Regional Seminar Series
Southern California

PI Infrastructure for LADWP's entire Power system & Beyond

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Empowering Business in Real Time.

About
Los Angeles Department of Water and Power

LA Dept of Water and Power

- Largest Municipal owned utility in the country
- Supplies water and electricity to the City of Los Angeles
- 7200MW peak load, 200 Substations
- 465 square mile service area
- 1.4 million customers
- 8800 employees
- Facilities in California, Arizona, Utah, Oregon and Nevada
- Power & Water operate almost as independent companies

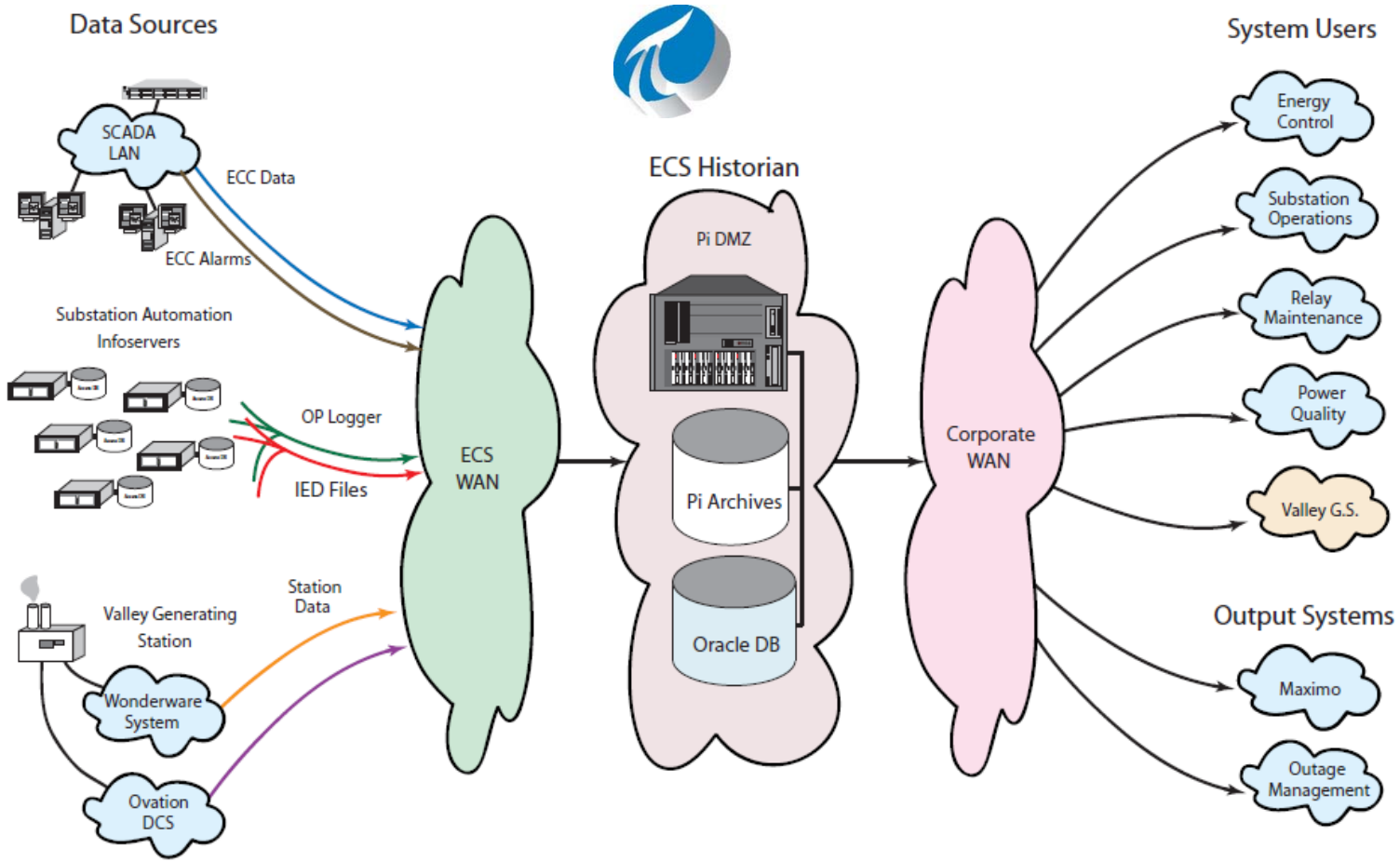
Business Challenge/Problem Addressed

Challenge / Problem

- Replace SCADA System / Implementation of Historian
  - 2001 – Implementation of OSII Monarch System
  - 2004 – Still no Historian
  - 2005 – RFP Process to select Historian Software
  - Selection of OSIsoft PI to Pilot an Power System Historian Infrastructure
    - Scope limited to 3 data sources
    - 1 Year Project
    - Instantiation of 3 applications, one being web based
  - Implementation handled in conjunction with outside consultant services
  - Problems:
    - maintaining many silos & application across Power System
    - data under utilized and hard to get to

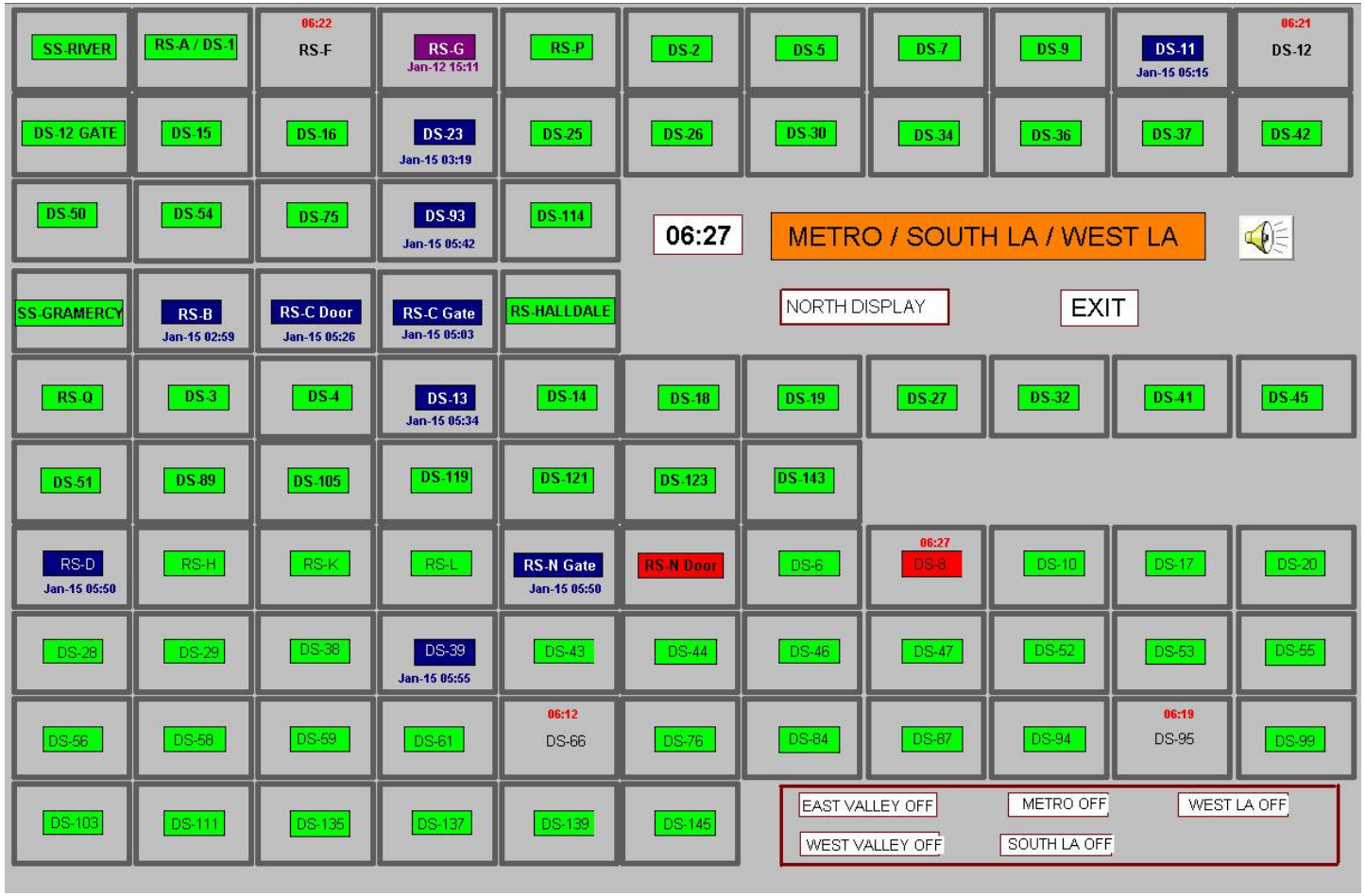
Initial architecture….

- Initial Implementation / Pilot Project



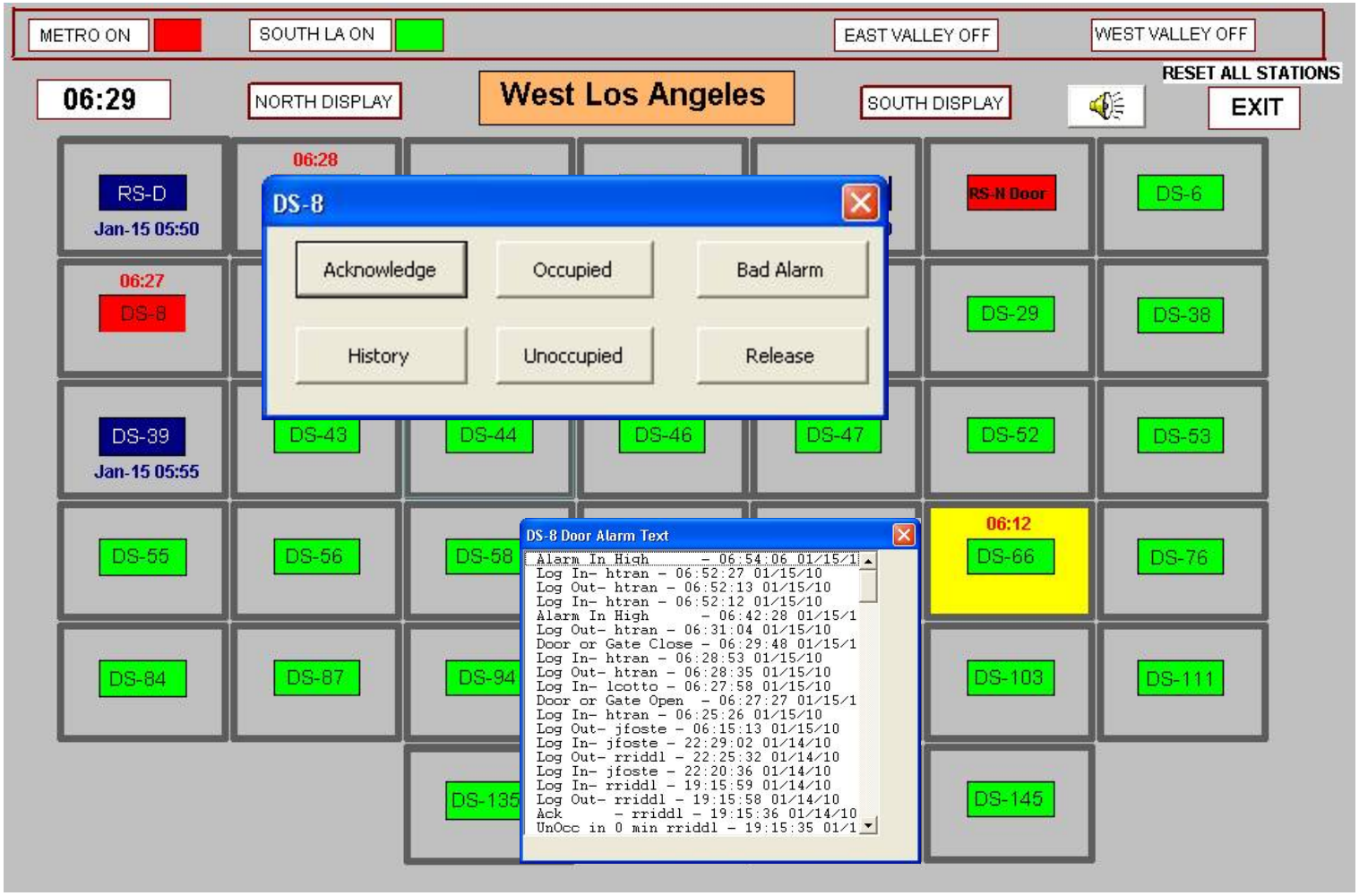
First Solution

- Door and Gate Alarms



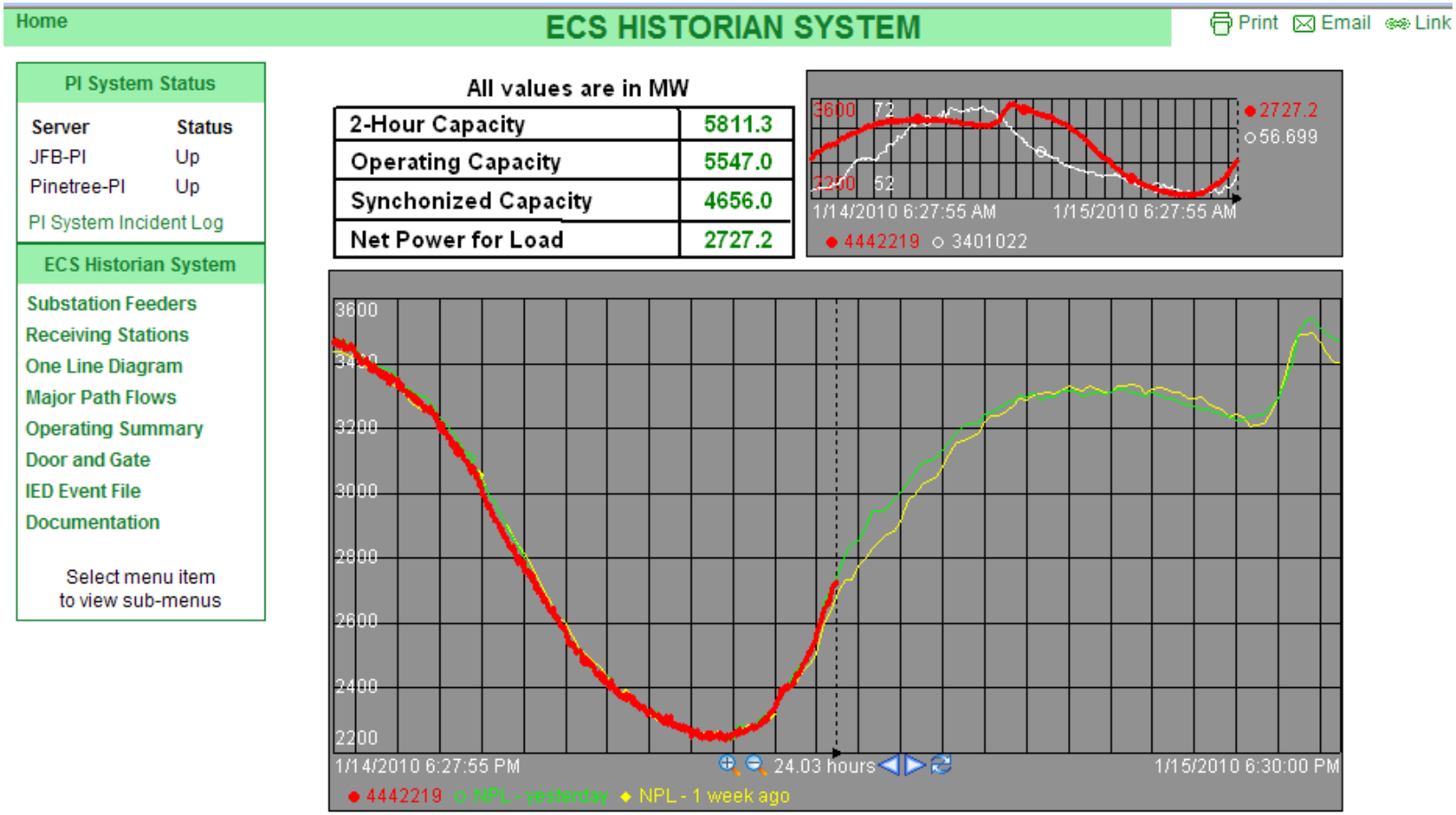
Solution

- Door and Gate Alarms / Detail



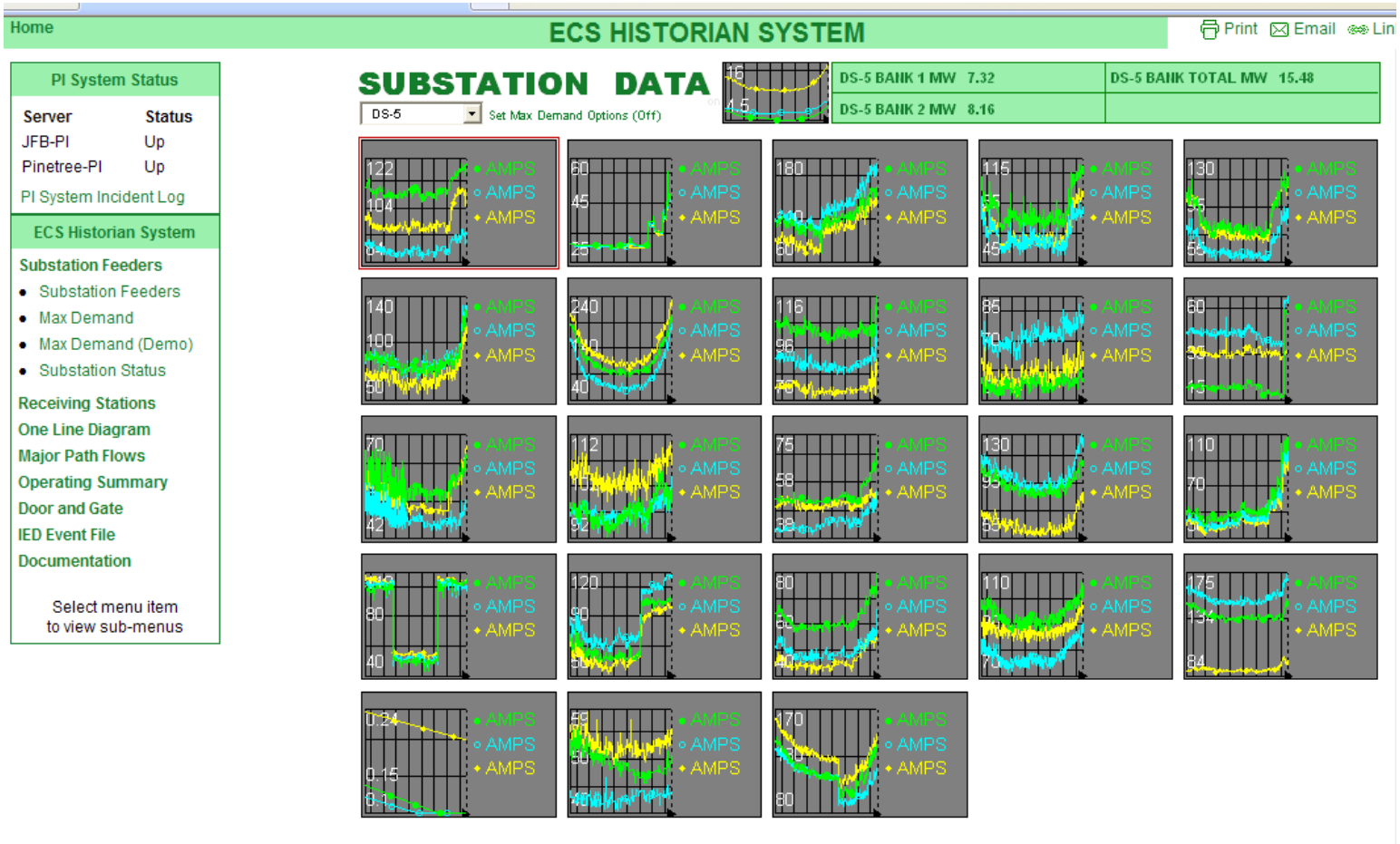
Evolved Solution

- Web Site
  - Implemented with Custom Code / Embedded ActiveView



Solution keep growing…

- Web Site / Substation Feeders



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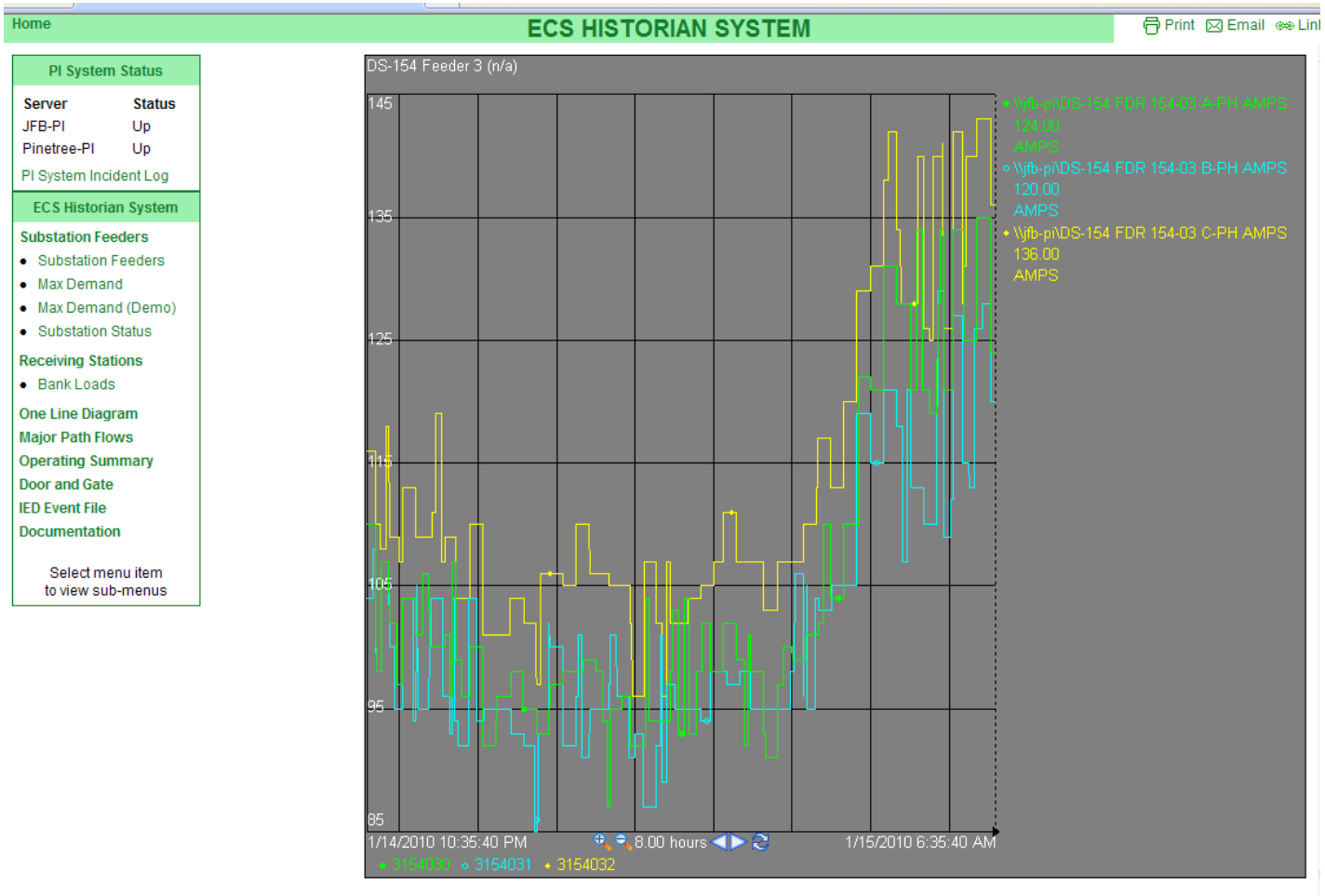
Solution

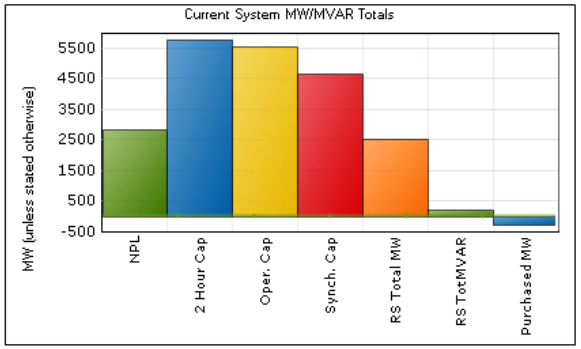
- Web Site / Substation Feeder Detail



Executive Dashboard

ECS Historian provides a central repository for all of LADWP's real-time process data and gives access to users throughout the utility. It improves the control, monitoring, and reliability of the power system. The Historian project utilizes OSISoft's PI System. 'PI' stands for Plant Information. The PI System gathers, archives, and processes operational data from automation and control systems. The PI System provides all of the tools needed to manipulate and distribute the data, turning it into meaningful information that can be processed and viewed in enterprise applications, web portals, and standard browsers.

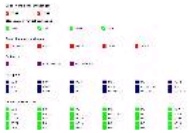
Current System MW/MVAR Totals



Click here for a 24 hour trend of the above data points.
Data updated as of Tuesday, January 19, 2010 11:45:13 PM

Door and Gate Alarm Status

Grouped by Status



Alphabetical order

In/Out of Service Status

Out Of Service

In Service

MW and MVAR data

Generating

Receiving

Distributing

Major Customers

OSI Software Agreement

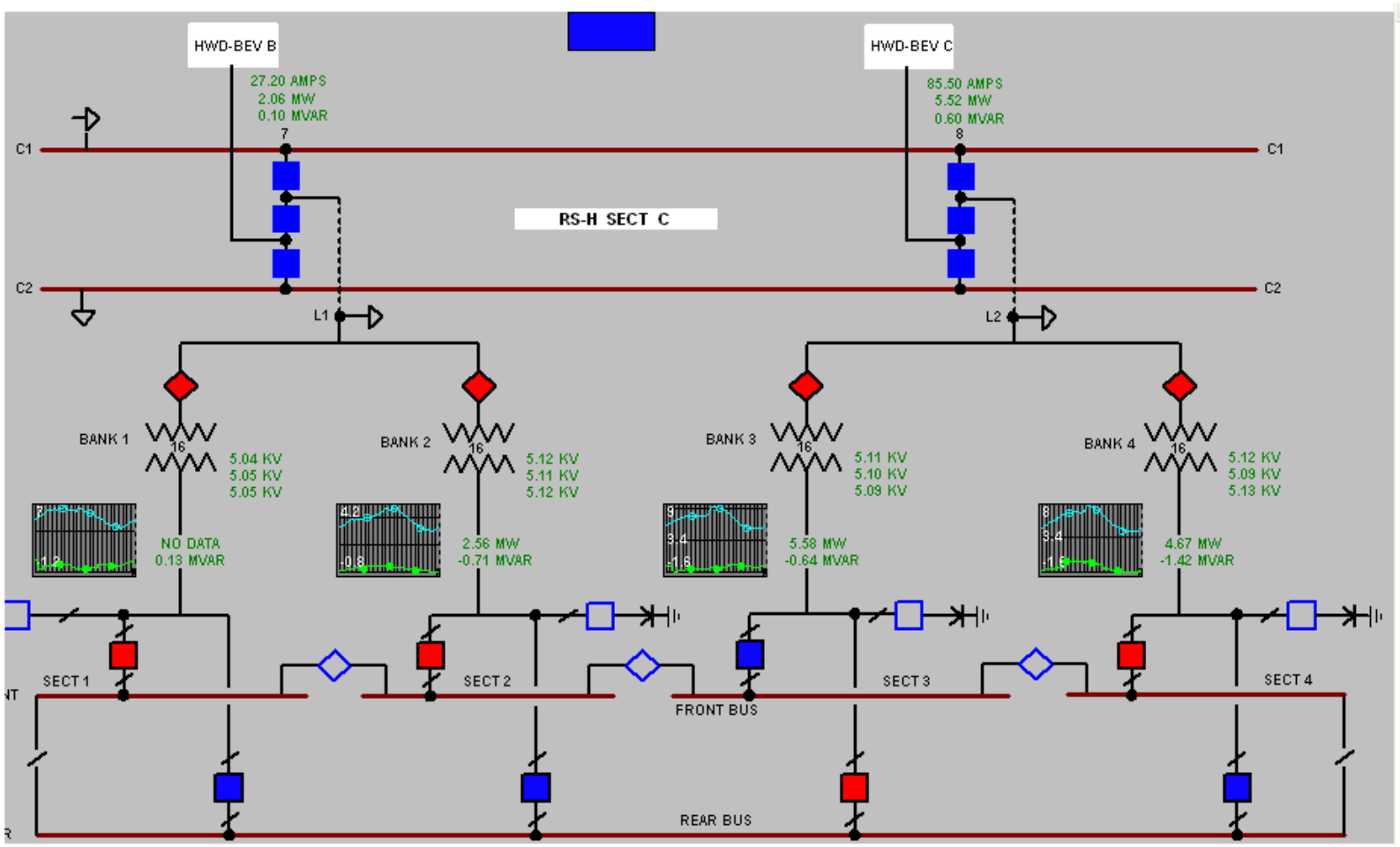
- Selection of OSIsoft Pi as Power System Enterprise Historian
- 5 year contract for LADWP's entire Power System
  - Generation / Substation / Transmission /Distribution
  - Continued Growth in Scope
- Contract Includes:
  - Server and point purchases, including High Availability and complete OSI Software Suite
  - Client software purchases
  - Software maintenance
  - Training Services
  - OSI Support and Integration Services
  - Computer Based Training

OSIsoft Software licensed

- Five (5) PI Professional Servers with **HA**
  - ECC: 50K Points
  - Valley Generating Station: 10K Points
  - Scattergood: 10K Points
  - PineTree (Wind): 70K Points
  - Centralized Server JFB: 100K Points – with **PI Notification**
  - IT Monitor for 100 Devices ITM Advanced Server
- Clients
  - PI Combo: 54 Concurrent
  - RtWebparts: 66 Concurrent
  - ActiveView
- RLink Maximo & 12 Standard Interfaces
- Up to 6 Training/coaching weeks a year

Solution

- Substation Diagrams



Wind Infrastructure Overview

CABLE A

WTG	Power (KW)	Wind (M/S)	Generation (KWH)
A1	-3	0.40	2,170,973
A2	-2	0.40	2,193,031
A3	-5	0.40	2,480,488
A4	-4	0.40	1,167,705
A5	-4	0.41	2,991,507
A6	-2	0.41	1,922,539
A7	-3	0.41	3,048,233
A8	-3	0.40	2,641,556
A9	-6	0.41	3,742,767
A10	-5	0.40	3,696,079
A11	-5	0.41	2,048,517
A12	-5	0.41	2,514,116
A13	-3	0.41	2,219,731
A14	-4	0.41	1,722,466
A15	Bad	Bad	Bad
A16	Bad	Bad	Bad
Cable A Total KW			-53.983

CABLE B

WTG	Power (KW)	Wind (M/S)	Generation (KWH)
B1	-6	0.40	2,444,597
B2	-4	0.41	1,758,267
B3	-7	0.41	3,470,411
B4	-4	0.40	2,887,119
B5	-4	0.40	2,766,959
B6	-4	0.40	2,784,259
B7	-3	0.41	2,399,394
B8	-4	0.41	2,394,098
B9	-7	0.40	1,787,340
B10	-7	0.40	999,547
B11	-3	0.40	1,792,096
B12	-6	0.40	2,304,309
B13	0	0.41	1,529,208
B14	-4	0.41	1,818,350
B15	-3	0.41	2,282,586
B16	-6	0.40	2,816,503
Cable B Total KW			-74.032

CABLE C

WTG	Power (KW)	Wind (M/S)	Generation (KWH)
C1	-6	0.41	3,165,527
C2	-2	0.41	2,906,511
C3	-7	0.40	2,795,556
C4	-3	0.40	2,441,641
C5	-6	0.40	2,490,914
C6	-5	0.41	2,394,924
C7	-6	0.41	2,196,044
C8	-2	0.40	2,599,878
C9	Bad	Bad	Bad
C10	Bad	Bad	Bad
C11	Bad	Bad	Bad
C12	Bad	Bad	Bad
Cable C Total KW			-37

CABLE D

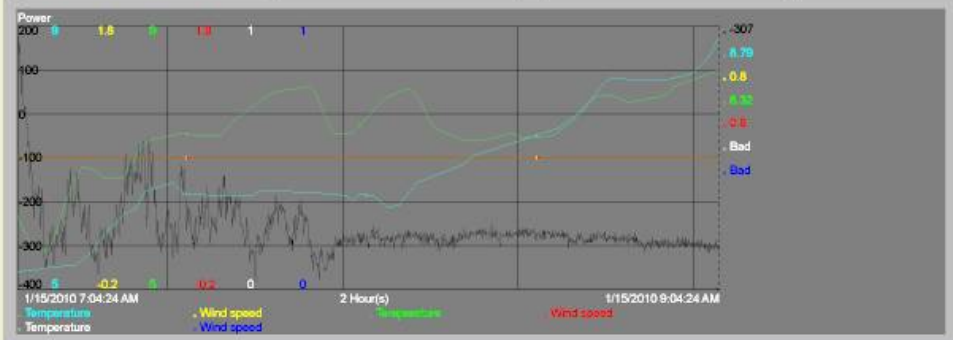
WTG	Power (KW)	Wind (M/S)	Generation (KWH)
D1	-4	0.40	2,734,952
D2	-4	0.40	3,236,859
D3	-3	0.41	1,535,727
D4	-7	0.40	1,334,328
D5	-7	0.41	2,706,719
D6	-3	0.41	2,618,305
D7	-1	0.40	2,433,451
D8	-4	0.41	2,318,107
D9	-2	0.41	1,504,391
D10	0	0.41	2,125,086
D11	-7	0.40	2,118,070
D12	-2	0.40	1,176,532
D13	-7	0.41	2,249,038
Cable D Total KW			-54.708

CABLE E

WTG	Power (KW)	Wind (M/S)	Generation (KWH)
E1	-9	0.40	2,195,618
E2	-3	0.40	2,076,365
E3	-7	0.40	2,525,537
E4	-3	0.41	1,620,705
E5	-1	0.40	1,110,209
E6	-11	0.40	2,937,589
E7	-7	0.41	1,932,671
E8	-3	0.92	2,051,353
E9	-3	0.41	2,902,562
Cable E Total KW			-47

CABLE F

WTG	Power (KW)	Wind (M/S)	Generation (KWH)
F1	-5	0.40	2,419,957
F2	-6	0.41	1,597,343
F3	-4	0.40	2,361,662
F4	-3	0.41	1,572,106
F5	-3	0.41	1,460,409
F6	-3	0.41	768,577
F7	-3	0.40	2,419,865
F8	-2	0.40	1,362,093
F9	-1	0.40	1,519,635
F10	-3	0.41	1,460,501
F11	-2	0.41	1,591,216
F12	-3	0.40	1,071,834
F13	-4	0.41	2,476,394
F14	-4	0.40	1,948,820
Cable F Total KW			-46.796



Metmast 70

Air pressure	845.29 mbar
Temperature	8.3199 °C
Wind speed	0.8000 m/s
Wind direction	263.5 °

Metmast 72

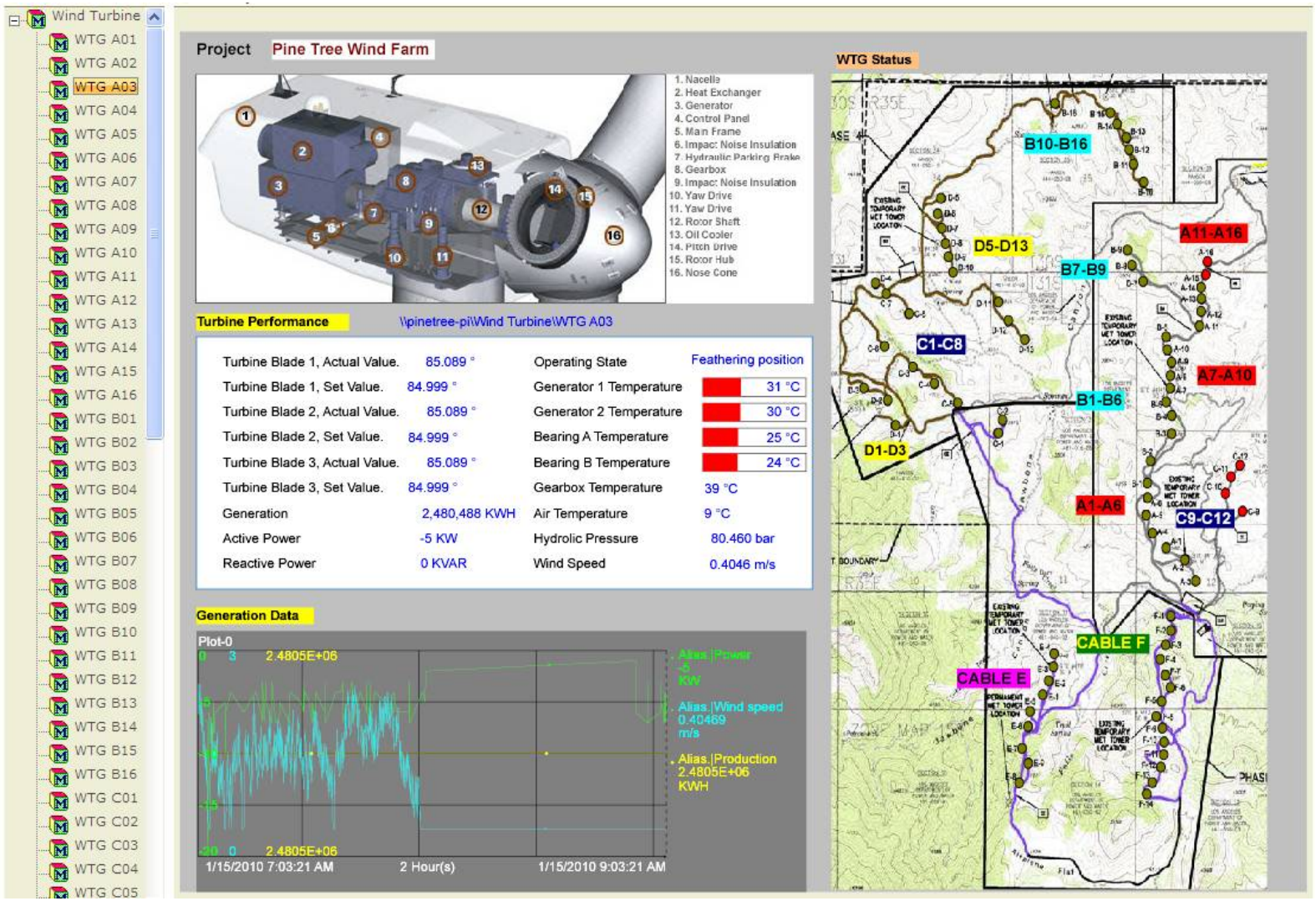
Air pressure	Bad
Temperature	Bad
Wind speed	Bad
Wind direction	Bad

Metmast 71

Air pressure	838.47 mbar
Temperature	8.7899 °C
Wind speed	0.8000 m/s
Wind direction	47 °

Total Power -307 KW

Wind Generation overview



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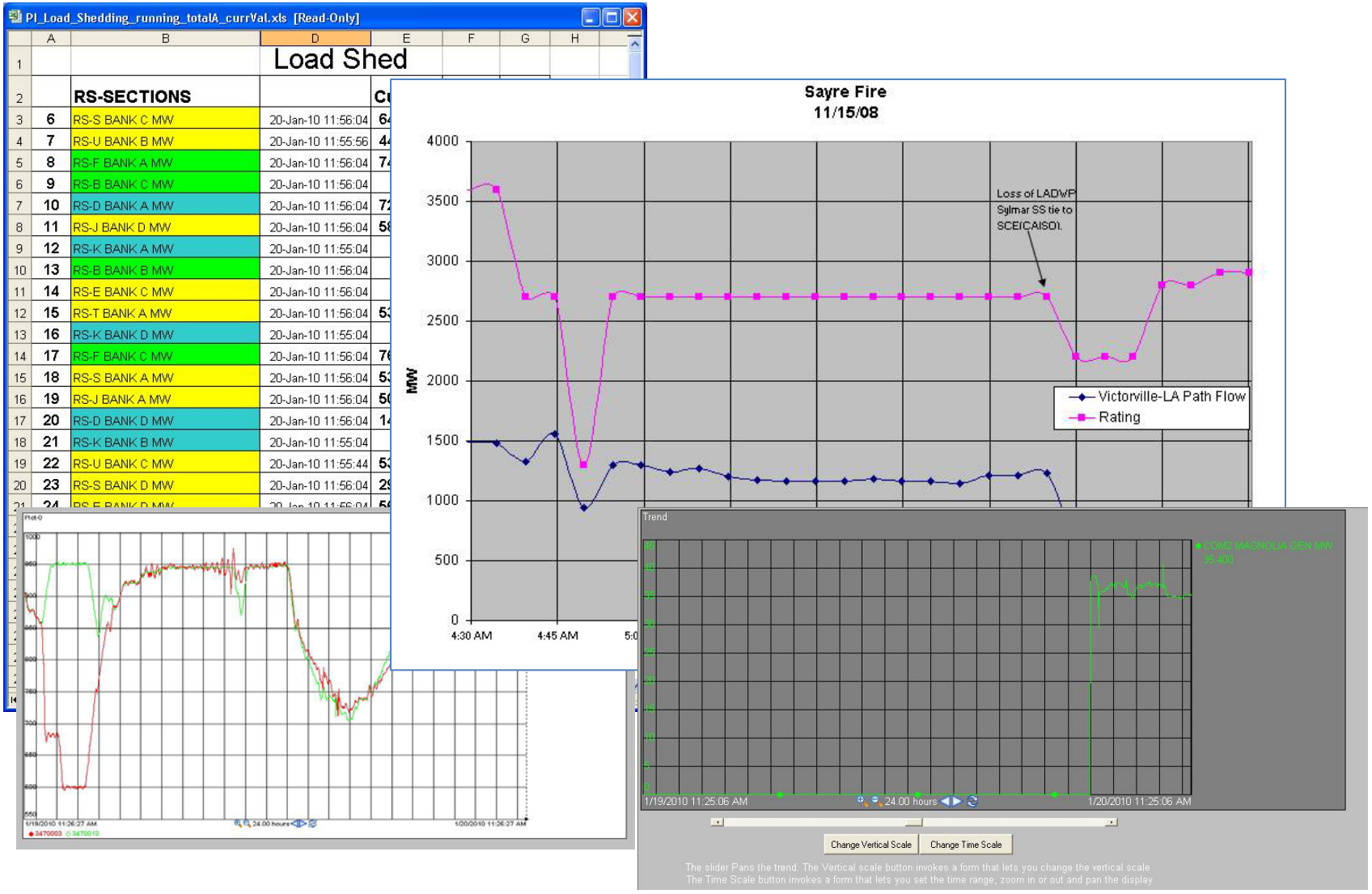
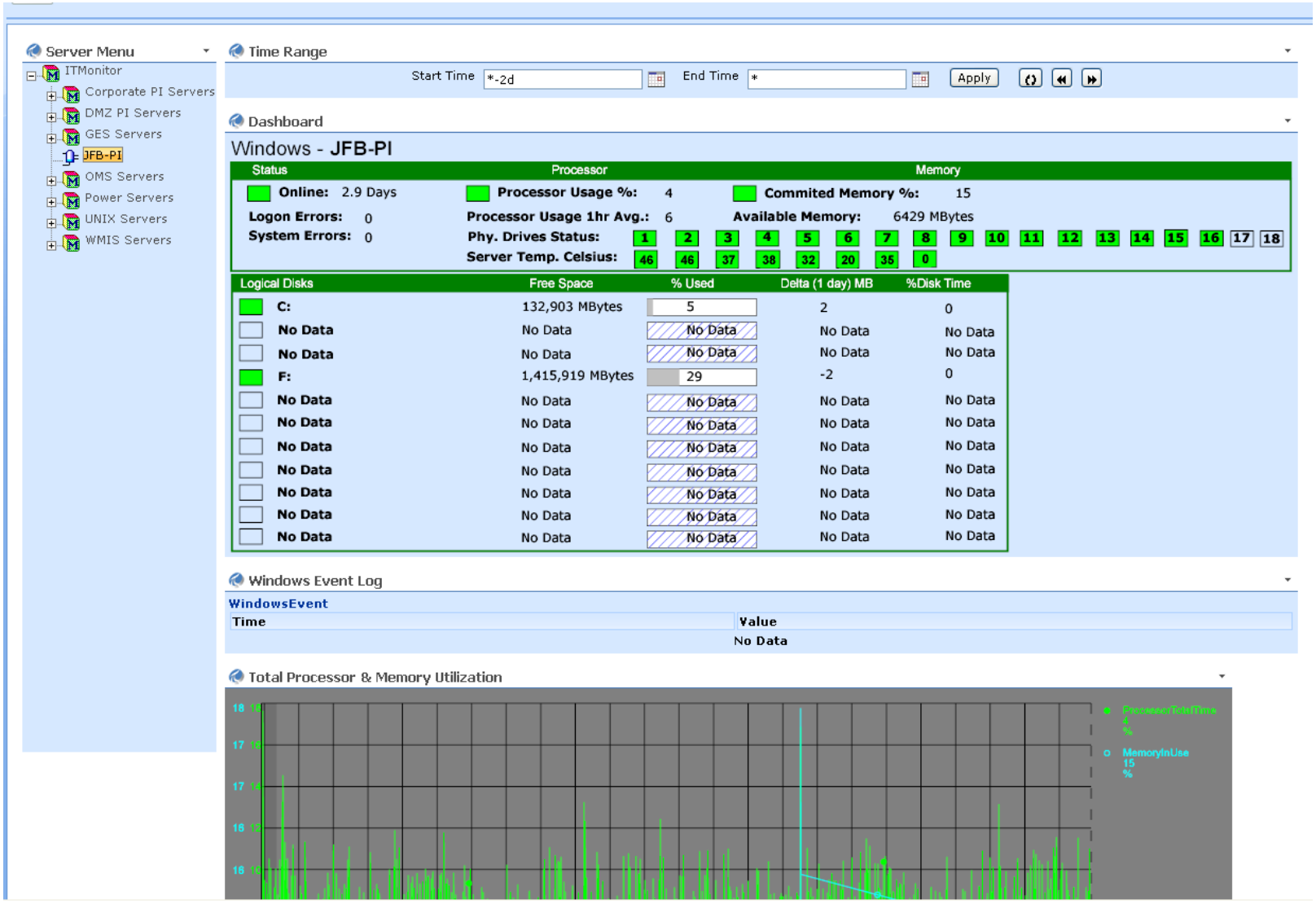
Emergency Reports



Also Using PI to monitor Servers / Windows



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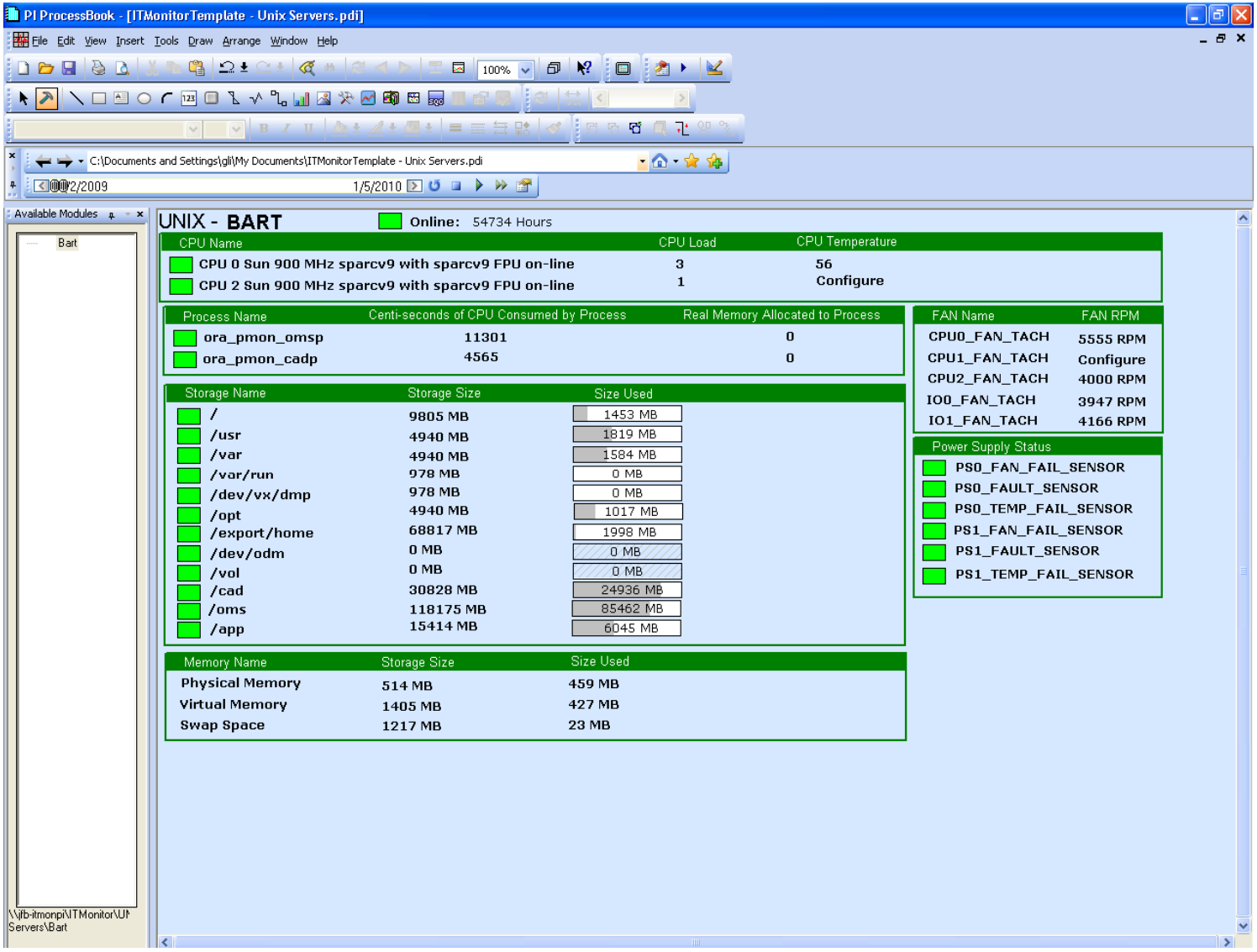
Also Using PI to monitor Servers / UNIX



Challenges

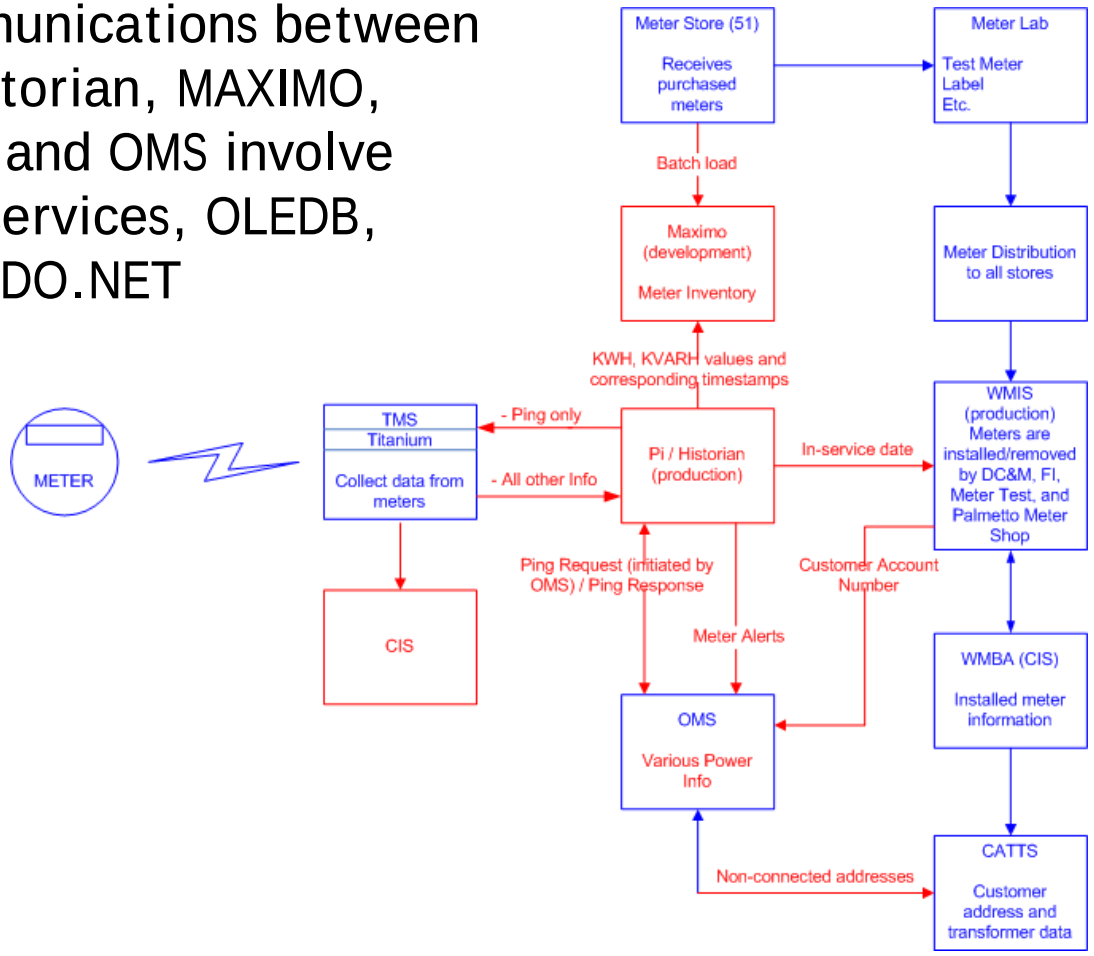
- Data Validation
  - Meter Improvement Project
- Security Issues
  - NERC / FERC
  - Data Access
- Penetration within the Organization
- End User Ownership
- Standardized Naming Convention
- Network Infrastructure
- Distributed System

Current Interfaces

- AMI Interface – TMS to OMS
- Feeder Lockout – SCADA to OMS
- Forecasting for renewable portfolio
- JCAPS to Pi
- Feeder Amps
- Pi to WMIS
- Pi to Maximo
- IED to Pi
- Others….

Solution – Smart Grid/AMI Integration

- Smart Grid Integration Process Pilot and Present Integration
  - Communications between PI Historian, MAXIMO, WMIS and OMS involve web services, OLEDB, and ADO.NET



Results / Benefits

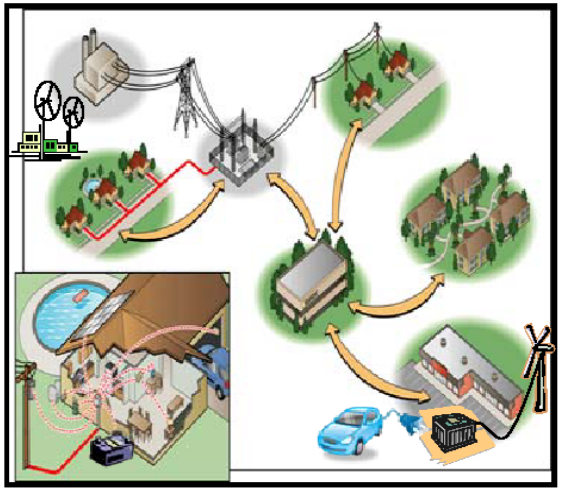
- Tangible and Intangible benefits
  - Centrally supported by Power System (2 Full-timers)
  - Excellent Technical Support
  - Enable Power users of each group to take ownership of application. Lower cost of curiosity and agile platform
  - Quick technology adoption by users – very flexible
  - Scalable and secured system to address all existing and future information needs
  - Although it's a "historian", users use it for near real-time, mission-critical decisions on a daily basis
  - Everything will go through PI – simplified architecture and minimum customization. Lower total cost of ownership.

Future Projects

- Implementation in Renewable Energy Projects
  - Solar
  - Bio Mass
  - Wind
- Installation in Non-DWP owned Wind Farms on Washington / Oregon border and in Utah
  As facilities turned over to DWP for operations, the appropriate data is available to make decisions on day one of DWP Control.
- Installation along our Aqueduct Power Plants across the Owens Valley.
- Starting 2011, Installation of Pi for all Substation Automation Projects.
- Installation for all SmartGrid Initiatives - PI is part of the Stimulus Grant submittal
- Maximo CBT

Smart Grid Initiatives

- Smart Grid Initiatives
  - Renewable Integration (Distributed Generation)
  - Transmission Automation Initiative
  - Substation Automation Systems Initiative
  - Distribution Automation Initiative
  - Advanced Metering Infrastructure (AMI) Initiative
  - Demand Side Management / Demand Response Initiative
  - Communications Initiative
  - System and Data Integration Initiative



Future

- PI is our critical standard infrastructure – grow with LADWP's business needs
- Continued Integration to OMS (CGI), CMMS (Maximo), OCS and CIS (SAP or Oracle)
- Potential Enterprise Agreement
  - Time-series data/information demand continues to grow
  - User base expands
  - Need Architectural guidance as we grow
  - OSIsoft is a trusted partner

Thank you

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