

REAL-TIME PERFORMANCE MANAGEMENT FOR THE ENTERPRISE

RtPM



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RtPM



Ann Moore

With PI: Sky's The Limit

Agenda

- SDGE – Who we are and What we do
- SDGE PI two-year History
- Beyond Control Room/Operators
- Beyond Historian
- Beyond T&D
- Beyond Power System
- Sky's The Limit



Sempra Energy

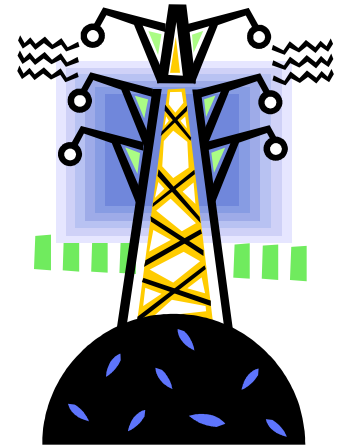
Sempra Energy is a Fortune 500 energy-services company, based in San Diego, Calif. with more than 13,000 employees worldwide

- **Sempra Energy Utilities**
 - ✓ **San Diego Gas & Electric (SDG&E)**
 - ✓ Southern California Gas Company (SoCalGas)
- **Sempra Energy Global Enterprises**
 - ✓ Sempra Commodities
 - ✓ Sempra Energy Trading
 - ✓ Sempra Metals Group Ltd.
 - ✓ Sempra Energy Solutions
 - ✓ Sempra Financial
 - ✓ Sempra Generation
 - ✓ Sempra LNG
 - ✓ Sempra Pipelines & Storage



SDGE & Power System

- 3.3 million consumers
- 1.3 million electric meters
- over 3,000 employees
- San Diego and southern Orange Counties
- 4,100 square miles
- 4,065 MW system peak load (9/10/04)



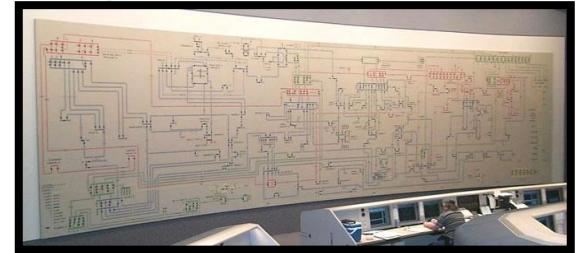
Electric T&D Operations

- Grid Operations

130 Transmission RTUs

(69kV, 138kV, 230kV, and 500kV)

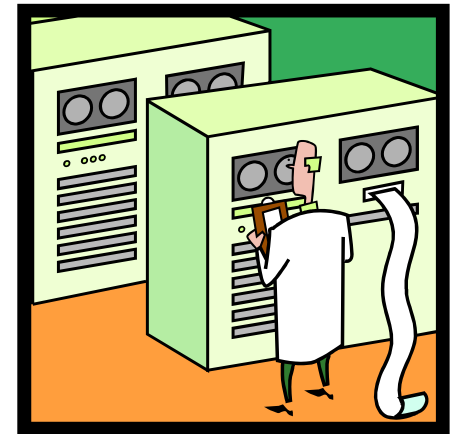
- GE XA21 EMS (Energy Management System)



- Distribution Operations

700 Distribution RTUs (12kV)

- Advanced Control Systems DMS
(Distribution Management System)



Data, Lots of data

SDGE PI two-year History

SCADA-Supervisory Control & Data Acquisition

- not intended for long-term data warehouse
- not intended for everyone to access



Joined forces with Distribution as project began providing useful data and synergies in data management from one place

- Electric Transmission (30%)
- Electric Distribution (70%)

Implementation started in **May 2003**



“Geek” Details



- Collecting 10K+ points from **EMS** (data backfilled since 1995)
- Collecting 45K+ points from **DMS** (data backfilled since 2000)
- Upgraded to **150K-tag** server in Dec. 2003
- **Full Redundancy** at Backup Control Center
- **IT Monitor** in 2004
- **RtPortal** Early Adopter in 2004
- 50 GB data archive grows about 500 MB/week



Going Enterprise

From T&D Operations...to...

- T&D Engineering
- T&D Planning
- System Protection
- Construction & Maintenance
- Metering
- Executives to Districts
- Customer Services, Marketing, Regulatory Strategy, Load Research, Corp. Communication, Emergency Operations Center, Environmental, ...etc.



Company-Wide Rollout Demo

2005

2004

Electric Power System Data at your Desktop: Learn more at a product demo coming up soon...

You forwarded this message on 2/25/2004 2:12 PM. Click here to find all related messages.

From: Take Note
To:
Cc:
Subject: Electric Power System Data at your Desktop: Learn more at a product demo coming up soon...

SDGE **SoCalGas** **take note**
Semptra Energy*utilities
Information of interest for the employees of SDG&E and SoCalGas.

Sent to all SDG&E employees with e-mail access

If your work at the company involves monitoring or studying Electric Transmission, now an easy way to view, capture, store, and manipulate that data right at your desk. Like to invite you to attend one of our four upcoming presentations at the Plant Information (PI) software product from OSI Soft.

The Energy Management System (EMS) group in Grid Operations is using over 50,000 points of real-time Transmission EMS and Distribution SCADA data. This is now available to anyone in the company who is interested (with some limitations). For example, this software can help if you'd like to know what electricity use (at 2:30 p.m. on Aug. 31, 1998) or need to see real-time data (good information to use when figuring out the timing of system improvements).

You are invited to attend one of the following Product Information demo sessions:

Wednesday, March 3 10:00am - 12:00pm
Wednesday, March 3 1:00pm - 3:00pm
Thursday, March 4 10:00am - 12:00pm
Thursday, March 4 1:00pm - 3:00pm

Lunch will be provided in the EOC from 12:00 - 1:00 p.m. for both groups.

Attend a demo of SDG&E's latest real-time power information system (PI) - Message (HTML)

File Edit View Insert Format Tools Actions Help

Session A Session B

Reply Reply to All Forward

Please respond using the buttons above.
You forwarded this message on 3/9/2005 12:57 PM. Click here to find all related messages.

From: Take Note
To:
Cc:
Subject: Attend a demo of SDG&E's latest real-time power information system (PI)

Sent: Thu 2/24/2005 3:51 PM

SDGE **SoCalGas** **take note**
Semptra Energy*utilities
Information of interest for the employees of SDG&E and SoCalGas.

Sent to SDG&E employees with email access

Have a slice of "PI!" On Mar. 11, attend a demonstration of the latest technology that can supply real-time information about SDG&E's transmission and distribution system to your desk top! Think you don't have any use for this kind of information? Consider this:

- **Grid Operations:** PI helps you monitor the transmission system for instant updates on load fluctuations.
- **Distribution Operations and the Operating Districts:** PI provides more than 40,000 SCADA points for outage tracking and investigation.
- **Distribution Planning:** with PI you can compare real-time and historical load data to help fine-tune your forecasts.
- **EOC responders:** PI can automatically calculate in seconds the circuits to drop if the ISO orders load curtailments this summer.

Other current users include Kearny maintenance, Customer Service account executives, Regulatory Affairs managers, engineers, planners and more.

With its great visual display representation and reporting capability, PI offers a powerful engineering, planning, operations and decision support tool right at your desk top. And with VPN remote access, you can stay in touch at home or whenever you're working away from the office.

Don't get left out! Find out how PI can give you the information edge.

Attend one of two sessions on Mar. 11, 2005 at the Emergency Operations Center (EOC) in CP Building 6.

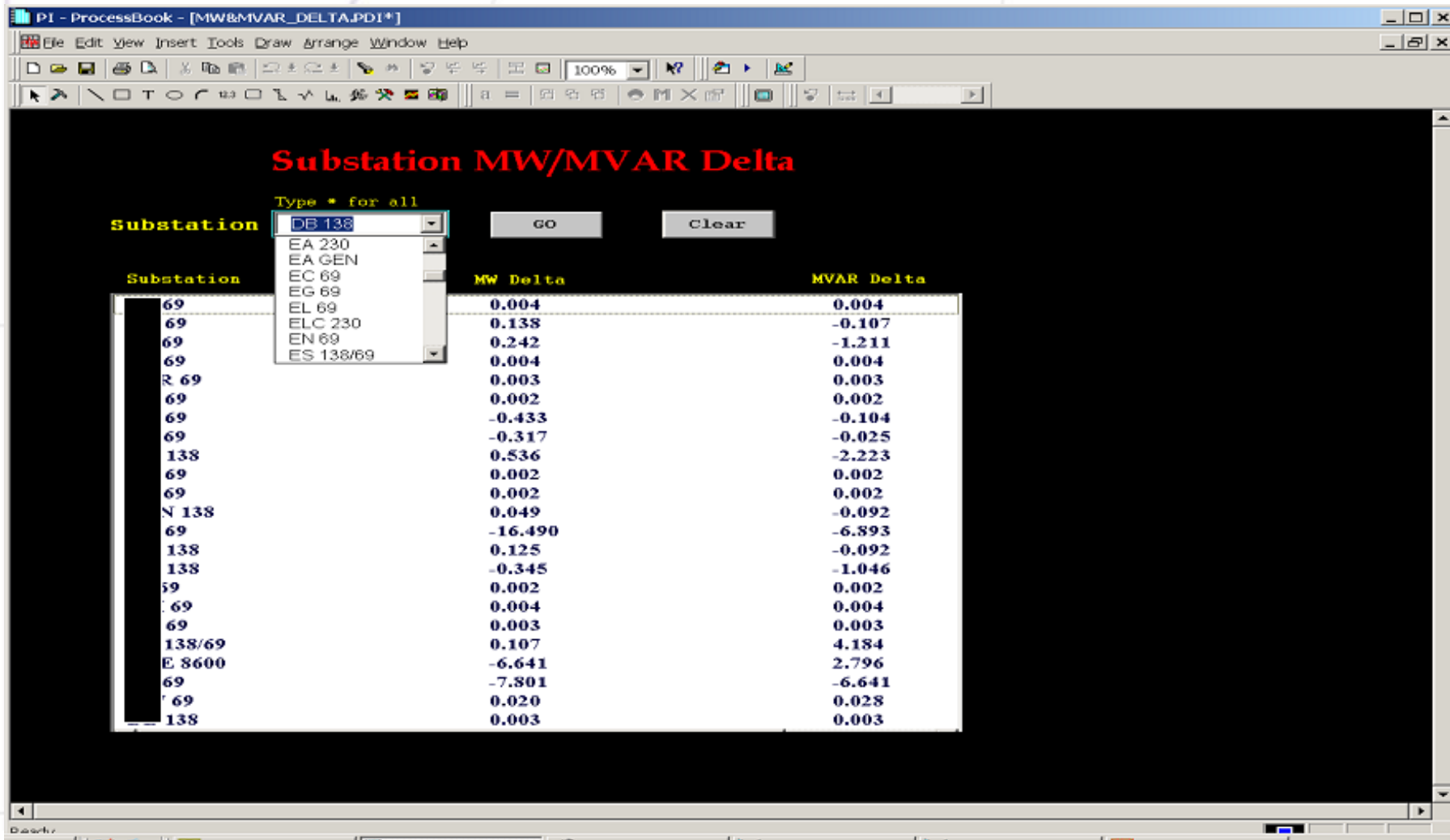
SDGE PI Users Group

- Two representatives from each T&D Department
- One representative from each Business Unit
- Quarterly meeting
- PI team status report
 - What's New and What's Next
- Users Show-and-Tell roundtable
- Testimony, Suggestion & Request



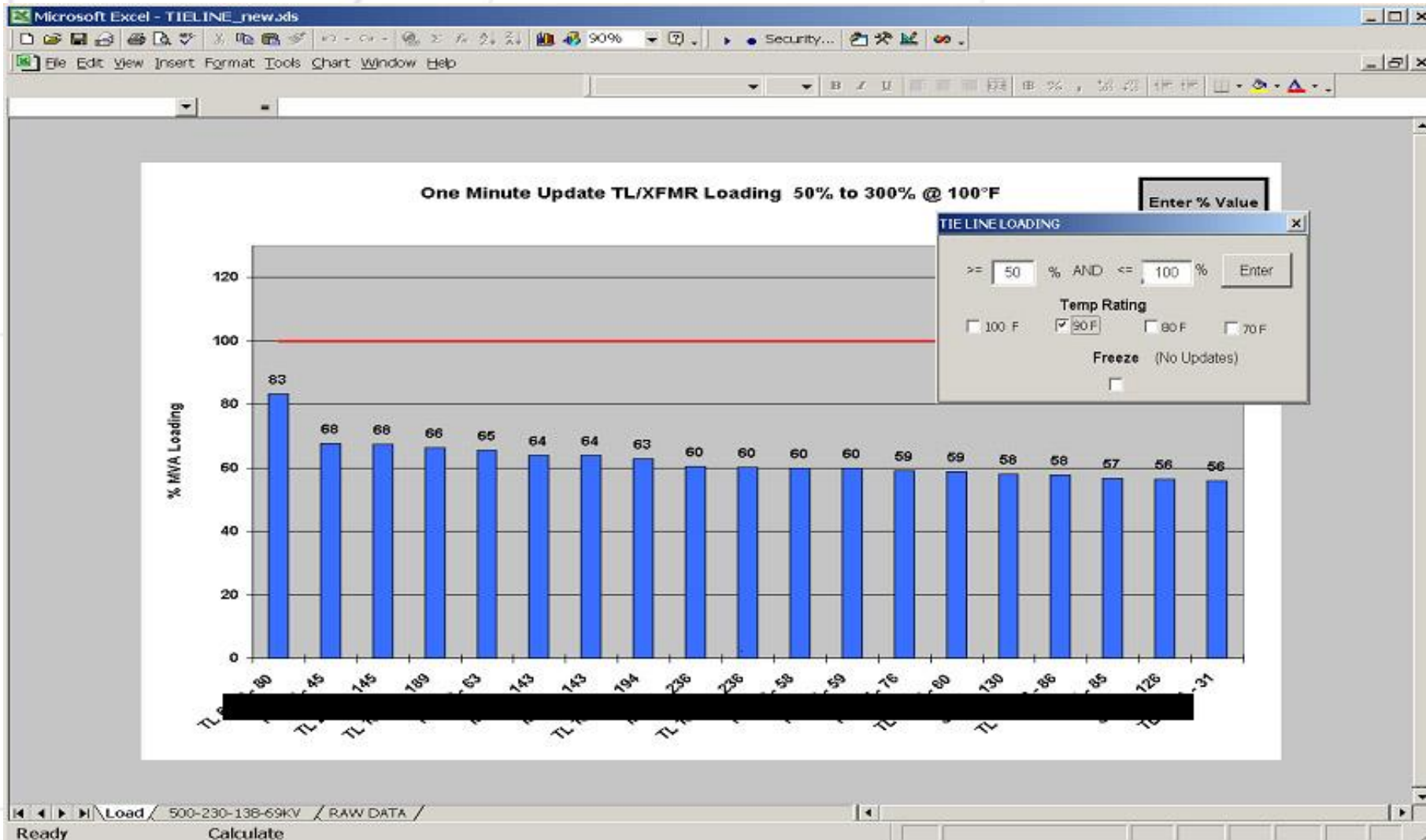
Operations Trouble-Shooting

Real-Time Substation Delta



Operations/Planning/Engineering

Real-Time Line/Transformer Loading



Distribution Planning

Watch List

PI - ProcessBook - [DISTWATCHLIST.PDI*]

File Edit View Insert Tools Draw Arrange Window Help

98%

Watch List 6/2/2005 12:13:16 PM

Select Substation

Circuit

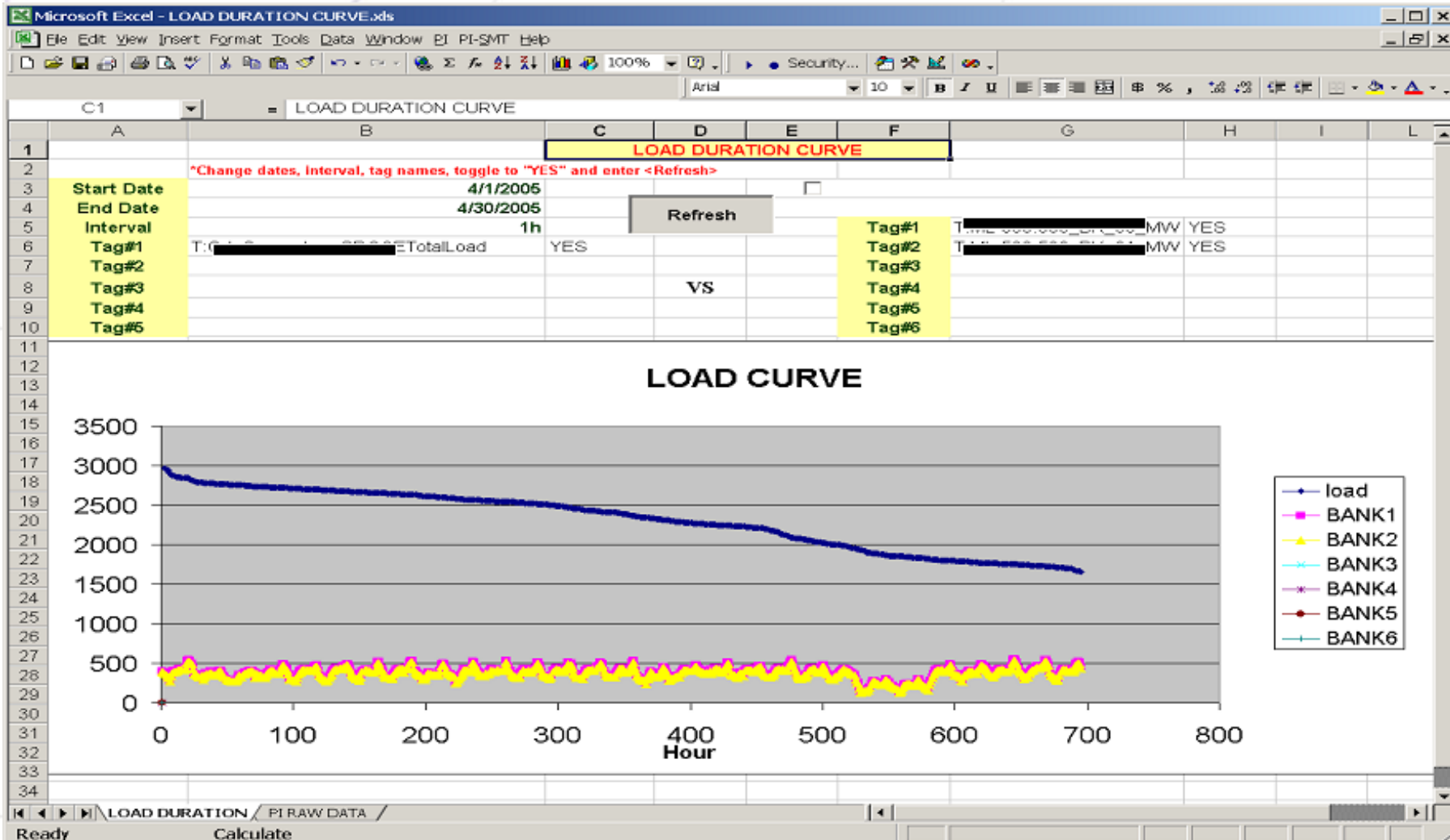
Bank

CIR/BK	MW	A Phase (Amps)	B Phase (Amps)	C Phase (Amps)	Rating (Amps/MW)	Forecast (Amps/MW)	% of Rating Max(A,B,C Or MW)
ADD []	5.84	285.00	289.20	287.40	660	413	44
CLR							
ADD []	6.06	235.20	245.40	240.00	614	391	40
CLR							
ADD []	10.06				29	22	35
CLR							
ADD []	3.16	162.00	160.80	157.80	600	352	27
CLR							
ADD []	6.40	315.00	322.80	295.20	770	491	42
CLR							
ADD []	2.84	136.80	169.20	151.20	600	266	28
CLR							
ADD []							
CLR							
ADD []							
CLR							
ADD []	6.08	284.10	289.80	293.70	520	448	55
CLR							

Ready

Planning/Engineering

Load Duration Curve



Operations/Planning Analysis

Bank Summary

Microsoft Excel - BANK_30_40_LOADS.xls

File Edit View Insert Format Tools Data Window E! P1-SMT Help

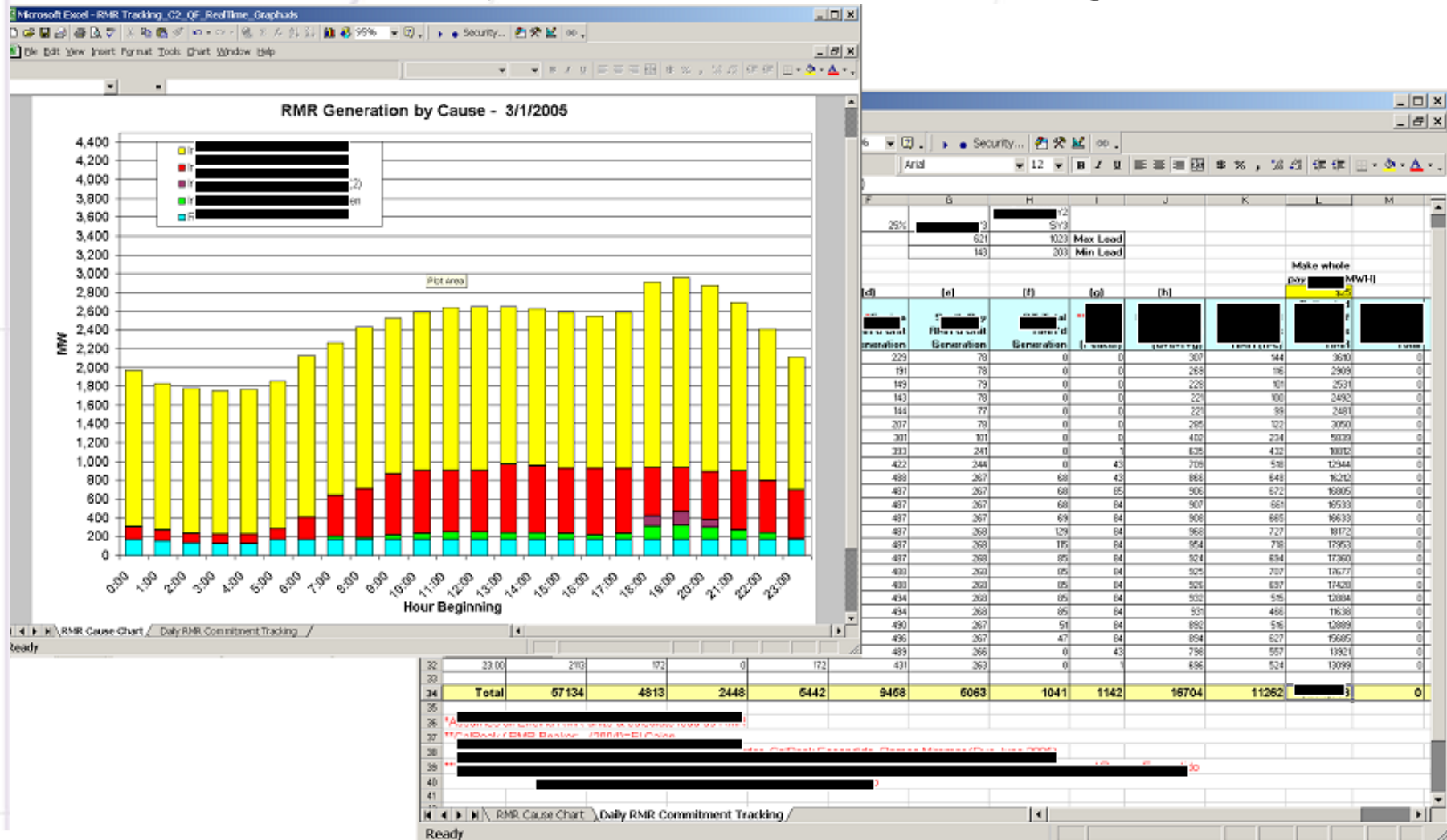
Bank 30's MW Summary

	C	D	E	F	G	H	I	J	K	L	M
1			Bank 30's MW Summary								
2											
3	5/1/2005	Start Date									
4	5/11/2005	End Date									
6	Substation	Date/time	Max MW	MVAR at Max MW	Date/time	Min MW	MVAR at Min MW	Avg MW	Current MW		
21	R 69	05/09/05 01:56:00	-12.33	1.23	05/03/05 20:41:00	-20.58	13.14	-16.79	-20.29		
22	8600	05/03/05 20:16:00	20.47	-1.78	05/01/05 02:20:00	11.98	-1.83	16.07	19.96		
23	69	05/02/05 20:03:00	32.16	-0.04	05/10/05 02:44:00	16.94	-2.26	23.40	29.20		
24	V 69	05/01/05 20:03:00	0.64	0.35	05/04/05 04:03:00	0.14	0.22	0.54	0.56		
25	E 69	05/09/05 20:23:00	3.13	0.03	05/01/05 04:23:00	1.66	-0.05	2.23	1.98		
26	I 69	05/11/05 00:00:00	-6.56	-3.65	05/03/05 16:15:00	-16.38	2.95	-12.04	-6.65		
27	8600	05/05/05 20:31:00	37.39	-6.15	05/09/05 04:22:00	17.71	-4.89	27.13	32.21		
28	C 69	05/04/05 13:48:00	56.15	2.70	05/08/05 03:15:00	24.83	-9.81	39.25	57.47		
29	69	05/03/05 15:08:00	20.96	-2.15	05/08/05 03:50:00	10.96	-5.23	14.33	20.79		
30	69	05/01/05 00:00:00	0.00	0.00	05/01/05 00:00:00	0.00	0.00	0.00	0.00		
31	4 69	05/01/05 00:00:00	0.00	0.00	05/01/05 00:00:00	0.00	0.00	0.00	0.00		
32	38/69	05/03/05 20:21:00	26.26	0.58	05/09/05 04:20:00	13.53	-3.11	20.27	26.94		
33	CO 69	05/01/05 00:00:00	0.00	0.00	05/01/05 00:00:00	0.00	0.00	0.00	0.00		
34	8600	05/03/05 20:06:00	42.89	-4.20	05/03/05 03:26:00	23.40	-1.12	31.71	36.15		
35	E 69	05/02/05 13:53:00	23.75	-9.76	05/07/05 03:59:00	8.74	-3.40	15.16	20.18		
36	T 69	05/01/05 00:00:00	0.00	0.00	05/01/05 00:00:00	0.00	0.00	0.00	0.00		
37	/ 69	05/01/05 00:00:00	0.00	0.00	05/01/05 00:00:00	0.00	0.00	0.00	0.00		
38	A 69	05/09/05 19:52:00	6.38	-3.06	05/03/05 03:33:00	3.00	-2.27	4.73	5.63		
39	C 69	05/01/05 00:00:00	0.00	0.00	05/01/05 00:00:00	0.00	0.00	0.00	0.00		
40	O 69	05/01/05 00:00:00	0.00	0.00	05/01/05 00:00:00	0.00	0.00	0.00	0.00		
41	E 69	05/02/05 11:01:00	66.22	-0.70	05/08/05 04:12:00	32.57	8.15	46.18	60.74		
42	R 69	05/01/05 00:00:00	0.00	0.00	05/01/05 00:00:00	0.00	0.00	0.00	0.00		
43	O 69	05/01/05 00:00:00	0.00	0.00	05/01/05 00:00:00	0.00	0.00	0.00	0.00		
44	69	05/01/05 00:00:00	0.00	0.00	05/01/05 00:00:00	0.00	0.00	0.00	0.00		
45	A 69	05/01/05 00:00:00	0.00	0.00	05/01/05 00:00:00	0.00	0.00	0.00	0.00		
46	M 69	05/10/05 20:27:00	33.77	-11.43	05/08/05 04:28:00	16.21	-9.51	24.84	30.55		
47	A 69	05/01/05 00:00:00	0.00	0.00	05/01/05 00:00:00	0.00	0.00	0.00	0.00		
48	E 69	05/04/05 12:23:00	30.66	-9.65	05/07/05 00:31:00	16.49	-5.54	23.49	29.48		
49	/ 69	05/03/05 12:18:00	42.35	1.74	05/01/05 03:07:00	18.24	5.86	27.02	44.26		
50	8550	05/03/05 20:16:00	25.98	-2.97	05/08/05 02:40:00	12.85	-5.63	19.11	23.02		
51	I 69	05/01/05 00:00:00	0.00	0.00	05/01/05 00:00:00	0.00	0.00	0.00	0.00		
52	O 69	05/04/05 12:40:00	19.60	-0.96	05/04/05 03:27:00	9.91	-0.43	15.17	20.19		
53	69	05/02/05 20:15:00	3.86	-0.89	05/08/05 04:15:00	2.69	-1.19	3.32	3.75		

Bank 30 / Bank 40 / Bank 50,60,70,80

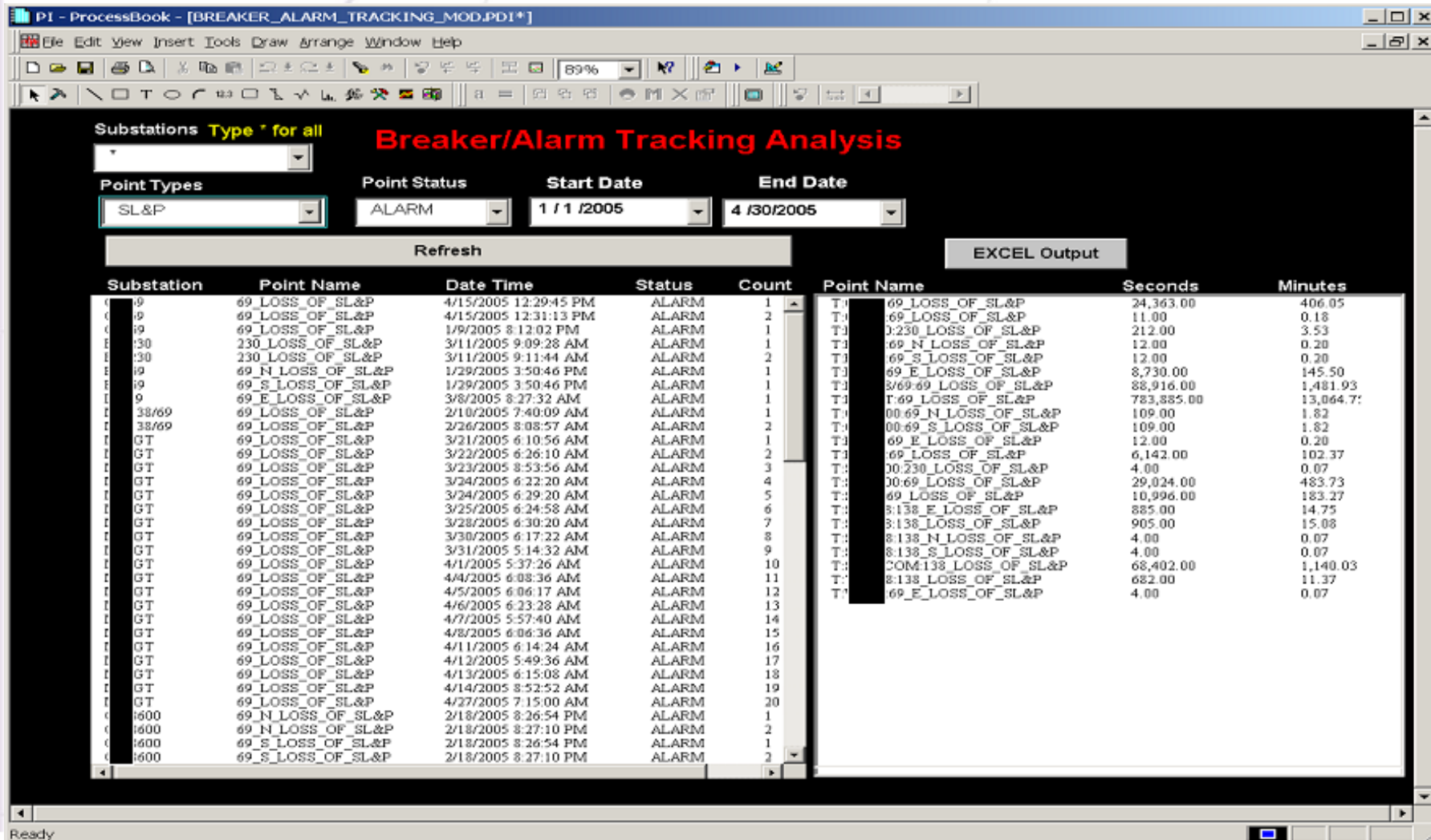
Energy Contract Management

Reliability-Must-Run Tracking



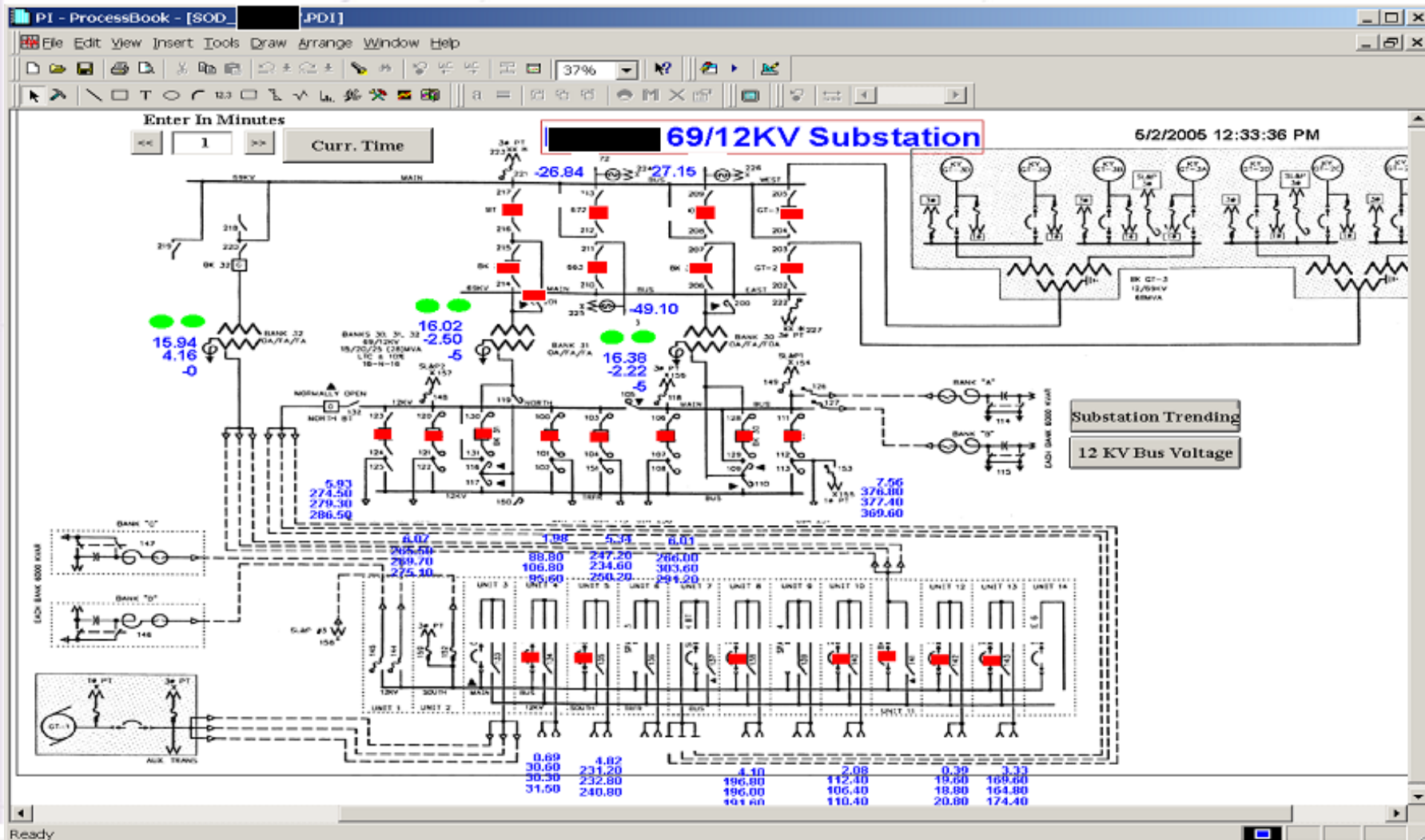
Construction & Maintenance

Digital Status Tracking Analysis



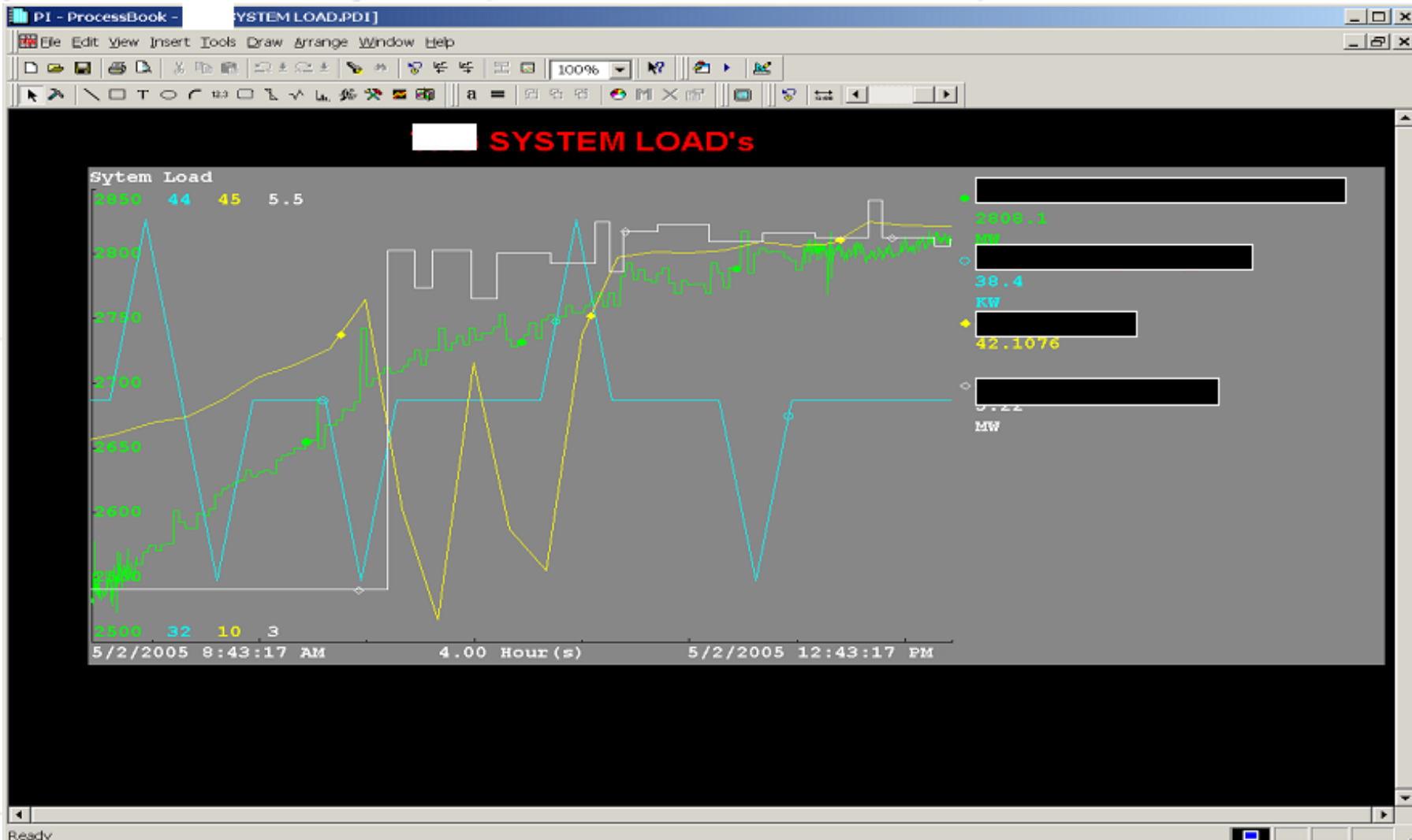
All T&D

System Operating Diagram-Substation Oneline



Metering

Distributed Generation



Environmental

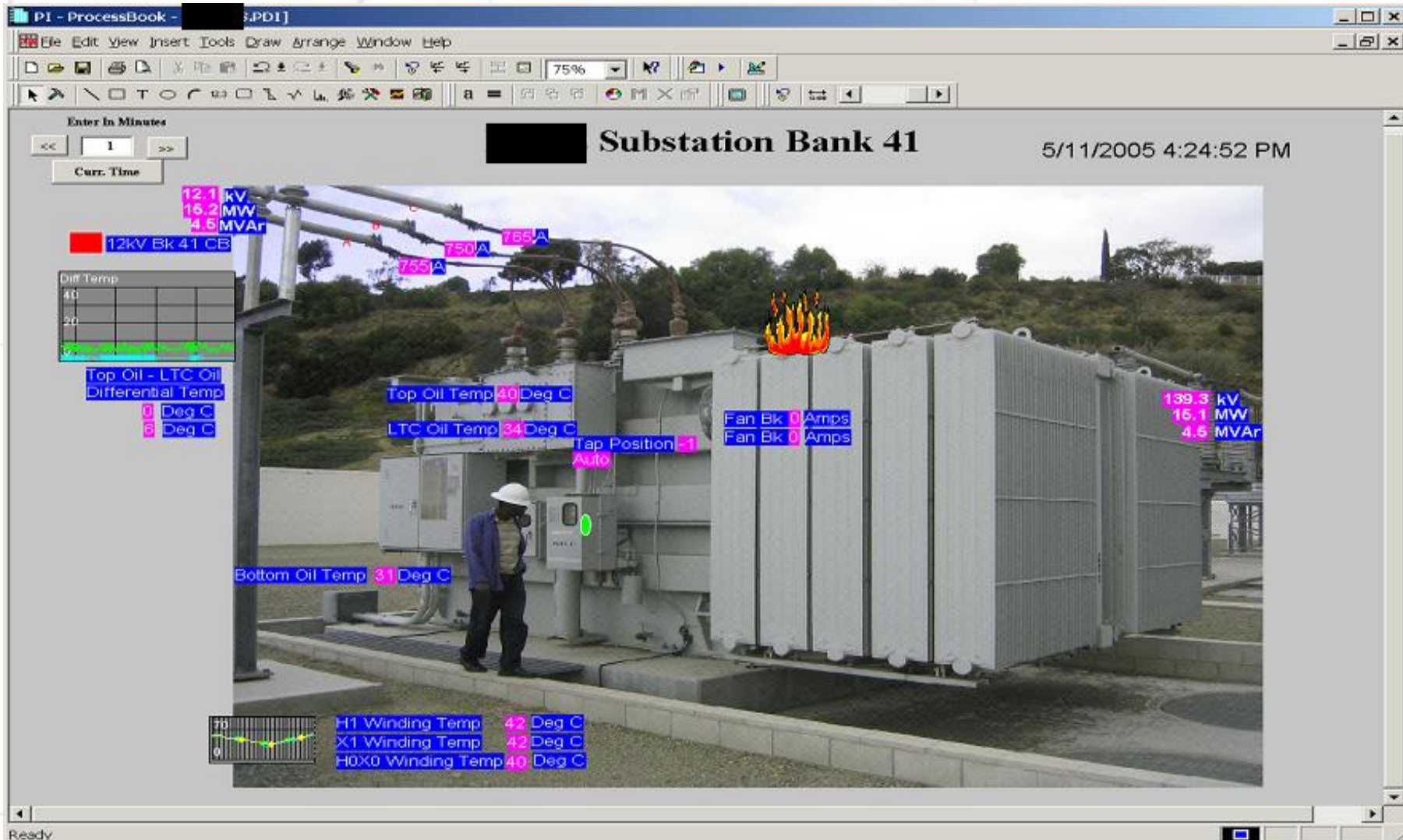
Emergency Generator/Fuel Run Tracking

Microsoft Excel - Gen_Run-Hour.xls								
File Edit View Insert Format Tools Data Window PI-SMT Help								
D15 = 534.2								
	A	B	C	D	E	F	G	H
3		SITE LOCATION: [REDACTED]		SUBSTATION: [REDACTED]				
4								
5								
6	EQUIPMENT: [REDACTED]							
7	ENGINE: Cummins Diesel 600							
8	MODEL: [REDACTED]							
9	Manufacturer's Rating: 450 kW @ 1000 RPM							
10	**NOTE** Input the Initial Start Meter Hours reading							
11								
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36								

Emergency Generator Run Hours							
Date	Description	Fuel Used/Day 6gph X 0.75hr	Meter Hours Start	Stop	Maintenance Run Time	Emergency Run Time	Completed By
1/6/2004	Normal Maintenance Reliability Testing	4.5	534.2	534.96	0.76	0	
1/13/2004	Normal Maintenance Reliability Testing	4.5	534.96	535.71	0.76	0	
1/20/2004	Normal Maintenance Reliability Testing	4.5	535.71	536.47	0.76	0	
1/27/2004	Normal Maintenance Reliability Testing	4.5	536.47	537.23	0.76	0	
2/3/2004	Normal Maintenance Reliability Testing	4.5	537.23	537.99	0.76	0	
2/10/2004	Normal Maintenance Reliability Testing	4.5	537.99	538.74	0.76	0	
2/17/2004	Normal Maintenance Reliability Testing	4.5	538.74	539.49	0.75	0	
2/24/2004	Normal Maintenance Reliability Testing	4.5	539.49	540.25	0.76	0	
3/2/2004	Normal Maintenance Reliability Testing	4.5	540.25	540.83	0.58	0	
3/9/2004	Normal Maintenance Reliability Testing	4.5	540.83	541.57	0.74	0	
3/16/2004	Normal Maintenance Reliability Testing	4.5	541.57	542.66	1.09	0	
3/23/2004	Normal Maintenance Reliability Testing	4.5	542.66	543.39	0.73	0	
3/30/2004	Normal Maintenance Reliability Testing	4.5	543.39	544.32	0.92	0	
4/6/2004	Normal Maintenance Reliability Testing	4.5	544.32	545.06	0.74	0	
4/13/2004	Normal Maintenance Reliability Testing	4.5	545.06	545.79	0.73	0	
4/20/2004	Normal Maintenance Reliability Testing	4.5	545.79	546.52	0.73	0	
4/27/2004	Normal Maintenance Reliability Testing	4.5	546.52	547.26	0.73	0	
5/4/2004	Normal Maintenance Reliability Testing	4.5	547.26	547.99	0.73	0	
5/11/2004	Normal Maintenance Reliability Testing	4.5	545.06	545.88	0.82	0	

Substation Automation

Non-Scada Data



Emergency Operations Center

Rolling Blackout/Load Curtailment

Microsoft Excel - DISTLOADCURTAILMENT_RT_slave.xls

File Edit View Insert Format Tools Data Window PI PI-SMT Help

45%

Security...

Arial

12

0

Last Update: 3/12/2005 2:51:54 PM

Electric Distribution Operations

F Test Mode

Daily Totals

MV Dropped: 74.43

Cost Affected: 41,312

Current Run:

2

Order

Block

Circuit

Total Customers

Community Area

1 1A 434 2434

2 1A 223 1773

3 1B 950 1500

4 2A 463 1713

5 2A 456 2376

6 2A 516 344

7 3A 831 3341

8 3A 911 3150

9 3A 63 2522

10 4A 83 2348

11 4A 72 2640

12 4B 382 1171

13 5A 968 1065

14 5A 944 1723

15 5B 177 1330

16 6A 500 5650

17 6A 703 2468

18 6B 268 2

19 7A 650 305

20 7A 183 3

21 7A 1856 231

22 8A 358 1192

23 8A 231 2483

24 9B 210 165

25 9A 443 3

26 9A 103 1208

27 9A 512 2570

28 10A 238 2119

29 10A 768 1566

30 10B 773 734

31 11A 737 2370

32 12A 608 34

33 12B 774 437

34 12A 450 2984

35 12A 517 453

36 12B 487 3883

37 13A 745 10

38 13A 285 2533

39 13B 003 403

40 13B 003 1246

41 13B 004 796

42 14A 536 2630

43 14A 458 102

44 14A 317 3308

45 15A 1010 1297

46 15A 438 4866

47 15A 68 1361

Run 21

Run 22

Run 23

Run 24

Run 25

Run Start Time: 0500 1000 1100

Run End Time: 1000 1100 1200

Total MV Dropped: 31.33 43.09 35.53

Customers Affected: 23,235 18,017 24,264

Detector Status

MV Dropped

MV Dropped

MV Dropped

MV Dropped

MV Dropped

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RtPortal

Home - SDGEPI - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Search Favorites Media Print

Address http://[redacted]/default.aspx Go Links

Home Documents and Lists Create Site Settings Help Up to Team Web Site

SDGEPI Home Modify Shared Page

Documents

- Shared Documents
- Transmission
- Distribution
- EOC
- non-SCADA
- IT Monitor

Pictures

- PI-Training
- PI-EOC
- PI-T&D User Conference

Lists

- Contacts
- Tasks

Discussions

- General Discussion

Surveys

- New SDGEPI Portal

SDGE-PI displays

SDGE System Load Trend

5/5/2005 8:54:02 AM 2 Hour(s) 5/5/2005 10:54:02 AM

Announcements

New SDGE PI RtPortal launch New 5/4/2005 7:43 AM
by OSI, RT
Check out the new PI displays on web RtPortal SDGEPI portal. Users can access displays from IE browser.

[Add new announcement](#)

Events

5/12/2005 11:30 AM **PI Users Group Meeting** New

Agenda:

- 11:30 - Lunch
- 12:00 - PI Team Status Report
- 12:15 - RtCBM (Real-Time Condition-Based Maintenance) Project Status
- 12:30 - Roundtable (or show-and-tell) - 5-10 minutes per person
- 13:30 - Meeting Adjourned

[Add new event](#)

SDGE
Semptra Energy

SDGE - System Load

Value 2717.8

Links

- OSI Soft Home page
- EMSO Web site
- Metro EMSO website
- CA ISO

[Add new link](#)

MSNBC Weather [Change Location](#)

San Diego, CA

Current conditions		Tomorrow	
61°	CLOUDY	Wind: 7 SSE	Barometer: 30.00"
		Humidity: 82%	66°/60°

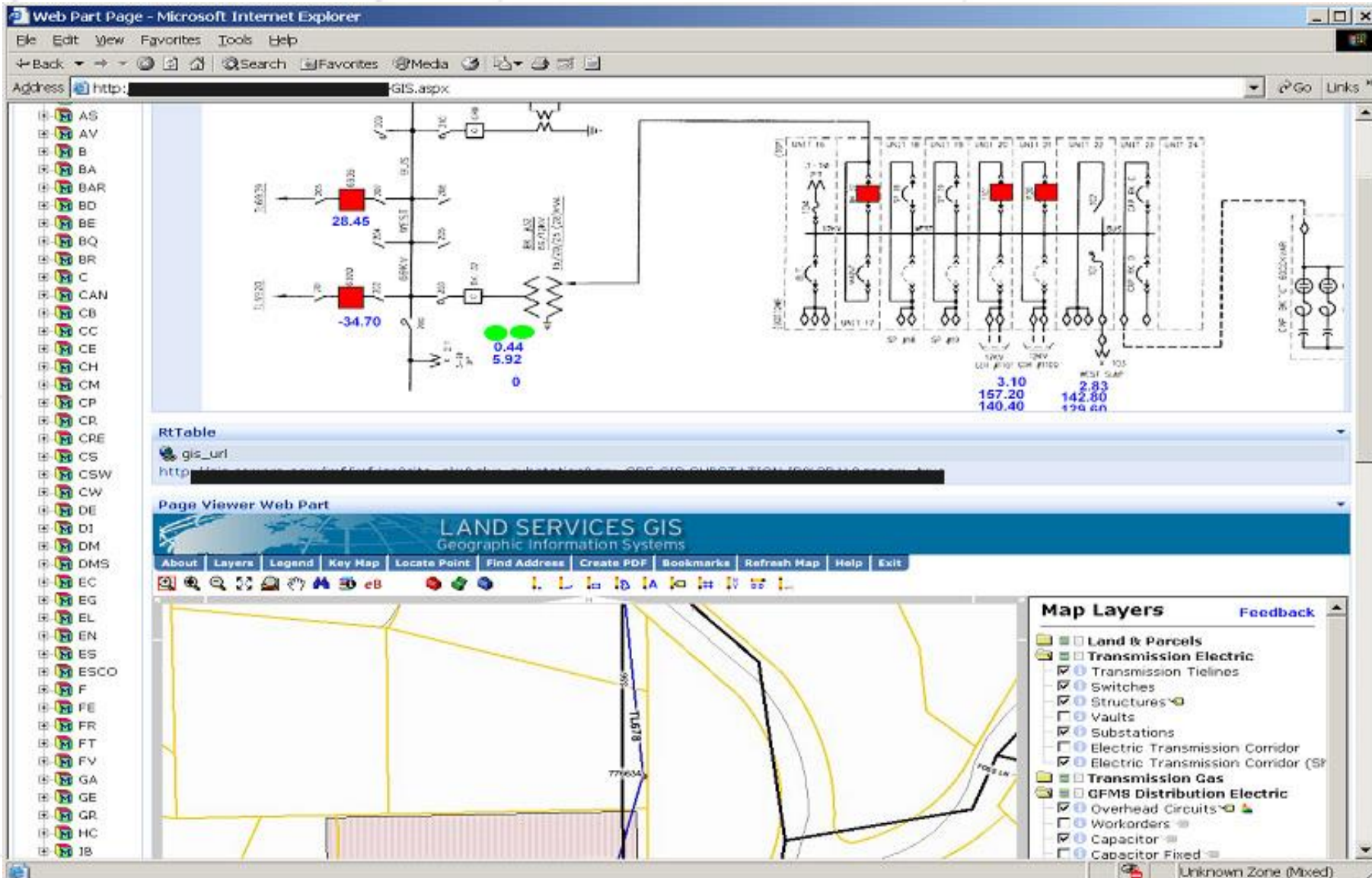
All temps shown in: [°F](#) [°C](#)

For extended forecasts, go to MSNBC.com

MSNBC Stock Quotes [Change Symbols](#)

Done Local intranet

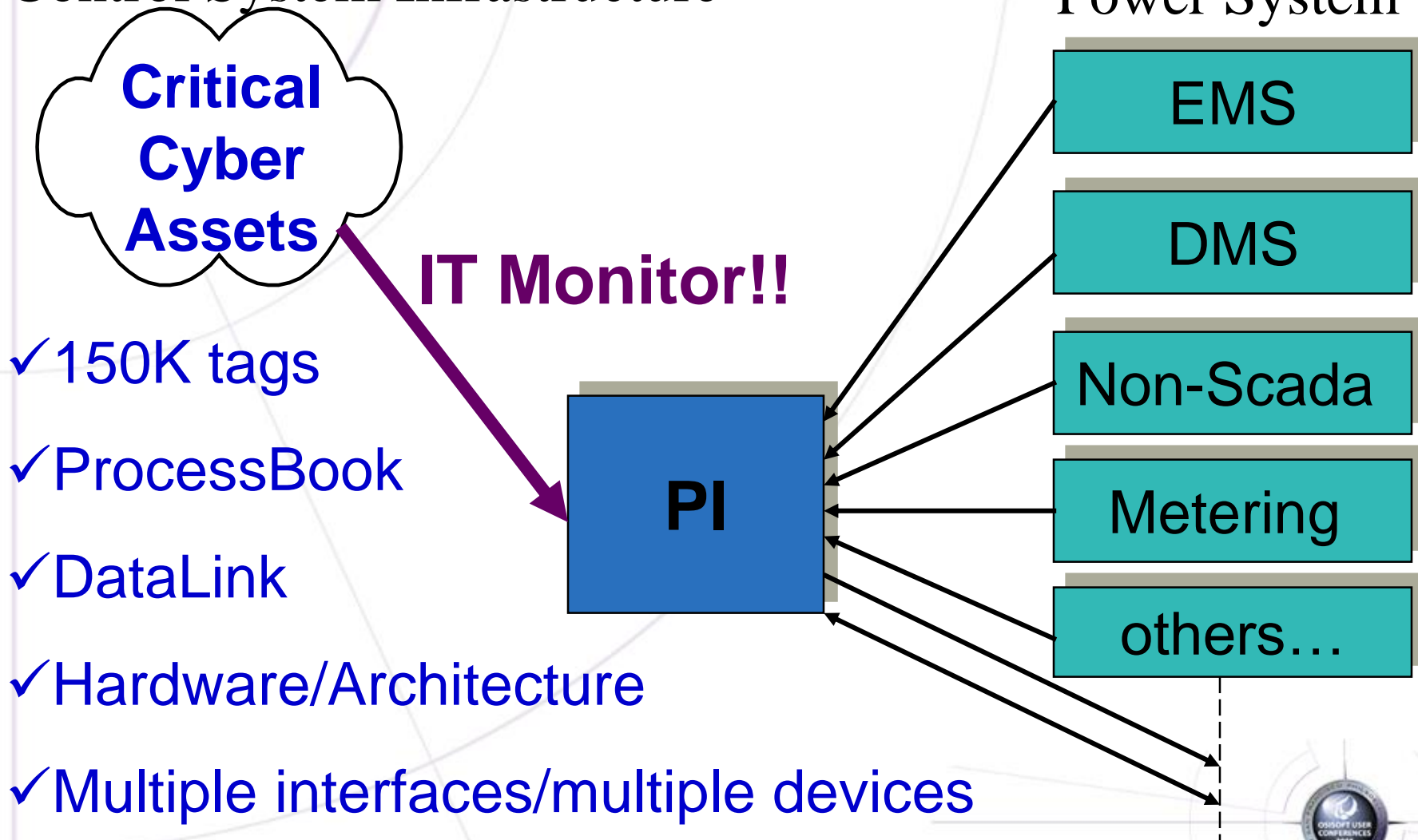
PI with GIS



Beyond Power System

Control System Infrastructure

Power System



NERC Cyber Security Standards

- North American Electric Reliability Council
- NERC 1200 Cyber Security (Urgent Action)
- NERC 1300 -> CIP 002-1 thru 009-1
 - Critical Infrastructure Protection

At SDGE

- Beyond Compliance
- Reliability -> Performance
- Proactive and Preventive



IT Monitor

- Ping
- TCP Response
- NetFlow
- PerfMon
- SNMP
- SNMP Traps
- Syslog

Monitoring ALL !!

Automatic Alarming & Notification

The screenshot displays the 'EMS Node Status Overview' window, which provides a comprehensive view of the system's health and performance. The window is organized into several sections:

- MCC (Master Control Computer):** A grid showing the status of various components including LANs, CPU, and memory usage. The status is indicated by green and red icons.
- BCC (Backup Control Computer):** Similar to the MCC, showing the status of its components.
- AP-Servers (AP-03 & AP-04):** A detailed view of the application servers, showing their status and performance metrics.
- Interface Connection:** A section showing the status of the network interfaces.
- Memory:** A section showing the status of the system memory.
- CPU:** A section showing the status of the system CPU.
- AP.1.PIAP.2.P:** A section showing the status of the application processes.
- XA21 Process Info:** A section showing the status of the XA21 processes.

The window also includes a toolbar with various icons for navigation and a status bar at the bottom.

New Development in 2005

- 3-D Frequency & Voltage Surface Profile
- SAN (Storage Area Networks)
- RtCBM (Condition-Based Maintenance)
- COMTRADE Fault-Record Transient Data
- Phasor Measurement



Sky's The Limit

Have a slice of “PI” !



Dream the dreams...

Make the dreams come true!