DTE Energy®

DTE Energy®

Fleet Optimization ……. through Process Controls & Technology

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Lead Engineer

November 13th, 2013



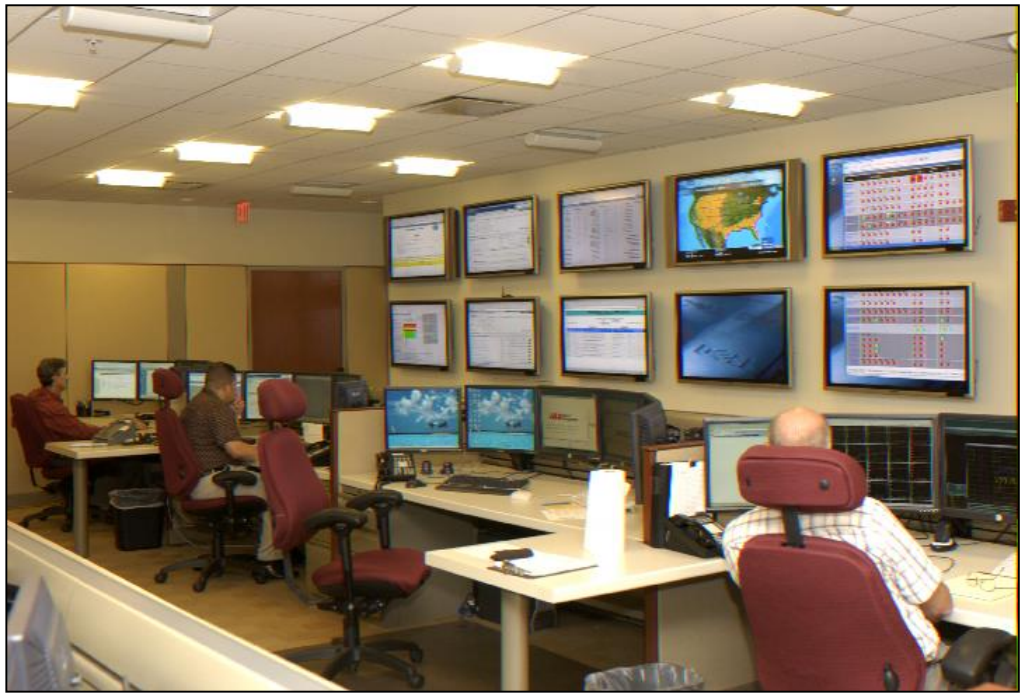


Fossil Generation

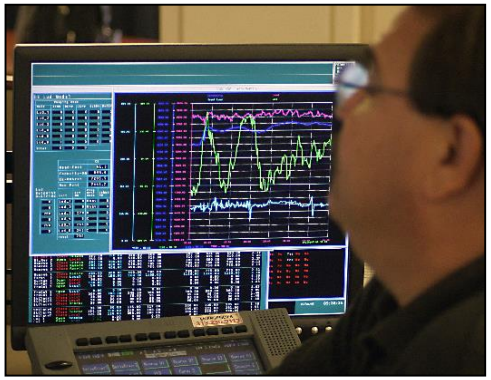
Process Controls & Technology

Fleet Optimization

……. through Process Controls & Technology



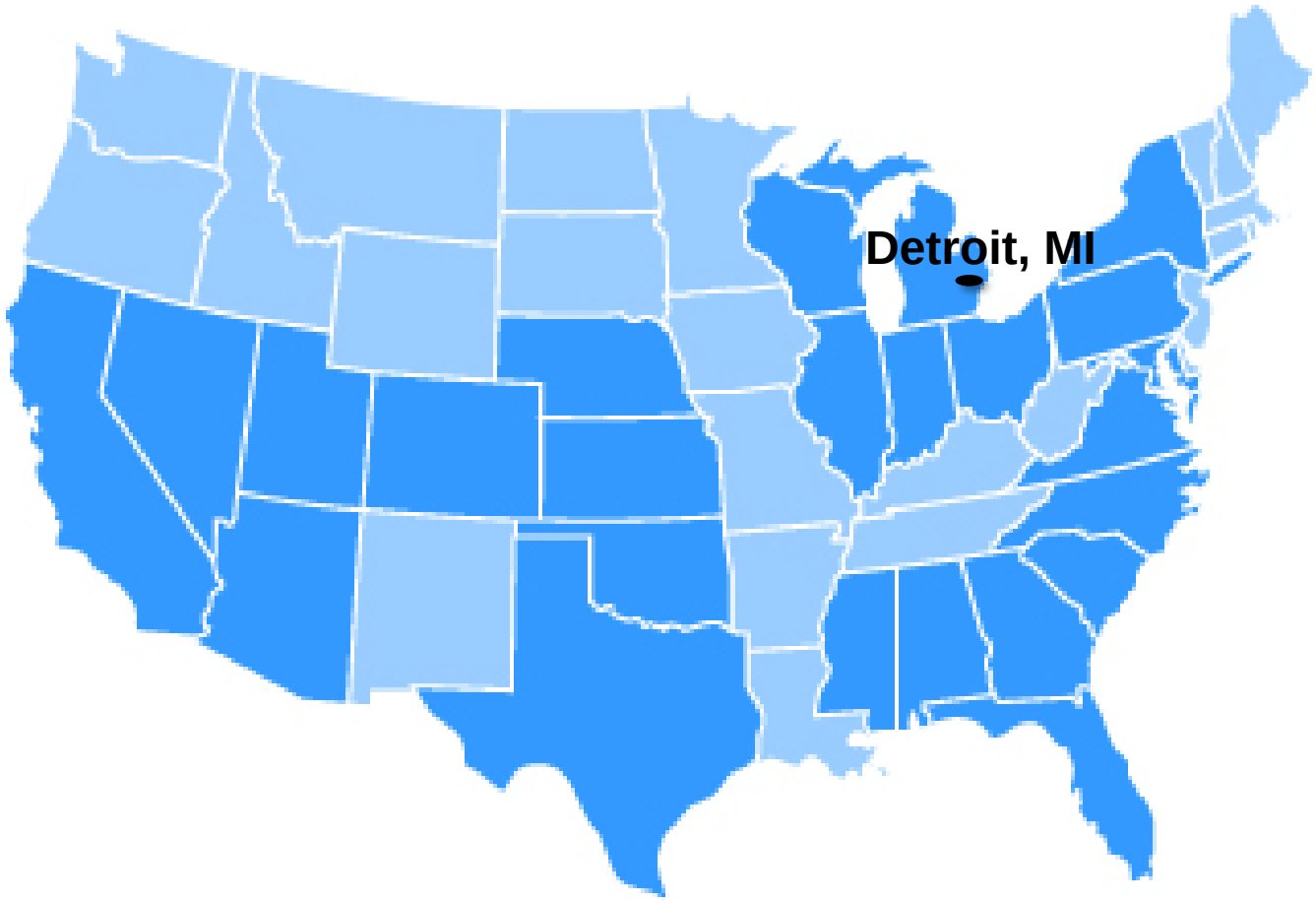
The Process Technology Enablers



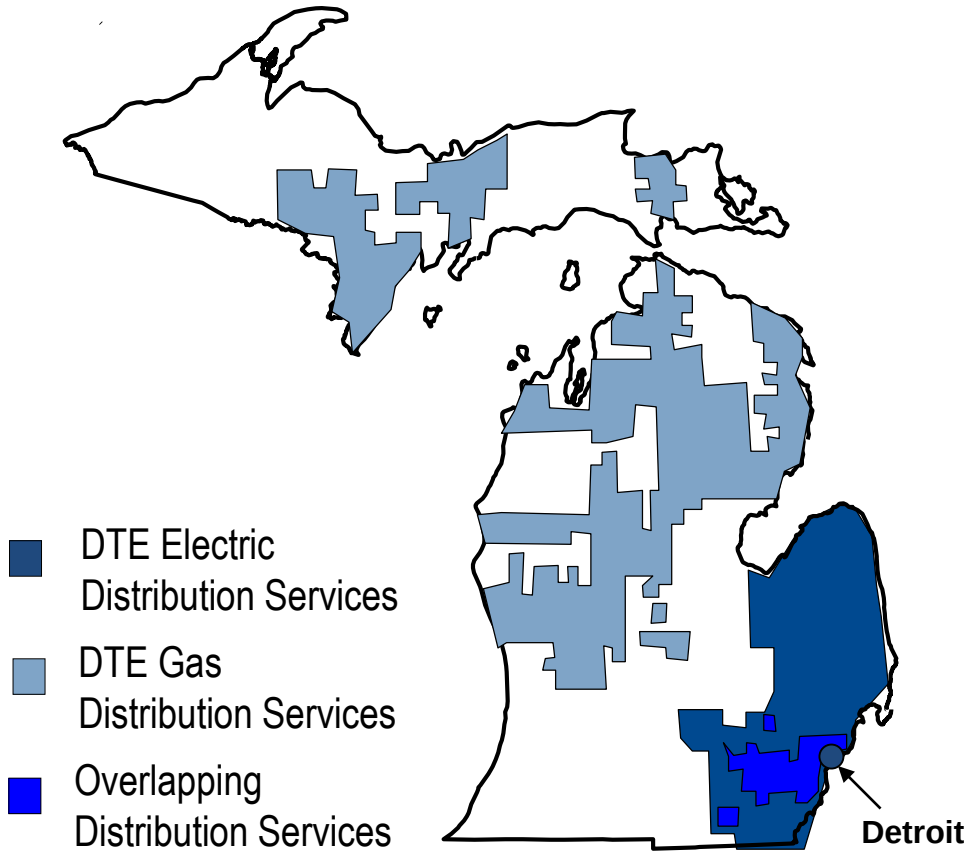
DTE Energy Geography

Utility Businesses
- DTE Electric
- DTE Gas
- Citizens Gas Fuel

Non-Utility Businesses
- DTE Coal Services
- DTE Rail Services
- DTE Energy Trading
- DTE Gas Storage
- Midwest Energy Resources
- DTE Biomass
- DTE Energy Services
- DTE Energy Ventures



Profile of DTE Utility Business



DTE Electric

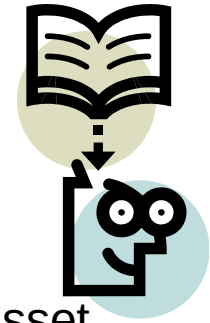
- Ninth largest electric utility in the U.S. with 2.1 million customers
- Over 11,080 MW of power generation, primarily coal fired
- 54,000 GWh in electric sales
- ~$8.79 billion in revenue

DTE Gas

- Fifth largest natural gas utility in the U.S. with1.2 million customers
- 170 Bcf of gas sales
- 12% of national gas storage capacity with 124 Bcf of regulated gas storage

Why Focus on Controls & Technology?

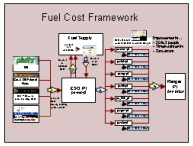
We operated for years without Process Information!



- Information in **capable hands** always yields benefits.
- Every **facility** and group has an effect on the company.
- The company is affected by **outside** influences.
- Fleet Optimization requires **awareness** of Process Costs, Performance, Asset Health, Reliability and Market Value.
- Small investments in Technology yields large **returns**.

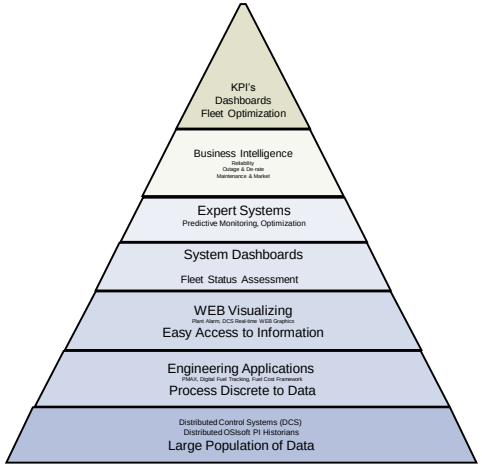
Process Controls & Technology

- Control & Technology Framework
- Application Examples
- Work in Progress
- Successes
- Questions & Discussion



PI Asset Framework

Integrated applications environment: Consistent framework for data, analysis, reporting and consistent user graphical interface.



Power Plants & Performance Center

Monroe – 3,135 mw

Belle River – 1,260 mw

Trenton Channel - 730 mw

Performance Center – 11,588 mw

River Rouge - 527 mw

Greenwood – 785 mw

Generating Unit	Capacity Unit	Capacity Plant
Belle River 1	625	
Belle River 2	635	
Belle River		**1260**
Conners Creek 15	135	
Conners Creek 16	100	
Conners Creek		**235**
Fermi 2	**1110**	**1110**
Greenwood 1	**785**	**785**

Expanding Renewable Portfolio

Trenton Channel		**766**
Peakers	**1224**	**1224**
Totals:	**10554**	**10554**

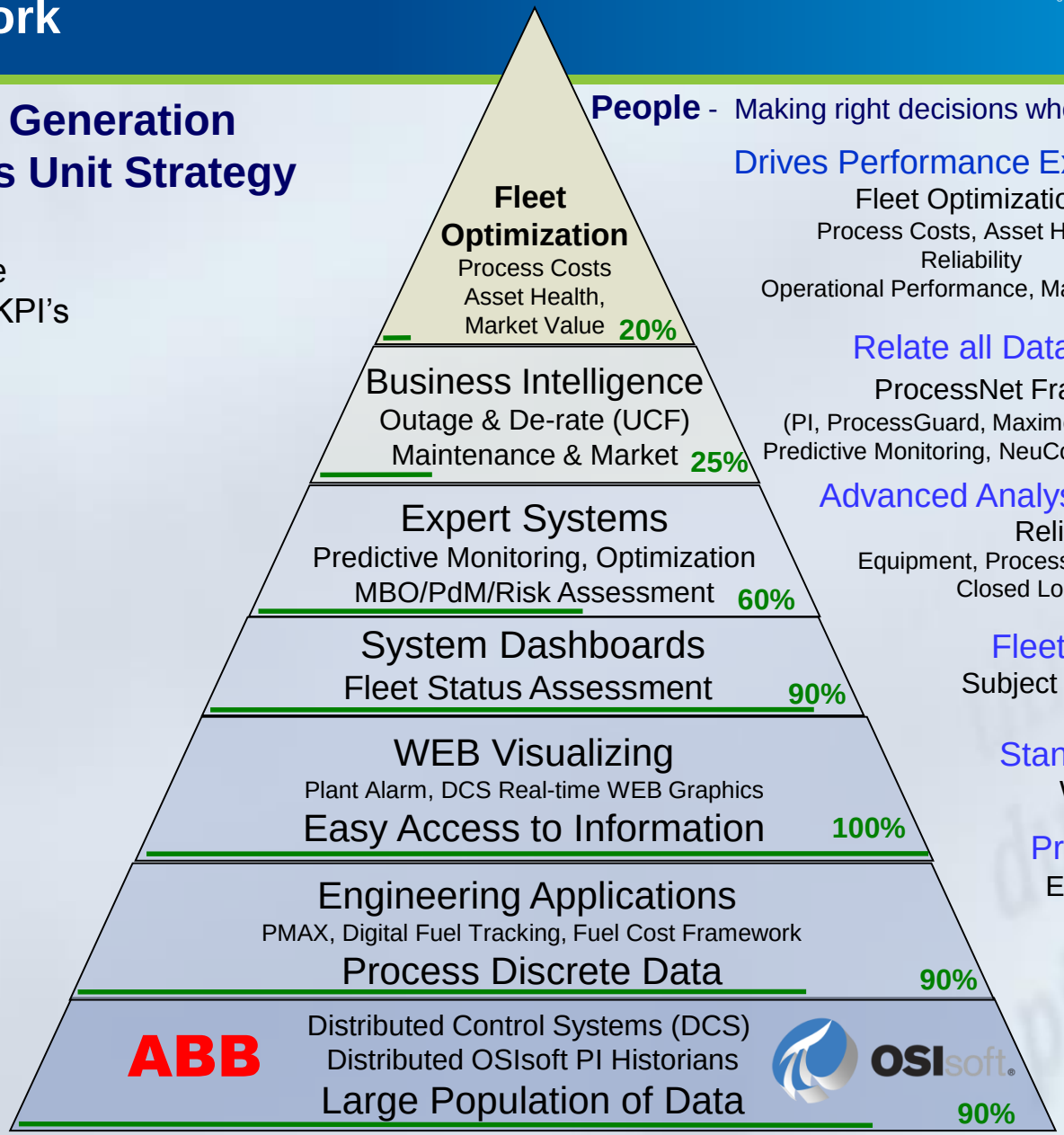
Control & Technology Framework

DTE Energy

Fossil Generation Business Unit Strategy

Actionable Information – KPI's

Discrete data Limited value



People - Making right decisions when it matters!

Drives Performance Excellence

Fleet Optimization

Process Costs, Asset Health, Reliability

Operational Performance, Market Value

Relate all Data Sources

ProcessNet Framework

(PI, ProcessGuard, Maximo, SAP, UCF, P3M, Predictive Monitoring, NeuCo, LIMS, Plant View ..)

Advanced Analysis & Process Optimization

Reliability Academy

Equipment, Process, Performance, Reliability Models

Closed Loop Process Optimization

Fleet Drill down

Subject Matter Experts

Standard User Interface

WEB Visualization

Process Discrete Data

Engineering Applications

PMAX, DFTS, eNote, Fuel Cost Framework, Alarm Management

Post Event Analysis

DCS, PLC & PI

% Complete

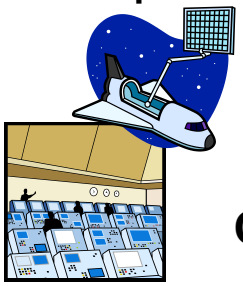
The Performance Center
The Door into the Fleet

Performance Center – Mission

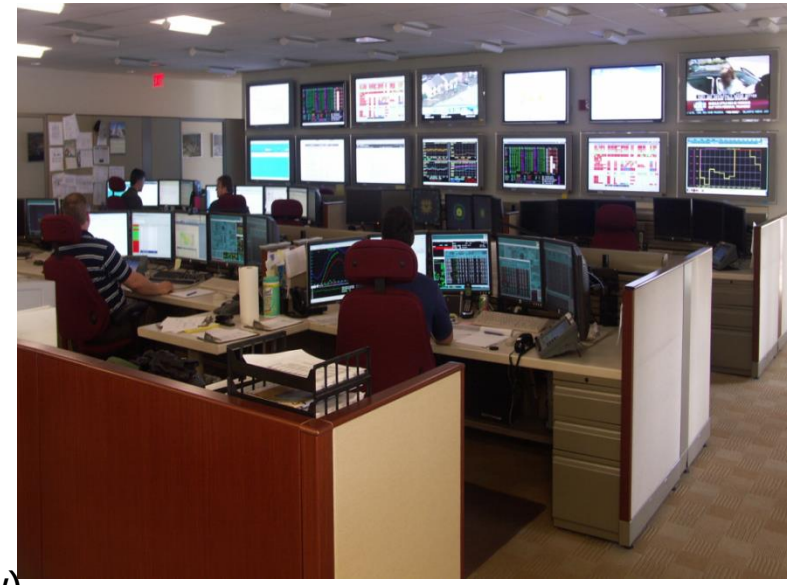
Equipment Performance Optimization of the Fossil Generation Portfolio through continuous "real time and **predictive** asset **condition monitoring**" to maximize the asset **market value**.

Performance Center – Vision

Fossil Generation's Fleet-wide "**Mission Control Center**" for continuous **monitoring** and **optimization** of plant equipment performance



Virtual Control Room - 23 Units



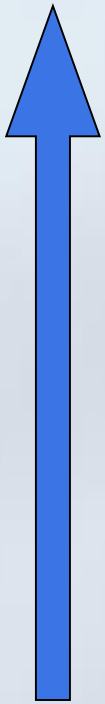
Operating View of Fleet

- Drives consistent practices (UCF)
- Market interface w/MOC
- Proficient users of technology
- SME rotation mutually beneficial
- Reliability tools (SmartSignal & Plant View)
- Input in the budget process

Control & Technology Framework

Fossil Generation
Business Unit Strategy

Actionable
Information – KPI's



Discrete data
Limited value

ABB

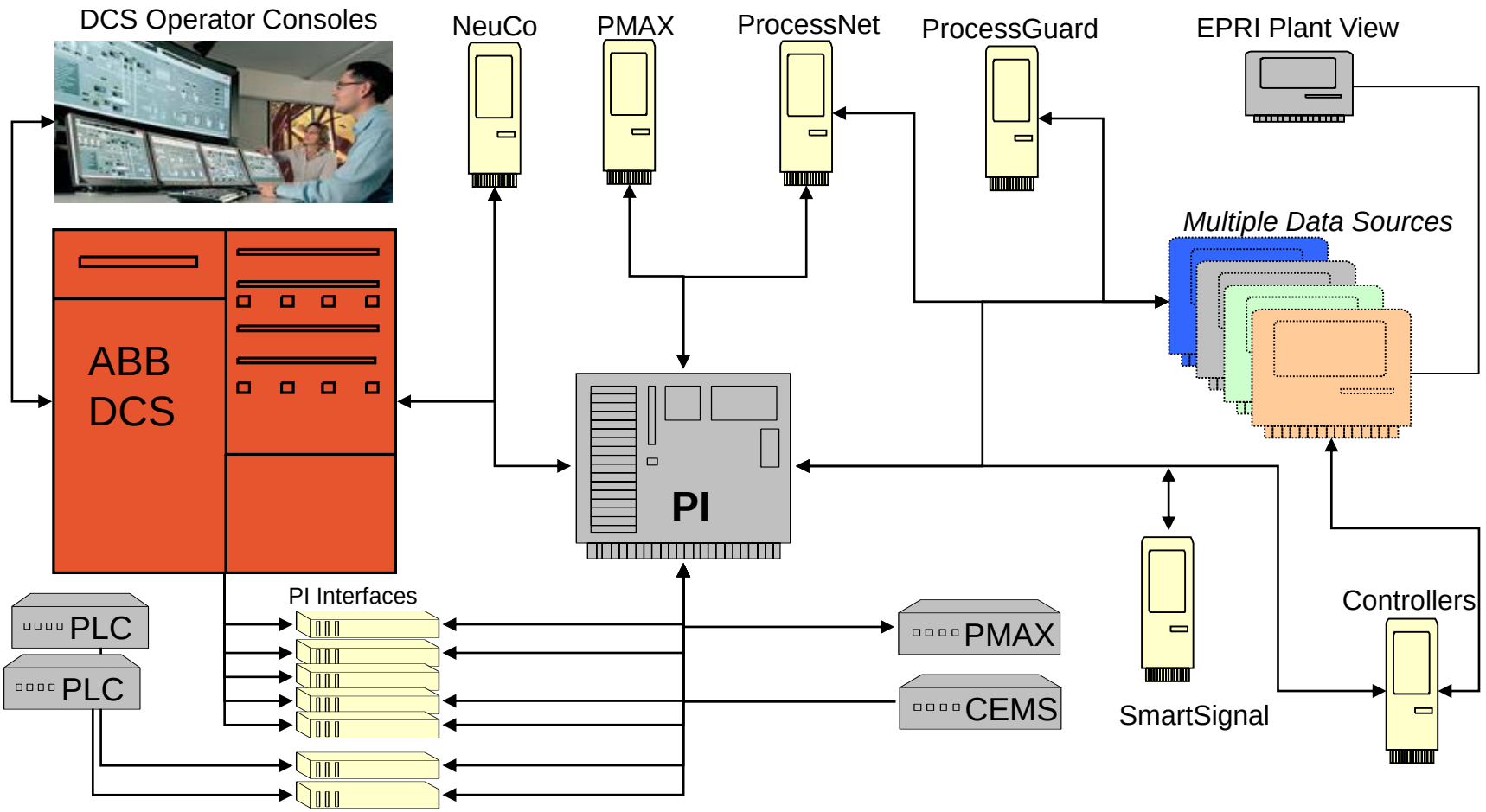
Distributed Control Systems (DCS)
Distributed OSIsoft PI Historians
Large Population of Data

OSIsoft

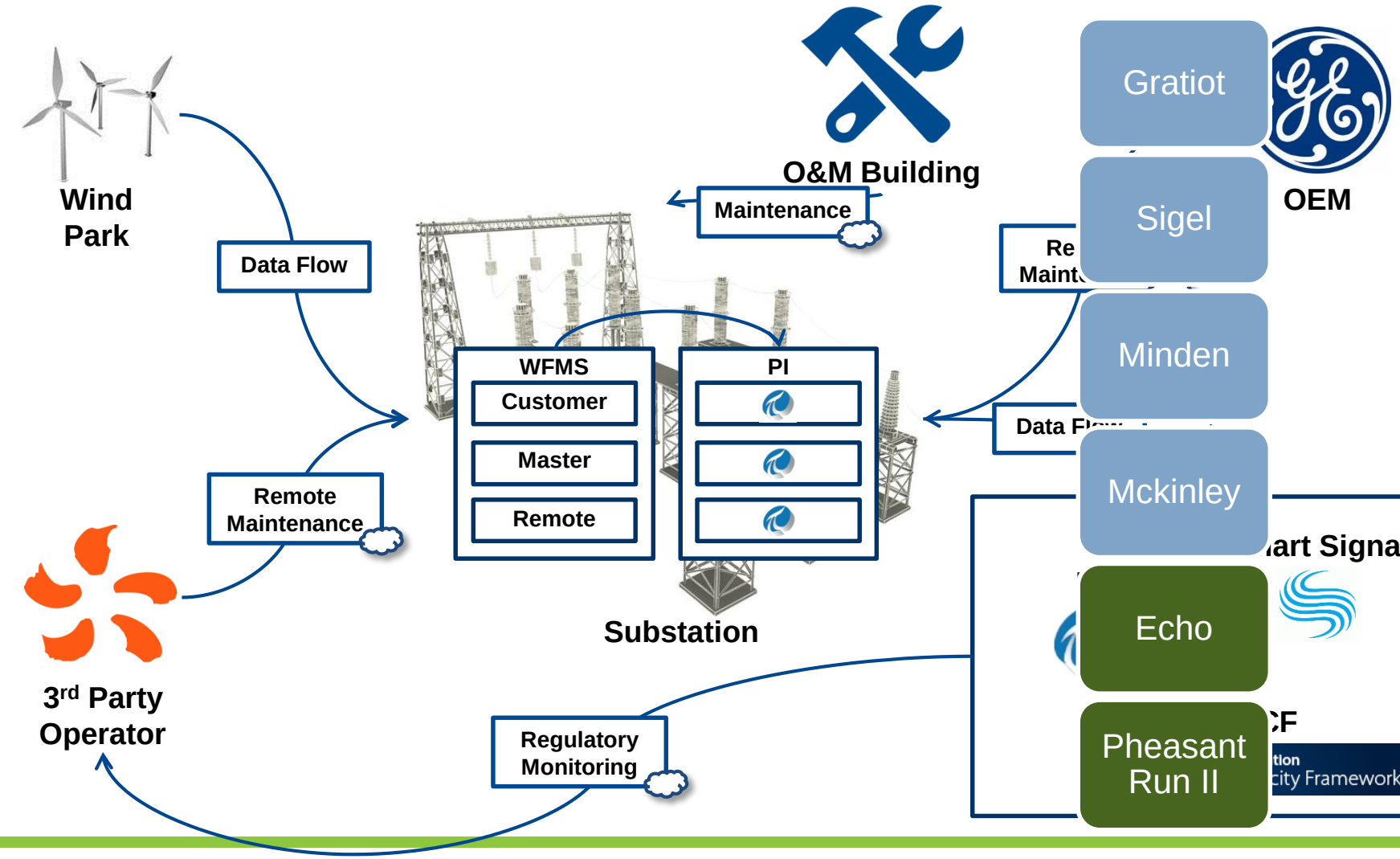
Plant Process Controls

- ABB Distributed Control Systems
  - All Units in the fleet
  - Installed investment $150 – $200 Million Dollars
  - Critical to
    - Plant Operation
    - Personnel Safety
    - Equipment Protection
- Many stand alone control systems.
- Process Information Historian (PI) & Interfaces

Control & Technology Infrastructure – Plants



Control & Technology Infrastructure – Wind Parks

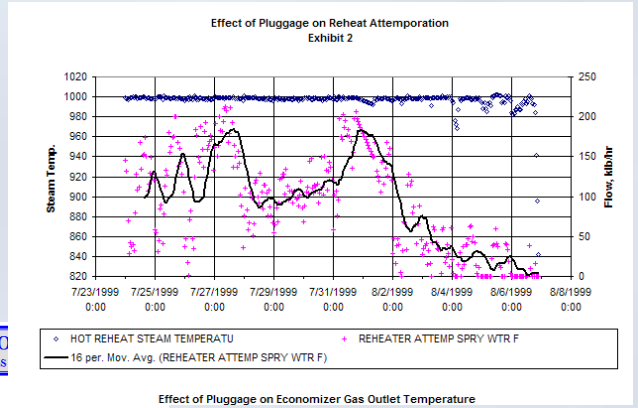


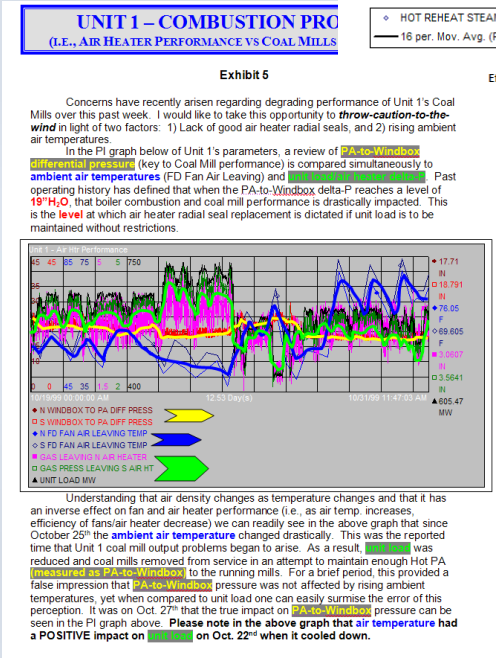
Denotes cloud networking

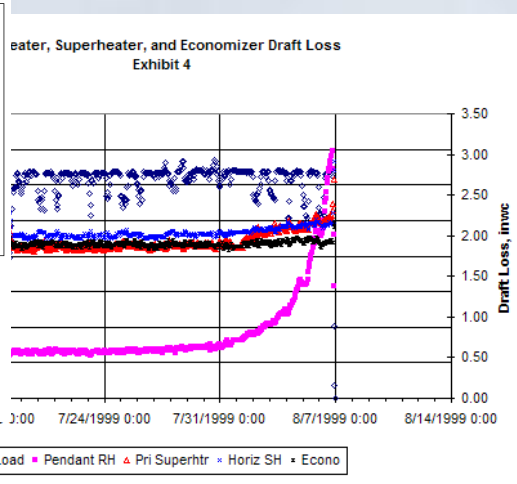
Raw PI Data Analysis

PI Yields Benefits

- Post trip analysis
- Process monitoring
- Optimization
- Early warning
- Alarming

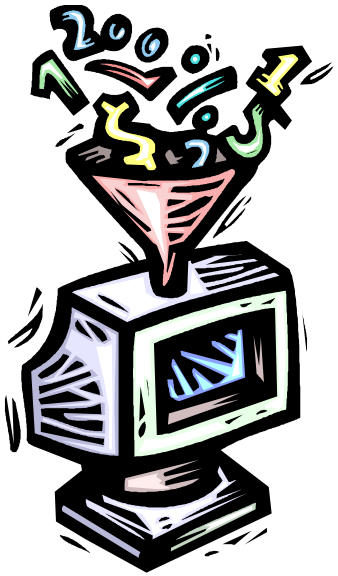


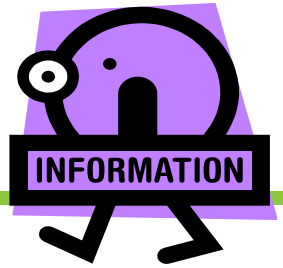




Challenge - Process Data Everywhere!

- **DCS** installations on nearly every unit
- Nearly **800,000** process data tags
  - PI Systems at each plant
  - PI Interfaces to DCS & many PLC's
- What is that **data screaming** at us?
- How do you effectively **utilize** the data?
- How do you turn data into **information**?

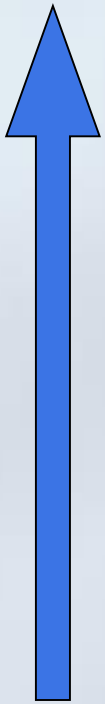




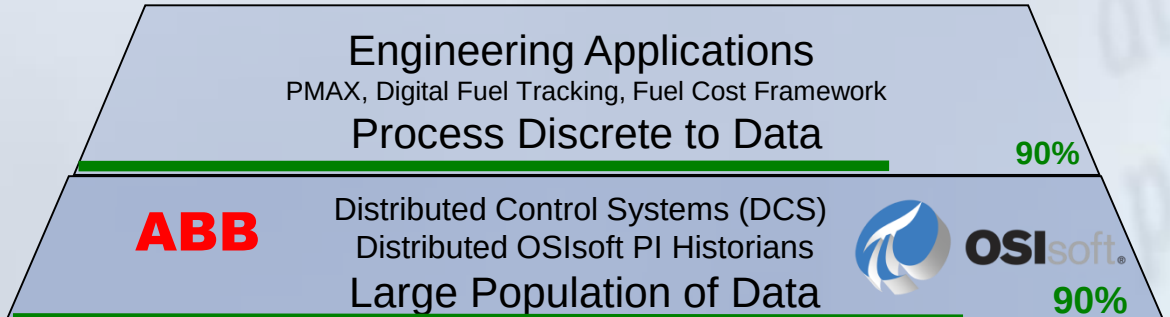
Control & Technology Framework

Fossil Generation Business Unit Strategy

Actionable Information – KPI's

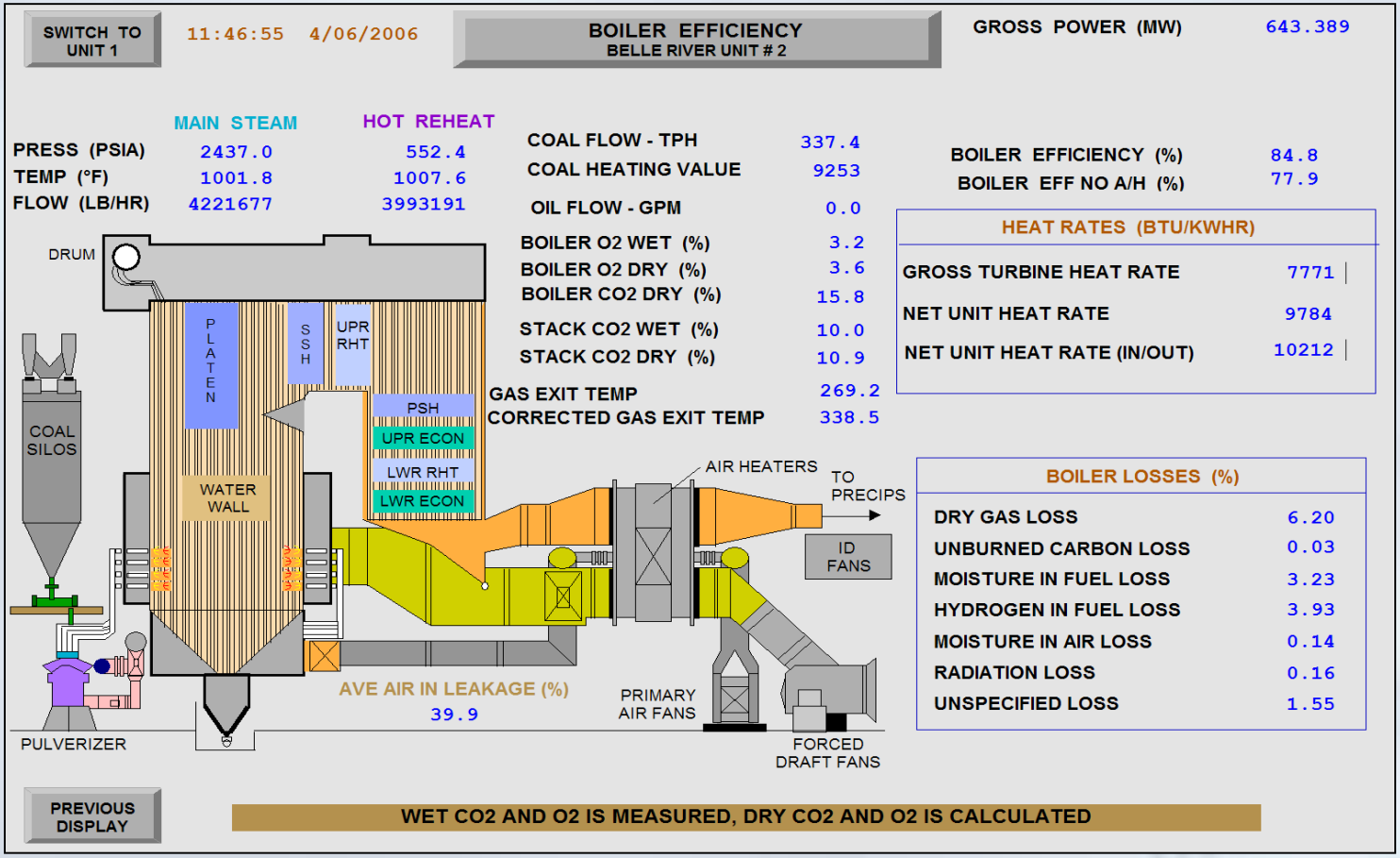


Discrete data Limited value

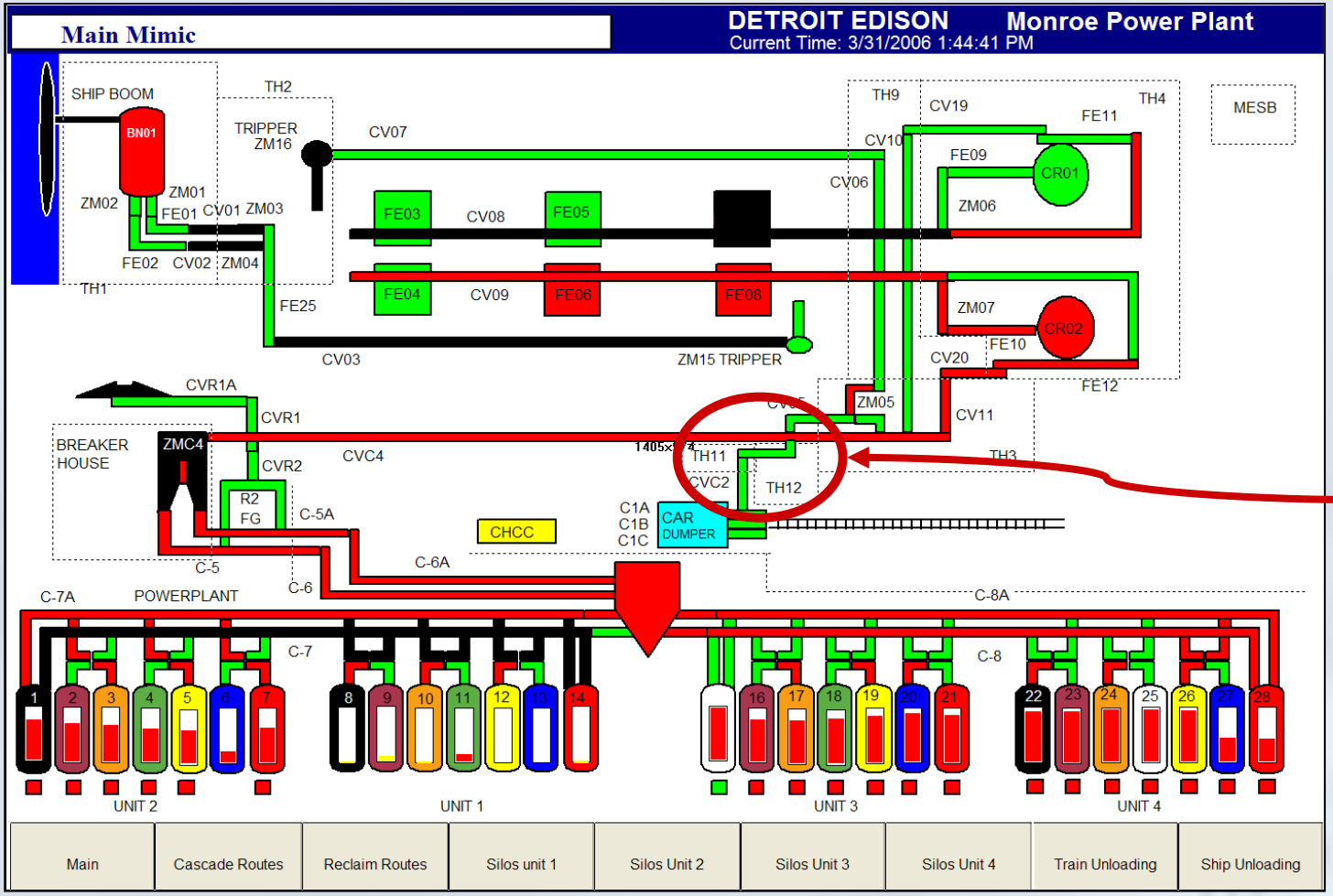


Fleet Performance Analysis (PMAX)

Thermal Performance Calculation Engine

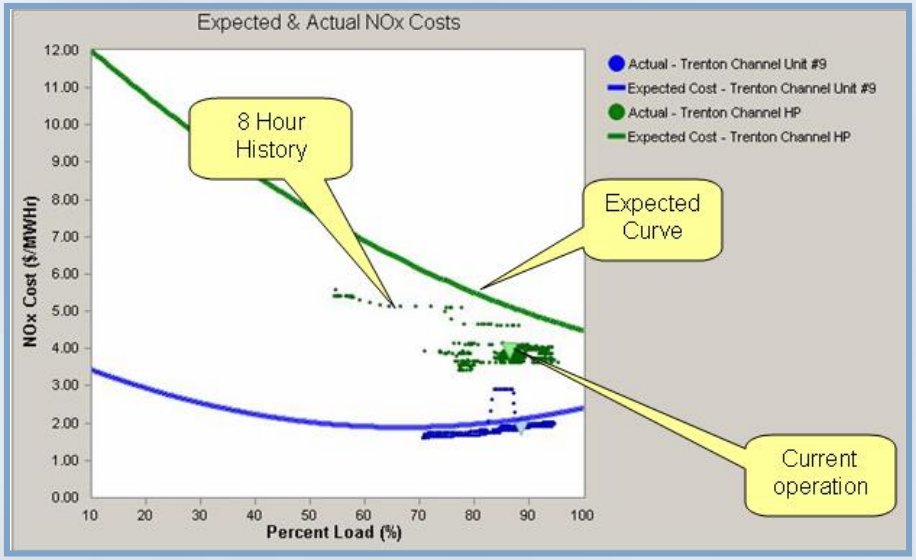


Digital Fuel Tracking System



On-line Fuel Analyzer

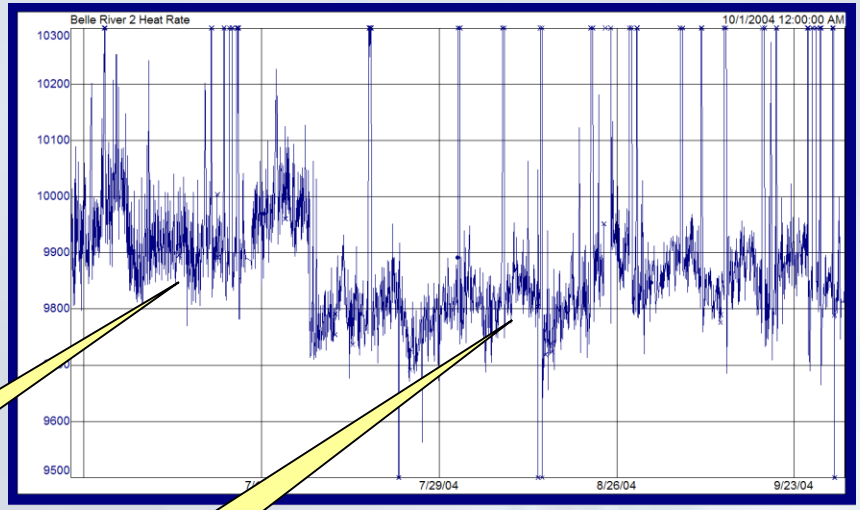
NOx Emissions Strategy



NOx Reduction with Improved Heatrate

Before Implementation

After Implementation



Primary focus is NOx reduction only

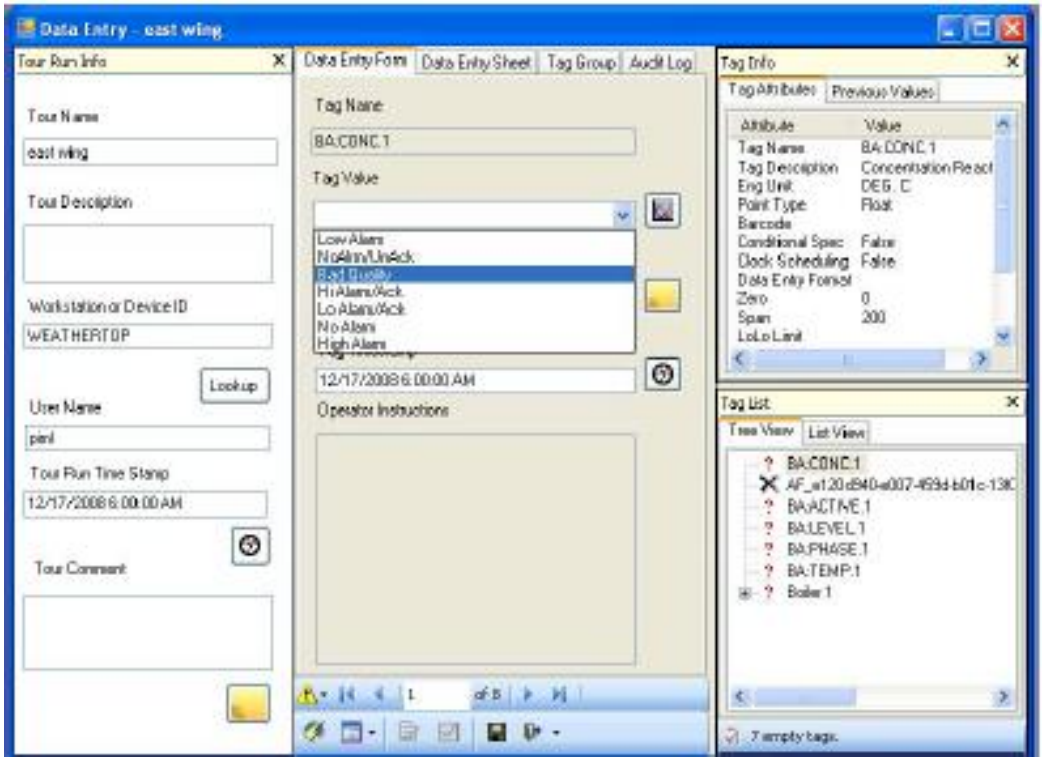
Focus on operating near NOx budget curve

Electronic Operator Rounds
RFID Technology / PI Manual Logger

RFID Tags

Industrial PDA (Symbol MC9060S)

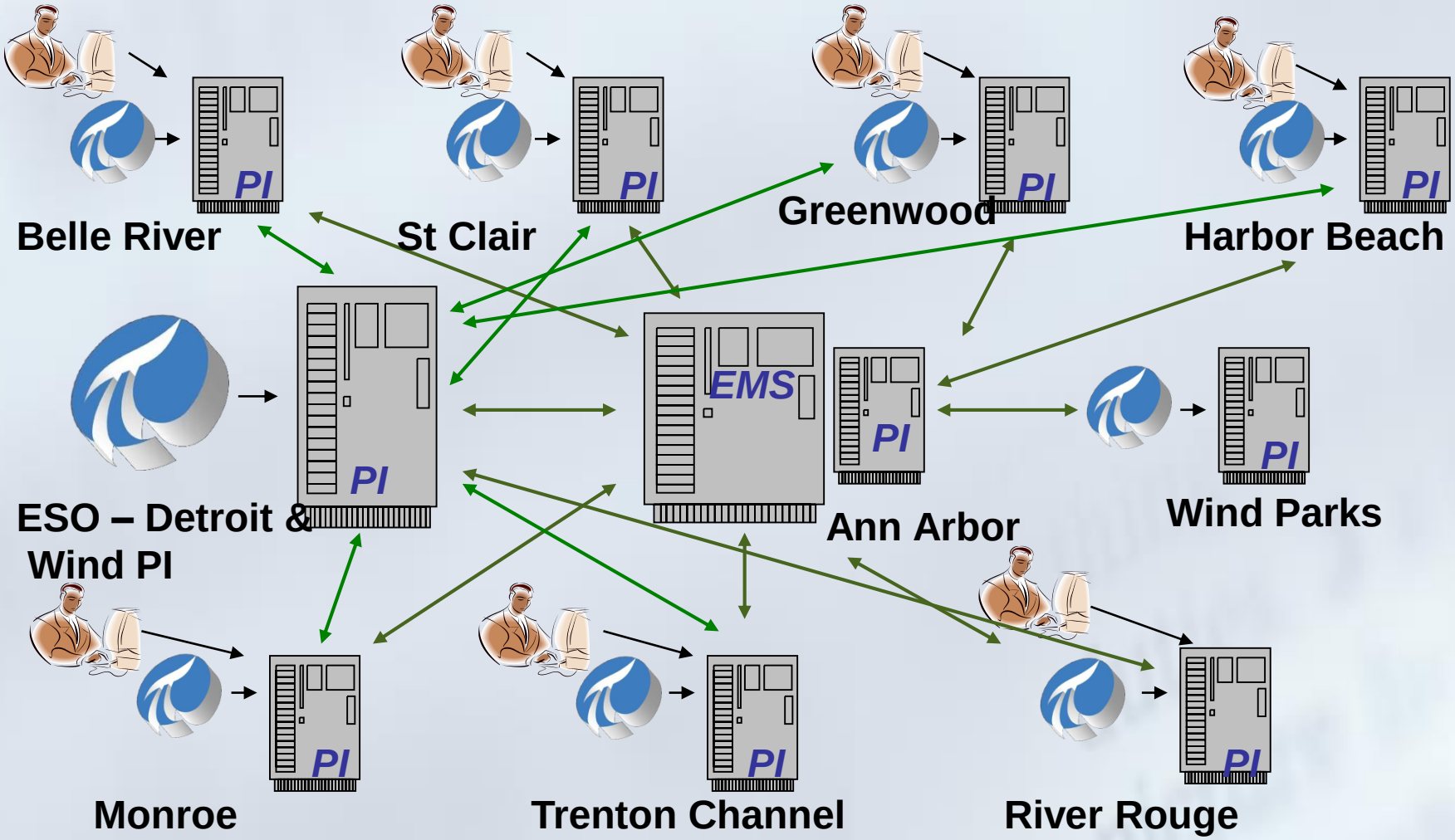
Tablets



PI Manual Logger

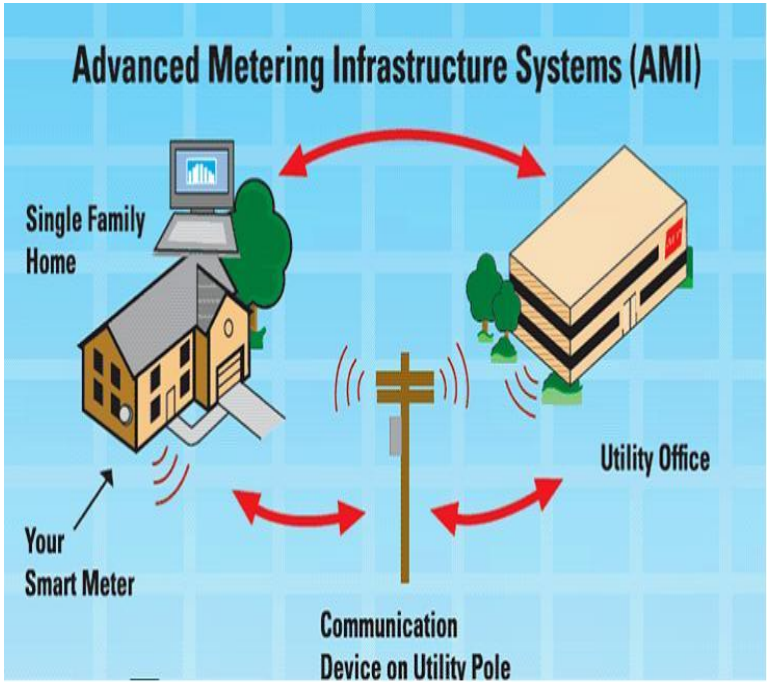
PI to PI Process Data Conduit

DTE Energy



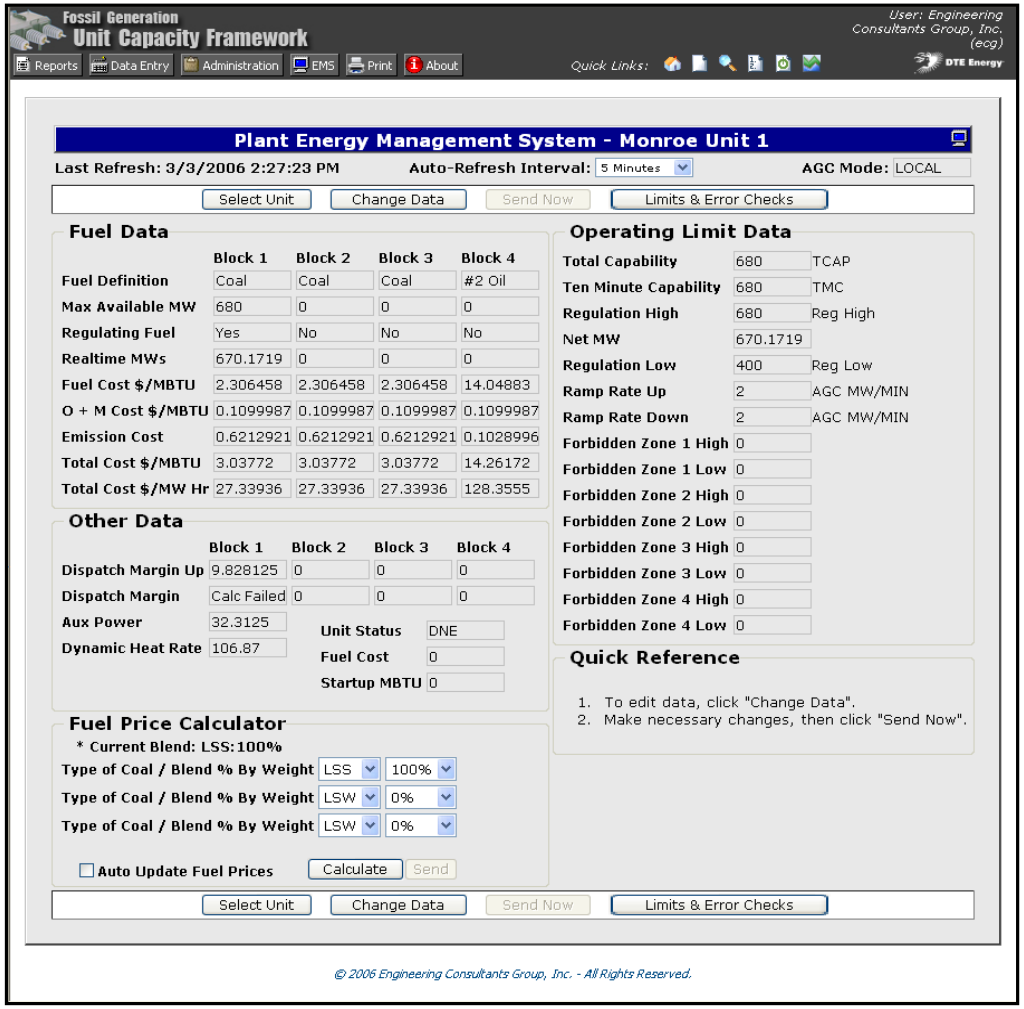
PI Advanced Metering Infrastructure (AMI)

- Implemented an extensive PI Infrastructure for AMI data
- MSP Interface to capture
- 8 Server PI Farm
- 1 Million Plus meters data
- 25 Million PI tags and growing

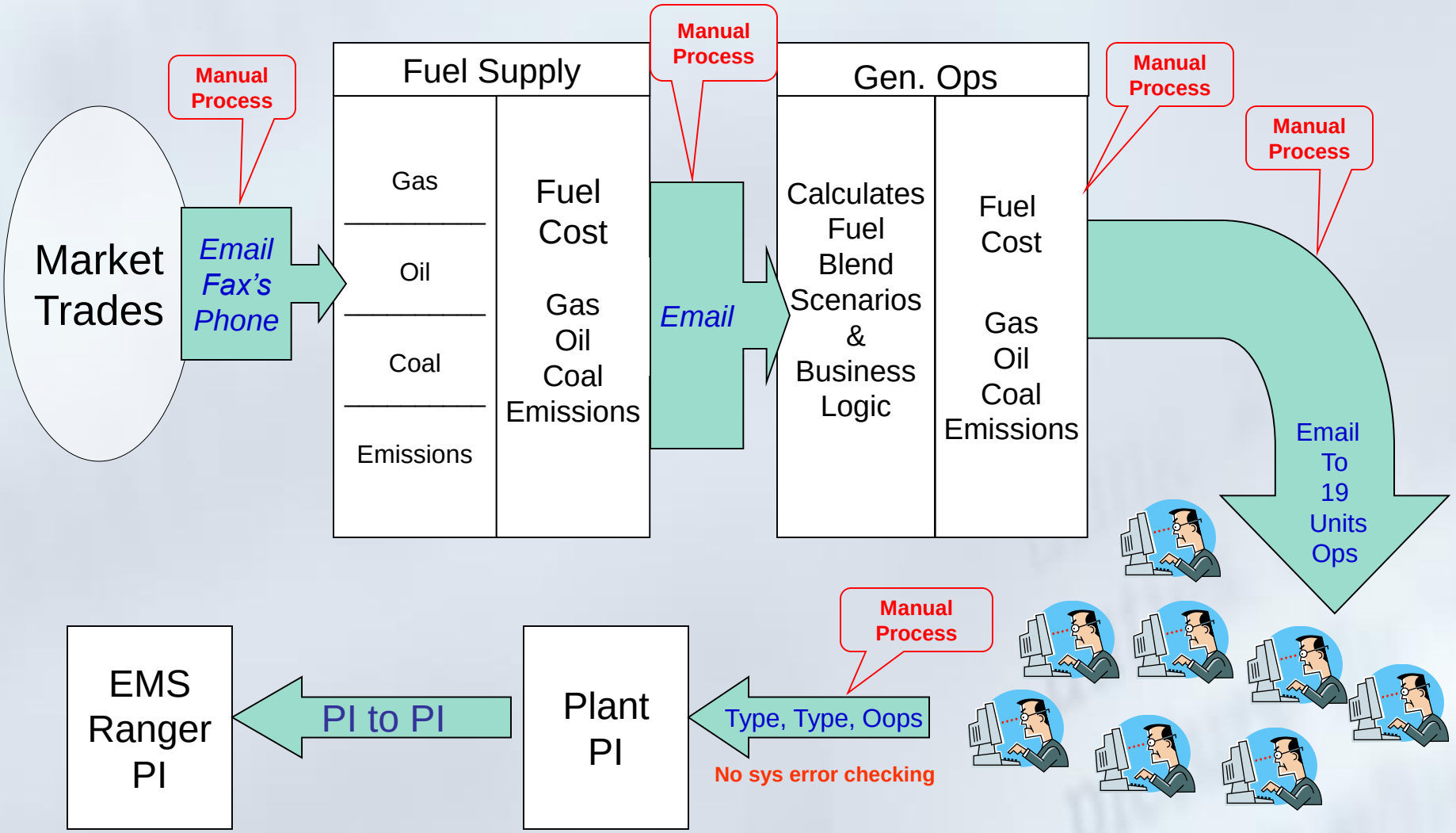


Energy Management System (EMS)

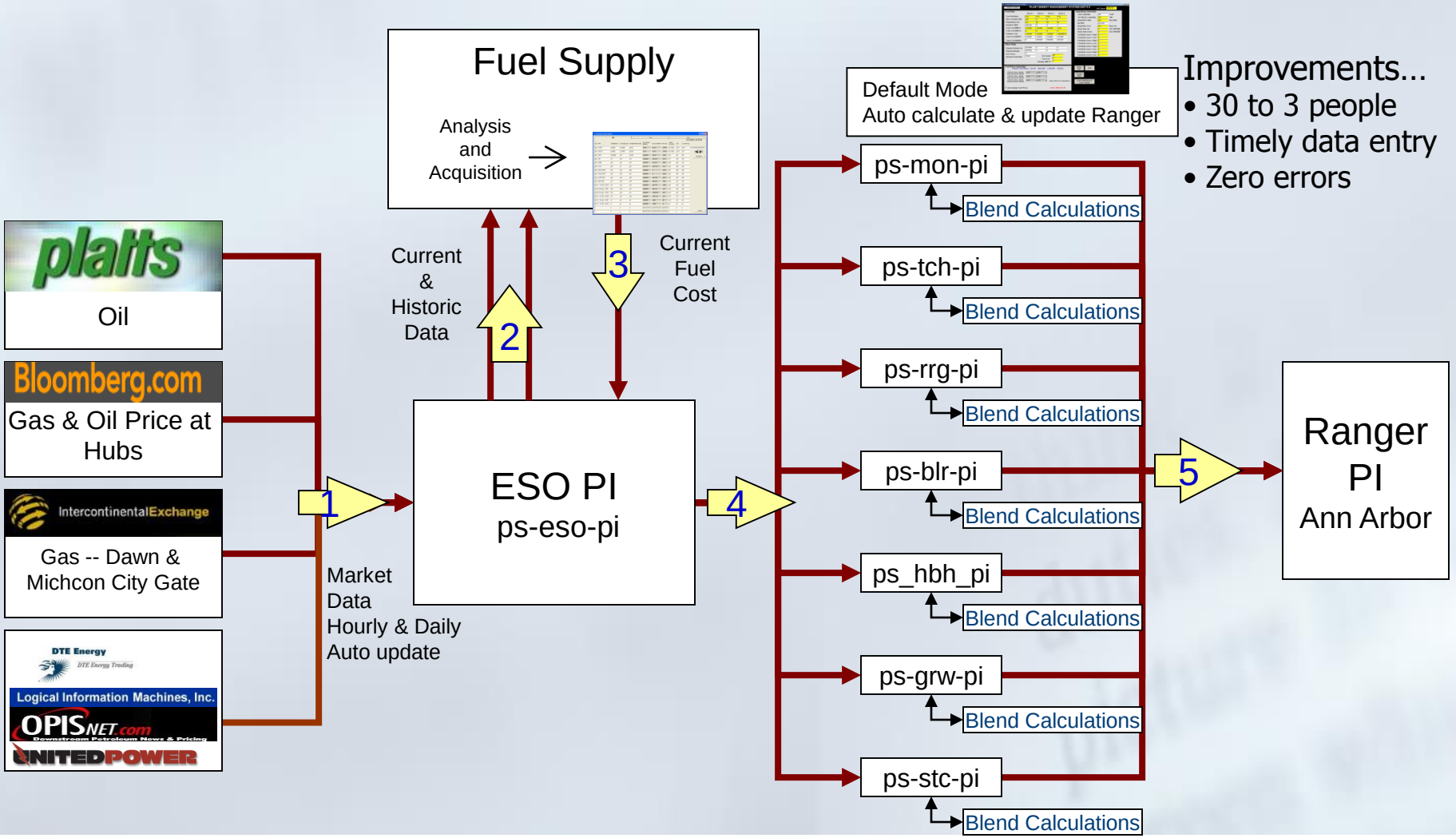
- The Plant Energy Management System is used to automatically control unit dispatch
- Implements data validation on all fields
- Performs several calculations based on PI data to determine validity of inputs.
- Transported to EMS Ranger via PI



Before Fuel Cost Framework



Fuel Cost Framework



PI to PI (AGC)

AGC – Automatic Generation Control

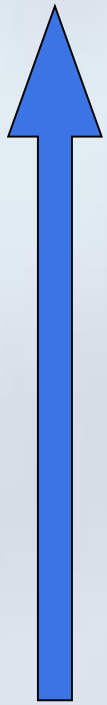
5 largest Fossil units & Peaking Units are ramped through PI Set Point control

Control & Technology Framework

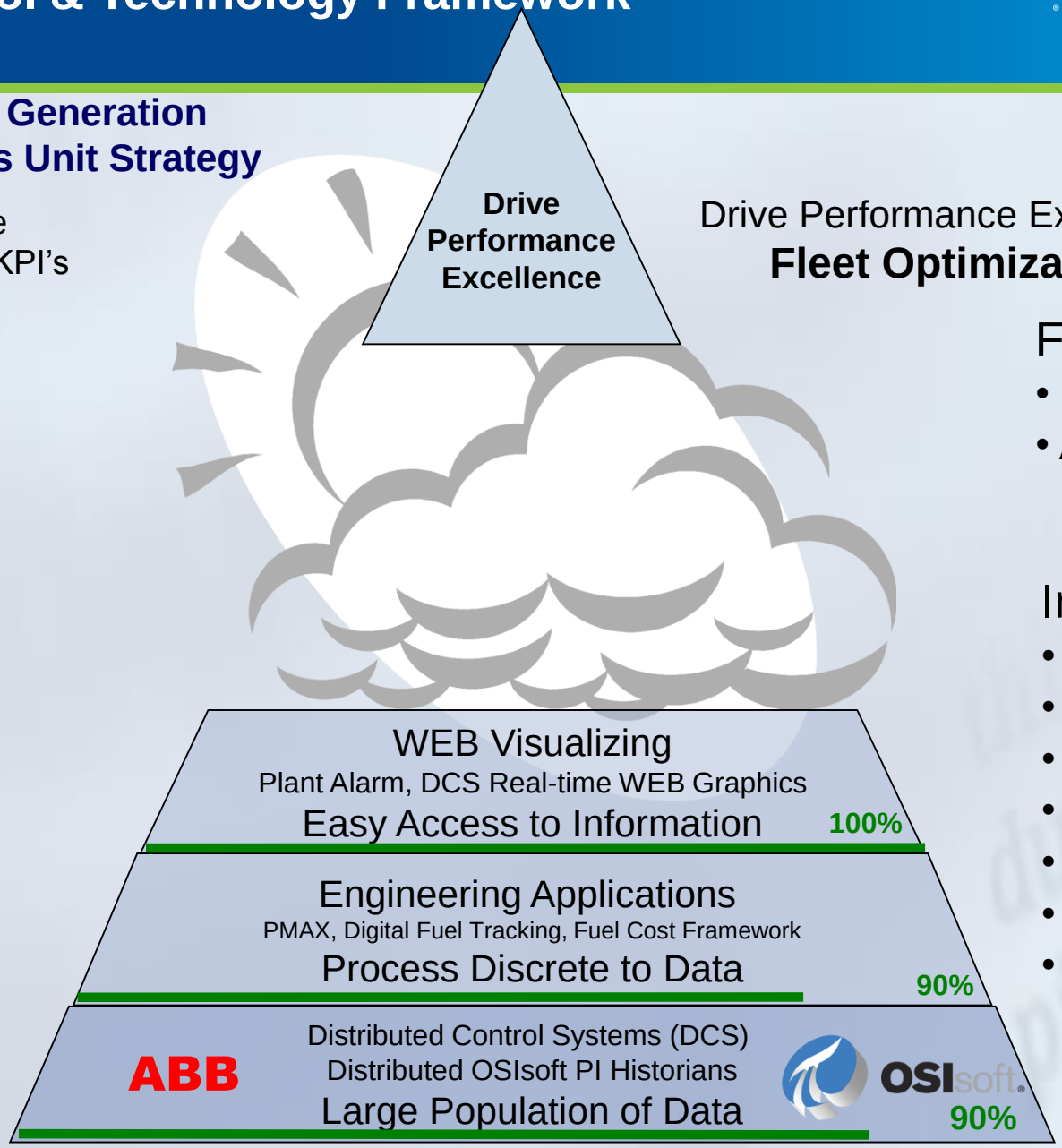
DTE Energy

Fossil Generation Business Unit Strategy

Actionable Information – KPI's



Discrete data
Limited value

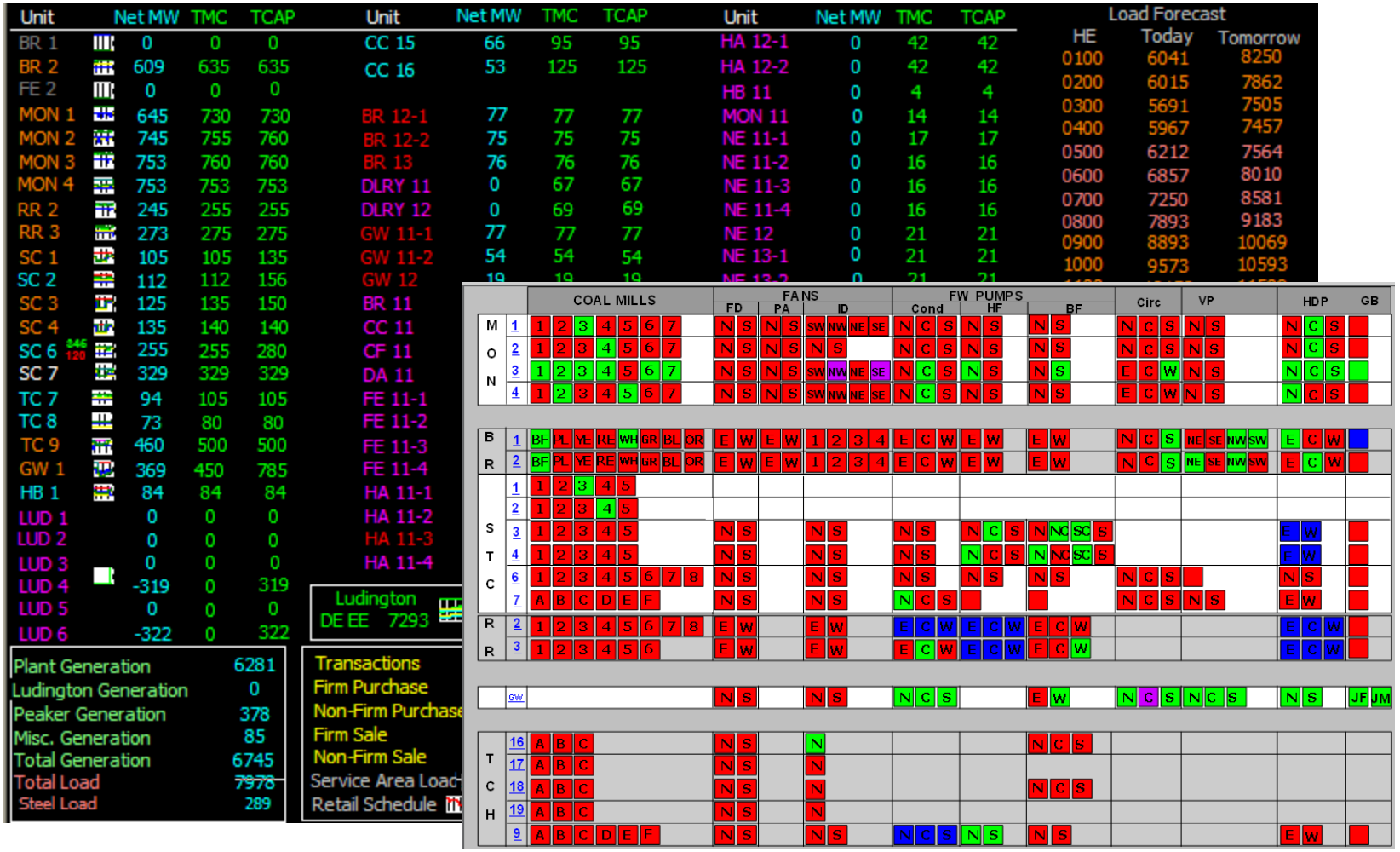


Drive Performance Excellence
Fleet Optimization

Fleet Perspective
- Methods
- Applications

Involves
- Operation
- Performance
- MISO Market
- Reliability
- Maintenance
- Reporting
- Budget

Fleet Status – PI WEB enabled



Unit	Net MW	TMC	TCAP
BR 1	0	0	0
BR 2	609	635	635
FE 2	0	0	0
MON 1	645	730	730
MON 2	745	755	760
MON 3	753	760	760
MON 4	753	753	753
RR 2	245	255	255
RR 3	273	275	275
SC 1	105	105	135
SC 2	112	112	156
SC 3	125	135	150
SC 4	135	140	140
SC 6	255	255	280
SC 7	329	329	329
TC 7	94	105	105
TC 8	73	80	80
TC 9	460	500	500
GW 1	369	450	785
HB 1	84	84	84
LUD 1	0	0	0
LUD 2	0	0	0
LUD 3	0	0	0
LUD 4	-319	0	319
LUD 5	0	0	0
LUD 6	-322	0	322

Unit	Net MW	TMC	TCAP
CC 15	66	95	95
CC 16	53	125	125
BR 12-1	77	77	77
BR 12-2	75	75	75
BR 13	76	76	76
DLRY 11	0	67	67
DLRY 12	0	69	69
GW 11-1	77	77	77
GW 11-2	54	54	54
GW 12	19	19	19
BR 11			
CC 11			
CF 11			
DA 11			
FE 11-1			
FE 11-2			
FE 11-3			
FE 11-4			
HA 11-1			
HA 11-2			
HA 11-3			
HA 11-4			

Unit	Net MW	TMC	TCAP
HA 12-1	0	42	42
HA 12-2	0	42	42
HB 11	0	4	4
MON 11	0	14	14
NE 11-1	0	17	17
NE 11-2	0	16	16
NE 11-3	0	16	16
NE 11-4	0	16	16
NE 12	0	21	21
NE 13-1	0	21	21

Load Forecast HE	Today	Tomorrow
0100	6041	8250
0200	6015	7862
0300	5691	7505
0400	5967	7457
0500	6212	7564
0600	6857	8010
0700	7250	8581
0800	7893	9183
0900	8893	10069
1000	9573	10593

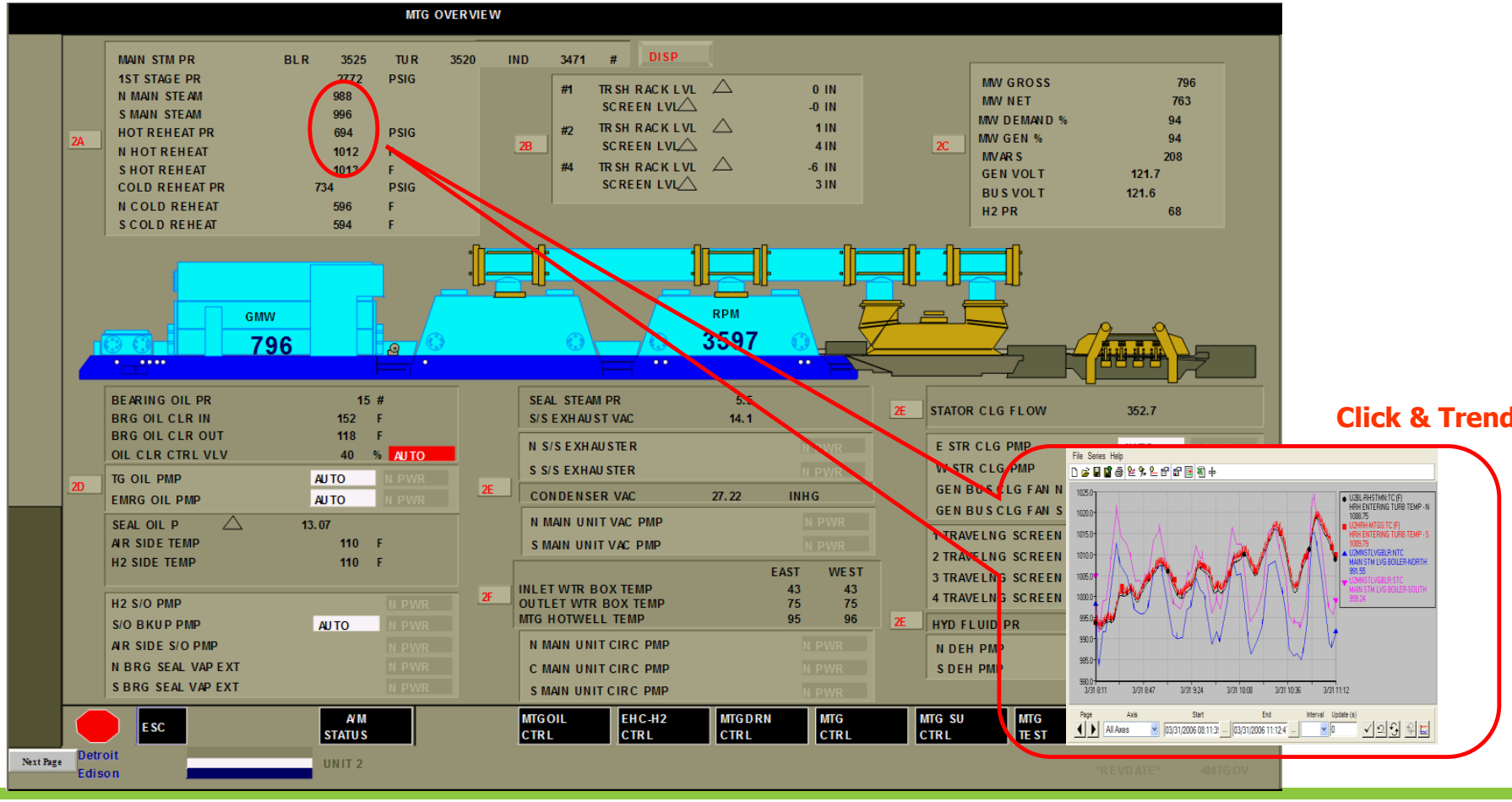
Plant Generation	6281
Ludington Generation	0
Peaker Generation	378
Misc. Generation	85
Total Generation	6745
Total Load	7978
Steel Load	289

Ludington DE EE 7293

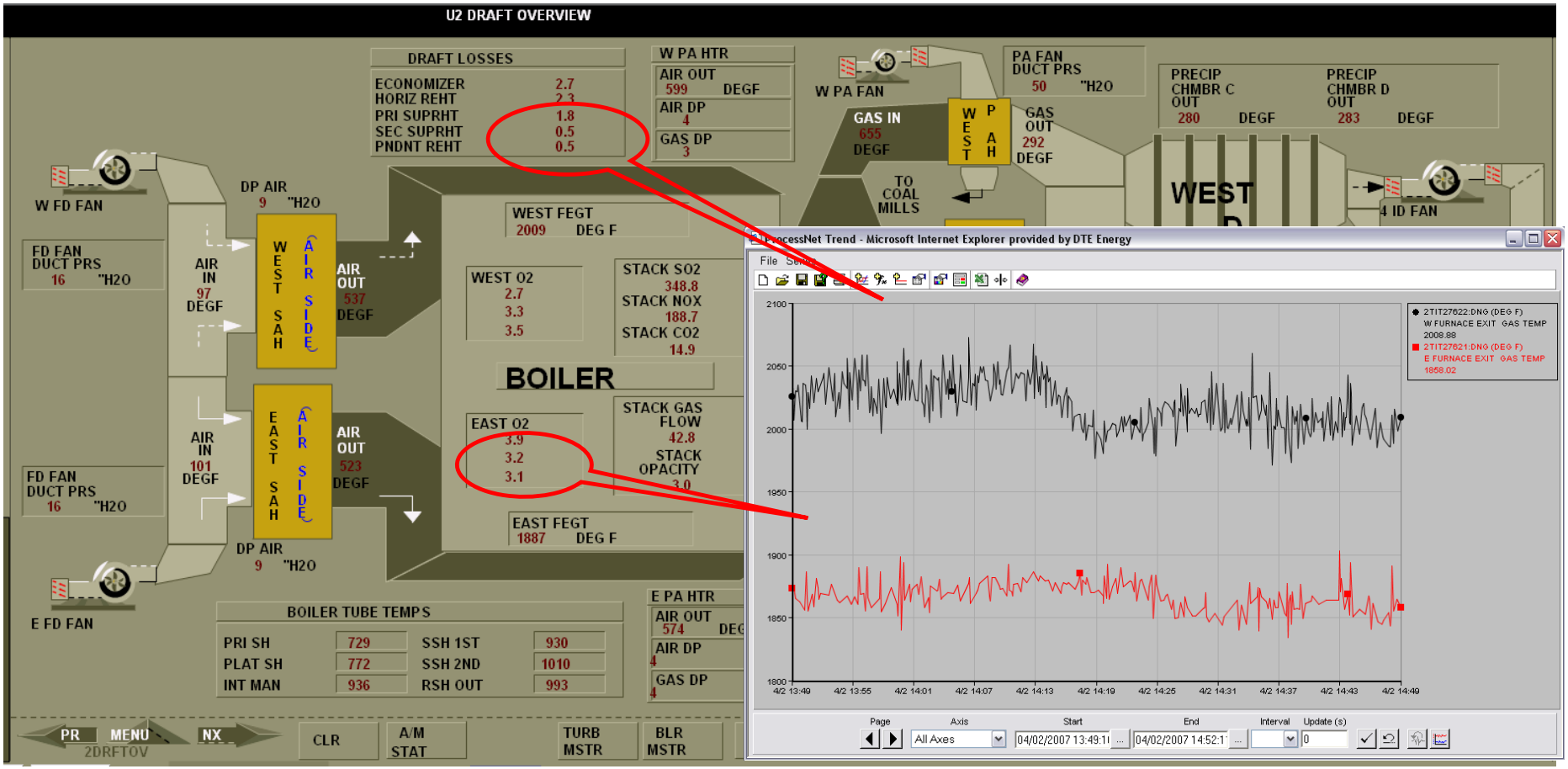
Transactions
Firm Purchase
Non-Firm Purchase
Firm Sale
Non-Firm Sale
Service Area Load
Retail Schedule

Real-Time DCS Operator Displays

6000 real time dynamic actively linked WEB DCS graphics

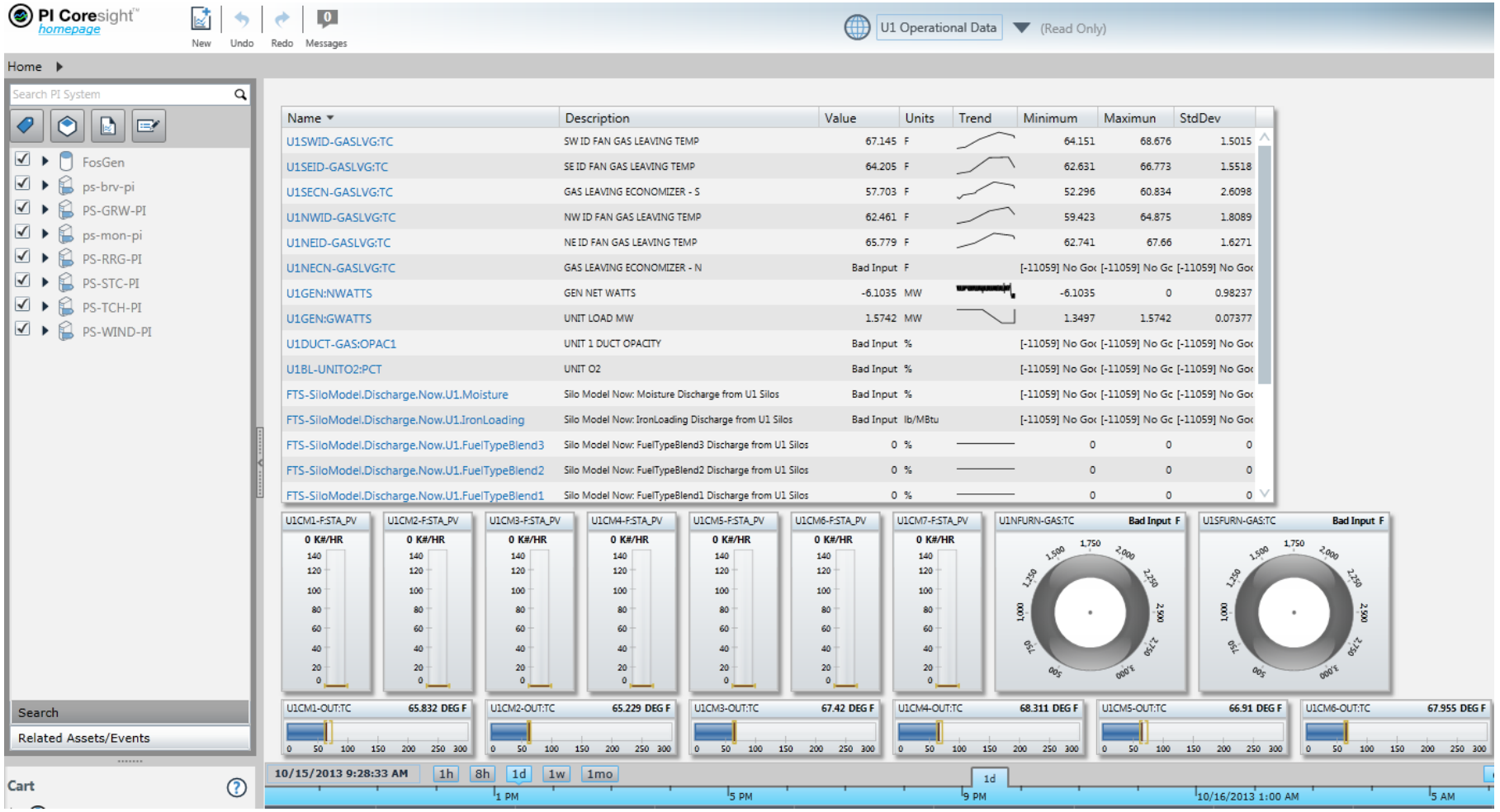


PI enabled - Event Re-play

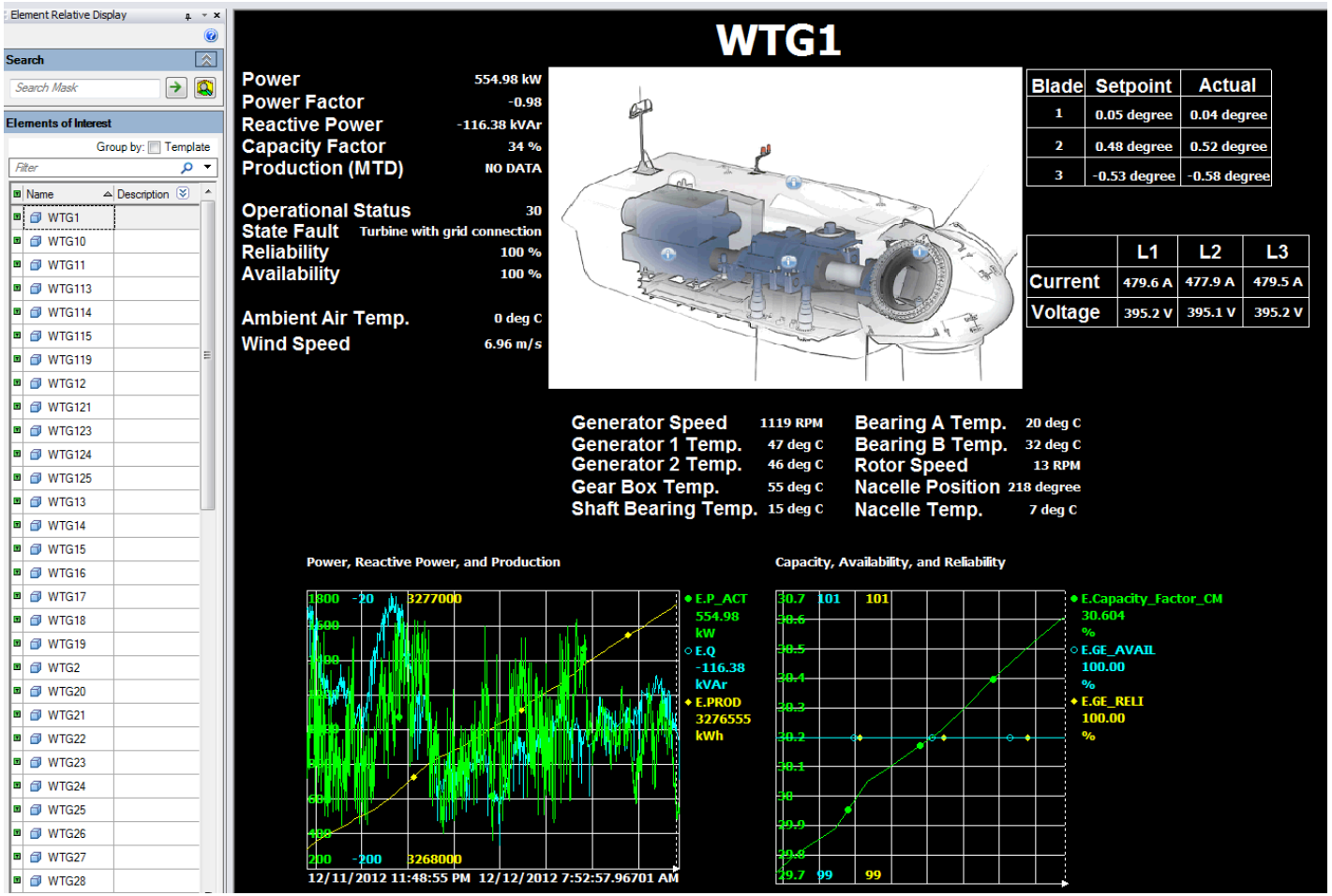


Re-play events using historical PI data

PI Coresight Displays



Real-Time Wind Turbine Display



DTE Energy

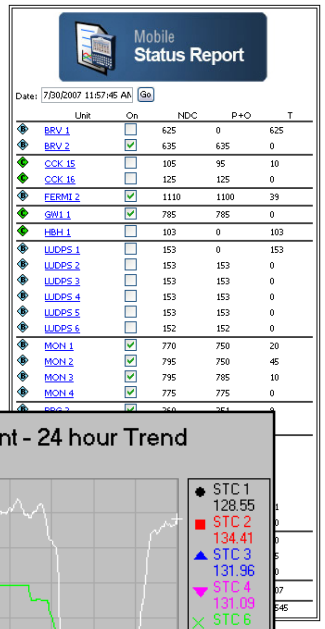
Mobile Work Force

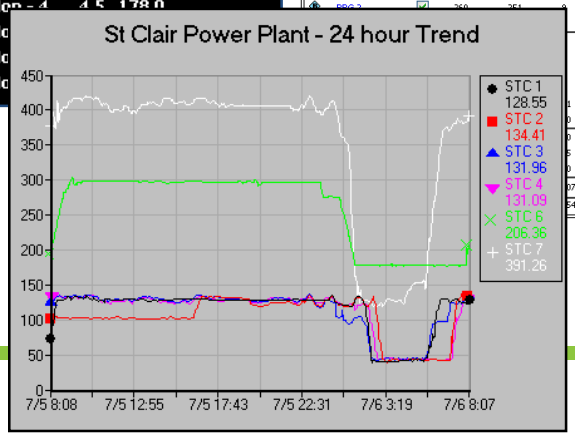
PI WEB reports available on your Mobile Device

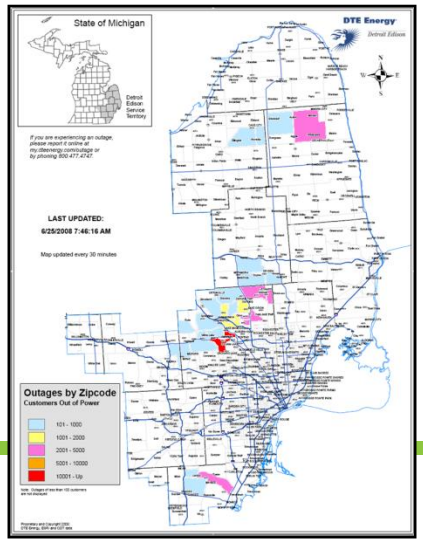
Unit	Net MW	TMC	TCAP
BR 1	601	625	625
BR 2	609	635	635
FE 2	1103	1103	1103
MON 1	523	770	770
MON 2	13	13	13
MON 3	404	785	785
MON 4	513	565	775
RR 2	193	251	251
RR 3	243	243	276
SC 1	121	125	125
SC 2	125	125	125
SC 3	125	125	125
SC 4	124	125	125
SC 6	183	270	270

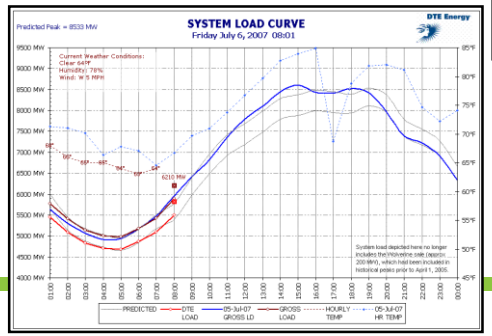
Unit	GrossMW	Rev/Min
Monroe Unit 1	547	3,599
Monroe Unit 2	44	3,600
Monroe Unit 3	438	3,599
Monroe Unit 4	545	3,599

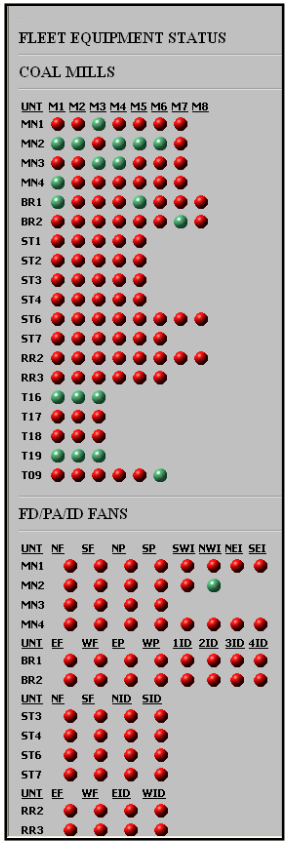
Bearing	Vibr	Temp
1 Mon - 12	0.8	168.0
1 Mon - 11	2.4	144.1
1 Mon - 10	2.7	156.4
1 Mon - 9	1.9	172.7
1 Mon - 8	3.2	166.2
1 Mon - 7	4.4	160.0
1 Mon - 6	1.3	177.4
1 Mon - 5	0.4	173.1
1 Mon - 4	4.5	178.0
1 Mo		
1 Mo		
1 Mo		







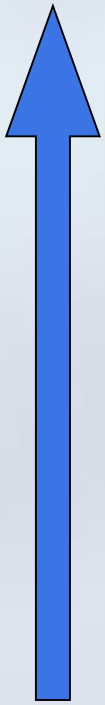




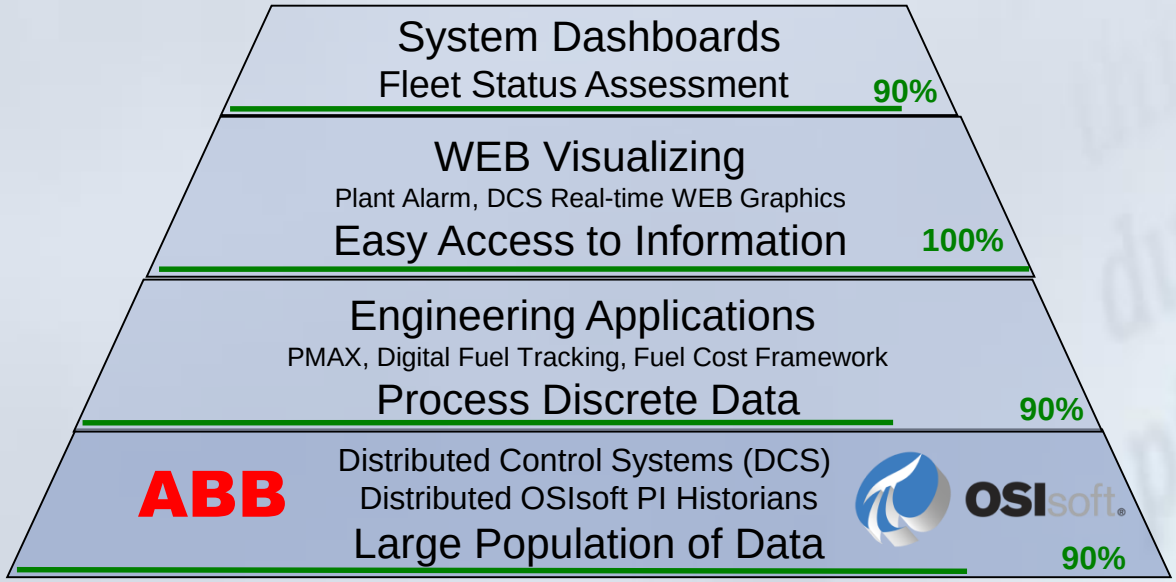
Control & Technology Framework

Fossil Generation Business Unit Strategy

Actionable Information – KPI's

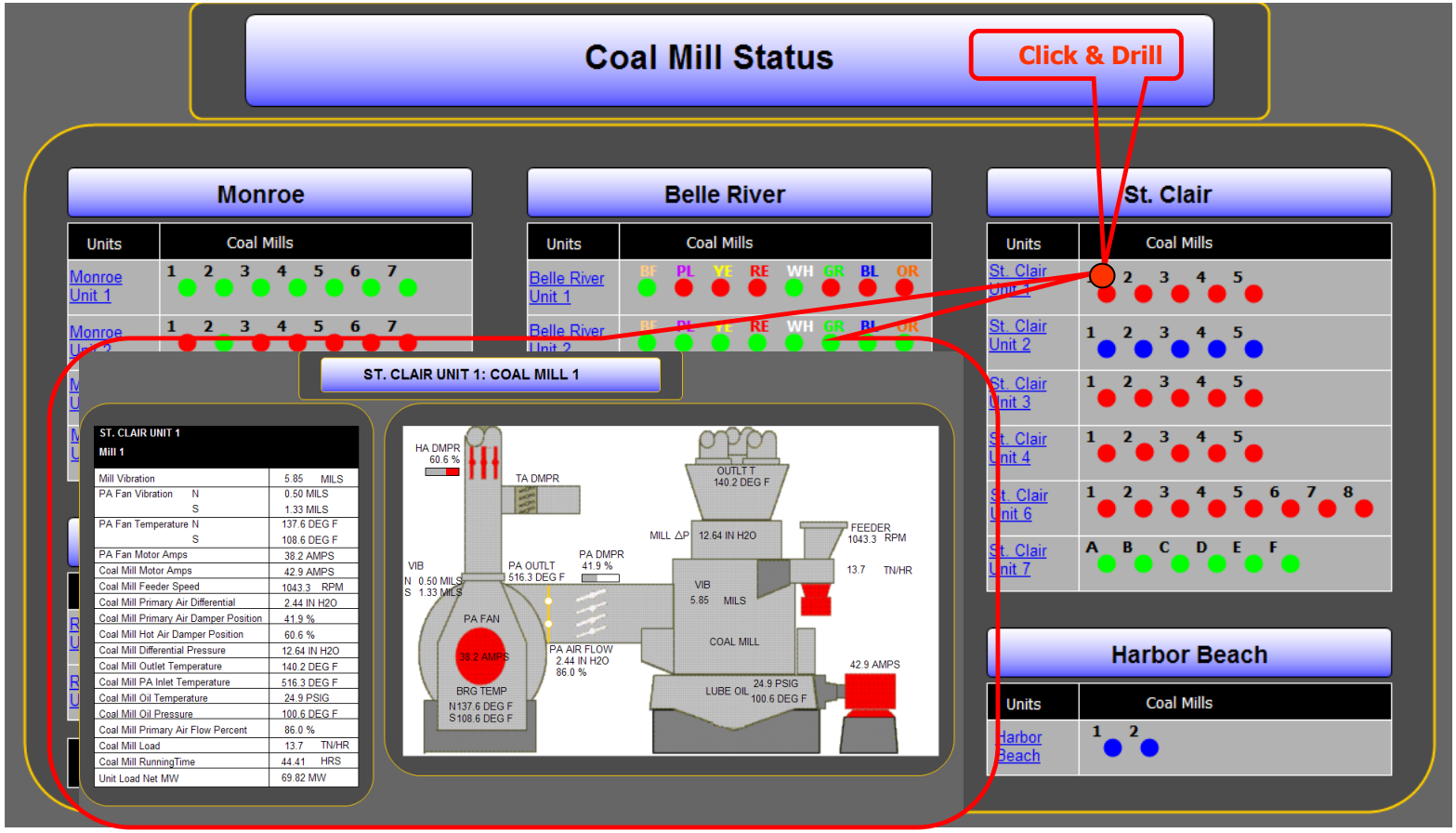


Discrete data Limited value



System Dashboards – PI Enabled

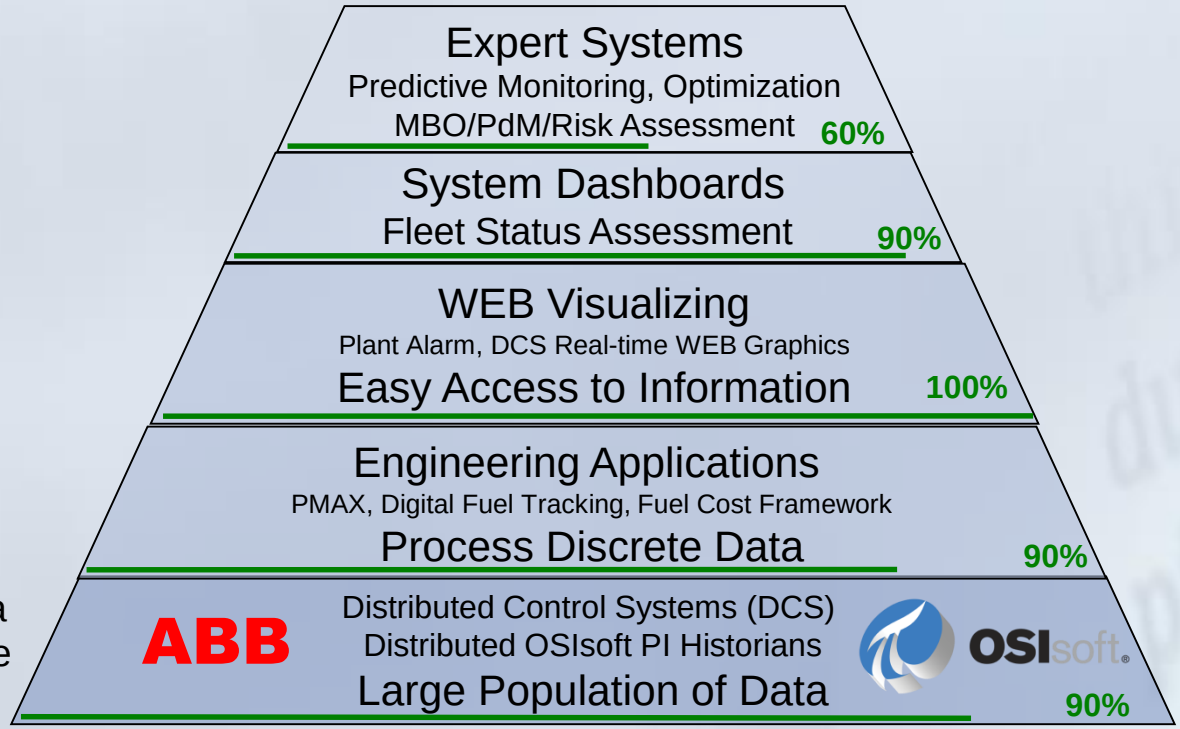
2000 real time dynamic actively linked WEB System graphics



Control & Technology Framework

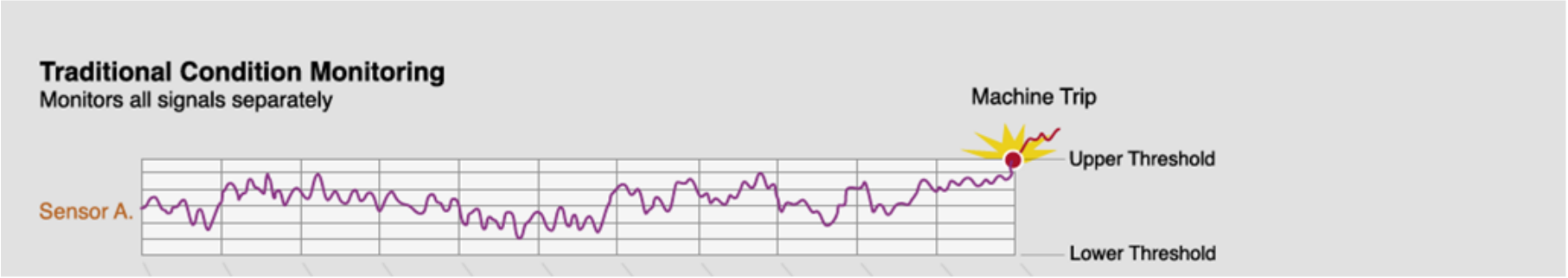
Fossil Generation Business Unit Strategy

Actionable Information – KPI's

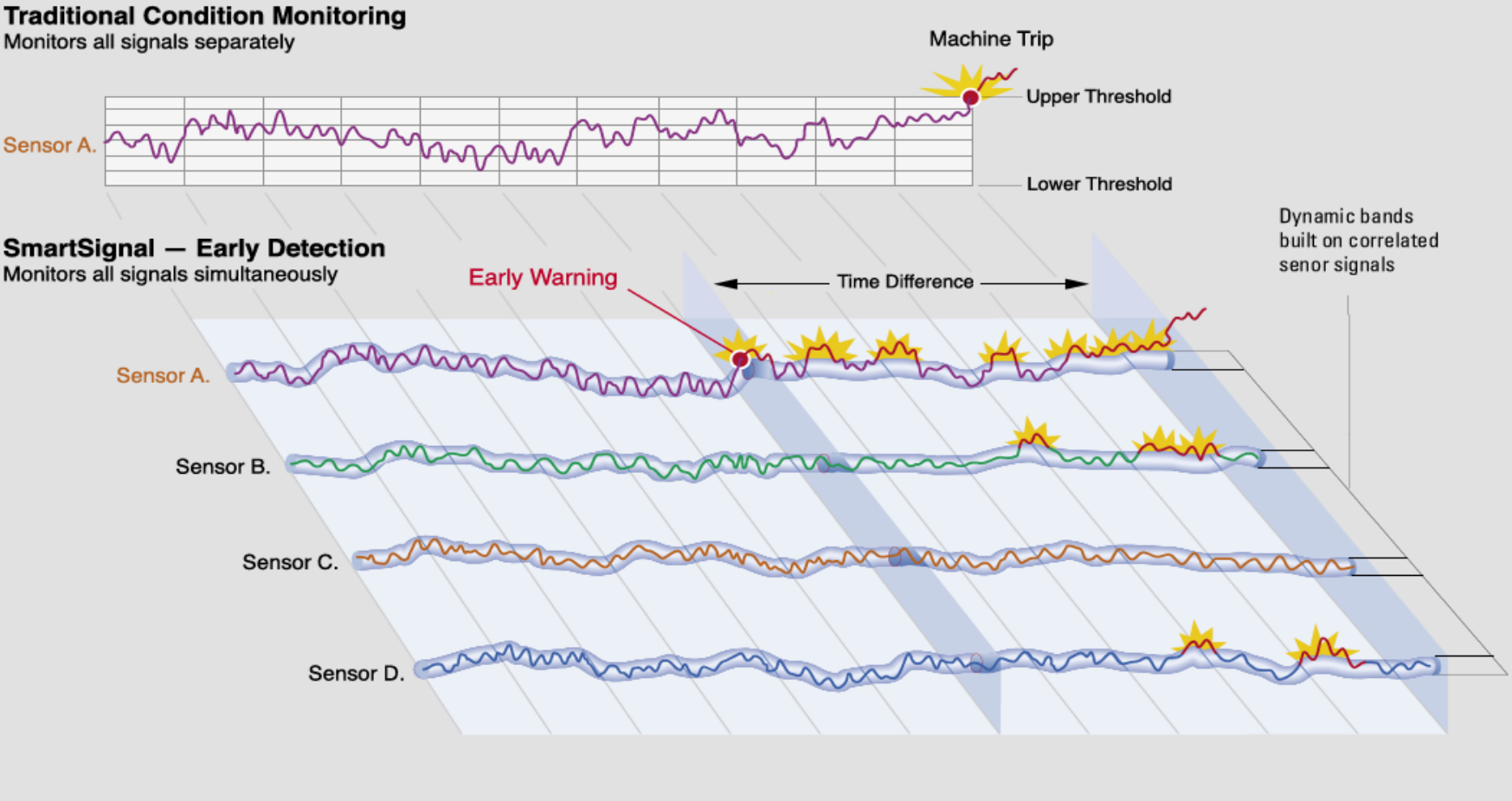


Discrete data Limited value

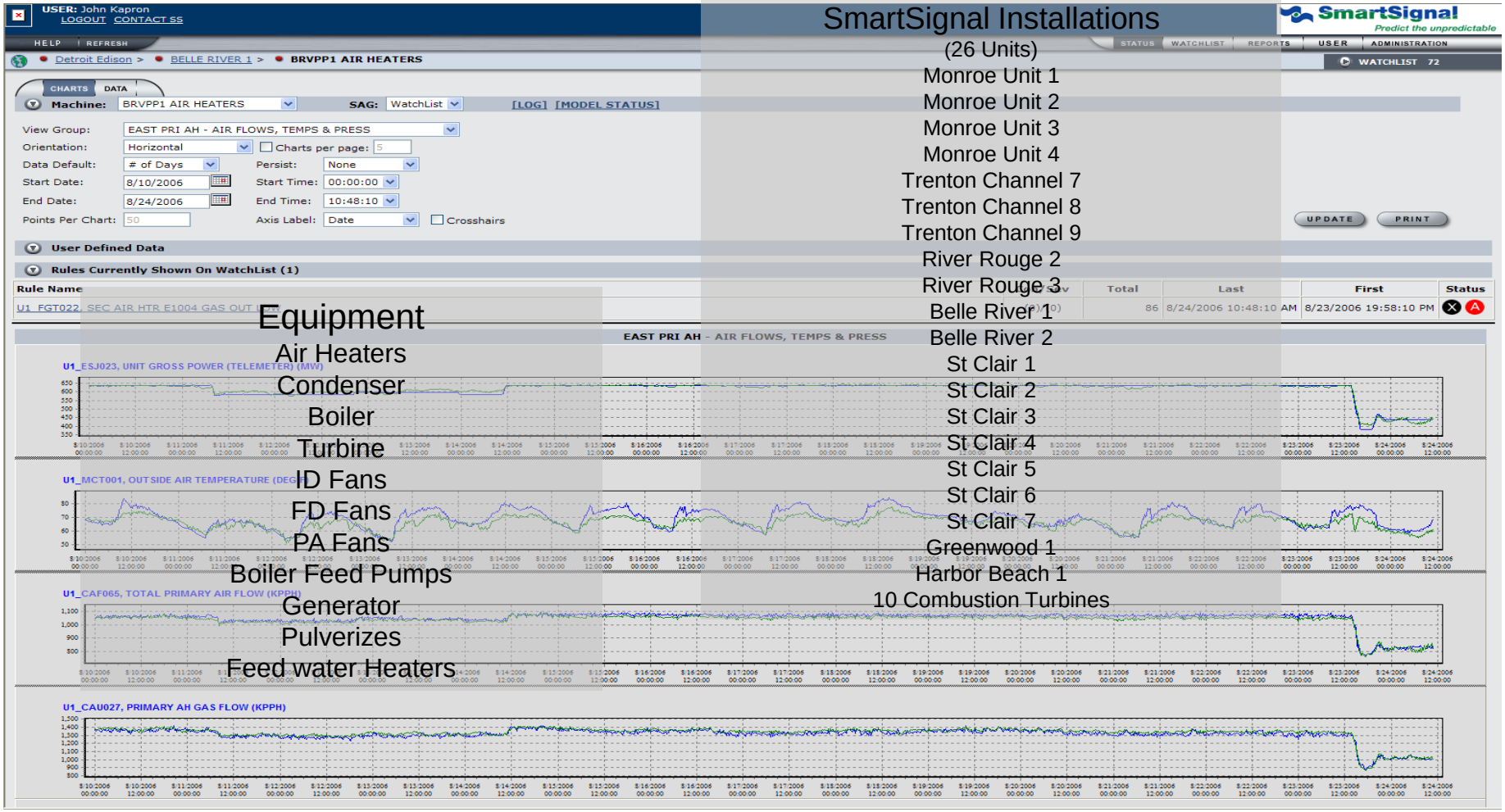
Equipment Condition Monitoring
SmartSignal Fleet wide



Equipment Condition Monitoring
SmartSignal Fleet wide



SmartSignal –
Asset, Process, Performance & Reliability



Equipment

- Air Heaters
- Condenser
- Boiler
- Turbine
- ID Fans
- FD Fans
- PA Fans
- Boiler Feed Pumps
- Generator
- Pulverizes
- Feed water Heaters

SmartSignal Installations

(26 Units)

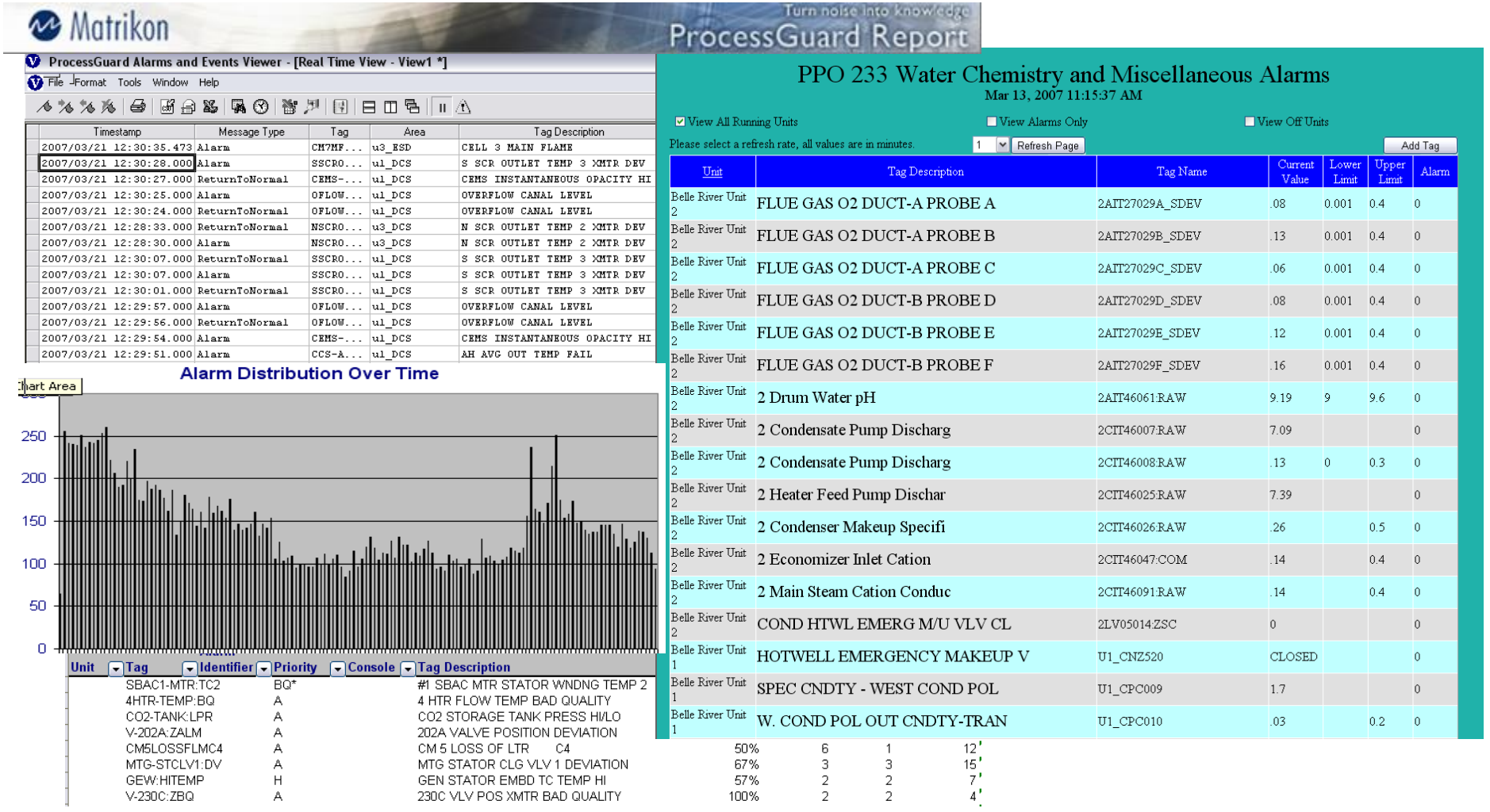
- Monroe Unit 1
- Monroe Unit 2
- Monroe Unit 3
- Monroe Unit 4
- Trenton Channel 7
- Trenton Channel 8
- Trenton Channel 9
- River Rouge 2
- River Rouge 3
- Belle River 1
- Belle River 2
- St Clair 1
- St Clair 2
- St Clair 3
- St Clair 4
- St Clair 5
- St Clair 6
- St Clair 7
- Greenwood 1
- Harbor Beach 1
- 10 Combustion Turbines

PI Dependant Expert Systems
Combustion Optimization – NeuCo

Objective – Coal pile to stack Optimization

- Closed loop Neural Net Optimization
- In Service St Clair Unit 7
- Installed on Belle River Units
- Planned for Monroe Units 1-4 (High PRB Utilization Project)

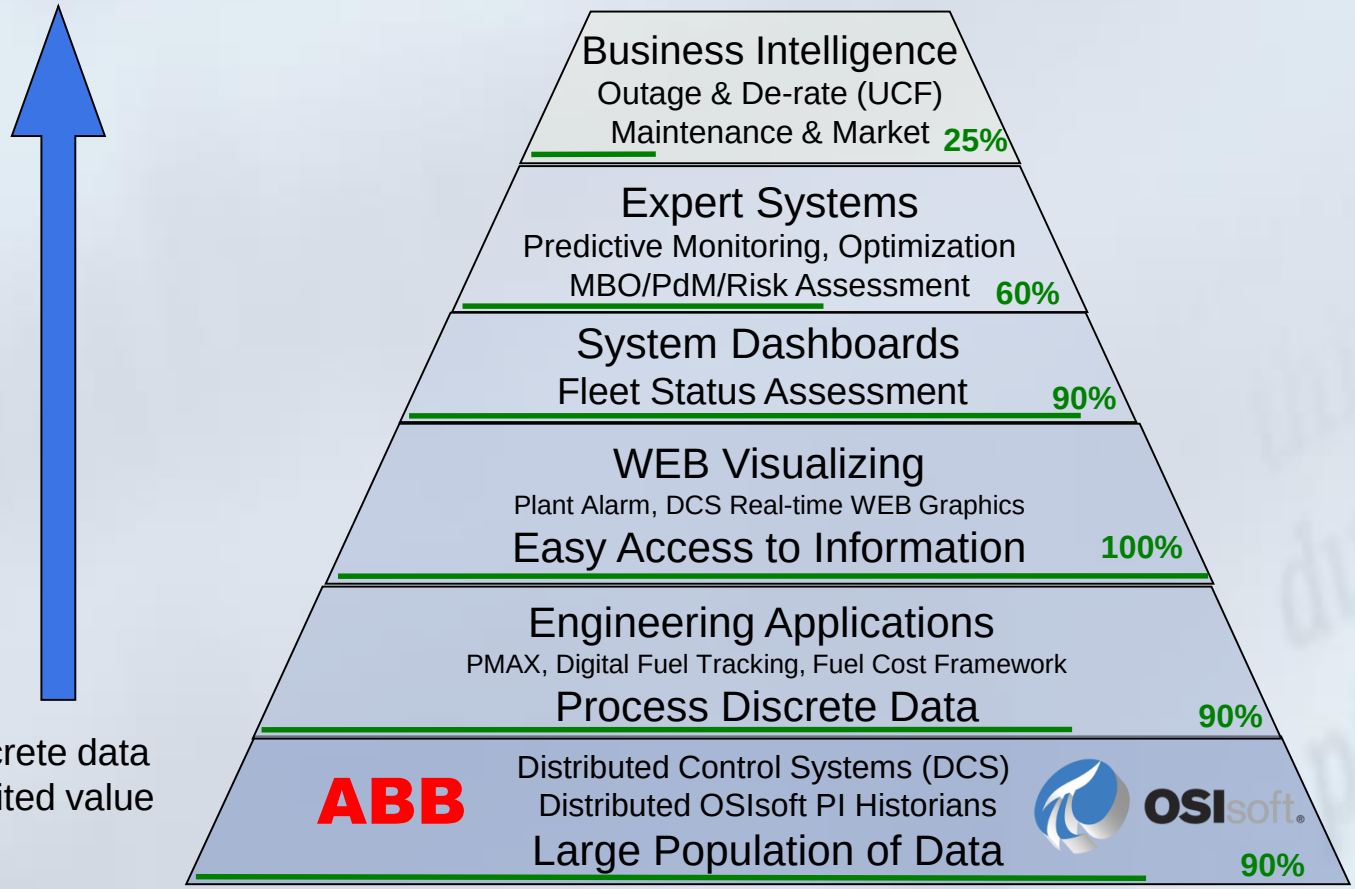
Process Alarm Analysis Fleet wide ProcessGuard



Control & Technology Framework

Fossil Generation Business Unit Strategy

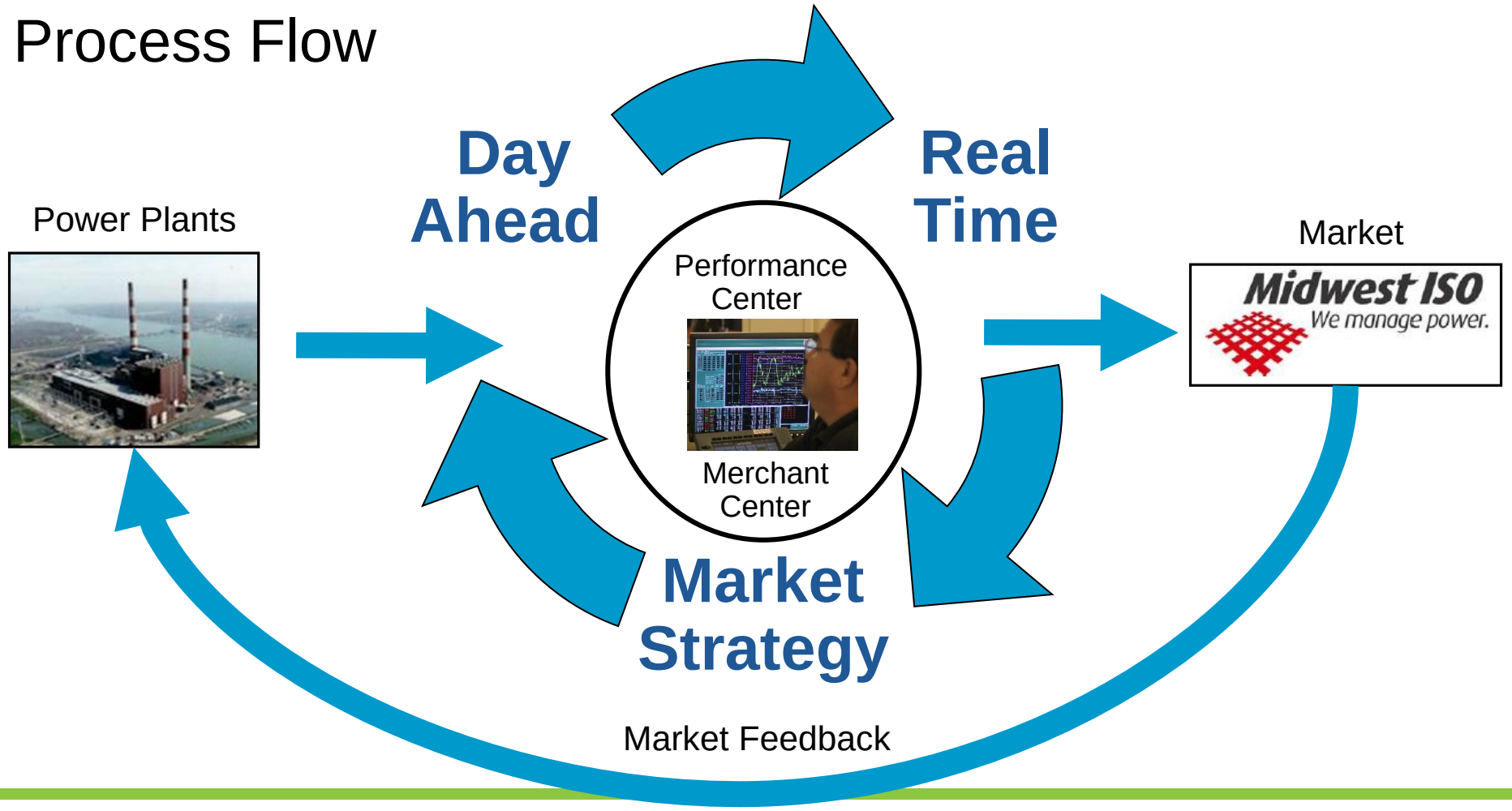
Actionable Information – KPI's



Discrete data Limited value

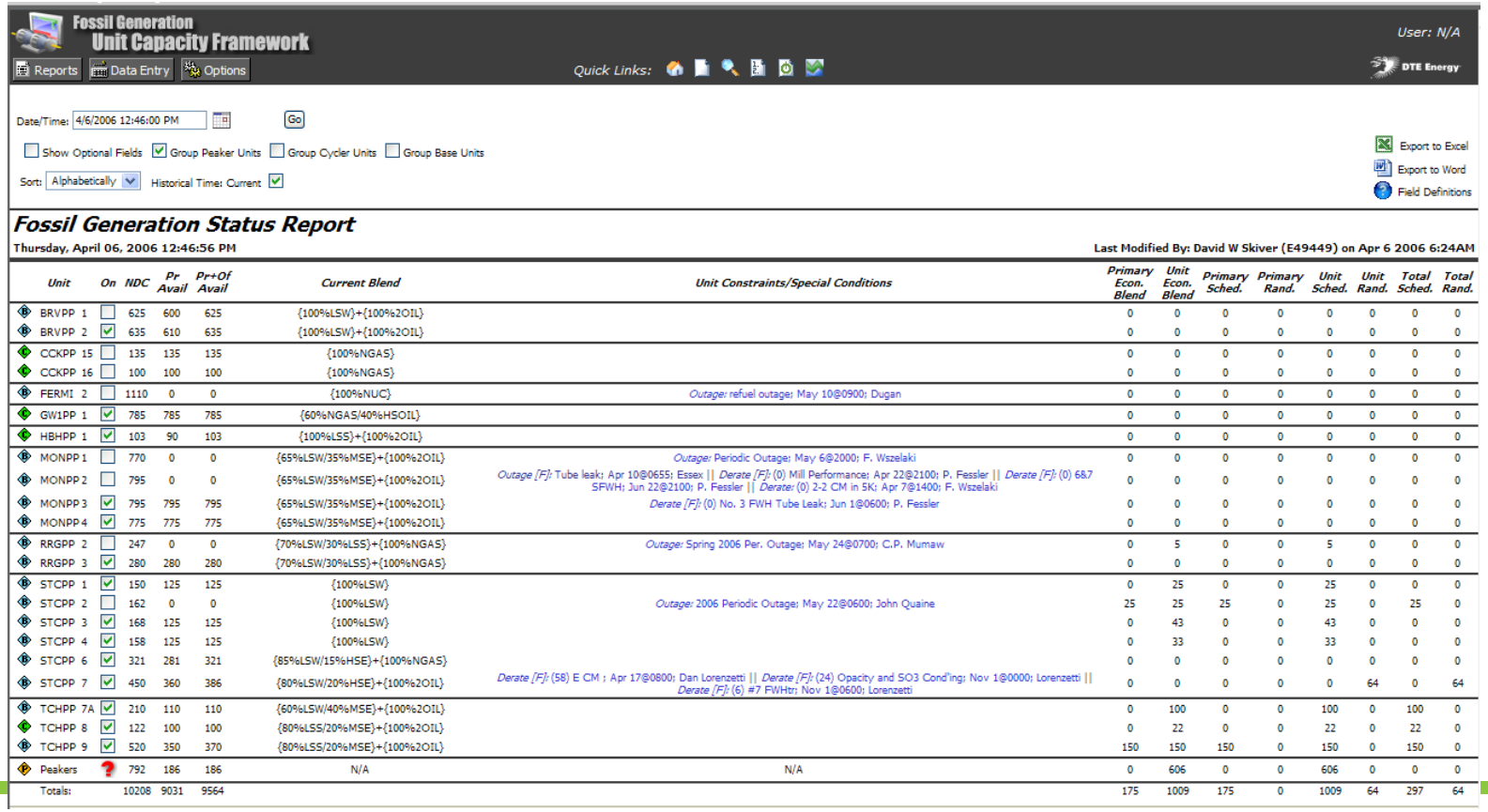
Unit Capacity Framework (UCF)

Process Flow



Unit Capacity Framework (UCF)

- Manages all Unit Capacity and De-rates - Interfaces to MISO, P3M & EMS
- Automatically Generated Status Report (Availability on BlackBerry)
- Dynamically linked with Outage and de-rate process



Fossil Generation
Unit Capacity Framework

Reports | Data Entry | Options | Quick Links: | User: N/A | DTE Energy

Date/Time: 4/6/2006 12:46:00 PM Go

Show Optional Fields | Group Peaker Units | Group Cycler Units | Group Base Units

Sort: Alphabetically | Historical Time: Current

Export to Excel | Export to Word | Field Definitions

Fossil Generation Status Report

Thursday, April 06, 2006 12:46:56 PM — Last Modified By: David W Skiver (E49449) on Apr 6 2006 6:24AM

Unit	On	NDC	Pr Avail	Pr+Of Avail	Current Blend	Unit Constraints/Special Conditions	Primary Econ. Blend	Unit Econ. Blend	Primary Sched.	Primary Rand.	Unit Sched.	Unit Rand.	Total Sched.	Total Rand.
BRVPP 1	☐	625	600	625	{100%LSW}+{100%2OIL}		0	0	0	0	0	0	0	0
BRVPP 2	☑	635	610	635	{100%LSW}+{100%2OIL}		0	0	0	0	0	0	0	0
CCKPP 15	☐	135	135	135	{100%NGAS}		0	0	0	0	0	0	0	0
CCKPP 16	☐	100	100	100	{100%NGAS}		0	0	0	0	0	0	0	0
FERMI 2	☐	1110	0	0	{100%NUC}	*Outage:* refuel outage; May 10@0900; Dugan	0	0	0	0	0	0	0	0
GW1PP 1	☑	785	785	785	{60%NGAS/40%HSOIL}		0	0	0	0	0	0	0	0
HBHPP 1	☑	103	90	103	{100%LSS}+{100%2OIL}		0	0	0	0	0	0	0	0
MONPP 1	☐	770	0	0	{65%LSW/35%MSE}+{100%2OIL}	*Outage:* Periodic Outage; May 6@2000; F. Wszelaki	0	0	0	0	0	0	0	0
MONPP 2	☐	795	0	0	{65%LSW/35%MSE}+{100%2OIL}	*Outage [F]:* Tube leak; Apr 10@0655; Essex || *Derate [F]:* (0) Mill Performance; Apr 22@2100; P. Fessler || *Derate [F]:* (0) 68.7 SFWH; Jun 22@2100; P. Fessler || *Derate:* (0) 2-2 CM in SK; Apr 7@1400; F. Wszelaki	0	0	0	0	0	0	0	0
MONPP 3	☑	795	795	795	{65%LSW/35%MSE}+{100%2OIL}	*Derate [F]:* (0) No. 3 FWH Tube Leak; Jun 1@0600; P. Fessler	0	0	0	0	0	0	0	0
MONPP 4	☑	775	775	775	{65%LSW/35%MSE}+{100%2OIL}		0	0	0	0	0	0	0	0
RRGPP 2	☐	247	0	0	{70%LSW/30%LSS}+{100%NGAS}	*Outage:* Spring 2006 Per. Outage; May 24@0700; C.P. Mumaw	0	5	0	0	5	0	0	0
RRGPP 3	☑	280	280	280	{70%LSW/30%LSS}+{100%NGAS}		0	0	0	0	0	0	0	0
STCPP 1	☑	150	125	125	{100%LSW}		0	25	0	0	25	0	0	0
STCPP 2	☐	162	0	0	{100%LSW}	*Outage:* 2006 Periodic Outage; May 22@0600; John Quaine	25	25	25	0	25	0	25	0
STCPP 3	☑	168	125	125	{100%LSW}		0	43	0	0	43	0	0	0
STCPP 4	☑	158	125	125	{100%LSW}		0	33	0	0	33	0	0	0
STCPP 6	☑	321	281	321	{85%LSW/15%HSE}+{100%NGAS}		0	0	0	0	0	0	0	0
STCPP 7	☑	450	360	386	{80%LSW/20%HSE}+{100%2OIL}	*Derate [F]:* (58) E CM ; Apr 17@0800; Dan Lorenzetti || *Derate [F]:* (24) Opacity and SO3 Cond'ing; Nov 1@0000; Lorenzetti || *Derate [F]:* (6) #7 FWHtr; Nov 1@0600; Lorenzetti	0	0	0	0	0	64	0	64
TCHPP 7A	☑	210	110	110	{60%LSW/40%MSE}+{100%2OIL}		0	100	0	0	100	0	100	0
TCHPP 8	☑	122	100	100	{80%LSS/20%MSE}+{100%2OIL}		0	22	0	0	22	0	22	0
TCHPP 9	☑	520	350	370	{80%LSS/20%MSE}+{100%2OIL}		150	150	150	0	150	0	150	0
Peakers	?	792	186	186	N/A	N/A	0	606	0	0	606	0	0	0
Totals:		10208	9031	9564			175	1009	175	0	1009	64	297	64

Enterprise Business Systems (EBS)
Maximo & SAP

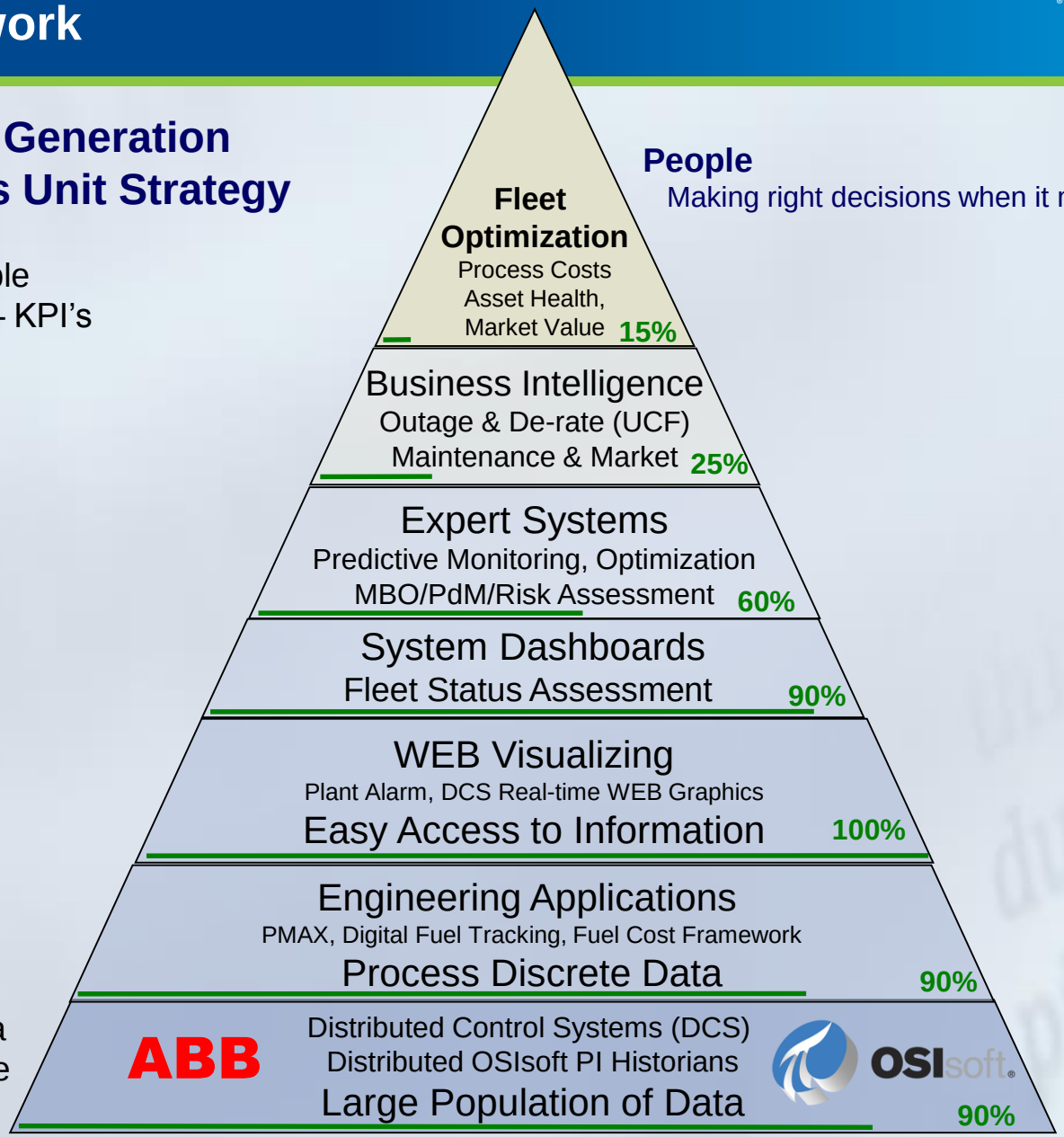
- SAP
  - Financial Information
  - Human Resources
  - Supply Chain
- Maximo
  - Work Management System

Control & Technology Framework

Fossil Generation Business Unit Strategy

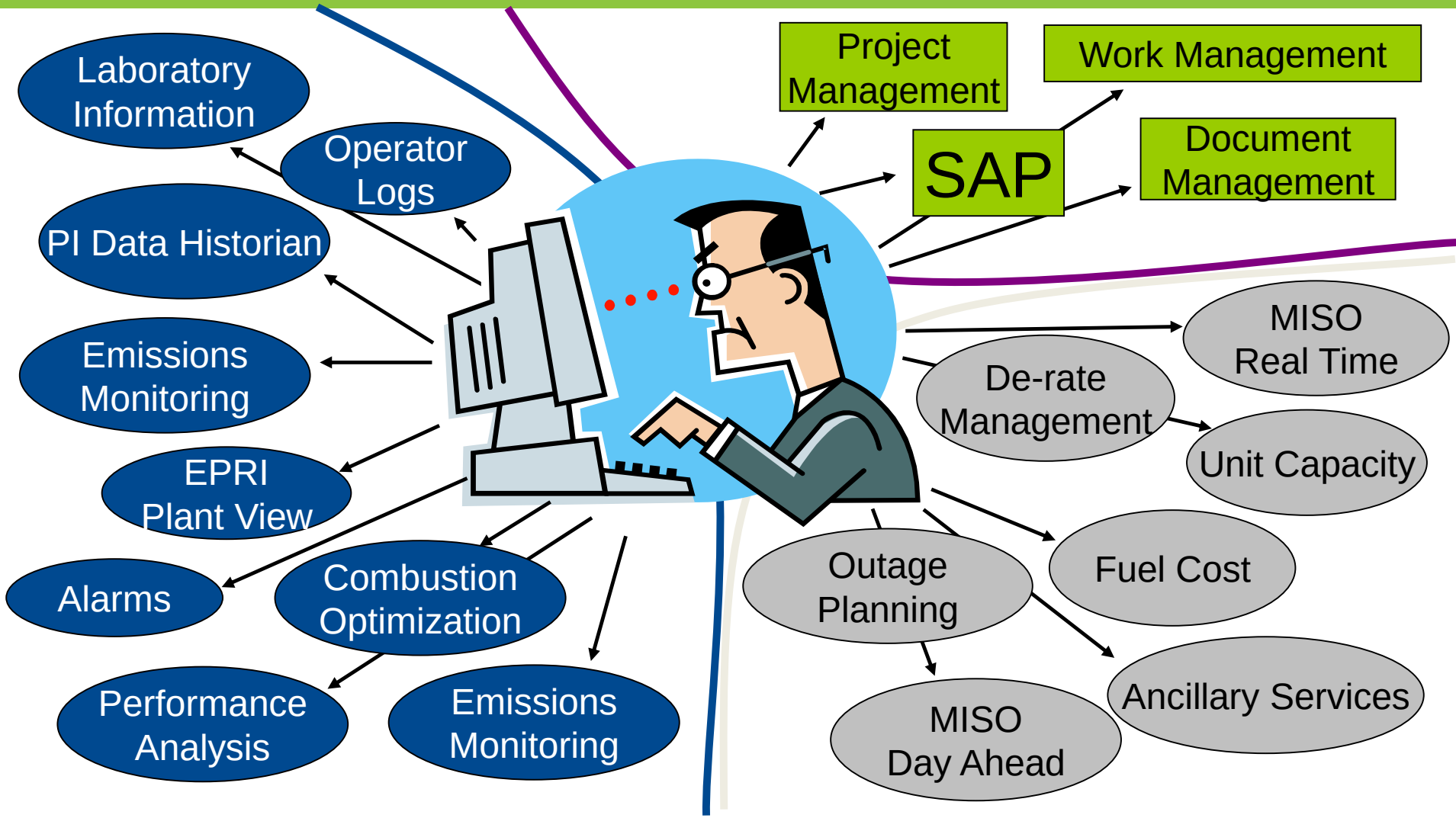
People
Making right decisions when it matters!

Actionable Information – KPI's



Discrete data
Limited value

No Shortage of Information!



Common Methodology

Standard GUI
Single Method

PI Asset Framework:
Integrated applications environment: Consistent framework for data, analysis, reporting and consistent user graphical interface.

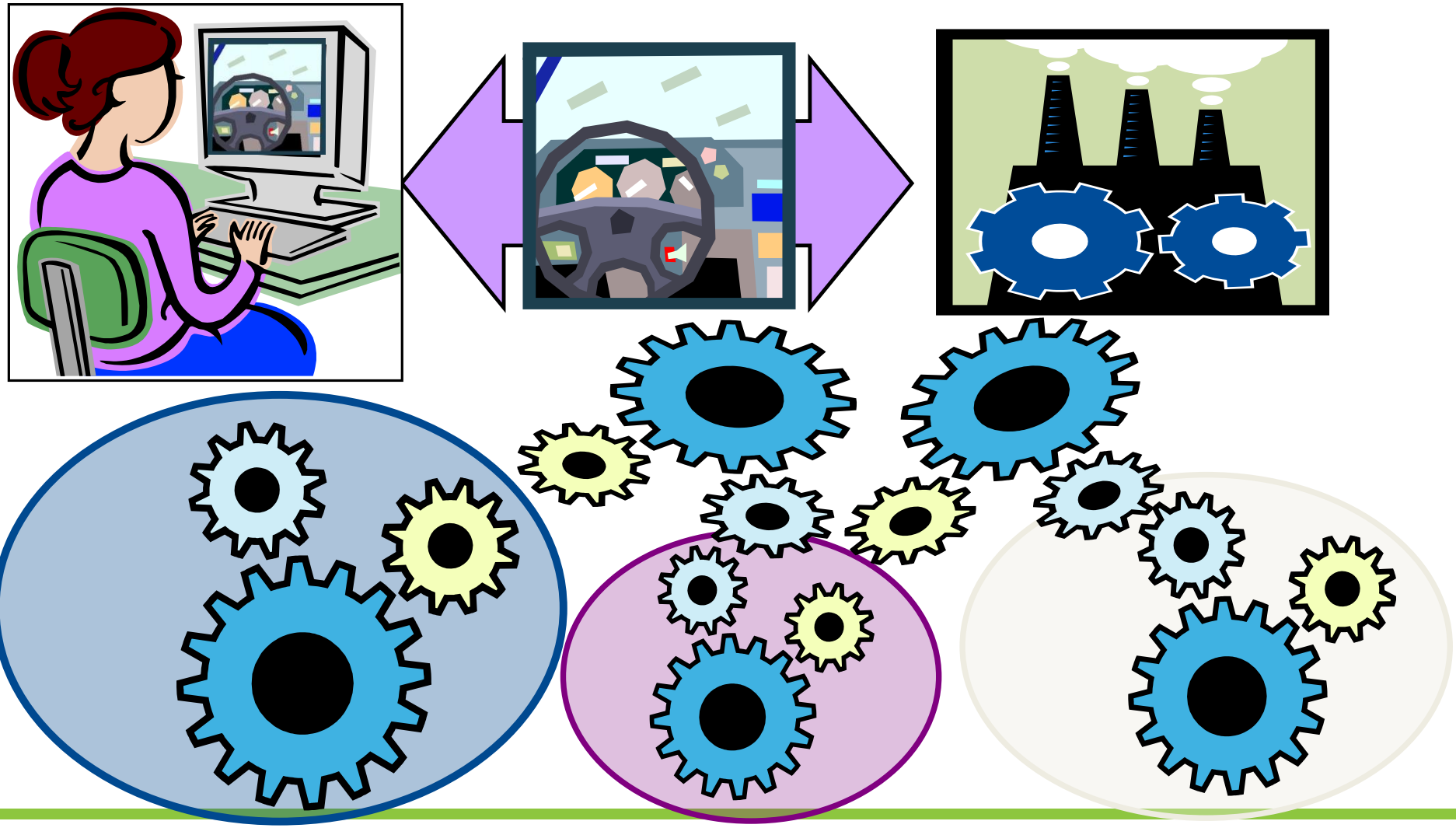
- PI Data Historian
- EPRI Plant View
- ECG AccuTrack
- Alarms
- Operator Logs
- Laboratory Information
- Performance Analysis
- Emissions Monitoring
- Combustion Optimization

- Work Management
- Project Management
- Document Management
- SAP

- MISO Real Time
- De-rate Management
- Unit Capacity
- Outage Planning
- MISO Day Ahead
- Fuel Cost
- Ancillary Services

Process Information **Business Systems** **Market Data**

Common Structure



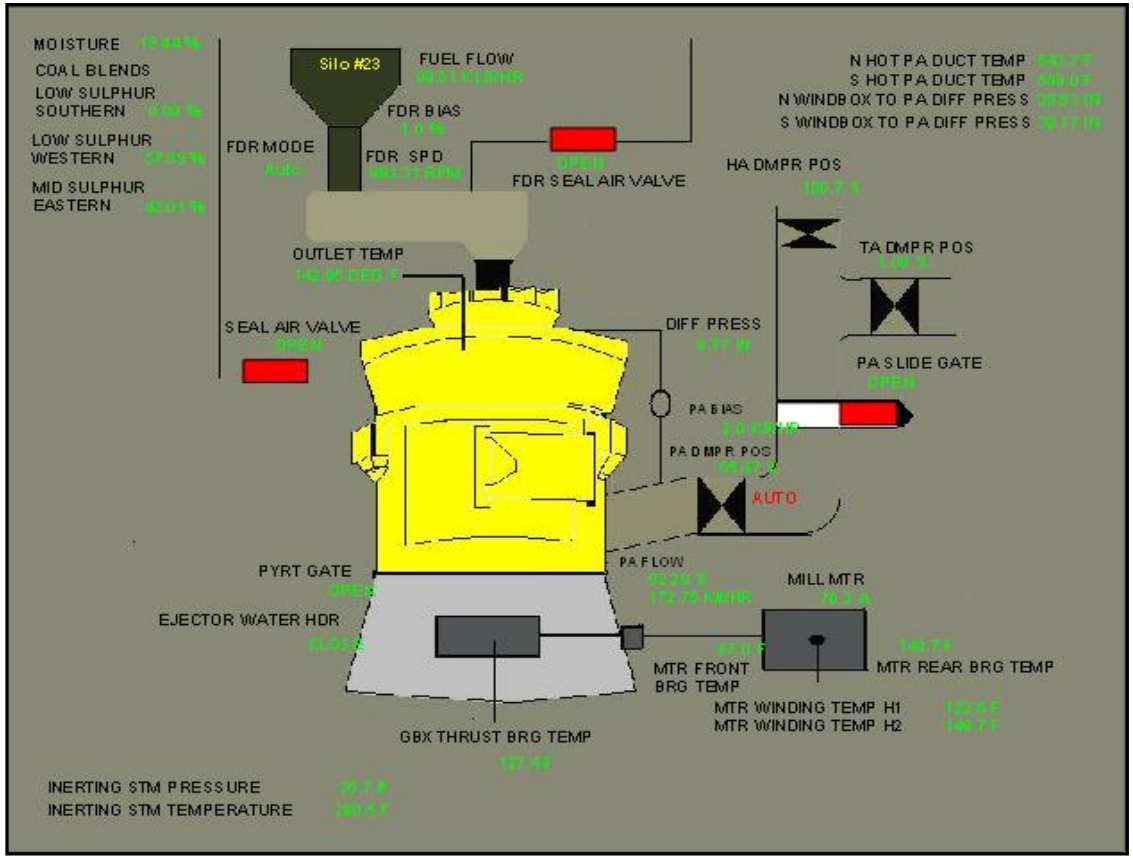
Process Information

Business Systems

Market Data

DTE Energy

Pulverizer Dashboard



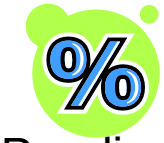
Process Information

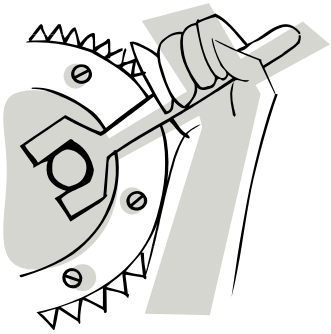
More information is need for Analysis

Pulverizer Assessment
What information is needed?

Pulverizer

- Milling Costs
- Process Costs
- Production Costs
- EAF
- SmartSignal Watch List
- Work Performed & Work Pending
- Alarms




Pulverizer
Multiple Data Sources

Consistent Reporting
- Common Methodology
- Common Structure

Unit
Capacity

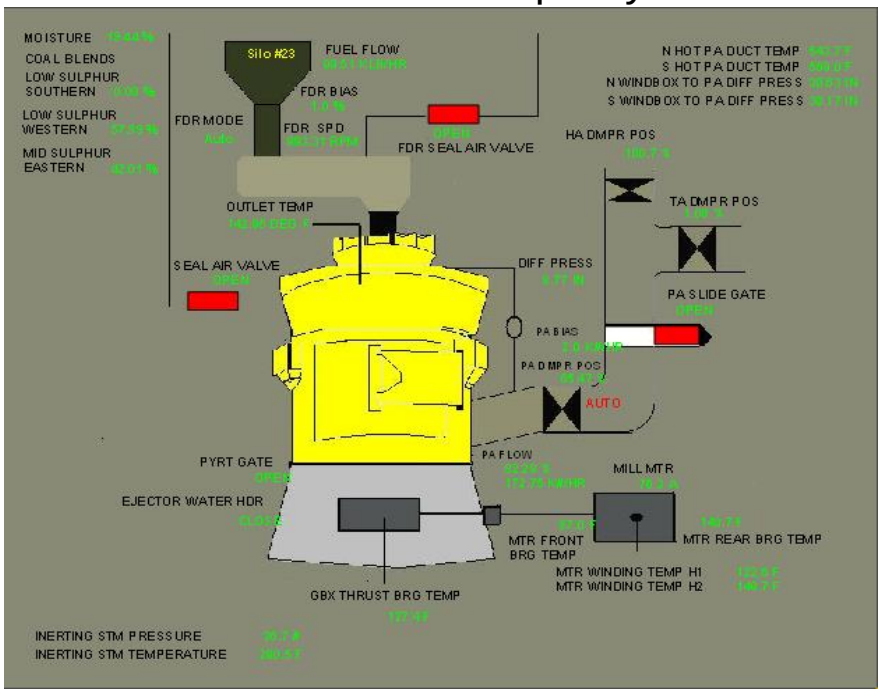
Alarms

EPRI PlantView

Maximo

SAP

Documentum

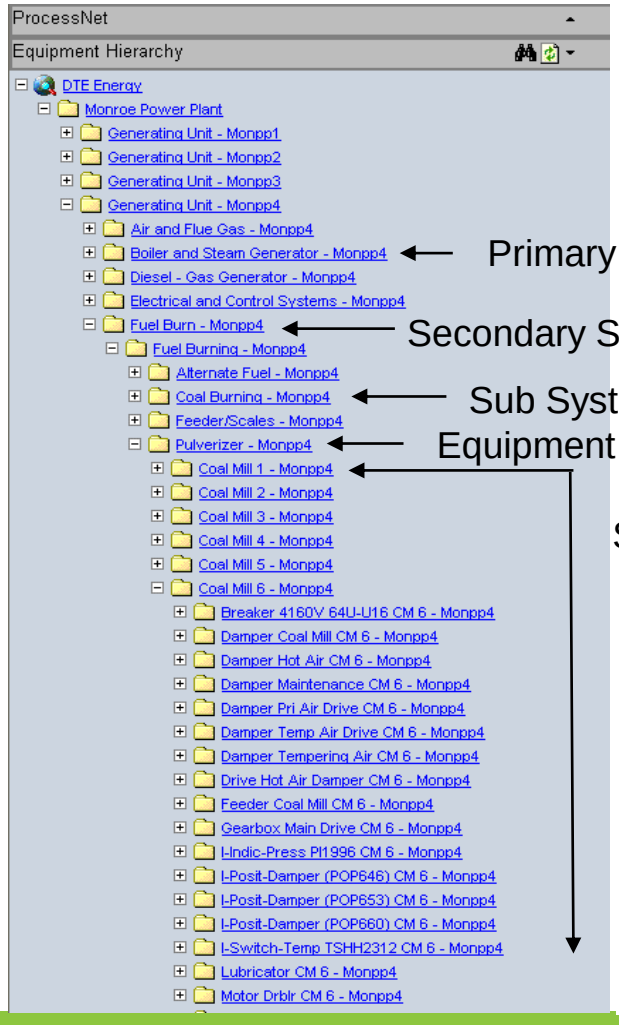


PI

P3M

SmartSignal

Common Thread
Equipment Hierarchy



Equipment Hierarchy

- Hierarchical System Index (HSI)
- Work Breakdown Structure (WBS)

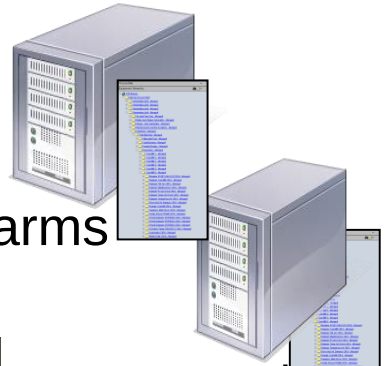
DTE Energy – Business Unit
Monroe Power Plant – Plant
Generating Unit - Monpp4 – Unit
Fuel Burn - Monpp4 – Primary System
Fuel Burn - Monpp4 – Secondary System
Pulverizer - Monpp4 – Sub System
Coal Mill 1 - Monpp4 – Equipment / Sub Equip
Breaker 4160V 64U-U16 CM 1 - Monpp4
Damper Coal Mill CM 1 - Monpp4
Damper Hot Air CM 1 - Monpp4
Damper Maintenance CM 1 - Monpp4
Damper Pri Air Drive CM 1 - Monpp4

Pulverizer
Multiple Data Sources

Consistent Reporting

- Common Methodology
- Common Structure

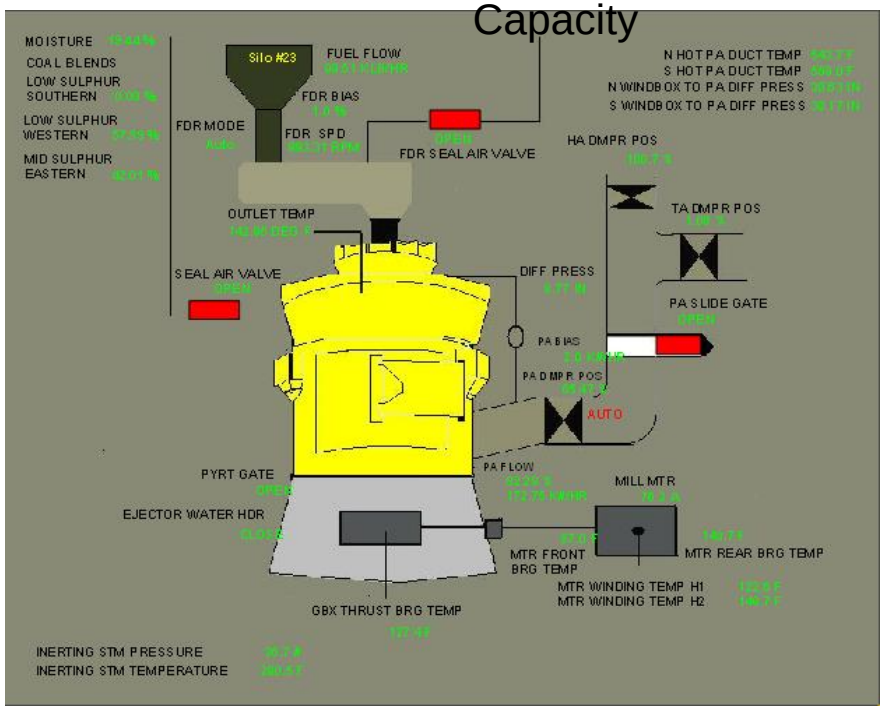
Unit Capacity



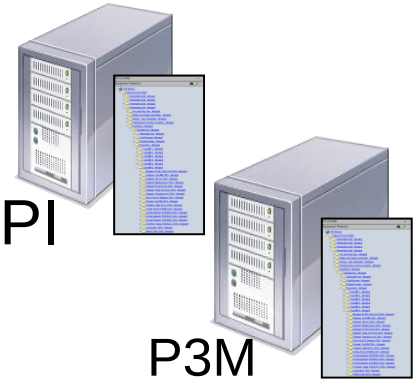
Alarms

EPRI PlantView

Maximo



SAP



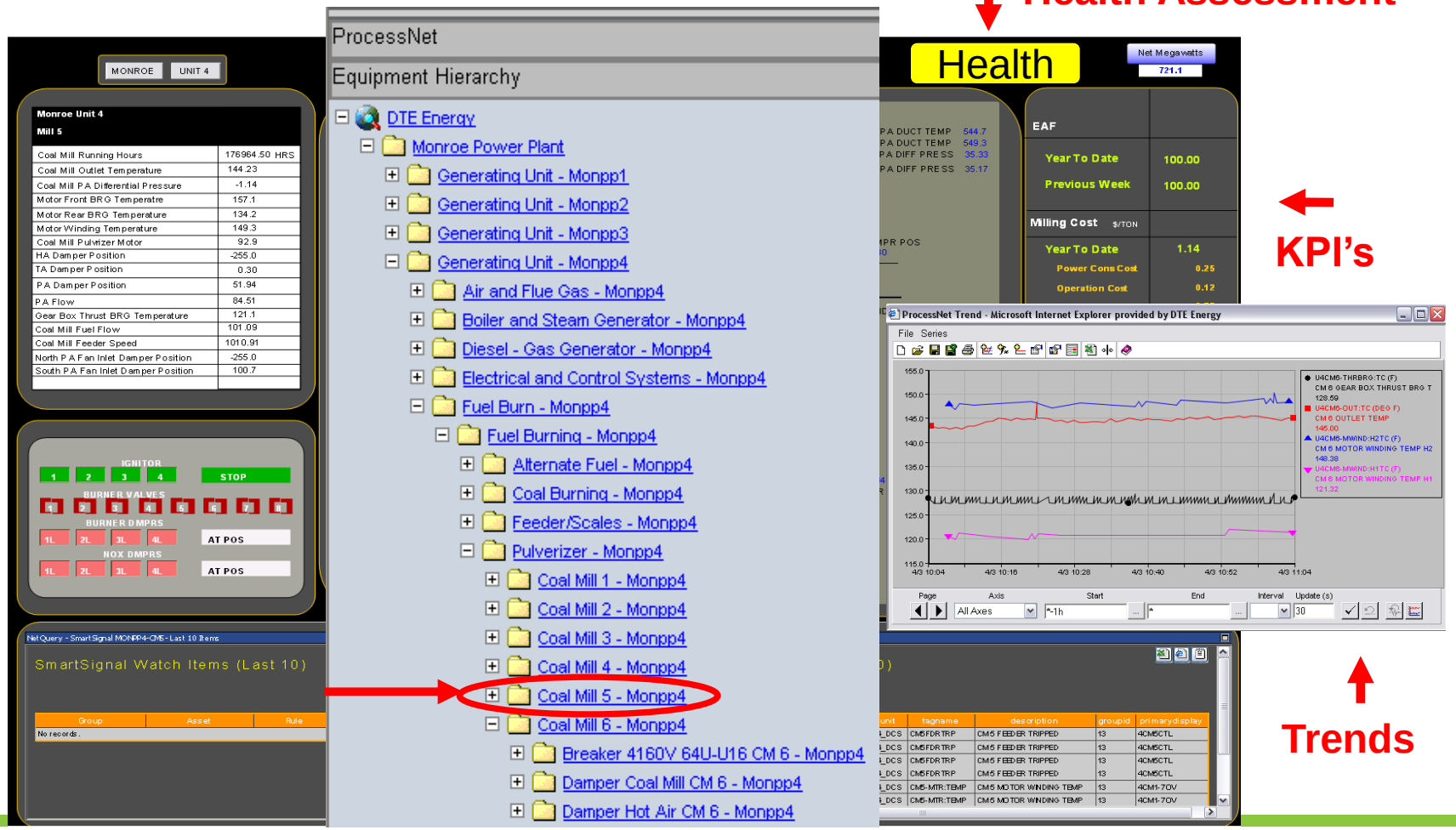
PI

P3M

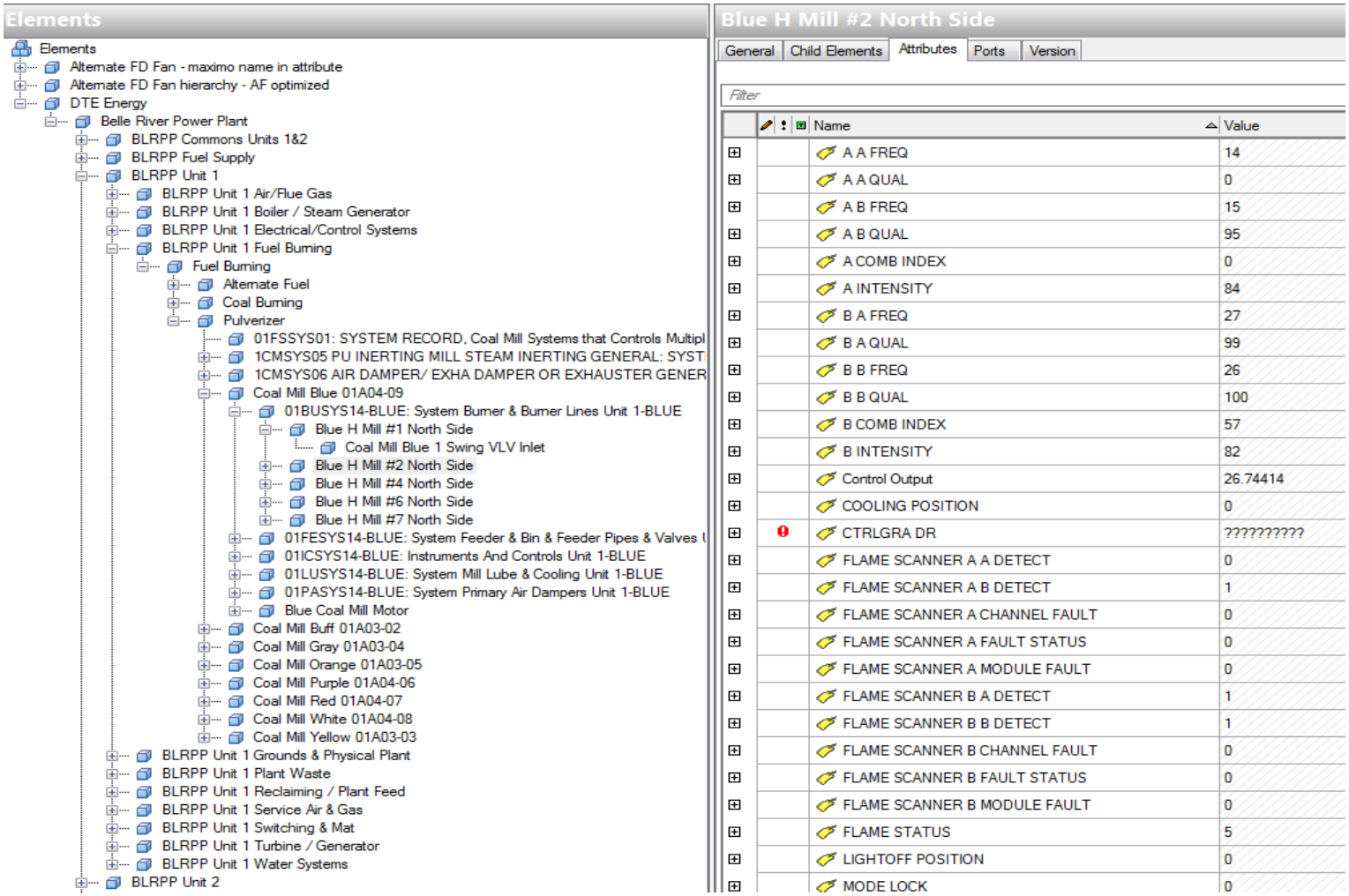
Documentum

SmartSignal

Asset Framework
Expanded System Dashboard



PI Asset Framework (AF)



Process Cost Drill Down

Asset Framework
Expanded System Dashboard

DTE Energy

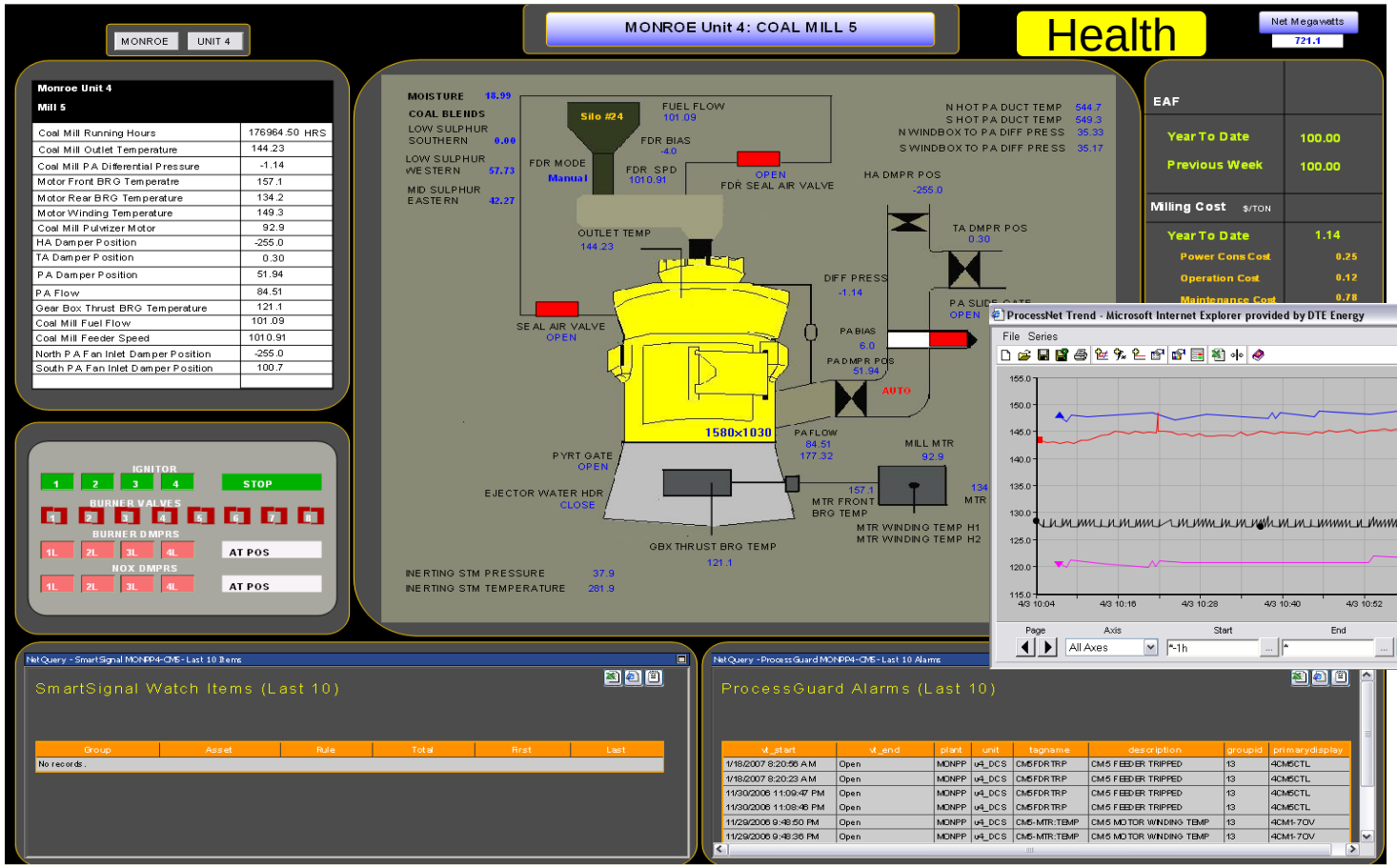
Health Assessment

PI

DCS

KPI's

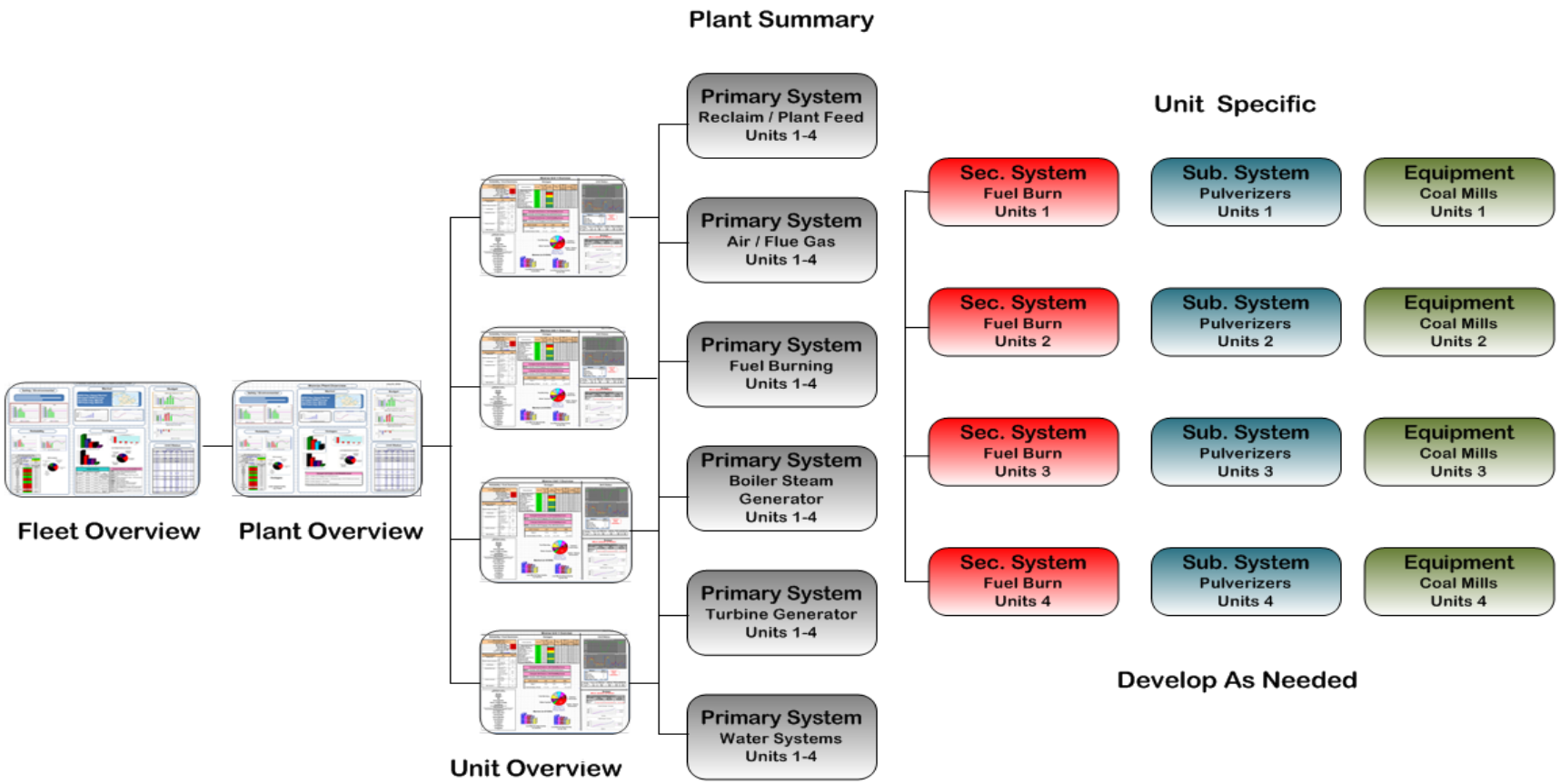
Trends



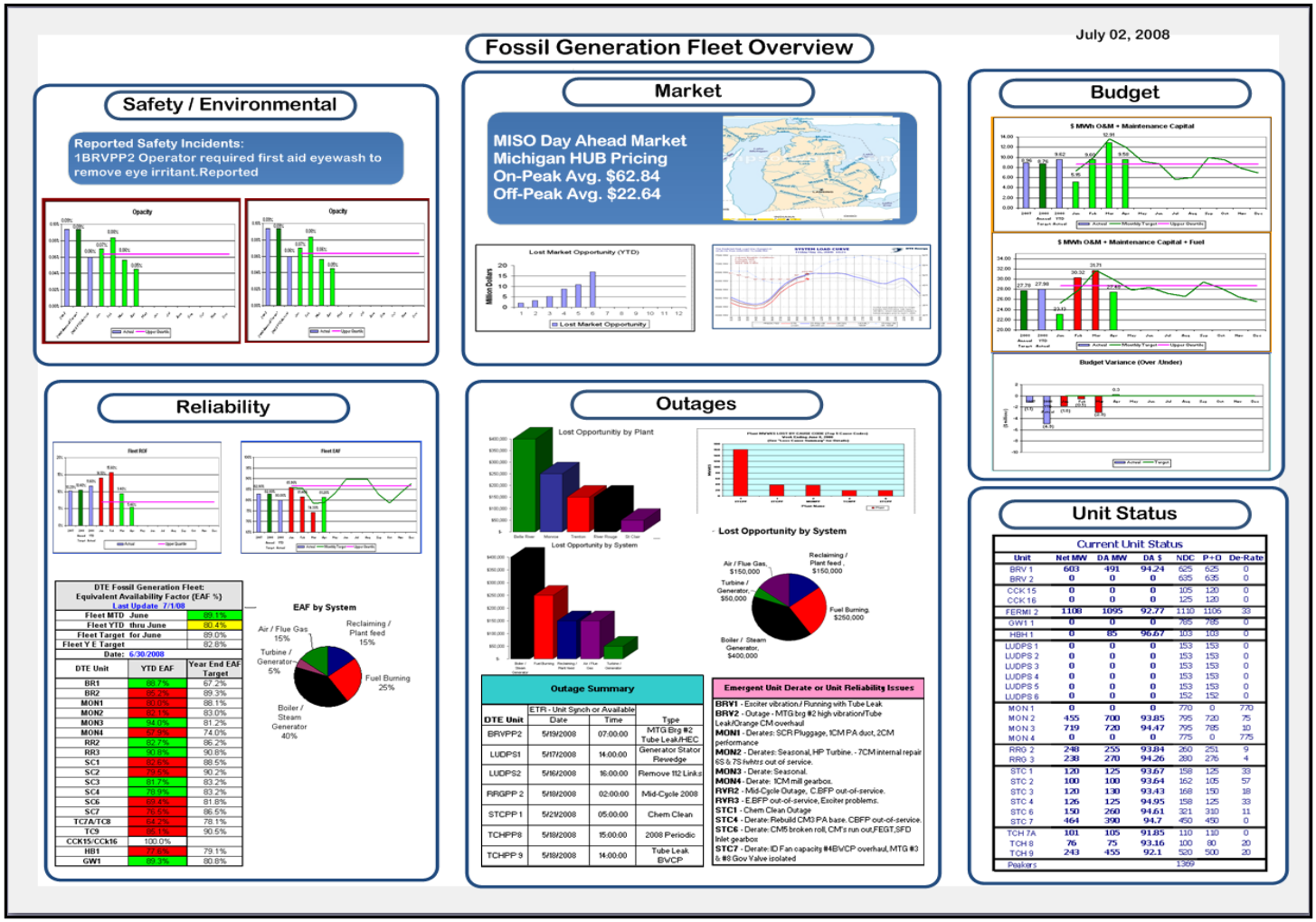
SmartSignal Watch List

Alarms

Logical Display Flow



Fleet Overview



Plant Overview

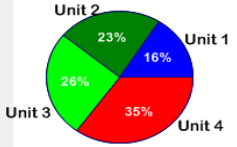
Monroe Power Plant Overview

May 21,2008

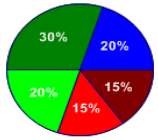
Reliability

DTE Fossil Generation Fleet: Equivalent Availability Factor (EAF %) Last Update 5/14/08		
Fleet MTD	May	88.1%
Fleet YTD	thru May	78.6%
Fleet Target	for May	82.2%
Fleet Y E Target		82.8%
Date:	5/13/2008	

DTE Unit	YTD EAF	Year End EAF
MON1	75.0%	88.1%
MON2	81.7%	83.0%
MON3	82.4%	81.2%
MON4	46.1%	74.0%



Monroe EAF(YTD) – by Unit

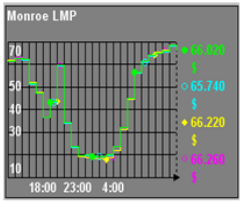


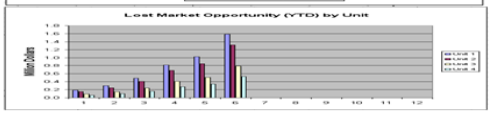
Monroe EAF (YTD) – by System

Market

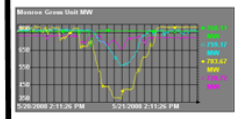
Day Ahead LMP

	5/20/2008 Monroe 1	Monroe 2	Monroe 3	Monroe 4
1:00	$ 23.03	$ 23.03	$ 22.50	$ 22.49
2:00	$ 19.62	$ 19.62	$ 19.07	$ 19.06
3:00	$ 19.04	$ 18.97	$ 19.14	$ 19.15
4:00	$ 17.93	$ 17.87	$ 18.02	$ 18.03
5:00	$ 18.13	$ 18.07	$ 18.24	$ 18.24
6:00	$ 18.93	$ 18.87	$ 18.95	$ 18.95
7:00	$ 22.62	$ 22.53	$ 22.64	$ 22.65
8:00	$ 28.57	$ 28.47	$ 28.69	$ 28.69
9:00	$ 40.40	$ 40.23	$ 40.53	$ 40.56
10:00	$ 53.91	$ 53.68	$ 54.08	$ 54.11
11:00	$ 56.04	$ 55.81	$ 56.22	$ 56.25
12:00	$ 61.89	$ 61.64	$ 62.10	$ 62.14
13:00	$ 64.79	$ 64.51	$ 65.00	$ 65.04
14:00	$ 65.00	$ 64.73	$ 65.23	$ 65.26
15:00	$ 66.56	$ 66.29	$ 66.80	$ 66.84
16:00	$ 61.52	$ 61.26	$ 61.73	$ 61.76
17:00	$ 62.82	$ 62.57	$ 63.04	$ 63.08
18:00	$ 62.20	$ 61.96	$ 62.49	$ 62.52
19:00	$ 51.62	$ 51.43	$ 51.97	$ 52.00
20:00	$ 47.26	$ 47.07	$ 47.47	$ 47.49
21:00	$ 36.58	$ 36.43	$ 36.70	$ 36.72
22:00	$ 43.46	$ 43.28	$ 43.60	$ 43.63
23:00	$ 59.47	$ 59.22	$ 59.66	$ 59.69
0:00	$ 34.33	$ 34.19	$ 34.44	$ 34.46





Unit Status



	Gross MW	Net MW
Unit 1	723	688
Unit 2	740	705
Unit 3	749	714
Unit 4	734	699

COAL INVENTORY	STORAGE
Low Sulfur Southern	117,006 Ton
Low Sulfur Western	841,073 Ton
Mid Sulfur Eastern	376,917 Ton

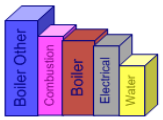
UNIT USAGE	LSS	LSW	MSE
Unit 1	0%	60%	40%
Unit 2	0%	60%	40%
Unit 3	0%	60%	40%
Unit 4	0%	60%	40%

	Unit 1	Unit 2	Unit 3	Unit 4
Unit Net Avail/Derate	7/25 - /05/10	7/40 - / 10/05	7/55 - /10/30	7/00 - /30/45
Cause	Fuel Blend /#2 CM	Seasonal / turbine effic.	seasonal/ #2 CM insp.	Fuel Blend/ #6 CM
AGC	OFF	ON at 1/min	ON at 1-7/min	ON at 1-7/min
Days on Line	7	7	122	9
Record Run / Year	233 – 1997	263 – 2006/7	235 – 1996/97	421 – 1992/93

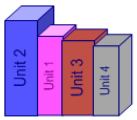
Safety / Environmental

	Lost Work	Restricted Work	Medical Treatment	First Aid	All Injuries	Monroe OSHA Recordable Rate
May-08	0	1	0	1	2	NA
Apr-08	0	0	1	2	3	2.57 as of 5.12.08
2008 YTD	1	3	3	11	18	1.96 as of 5.12.08
2007 Totals	2	3	7	30	42	2.71

Outages



Lost opportunity – by System

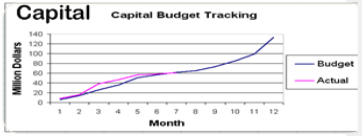


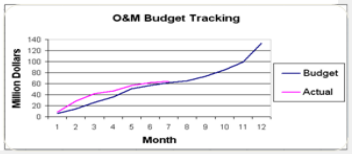
Lost opportunity – by Plant

Emergent Unit Derate or Unit Reliability Issues
MON1 - Derates: SCR Pluggage, Poor Mill Performance
MON2 - Derates: Seasonal, HP Turbine. - 7CM internal repair - 6S &7S fwhtrs out of service.
MON3 - Derate: Seasonal. 2CM rebuild
MON4- Derate: 5CM Slide gate stuck. - 1CM mill gearbox.

Budget

DTE Commercial Availability Variance			
DTE Site	Date: 5/12/2008	MTD May 08	YTD May 08
Monroe	$ (414,262)	$ (5,044,847)	$ (731,513)





Unit Overview

Monroe Unit 1 Overview

Reliability / Cost Summary

Monroe Power Plant: Equivalent Availability Factor (EAF %) Last Update 5/14/08		
Monroe MTD	May	66.1%
Monroe YTD	thru May	78.6%
Unit 1 MTD	May	62.0%
Unit 1 YTD	thru May	81.9%
Unit 1 Target	for May	82.2%
Unit 1 Y E Target		82.8%
Date:	5/13/2008	

Primary Systems	KPI	Value
Air/Flue Gas	Aux Power Cost	$ -
	Process Cost	$ -
	EAF	%
Boiler & Steam Generation	EAF	%
	Unit Heat Rate	BTU/KWHr
	Boiler Efficiency	%
Fuel Burning	Milling Cost	$ -
	EAF	%
	Air to Coal Ratio	%
Reclaim/Plant Feed	O&M Costs	$ -
	AUX Power Cost	$ -
	Actual Inventory	tons
	Actual Delivery	tons
	Actual Consumption	tons
	Replacement Cost	$ -
	Blend	%
	Blend Cost	$ -
	Blend Quality	
Turbine/ Generator	Process Cost	$ -
	Mega Watts	mw
	EAF	%
	MTBF	
	MTTR	
Water Systems	EAF	%
	Process Cost	$ -

MONPP Unit 1 Detail
Date: 6/2/2008 10:41:34 AM

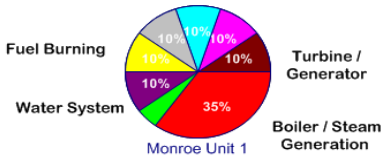
Unit Type: Base Load
MegaWatts: 707.3983
NDC: 770
Primary Available: 710
Primary + Overfire Available: 710
Current Blend: (60%LSW/40%MSE)+(100%2O1L)
Unit Constraints:
Derate [F]: (0) #2 CM internal inspection; Jun 6@1600; Harrison
Derate [F]: (60) SCR Pluggage; Jun 8@0805; E. Harrison
Special Conditions: None
Primary Econ. Blend: 45
Unit Econ. Blend: 0
Primary Scheduled: 45
Primary Random: 0
Unit Scheduled: 0
Unit Random: 60
Total Scheduled: 0
Total Random: 60

Outages

Primary Systems	YTD EAF	Year End EAF Target	Health Assesment	O&M Cost YTD	O&M Cost Previous Week	Capital Cost YTD	Capital Cost Previous Week
Monroe Unit 1 Total	75.0%	88.1%		$25,500.0	$1,593.8	$25,500.0	$1,500.0
Unloading / Storage	88.0%	90.0%		$1,500.0	$93.8	$1,500.0	$93.8
Reclaiming / Plant feed	92.0%	94.0%		$2,000.0	$125.0	$2,000.0	$125.0
Fuel Burning	71.0%	73.0%		$2,000.0	$125.0	$2,000.0	$125.0
Boiler / Steam Generator	74.0%	76.0%		$2,000.0	$125.0	$2,000.0	$125.0
Air / Flue Gas	88.0%	90.0%		$2,000.0	$125.0	$2,000.0	$125.0
Turbine / Generator	96.0%	98.0%		$2,000.0	$125.0	$2,000.0	$125.0
Water System	77.0%	79.0%		$3,500.0	$218.8	$3,500.0	$218.8
Plant Waste	88.0%	90.0%		$2,000.0	$125.0	$2,000.0	$125.0
Electical & Control System	96.0%	98.0%		$2,000.0	$125.0	$2,000.0	$125.0
Service Air & Gas	86.0%	88.0%		$2,000.0	$125.0	$2,000.0	$125.0
Switching & Mat	100.0%	102.0%		$2,000.0	$125.0	$2,000.0	$125.0
Diesel - Gas generator	82.0%	84.0%		$2,000.0	$125.0	$2,000.0	$125.0
Grounds & Physical Plant	92.0%	96.0%		$500.0	$31.3	$500.0	$31.3

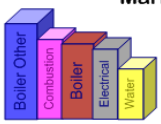
Emergent Unit Derate or Unit Reliability Issues

MON1 - Derates: SCR Pluggage, Poor Mill Performance

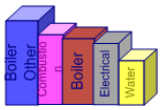


Monroe Unit 1 EAF(YTD) – by Primary System

Market (in $1000)

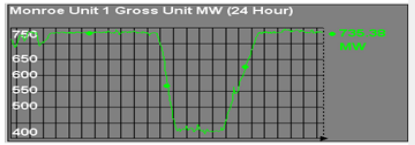


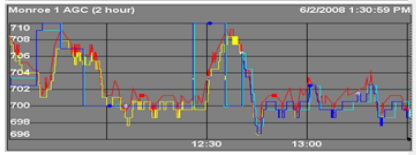
Lost Market Opportunity - by System



Lost Market Opportunity - by De-rate

Unit Status



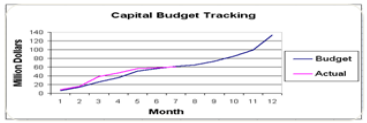


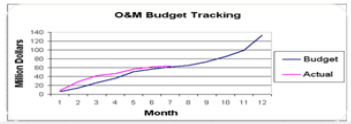
	Unit 1
Unit Net Avail/Derate	725 - /35/10
Cause	Fuel Blend /#2 CM
AGC	OFF
Days on Line	7
Record Run / Year	733 – 1997

Heat Rate (BTU/KWHR)	P3M for Last Month	PMAX Gross Turbine Heat Rate	PMAX Net Turbine Heat Rate	PMAX Gross Unit Heat Rate	PMAX Net Unit Heat Rate
Unit 1	9988	7966	8392	9473	9979

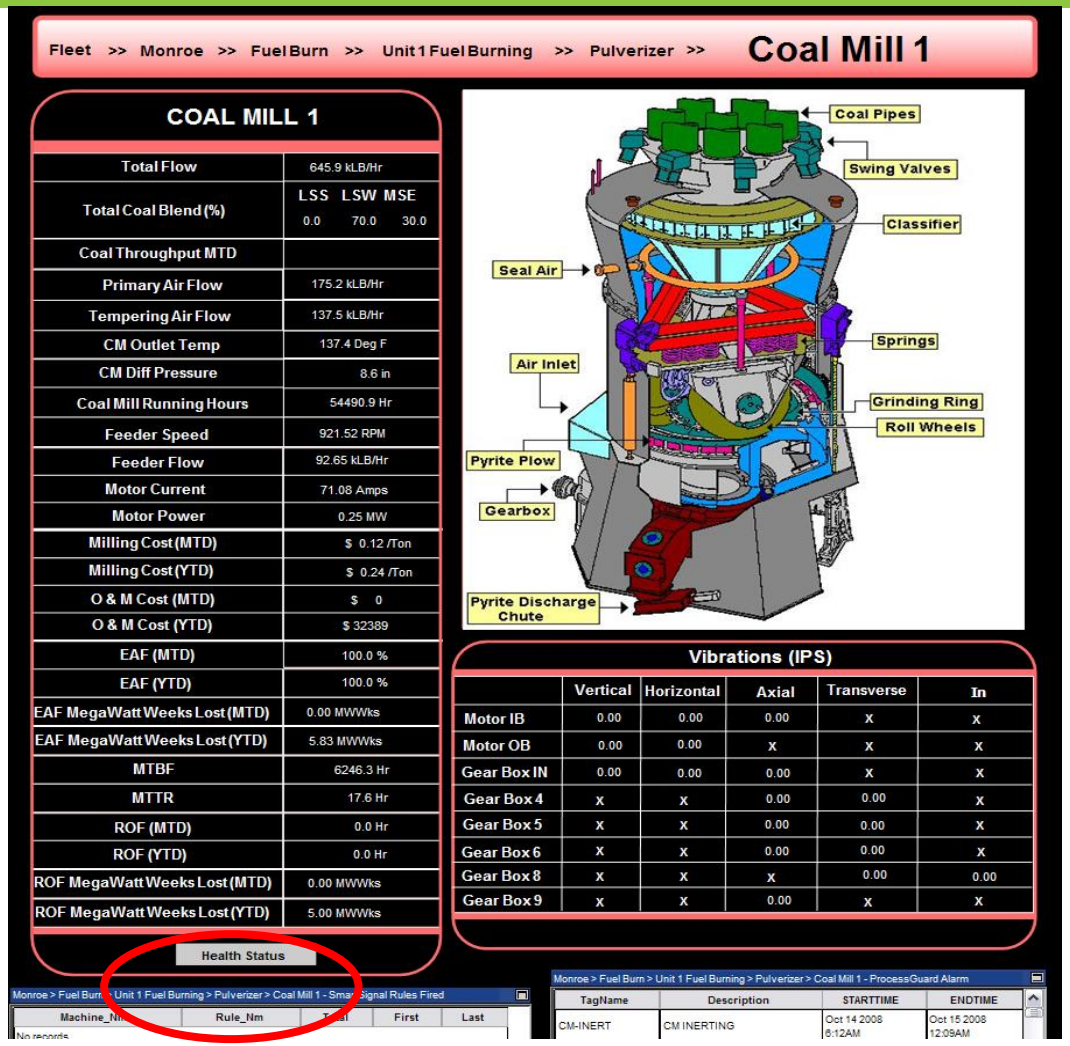
Budget

DTE Commercial Availability Variance			
DTE Site	Date: 5/12/2008	MTD May 08	YTD May 08
Monroe Unit 1	$ (414,262)	$ (5,044,847)	$ (731,513)





Coal Mill


Fleet >> Monroe >> Fuel Burn >> Unit 1 Fuel Burning >> Pulverizer >> Coal Mill 1
COAL MILL 1
Total Flow 645.9 kLB/Hr
Total Coal Blend (%) LSS LSW MSE 0.0 70.0 30.0
Coal Throughput MTD
Primary Air Flow 175.2 kLB/Hr
Tempering Air Flow 137.5 kLB/Hr
CM Outlet Temp 137.4 Deg F
CM Diff Pressure 8.6 in
Coal Mill Running Hours 54490.9 Hr
Feeder Speed 921.52 RPM
Feeder Flow 92.65 kLB/Hr
Motor Current 71.08 Amps
Motor Power 0.25 MW
Milling Cost (MTD) $ 0.12 /Ton
Milling Cost (YTD) $ 0.24 /Ton
O & M Cost (MTD) $ 0
O & M Cost (YTD) $ 32389
EAF (MTD) 100.0 %
EAF (YTD) 100.0 %
EAF MegaWatt Weeks Lost (MTD) 0.00 MWWks
EAF MegaWatt Weeks Lost (YTD) 5.83 MWWks
MTBF 6246.3 Hr
MTTR 17.6 Hr
ROF (MTD) 0.0 Hr
ROF (YTD) 0.0 Hr
ROF MegaWatt Weeks Lost (MTD) 0.00 MWWks
ROF MegaWatt Weeks Lost (YTD) 5.00 MWWks
Health Status
Coal Pipes
Swing Valves
Classifier
Seal Air
Springs
Air Inlet
Grinding Ring
Roll Wheels
Pyrite Plow
Gearbox
Pyrite Discharge Chute
Vibrations (IPS)
Vertical Horizontal Axial Transverse In
Motor IB 0.00 0.00 0.00 x x
Motor OB 0.00 0.00 x x x
Gear Box IN 0.00 0.00 0.00 x x
Gear Box 4 x x 0.00 0.00 x
Gear Box 5 x x 0.00 0.00 x
Gear Box 6 x x 0.00 0.00 x
Gear Box 8 x x x 0.00 0.00
Gear Box 9 x x 0.00 x x
Monroe > Fuel Burn > Unit 1 Fuel Burning > Pulverizer > Coal Mill 1 - ProcessGuard Alarm
TagName Description STARTTIME ENDTIME
CM-INERT CM INERTING Oct 14 2008 8:12AM Oct 15 2008 12:09AM

Coal Mill Health Status

Coal Mills

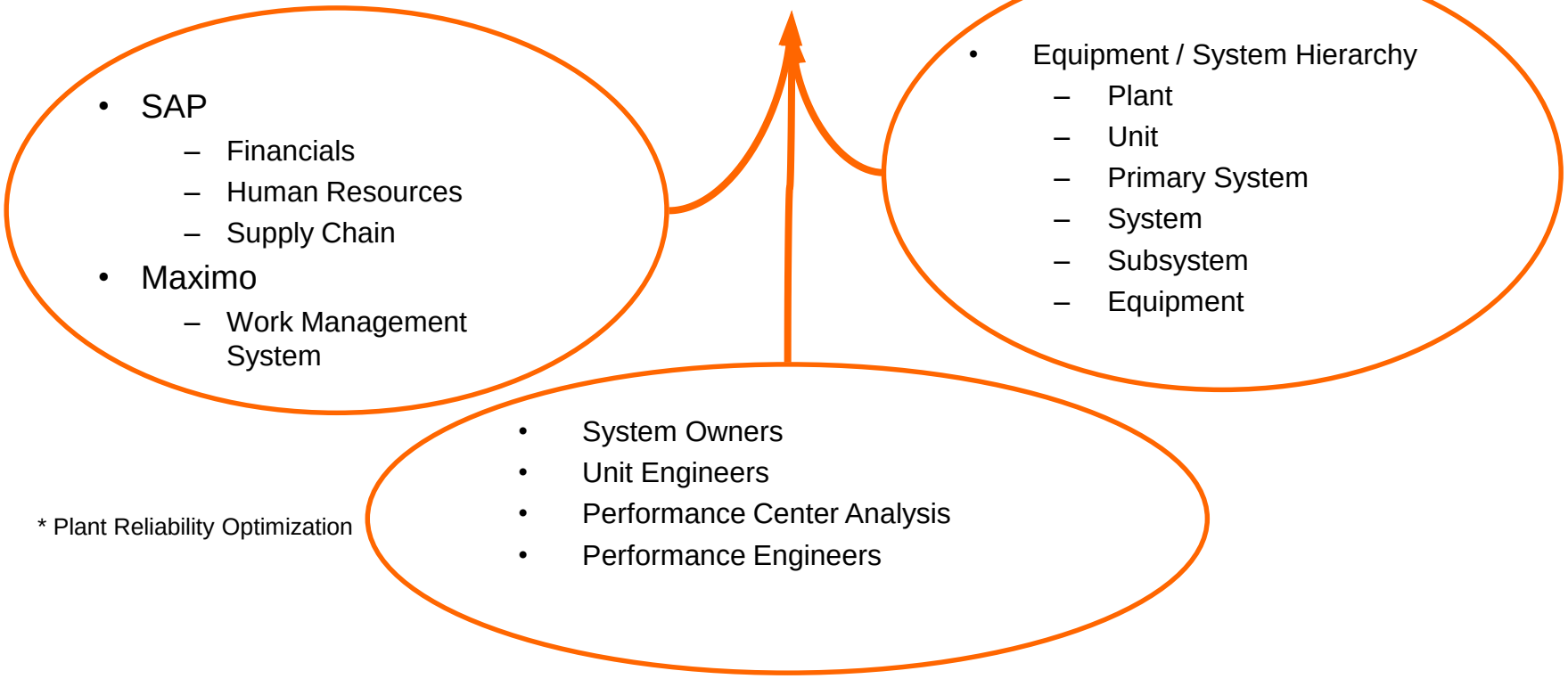
		MON1-1	MON1-2	MON1-3	MON1-4	MON1-5	MON1-6	MON1-7
▶	Performance Center Tech Exam	Acceptable	Acceptable	Acceptable	Acceptable			Acceptable
	Motor - Performance Center Tech	Acceptable	Acceptable	Acceptable	Marginal	Acceptable	Acceptable	Acceptable
	Coal Mills/Burnerlines-Infrared Te	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
	Mill - Capacity (max load)				112			
	Gearbox - #9 Bearing Boroscope	Acceptable	Acceptable	Acceptable		Acceptable	Acceptable	
	Gearbox - #9 Bearing Temperatu	121.2358	0	131.3547	122.8538	141.0122	122.8364	125.6046
	Motor - Vibration Tech Exam	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
	Feeders - Seal Air Pressure							
	dT Gearbox Rebuild	44658	18305	7437	171698	190326	71301	182189
	dT Mill Rebuild	17740	18305	7437	40359	30264	37068	45810
	4K Inspection Results	Acceptable	Acceptable	Watch List	Watch List	Marginal	Watch List	Marginal
	dT Mill Inspection	1413	2499	2116	1568	496	1000	3372
	Mill - Performance Testing	Marginal		Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
	Mill - PA Probe Head status							
	PA Damper Position	31.72612	44.57829	35.09745	33.1591	28.24178	39.77391	44.35405
	Gearbox - Oil Quality Tech Exam	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
	Motor-BearingTemps	152.7597	139.6018	156.5521	150.8596	172.4659	147.9689	150.2472
	Motor-WindingTemps	169.5674	156.5223	160.9825	188.5659	179.8029	191.5914	197.6467
	Mill - System Engineer Review	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	
	Motor - System Engineer Review	Acceptable						
	Feeder - System Engineer Review	Acceptable			Acceptable			
	Motor - Infrared Tech Exam	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
	Gearbox - Infrared Tech Exam	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
	Mill - Wheel Oil Quality	Acceptable			Watch List	Marginal	Watch List	
	Motor - Current Analysis Tech Exa	Acceptable	Acceptable	Acceptable	Watch List	Watch List	Watch List	Watch List
	Motor - Offline Testing Tech Exan	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
	Burnerlines - Condition							
	Burnerlines: Air Balance	24.2	24.6	10.2	10	13.5	10.6	7.9
	Burners- Air Register movement	Unacceptable	Acceptable	Unacceptable	Unacceptable	Unacceptable	Unacceptable	Acceptable
	Burnerlines: Coal Balance	40	28.7	29.4	19.6	20.7	20.6	48.3
	Gearbox - Vibration Tech Exam	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
	Gearbox - Performance Center Te	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable		
	Gearbox - System Engineer Revie	Acceptable		Acceptable		Watch List		
	Gearbox - Seal Plate Visual Insp							
	Gearbox -Gears Visual Insp	Acceptable			Acceptable	Acceptable	Acceptable	Acceptable
	Mill - Outlet Temperature	137.9035	135.7611	136.9061	139.7929	141.9907	144.3207	138.4588
	Mill - Primary Air Flow	163.0417	163.5651	163.2302	162.074	151.9384	152.0923	158.8469

Plant Reliability -- EPRI PRO Model

EPRI PRO* Process Model

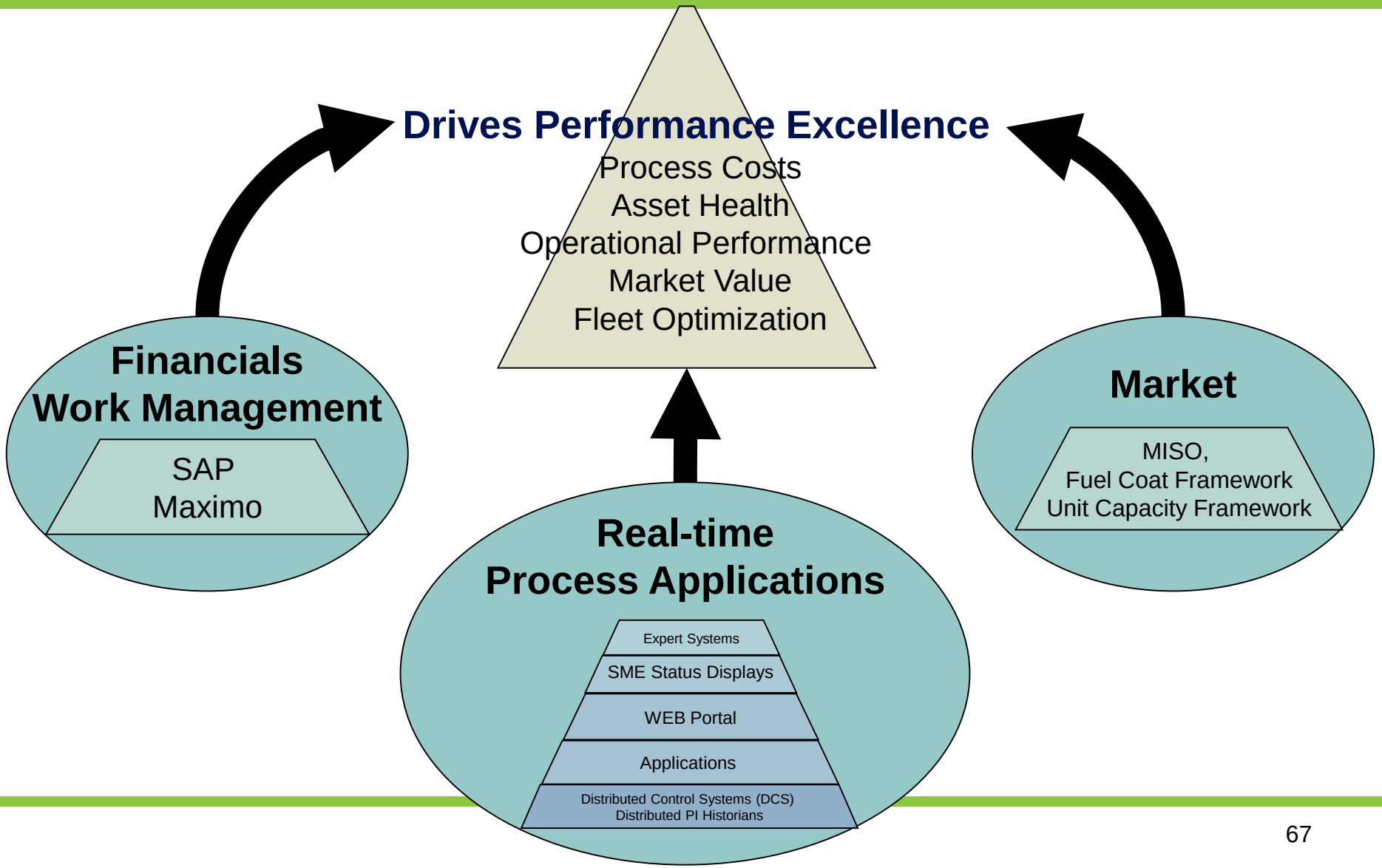
Achieve the appropriate balance of:

- Preventative Maintenance
- Predictive Maintenance
- Corrective Maintenance



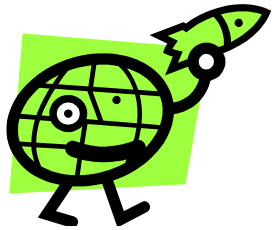
* Plant Reliability Optimization

Total Fleet Management



Process Control & Technology
A Technology Leader

- Contributed to **DTE's** recognition as a **technology leader** in North America.
- **Performance Center Tours** -- Global visitors
- **Conference Presentation** (past 12 Months)
  - User Conferences -- SmartSignal, NeuCo, Matrikon, Coal-Gen, OSIsoft,
  - Gartner, Inc. (NYSE: IT) is the world's leading information technology research and advisory company.
  - Vattenfall Workshop Copenhagen Denmark November 2007
  - Marcus Evans Asset Management February 2008
  - Electric Power 2008 Conference May 2008
- **Awards & Recognitions**
  - **M2M Gold Award** (Manufacturing Category)
  - Matrikon (Most Visionary Initiative)
- **Articles**
  - **Power Engineering** *October 2006*
  - **Control** *December 2007*



DTE Energy - A Technology Leader
Presentations, Articles & Awards

Audience	Location
Tennessee Valley Authority - TVA	AMB
Allegheny Energy	Detroit
APS (Arizona)	Detroit
SCE&G	Detroit
Santee Cooper - SC	Conference Call
CMS Energy	Detroit
MichCon OSSG - Gas Operations	AMB
Fermi 2 Performance Management	Conference Call
MichCon Compressor Station	Belle River
Electric Power & Light	Baltimore, MD
SmartSignal Users Conference 2008	Chicago, IL
Indra (Spain)	AMB
Union Fenosa (Spain)	AMB
Allegehney Entergy	Conference Call
DTE Distribution Operations	AMB
E.ON U.S. Services Inc, Louisville, KY	AMB
Control Magazine - Technology Framework Article	National
Constellation Energy	AMB
Michcon	AMB
Vattenfall	Copenhagen, Denmark
SAOC (Ameren, We Energies., Kanses City, First Energy	Detroit
Gartner Group - Energy and Utilities IT Summit	Dallas, TX
Eskom	AMB
Entergy Nuclear	AMB
OSI User Conference 2007	Monterey, CA
COAL-Gen 2007	Milwaukee, WI
M2M Award Dinner - Gold Award Manufacturing	Chicago, IL
Ameren	AMB

Audience	Location
PPL Corporation	AMB
Pearl Street Inc	AMB
NeuCo ProcessLink Summit 2007	St Louis, MO
KEPRI (Korean electrical power research institute)	AMB
Matrikon Summit 2007	Chicago, IL
Japan Atomic Power Company (JAPC)	AMB
Michcon	AMB
ALSTOM Power	AMB
SCANNA	AMB
Power Magazine Article - Performance Center	National
SmartSignal Summit 2006	Chicago, IL
ABB	AMB
NRG Energy	AMB
DTE Energy Trading	AMB
TransAlta	Alberta
Johns Manville Corp	Monroe Power Plant
IEEE/University of Michigan	U of M Campus
Merdiam	AMB
AmerenUE	St Louis, MO
Presentations in Process	
AEP American Electric Power	AMB
Emerson Process Management	AMB
OSI Regional Conference	Detroit, MI
Requested to Present but DTE Declined	
Marcus Evans World Engineering Congress	Bangkok, Thailand
Tenaga Power Conference Malaysia	Singapore, Malaysia

DTE Energy

Fleet Optimization is about ……

People Making the right decisions when it matters!

QUESTIONS?

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