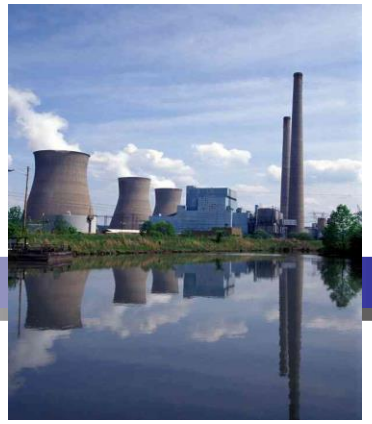


Technology is Integral to Corporate Culture

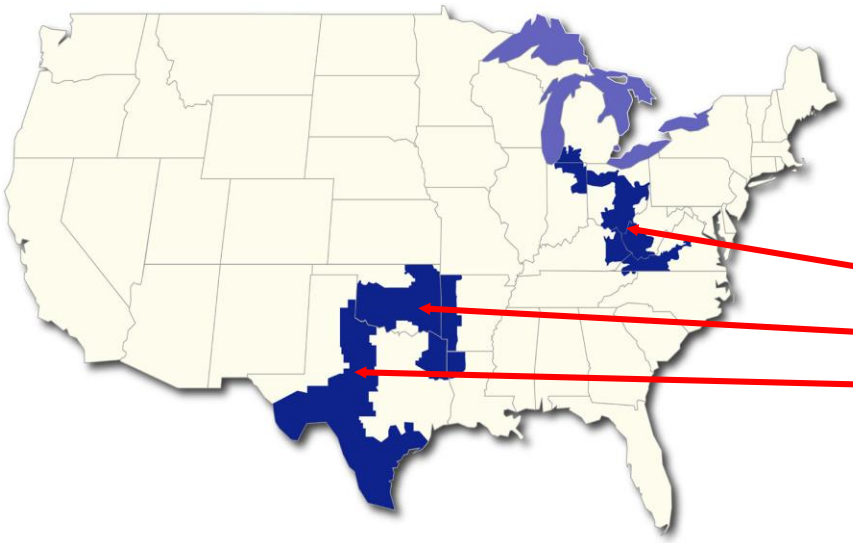
May 8th, 2008

H. Kevin Stogran
Director - Market Operations Support
OSISoft Regional Conference, Kansas City

Agenda

- Who is AEP (American Electric Power)
- AEP's PI History and Footprint
- Information Management Challenges
- PI Display Examples
- AEP's Culture of Technology
- The Big Picture Challenge
- Technology Toolbox
- Portable Data
- Conclusion

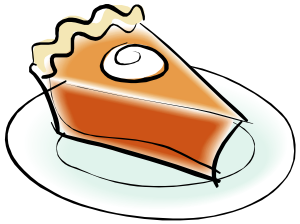
AEP – Who We Are – By Assets



- One of the largest U.S. electricity generators (~ 38,000 MWs) with a significant cost advantage in many of our market areas
- Largest consumer of coal in the Western Hemisphere
- Operations within four RTO's
  - PJM
  - SPP
  - ERCOT
  - MISO
- A leading consumer of natural gas
- Major wind power developer (#3 in U.S. in 2005)
- 39,000 miles of transmission
- 186,000 miles of distribution
- Coal transportation
  - 7,000 railcars
  - 2,230 barges and 53 towboats
- 5 million customers

PI History – Where Have We Been

- AEP began installing PI servers in 1993
- Five servers installed between 1993 – 1998
  - Conesville 5, Conesville 6, Conesville 4, Sporn 5, Muskingum 5
- Bank License 40,000 Tags (1998)
- Corporate PI server installed in 1999
- Most plant PI servers installed after 1999
- Plant's Question - How Do You Justify PI?
- The Annual Bank
- AEP "All you can Eat" Contract 2004 (**aka EA**)
- Development partnership with Transpara, 2006
- Current Contract 2007-2009



AEP's Current PI Footprint

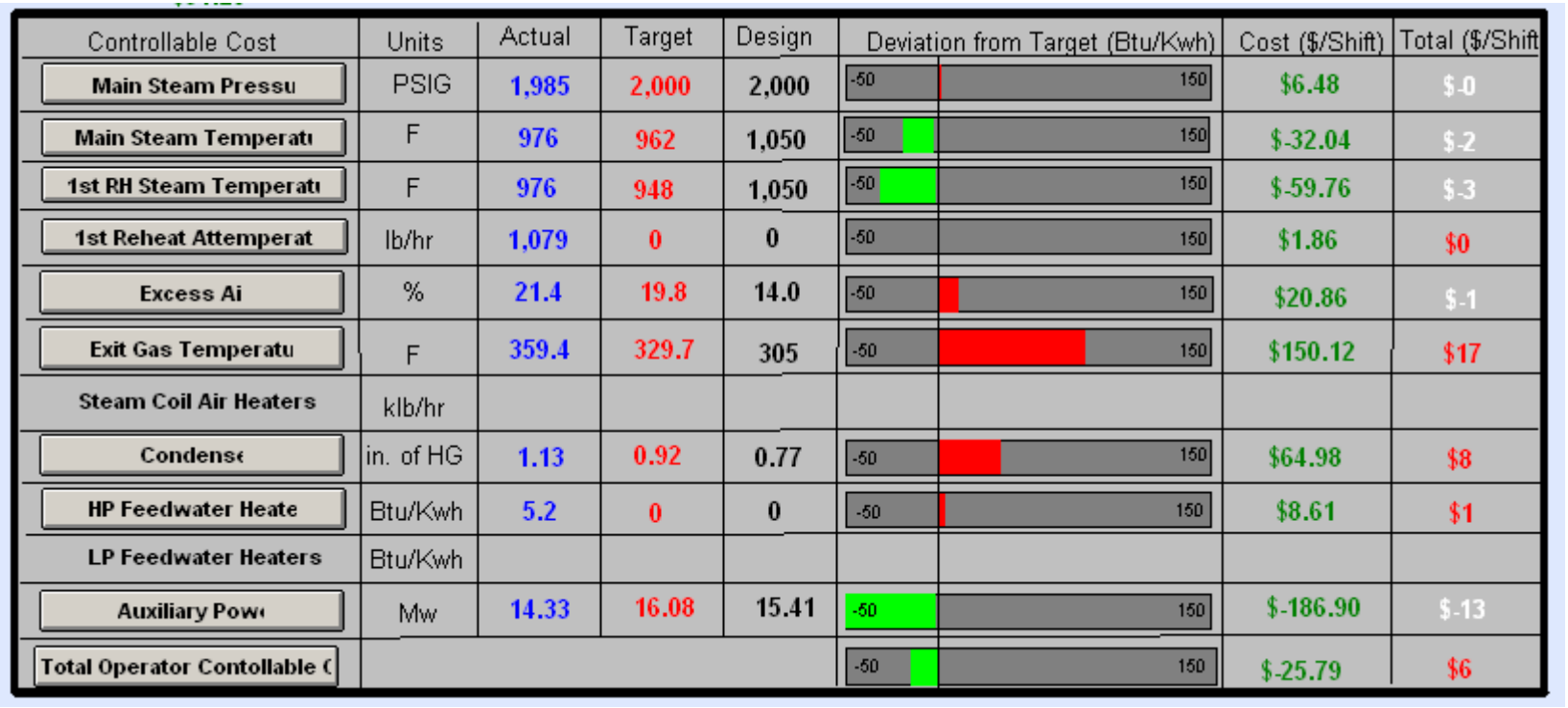
- **Servers**
  - 4 Corporate PI Server
  - 49 Plant PI Servers
  - 2 Plant Simulator PI Servers
  - 3 Transmission PI Servers
  - 2 IT Monitor PI Servers
  - 60 Total PI Servers
- **PI Tags**
  - AEP total tag usage is about ~ 500,000 tags
  - Plant PI servers have over 325,000 Tags
    - Plants server tag counts range from 75 tags to over 20,000 tags
  - Corporate PI server has over 75,000 tags
  - IT Monitor server has over 70,000 tags
  - Transmission PI servers have over 50,000 tags
- **Processbooks**
  - No Idea Anymore!
  - Control Access As Needed, Not Desktop Applications.

Information Management Challenges

- Aging Workforce
  - Provide Smart Displays
- Improve Information Management
  - Millions and Millions Points of Data!
- How Do We Use Information to Be:
  - More Productive ?
  - Retain / Expand Knowledge and Experience ?
  - More Cost Effective ?
  - More Responsive to RTO Market Needs
    - **Process More Data with Same Staff.**
    - **Be Aware of Market Conditions and Current Situational Awareness**

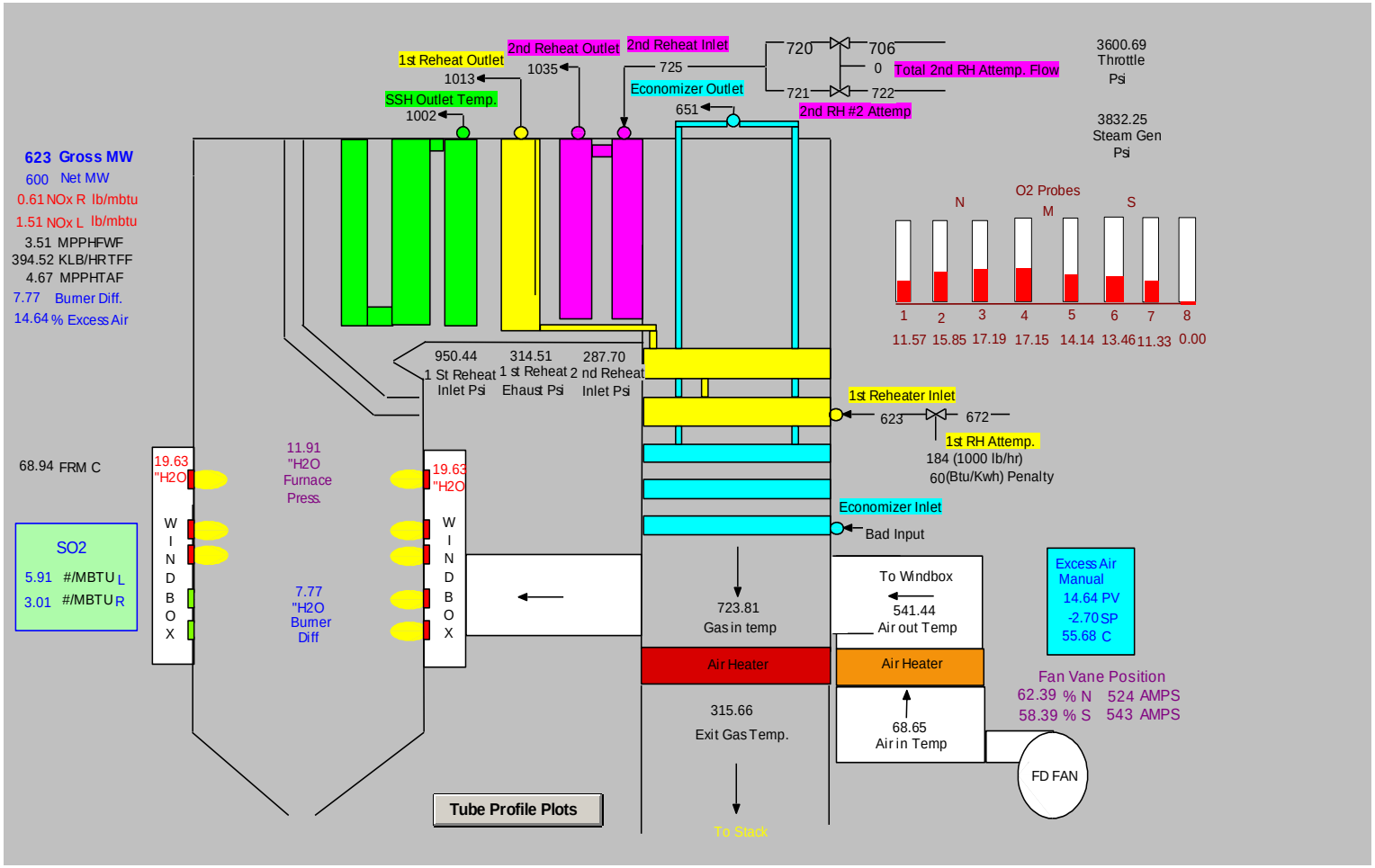
Conventional PI Development

PI Helps Control Production Costs

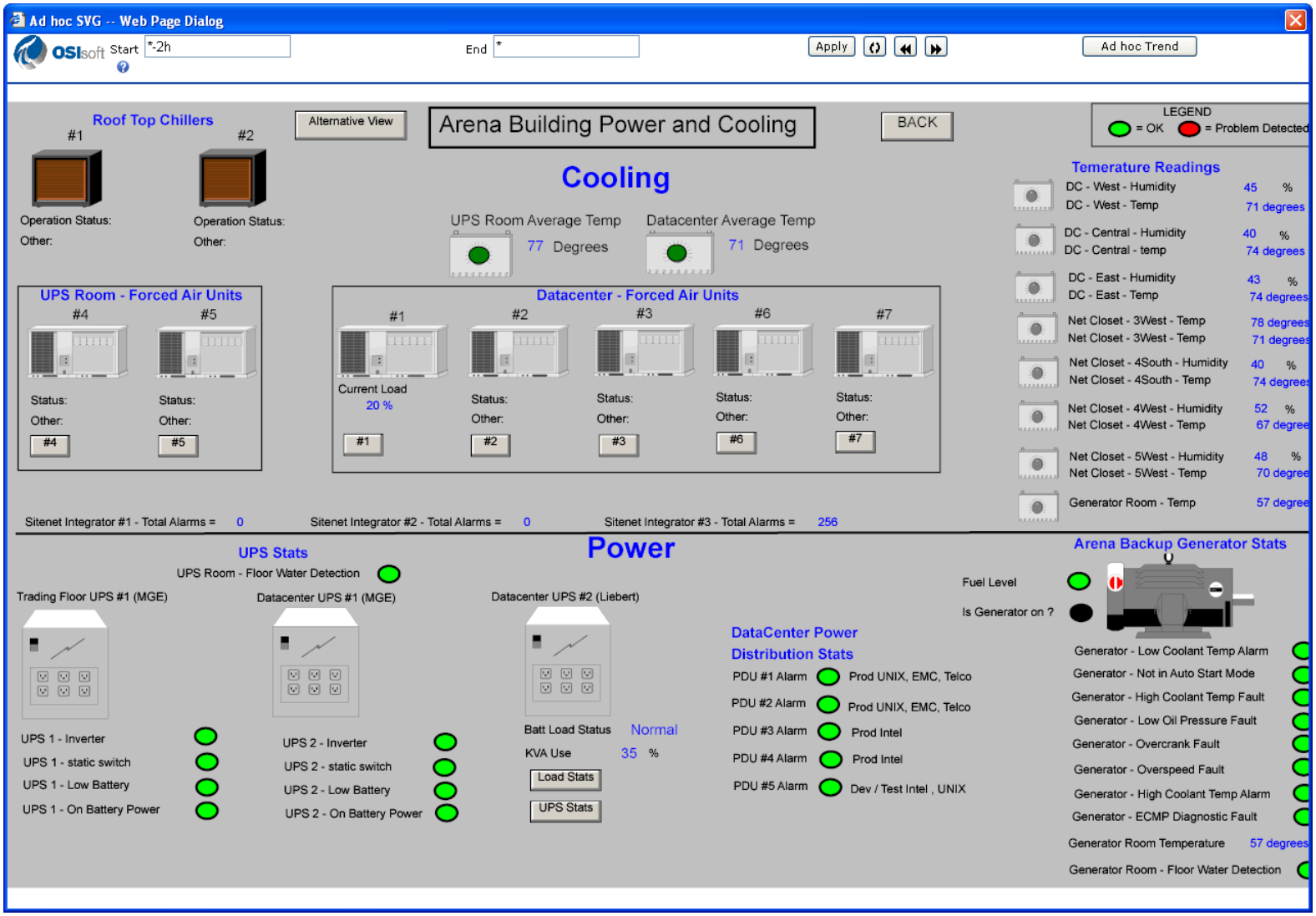


Controllable Cost	Units	Actual	Target	Design	Deviation from Target (Btu/Kwh)	Cost ($/Shift)	Total ($/Shift
Main Steam Pressu	PSIG	1,985	2,000	2,000	-50 150	$6.48	$-0
Main Steam Temperatı	F	976	962	1,050	-50 150	$-32.04	$-2
1st RH Steam Temperatı	F	976	948	1,050	-50 150	$-59.76	$-3
1st Reheat Attemperat	lb/hr	1,079	0	0	-50 150	$1.86	$0
Excess Ai	%	21.4	19.8	14.0	-50 150	$20.86	$-1
Exit Gas Temperatu	F	359.4	329.7	305	-50 150	$150.12	$17
Steam Coil Air Heaters	klb/hr						
Condens‹	in. of HG	1.13	0.92	0.77	-50 150	$64.98	$8
HP Feedwater Heate	Btu/Kwh	5.2	0	0	-50 150	$8.61	$1
LP Feedwater Heaters	Btu/Kwh						
Auxiliary Pow‹	Mw	14.33	16.08	15.41	-50 150	$-186.90	$-13
Total Operator Contollable (					-50 150	$-25.79	$6

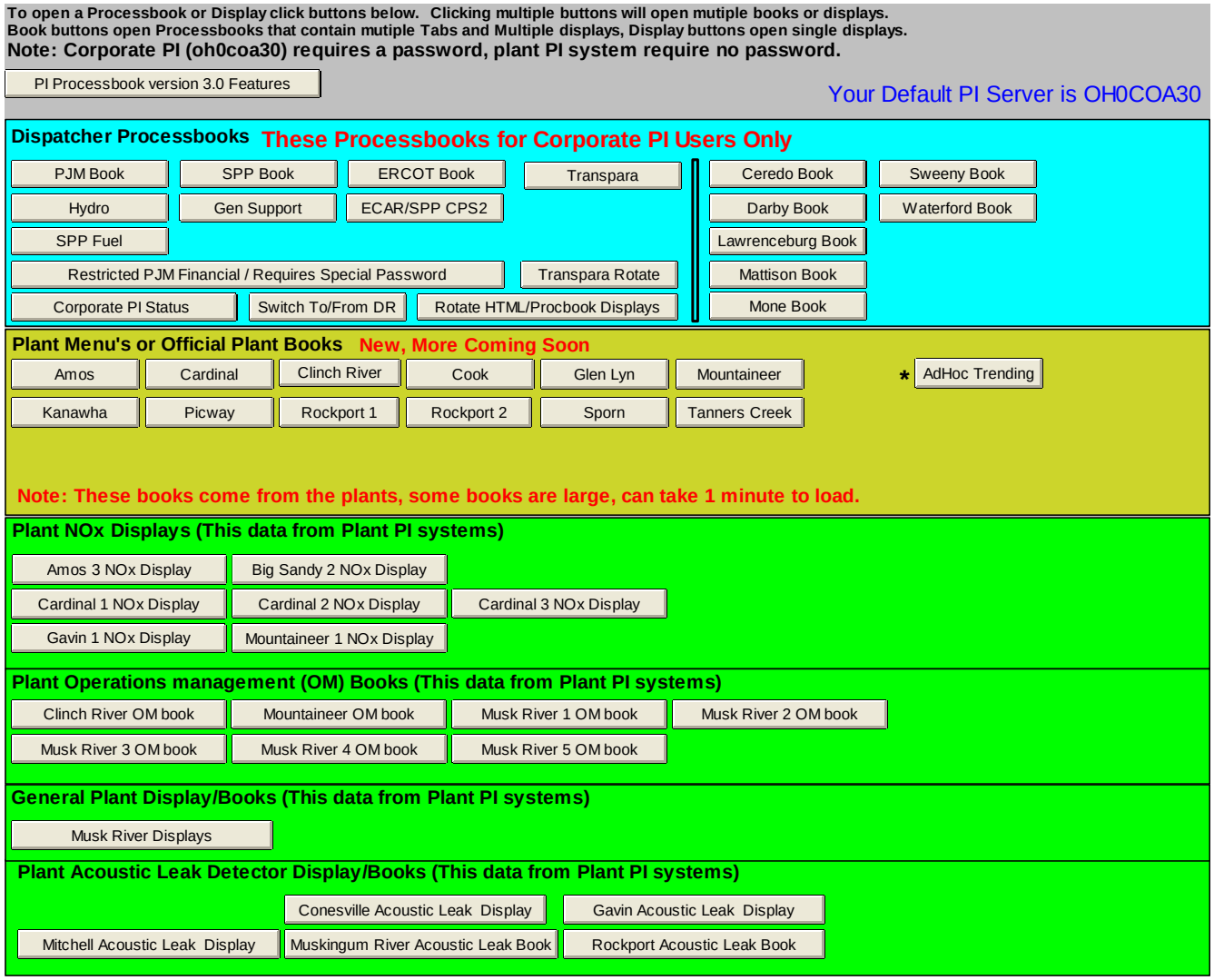
PI Brings Diverse Data to One Graphical View



Building Diverse Monitor Capability (RTWebParts)

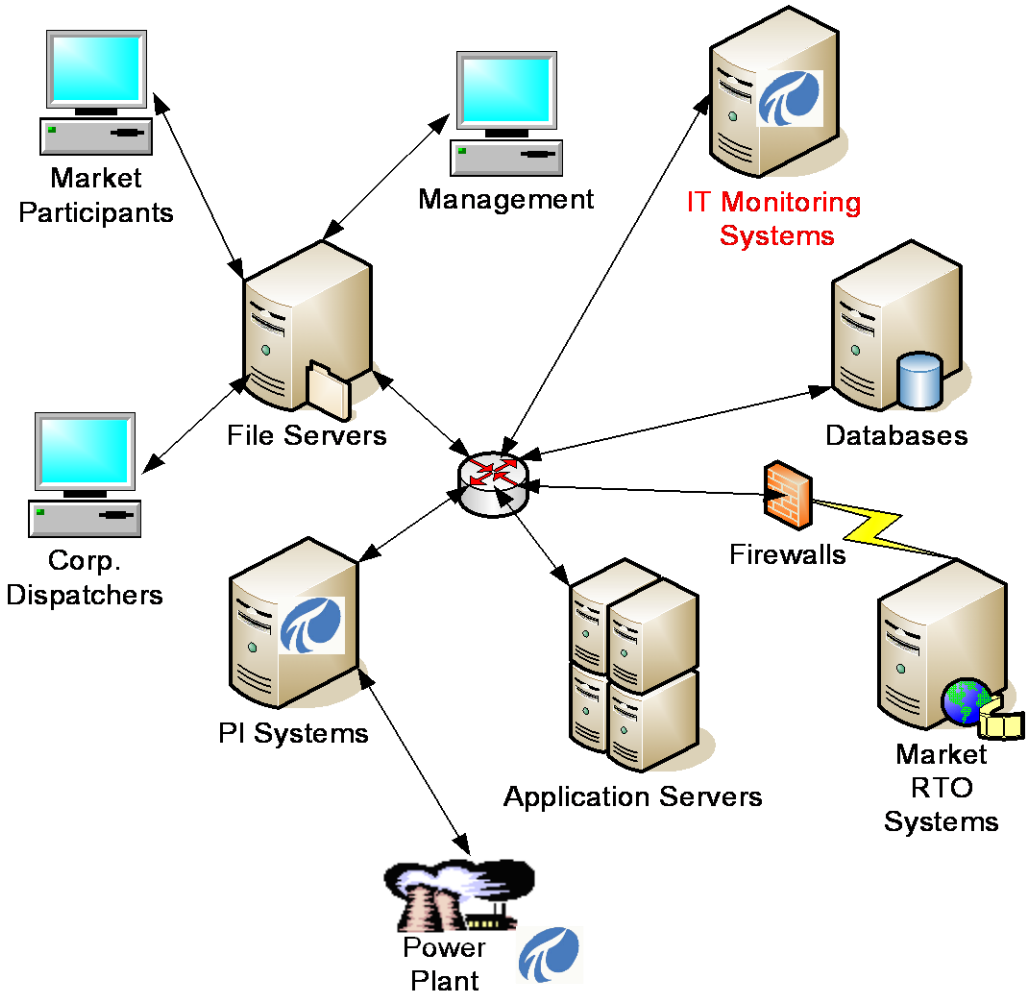


AEP Processbook Menu



IT Monitor of Critical Systems

- **IT Monitoring**
- Corporate and Plant PI Server Monitoring
  - Hardware statistics (CPU Use, Memory Use, Network, etc)
  - PI statistics (Snapshot, Archive, Cache, Interfaces, etc.)
- Backup Generator and Inverter Monitoring
- Computer Center Temperature and Humidity Monitoring
- 70,000 Tags in One Year.
- Used to Measure Business Disruptions for IT's ICP

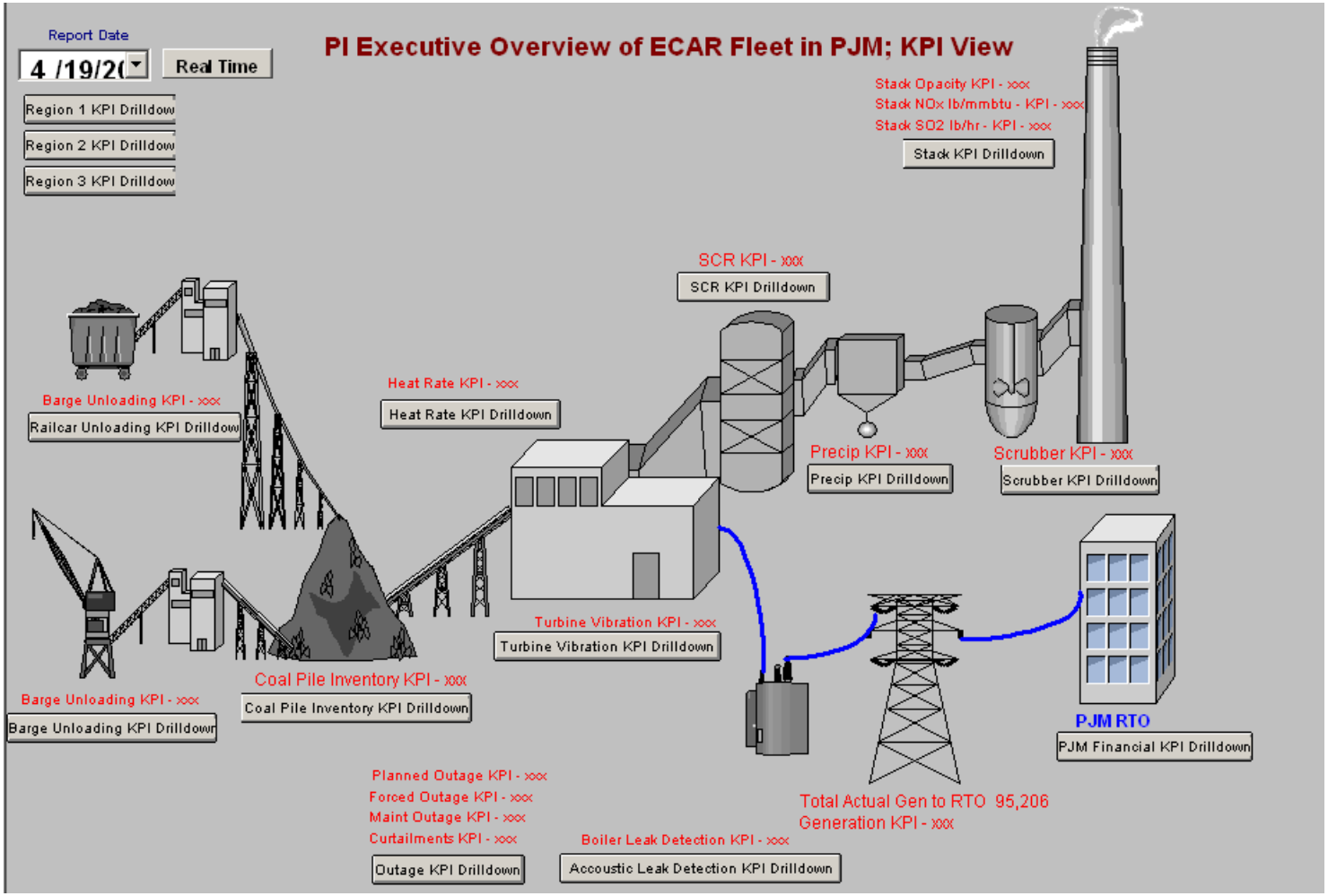


AEP's Culture of Technology

- Use technology to enhance and expand our staff's capability and maintain headcount (FTE's)
- Single point of data entry, and share that data and it's context.
- It's better to have too much data than not have what you need after the fact. When in doubt, store it.
- Simplify the user's interface and experience.
- Get the data to the right person, at the right time.
- Understand the "True Costs" of technology and the data experience.
- Empower the staff to use technology, don't top down constrain them.
  - AEP's Contract – encourage the use of technology; don't discourage it.
  - Transpara grass roots expansion.

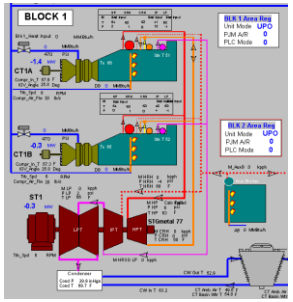
The Road Ahead in PI Development

The Challenge
Provide Those That Need The Data The Big Picture



The Technology Toolbox

- Provide the Technology
  - Eliminate the Roadblocks
- Provide the Drive
- Enable the Team to Get It Done

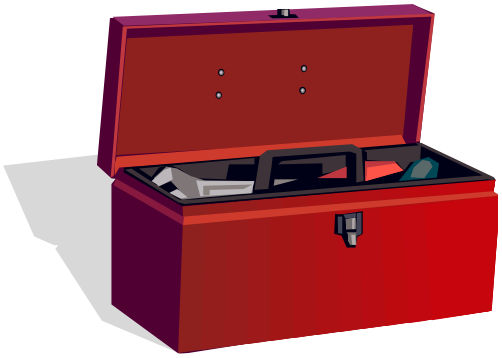


ProcessBook

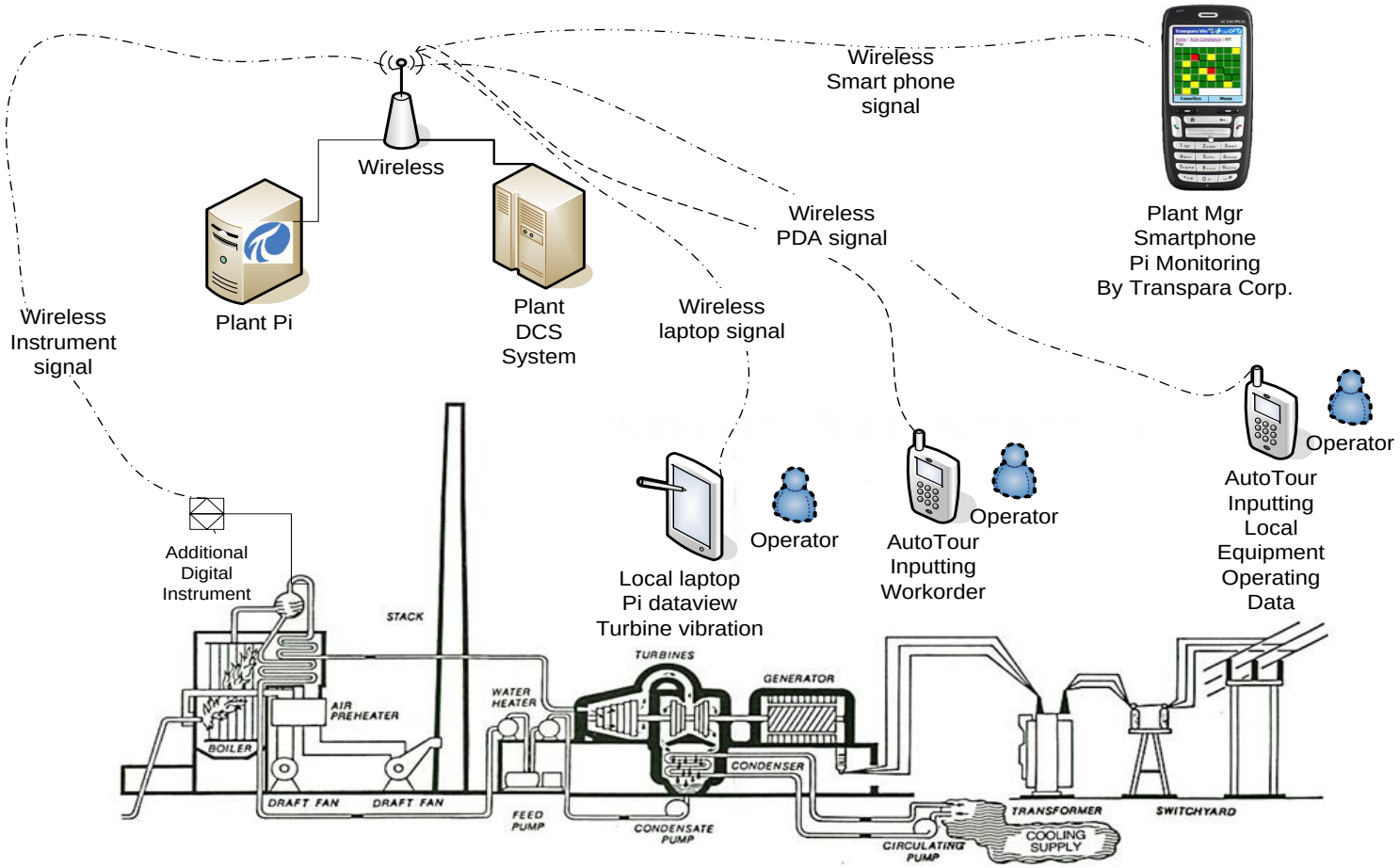
PI Server

SharePoint

Transpara



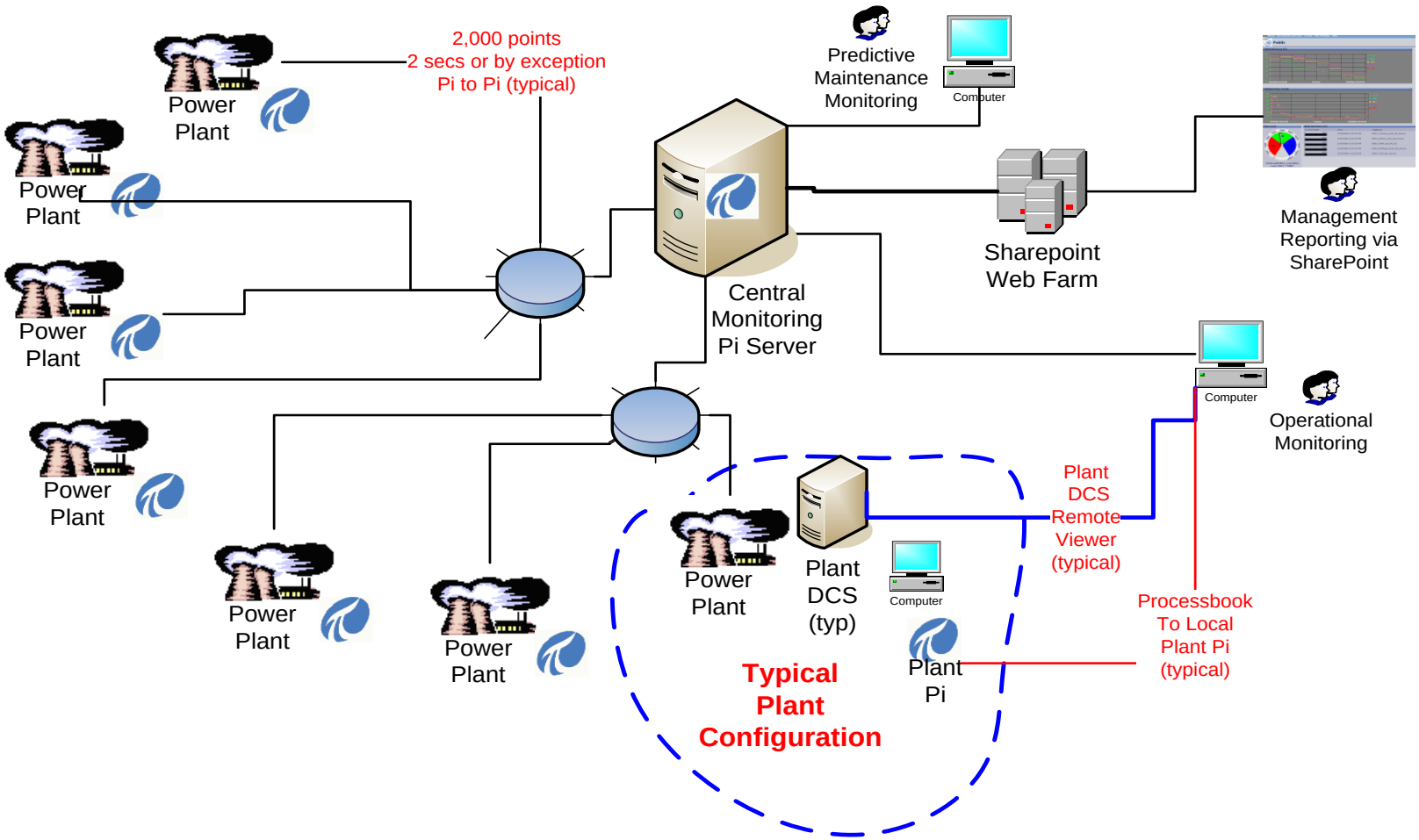
Wireless Potential in a Power Plant



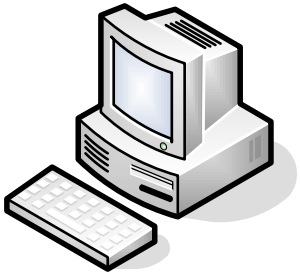
Centralized Data Monitoring

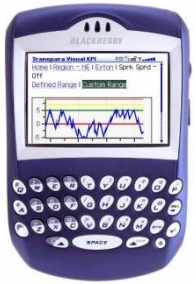
Central Monitoring Network Backbone

(typical)

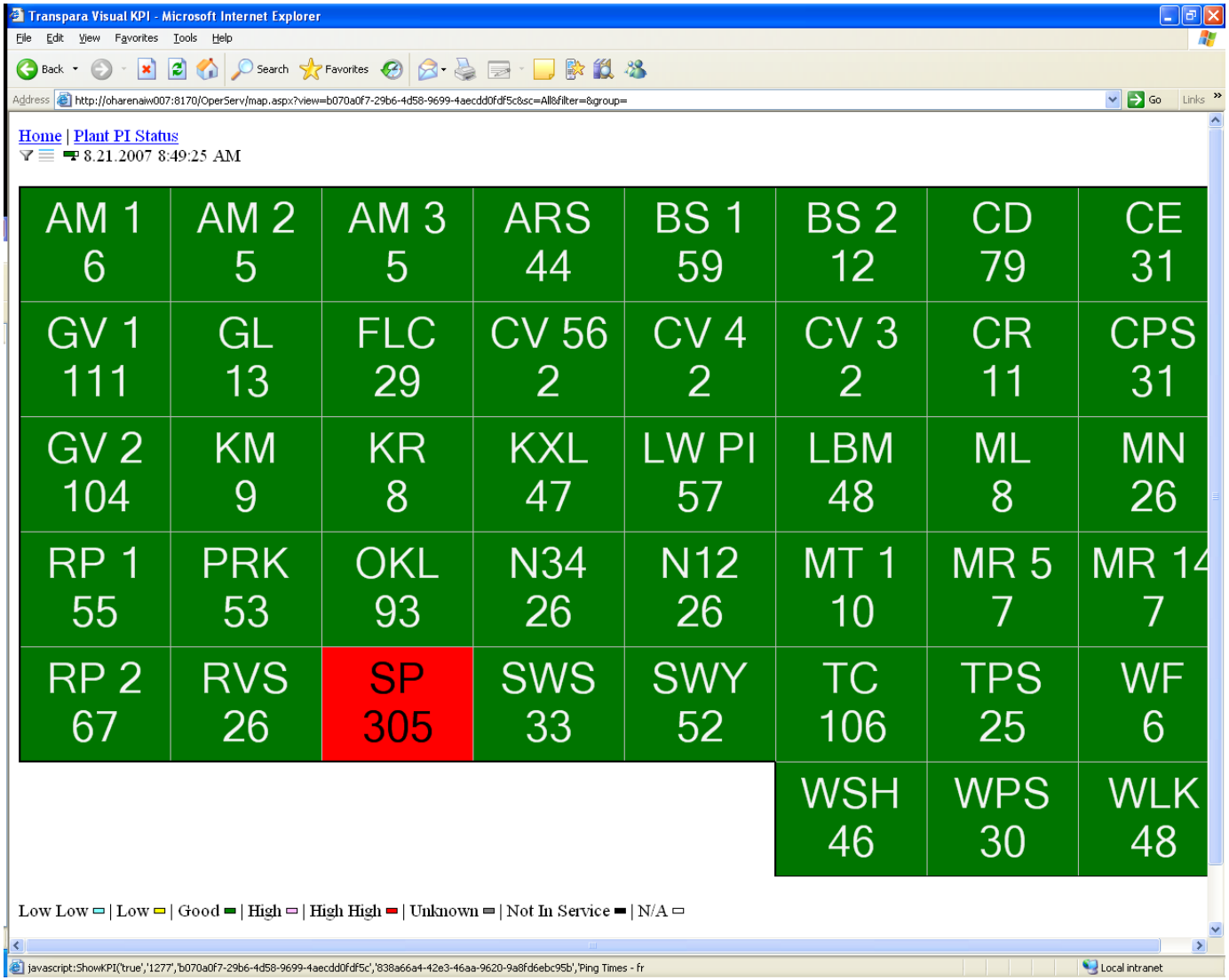


Portable Data – Transpara / PI

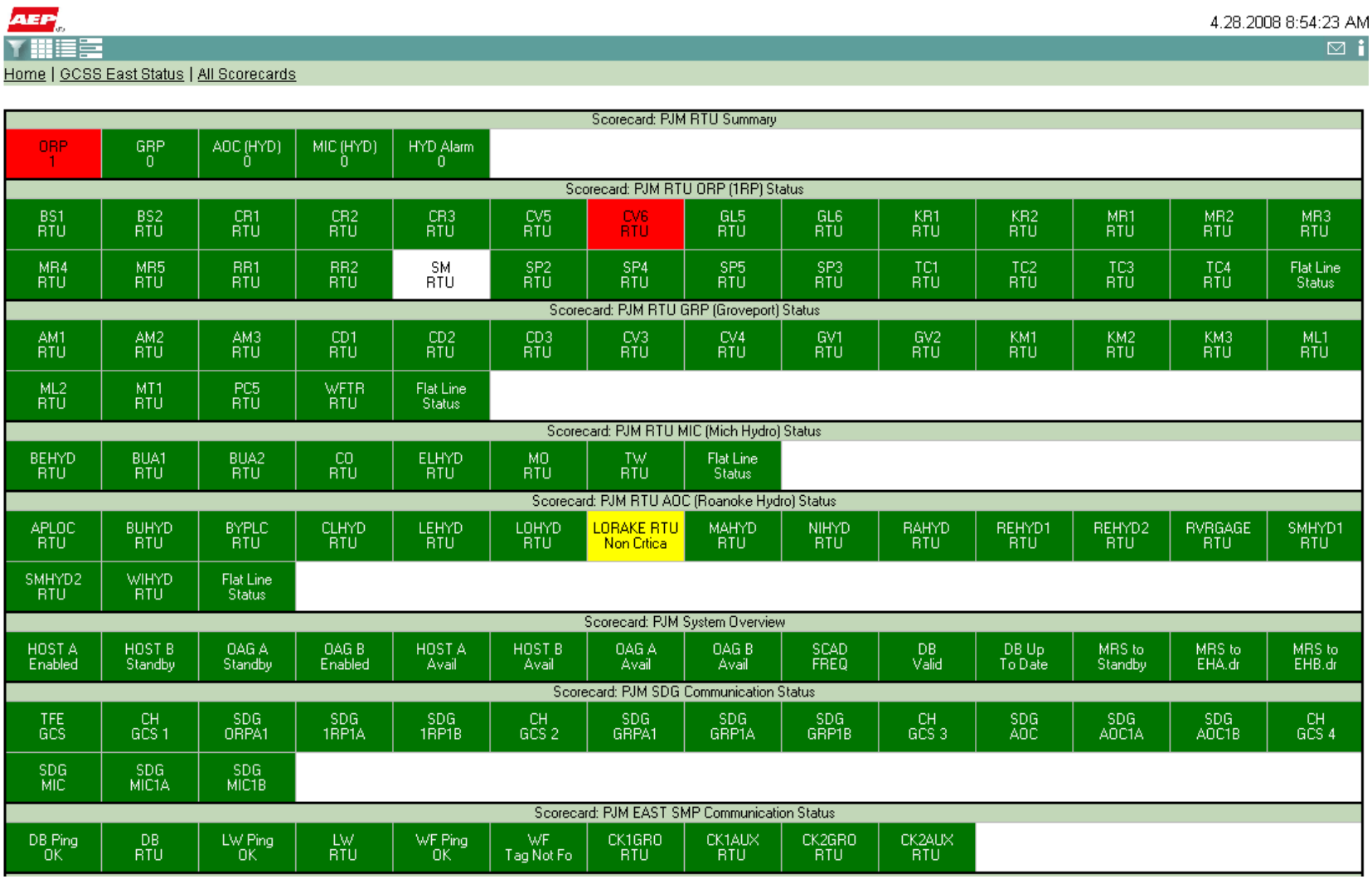




Transpara – Plant PI Ping Status



Monitoring of Critical Systems



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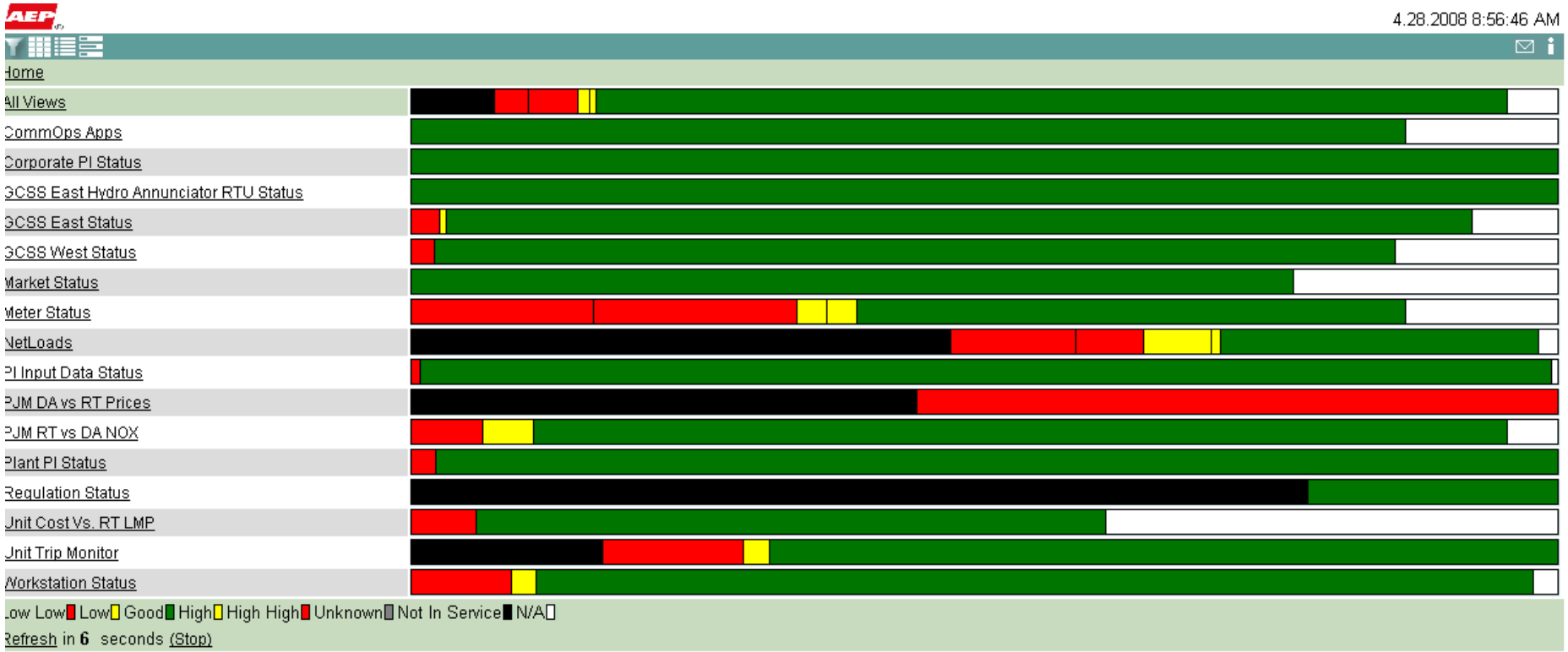
Home | GCSS East Status | All Scorecards

Scorecard: PJM RTU Summary													
ORP 1	GRP 0	AOC (HYD) 0	MIC (HYD) 0	HYD Alarm 0									
Scorecard: PJM RTU ORP (1RP) Status													
BS1 RTU	BS2 RTU	CR1 RTU	CR2 RTU	CR3 RTU	CV5 RTU	CV6 RTU	GL5 RTU	GL6 RTU	KR1 RTU	KR2 RTU	MR1 RTU	MR2 RTU	MR3 RTU
MR4 RTU	MR5 RTU	RR1 RTU	RR2 RTU	SM RTU	SP2 RTU	SP4 RTU	SP5 RTU	SP3 RTU	TC1 RTU	TC2 RTU	TC3 RTU	TC4 RTU	Flat Line Status
Scorecard: PJM RTU GRP (Groveport) Status													
AM1 RTU	AM2 RTU	AM3 RTU	CD1 RTU	CD2 RTU	CD3 RTU	CV3 RTU	CV4 RTU	GV1 RTU	GV2 RTU	KM1 RTU	KM2 RTU	KM3 RTU	ML1 RTU
ML2 RTU	MT1 RTU	PC5 RTU	WFTR RTU	Flat Line Status									
Scorecard: PJM RTU MIC (Mich Hydro) Status													
BEHYD RTU	BUA1 RTU	BUA2 RTU	CO RTU	ELHYD RTU	MO RTU	TW RTU	Flat Line Status						
Scorecard: PJM RTU AOC (Roanoke Hydro) Status													
APLOC RTU	BUHYD RTU	BYPLC RTU	CLHYD RTU	LEHYD RTU	LOHYD RTU	LORAKE RTU Non Critica	MAHYD RTU	NIHYD RTU	RAHYD RTU	REHYD1 RTU	REHYD2 RTU	RVRGAGE RTU	SMHYD1 RTU
SMHYD2 RTU	WIHYD RTU	Flat Line Status											
Scorecard: PJM System Overview													
HOST A Enabled	HOST B Standby	OAG A Standby	OAG B Enabled	HOST A Avail	HOST B Avail	OAG A Avail	OAG B Avail	SCAD FREQ	DB Valid	DB Up To Date	MRS to Standby	MRS to EHA.dr	MRS to EHB.dr
Scorecard: PJM SDG Communication Status													
TFE GCS	CH GCS 1	SDG ORPA1	SDG 1RP1A	SDG 1RP1B	CH GCS 2	SDG GRPA1	SDG GRP1A	SDG GRP1B	CH GCS 3	SDG AOC	SDG AOC1A	SDG AOC1B	CH GCS 4
SDG MIC	SDG MIC1A	SDG MIC1B											
Scorecard: PJM EAST SMP Communication Status													
DB Ping OK	DB RTU	LW Ping OK	LW RTU	WF Ping OK	WF Tag Not Fo	CK1GRO RTU	CK1AUX RTU	CK2GRO RTU	CK2AUX RTU				

KPI Map – Full Overview



Conclusion

- The Future is Upon Us !
  - We Intend to Use Information Technology to Make Us:
    - More Effective !
    - More Responsive !
    - More Flexible !
    - More Profitable !