



# DTE Energy®





# **DTE Energy<sup>®</sup>**

## **Fleet Optimization** **..... through Process Controls** **& Technology**

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**Lead Engineer**

**November 13<sup>th</sup>, 2013**



# Fossil Generation

## Process Controls & Technology



### Fleet Optimization ..... through Process Controls & Technology



### The Process Technology Enablers



# DTE Energy Geography



## Utility Businesses

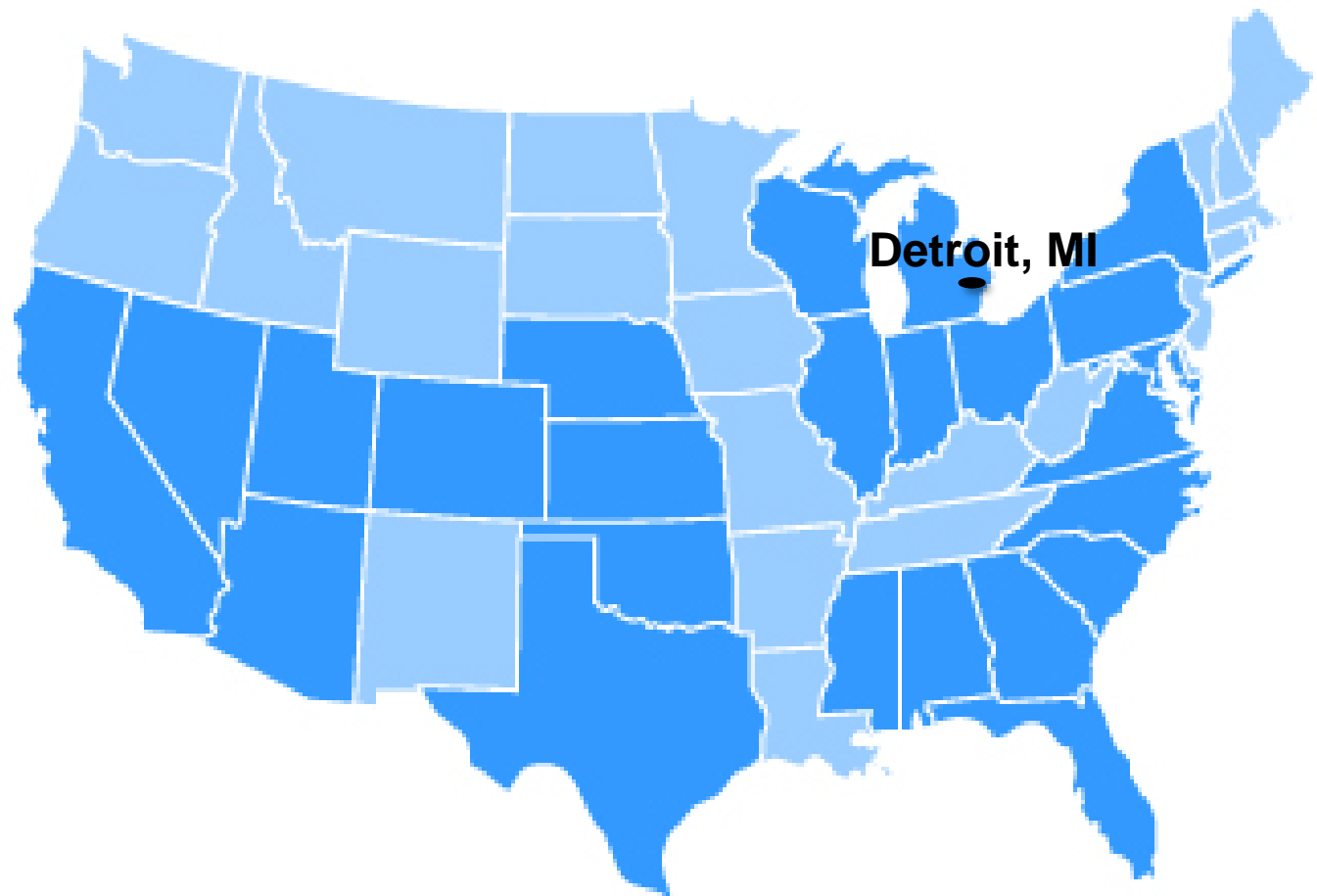
- DTE Electric
- DTE Gas
- Citizens Gas Fuel

## Non-Utility Businesses

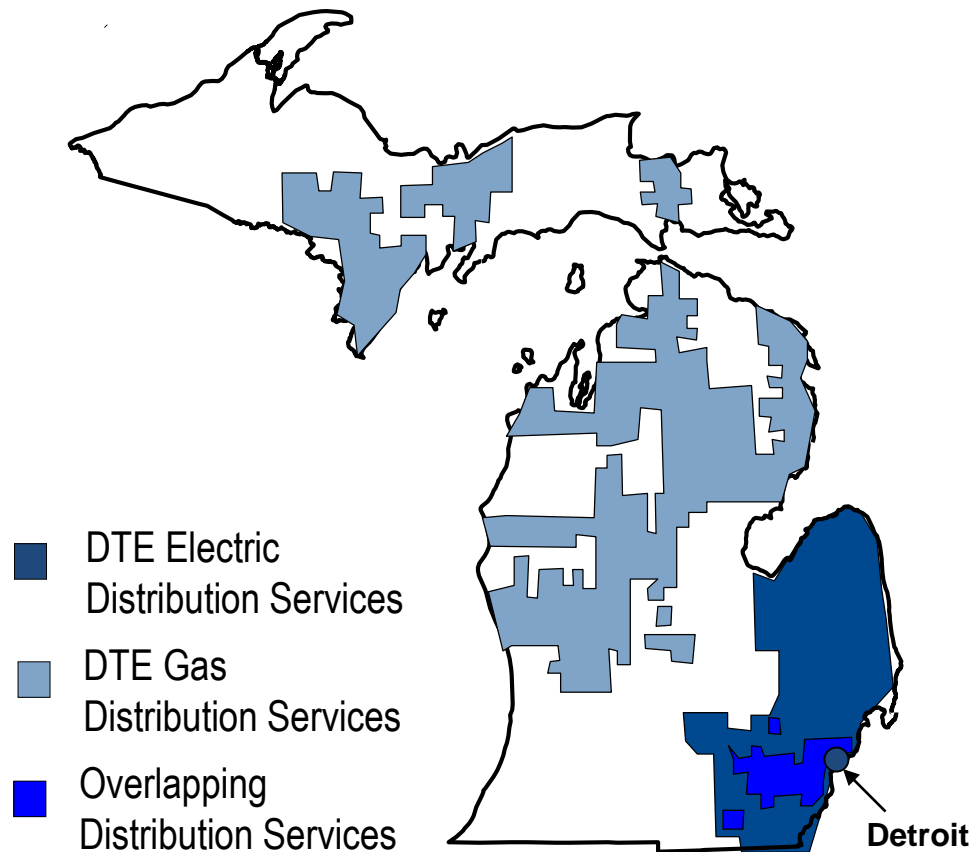
- DTE Coal Services
- DTE Rail Services
- DTE Energy Trading
- DTE Gas Storage
- Midwest Energy Resources

## 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

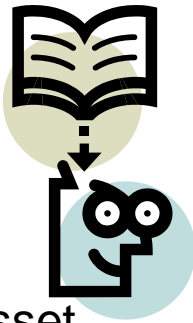
- Fifth largest natural gas utility in the U.S. with 1.2 million customers
- 170 Bcf of gas sales
- 12% of national gas storage capacity with 124 Bcf of regulated gas storage



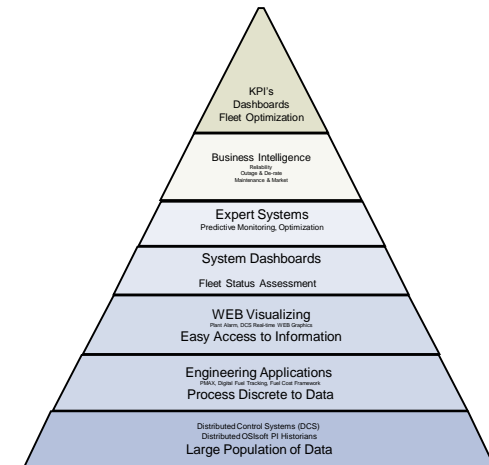
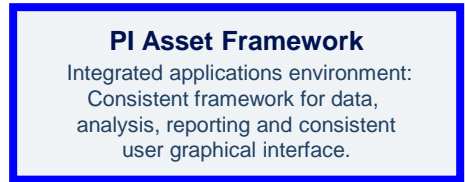
# Why Focus on Controls & Technology?

## 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**.



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



# Power Plants & Performance Center



Monroe – 3,135 mw



Belle River – 1,260 mw



Trenton Channel - 730 mw



Performance Center – 11,588 mw



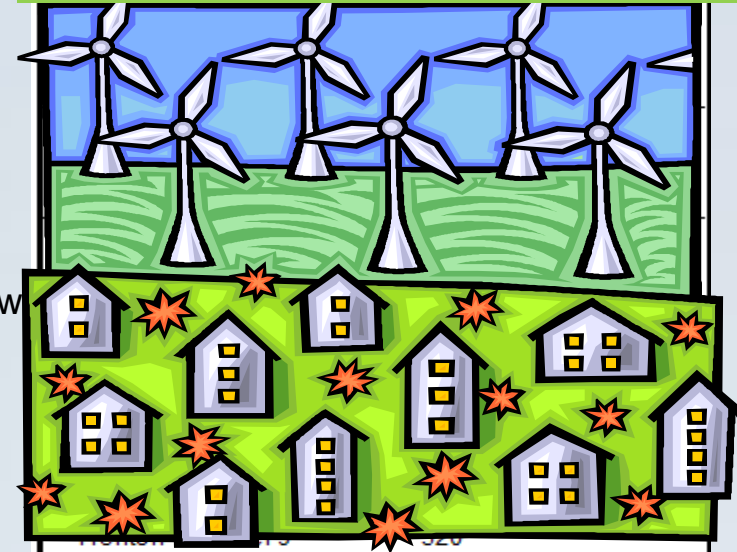
River Rouge - 527 mw



Greenwood – 785 mw

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

## Expanding Renewable Portfolio



Trenton Channel		766
Peakers	1224	1224
<b>Totals:</b>	<b>10554</b>	<b>10554</b>

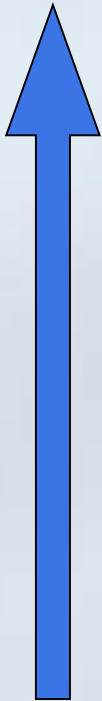


# Control & Technology Framework

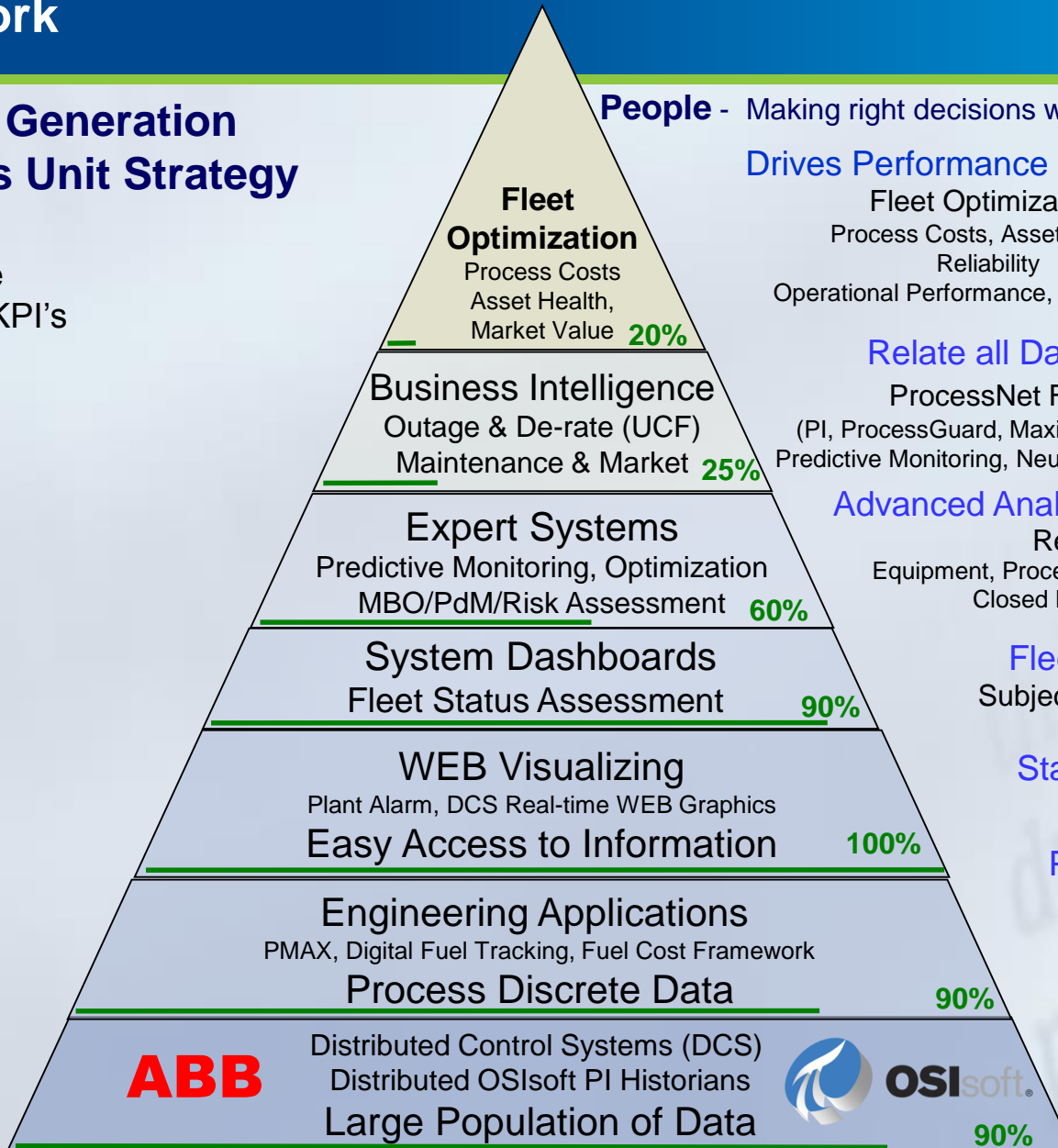


## Fossil Generation Business Unit Strategy

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



### 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

### Virtual Control Room - 23 Units

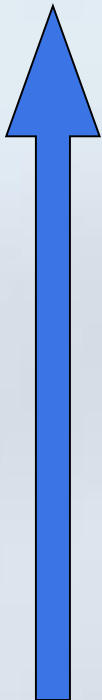


# Control & Technology Framework



## 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

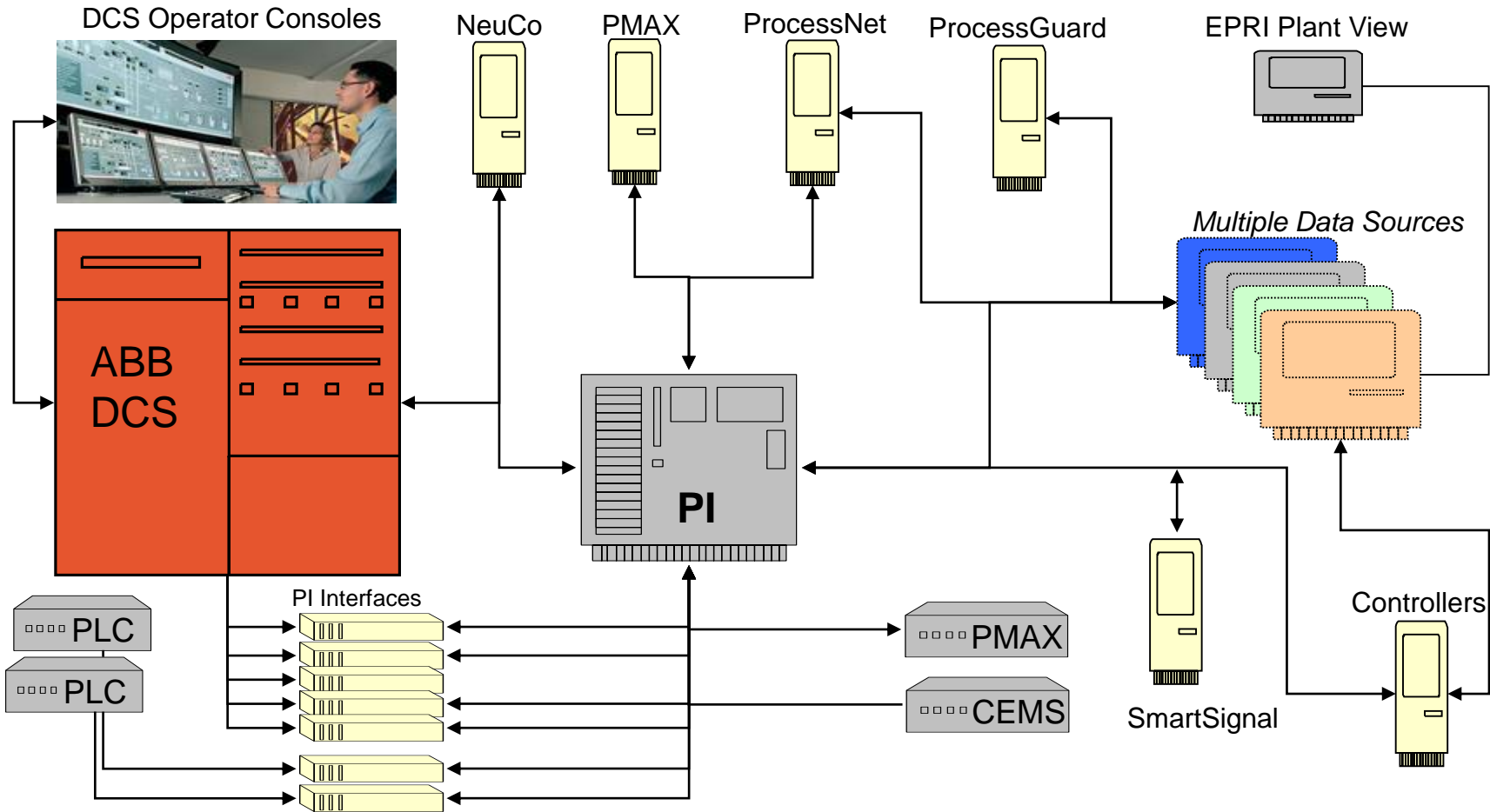


**OSIsoft**

# Plant Process Controls

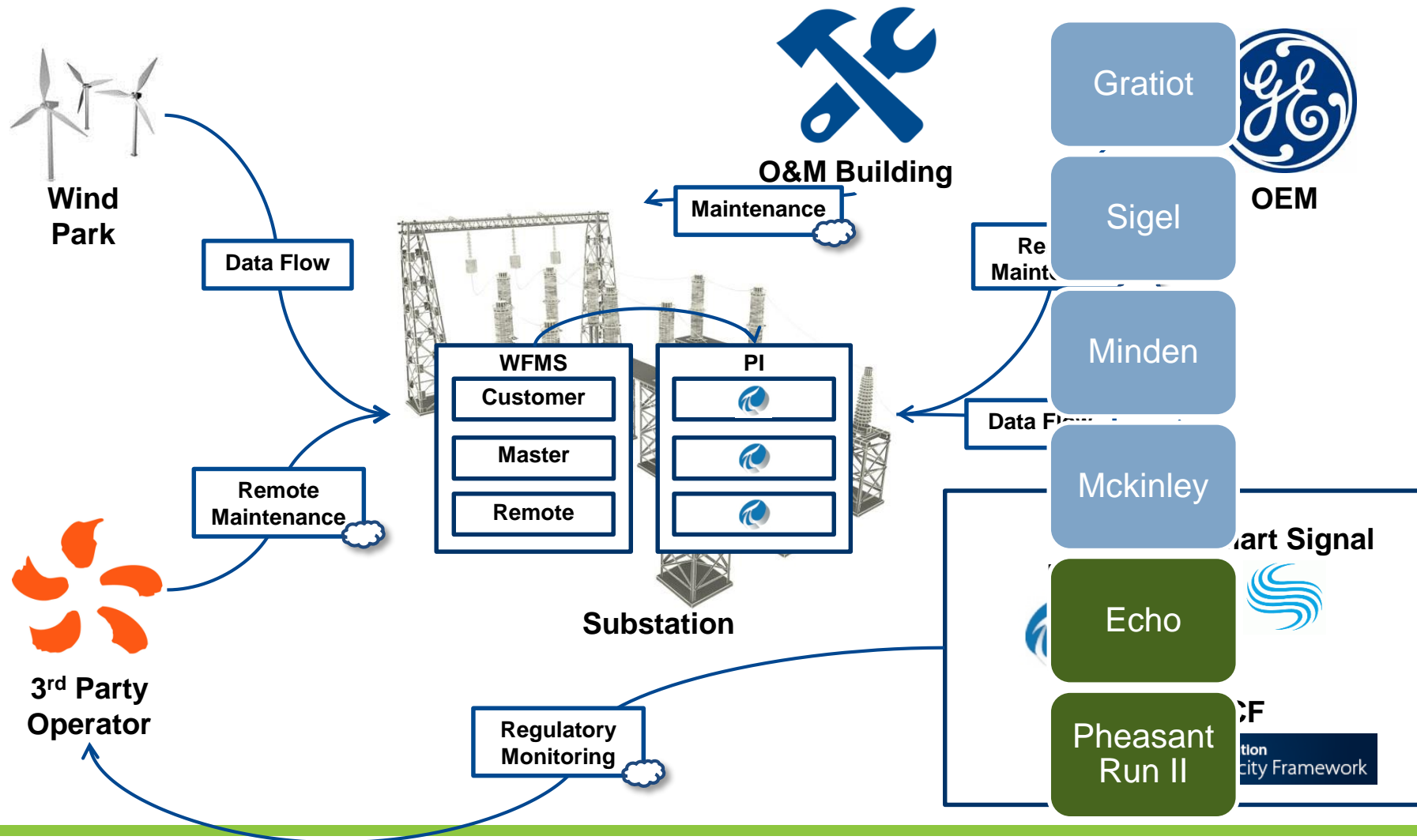
- ABB Distributed Control Systems
  - All Units in the fleet
  - Installed investment \$150 – \$200 Million Dollars
  - Critical to
    - Plant Operation
    - Personnel Safety
    - Equipment Protection
- Many stand alone control systems.
- Process Information Historian (PI) & Interfaces







# Control & Technology Infrastructure – Wind Parks



# Raw PI Data Analysis

## PI Yields Benefits

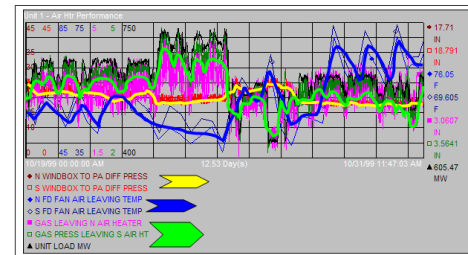
- Post trip analysis
- Process monitoring
- Optimization
- Early warning
- Alarming

### UNIT 1 – COMBUSTION PRO (I.E., AIR HEATER PERFORMANCE VS COAL MILLS)

Exhibit 5

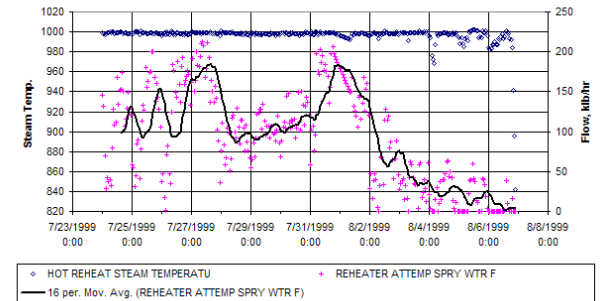
Concerns have recently arisen regarding degrading performance of Unit 1's Coal Mills over this past week. I would like to take this opportunity to **throw-caution-to-the-wind** in light of two factors: 1) Lack of good air heater radial seals, and 2) rising ambient air temperatures.

In the PI graph below of Unit 1's parameters, a review of **PA-to-Windbox differential pressure** (key to Coal Mill performance) is compared simultaneously to **ambient air temperatures** (FD Fan Air Leaving) and **Windbox delta-P**. Past operating history has defined that when the PA-to-Windbox delta-P reaches a level of **19" H<sub>2</sub>O**, that boiler combustion and coal mill performance is drastically impacted. This is the **level** at which air heater radial seal replacement is dictated if unit load is to be maintained without restrictions.



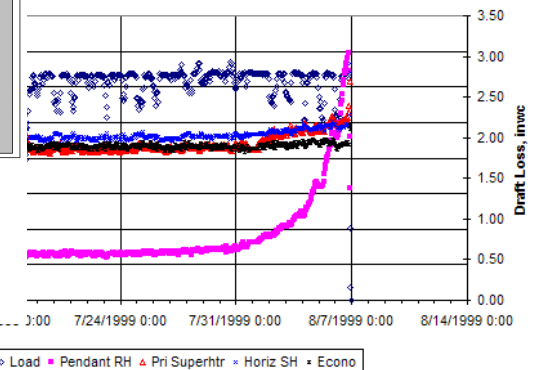
Understanding that air density changes as temperature changes and that it has an inverse effect on fan and air heater performance (i.e., as air temp. increases, efficiency of fans/air heater decrease) we can readily see in the above graph that since October 25<sup>th</sup> the **ambient air temperature** changed drastically. This was the reported time that Unit 1 coal mill output problems began to arise. As a result, **Unit 1** was reduced and coal mills removed from service in an attempt to maintain enough Hot PA **temperature** and **PA-to-Windbox** to the running mills. For a brief period, this provided a false impression that **PA-to-Windbox** pressure was not affected by rising ambient temperatures, yet when compared to unit load one can easily surmise the error of this perception. It was on Oct. 27<sup>th</sup> that the true impact on **PA-to-Windbox** pressure can be seen in the PI graph above. **Please note in the above graph that air temperature had a POSITIVE impact on** **Unit 1** **on Oct. 22<sup>nd</sup> when it cooled down.**

Effect of Pluggage on Reheat Attemptation  
Exhibit 2



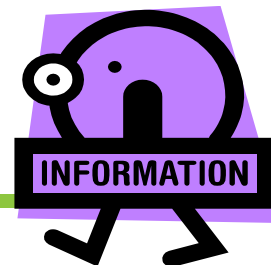
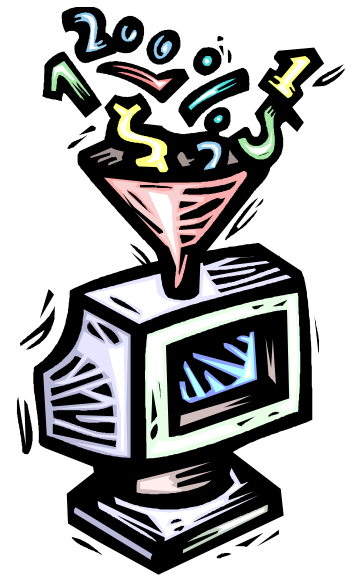
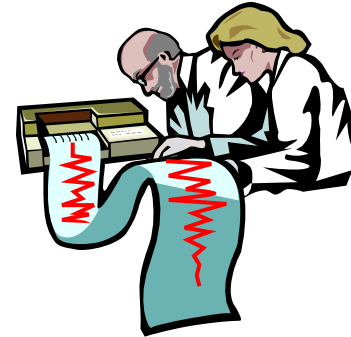
Effect of Pluggage on Economizer Gas Outlet Temperature

Reheater, Superheater, and Economizer Draft Loss  
Exhibit 4



## 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**?

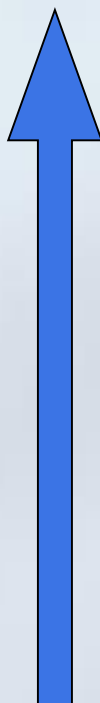


# Control & Technology Framework

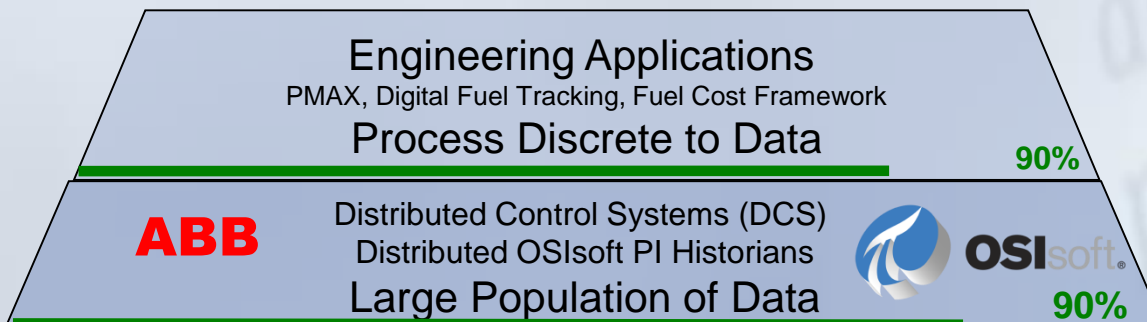


## Fossil Generation Business Unit Strategy

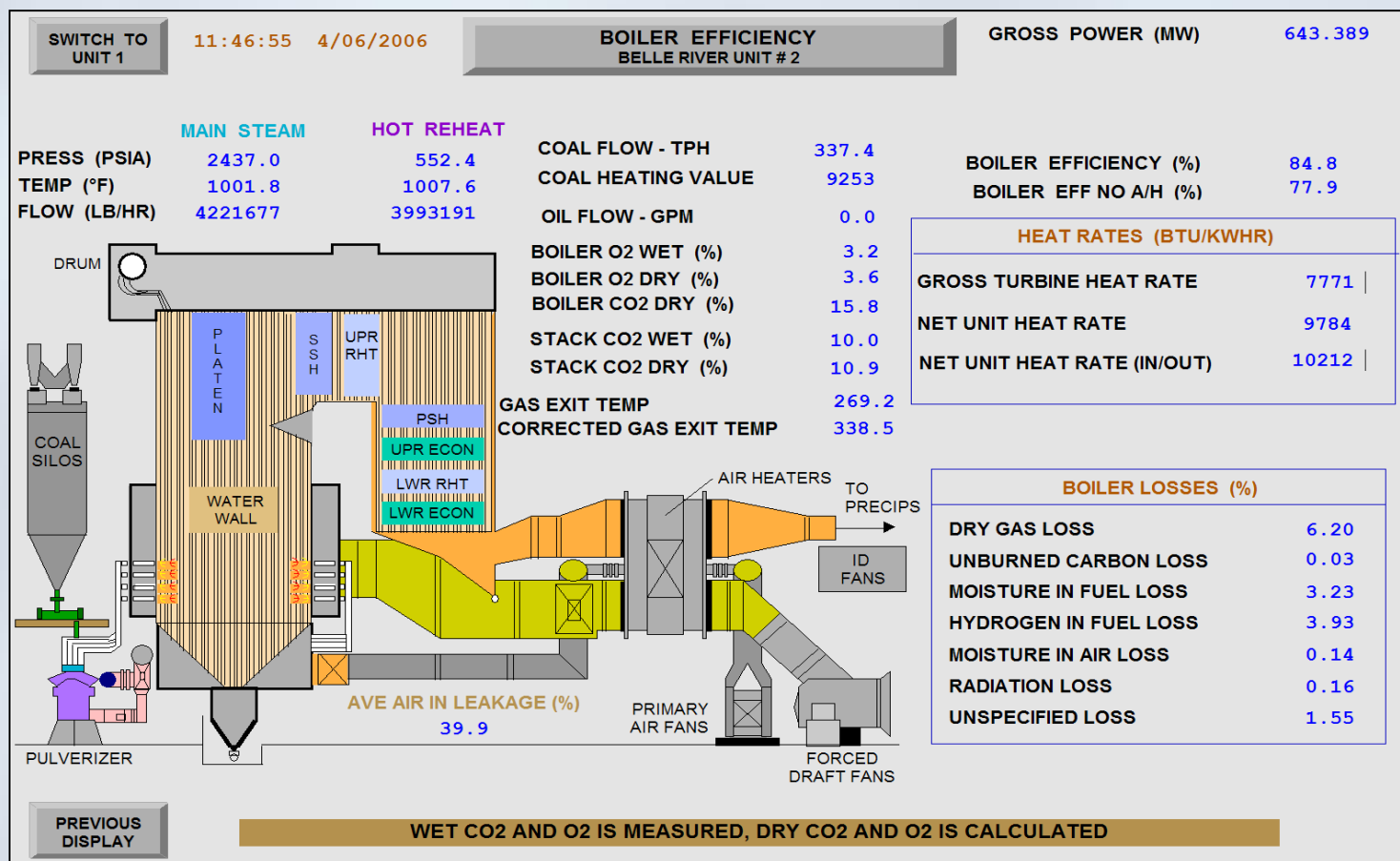
Actionable  
Information – KPI's



Discrete data  
Limited value

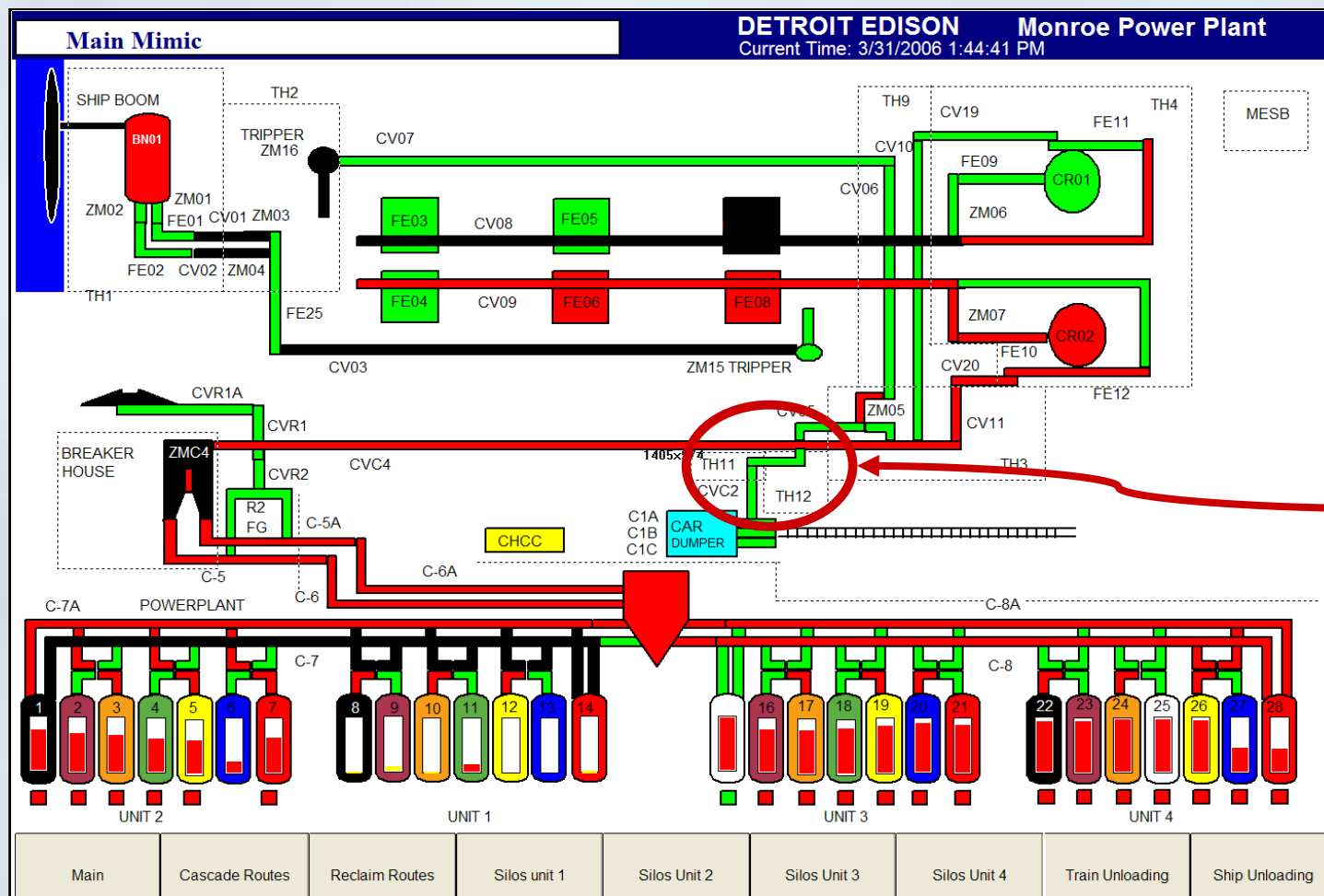


## Thermal Performance Calculation Engine



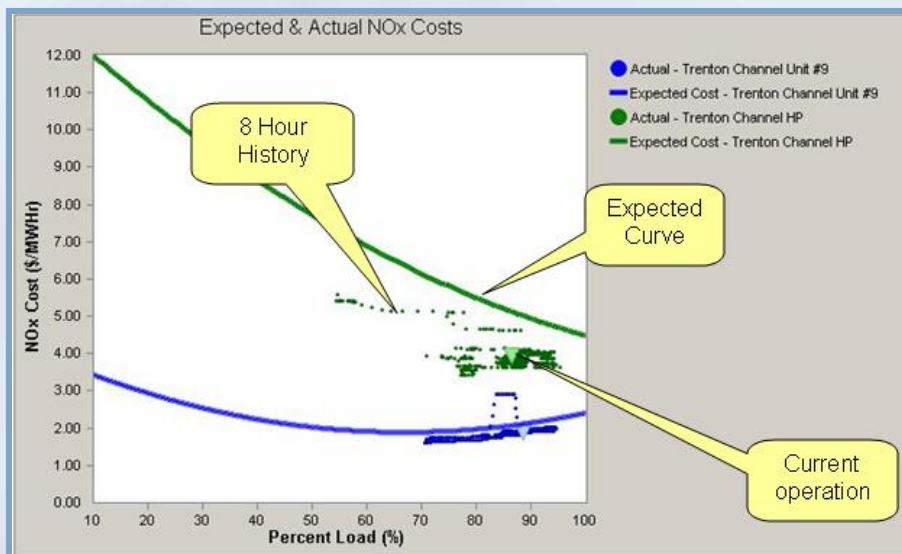


# Digital Fuel Tracking System



**On-line  
Fuel Analyzer**

# NOx Emissions Strategy



## NOx Reduction with Improved Heatrate



Primary focus is NOx reduction only

Focus on operating near NOx budget curve

# Electronic Operator Rounds RFID Technology / PI Manual Logger



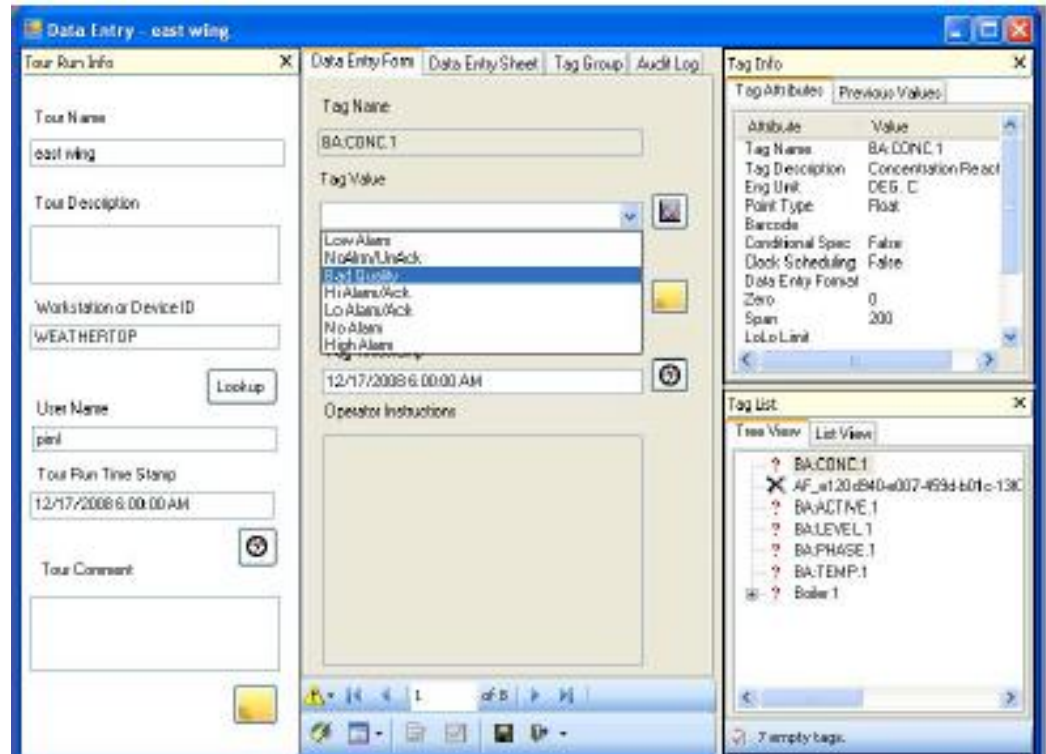
RFID Tags



Industrial PDA (Symbol MC9060S)



Tablets

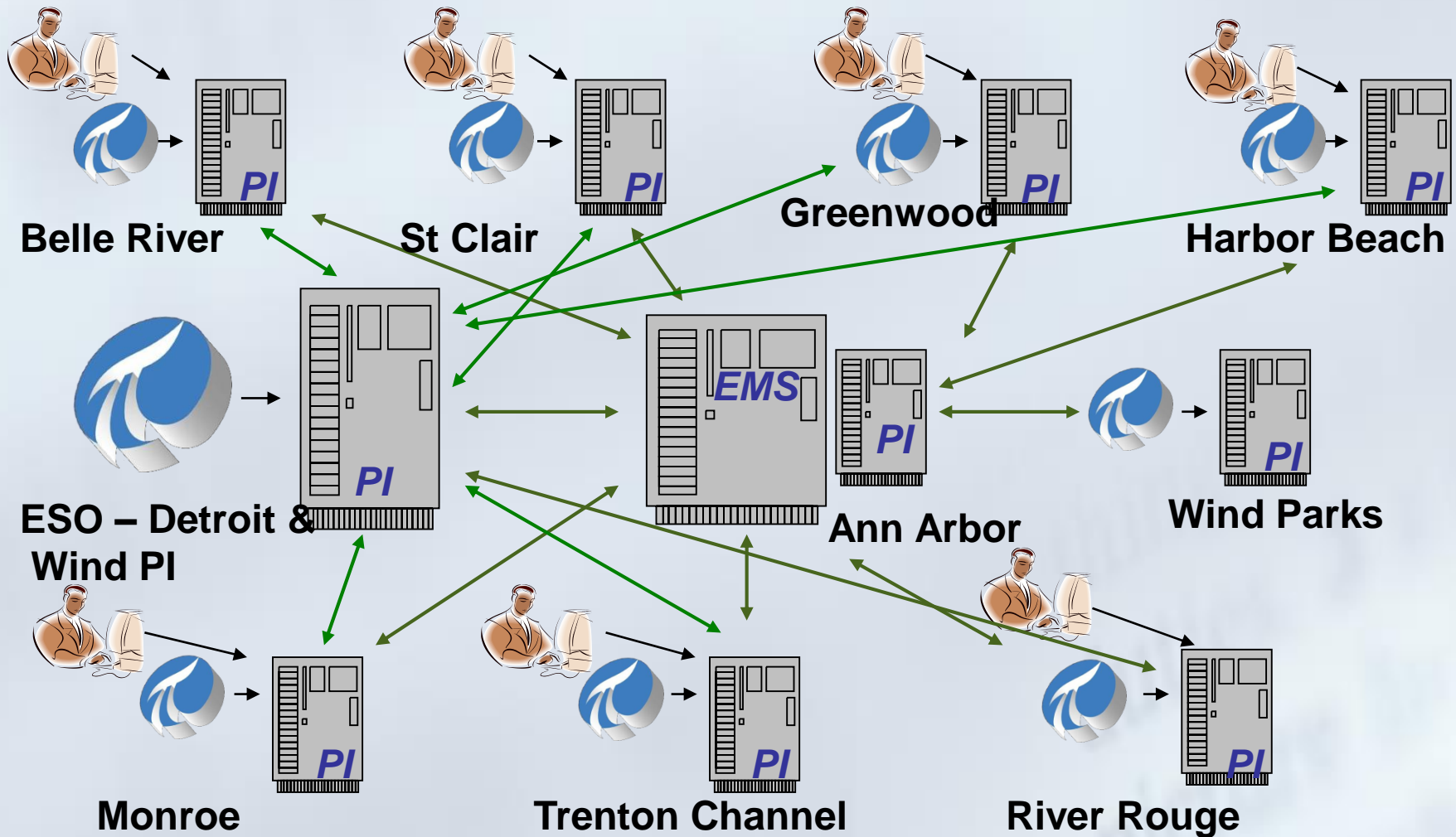
The screenshot shows the "Data Entry - east wing" software interface. It has several panes: "Tour Run Info" on the left with fields for Tour Name, Description, Workstation/Device ID, User Name, Tour Run Time Stamp, and Tour Comment; a central "Data Entry Form" with fields for Tag Name, Tag Value, and Operator Instructions; and two panes on the right. The "Tag Info" pane shows attributes like Tag Name, Description, and Unit. The "Tag List" pane shows a list of tags, including "BA.CONC.1", "AF\_u120dB40-w007-463d-b01c-138C", "BA.ACTIVE.1", "BA.LEVEL.1", "BA.PHASE.1", "BA.TEMP.1", and "Boiler 1".

Attribute	Value
Tag Name	BA.CONC.1
Tag Description	Concentration React
Eng Unit	DEG. C
Point Type	Float
Barcode	
Conditional Spec	False
Clock Scheduling	False
Data Entry Forecast	
Zero	0
Span	200
LoLo Limit	

Tag Name	Tag Value
BA.CONC.1	12/17/2008 6:00:00 AM

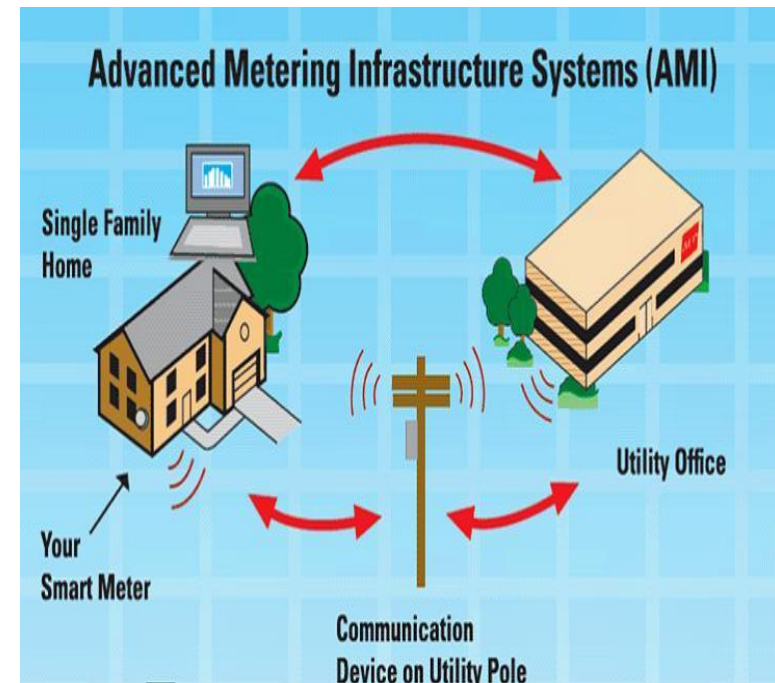
PI Manual Logger

# PI to PI Process Data Conduit



## 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

**Fossil Generation Unit Capacity Framework**

User: Engineering Consultants Group, Inc. (ecg) DTE Energy

Reports Data Entry Administration EMS Print About Quick Links

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**Plant Energy Management System - Monroe Unit 1**

Last Refresh: 3/3/2006 2:27:23 PM Auto-Refresh Interval: 5 Minutes AGC Mode: LOCAL

Select Unit Change Data Send Now Limits & Error Checks

	Block 1	Block 2	Block 3	Block 4
<b>Fuel Data</b>				
Fuel Definition	Coal	Coal	Coal	#2 Oil
Max Available MW	680	0	0	0
Regulating Fuel	Yes	No	No	No
Realtime MWs	670.1719	0	0	0
Fuel Cost \$/MBTU	2.306458	2.306458	2.306458	14.04883
O + M Cost \$/MBTU	0.1099987	0.1099987	0.1099987	0.1099987
Emission Cost	0.6212921	0.6212921	0.6212921	0.1028996
Total Cost \$/MBTU	3.03772	3.03772	3.03772	14.26172
Total Cost \$/MW Hr	27.33936	27.33936	27.33936	128.3555

	Block 1	Block 2	Block 3	Block 4
<b>Other Data</b>				
Dispatch Margin Up	9.828125	0	0	0
Dispatch Margin	Calc Failed	0	0	0
Aux Power	32.3125			
Dynamic Heat Rate	106.87			
Unit Status	DNE			
Fuel Cost	0			
Startup MBTU	0			

	Block 1	Block 2	Block 3	Block 4
<b>Fuel Price Calculator</b>				
* Current Blend: LSS:100%				
Type of Coal / Blend % By Weight	LSS	100%		
Type of Coal / Blend % By Weight	LSW	0%		
Type of Coal / Blend % By Weight	LSW	0%		
<input type="checkbox"/> Auto Update Fuel Prices Calculate Send				

<b>Operating Limit Data</b>	
Total Capability	680 TCAP
Ten Minute Capability	680 TMC
Regulation High	680 Reg High
Net MW	670.1719
Regulation Low	400 Reg Low
Ramp Rate Up	2 AGC MW/MIN
Ramp Rate Down	2 AGC MW/MIN
Forbidden Zone 1 High	0
Forbidden Zone 1 Low	0
Forbidden Zone 2 High	0
Forbidden Zone 2 Low	0
Forbidden Zone 3 High	0
Forbidden Zone 3 Low	0
Forbidden Zone 4 High	0
Forbidden Zone 4 Low	0

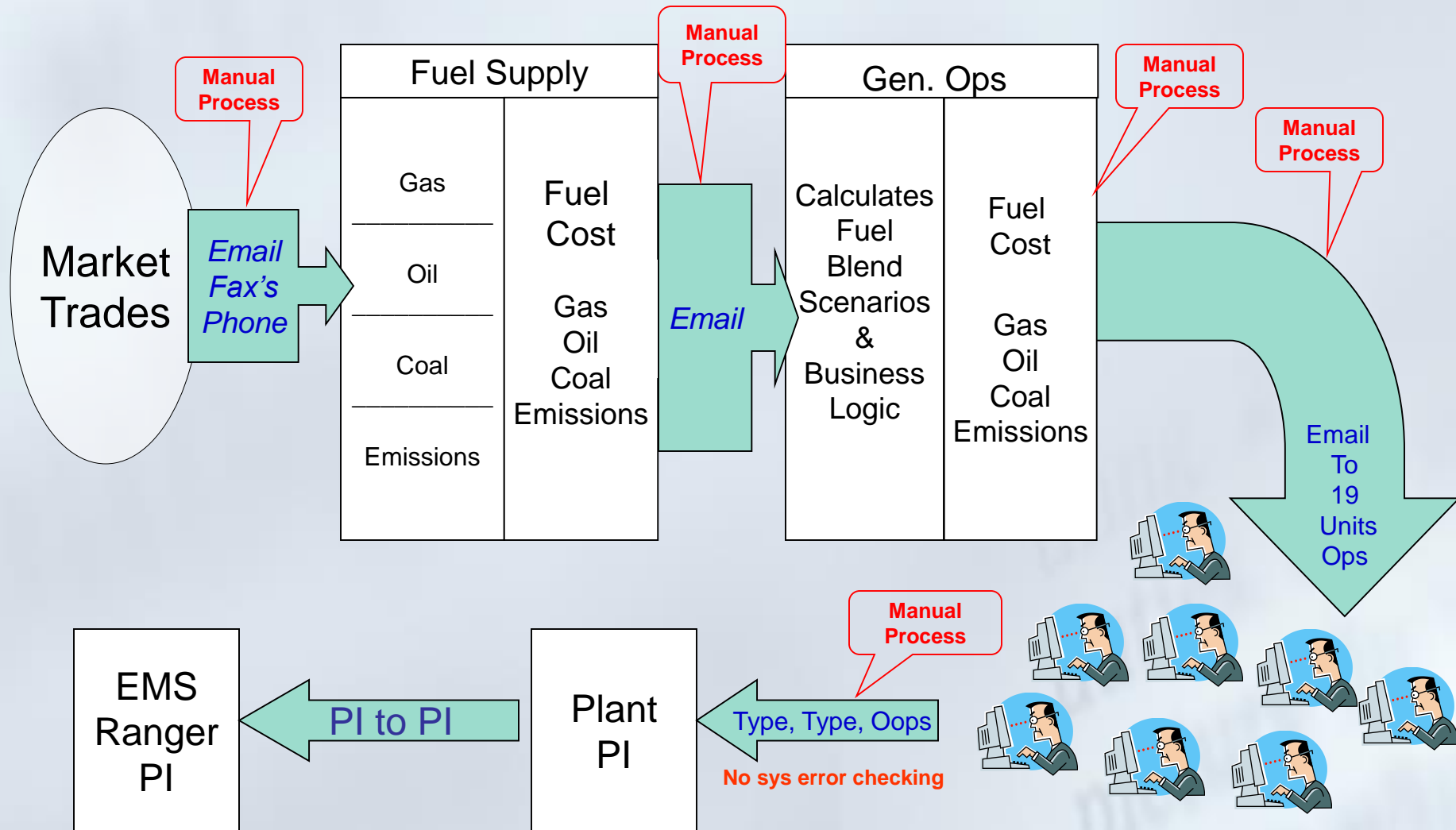
**Quick Reference**

1. To edit data, click "Change Data".
2. Make necessary changes, then click "Send Now".

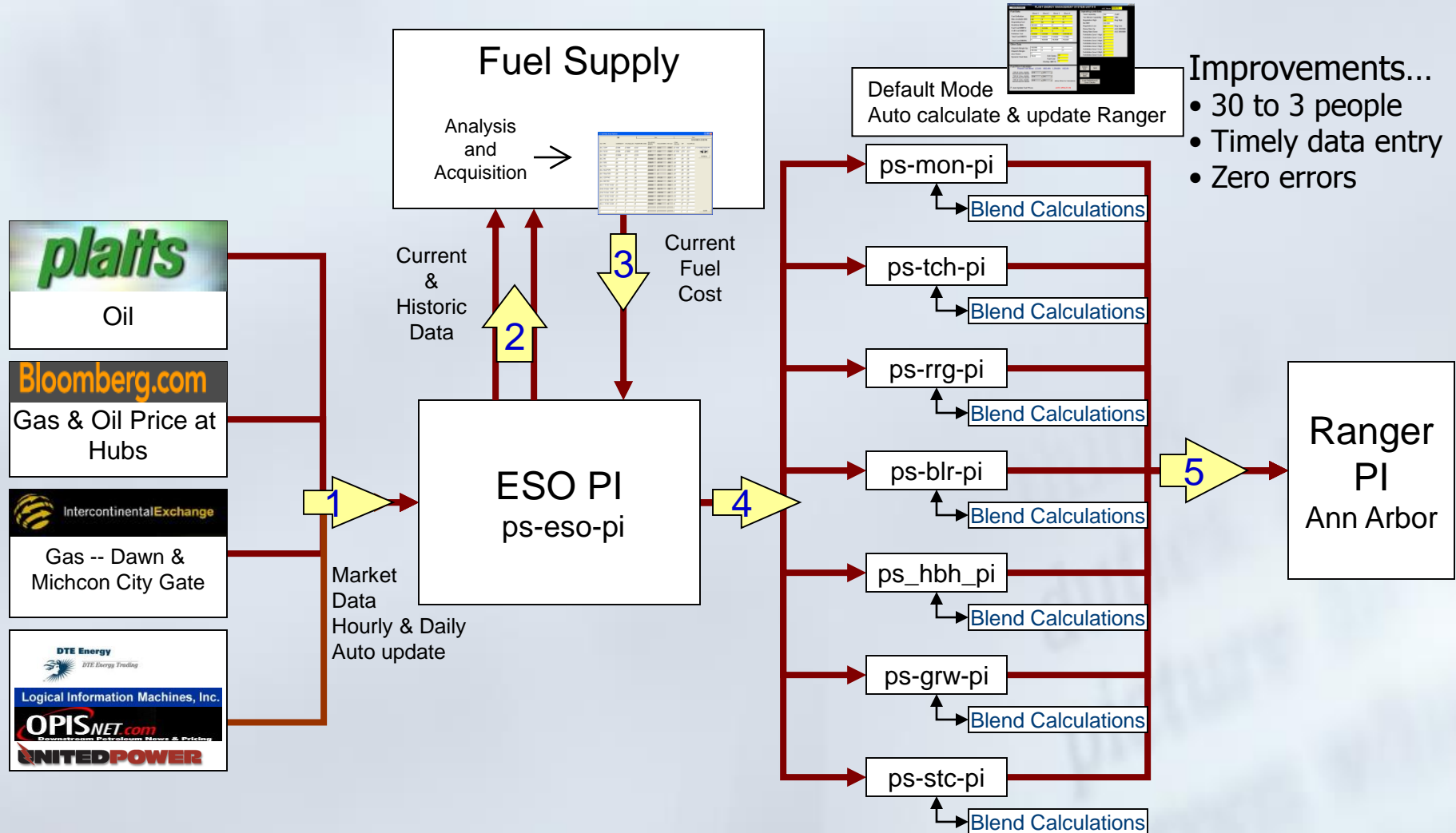
Select Unit Change Data Send Now Limits & Error Checks

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# Before Fuel Cost Framework



# Fuel Cost Framework



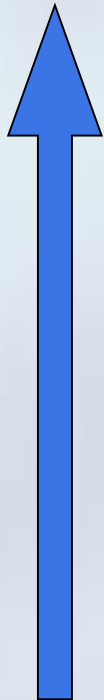
5 largest Fossil units & Peaking Units are ramped through PI Set Point control



# Control & Technology Framework

## Fossil Generation Business Unit Strategy

Actionable  
Information – KPI's



Discrete data  
Limited value

**Drive  
Performance  
Excellence**

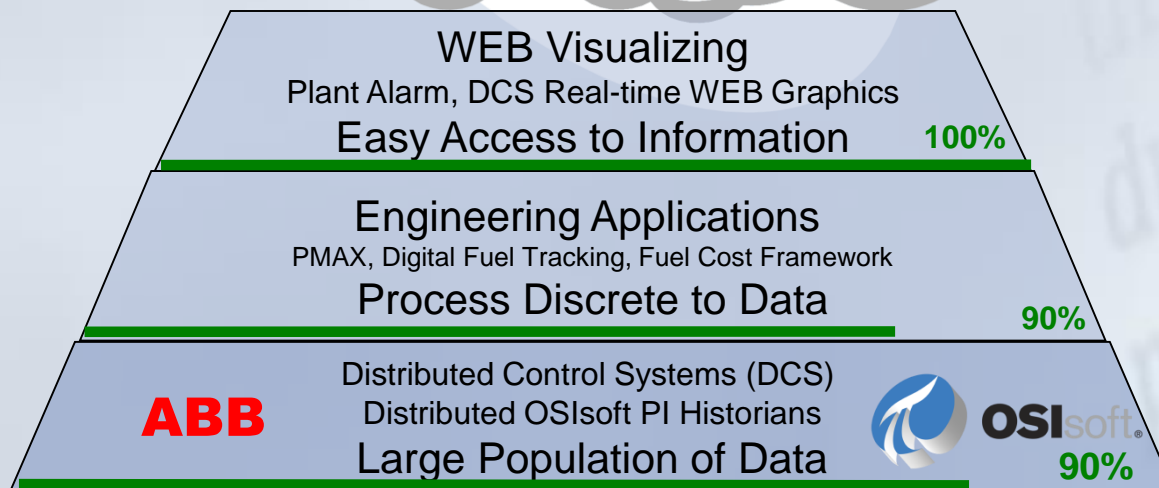
Drive Performance Excellence  
**Fleet Optimization**

**Fleet Perspective**

- Methods
- Applications























**Involves**

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





# Fleet Status – PI WEB enabled

Unit	Net MW	TMC	TCAP	Unit	Net MW	TMC	TCAP	Unit	Net MW	TMC	TCAP	Load Forecast			
BR 1		0	0	0	CC 15	66	95	95	HA 12-1	0	42	42	HE	Today	Tomorrow
BR 2		609	635	635	CC 16	53	125	125	HA 12-2	0	42	42	0100	6041	8250
FE 2		0	0	0					HB 11	0	4	4	0200	6015	7862
MON 1		645	730	730	BR 12-1	77	77	77	MON 11	0	14	14	0300	5691	7505
MON 2		745	755	760	BR 12-2	75	75	75	NE 11-1	0	17	17	0400	5967	7457
MON 3		753	760	760	BR 13	76	76	76	NE 11-2	0	16	16	0500	6212	7564
MON 4		753	753	753	DLRY 11	0	67	67	NE 11-3	0	16	16	0600	6857	8010
RR 2		245	255	255	DLRY 12	0	69	69	NE 11-4	0	16	16	0700	7250	8581
RR 3		273	275	275	GW 11-1	77	77	77	NE 12	0	21	21	0800	7893	9183
SC 1		105	105	135	GW 11-2	54	54	54	NE 13-1	0	21	21	0900	8893	10069
SC 2		112	112	156	GW 12	19	19	19	NE 13-2	0	21	21	1000	9573	10593
SC 3		125	135	150	BR 11										
SC 4		135	140	140	CC 11										
SC 6 <sup>346</sup> <sub>120</sub>		255	255	280	CF 11										
SC 7		329	329	329	DA 11										
TC 7		94	105	105	FE 11-1										
TC 8		73	80	80	FE 11-2										
TC 9		460	500	500	FE 11-3										
GW 1		369	450	785	FE 11-4										
HB 1		84	84	84	HA 11-1										
LUD 1		0	0	0	HA 11-2										
LUD 2		0	0	0	HA 11-3										
LUD 3		0	0	0	HA 11-4										
LUD 4		-319	0	319											
LUD 5		0	0	0											
LUD 6		-322	0	322											
Plant Generation 6281				Transactions											
Ludington Generation 0				Firm Purchase											
Peaker Generation 378				Non-Firm Purchase											
Misc. Generation 85				Firm Sale											
Total Generation 6745				Non-Firm Sale											
Total Load 7978				Service Area Load											
Steel Load 289				Retail Schedule 											

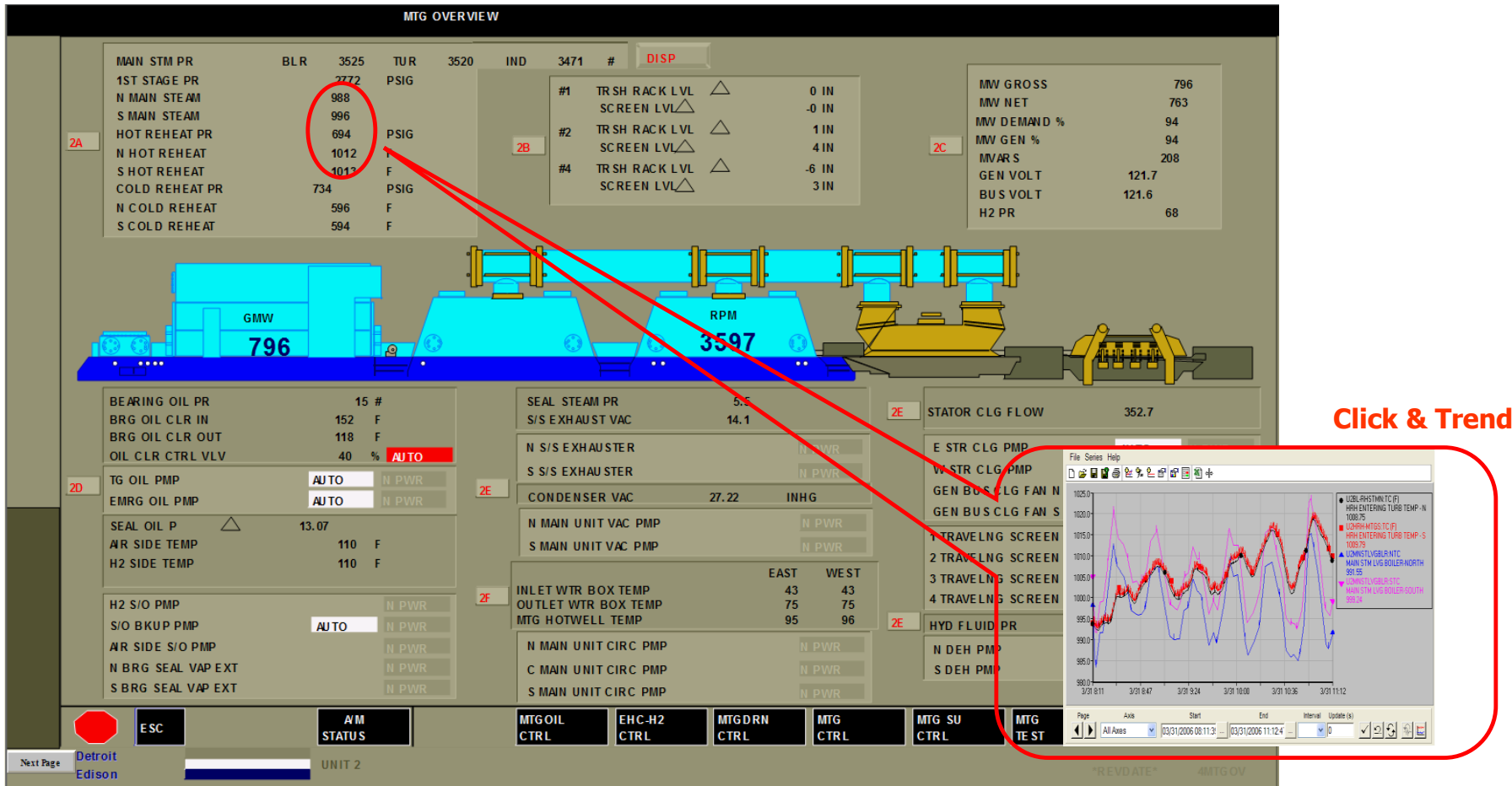
COAL MILLS							FANS				FW PUMPS				Circ				VP				HDP				GB									
M	1	2	3	4	5	6	7	FD	PA	SW	NW	NE	SE	Cond	N	C	S	N	S	BF	N	C	S	N	S	N	C	S	N	S	N	C	S	N	S	
O	1	2	3	4	5	6	7	N	S	N	S	N	S	N	C	S	N	S	N	S	N	C	S	N	S	N	C	S	N	S	N	C	S	N	S	
N	3	1	2	3	4	5	6	7	N	S	N	S	N	S	N	C	S	N	S	N	S	N	C	S	N	S	N	C	S	N	S	N	C	S	N	S
	4	1	2	3	4	5	6	7	N	S	N	S	N	S	N	C	S	N	S	N	S	N	C	S	N	S	N	C	S	N	S	N	C	S	N	S

B	1	BF	PL	YE	RE	WH	GR	BL	OR	E	W	E	W	1	2	3	4	E	C	W	E	W	E	W	N	C	S	NE	SE	NW	SW	E	C	W		
R	2	BF	PL	YE	RE	WH	GR	BL	OR	E	W	E	W	1	2	3	4	E	C	W	E	W	E	W	N	C	S	NE	SE	NW	SW	E	C	W		
S	1	1	2	3	4	5																														
T	2	1	2	3	4	5																														
C	3	1	2	3	4	5				N	S			N	S			N	S			N	C	S	N	C	S	N	C	S	N	C	S	N	C	S
	4	1	2	3	4	5				N	S			N	S			N	S			N	C	S	N	C	S	N	C	S	N	C	S	N	C	S
	6	1	2	3	4	5	6	7	8	N	S			N	S			N	S			N	C	S	N	C	S	N	C	S	N	C	S	N	C	S
	7	A	B	C	D	E	F			N	S			N	S			N	C	S																
R	2	1	2	3	4	5	6	7	8	E	W			E	W			E	C	W	E	C	W	E	C	W										
R	3	1	2	3	4	5	6			E	W			E	W			E	C	W	E	C	W	E	C	W										

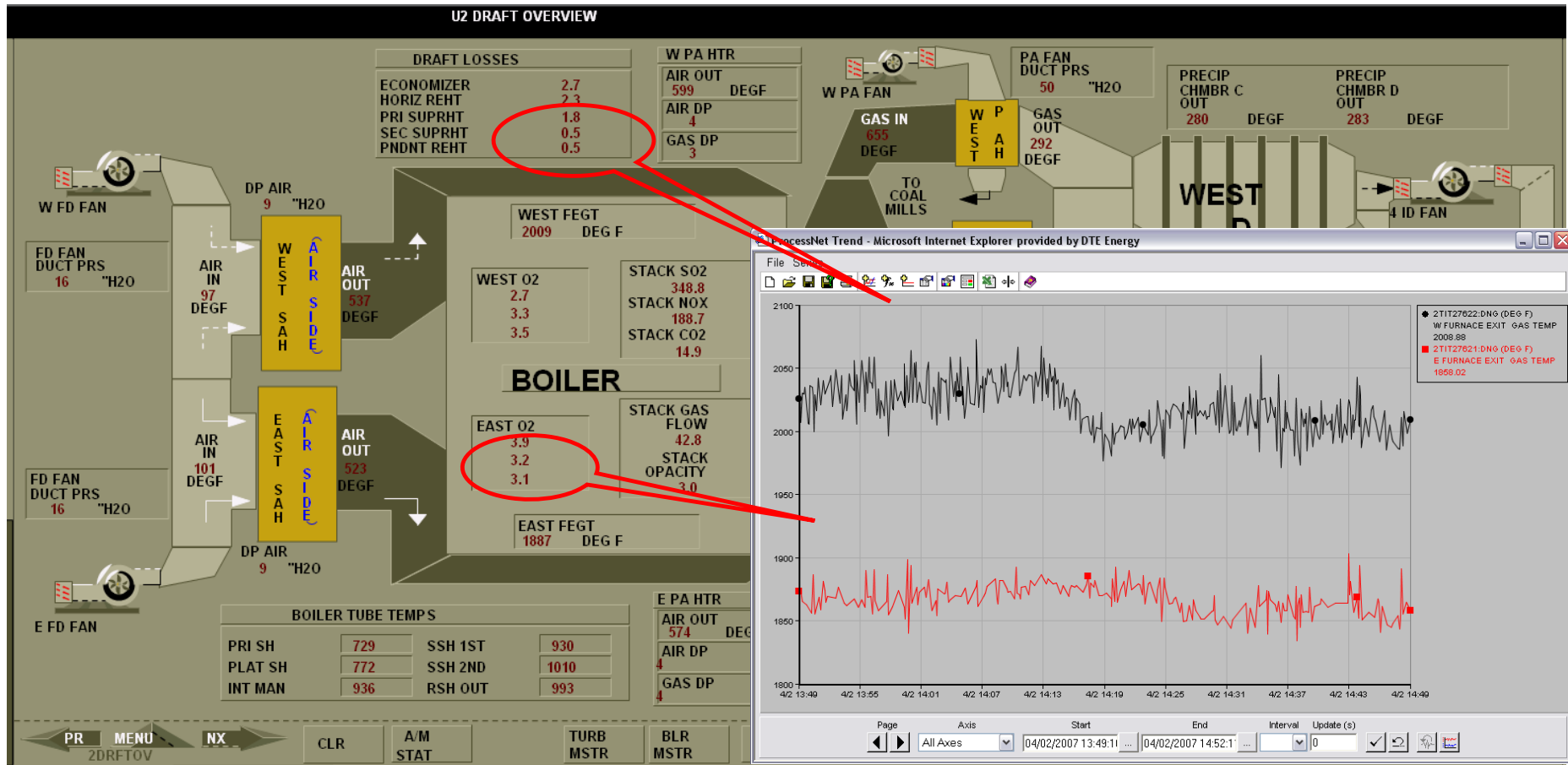
GW										N	S			N	S			N	C	S			E	W			N	C	S	N	C	S		N	S	JF	JM
T	16	A	B	C						N	S			N											N	C	S										
C	17	A	B	C						N	S			N																							
	18	A	B	C						N	S			N													N	C	S								
H	19	A	B	C						N	S			N																							
	9	A	B	C	D	E	F			N	S			N	S			N	C	S	N	S													E	W	

# Real-Time DCS Operator Displays

6000 real time dynamic actively linked WEB DCS graphics

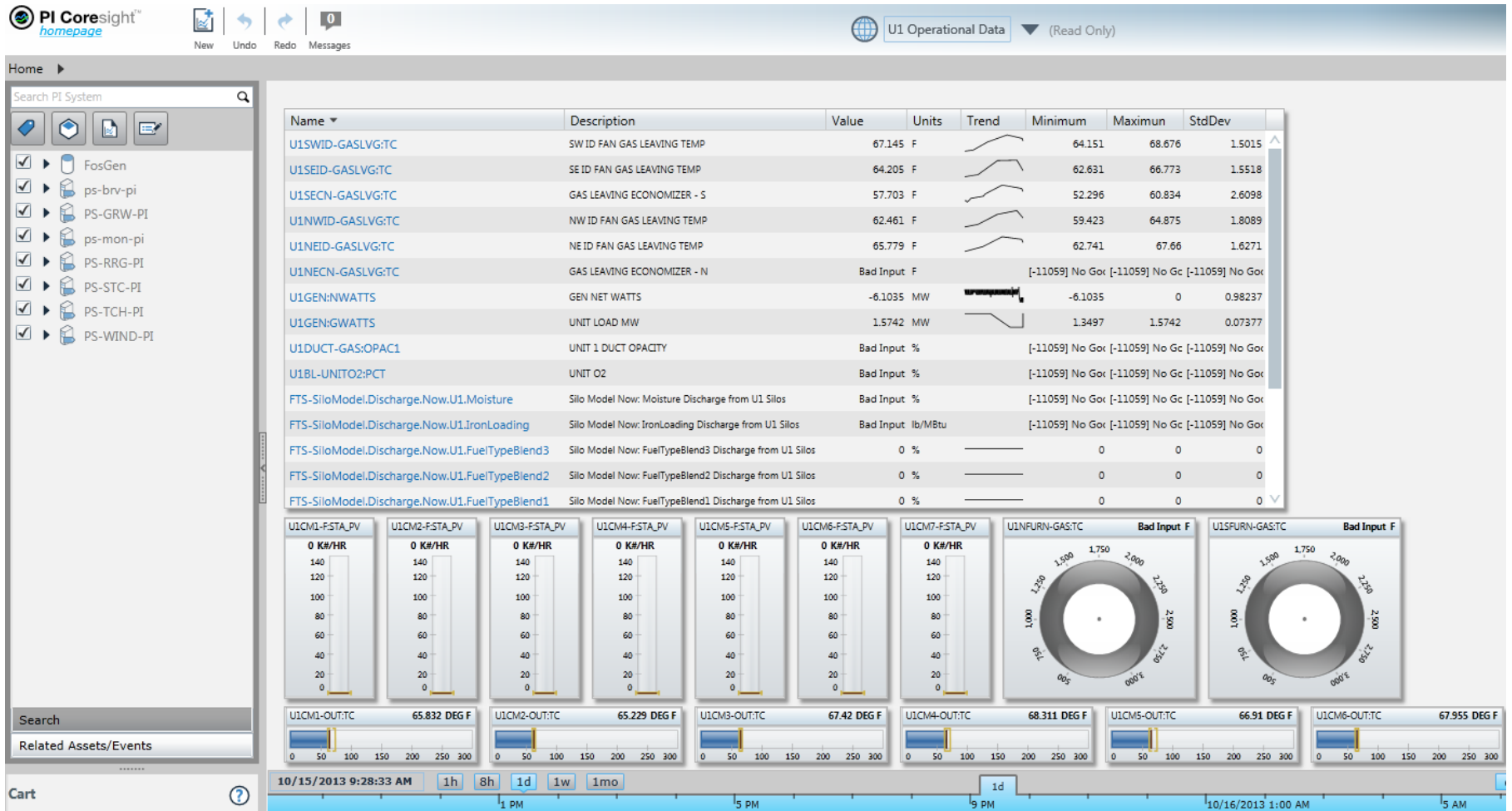


# PI enabled - Event Re-play

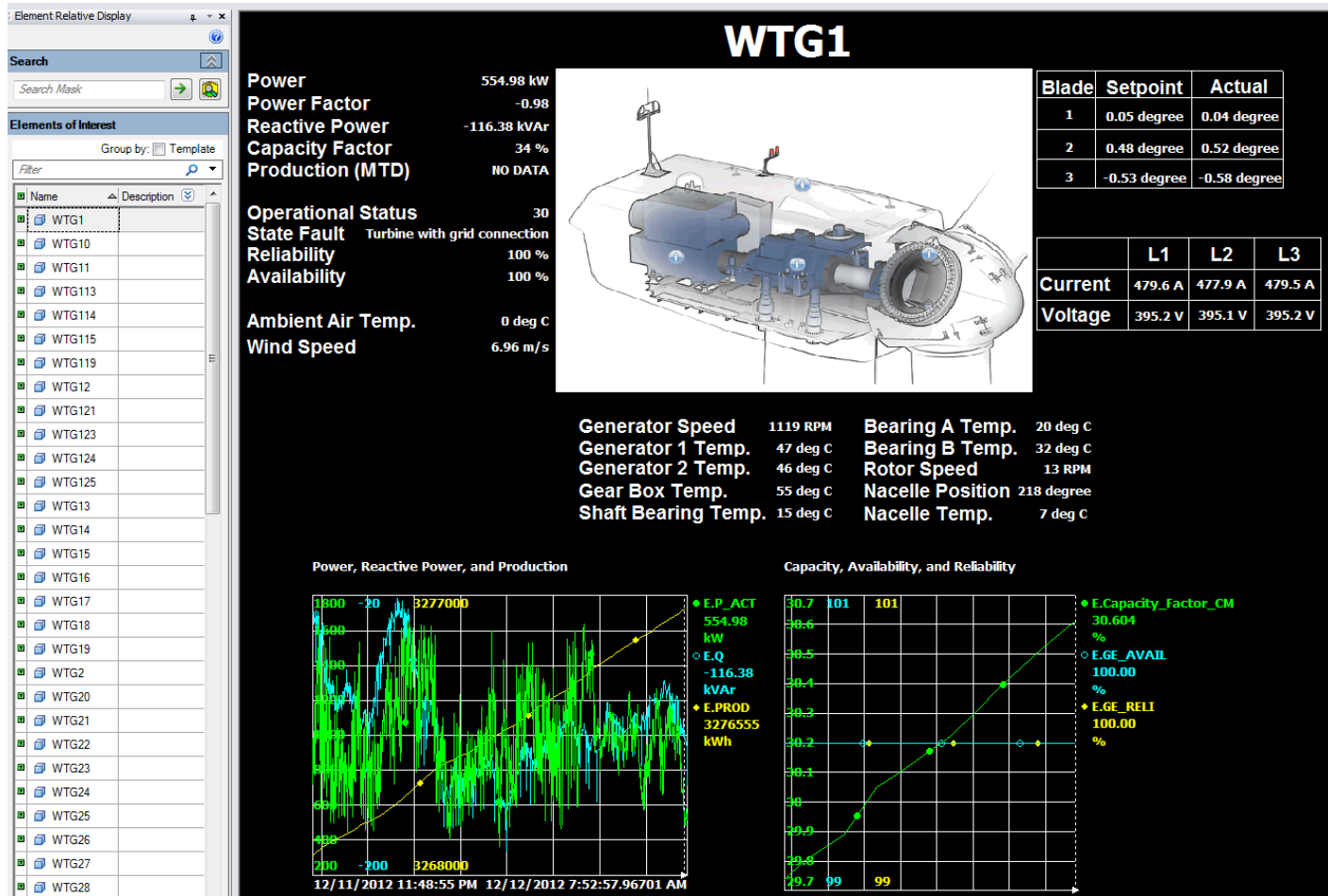


Re-play events using historical PI data

# PI Coresight Displays



# Real-Time Wind Turbine Display



## Mobile Work Force

PI WEB reports available  
on your Mobile Device

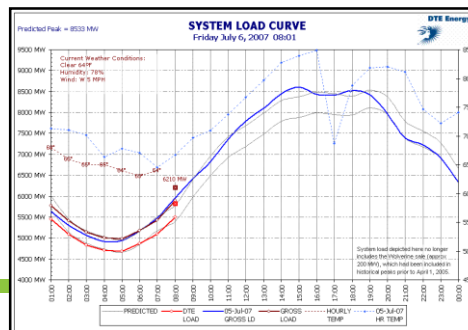
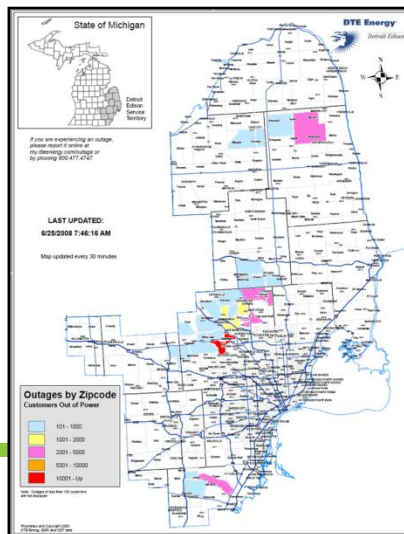
Unit	GrossMW	Rev/Min
Monroe Unit 1	547	3,599
Monroe Unit 2	44	3,600
Monroe Unit 3	438	3,599
Monroe Unit 4	545	3,599

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

Mobile Status Report						
Date: 7/6/2007 11:57:45 AM (96)						
Unit	On	NDC	P+O	T		
BEV1	<input type="checkbox"/>	625	0	625		
BEV2	<input checked="" type="checkbox"/>	635	635	0		
GCK15	<input type="checkbox"/>	105	95	10		
GCK16	<input type="checkbox"/>	125	125	0		
FERM1	<input checked="" type="checkbox"/>	1110	1100	39		
QW11	<input checked="" type="checkbox"/>	785	785	0		
MH11	<input type="checkbox"/>	103	0	103		
WUPS1	<input type="checkbox"/>	153	0	153		
WUPS2	<input type="checkbox"/>	153	153	0		
WUPS3	<input type="checkbox"/>	153	153	0		
WUPS4	<input type="checkbox"/>	153	153	0		
WUPS5	<input type="checkbox"/>	153	153	0		
WUPS6	<input type="checkbox"/>	152	152	0		
MON1	<input checked="" type="checkbox"/>	770	750	20		
MON2	<input checked="" type="checkbox"/>	795	750	45		
MON3	<input checked="" type="checkbox"/>	795	785	10		
MON4	<input checked="" type="checkbox"/>	775	775	0		
MON5	<input checked="" type="checkbox"/>	760	760	0		

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

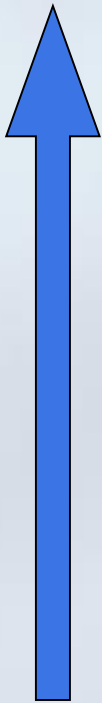
21,204 Total Customers Out	
Total Jobs: 59	Cust Dispatched: 84



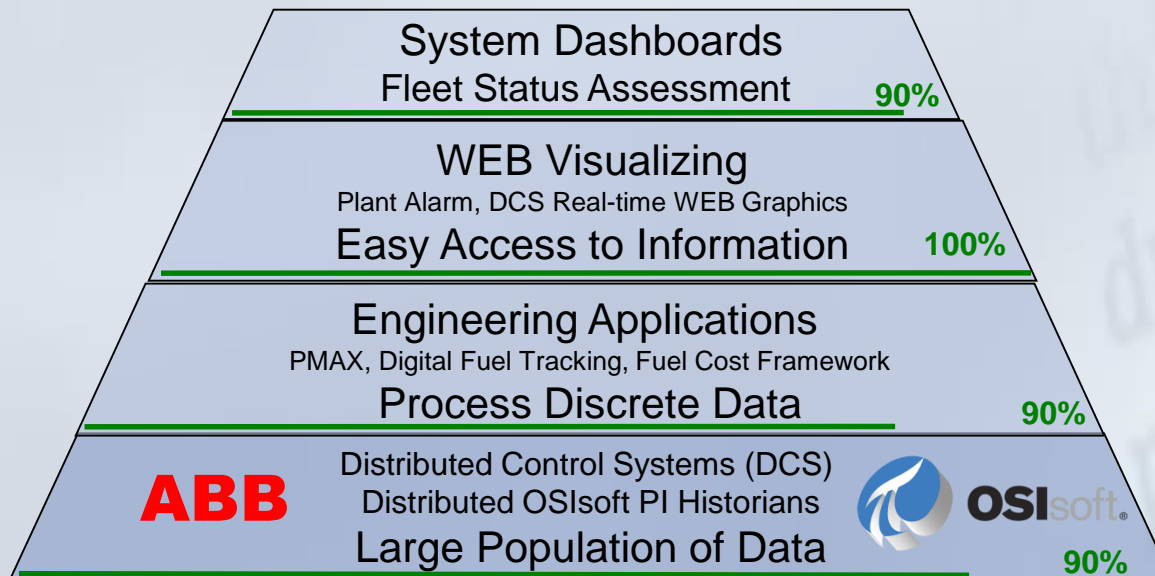
FLEET EQUIPMENT STATUS												
COAL MILLS												
UNIT	M1	M2	M3	M4	M5	M6	M7	M8				
MN1	●	●	●	●	●	●	●	●				
MN2	●	●	●	●	●	●	●	●				
MN3	●	●	●	●	●	●	●	●				
MN4	●	●	●	●	●	●	●	●				
BR1	●	●	●	●	●	●	●	●				
BR2	●	●	●	●	●	●	●	●				
ST1	●	●	●	●	●	●	●	●				
ST2	●	●	●	●	●	●	●	●				
ST3	●	●	●	●	●	●	●	●				
ST4	●	●	●	●	●	●	●	●				
ST6	●	●	●	●	●	●	●	●				
ST7	●	●	●	●	●	●	●	●				
RR2	●	●	●	●	●	●	●	●				
RR3	●	●	●	●	●	●	●	●				
T16	●	●	●	●	●	●	●	●				
T17	●	●	●	●	●	●	●	●				
T18	●	●	●	●	●	●	●	●				
T19	●	●	●	●	●	●	●	●				
T09	●	●	●	●	●	●	●	●				
FD/PAID FANS												
UNIT	NE	SE	NP	SP	SWI	NWI	NEI	SEI				
MN1	●	●	●	●	●	●	●	●				
MN2	●	●	●	●	●	●	●	●				
MN3	●	●	●	●	●	●	●	●				
MN4	●	●	●	●	●	●	●	●				
BR1	●	●	●	●	●	●	●	●				
BR2	●	●	●	●	●	●	●	●				
UNIT	NE	SE	NID	SID								
ST3	●	●	●	●								
ST4	●	●	●	●								
ST6	●	●	●	●								
ST7	●	●	●	●								
RR2	●	●	●	●								
RR3	●	●	●	●								

## Fossil Generation Business Unit Strategy

Actionable  
Information – KPI's



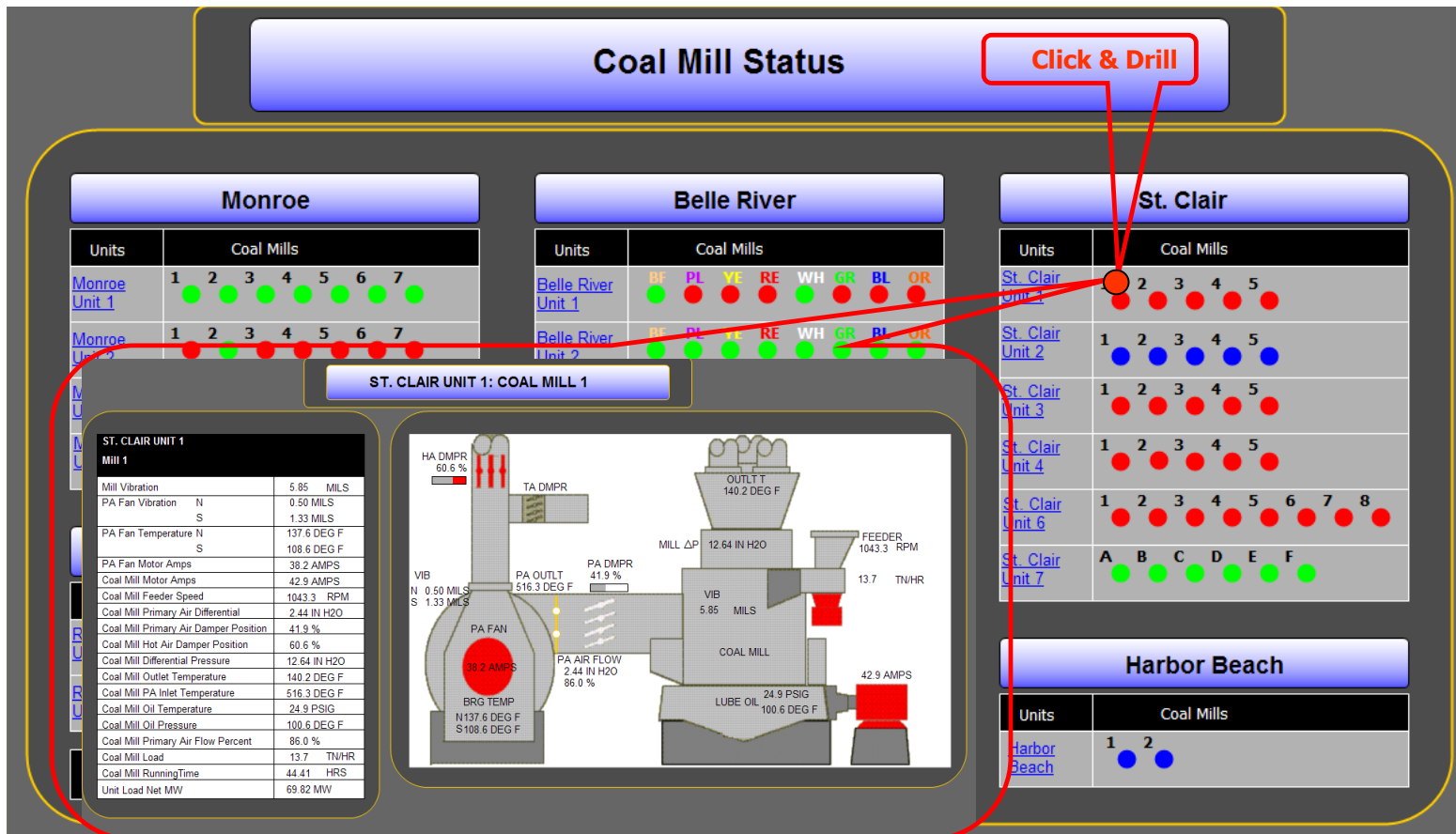
Discrete data  
Limited value





# System Dashboards – PI Enabled

2000 real time dynamic actively linked WEB System graphics



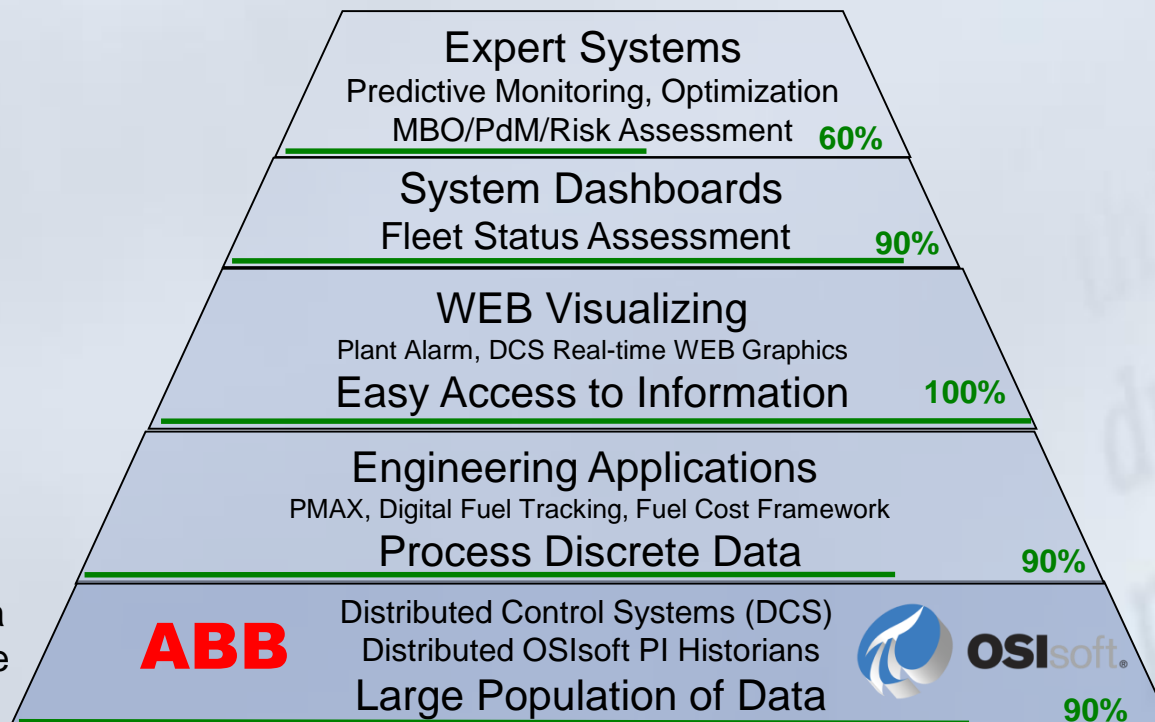
# Control & Technology Framework

## Fossil Generation Business Unit Strategy

Actionable  
Information – KPI's



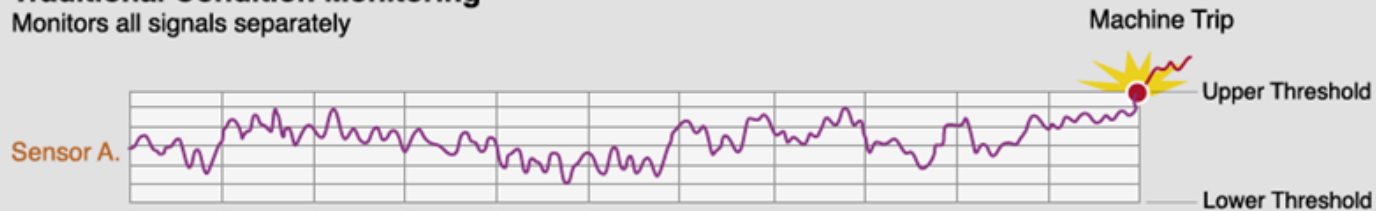
Discrete data  
Limited value



# Equipment Condition Monitoring SmartSignal Fleet wide

## Traditional Condition Monitoring

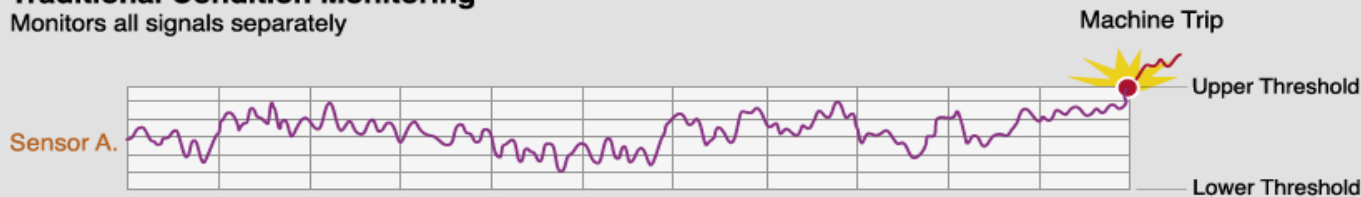
Monitors all signals separately



# Equipment Condition Monitoring SmartSignal Fleet wide

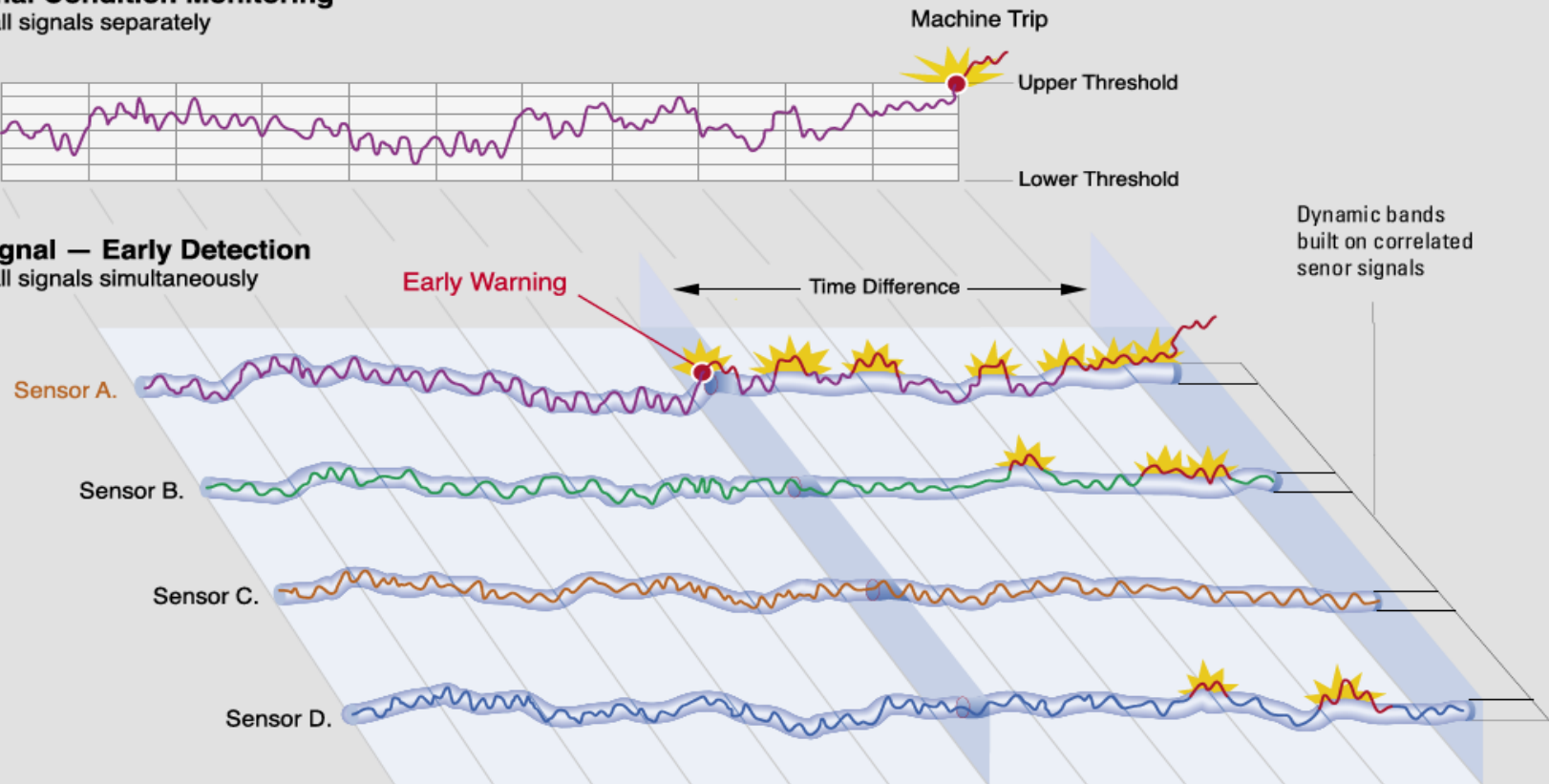
## Traditional Condition Monitoring

Monitors all signals separately

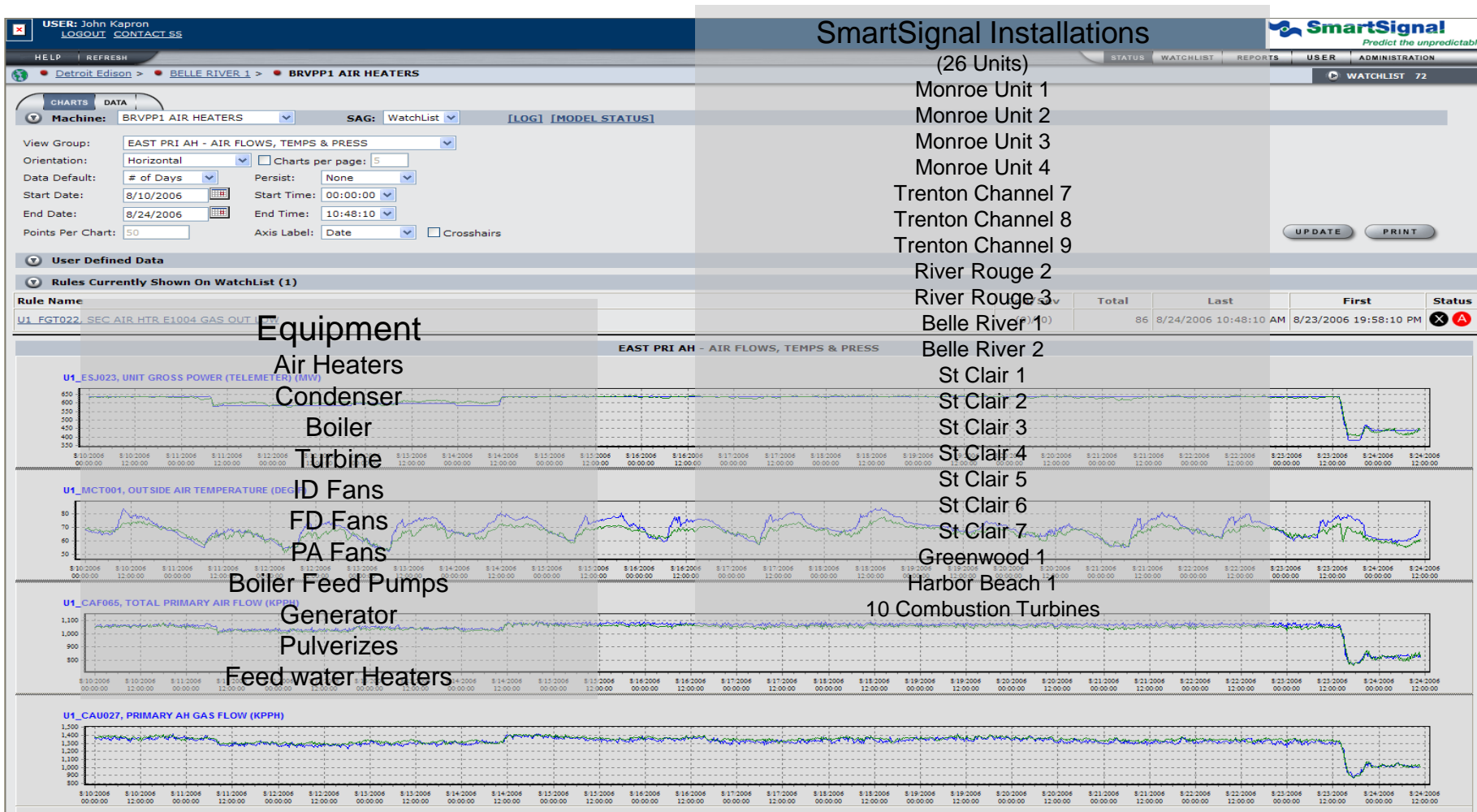


## SmartSignal — Early Detection

Monitors all signals simultaneously



# SmartSignal – Asset, Process, Performance & Reliability



# 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



## ProcessGuard Report

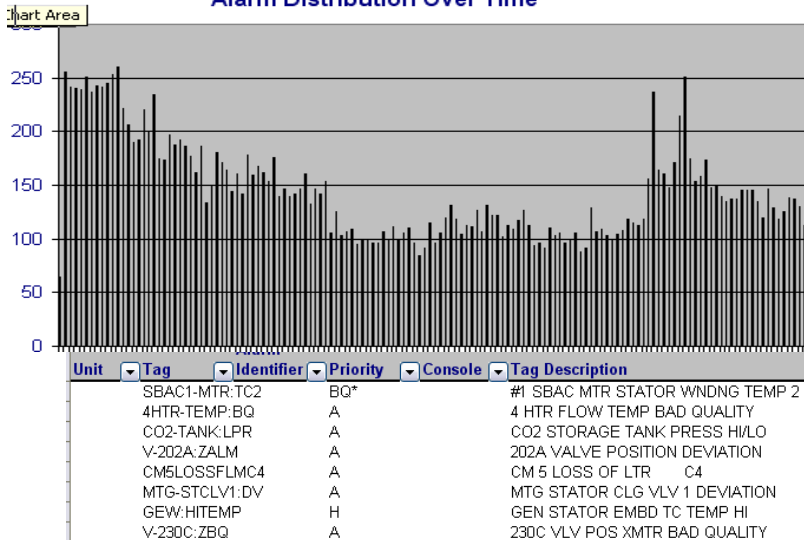
ProcessGuard Alarms and Events Viewer - [Real Time View - View1 \*]

File Format Tools Window Help



Timestamp	Message Type	Tag	Area	Tag Description
2007/03/21 12:30:35.473	Alarm	CM7MF...	u3_ESD	CELL 3 MAIN FLAME
2007/03/21 12:30:28.000	Alarm	SSCR0...	u1_DCS	S SCR OUTLET TEMP 3 XMTR DEV
2007/03/21 12:30:27.000	ReturnToNormal	CEMS-...	u1_DCS	CEMS INSTANTANEOUS OPACITY HI
2007/03/21 12:30:25.000	Alarm	OFLOW...	u1_DCS	OVERFLOW CANAL LEVEL
2007/03/21 12:30:24.000	ReturnToNormal	OFLOW...	u1_DCS	OVERFLOW CANAL LEVEL
2007/03/21 12:28:33.000	ReturnToNormal	NSCR0...	u3_DCS	N SCR OUTLET TEMP 2 XMTR DEV
2007/03/21 12:28:30.000	Alarm	NSCR0...	u3_DCS	N SCR OUTLET TEMP 2 XMTR DEV
2007/03/21 12:30:07.000	ReturnToNormal	SSCR0...	u1_DCS	S SCR OUTLET TEMP 3 XMTR DEV
2007/03/21 12:30:07.000	Alarm	SSCR0...	u1_DCS	S SCR OUTLET TEMP 3 XMTR DEV
2007/03/21 12:30:01.000	ReturnToNormal	SSCR0...	u1_DCS	S SCR OUTLET TEMP 3 XMTR DEV
2007/03/21 12:29:57.000	Alarm	OFLOW...	u1_DCS	OVERFLOW CANAL LEVEL
2007/03/21 12:29:56.000	ReturnToNormal	OFLOW...	u1_DCS	OVERFLOW CANAL LEVEL
2007/03/21 12:29:54.000	Alarm	CEMS-...	u1_DCS	CEMS INSTANTANEOUS OPACITY HI
2007/03/21 12:29:51.000	Alarm	CCS-A...	u1_DCS	AH AVG OUT TEMP FAIL

### Alarm Distribution Over Time



## PPO 233 Water Chemistry and Miscellaneous Alarms

Mar 13, 2007 11:15:37 AM

☒ View All Running Units

☐ View Alarms Only

☐ View Off Units

Please select a refresh rate, all values are in minutes.

1 Refresh Page

Add Tag

Unit	Tag Description	Tag Name	Current Value	Lower Limit	Upper Limit	Alarm
Belle River Unit 2	FLUE GAS O2 DUCT-A PROBE A	2AIT27029A_SDEV	.08	0.001	0.4	0
Belle River Unit 2	FLUE GAS O2 DUCT-A PROBE B	2AIT27029B_SDEV	.13	0.001	0.4	0
Belle River Unit 2	FLUE GAS O2 DUCT-A PROBE C	2AIT27029C_SDEV	.06	0.001	0.4	0
Belle River Unit 2	FLUE GAS O2 DUCT-B PROBE D	2AIT27029D_SDEV	.08	0.001	0.4	0
Belle River Unit 2	FLUE GAS O2 DUCT-B PROBE E	2AIT27029E_SDEV	.12	0.001	0.4	0
Belle River Unit 2	FLUE GAS O2 DUCT-B PROBE F	2AIT27029F_SDEV	.16	0.001	0.4	0
Belle River Unit 2	2 Drum Water pH	2AIT46061RAW	9.19	9	9.6	0
Belle River Unit 2	2 Condensate Pump Discharg	2CIT46007RAW	7.09			0
Belle River Unit 2	2 Condensate Pump Discharg	2CIT46008RAW	.13	0	0.3	0
Belle River Unit 2	2 Heater Feed Pump Dischar	2CIT46025RAW	7.39			0
Belle River Unit 2	2 Condenser Makeup Specifi	2CIT46026RAW	.26		0.5	0
Belle River Unit 2	2 Economizer Inlet Cation	2CIT46047COM	.14		0.4	0
Belle River Unit 2	2 Main Steam Cation Conduc	2CIT46091RAW	.14		0.4	0
Belle River Unit 2	COND HTWL EMERG M/U VLV CL	2LV05014ZSC	0			0
Belle River Unit 1	HOTWELL EMERGENCY MAKEUP V	U1_CNZ520	CLOSED			0
Belle River Unit 1	SPEC CNDTY - WEST COND POL	U1_CPC009	1.7			0
Belle River Unit 1	W. COND POL OUT CNDTY-TRAN	U1_CPC010	.03		0.2	0

50%	6	1	12'
67%	3	3	15'
57%	2	2	7'
100%	2	2	4'

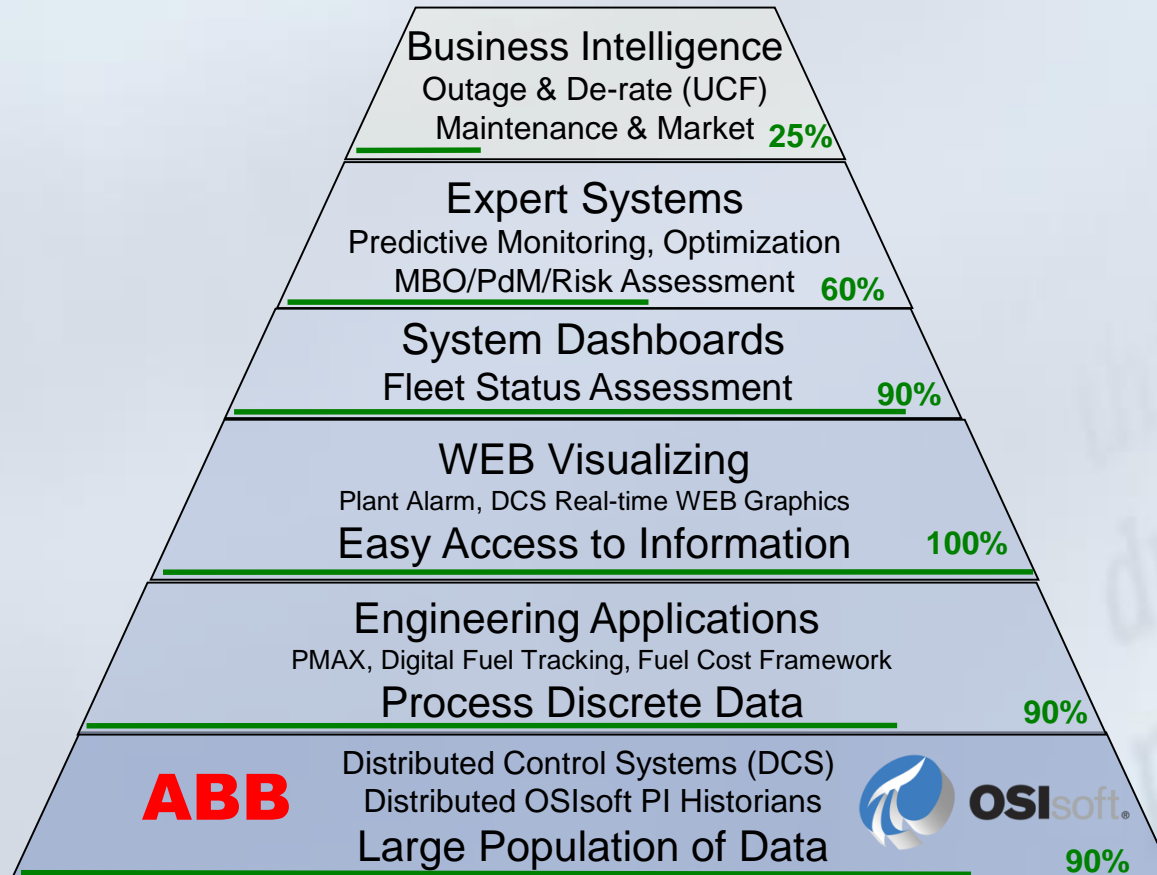
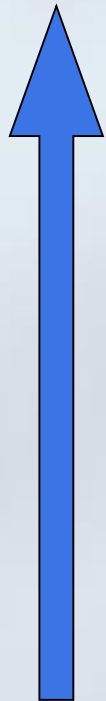


# Control & Technology Framework



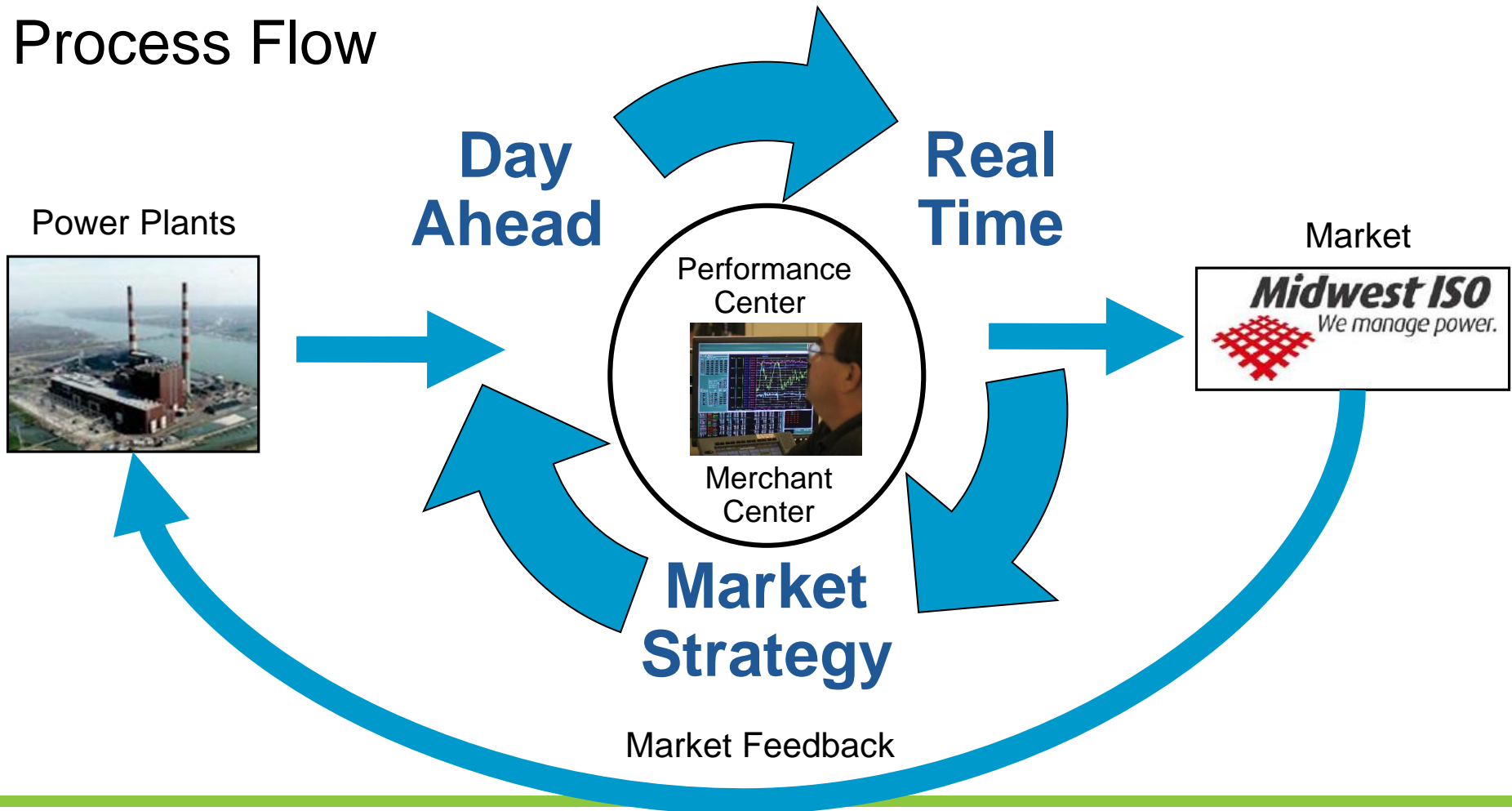
## Fossil Generation Business Unit Strategy

Actionable  
Information – KPI's



# 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	<input type="checkbox"/>	625	600	625	{100%LSW}+{100%2OIL}		0	0	0	0	0	0	0	0
BRVPP 2	<input checked="" type="checkbox"/>	635	610	635	{100%LSW}+{100%2OIL}		0	0	0	0	0	0	0	0
CKKPP 15	<input type="checkbox"/>	135	135	135	{100%NGAS}		0	0	0	0	0	0	0	0
CKKPP 16	<input type="checkbox"/>	100	100	100	{100%NGAS}		0	0	0	0	0	0	0	0
FERMI 2	<input type="checkbox"/>	1110	0	0	{100%NUC}	Outage: refuel outage: May 10@0900; Dugan	0	0	0	0	0	0	0	0
GW1PP 1	<input checked="" type="checkbox"/>	785	785	785	{60%NGAS/40%HSOIL}		0	0	0	0	0	0	0	0
HBHPP 1	<input checked="" type="checkbox"/>	103	90	103	{100%LSS}+{100%2OIL}		0	0	0	0	0	0	0	0
MONPP 1	<input type="checkbox"/>	770	0	0	{65%LSW/35%MSE}+{100%2OIL}	Outage: Periodic Outage: May 6@2000; F. Wiselaki	0	0	0	0	0	0	0	0
MONPP 2	<input type="checkbox"/>	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. Wiselaki	0	0	0	0	0	0	0	0
MONPP 3	<input checked="" type="checkbox"/>	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	<input checked="" type="checkbox"/>	775	775	775	{65%LSW/35%MSE}+{100%2OIL}		0	0	0	0	0	0	0	0
RRGPP 2	<input type="checkbox"/>	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	<input checked="" type="checkbox"/>	280	280	280	{70%LSW/30%LSS}+{100%NGAS}		0	0	0	0	0	0	0	0
STCPP 1	<input checked="" type="checkbox"/>	150	125	125	{100%LSW}		0	25	0	0	25	0	0	0
STCPP 2	<input type="checkbox"/>	162	0	0	{100%LSW}	Outage: 2006 Periodic Outage: May 22@0600; John Quaine	25	25	25	0	25	0	25	0
STCPP 3	<input checked="" type="checkbox"/>	168	125	125	{100%LSW}		0	43	0	0	43	0	0	0
STCPP 4	<input checked="" type="checkbox"/>	158	125	125	{100%LSW}		0	33	0	0	33	0	0	0
STCPP 6	<input checked="" type="checkbox"/>	321	281	321	{85%LSW/15%HSE}+{100%NGAS}		0	0	0	0	0	0	0	0
STCPP 7	<input checked="" type="checkbox"/>	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 FWHr: Nov 1@0600; Lorenzetti	0	0	0	0	0	64	0	64
TCHPP 7A	<input checked="" type="checkbox"/>	210	110	110	{60%LSW/40%MSE}+{100%2OIL}		0	100	0	0	100	0	100	0
TCHPP 8	<input checked="" type="checkbox"/>	122	100	100	{80%LSS/20%MSE}+{100%2OIL}		0	22	0	0	22	0	22	0
TCHPP 9	<input checked="" type="checkbox"/>	520	350	370	{80%LSS/20%MSE}+{100%2OIL}		150	150	150	0	150	0	150	0
Peakers	<input checked="" type="checkbox"/>	792	186	186	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

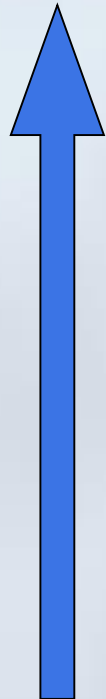


# Control & Technology Framework

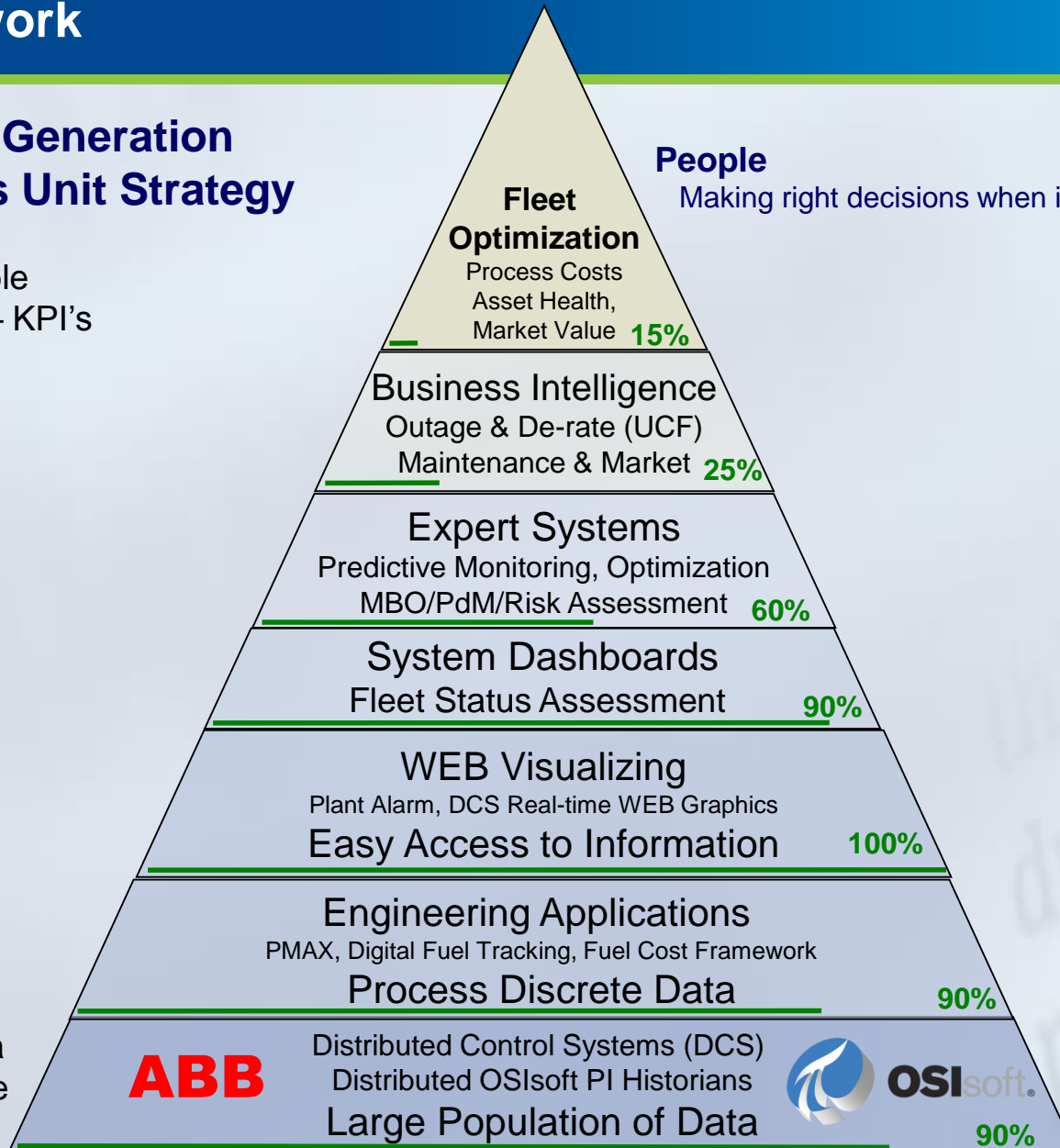


## Fossil Generation Business Unit Strategy

Actionable Information – KPI's



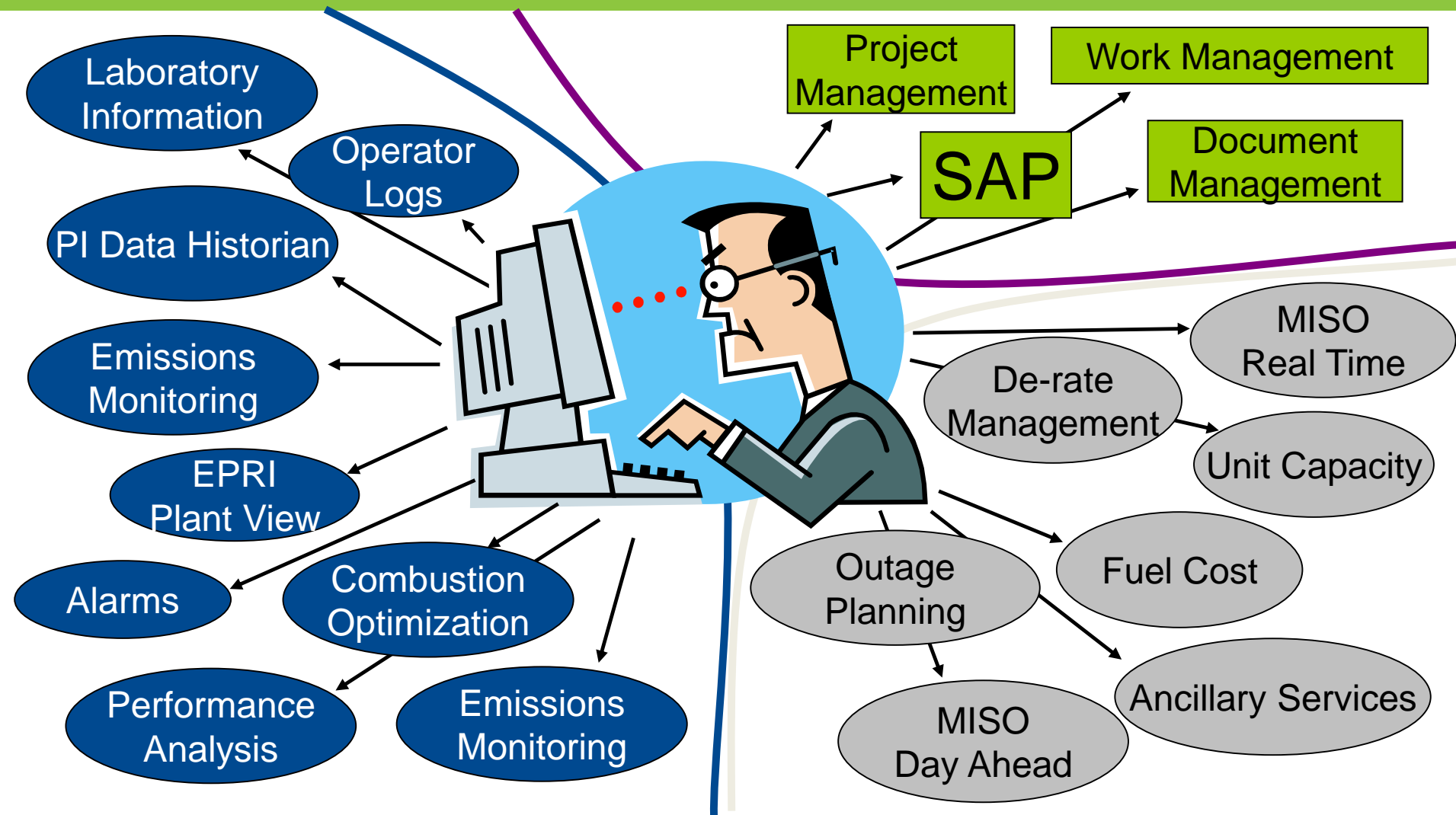
Discrete data  
Limited value



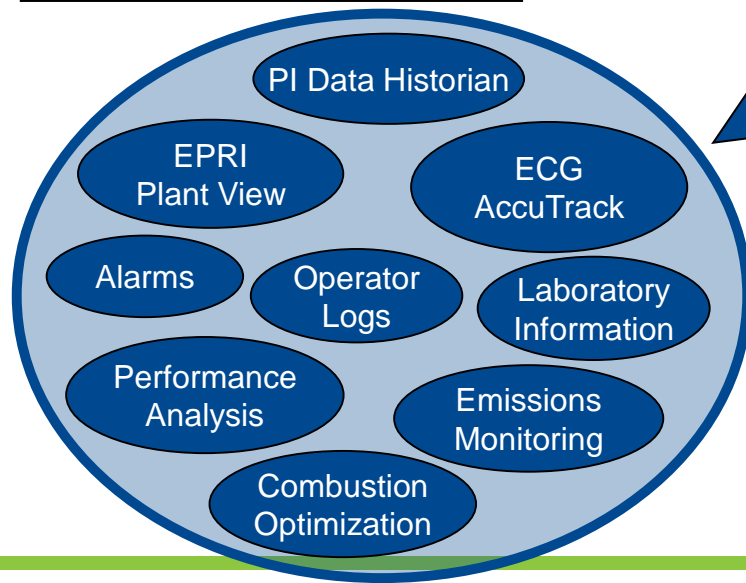
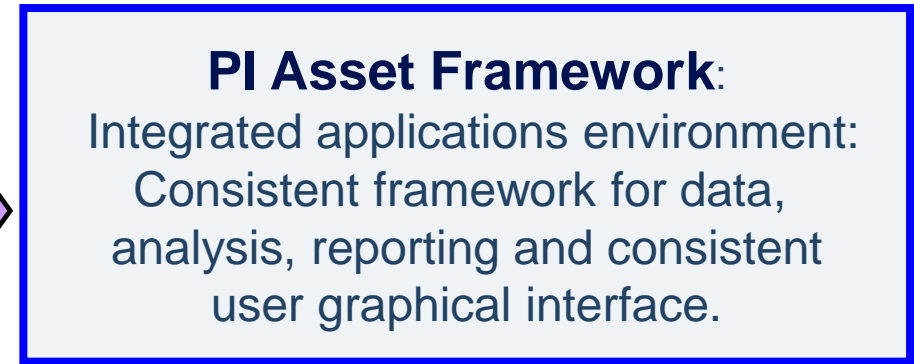
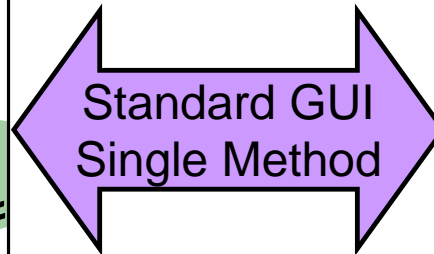
## People

Making right decisions when it matters!

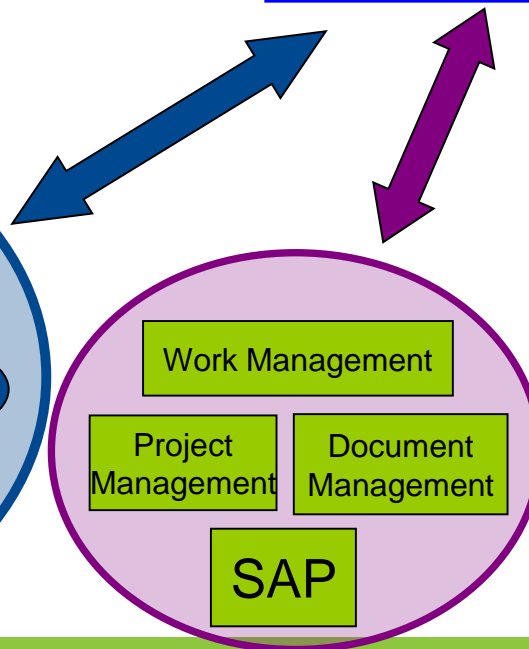
# No Shortage of Information!



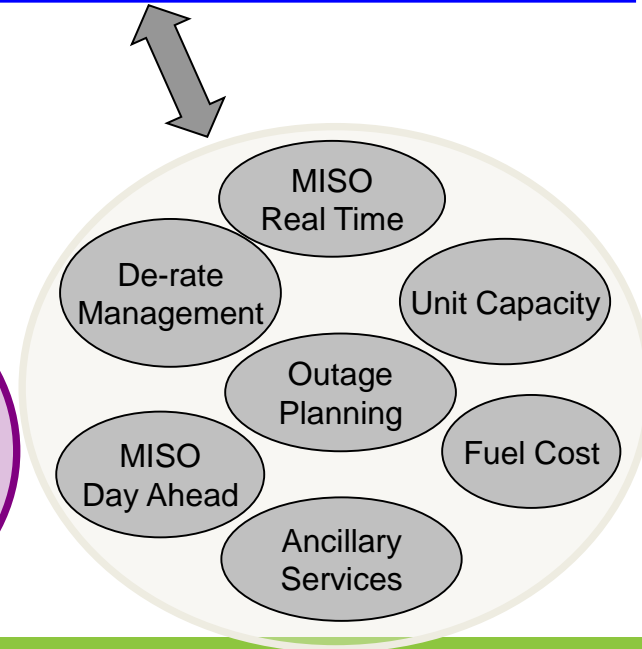
# Common Methodology



**Process Information**



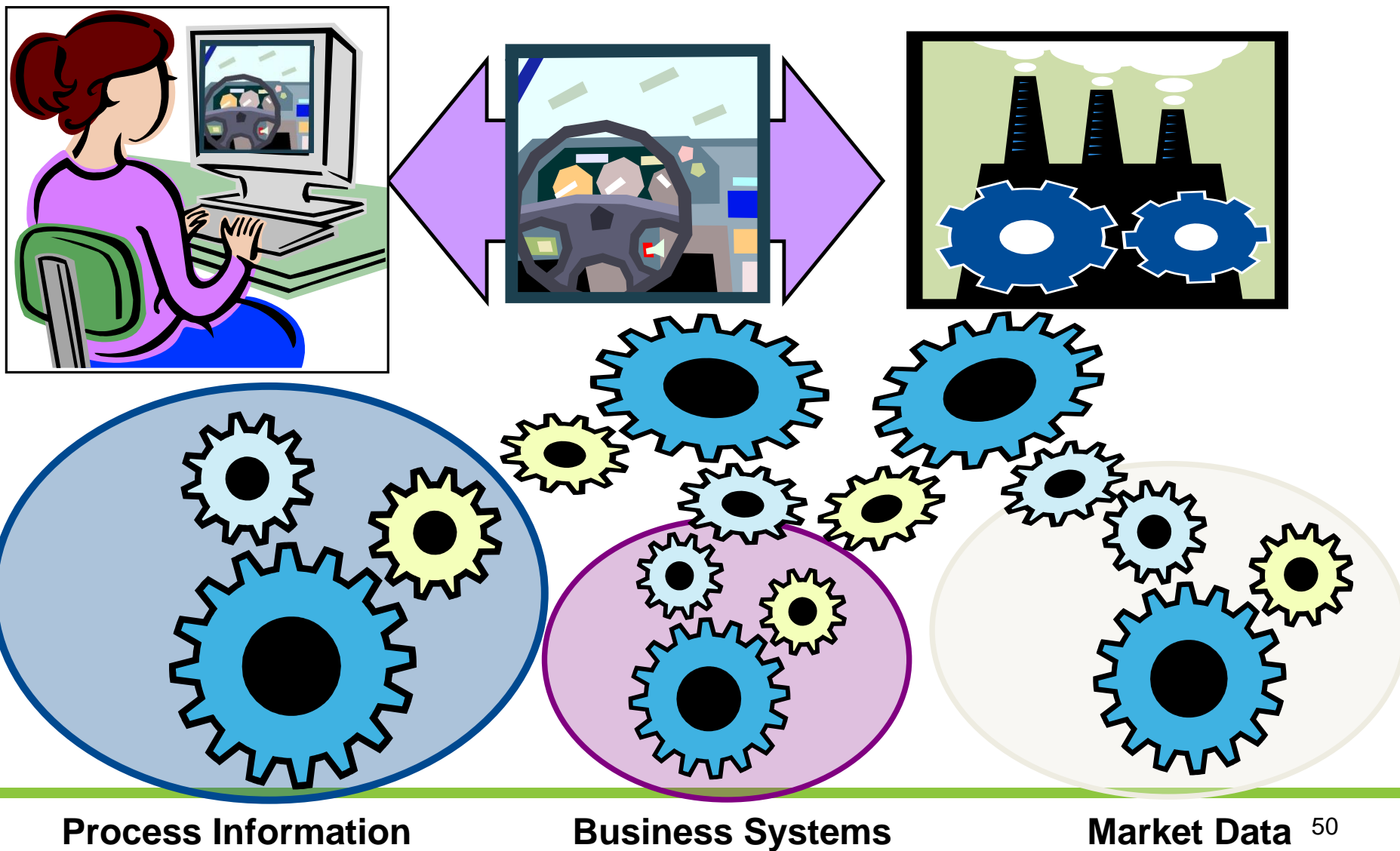
**Business Systems**



**Market Data**



# Common Structure

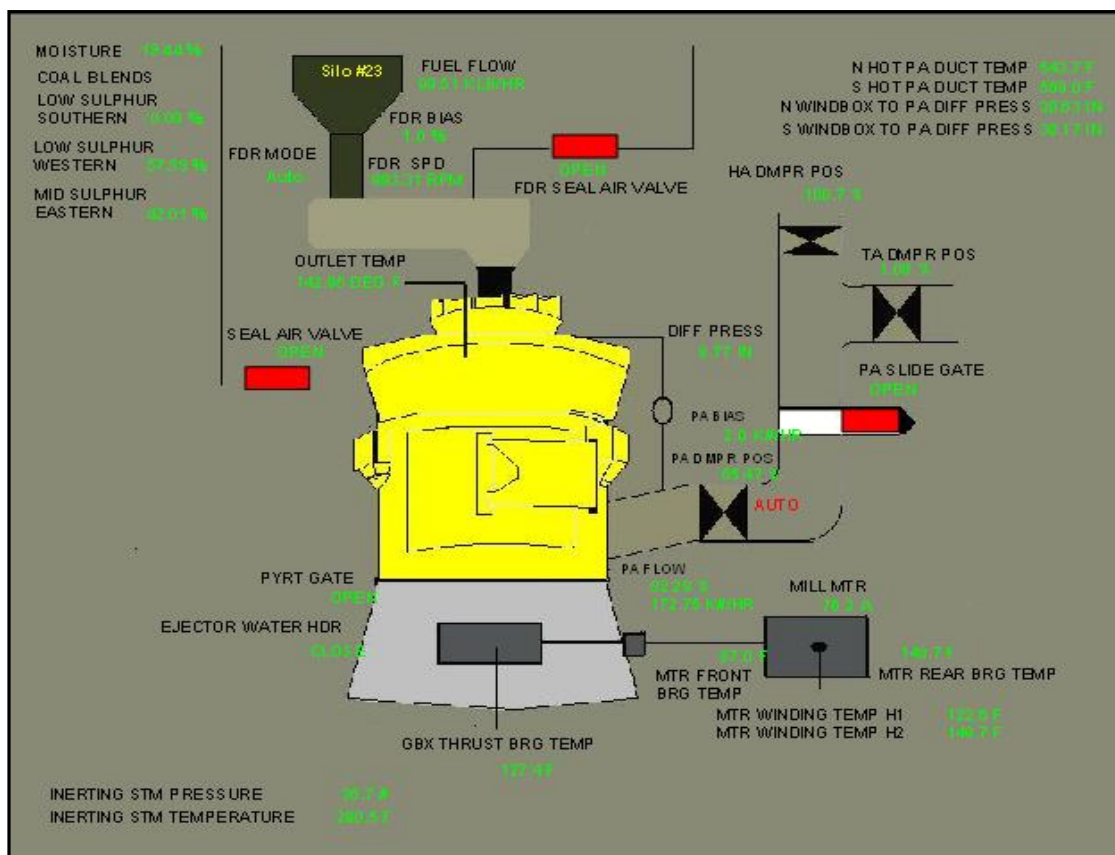


Process Information

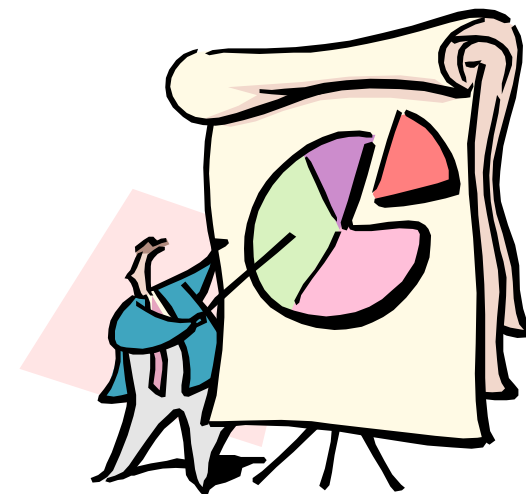
Business Systems

Market Data 50

## Pulverizer Dashboard



## Process Information



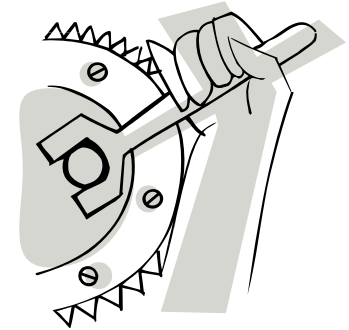
**More information  
is need for Analysis**

# 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



Maximo



SAP



Documentum



Unit  
Capacity



Alarms



EPRI PlantView



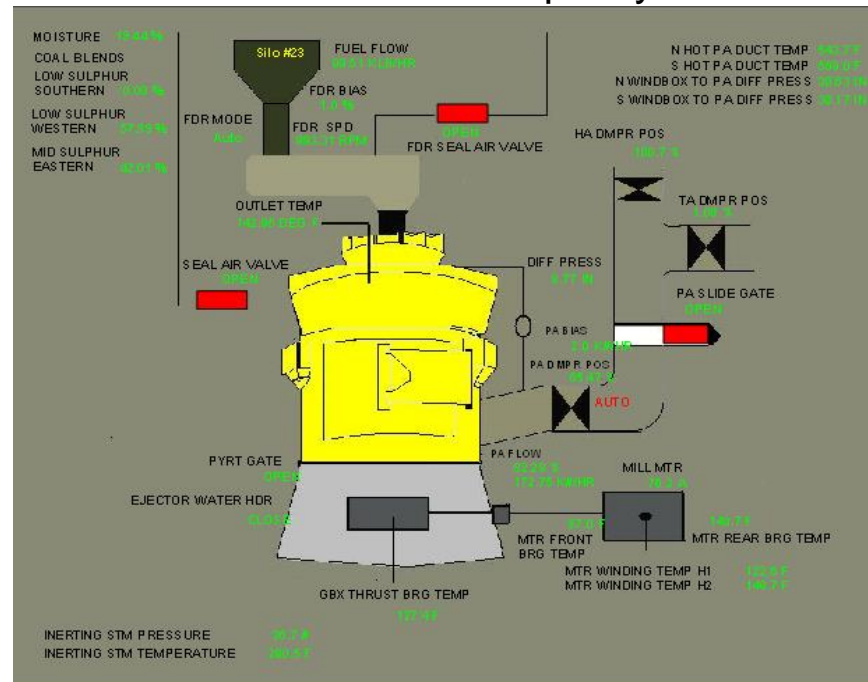
PI



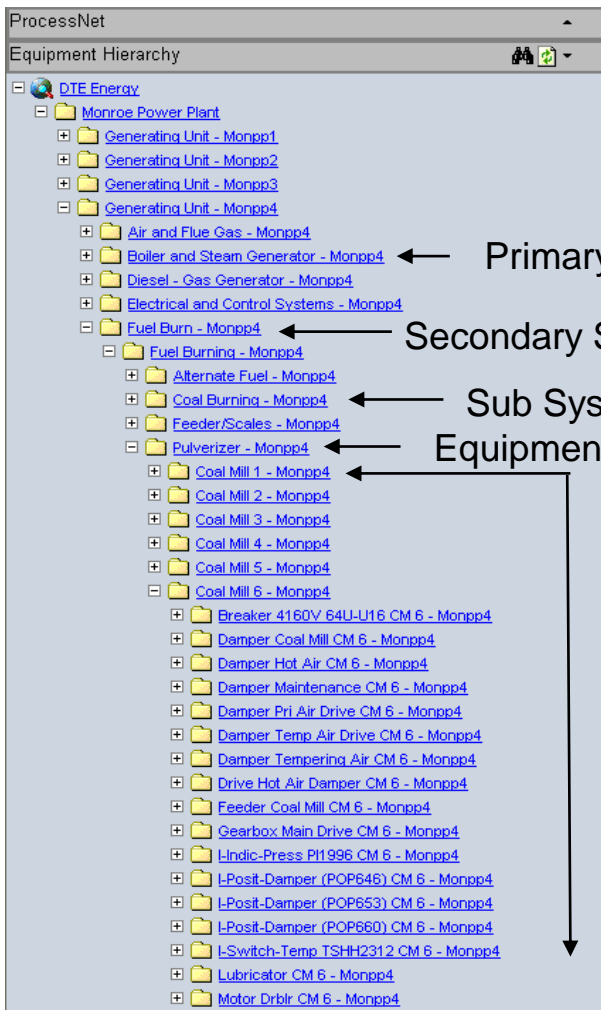
P3M



SmartSignal

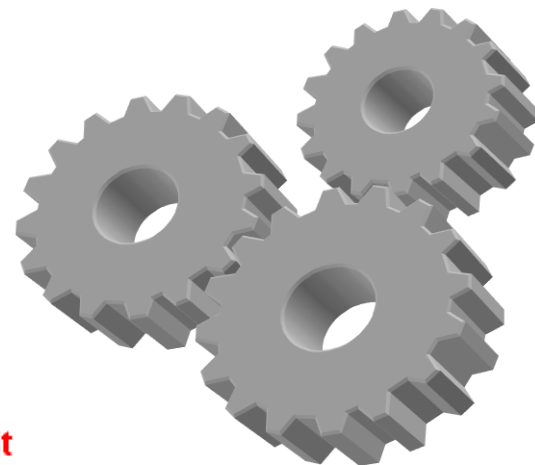


# Common Thread Equipment Hierarchy



## Equipment Hierarchy

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



Sub Equipment

**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

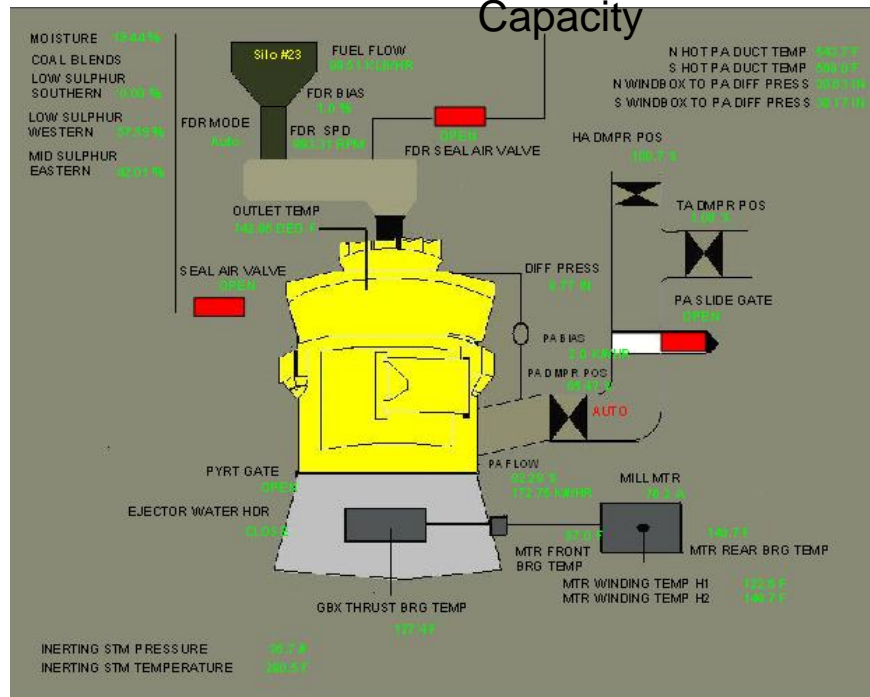
# Pulverizer Multiple Data Sources

## Consistent Reporting

- Common Methodology
- Common Structure



## Unit Capacity



## Alarms

## EPRI PlantView

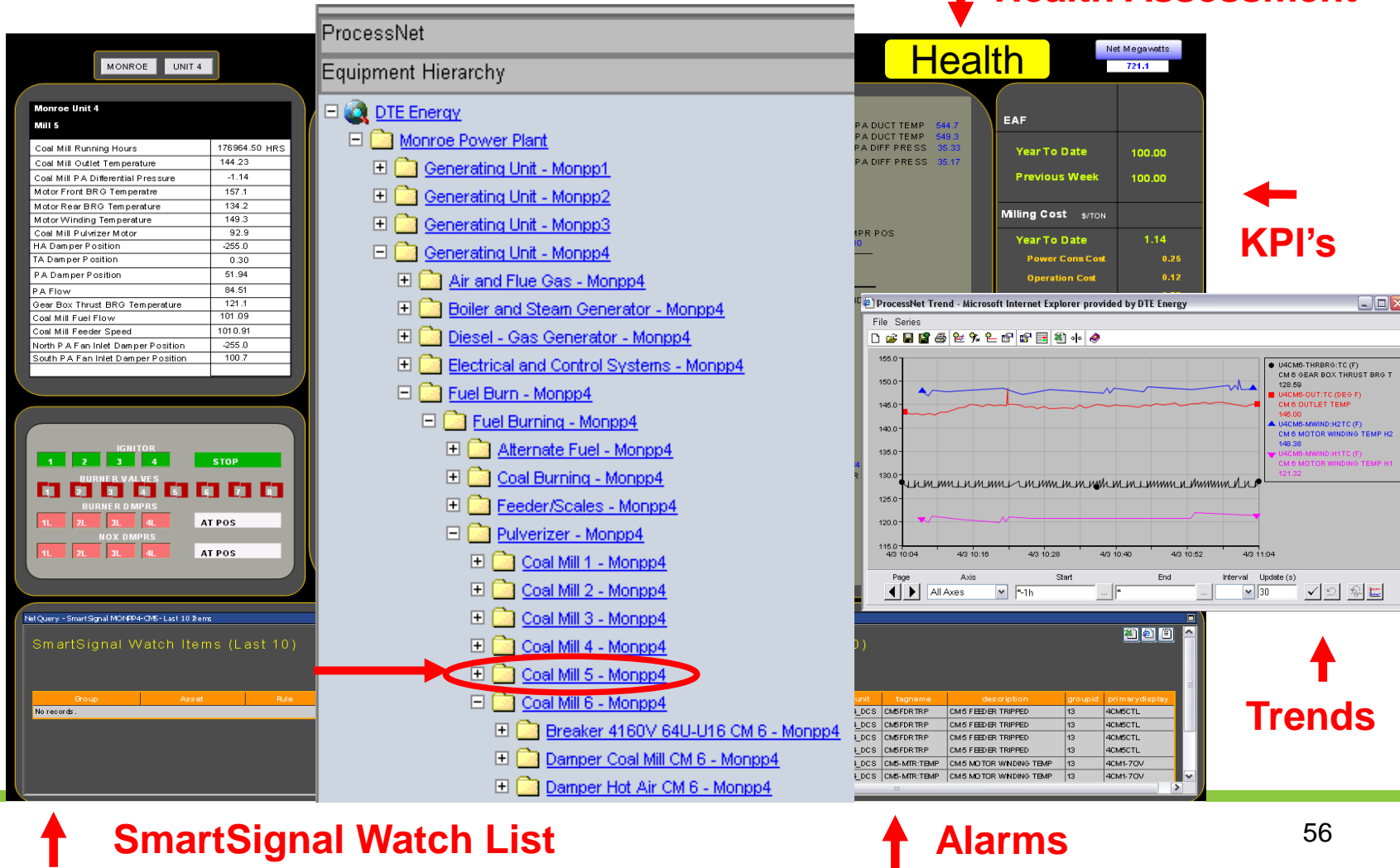
## PI

## P3M

## SmartSignal



# Asset Framework Expanded System Dashboard







# Process Cost Drill Down

MONROE		MONROE UNIT 4								ALL PLANTS		MONROE POWER PLANT								
MONROE		UNIT 4		Coal Mill		MIL 1	MIL 2	MIL 3	MIL 4	MIL 5	MIL 6	MIL 7	MONROE		UNIT 1	UNIT 2	UNIT 3	UNIT 4		
EAF				Status		<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	EAF							
Year To Date		80.14												Year To Date		96.57	76.76	0.00	80.14	
Previous Week		100.00												Previous Week		98.96	40.46	0.00	100.00	
PROD COST (Inst) \$/MWh				Year To Date		100.00	100.00	99.93	99.79	100.00	100.00	100.00	PROD COST (Inst) \$/MWh							
Current Date		21.21		Previous Week		100.00	100.00	100.00	100.00					Current Date						
Fuel Cost		18.16												Fuel Cost						
Emission Cost		3.05												Emission Cost						
Previous Week		22.22		Milling Cost \$/TON										Previous Week						
Fuel Cost		18.92		Year To Date		1.87	1.82	1.75	13.43					Fuel Cost						
Emission Cost		3.30		Power Cons Cost		0.21	0.22	0.22	0.20					Emission Cost						
PROD COST \$/MWh				Operation Cost		0.10	0.12	0.13	0.14					PROD COST \$/MWh						
Year To Date		19.85		Maintenance Cost		1.55	1.48	1.40	13.09					Year To Date						
Fuel Cost		17.73		Previous Week		0.28	0.30	0.29	0.26					Fuel Cost						
Operation Cost		1.45		Power Cons Cost		0.21	0.22	0.22	0.20					Operation Cost						
Maintenance Cost		0.66		Operation Cost		0.07	0.07	0.07	0.07					Maintenance Cost						
Previous Week		19.83		Maintenance Cost		0.00	0.00	0.00	0.00					Previous Week						
Fuel Cost		18.92		SS Count										Fuel Cost						
Operation Cost		0.91		Year To Date		0	3	0	0					Operation Cost						
Maintenance Cost		0.00		Previous Week		0	0	0	0					Maintenance Cost						
Previous Week		2.20		PG Count										Previous Week						
Power Cons Cost		0.11		Year To Date		6	2	0	6					Power Cons Cost						
Operation Cost		2.09		Previous Week		0	0	0	0					Operation Cost						
Maintenance Cost		0.00												Maintenance Cost						
HEAT RATE BTU/100KWH														HEAT RATE BTU/100KWH						
Current Date		10732												Current Date		10687	10614	10669	10732	
Previous Week		10732												Previous Week		10687	10614	10669	10732	

Unit Summary

Unit Summary

NetQuery - ProcessGuard MOMP4 - Last 10 Alarms

ProcessGuard Alarms (Last 10)

vt_start	vt_end	plant	unit	signature	description	groupid	primarydisplay
1/29/2007 10:35:01 AM	Open	MONPP	14_DCS	CM6-MTFF6RG-TC	CM6 MOTOR FRONT BEARING TEMP	14	AMS/CTL
1/29/2007 10:37:59 AM	01/29/2007 10:38:01	MONPP	14_DCS	CM6-MTFF6RG-TC	CM6 MOTOR FRONT BEARING TEMP	14	AMS/CTL
1/29/2007 10:37:53 AM	01/29/2007 10:37:58	MONPP	14_DCS	CM6-MTFF6RG-TC	CM6 MOTOR FRONT BEARING TEMP	14	AMS/CTL
1/29/2007 10:37:46 AM	01/29/2007 10:37:58	MONPP	14_DCS	CM6-MTFF6RG-TC	CM6 MOTOR FRONT BEARING TEMP	14	AMS/CTL
1/29/2007 10:37:36 AM	01/29/2007 10:37:46	MONPP	14_DCS	CM6-MTFF6RG-TC	CM6 MOTOR FRONT BEARING TEMP	14	AMS/CTL
1/29/2007 10:37:34 AM	01/29/2007 10:37:46	MONPP	14_DCS	CM6-MTFF6RG-TC	CM6 MOTOR FRONT BEARING TEMP	14	AMS/CTL
1/29/2007 10:37:19 AM	01/29/2007 10:37:34	MONPP	14_DCS	CM6-MTFF6RG-TC	CM6 MOTOR FRONT BEARING TEMP	14	AMS/CTL
1/29/2007 10:37:17 AM	01/29/2007 10:37:34	MONPP	14_DCS	CM6-MTFF6RG-TC	CM6 MOTOR FRONT BEARING TEMP	14	AMS/CTL
1/29/2007 10:29:41 AM	Open	MONPP	14_DCS	CM6-MTFF6RG-TC	CM6 MOTOR REAR BEARING TEMP	14	AMS/CTL
1/29/2007 10:29:36 AM	01/29/2007 10:29:41	MONPP	14_DCS	CM6-MTFF6RG-TC	CM6 MOTOR REAR BEARING TEMP	14	AMS/CTL

NetQuery - SmartSignal MOMP4 - Last 10 Items

SmartSignal Watch Items (Last 10)

Group	Alert	Rule	Total	Alert	Last
MIL2 - MOTOR, BPG TEMPS & CURRENT	MONPP4 PULV DRGRS	UAC102-MTFF6RG-TC, CM2 MOTOR REAR BEARING TLOW	17/57	3/23/2007 7:12:31 PM	4/5/2007 1:23:18 PM
MIL1 - MOTOR, BPG TEMPS & CURRENT	MONPP4 PULV DRGRS	UAC101-MTFF6RG-TC, CM1 MOTOR REAR BEARING TLOW	6	4/5/2007 9:53:17 AM	4/5/2007 11:03:16 AM
MIL7 - MOTOR, BPG TEMPS & CURRENT	MONPP4 PULV DRGRS	UAC107-MTFF6RG-TC, CM7 OVER BOX TRUCT BPG TLOW	16	4/5/2007 1:03:16 AM	4/5/2007 4:53:14 AM
MIL2 - MOTOR, BPG TEMPS & CURRENT	MONPP4 PULV DRGRS	UAC102-MTFF6RG-TC, CM2 MOTOR WINDING TEMP HIGH	4	4/3/2007 11:53:38 PM	4/4/2007 12:43:37 AM
MIL2 - MOTOR, BPG TEMPS & CURRENT	MONPP4 PULV DRGRS	UAC102-MTFF6RG-TC, CM2 MOTOR WINDING TEMP HIGH	4	4/3/2007 11:53:38 PM	4/4/2007 12:43:37 AM

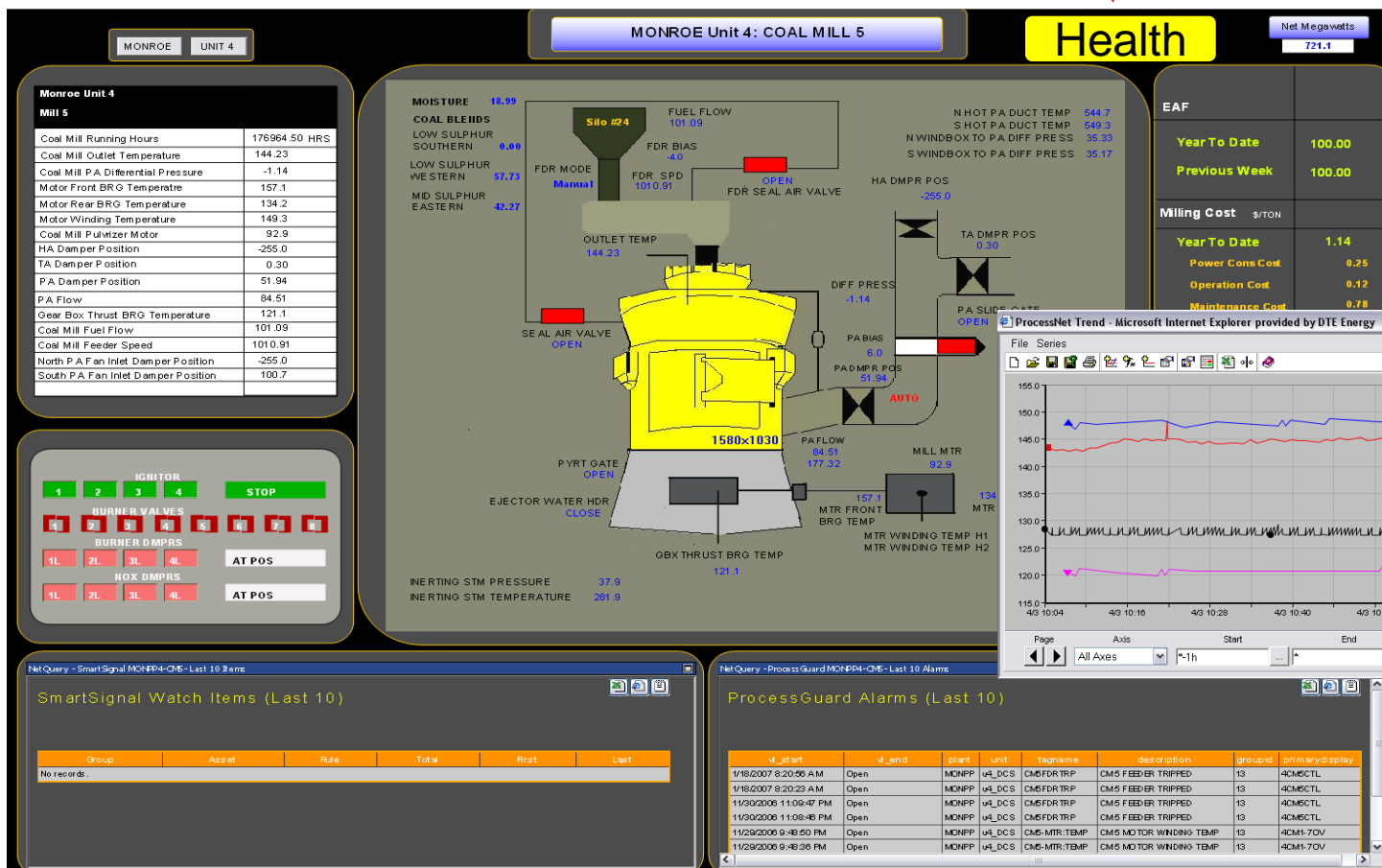
= RUNNING

= NOT RUNNING

= NOT INSTRUMENTED

# Asset Framework Expanded System Dashboard

↓ **Health Assessment**



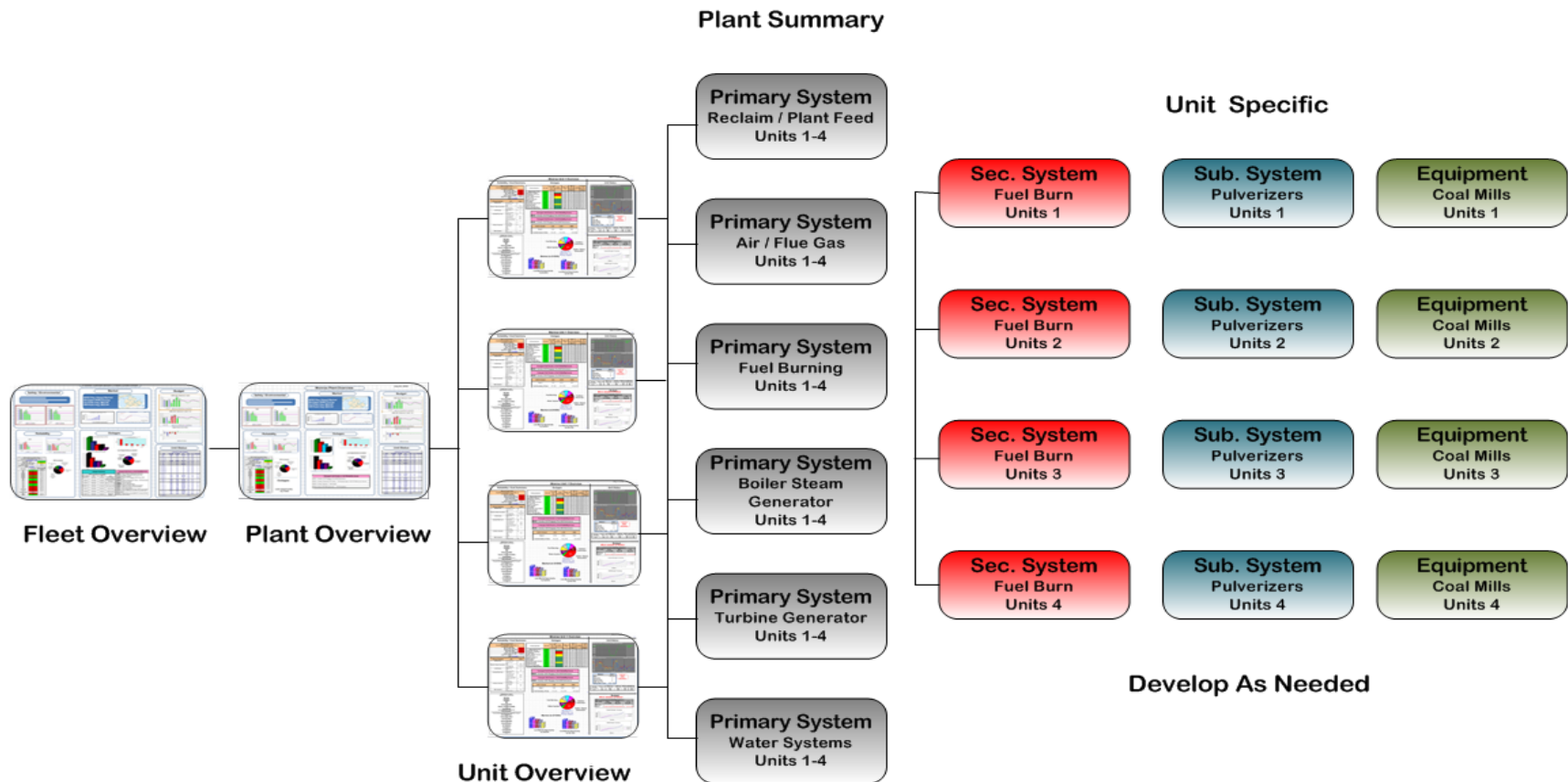
← **KPI's**

↑ **Trends**

↑ **SmartSignal Watch List**

↑ **Alarms**

# Logical Display Flow



# Fleet Overview



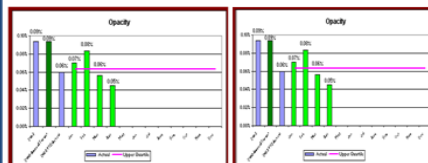
DTE Energy®

## Fossil Generation Fleet Overview

July 02, 2008

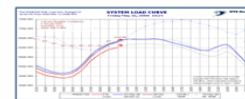
### Safety / Environmental

Reported Safety Incidents:  
1BRVPP2 Operator required first aid eyewash to remove eye irritant. Reported

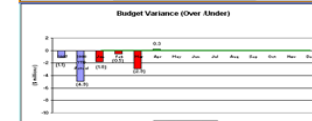
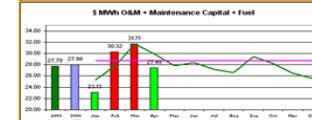
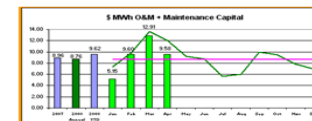


### Market

MISO Day Ahead Market  
Michigan HUB Pricing  
On-Peak Avg. \$62.84  
Off-Peak Avg. \$22.64



### Budget



### Reliability

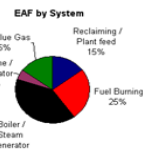


DTE Fossil Generation Fleet:  
Equivalent Availability Factor (EAF %)  
Last Update: 7/1/08

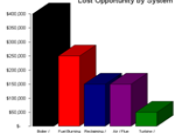
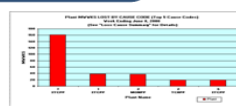
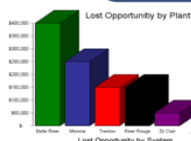
Fleet MTD June	Fleet YTD thru June	Fleet Target for June	Fleet Yr Target
66.1%	64.4%	69.0%	82.8%

Date: 6/30/2008

DTE Unit	YTD EAF	Year End EAF Target
BRV1	86.3%	87.2%
BRV2	85.4%	89.3%
MON1	83.0%	88.1%
MON2	82.4%	83.0%
MON3	81.4%	81.2%
MON4	77.2%	74.0%
RVR1	86.2%	88.2%
RVR2	81.1%	90.8%
RVR3	81.1%	88.5%
SC1	84.2%	90.2%
SC2	80.2%	90.2%
SC3	81.2%	83.2%
SC4	78.1%	83.2%
SC6	89.4%	81.8%
SC7	82.3%	88.5%
TCH/TC8	84.2%	78.1%
TC9	84.2%	90.5%
COCKS/CO16	100.0%	79.1%
HB1	77.4%	80.8%
GW1	84.3%	80.8%



### Outages



Outage Summary

DTE Unit	ETR - Unit Synch or Available	Date	Time	Type
BRVPP2	5/8/2008	07:00:00	MTG Brg #2	Tube Leak/REC
LUCPS1	5/17/2008	14:00:00	Generator Stator	Rewinding
LUCPS2	5/18/2008	16:00:00	Remove 112 Link	
RRGPP2	5/18/2008	02:00:00	Mid-Cycle	2008
STCCP1	5/2/2008	05:00:00	Chem Clean	
TCHPP8	5/18/2008	15:00:00	2008 Periodic	
TCHPP9	5/18/2008	14:00:00	Tube Leak	BRVCP

Emergent Unit Derate or Unit Reliability Issues

BRV1	- Escalator vibration / Running with Tube Leak
BRV2	- Outage - MTG Brg #2 high vibration/Tube Leak/Orange CM overhead
MON1	- Derates: SCR Plugage, ICM PA dust, 2CM performance
MON2	- Derates: Seasonal, HP Turbine - 7CM internal repair 65 & 75 inches out of service.
MON3	- Derates: Seasonal
MON4	- Derates: ICM mill gearbox.
RVR1	- Mid-Cycle Outage, CBFP out-of-service.
RVR2	- Derates: Rebuild CM3 PA base, CBFP out-of-service.
STC6	- Derates: CM5 broken roll, CM's run out/FEGT, SPD inlet gearbox
STC7	- Derates: ID Fan capacity #BRVCP overhead, MTG #3 & #6 Gov Valve isolated

### Unit Status

Current Unit Status

Unit	Net MW	DA MW	DA \$	NDC	P+0	De-Rate
BRV1	663	491	94.24	325	635	0
BRV2	0	0	635	635	0	0
COCK15	0	0	0	325	120	0
COCK16	0	0	0	325	120	0
FERMI2	1108	1095	92.77	1130	1106	28
GW11	0	0	0	765	765	0
HBH1	0	85	96.67	103	103	0
LUCPS1	0	0	0	353	353	0
LUCPS2	0	0	0	353	353	0
LUCPS3	0	0	0	353	353	0
LUCPS4	0	0	0	353	353	0
LUCPS5	0	0	0	353	353	0
LUCPS6	0	0	0	353	353	0
MON1	0	0	0	770	0	770
MON2	455	700	93.85	795	720	75
MON3	719	720	94.47	795	795	20
MON4	0	0	0	775	0	775
RVR1	240	250	93.84	260	251	9
RVR2	230	270	94.26	300	276	4
STC1	120	125	93.67	158	125	33
STC2	100	100	93.64	162	105	57
STC3	120	130	93.43	168	130	38
STC4	126	125	94.95	158	125	33
STC5	130	260	94.61	321	330	11
STC7	464	390	94.7	450	430	0
TCH7A	101	105	91.85	110	110	0
TCH8	76	75	93.16	100	80	20
TCH9	243	455	92.1	520	500	20
Peakers				1309		

# Plant Overview



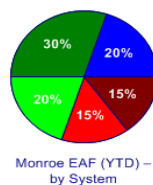
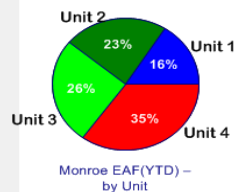
**DTE Energy**

## Monroe Power Plant Overview

May 21, 2008

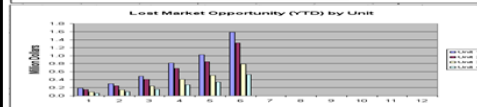
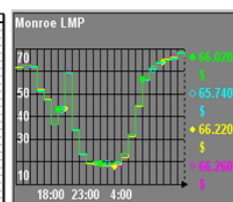
### Reliability

DTE Fossil Generation Fleet: Equivalent Availability Factor (EAF %) Last Update: 5/14/08		
Fleet MTD May	68.1%	688
Fleet YTD thru May	73.8%	688
Fleet Target for May	82.2%	
Fleet YTD 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	92.4%	81.2%
MON4	46.1%	74.0%



### Market

Day Ahead LMP	Monroe 1	Monroe 2	Monroe 3	Monroe 4
1:00	23.03	23.03	23.03	23.03
2:00	19.13	19.13	19.13	19.13
3:00	19.04	19.07	19.14	19.15
4:00	17.93	17.97	18.02	18.03
5:00	18.13	18.07	18.24	18.24
6:00	18.93	18.97	19.04	19.05
7:00	22.82	22.83	22.84	22.85
8:00	26.07	26.07	26.08	26.09
9:00	40.40	40.23	40.53	40.56
10:00	53.11	53.68	54.88	54.11
11:00	56.04	56.81	58.20	56.25
12:00	61.88	61.84	62.20	62.14
13:00	64.68	64.73	65.20	65.14
14:00	66.09	66.14	66.20	66.26
15:00	67.12	67.26	67.73	67.74
16:00	67.23	67.37	67.84	67.86
17:00	62.20	61.96	61.49	61.52
18:00	47.26	47.07	47.47	47.49
19:00	36.81	36.43	36.74	36.77
20:00	43.46	43.28	43.60	43.63
21:00	50.47	50.23	50.66	50.63
22:00	54.33	54.19	54.44	54.45



### Unit Status

Gross MW	Net M
Unit 1	723
Unit 2	740
Unit 3	749
Unit 4	734

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 Net Avail/Date	Unit 1	Unit 2	Unit 3	Unit 4
Cause	Fuel Blend #2 CM	Seasonal #2 turbine eff.	Seasonal #2 CM insp.	Fuel Blend #6 CM
ACC	OFF	ON at 1min	ON at 1.7min	ON at 1.7min
Days on Line	7	7	122	9
Record Run / Year	233 - 1997	263 - 2006/7	235 - 1995/6/7	421 - 1990/6/3

### 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

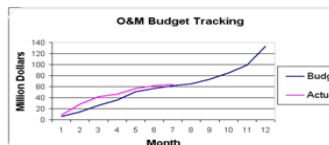
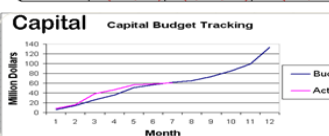
### Outages



Emergent Unit Derate or Unit Reliability Issues
MON1 - Derates: SCR Pluggage, Poor Mill Performance
MON2 - Derates: Seasonal, HP Turbine, - 7CM internal repair - 6S & 7S fuelers 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:	MTD	YTD
	5/12/2008	May 08	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	88.1%	
Monroe YTD thru May	78.6%	
Unit 1 MTD May	92.0%	
Unit 1 YTD thru May	81.0%	
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	Unit Heat Rate	BTU/KWhr
	Boiler Efficiency	%
	Milling Cost	\$ -
Fuel Burning	Air to Coal Ratio	%
	EAF	%
	Reclaim/Plant Feed	\$ -
Reclaim/Plant Feed	O&M Costs	\$ -
	AUX Power Cost	\$ -
	Actual Inventory	tons
Turbine / Generator	Actual Delivery	tons
	Replacement Cost	\$ -
	Blend	%
Water Systems	Blend Cost	\$ -
	Blend Quality	%
	Process Cost	\$ -
Water Systems	Mega Watts	mw
	EAF	%
	MTTR	%
Water Systems	Process Cost	\$ -
	EAF	%
	Process Cost	\$ -

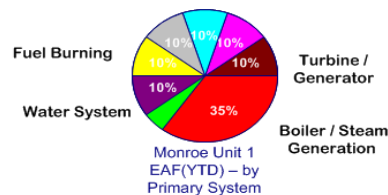
MONOP Unit 1 Detail Date: 6/2/2008 10:41:34 AM	
Unit Type:	Base Load
Base Load:	707.383
NDC:	770
Primary Available:	710
Primary + Overfire Available:	710
Current Blend:	(60%LSW/40%MSE) + (100%201)
Unit Constraints:	None
Derate (F): (0) A2 CM internal inspection; Jun 6@1600; Hamilton	
Derate (F): (60) SCR Pluggage; Jun 8@0805; E. Hamilton	
Special Conditions:	None
Primary Econ. Blend:	65
Unit Econ. Blend:	65
Primary Scheduled:	60
Primary Random:	0
Unit Scheduled:	60
Unit Random:	0
Total Scheduled:	60
Total Random:	0

### Outages

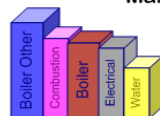
Primary Systems	YTD EAF	Year End EAF Target	Health Assessment	O&M Cost YTD	O&M Cost Previous Week	Capital Cost YTD	Capital Cost Previous Week
Monroe Unit 1 Total	78.6%	88.1%		\$25,500.0	\$1,893.8	\$25,500.0	\$1,500.0
Unloading / Storage	88.0%	90.0%		\$1,500.0	\$93.8	\$1,500.0	\$93.8
Reclaiming / Plant 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
Electrical & Control System	86.0%	88.0%		\$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

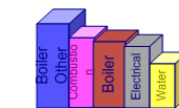
MON1 - Derates: SCR Pluggage, Poor Mill Performance



### Market (in \$1000)

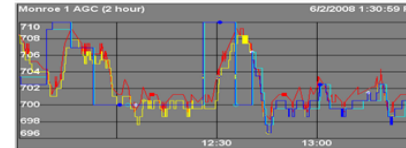
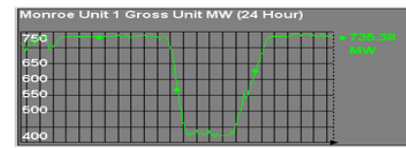


Lost Market Opportunity - by System



Lost Market Opportunity - by De-rate

### Unit Status

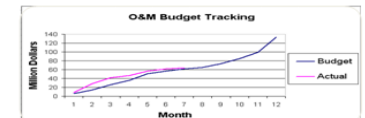
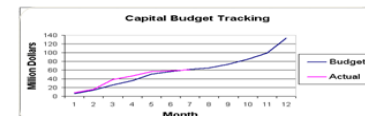


Unit Net Avail/Derate	Unit 1
Cause	Fuel Blend /#2 CM
AGC	OFF
Days on Line	7
Record Run / Year	233 - 1997

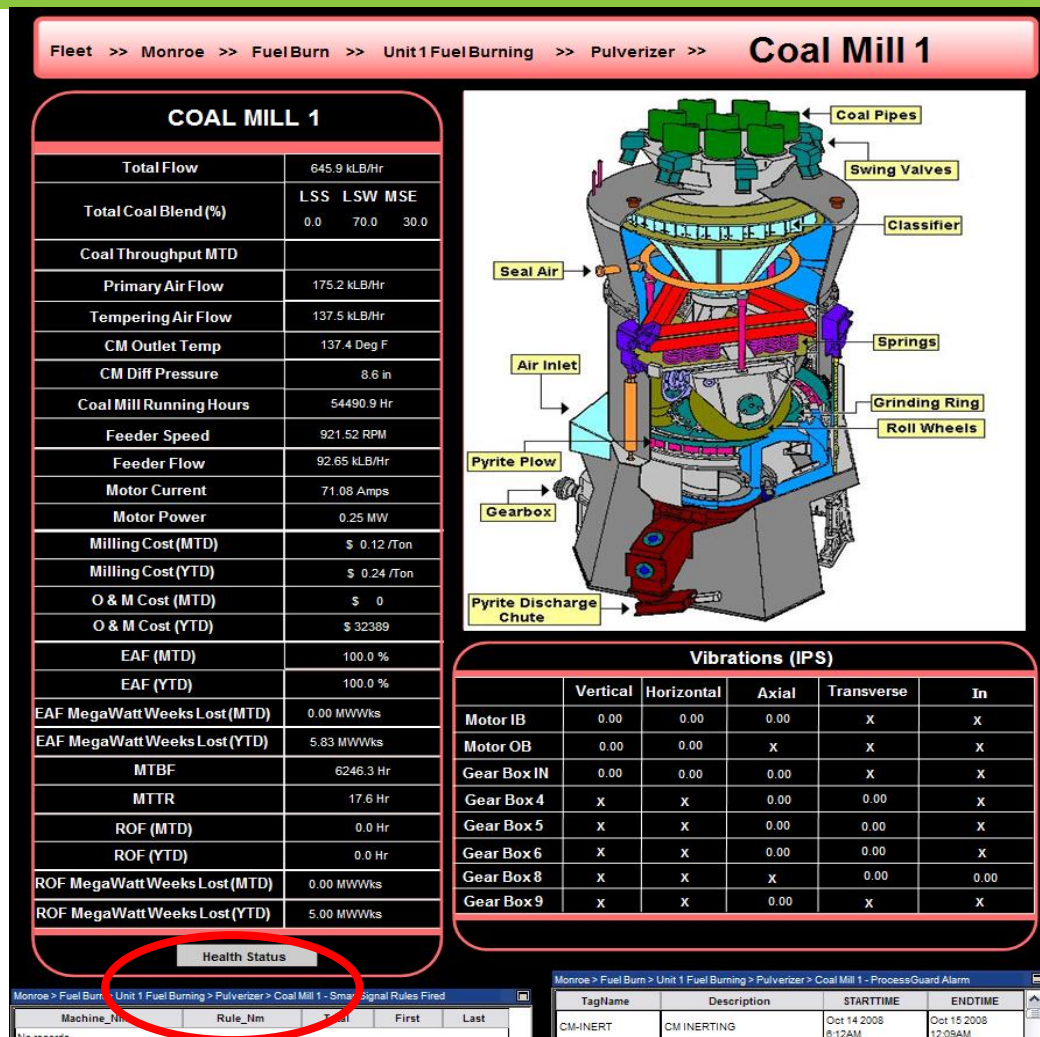
Heat Rate (BTU/KWhr)	P3M for Last Month	PMAX Gross Turbine Heat Rate	PMAX Net Turbine Heat Rate	PMAX Gross Unit Heat Rate	PMAX Net Unit Heat Rate
Unit 1	9988	7966	8392	9473	9979

### Budget

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







# 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 Temperature		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 Exam		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

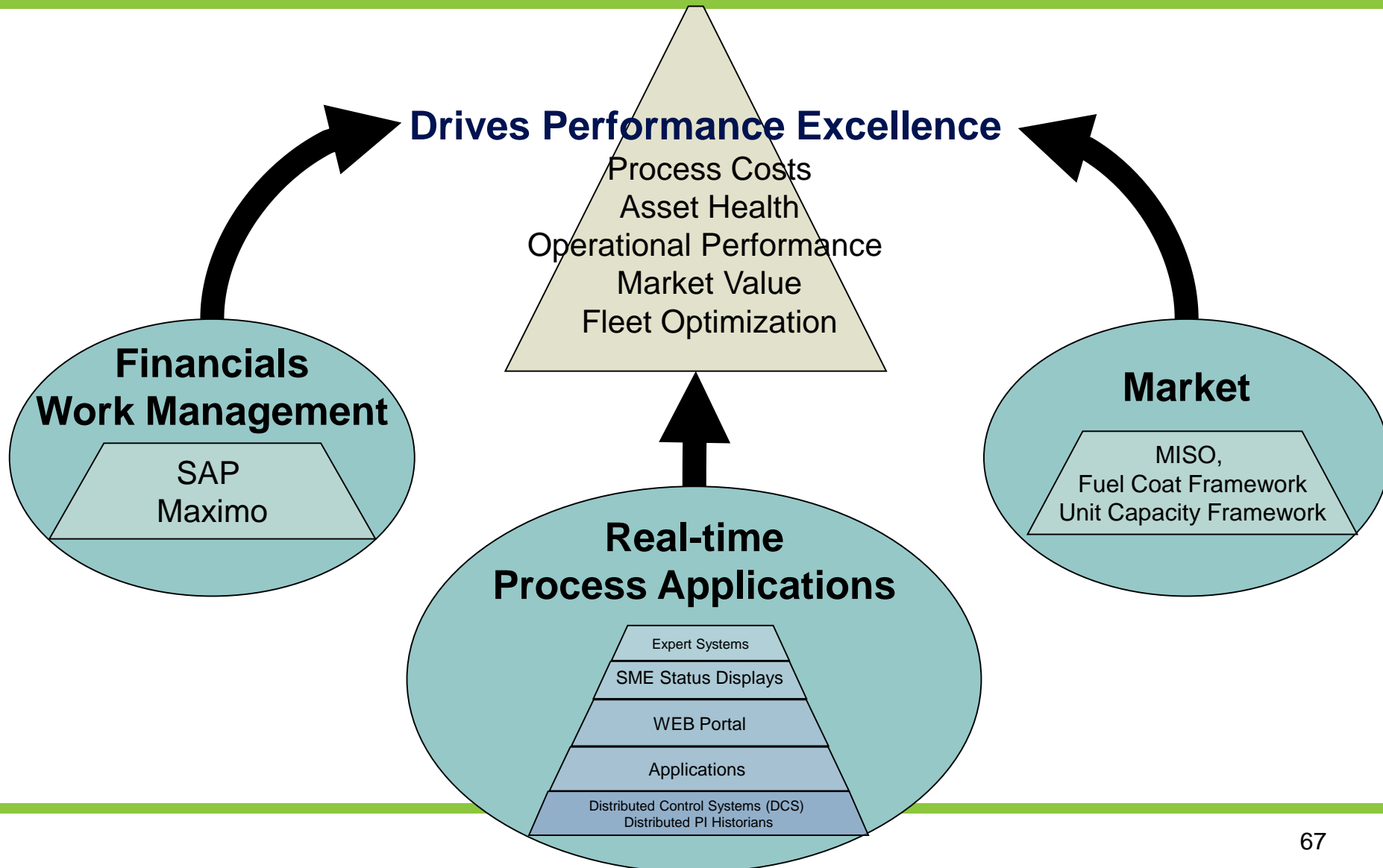
- SAP
  - Financials
  - Human Resources
  - Supply Chain
- Maximo
  - Work Management System

- Equipment / System Hierarchy
  - Plant
  - Unit
  - Primary System
  - System
  - Subsystem
  - Equipment

- System Owners
- Unit Engineers
- Performance Center Analysis
- Performance Engineers

\* Plant Reliability Optimization

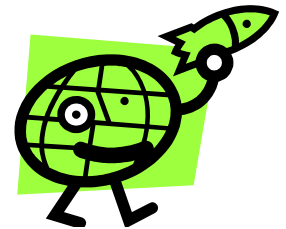
# Total Fleet Management



# 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
Allegheny Energy	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., Kansas 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
<b>Presentations in Process</b>	
AEP American Electric Power	AMB
Emerson Process Management	AMB
OSI Regional Conference	Detroit, MI
<b>Requested to Present but DTE Declined</b>	
Marcus Evans World Engineering Congress	Bangkok, Thailand
Tenaga Power Conference Malaysia	Singapore, Malaysia

# Fleet Optimization is about .....



## People Making the right decisions when it matters!



# QUESTIONS?

