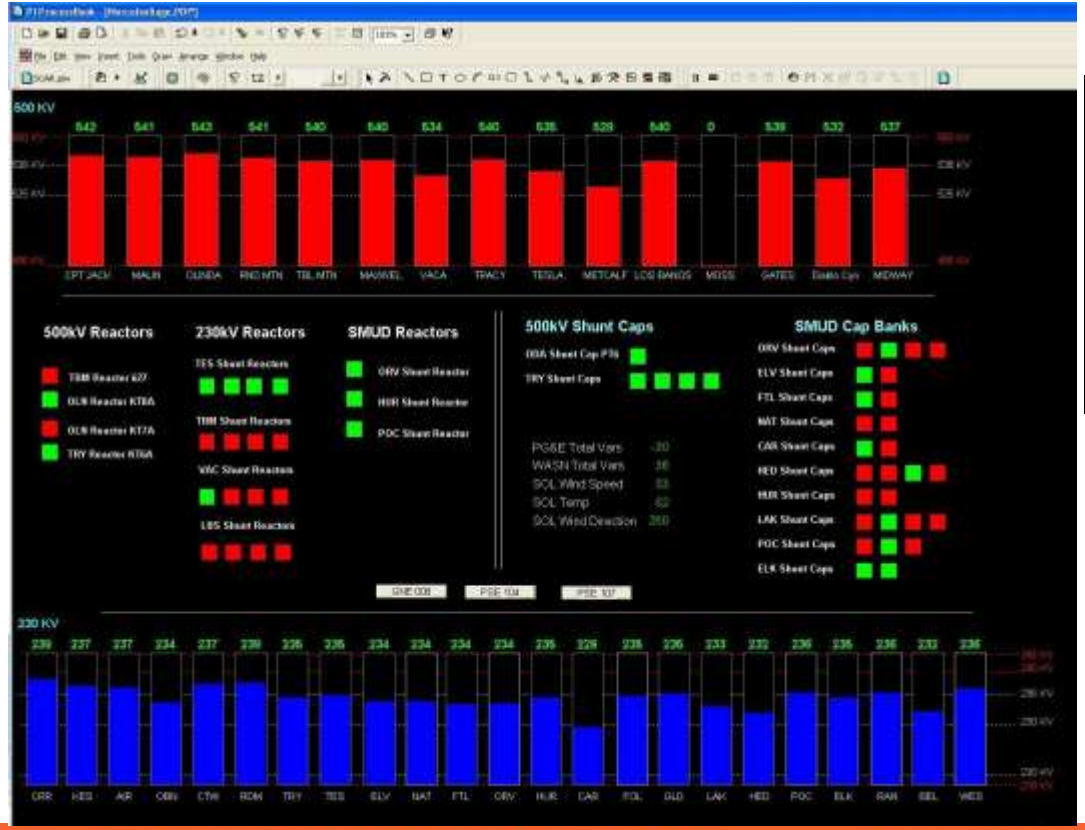
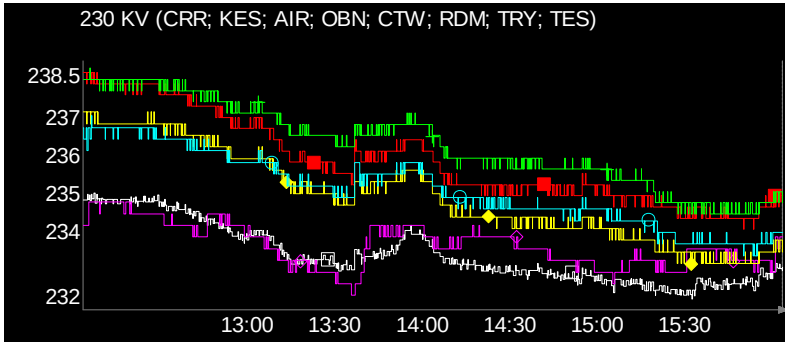
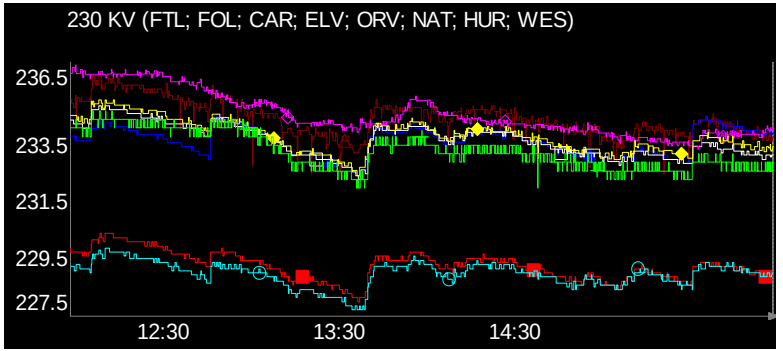
Control Room Video Wall for PSO



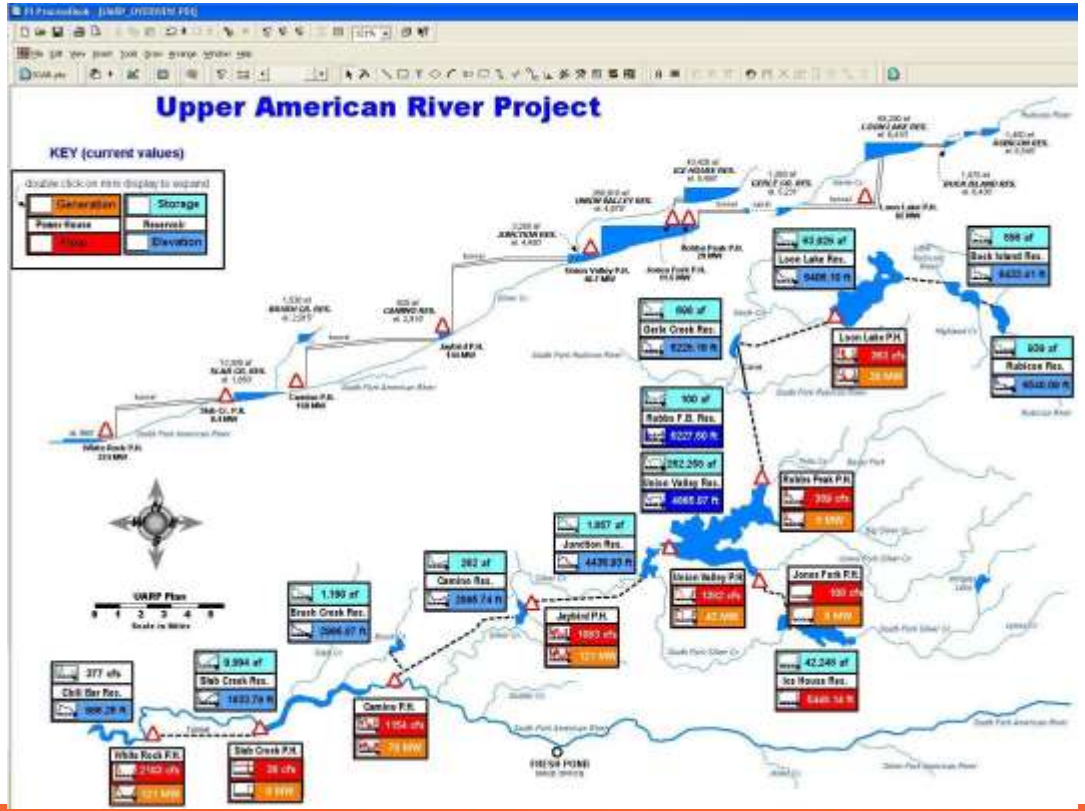
Transmission Voltage





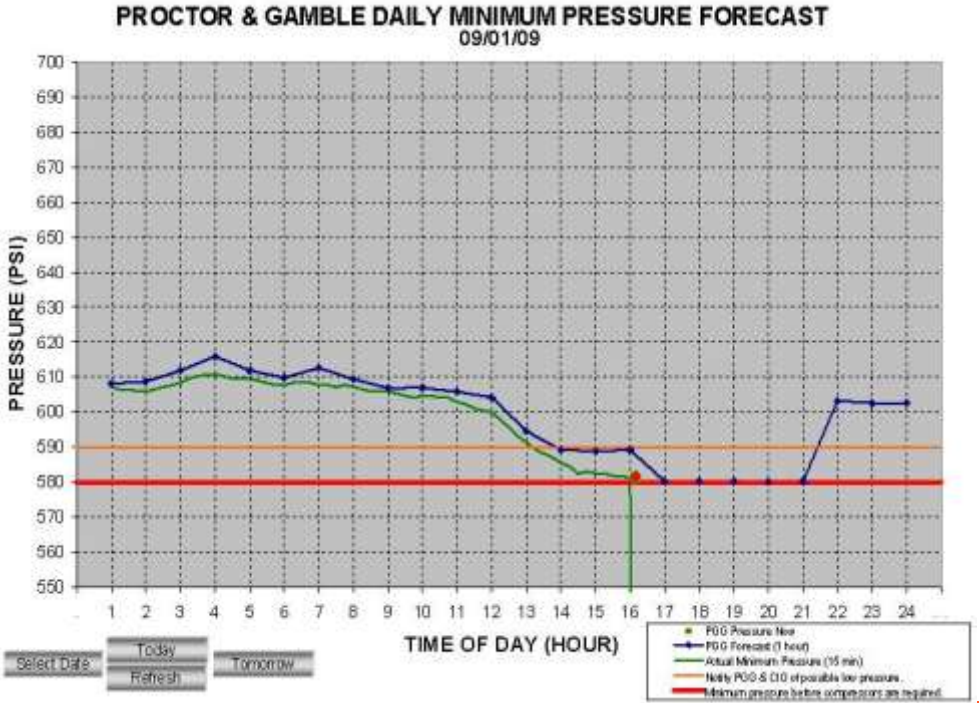


SMUD's Upper American River Project

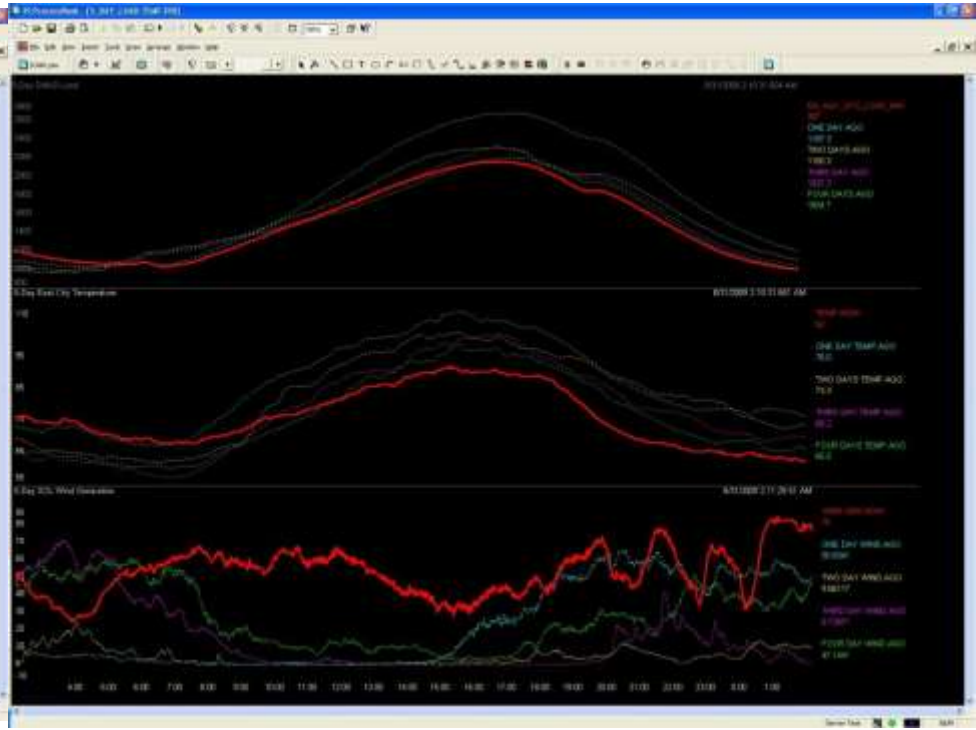


Natural Gas

Use PI DataLink data to help forecast low gas pressure



Wind Generation



Distribution Operations – Making Data Actionable

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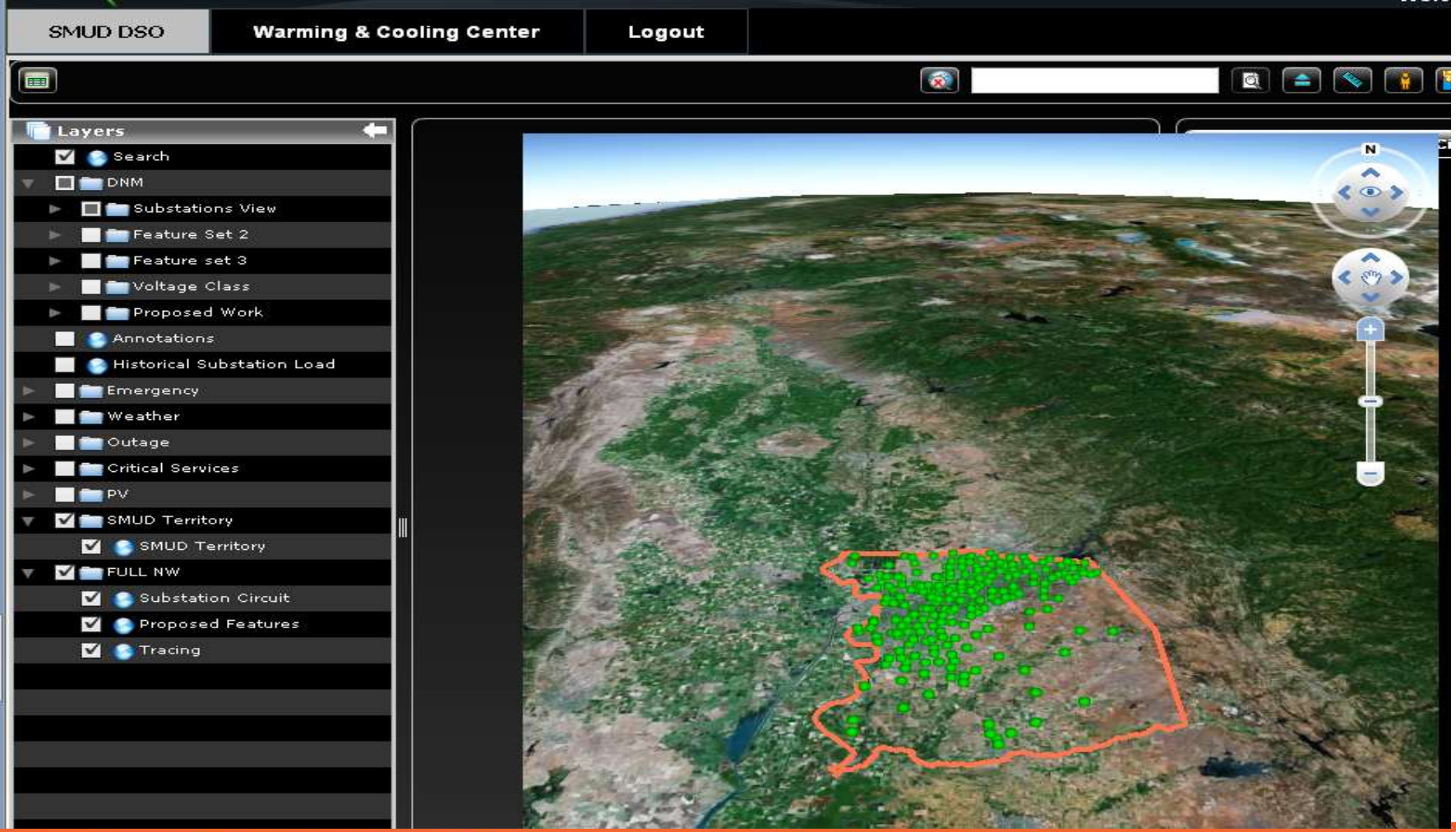
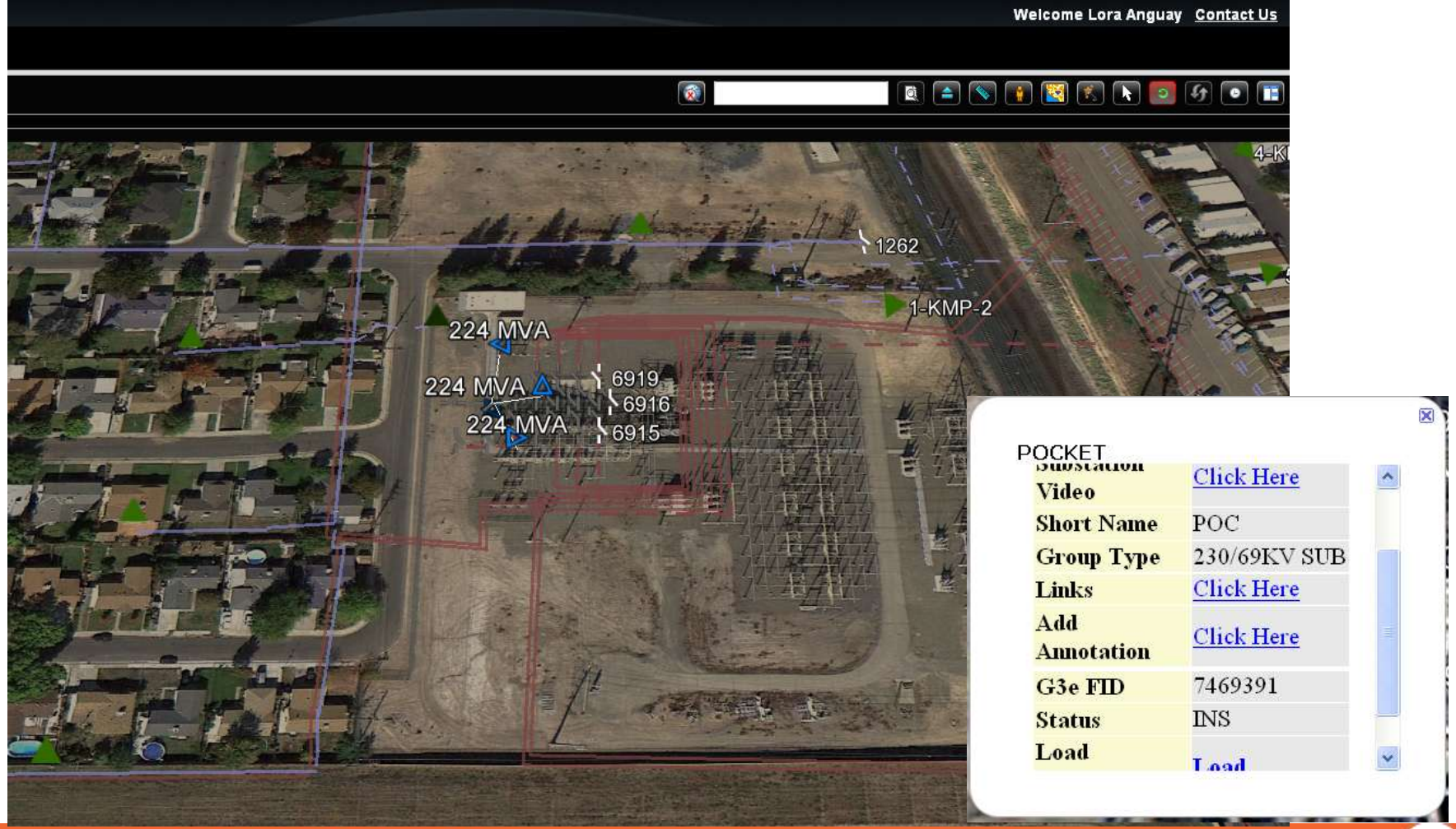
Initial Functionality

- Substation information
  - **Capacity and load data (PI System)**
  - One line diagrams
  - Live video stream
- **PV capacity and forecasting (PI System)**
- Work in Progress
  - Construction prints
  - Location
- Outage information
- **Weather (PI System)**





Distributed Generation

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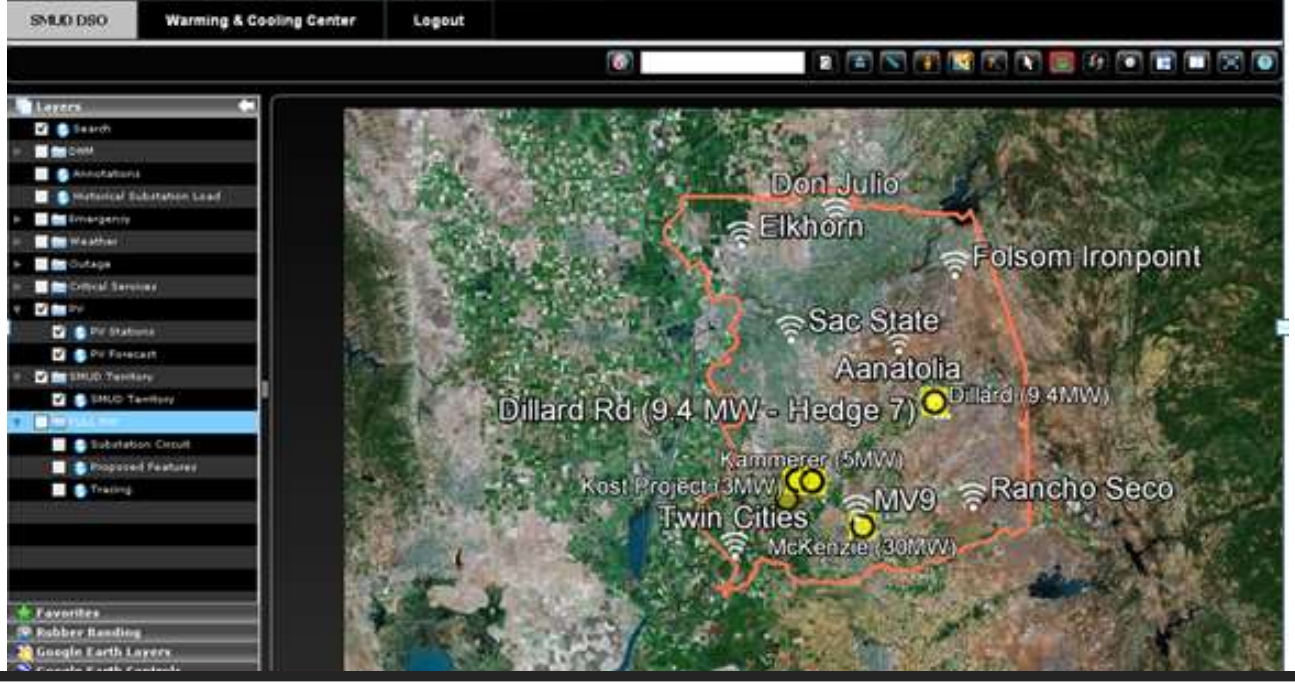
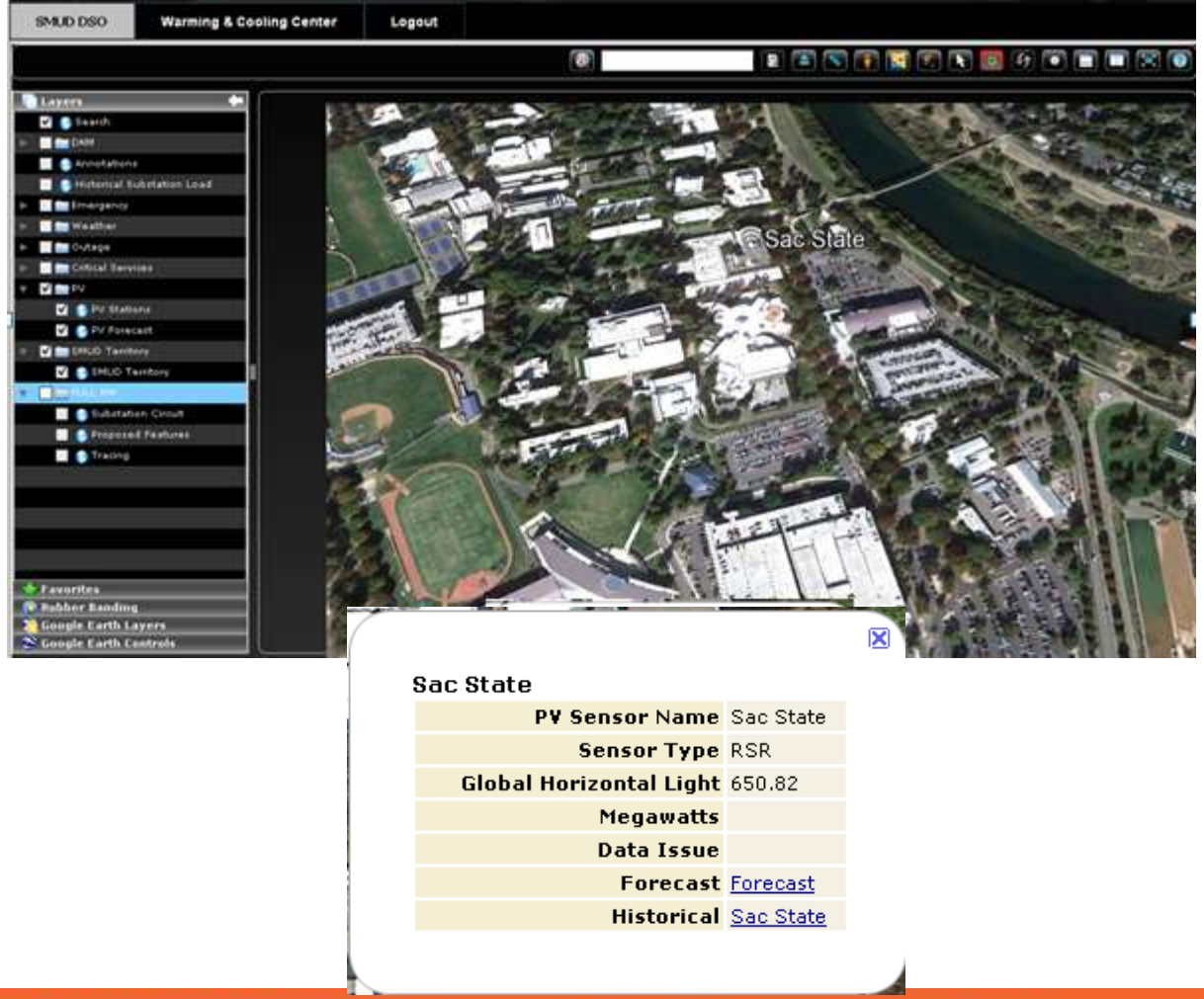
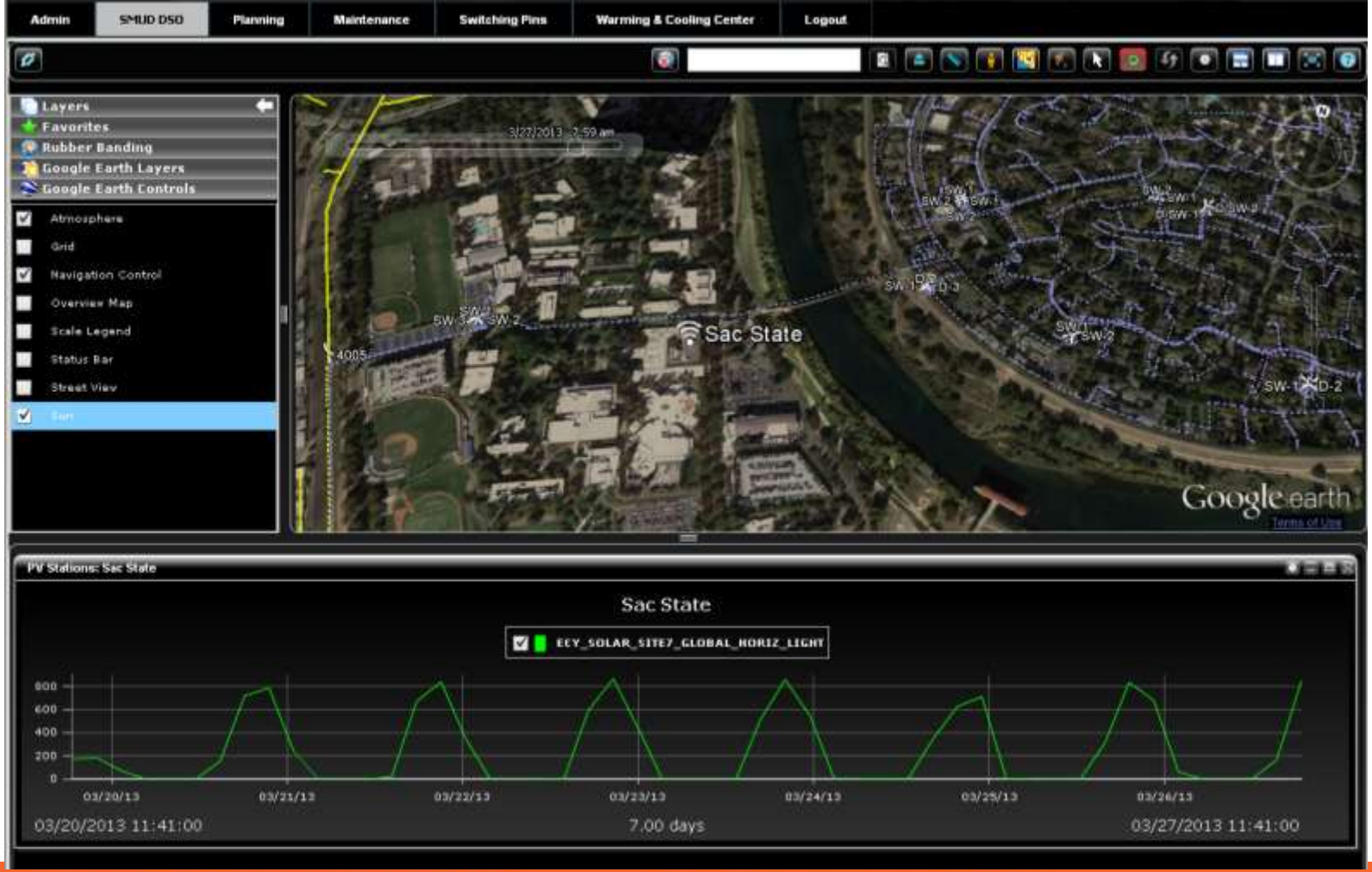
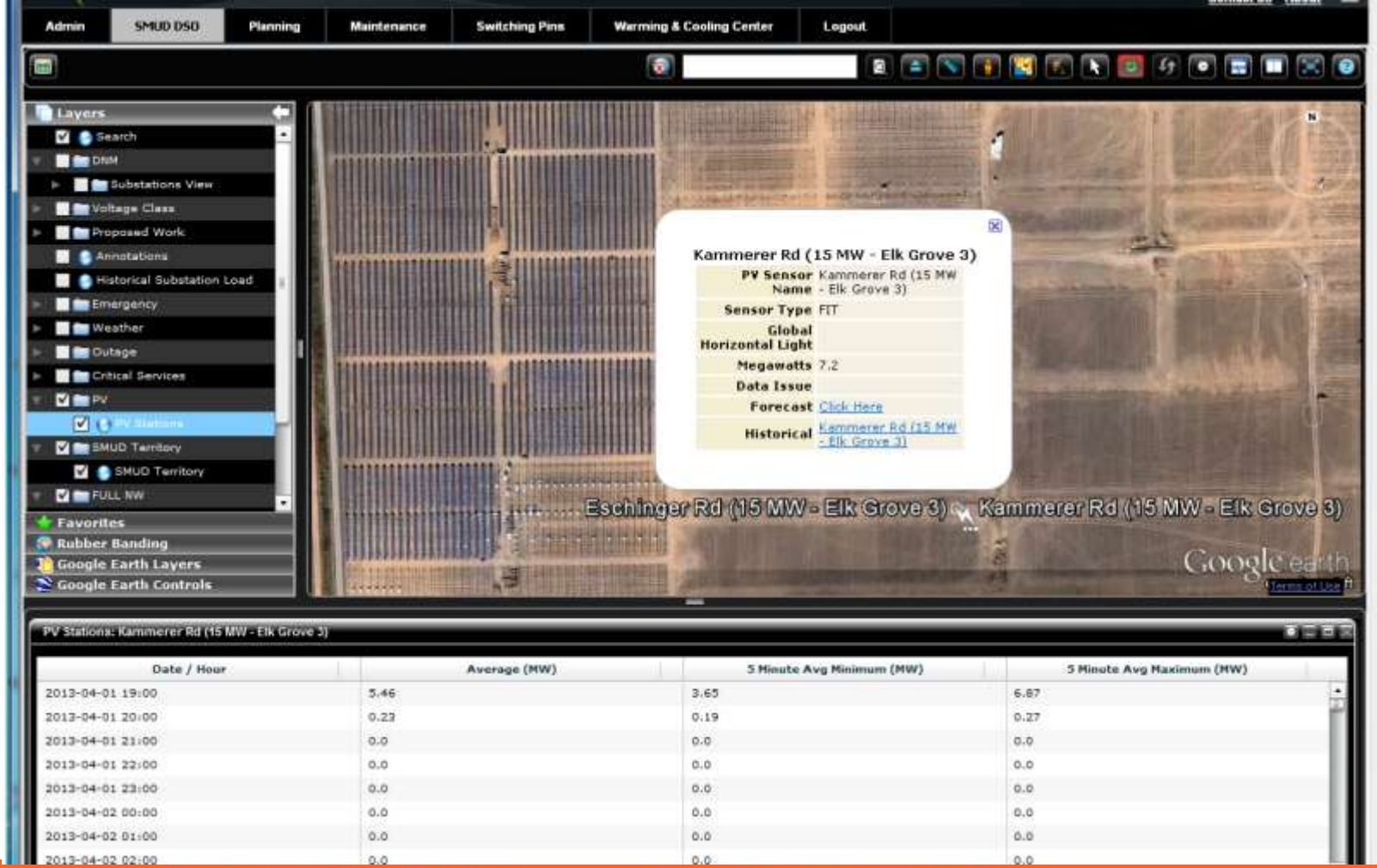


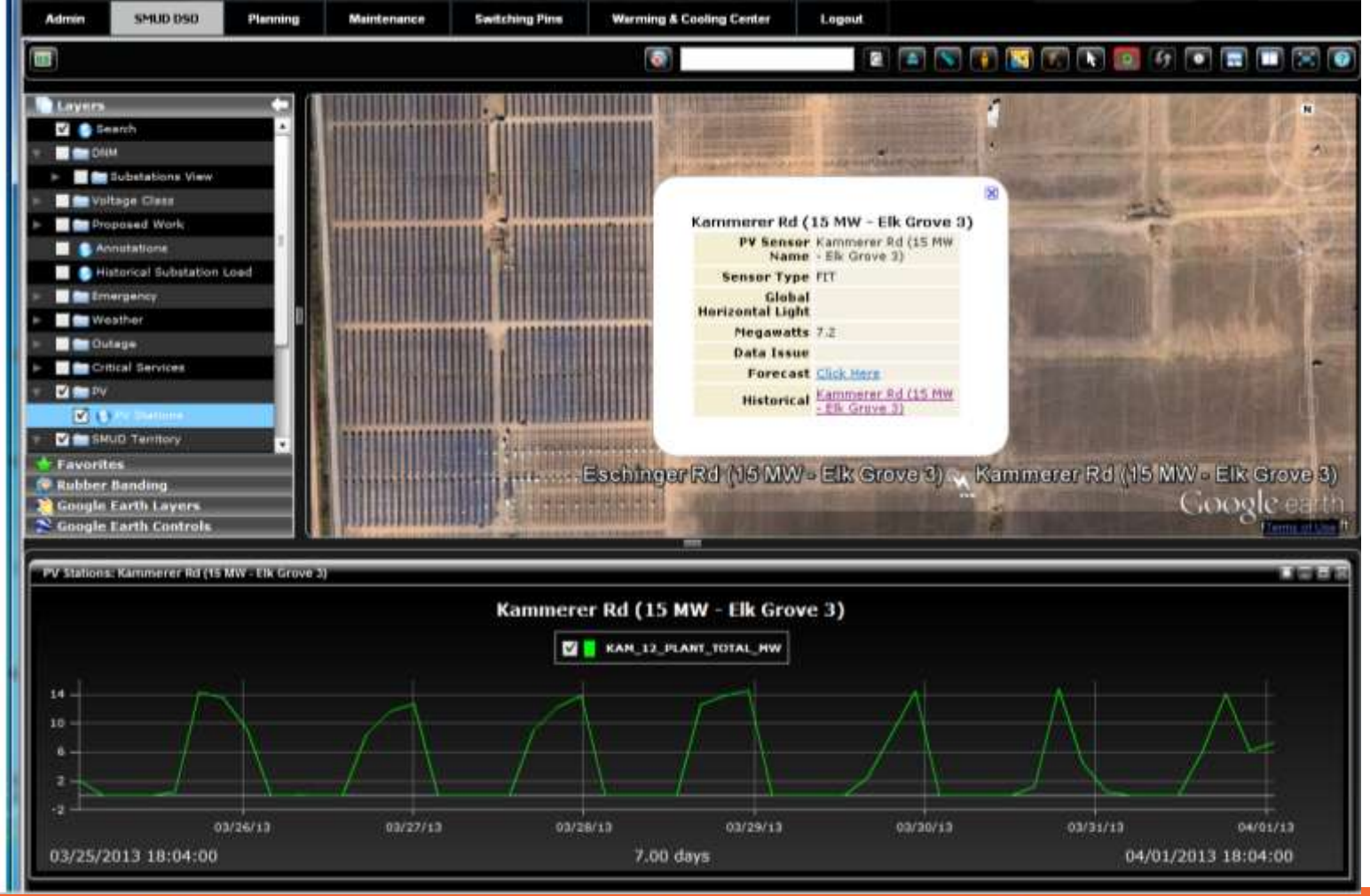
PV Stations

PV Sensor Name	Sensor Type	Global Horizontal Light	Megawatts	Data Issue
Boessow Rd (3 MW - Elk Grove 4)	FIT		2.19	
Kost Rd (3 MW - Elk Grove 6)	FIT		2.08	
Bruceville Rd (18 MW - Elk Grove 3)	FIT		14.3	
MV9	RSR	712.45		
Rancho Seco	RSR			









Weather and Outage

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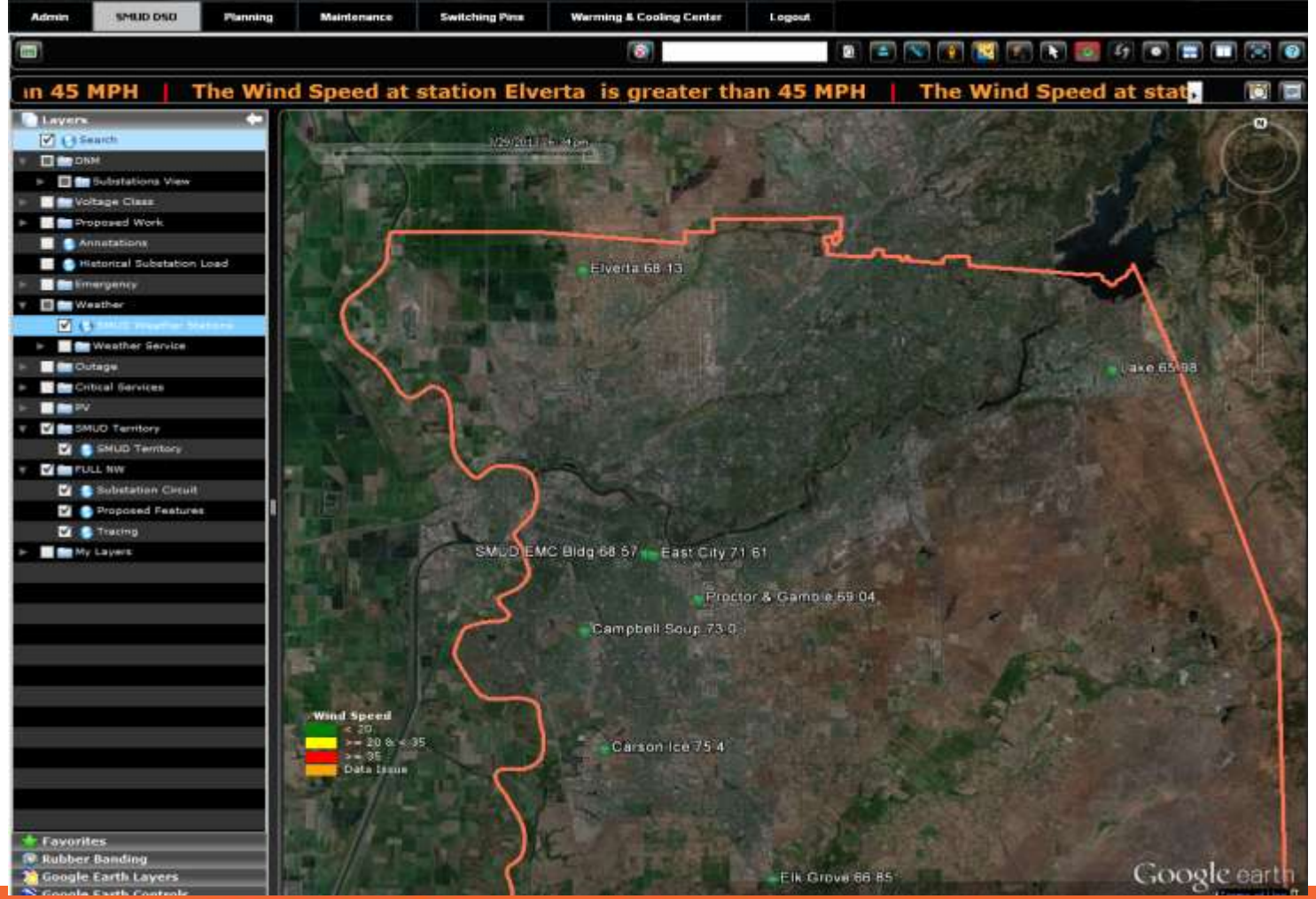
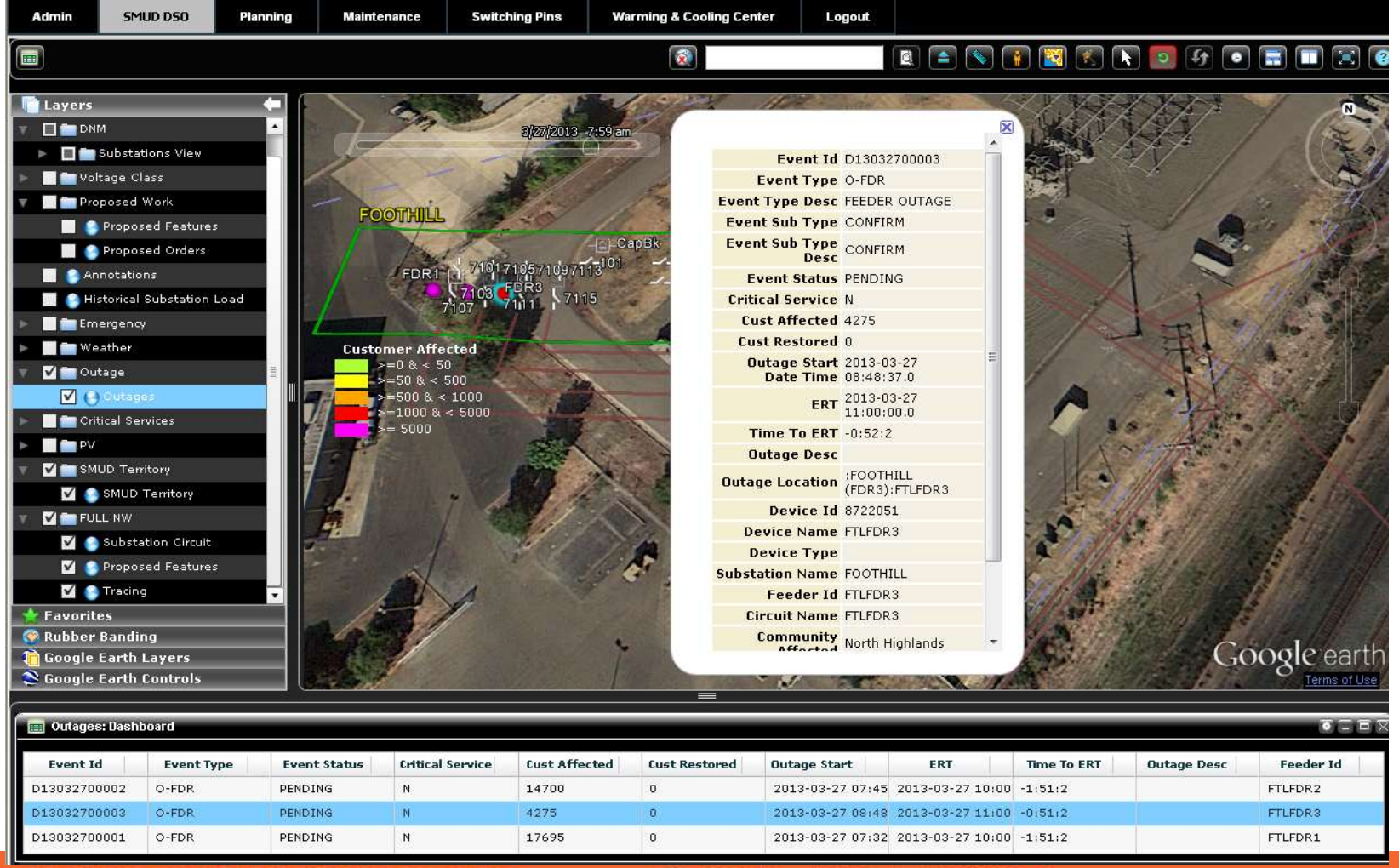
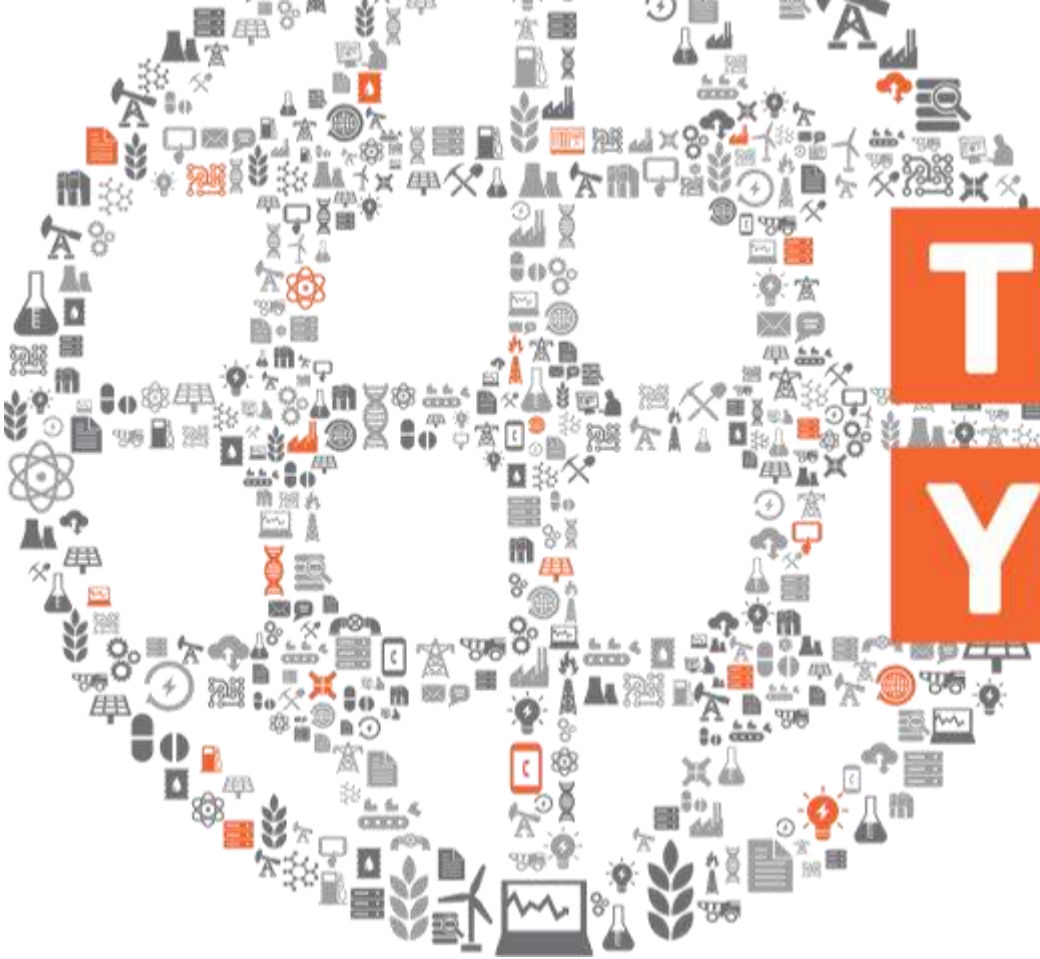




Event Id	Event Type	Event Status	Critical Service	Cust Affected	Cust Restored	Outage Start	ERT	Time To ERT	Outage Desc	Feeder Id
D13032700002	O-FDR	PENDING	N	14700	0	2013-03-27 07:45	2013-03-27 10:00	-1:51:2		FTLFDR2
D13032700003	O-FDR	PENDING	N	4275	0	2013-03-27 08:48	2013-03-27 11:00	-0:51:2		FTLFDR3
D13032700001	O-FDR	PENDING	N	17695	0	2013-03-27 07:32	2013-03-27 10:00	-1:51:2		FTLFDR1

Future Phase

- Operational Smart Meter Data in PI System by end of April 2013
- Geospatial display
    - Transformer loading
    - Segment loads
    - Abnormal voltage conditions



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