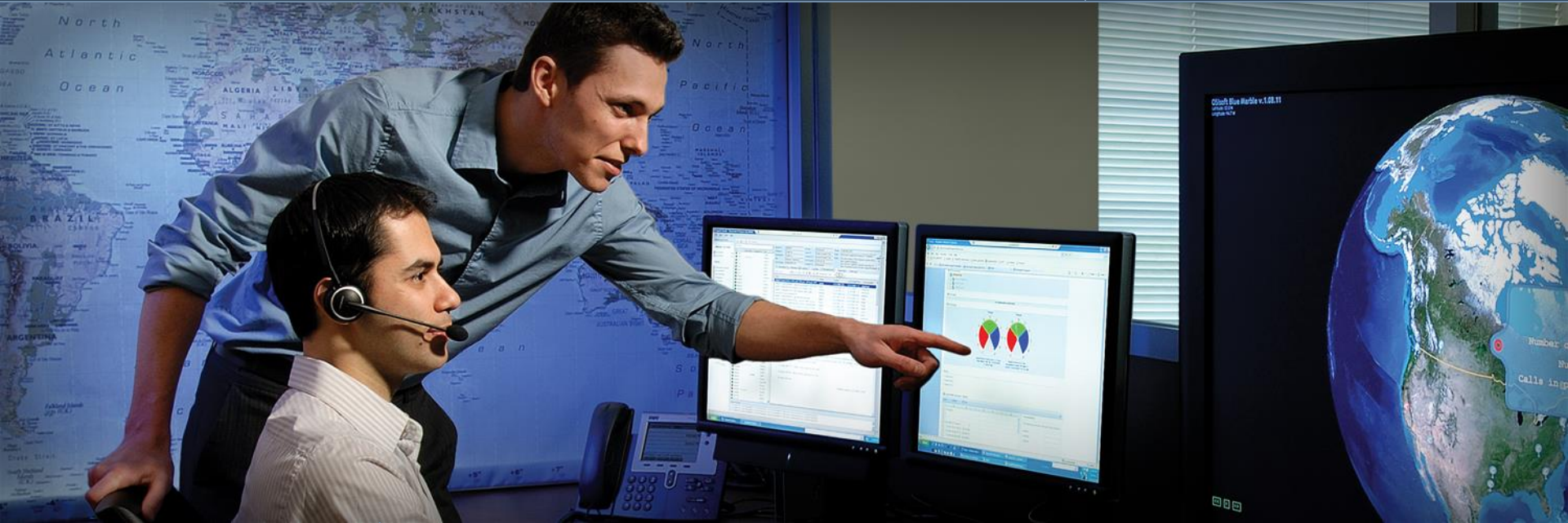




Regional Seminar Series Cincinnati



Fleet Optimization Through Process Information

John C. Kapron
Sr. Technical Specialist
DTE Energy

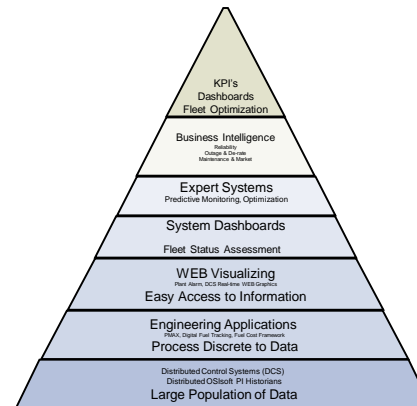
Sumanth K. Makunur
Lead Engineer
DTE Energy

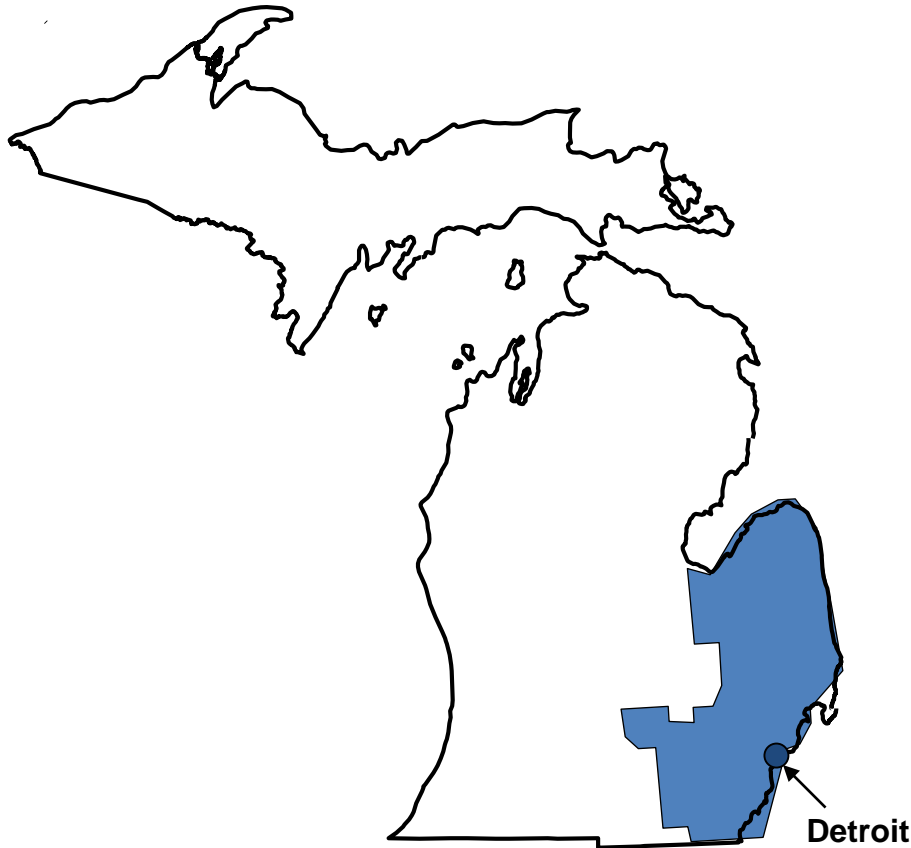
October 7, 2009

Empowering Business in Real Time.

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- About **DTE Energy**
- **OSIsoft** a Key Technology Enabler
- DTE - **OSIsoft** Enterprise Agreement (EA)
- Technology Framework
 - Accomplished
 - Currently in Development





Detroit Edison

- Michigan's largest electric utility with 2.2 million customers
- Over 11,080 MW of power generation, primarily coal fired
- 54,000 GWh in electric sales
- \$4.7 billion in revenue

 DTE Energy - Detroit Edison

Plants & Performance Center



Monroe – 3,135 mw



Trenton Channel - 730 mw



River Rouge - 527 mw



Belle River – 1,260 mw



Performance Center – 11,588 mw



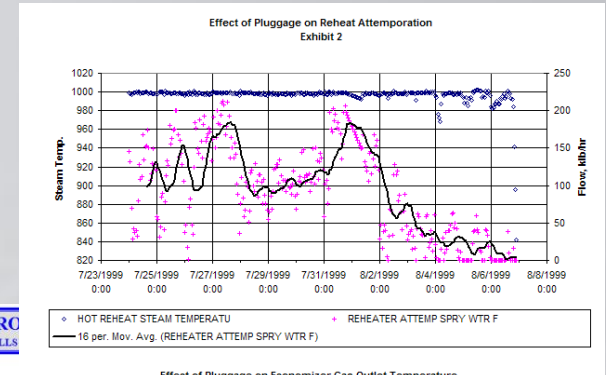
Greenwood – 785 mw

Generating Unit	Capacity Unit	Capacity Plant
Belle River 1	625	1260
Belle River 2	635	
Belle River		
Conners Creek 15	135	235
Conners Creek 16	100	
Conners Creek		
Fermi 2	1110	1110
Greenwood 1	785	785
Harbor Beach 1	103	103
Monroe 1	770	3135
Monroe 2	795	
Monroe 3	795	
Monroe 4	775	
Monroe		
River Rouge 2	247	527
River Rouge 3	280	
River Rouge		
St Clair 1	150	1409
St Clair 2	162	
St Clair 3	168	
St Clair 4	158	
St Clair 6	321	
St Clair 7	450	
St Clair		
Trenton Channel 7A	124	766
Trenton Channel 8	122	
Trenton Channel 9	520	
Trenton Channel		
Peakers	1224	1224
Totals:	10554	10554

History of OSI PI in DTE Energy



- Pilot at Monroe PP in 1998
- Fossil Generation Fleet 1999
- GenOps - EMS Ranger 2001
- SOC SCADA- 2002
- Fermi Nuclear- 2003
- DTE Subsidiaries - 2007
- Enterprise Agreement - 2007
- Continuous PI Expansion
 - Magnitude
 - Functionality

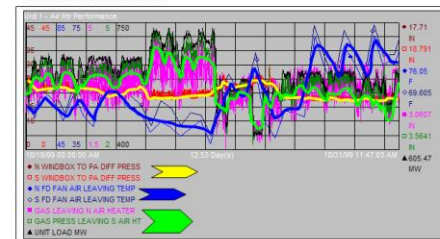


UNIT 1 – COMBUSTION PRO (I.E., AIR HEATER PERFORMANCE VS COAL MILLS)

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 **PA-to-Windbox** delta-P. Past operating history has defined that when the PA-to-Windbox delta-P reaches a level of **19" H₂O**, 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.

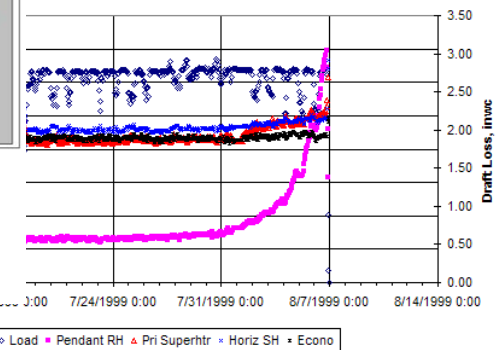


Understanding that air density changes as temperature changes and that it has an inverse effect on fan and air heater performance (i.e., as air temp. increases, efficiency of fans/air heater decrease) we can readily see in the above graph that since October 25th the ambient air temperature changed drastically. This was the reported time that Unit 1 coal mill output problems began to arise. As a result, **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. 27th 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 **PA-to-Windbox** pressure on Oct. 22nd when it cooled down.

Effect of Pluggage on Economizer Gas Outlet Temperature

Success!

Water, Superheater, and Economizer Draft Loss
Exhibit 4

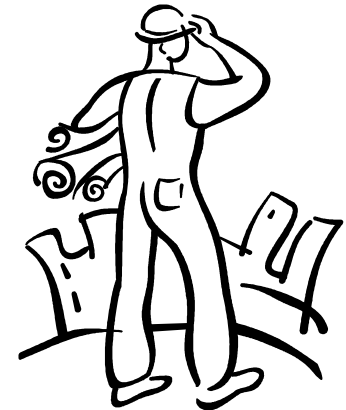
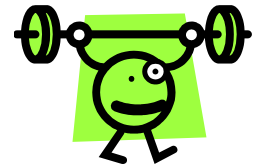
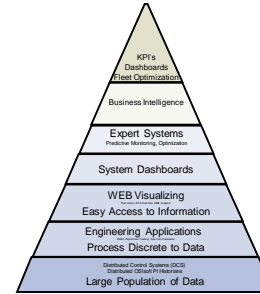


- **Information and Application Integration**
 - **Primary data source** of process data (current & historic)
 - **Integral part of many Applications** (process and business)
 - **Communication Conduit** (plant status, fuel cost, control, EMS)
 - **Strategic to DTE Energy's day to day Operation**
- **Performance Center - Enabling Technology**
 - Equipment Condition Monitoring
 - Enables DCS Displays
 - Process & Market Analysis
- **DTE - OSIsoft Enterprise Agreement (EA)**
 - Key to the Supply Cabinet



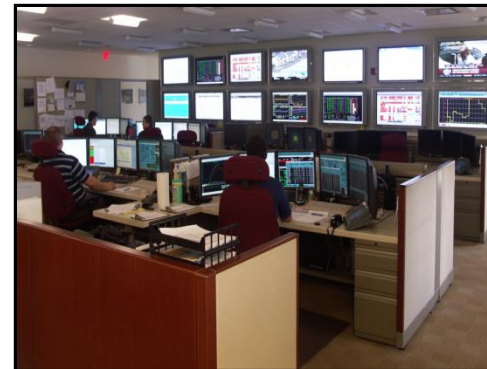
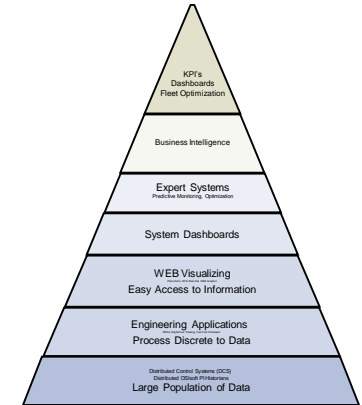
5 Key Benefits

1. OSI is a DTE Core Technology
2. OSI's Strong Track Record & Future Direction
3. Expand DTE's Use of OSIsoft Applications
4. Normalize Budget Allocation
5. Premium Software Reliance Program



1. Core Technology

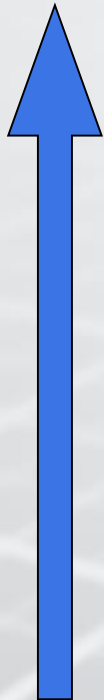
- **Integral Part Technology Framework**
- **Component of Many Applications**
 - Control Processes
 - Business Processes
- **Performance Center**
 - Enabling Technology



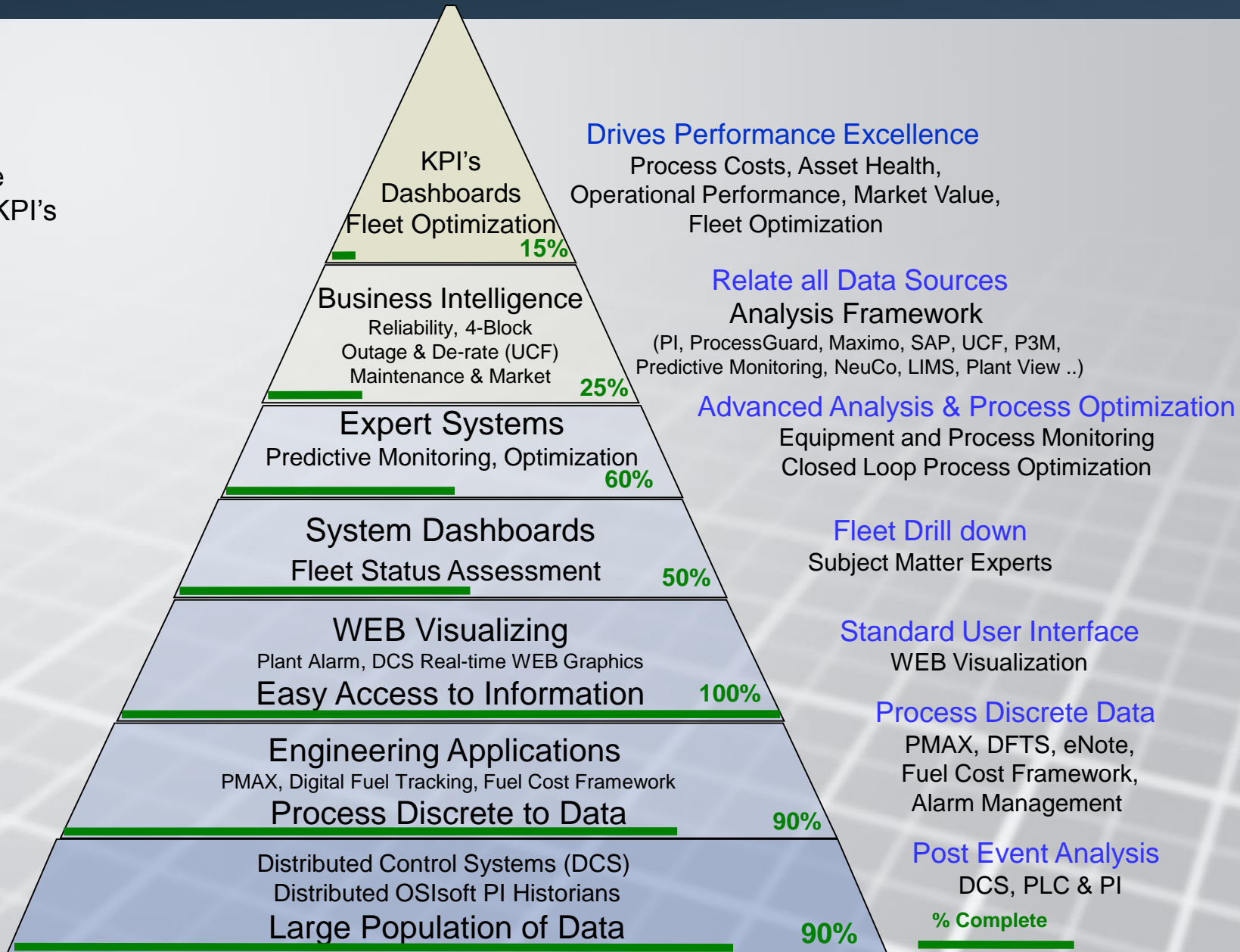
Technology Framework



Actionable
Information – KPI's



Discrete data
Limited value



Mobile Work Force



Mobile Work Force PI WEB reports available on your BlackBerry

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

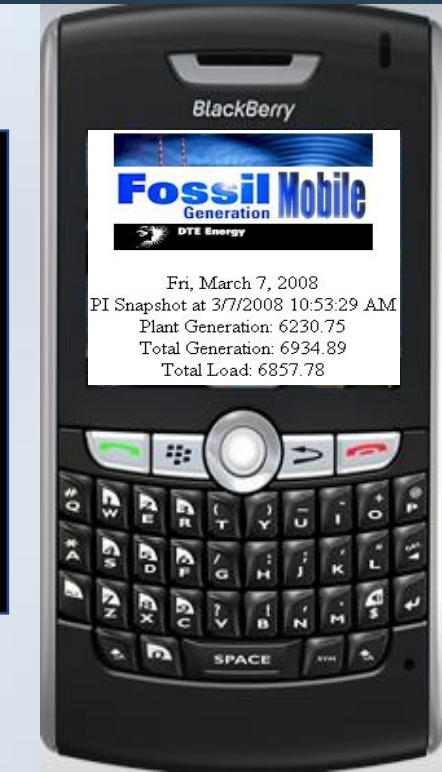
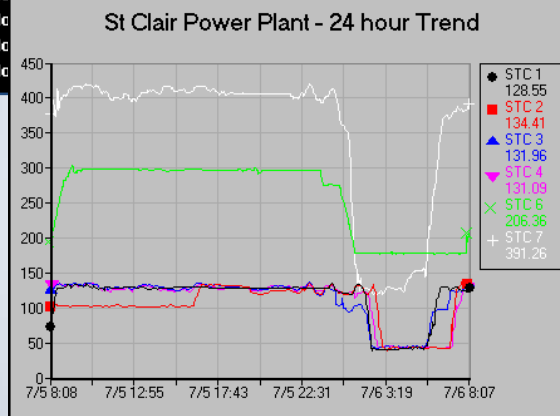
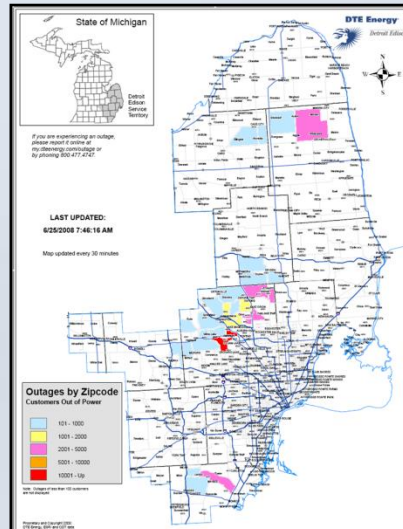
Mobile Status Report

Date: 7/6/2007 11:57:45 AM (96)

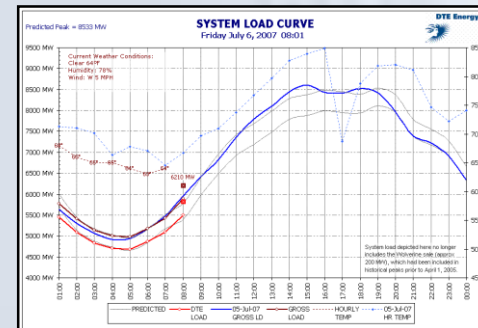
	Unit	On	NDC	P+O	T
+	BEV_1	<input type="checkbox"/>	625	0	625
+	BEV_2	<input checked="" type="checkbox"/>	635	635	0
+	GCK_15	<input type="checkbox"/>	105	95	10
+	GCK_16	<input type="checkbox"/>	125	125	0
+	FERM1	<input checked="" type="checkbox"/>	1110	1100	39
+	QW11	<input checked="" type="checkbox"/>	785	785	0
+	MBH_1	<input type="checkbox"/>	103	0	103
+	WUPS_1	<input type="checkbox"/>	153	0	153
+	WUPS_2	<input type="checkbox"/>	153	153	0
+	WUPS_3	<input type="checkbox"/>	153	153	0
+	WUPS_4	<input type="checkbox"/>	153	153	0
+	WUPS_5	<input type="checkbox"/>	153	153	0
+	WUPS_6	<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
+	MBH_2	<input checked="" type="checkbox"/>	366	364	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	●	●	●	●	●	●	●	●				
UNIT	EE	WE	EP	WP	IID	ZID	3ID	4ID				
BR1	●	●	●	●	●	●	●	●				
BR2	●	●	●	●	●	●	●	●				
UNIT	NE	SE	NID	SID								
ST3	●	●	●	●								
ST4	●	●	●	●								
ST6	●	●	●	●								
ST7	●	●	●	●								
UNIT	EE	WE	EID	WID								
RR2	●	●	●	●								
RR3	●	●	●	●								



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



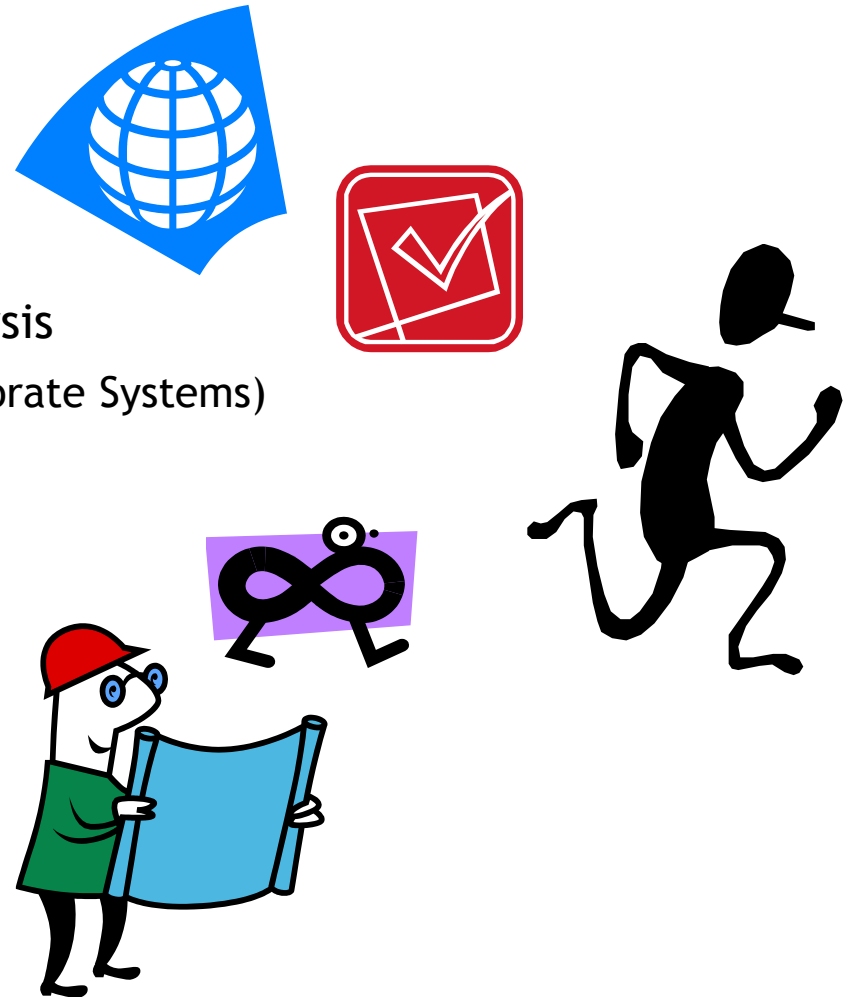
- Located in Ann Arbor Michigan
- 7x24 hour operation (February 2006).
- Plant interface with Merchant Operation Center.
- Oversight of Outage and de-rate coordination.



2. Track Record & Future Direction

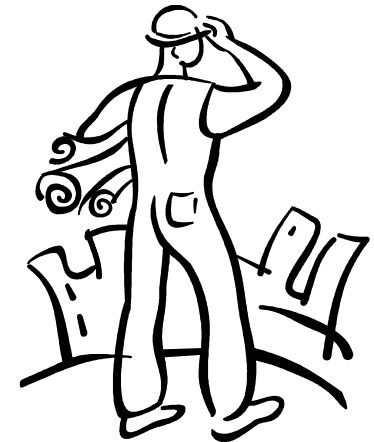
OSIsoft

- Exceptional Track Record
 - **Worldwide** and Multi Industry
 - Exceptional System **Availability**
 - **Open** and **Fast** Data Access for Analysis
 - Unlimited **Interfaces** (PLC, DCS, Corporate Systems)
- Future Direction
 - Multi Industry Leverage
 - Managed PI
 - High Availability (HA) PI System
 - Analysis Framework



3. Expand Use of PI Applications

- **Currently Application in Use**
 - PI Data Historian - Fleet Wide 1,000,000 tags
 - ProcessBook, DataLink, Active View, PI ManualLogger, PI Alarm, PI SMT
 - Multiple PI interfaces, Data Access Pack, API and SDK
- **Planned Expansion**
 - Expand PI tag count (Process Data, Operator Rounds, Application data ...)
 - IT Monitor
 - Analysis Framework
 - Advanced Computing Engine (PI ACE)
 - PI Module Database
 - RtPortal (WEB Visualization)
- **Required Expansion**
 - NERC Critical Infrastructure Protection
 - Market Interface
 - Environmental Reporting Regulations



4. Normalize / Reduce Budget

- Capital Budget - Application Expansion
 - Strategic Technology Approval
 - Facilitates stable budget forecast
- O&M Budget - Support
 - Fixed Budget
 - Known Future Budget Impact
- Product Cost
 - Significant **Discounts**
 - **Unlimited Usage**



5. Premium SRP (Software Reliance Program)



- **Enterprise Project Manager and Enterprise Account Manager**
- **Remote Monitoring**
- **Proactive Problem Resolution**
- **Specialized Performance Reports**
- **Access to Center of Excellence**
- **Unlimited Tags & Standard Interfaces**
- **Software Update System**
- **Quarterly Reviews**
- **Access to all CBT's and Webinars, Training and Event vouchers**



Why - OSIsoft Enterprise Agreement?



A DTE Core Technology



OSI's Strong Track Record & Future Direction



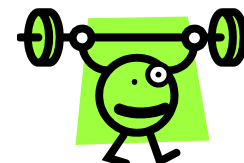
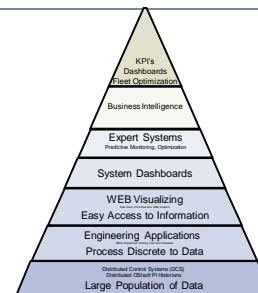
Expand DTE Use of OSIsoft Applications



Normalize Budget Allocation



Premium Software Reliance Program

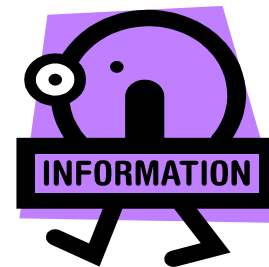
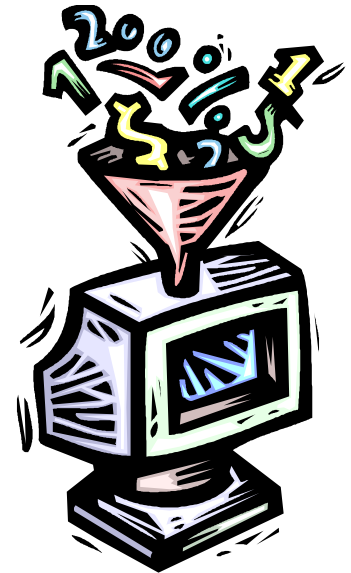
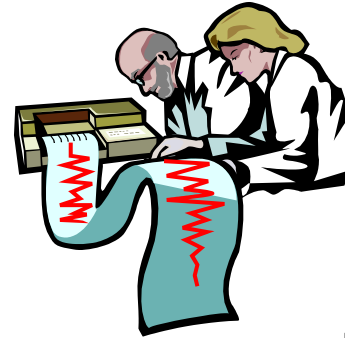


Lets take a closer look under the hood.



Challenge - Process Data Everywhere!

- DCS installations on nearly every unit
- Nearly 1,000,000 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**?



Technology Framework - Benefits



Annual Savings

Actionable
Information – KPI's



Discrete data
Limited value

Distributed OSIsoft PI Historians
Large Population of Data

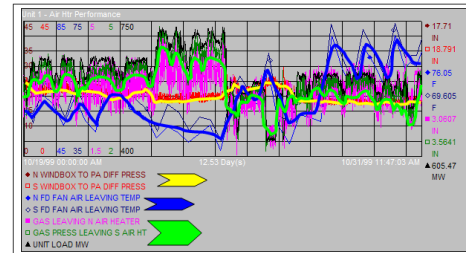
Data Analysis
\$3,000,000

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

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

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** (key to Coal Mill performance) is compared simultaneously to **ambient air temperatures** (FD Fan Air Leaving) and **PA-to-Windbox**. Past operating history has defined that when the PA-to-Windbox delta-P reaches a level of **19" H₂O**, 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 decreases) we can readily see in the above graph that since October 25th the **ambient air temperature** changed drastically. This was the reported time that Unit 1 coal mill output problems began to arise. As a result, **PA-to-Windbox** was reduced and coal mills removed from service in an attempt to maintain enough Hot PA **measured as 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. 27th 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 PA-to-Windbox on Oct. 22nd when it cooled down.**

Effect of Pluggage on Reheat Attenuation
Exhibit 2

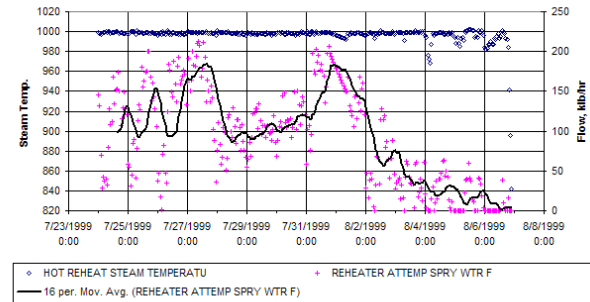
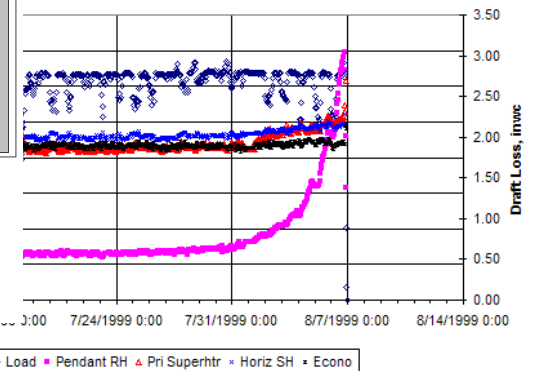


Exhibit 5

Effect of Pluggage on Reheat Attenuation

\$ 1,890,000
One Plant
1st year savings!

Reheater, Superheater, and Economizer Draft Loss
Exhibit 4

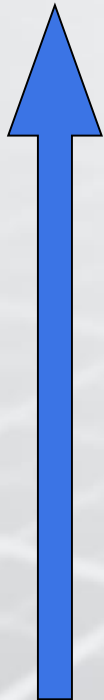


Technology Framework - Benefits

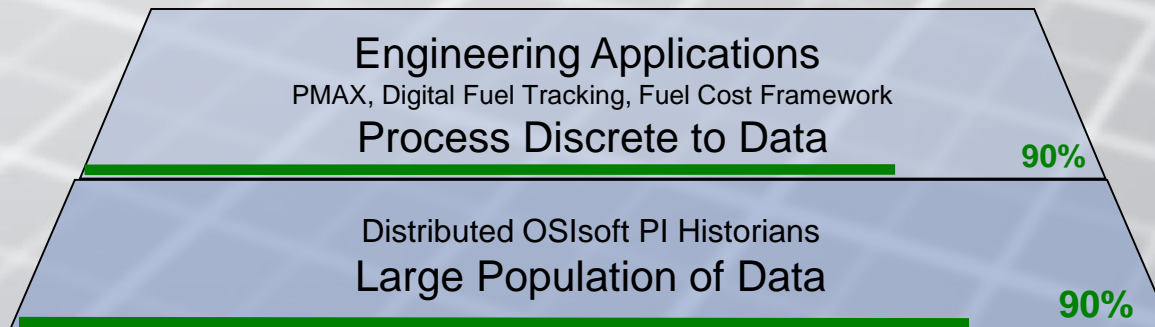


Annual Savings

Actionable
Information – KPI's



Discrete data
Limited value

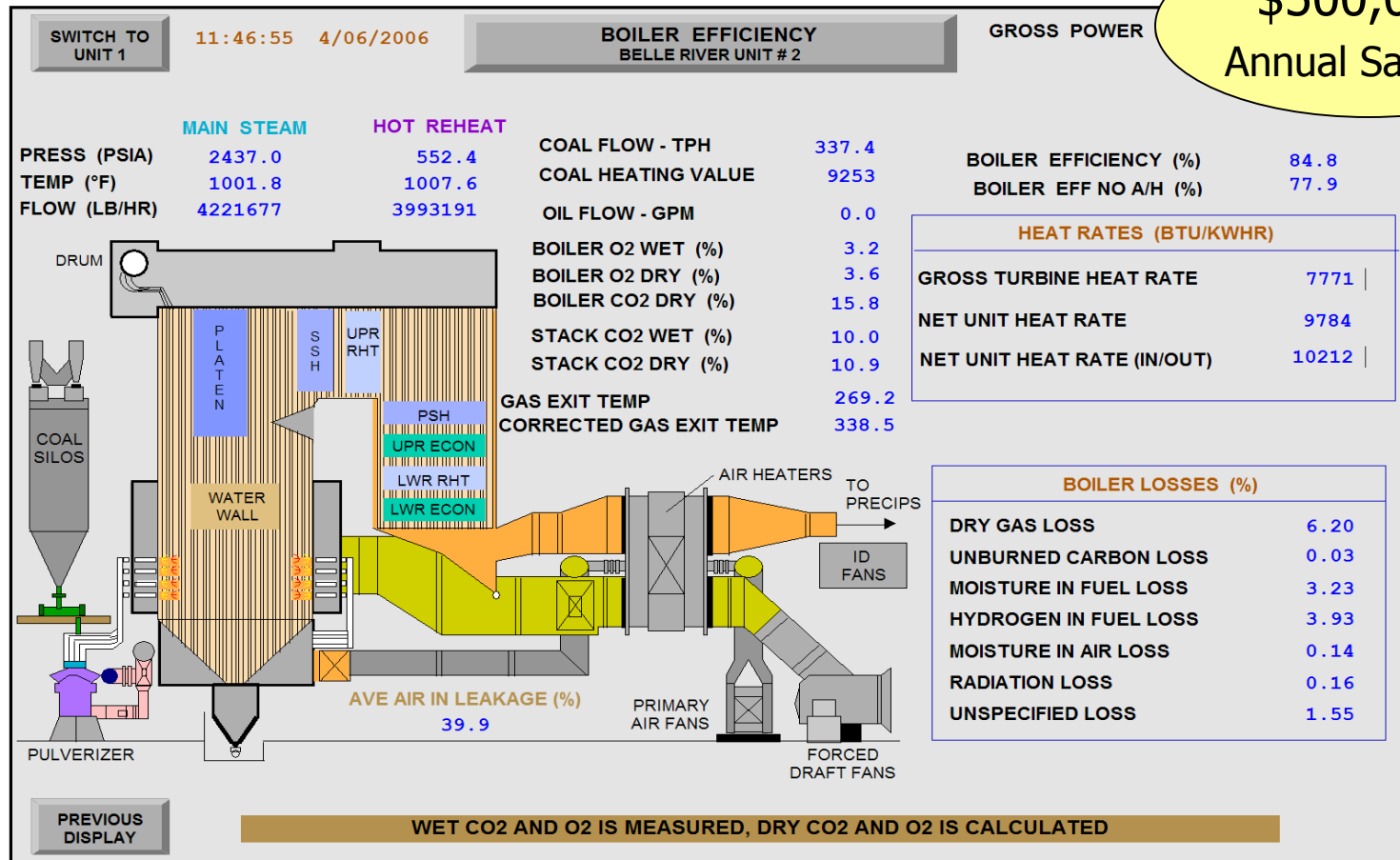


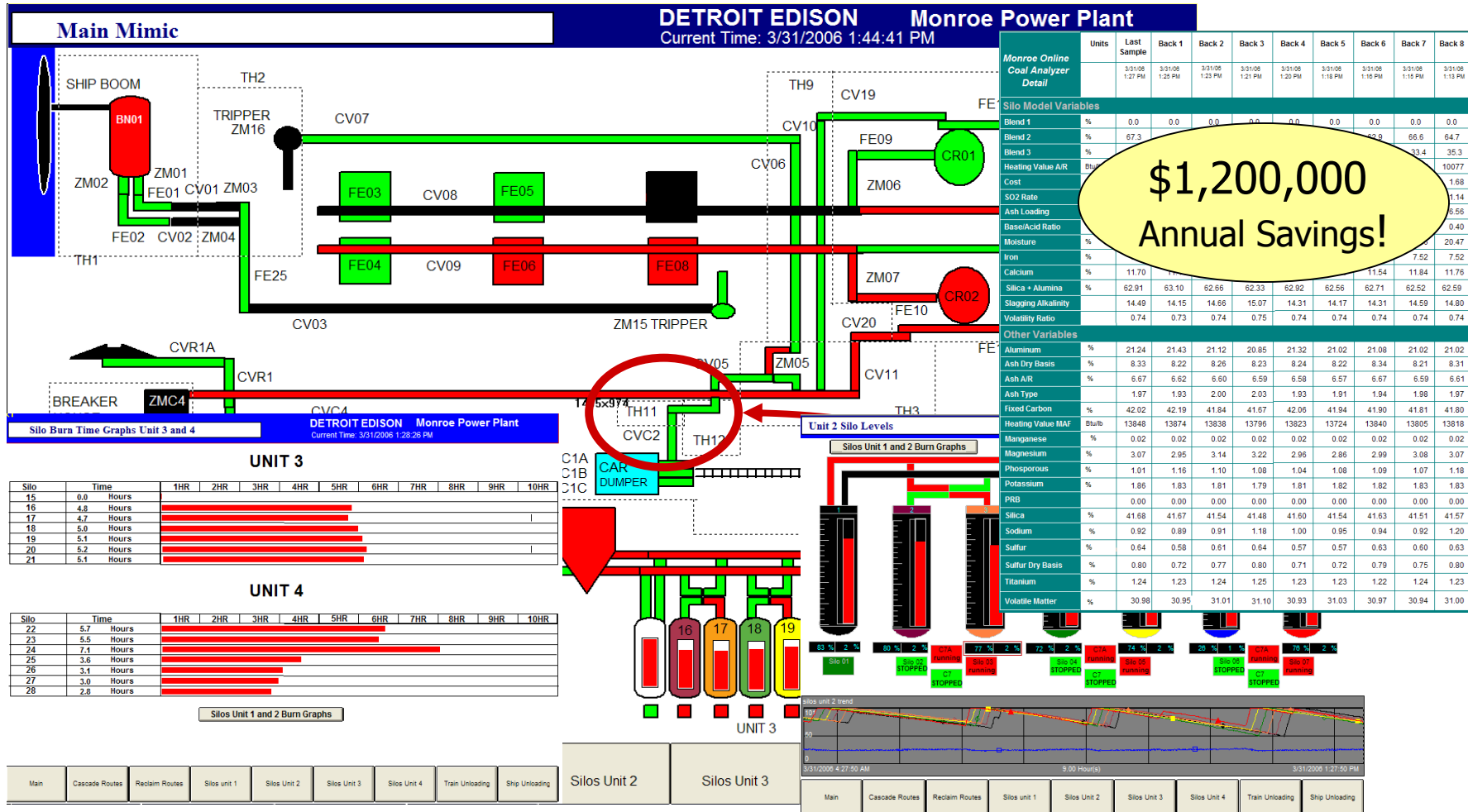
Process Analysis
\$4,500,000

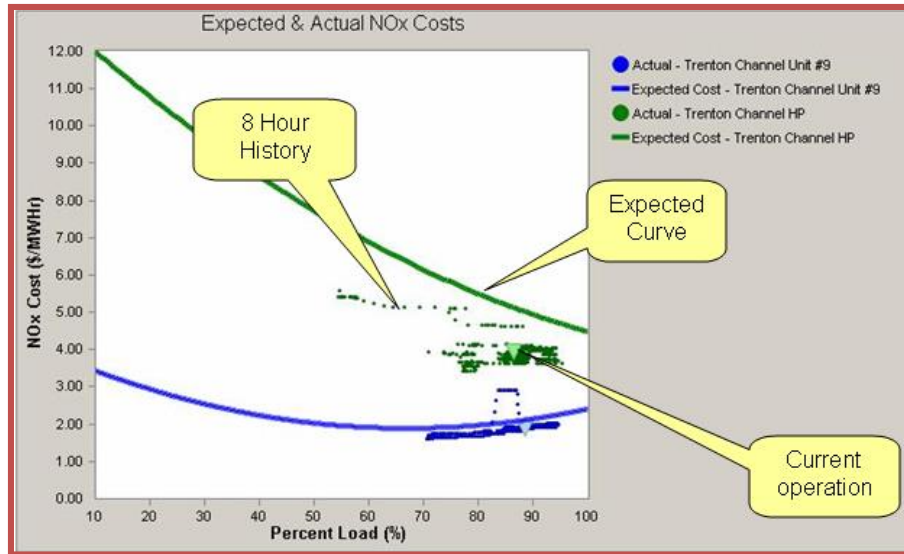
\$3,000,000

Thermal Performance Calculation Engine

\$500,000
Annual Savings!





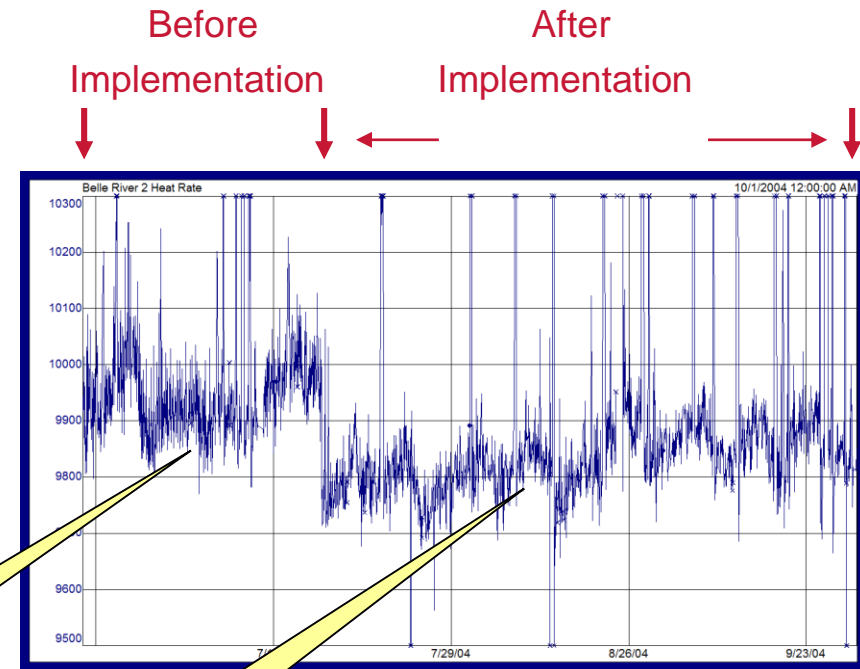


**\$2,200,000
Annual Savings!**

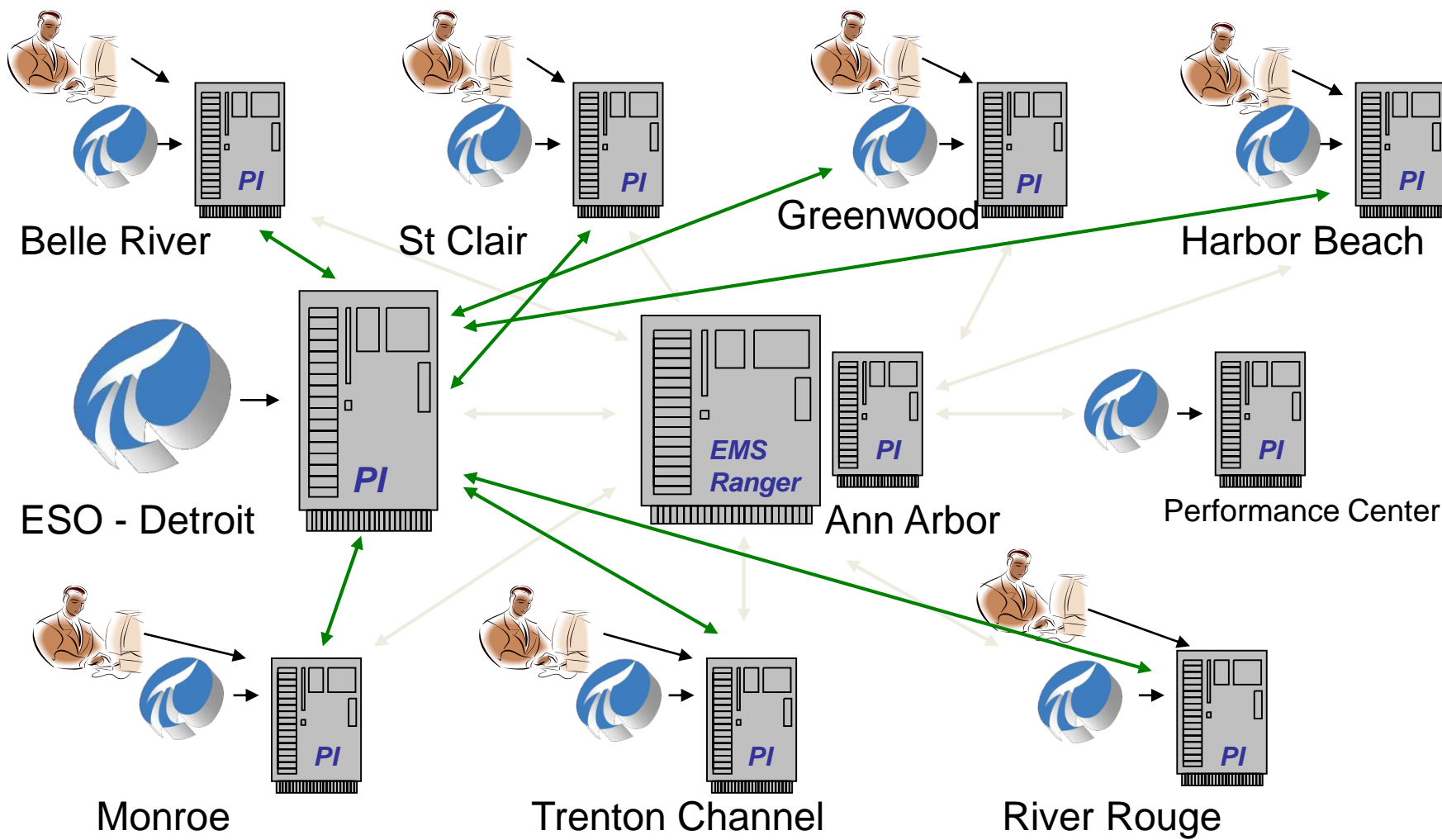
Primary
focus is NOx
reduction
only

Focus on
operating
near NOx
budget curve

NOx Reduction with Improved Heatrate



PI to PI Process Data Conduit



- 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

Quick Links:

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
Fuel Data				
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
Other Data				
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			

Fuel Price Calculator

* 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%

☐ Auto Update Fuel Prices Calculate Send

Operating Limit Data

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

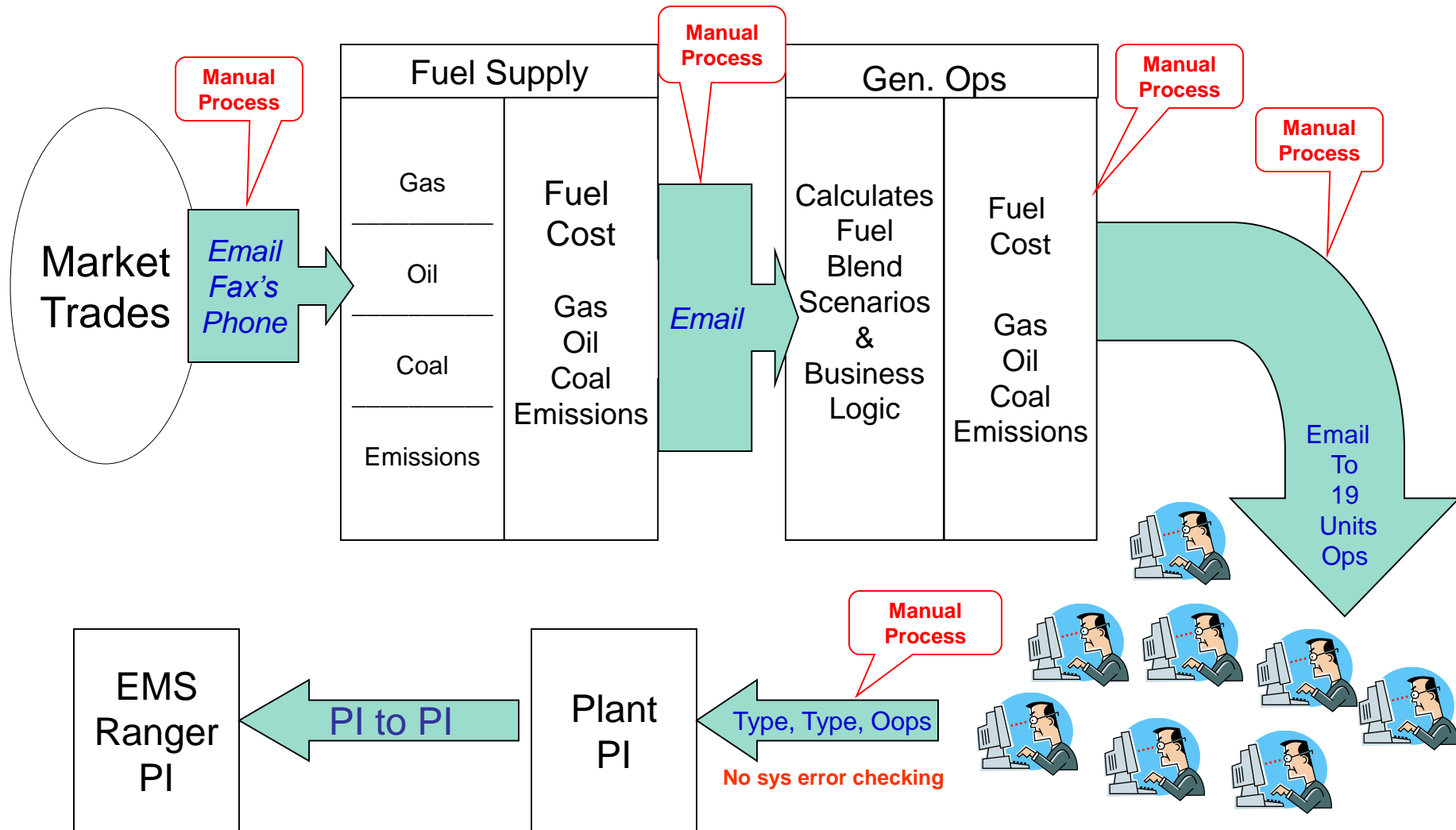
1. To edit data, click "Change Data".
2. Make necessary changes, then click "Send Now".

Select Unit Change Data Send Now Limits & Error Checks

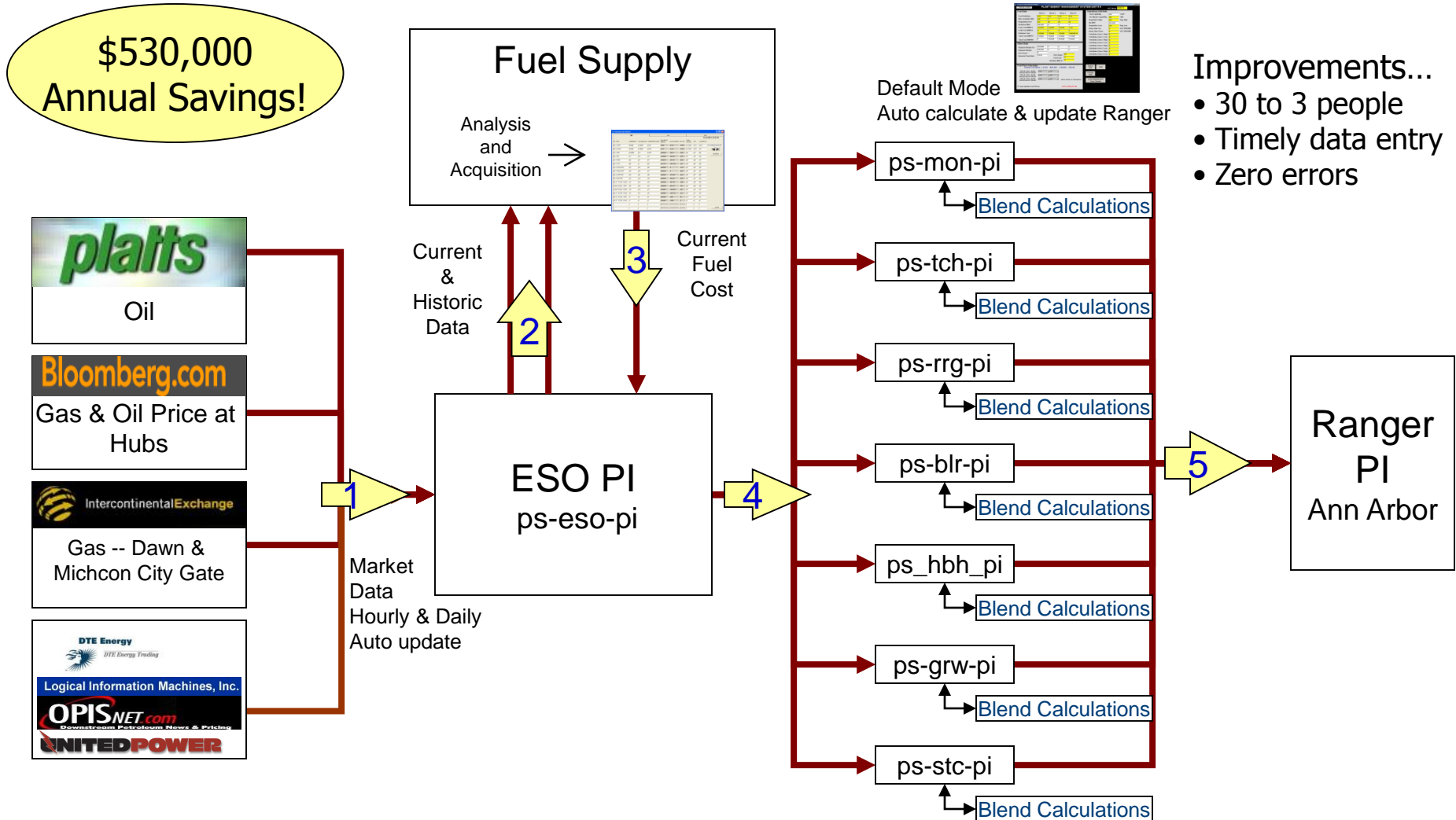
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\$120,000 Savings!

Before Fuel Cost Framework

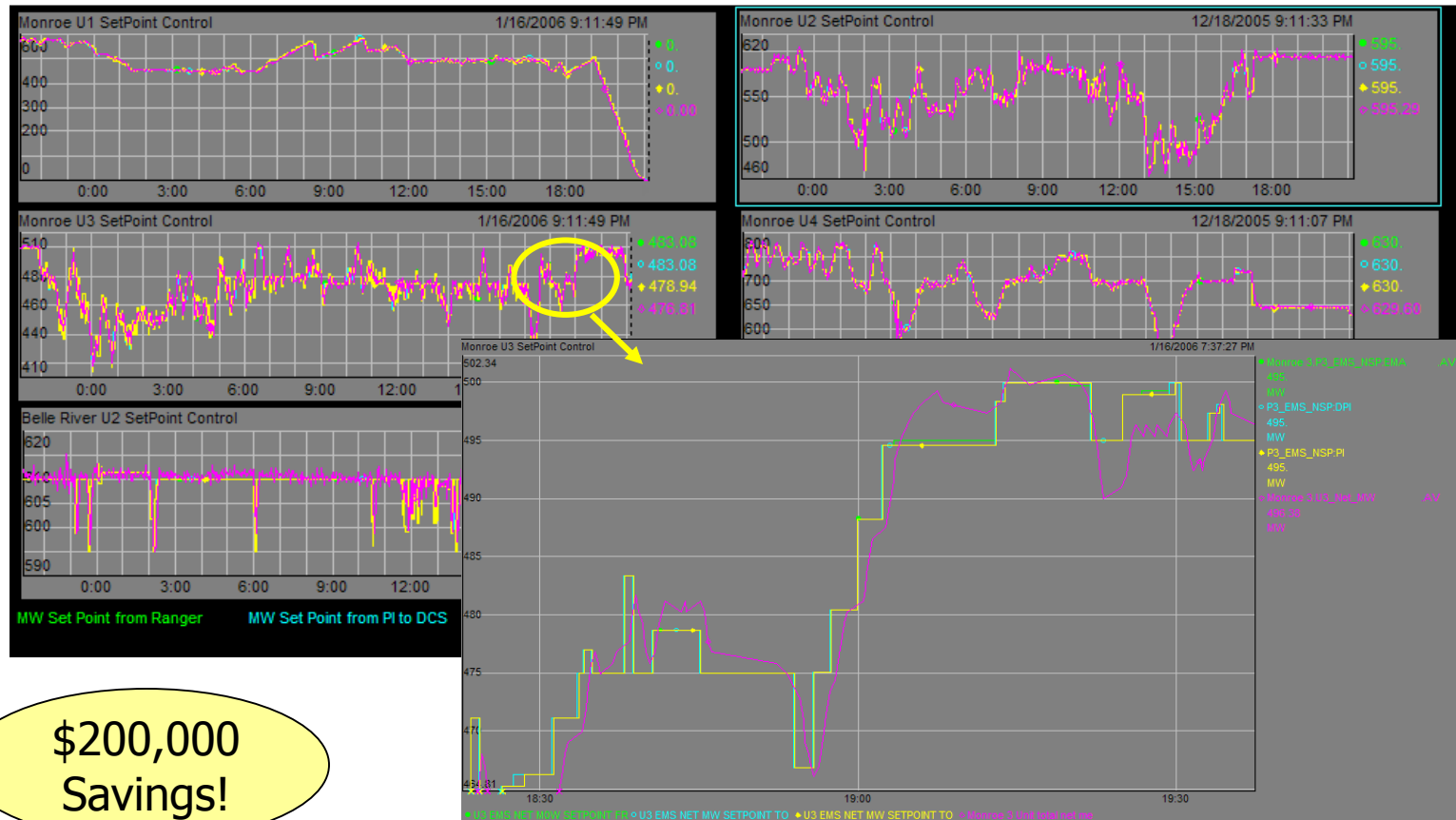


Fuel Cost Framework



AGC - Automatic Generation Control

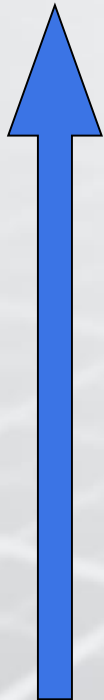
5 largest Fossil units & Peaking Units are ramped through PI Set Point control



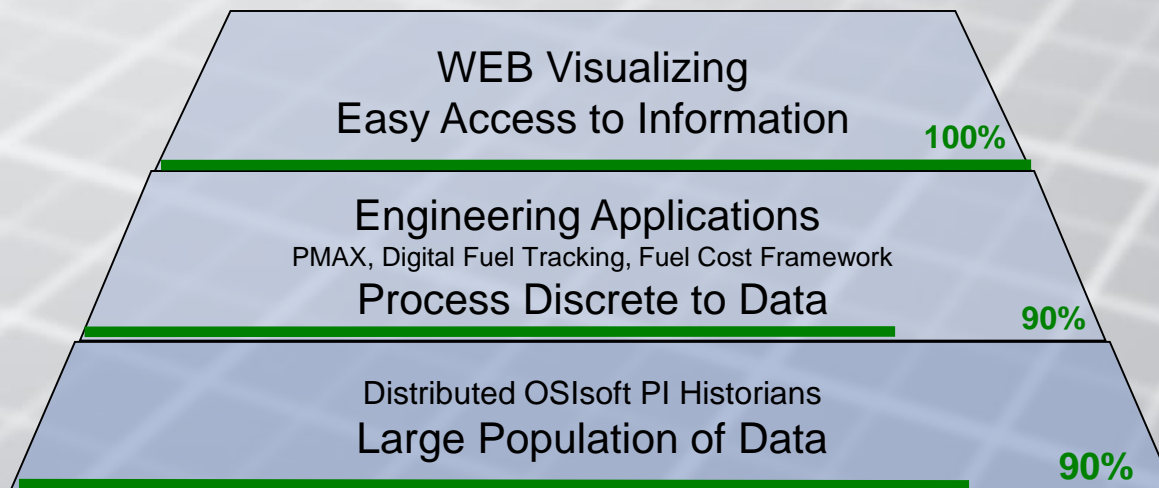
**\$200,000
Savings!**

Annual Savings

Actionable
Information – KPI's



Discrete data
Limited value



Easy Visualization
\$5,500,000

\$4,500,000

\$3,000,000

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 6 ³⁴⁶ ₁₂₀		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 Generation6281

Ludington Generation0

Peaker Generation378

Misc. Generation85

Total Generation6745

Total Load7978

Steel Load289

Transactions

Firm Purchase

Non-Firm Purchase

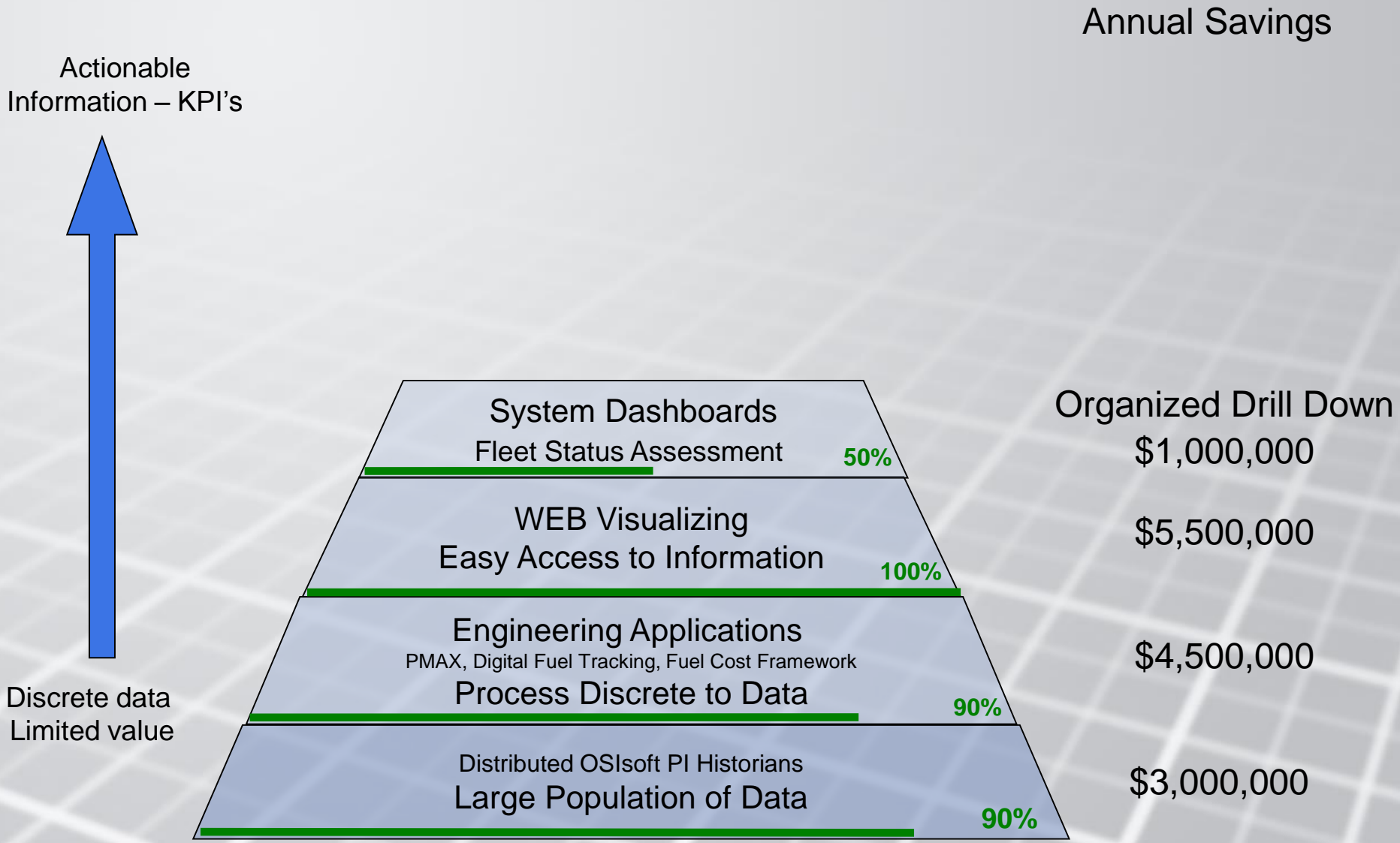
Firm Sale

Non-Firm Sale

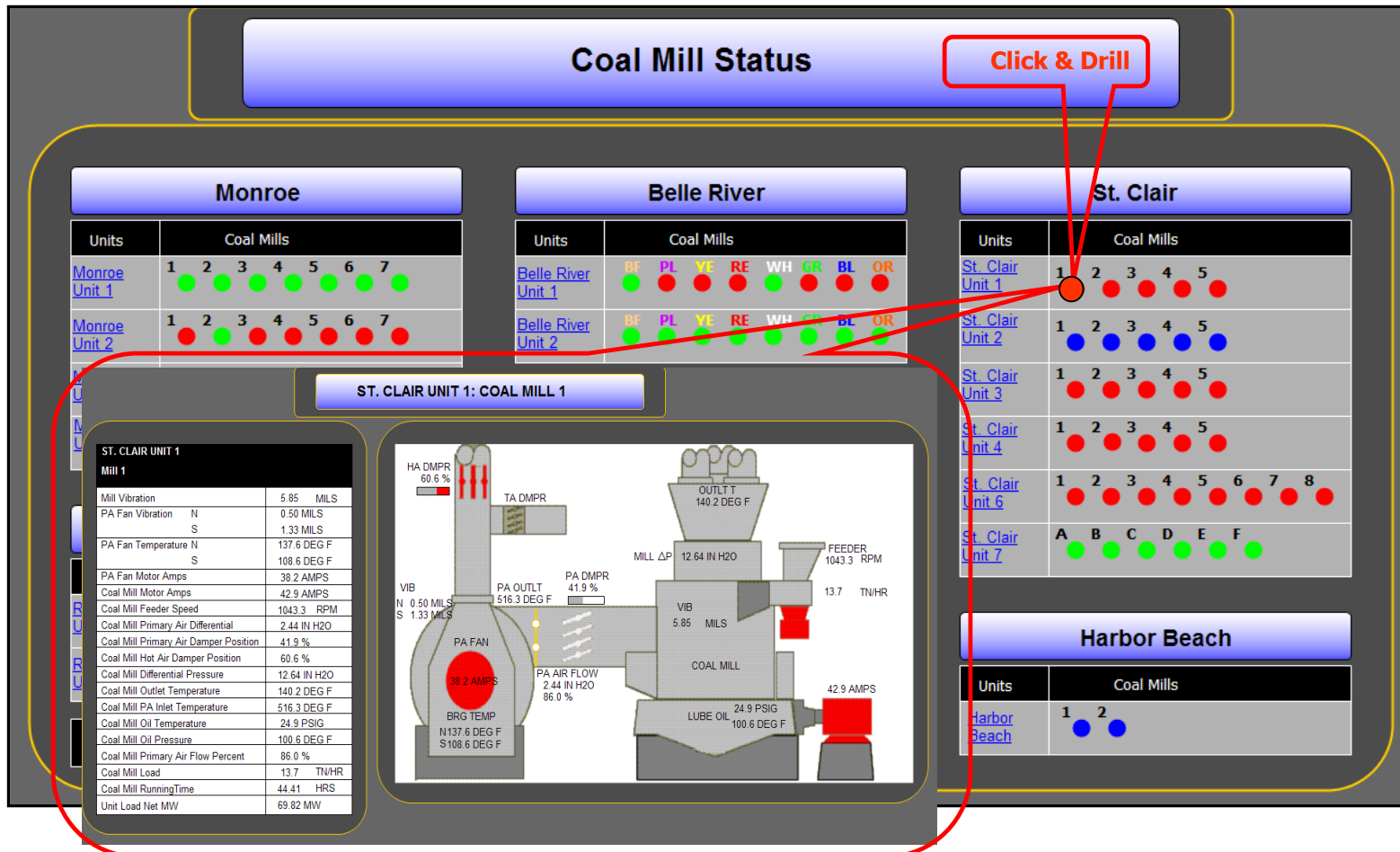
Service Area Load

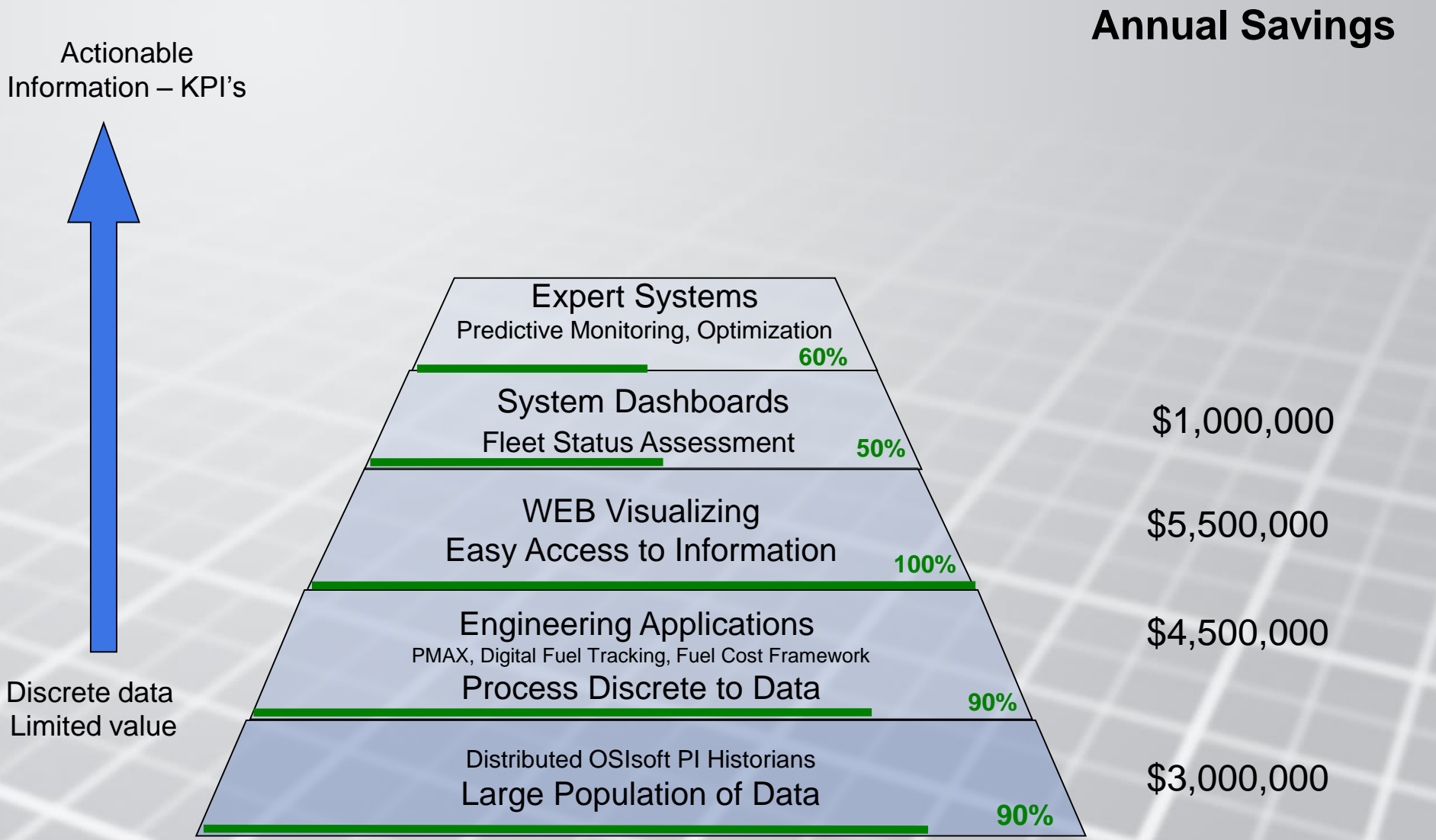
Retail Schedule

COAL MILLS										FANS										FW PUMPS										Circ				VP				HDP				GB			
M	1	2	3	4	5	6	7	8	9	FD	PA	SW	NW	NE	SE	Cond	HF	N	S	BF	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S							
O	1	1	2	3	4	5	6	7		N	S	N	S	N	S	N	C	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S							
	2	1	2	3	4	5	6	7		N	S	N	S	N	S	N	C	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S							
	3	1	2	3	4	5	6	7		N	S	N	S	N	S	N	C	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	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	S	N	S	N	S	N	S	N	S	N	S	N	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										
	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										
	3	1	2	3	4	5																																							
	4	1	2	3	4	5																																							
S	1	1	2	3	4	5																																							
	2	1	2	3	4	5																																							
	3	1	2	3	4	5				N	S			N	S			N	S		N	S		N	C	S	N	N	C	S	S														
	4	1	2	3	4	5				N	S			N	S			N	S		N	S		N	C	S	N	N	C	S	S														
T	1	1	2	3	4	5																																							
	2	1	2	3	4	5																																							
	3	1	2	3	4	5				N	S			N	S			N	S		N	S		N	C	S	N	N	C	S	S														
	4	1	2	3	4	5				N	S			N	S			N	S		N	S		N	C	S	N	N	C	S	S														
C	1	1	2	3	4	5	6	7	8	N	S			N	S			N	S		N	S		N	S																				
	2	1	2	3	4	5	6	7	8	N	S			N	S			N	S		N	S		N	S																				
	3	A	B	C	D	E	F			N	S			N	S			N	C	S																									
	4	A	B	C	D	E	F			N	S			N	S			N	C	S																									
R	1	1	2	3	4	5	6	7	8	E	W			E	W			E	C	W	E	C	W	E	C	W																			
	2	1	2	3	4	5	6	7	8	E	W			E	W			E	C	W	E	C	W	E	C	W																			
	3	1	2	3	4	5	6	7	8	E	W			E	W			E	C	W	E	C	W	E	C	W																			
	4	1	2	3	4	5	6	7	8	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																													
	17	A	B	C											N	S																													
	18	A	B	C											N	S																													
	19	A	B	C											N	S																													
H	9	A	B	C	D	E	F							N	S			N	S																										
	10	A	B	C	D	E	F							N	S			N	S																										
	11	A	B	C	D	E	F							N	S			N	S																										
	12	A	B	C	D	E	F							N	S			N	S																										



2000 real time dynamic actively linked WEB System graphics



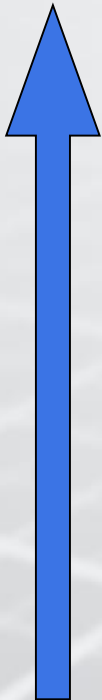


- Equipment & Process Monitoring
 - Fleet wide implementation 2006
 - A Primary Performance Center Application
- Combustion Optimization - NeuCo
 - Implemented on St Clair Unit 7
 - Implemented on Belle River 2
 - Planned for Belle River 1
 - Planned for Monroe Units 1-4

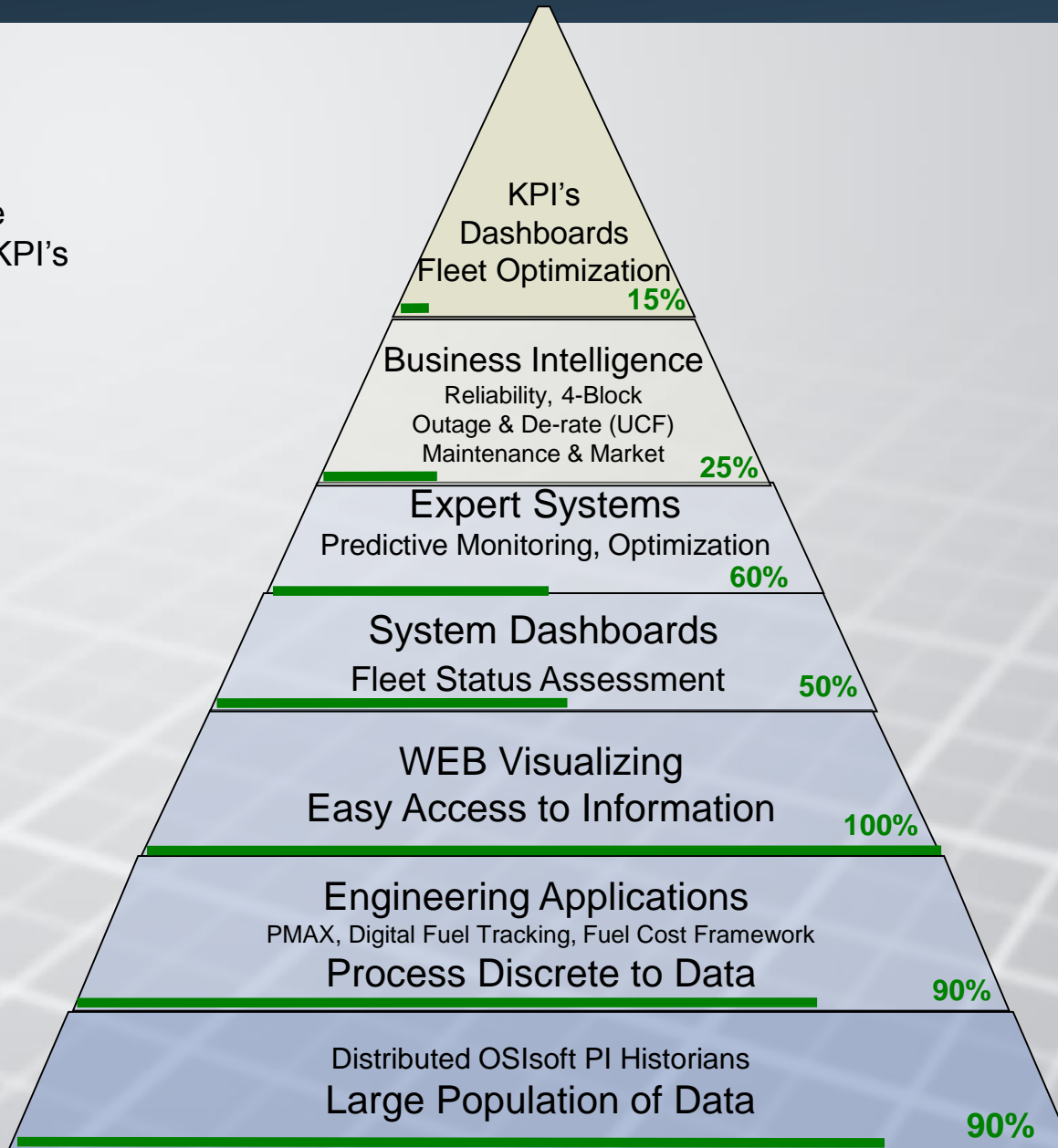
Technology Framework



Actionable
Information – KPI's



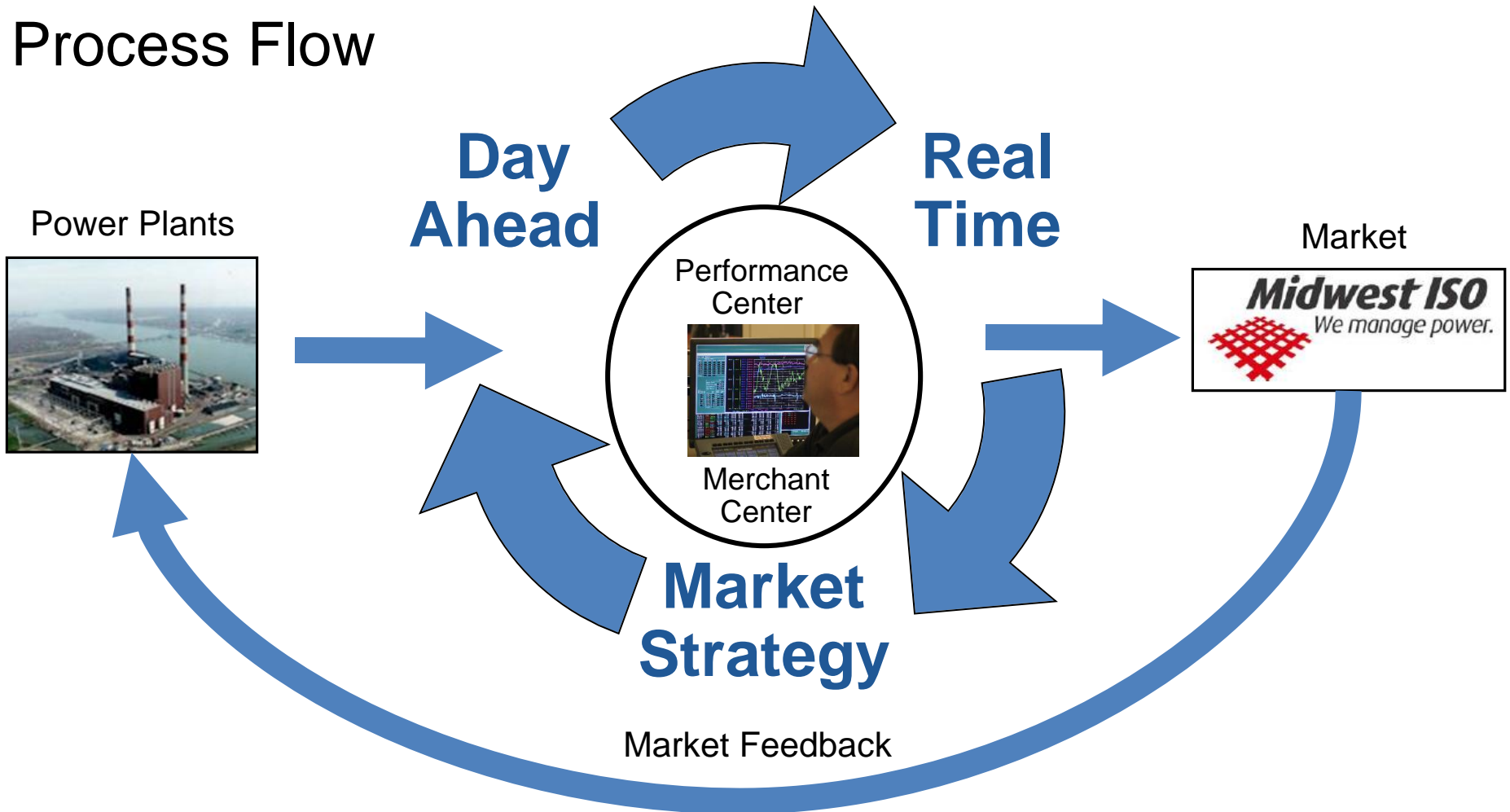
Discrete data
Limited value



Annual Savings

Fleet Optimization
\$20,000,000
(Projected Savings)

Process Flow



Unit Capacity Framework (UCF)

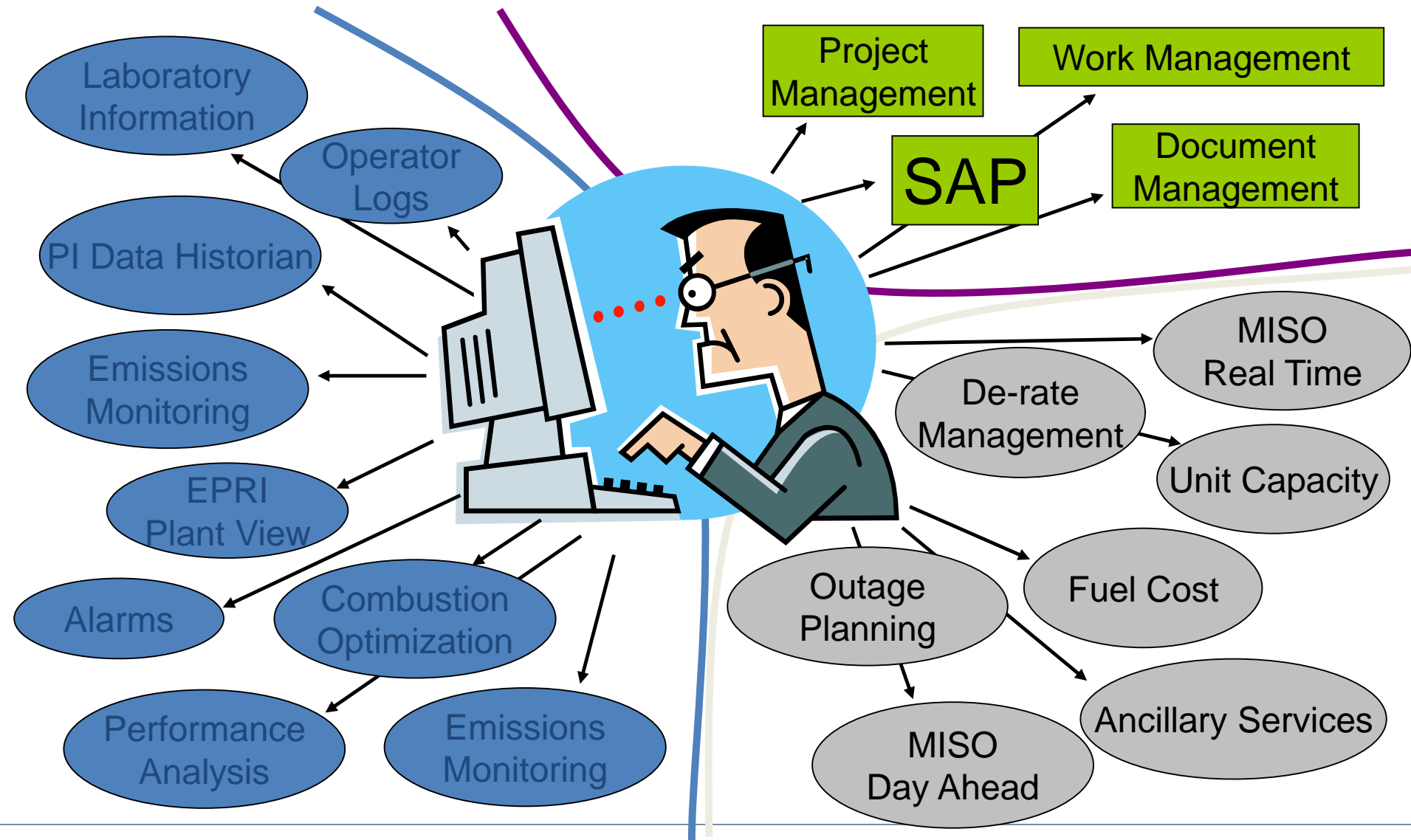


- Manages all Unit Capacity and De-rates - Interfaces to MISO, P3M & EMS
- Automatically Generated Status Report (Availability on BlackBerry)
- Dynamically linked with Outage and de-rate process

**\$6,900,000
Savings To Date!**

Fossil Generation Unit Capacity Framework										User: N/A									
<div> <div>Reports</div> <div>Data Entry</div> <div>Options</div> </div>										<div>Quick Links:</div> <div> </div>									
<div>Date/Time: 4/6/2006 12:46:00 PM</div> <div>Go</div>										<div> <div>Export to Excel</div> <div>Export to Word</div> <div>Field Definitions</div> </div>									
<div> <div>Show Optional Fields</div> <div><input checked="" type="checkbox"/> Group Peaker Units</div> <div><input type="checkbox"/> Group Cycler Units</div> <div><input type="checkbox"/> Group Base Units</div> </div>																			
<div>Sort: Alphabetically</div> <div>Historical Time: Current</div>																			
Fossil Generation Status Report										Last Modified By: David W Skiver (E49449) on Apr 6 2006 6:24AM									
Thursday, April 06, 2006 12:46:56 PM																			
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		
CCKPP 15	<input checked="" type="checkbox"/>	135	135	135	{100%NGAS}					0	0	0	0	0	0	0	0		
CCKPP 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. Wszelaki				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 SPWH: Jun 22@2100: P. Fessler Derate (0) 2-2 CM in 5K: Apr 7@1400: F. Wszelaki				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 FWH: 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		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		

No Shortage of Information!

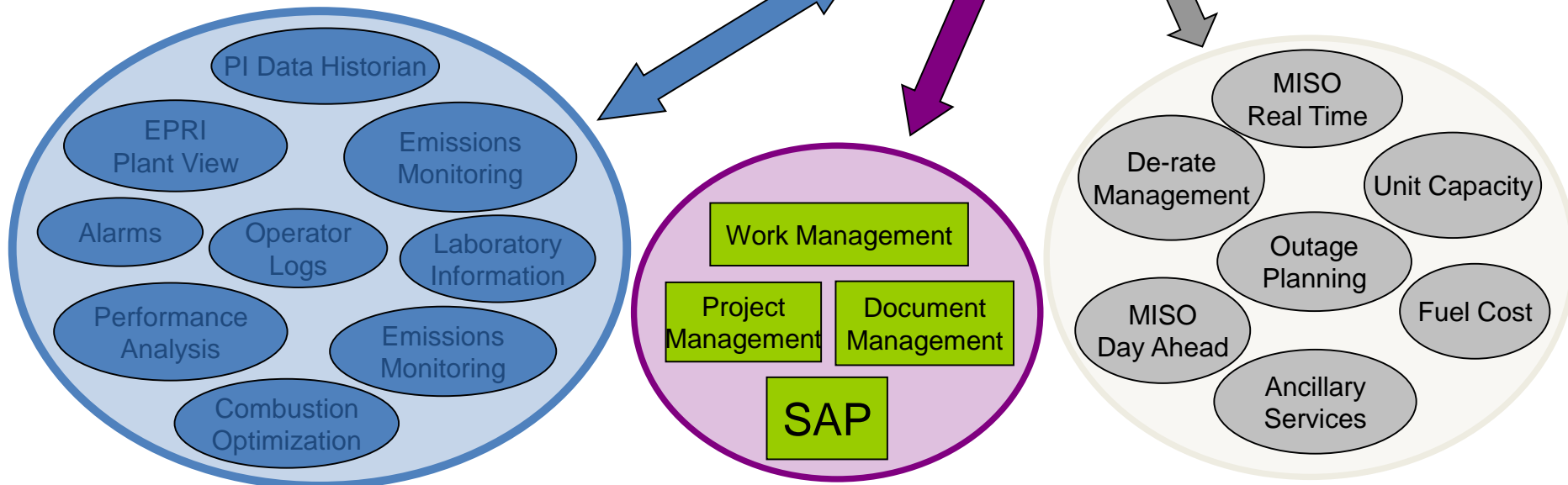


Integration Framework

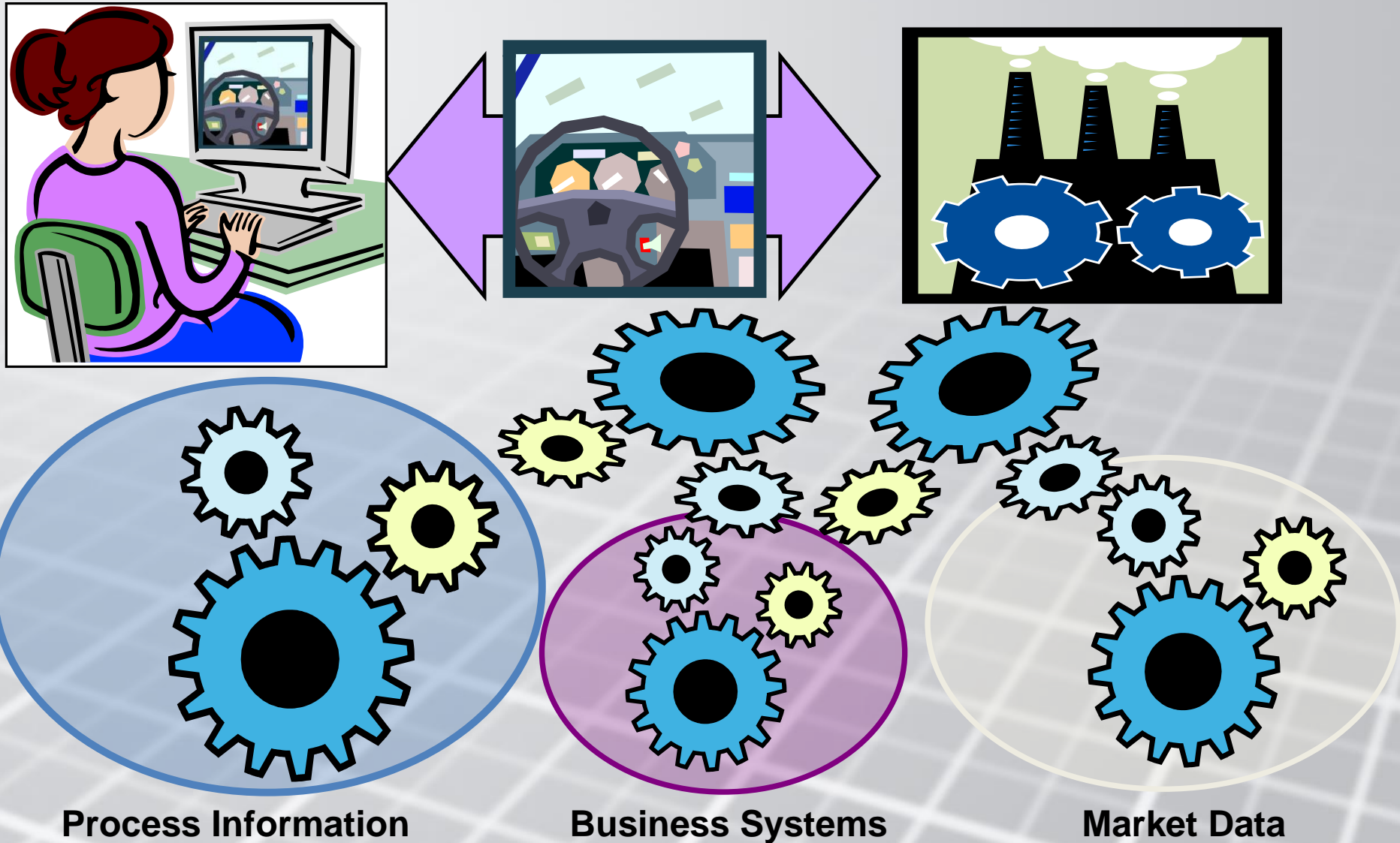


Standard GUI
Single Method

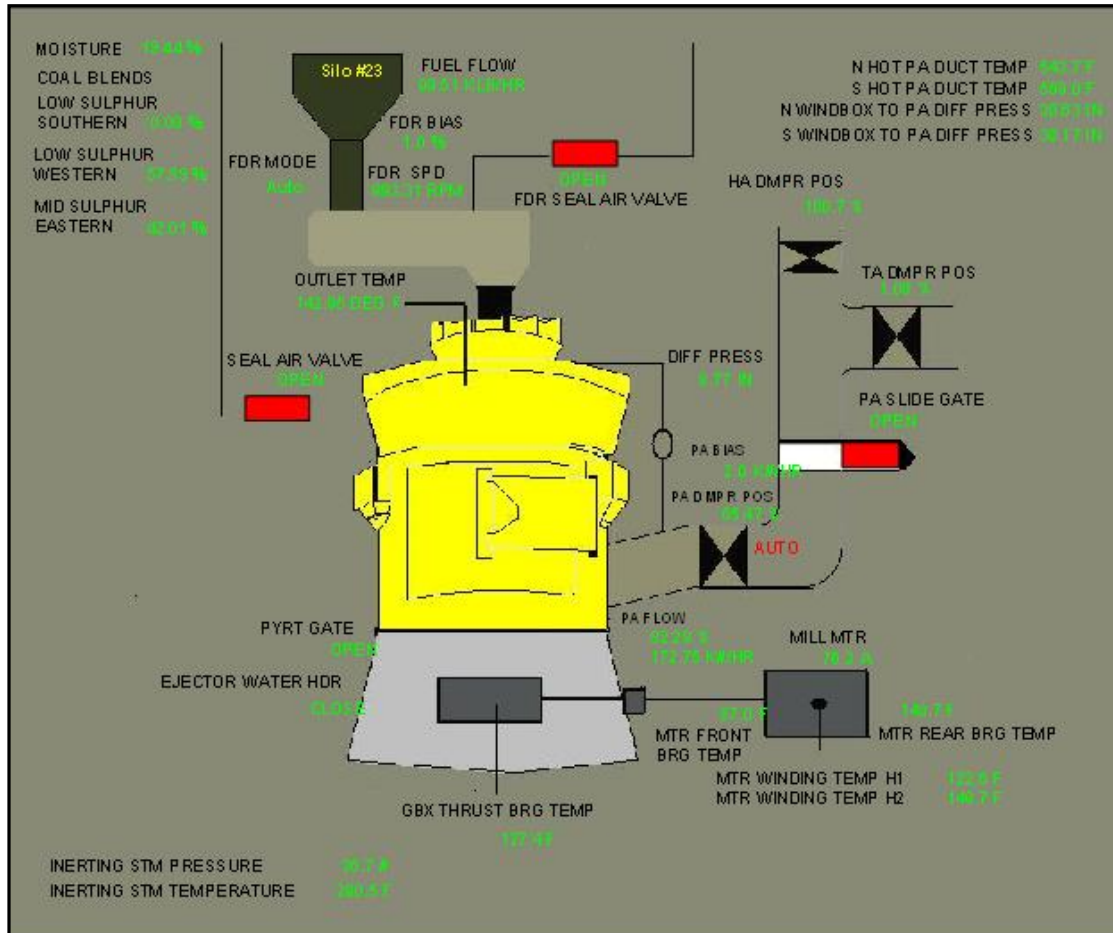
Integration Framework:
Integrated applications environment:
Consistent framework for data,
analysis, reporting and consistent
user graphical interface.



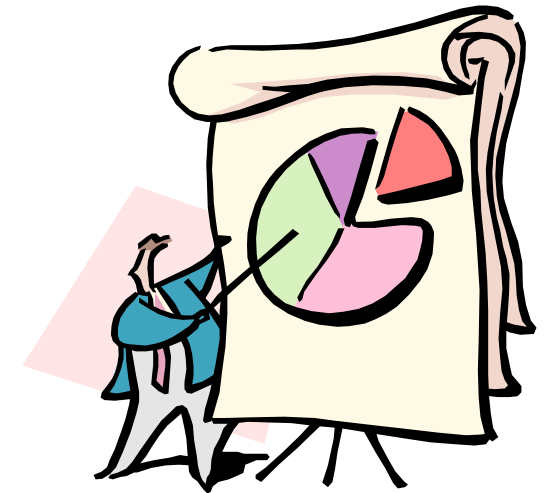
Common Structure



Pulverizer Dashboard



Process Information

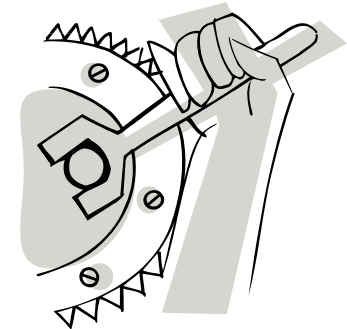


**More information
is need for Analysis**

What information is needed?

Pulverizer

- Milling Costs
- Process Costs
- Production Costs
- EAF
- Equipment Condition Monitoring Information
- Work Performed & Work Pending
- Alarms
- LIMS
- Vibration Analysis



Pulverizer - Multiple Data Sources

Consistent Reporting

- Common Methodology
- Common Structure



Maximo



SAP



Documentum



Unit
Capacity



Alarms



EPRI PlantView



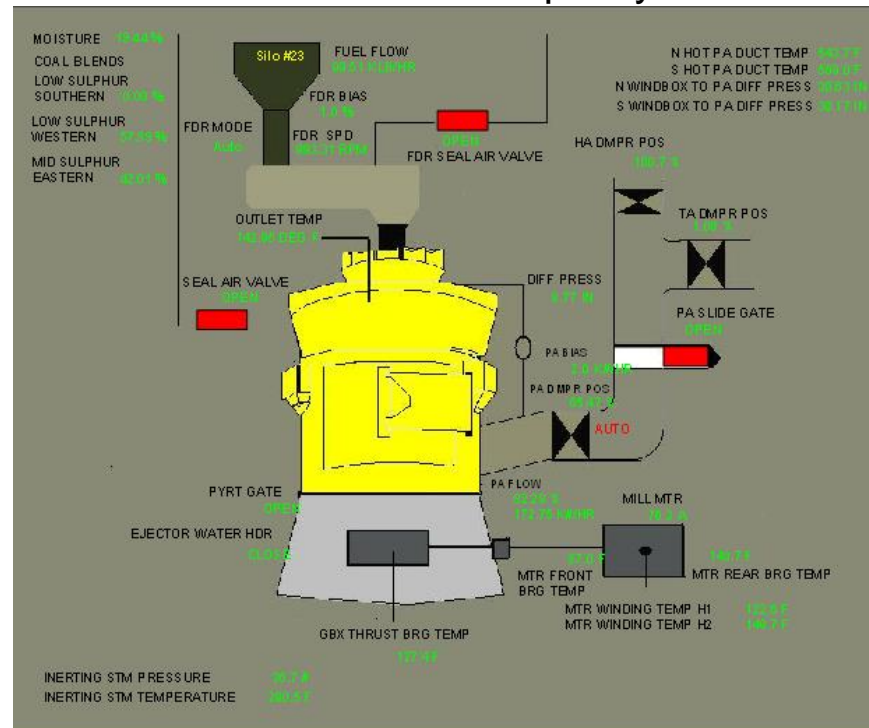
PI



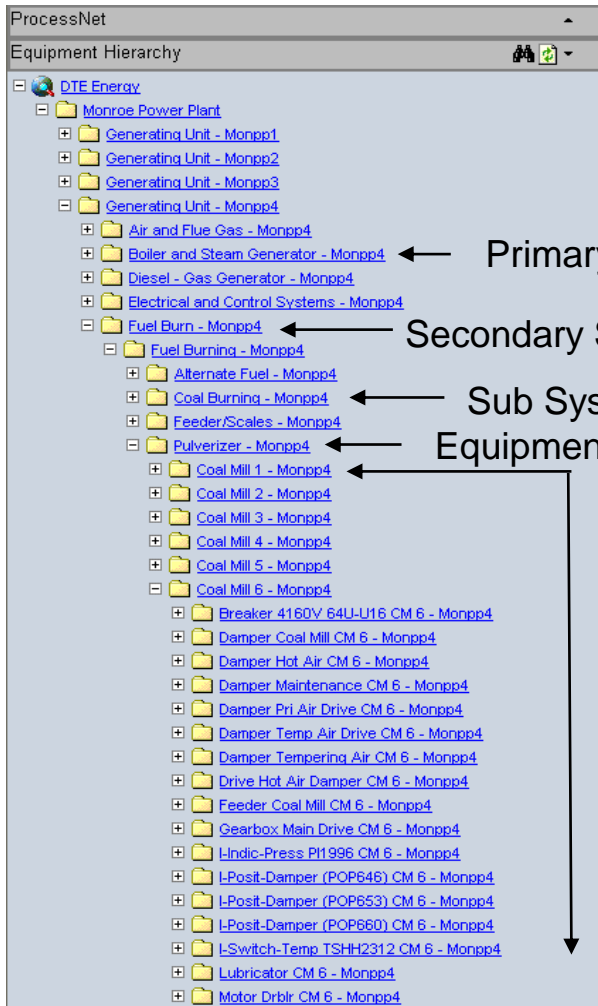
P3M



Equipment Monitoring

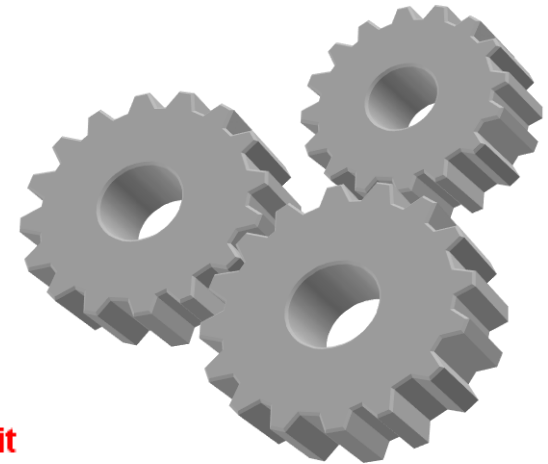


Common Thread- Equipment Hierarchy



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

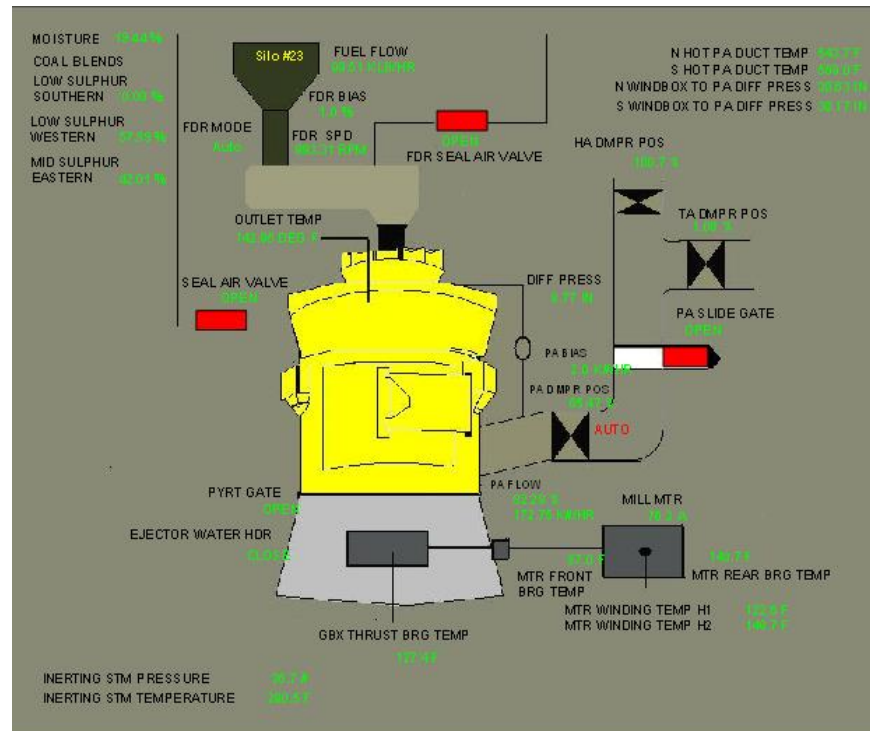
- Common Methodology
- Common Structure



EPRI PlantView

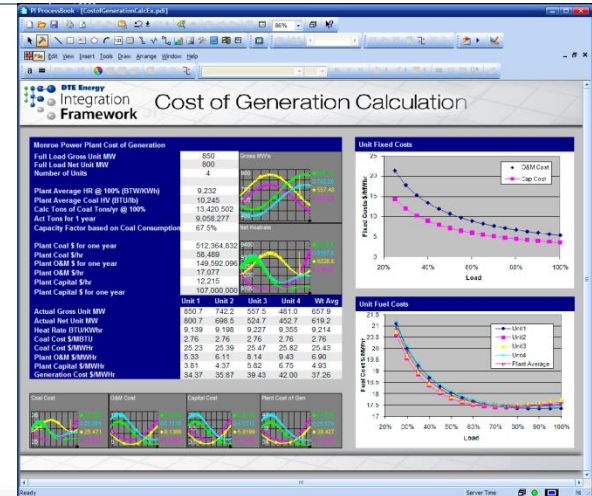


P3M



Integration between Process Controls & Business Systems to achieve Fleet Optimization.

Using OSIsoft's suite of applications as a foundation, DTE Energy has created a framework that integrates plant information to work management & financial management systems. This enables us to streamline business processes and drive decisions at the point of activity.



Business Challenge

Technology implementation over the last decade to achieve various business objectives has created an overload of data.

- How to convert this data in to information?
- How to deliver the right information to the right people at the right time?
- How to become proactive instead of reactive and then on the path to continuous improvement.

Solution

- Use a single platform (RT Portal) to deliver the information across the fleet.
- Acquire data and perform computations using Analysis Framework (AF) & ACE
- Implement a logical structure called Hierarchical System Index (HSI) on all data sources using AF / MDB

Customer Results / Benefits

- Ability to view KPI's for Plant / Unit / Equipment uniformly from disparate data sources.
- Comparative analysis of like equipment through out the fleet.
- Information tailored to the end-user based the job function and role.
- One stop and one source for all information.

Integration Framework



INPUTS

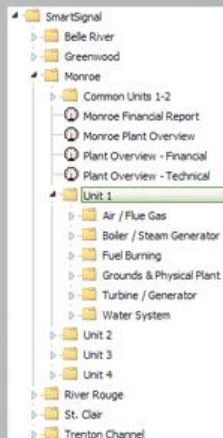
FIELD



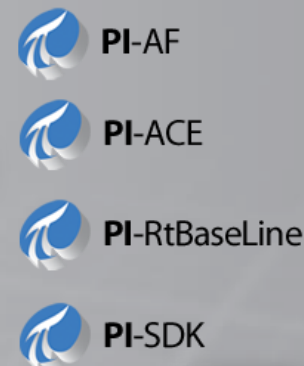
RDBMS



HSI



PROCESSING KPI'S

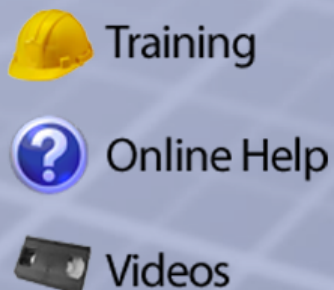


USER EXPERIENCE

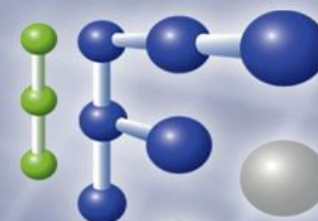
FRONT END



IMPLEMENTATION

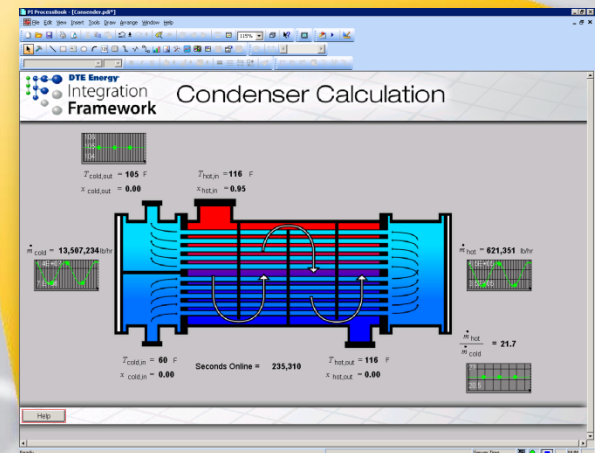
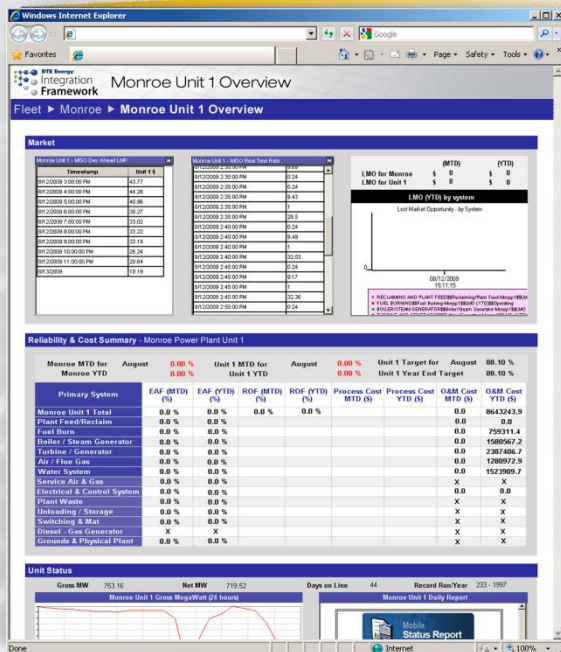
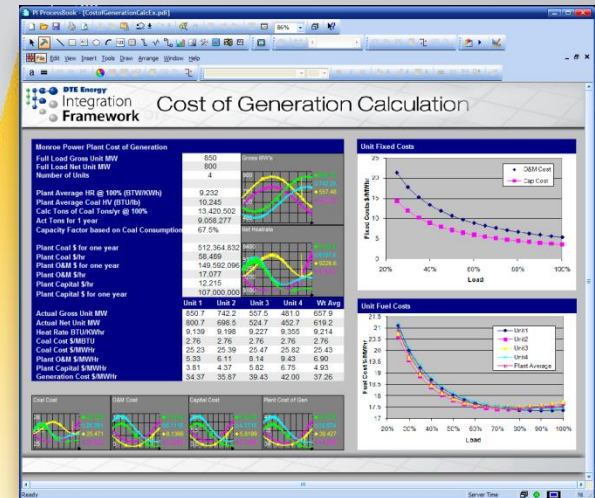
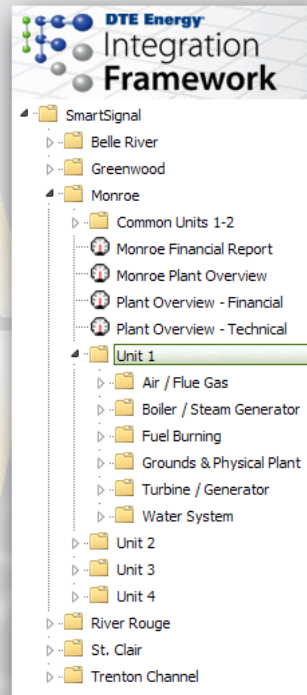
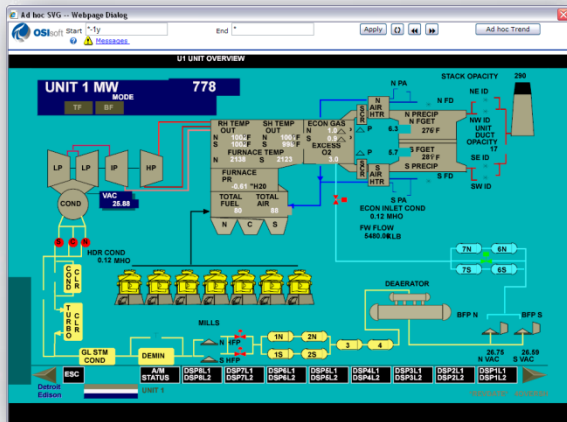


NOTIFICATIONS



DTE Energy
Integration
Framework

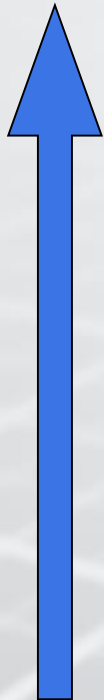
Integration Framework



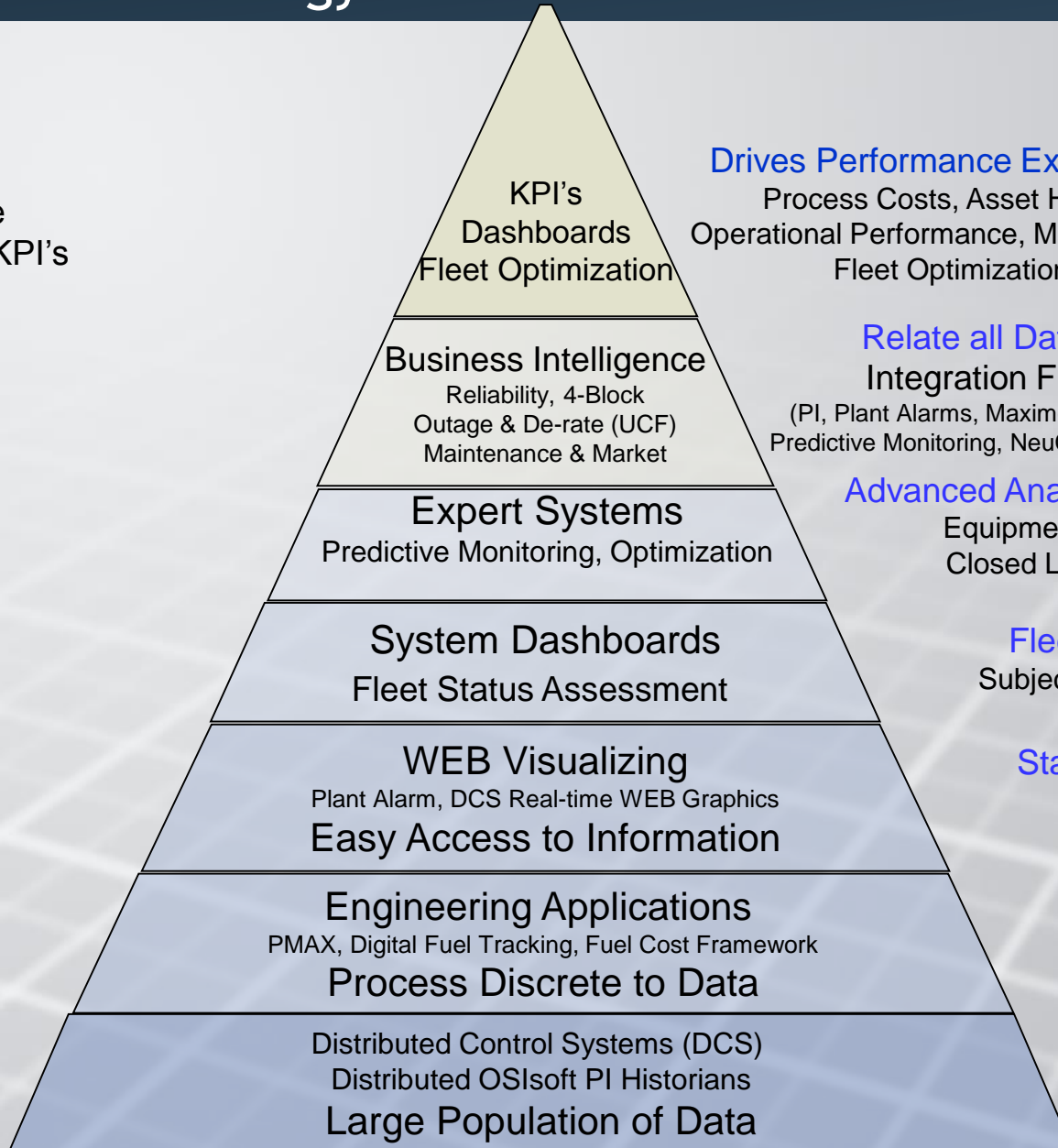
Control & Technology Framework



Actionable
Information – KPI's



Discrete data
Limited value



Drives Performance Excellence
Process Costs, Asset Health,
Operational Performance, Market Value,
Fleet Optimization

Relate all Data Sources
Integration Framework
(PI, Plant Alarms, Maximo, SAP, UCF, GADS,
Predictive Monitoring, NeuCo, LIMS, Plant View ..)

Advanced Analysis & Process Optimization
Equipment and Process Monitoring
Closed Loop Process Optimization

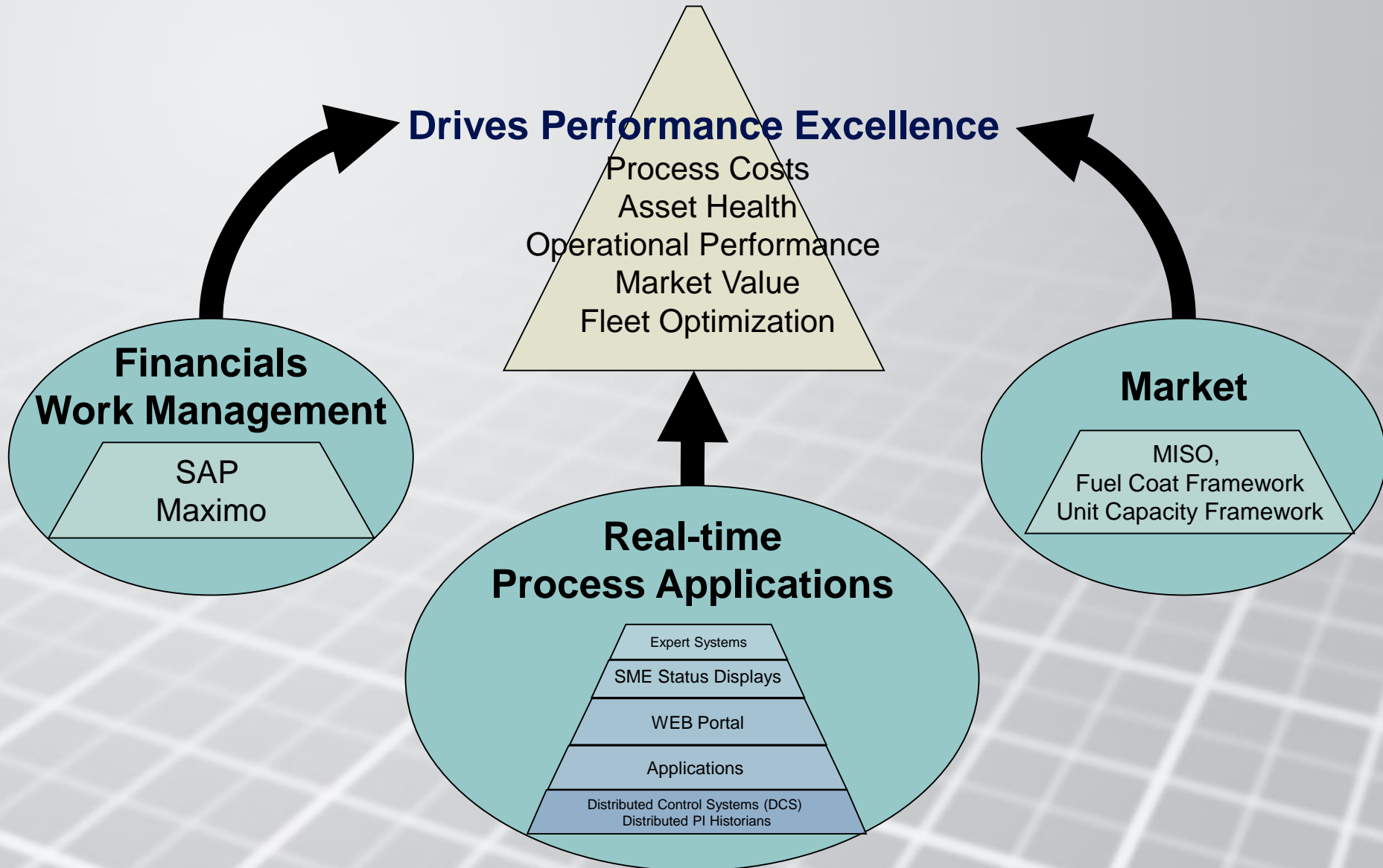
Fleet Drill down
Subject Matter Experts

Standard User Interface
WEB Visualization

Process Discrete Data
PMAx, DFTS, eNote,
Fuel Cost Framework,
Alarm Management

Post Event Analysis
DCS, PLC & PI

Total Fleet Management





Thank you

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