Regional Seminar Series

Detroit, Michigan, USA

Energy and Process Optimization

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SunChemical® a member of the DIC group

October 14, 2010

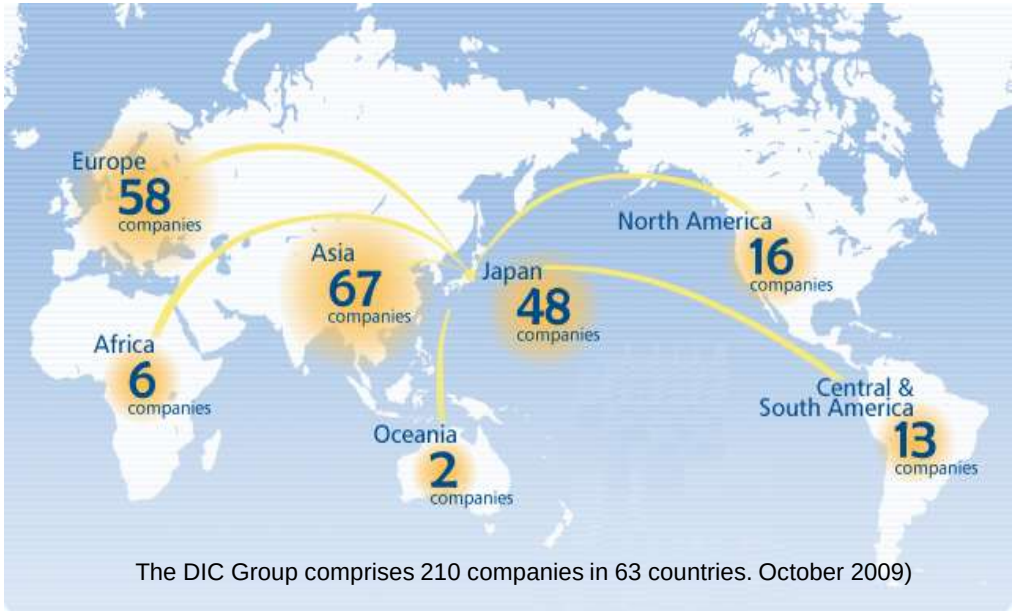
Empowering Business in Real-time.

About “Sun Chemical”

- Chemical Industry
- Sun Chemical is world's largest producer of printing inks and pigments.
- Leading provider of materials to
  - packaging
  - publication
  - coatings
  - plastics
  - cosmetics
  - and other industrial markets

About “Sun Chemical”

- Annual sales over $3.5 billion
- more than 10,000 employees
- > 210 locations in 63 countries



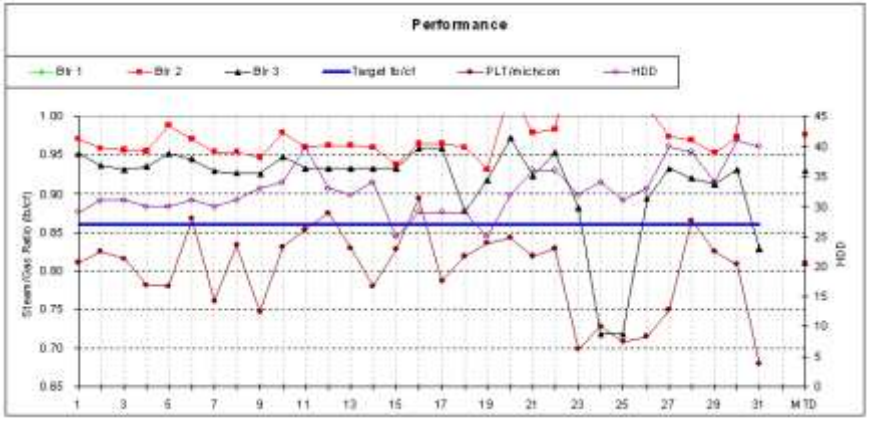
The DIC Group comprises 210 companies in 63 countries. October 2009)

Customer needs:

- improving performance
- improving reliability
- on time delivery
- consistent product quality

Business Challenge / Problem Addressed

Create an energy model for the plant that can be used for budgets and set baselines.



Tasks

- Use real time data for the model
  - Energy was measured weekly by manual meter readings.
  - Where and when is our energy used?
- Display and report energy usage
  - Create dashboards
  - Create reports
- Support Six Sigma energy projects
  - Analyze data for projects
  - Measure projects results (control plan)

Challenge / Problem Details

Map utility resources and measure automatically and/or set up a better way to manual entry the data.

Analyze data and verify.

Solution

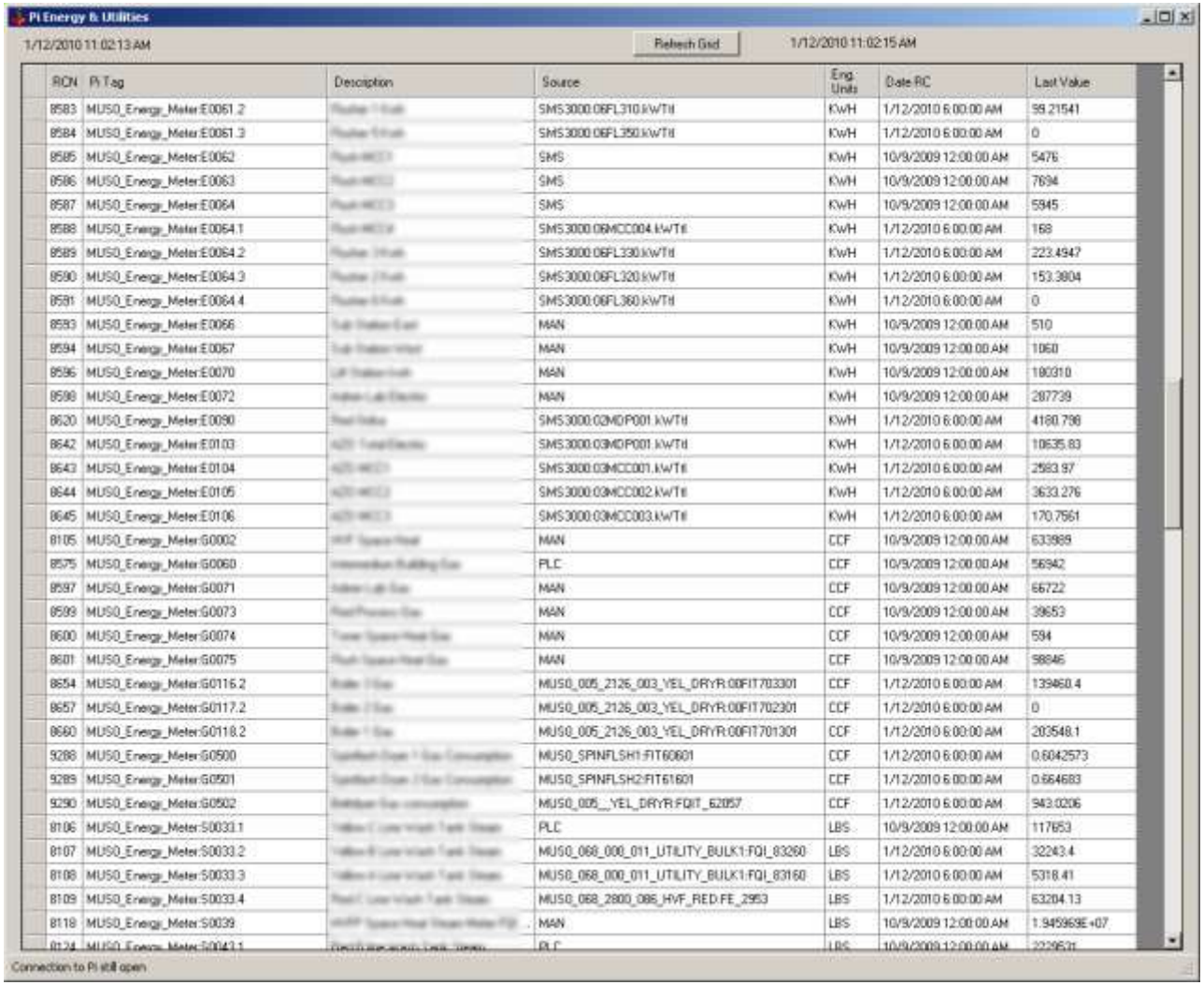
Utilities:

- Electricity: data from PowerLogic through SMS3000 OPC server to PI
- Gas: Flow meters in PI and manual readings
- Steam: boiler house steam production and flow meters in PI

  some manual meter readings
- Water: pump house and flow meters in PI

  more manual meter readings

In-house development



RCN	Pi Tag	Description	Source	Eng. Units	Date RC	Last Value
8583	MUSO_Energy_Meter:E0061.2		SMS3000:06FL310.kWTH	KWH	1/12/2010 6:00:00 AM	99.21541
8584	MUSO_Energy_Meter:E0061.3		SMS3000:06FL350.kWTH	KWH	1/12/2010 6:00:00 AM	0
8585	MUSO_Energy_Meter:E0062		SMS	KWH	10/9/2009 12:00:00 AM	5476
8586	MUSO_Energy_Meter:E0063		SMS	KWH	10/9/2009 12:00:00 AM	7694
8587	MUSO_Energy_Meter:E0064		SMS	KWH	10/9/2009 12:00:00 AM	5945
8588	MUSO_Energy_Meter:E0064.1		SMS3000:06MCC004.kWTH	KWH	1/12/2010 6:00:00 AM	168
8589	MUSO_Energy_Meter:E0064.2		SMS3000:06FL330.kWTH	KWH	1/12/2010 6:00:00 AM	223.4947
8590	MUSO_Energy_Meter:E0064.3		SMS3000:06FL320.kWTH	KWH	1/12/2010 6:00:00 AM	153.3804
8591	MUSO_Energy_Meter:E0064.4		SMS3000:06FL360.kWTH	KWH	1/12/2010 6:00:00 AM	0
8593	MUSO_Energy_Meter:E0066		MAN	KWH	10/9/2009 12:00:00 AM	510
8594	MUSO_Energy_Meter:E0067		MAN	KWH	10/9/2009 12:00:00 AM	1060
8596	MUSO_Energy_Meter:E0070		MAN	KWH	10/9/2009 12:00:00 AM	180310
8598	MUSO_Energy_Meter:E0072		MAN	KWH	10/9/2009 12:00:00 AM	287739
8620	MUSO_Energy_Meter:E0090		SMS3000:02MDP001.kWTH	KWH	1/12/2010 6:00:00 AM	4180.798
8642	MUSO_Energy_Meter:E0103		SMS3000:03MDP001.kWTH	KWH	1/12/2010 6:00:00 AM	10635.83
8643	MUSO_Energy_Meter:E0104		SMS3000:03MCC001.kWTH	KWH	1/12/2010 6:00:00 AM	2583.97
8644	MUSO_Energy_Meter:E0105		SMS3000:03MCC002.kWTH	KWH	1/12/2010 6:00:00 AM	3633.276
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8597	MUSO_Energy_Meter:G0071		MAN	CCF	10/9/2009 12:00:00 AM	66722
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8106	MUSO_Energy_Meter:S0033.1		PLC	LBS	10/9/2009 12:00:00 AM	117653
8107	MUSO_Energy_Meter:S0033.2		MUSO_068_000_011_UTILITY_BULK1:FQI_83260	LBS	1/12/2010 6:00:00 AM	32243.4
8108	MUSO_Energy_Meter:S0033.3		MUSO_068_000_011_UTILITY_BULK1:FQI_83160	LBS	1/12/2010 6:00:00 AM	5318.41
8109	MUSO_Energy_Meter:S0033.4		MUSO_068_2800_086_HVF_RED:FE_2953	LBS	1/12/2010 6:00:00 AM	63204.13
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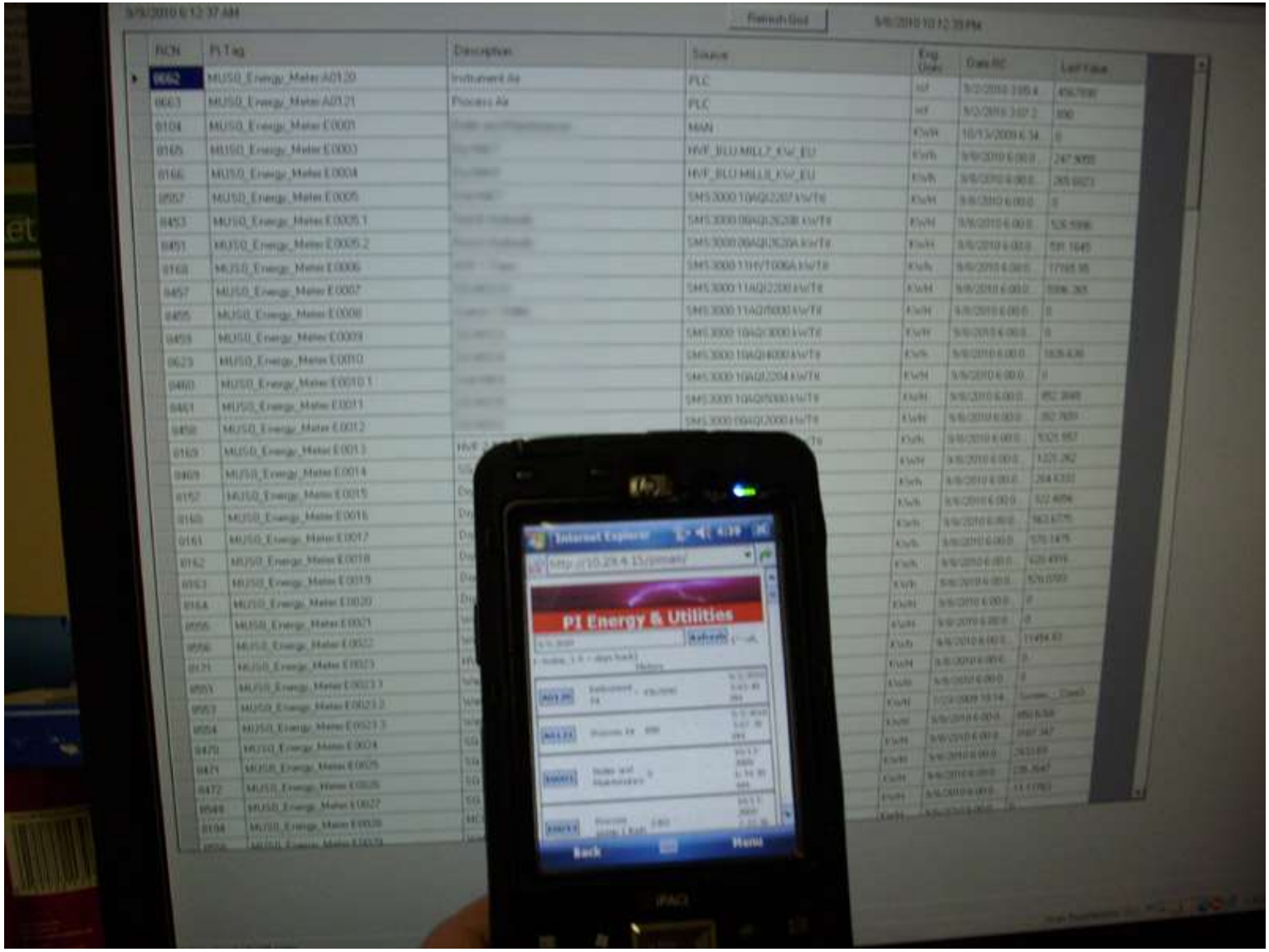
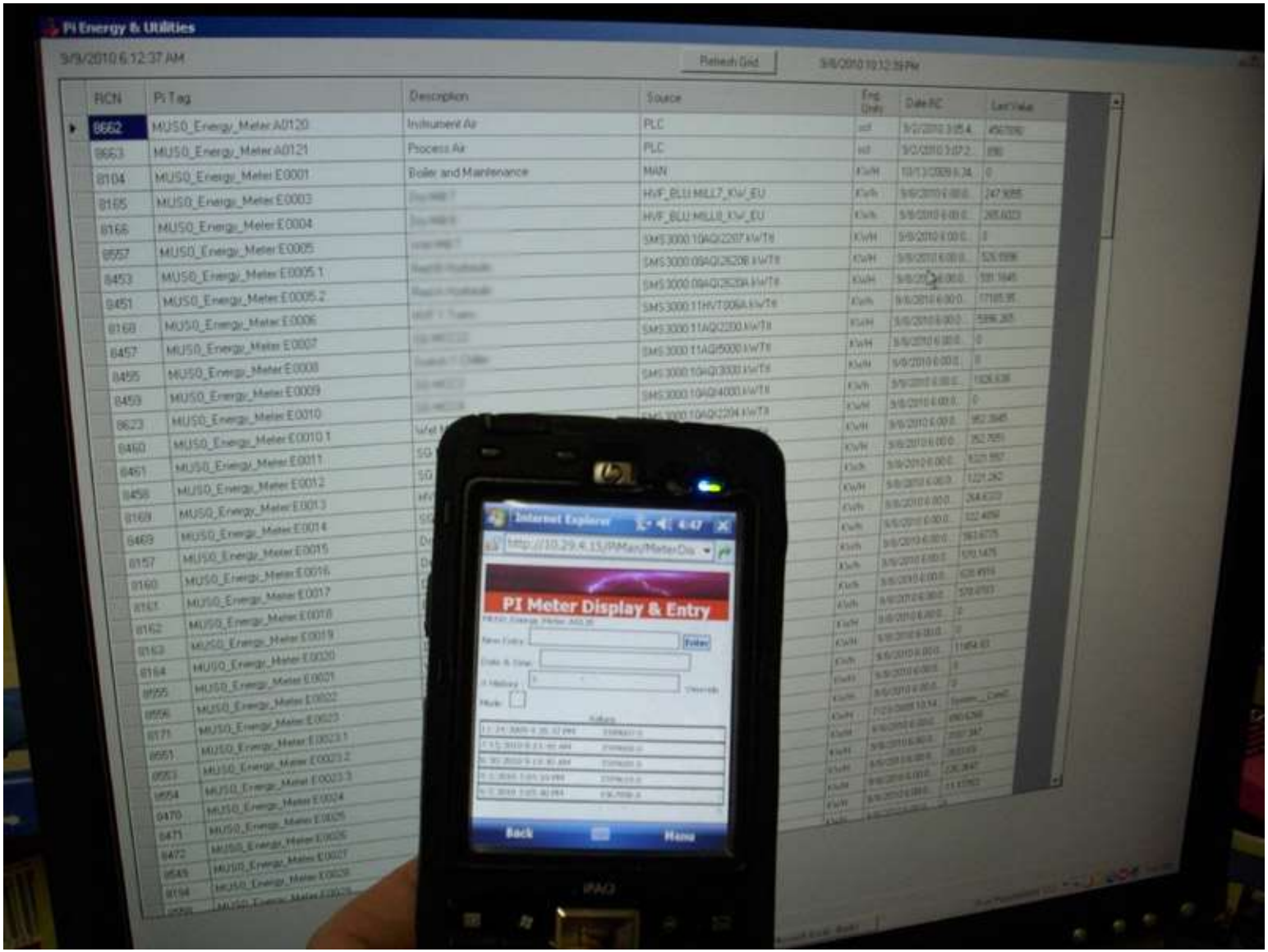


Empowering Business in Real-time.



Empowering Business in Real-time.

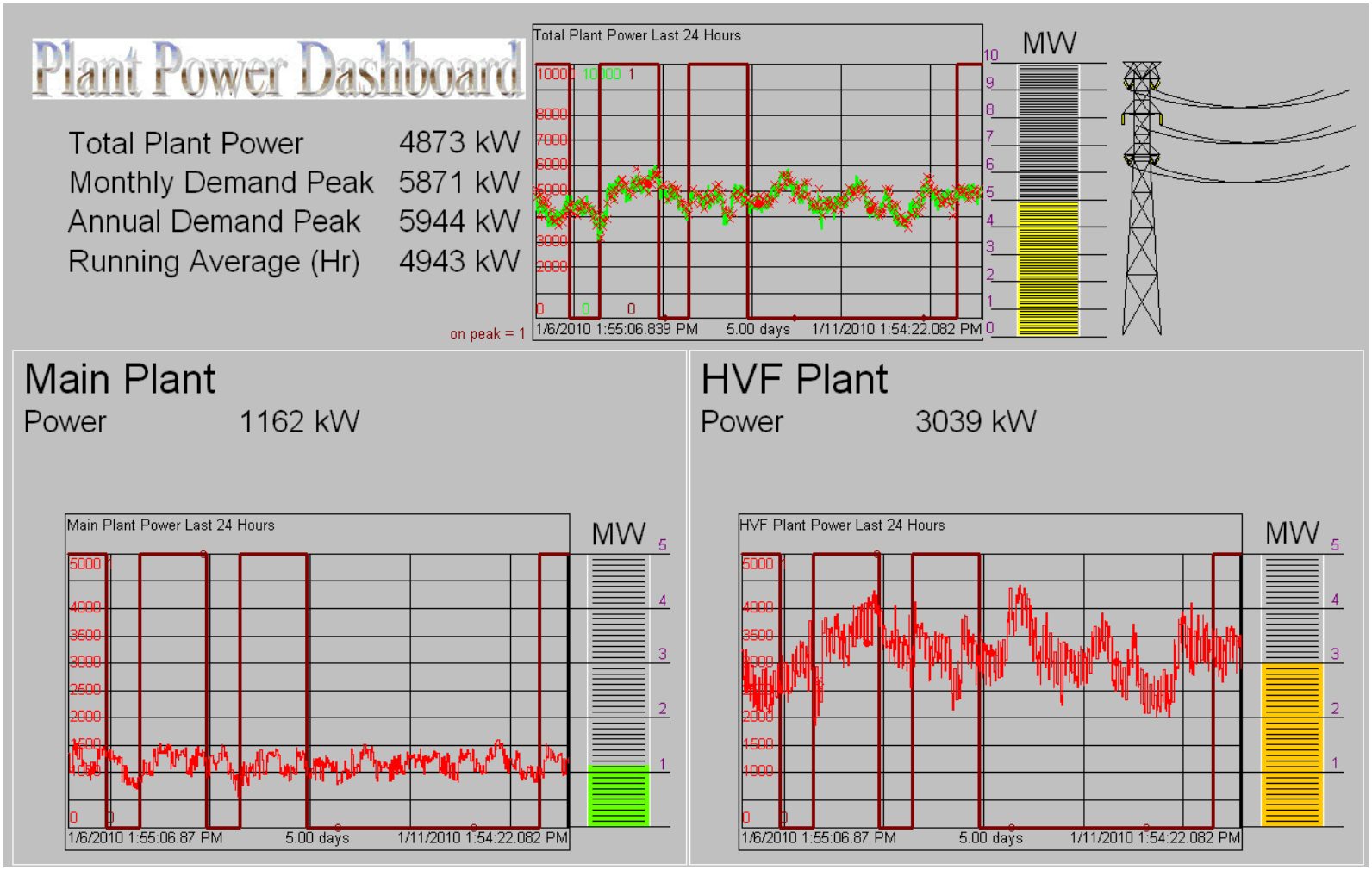
Electricity

A dashboard that reflects how electricity is billed.

- A contracted usage for the site: 4 Mega Watts peak demand.
- Peak hours from 7 am to 11 pm on weekdays.
- A monthly and annual demand peak based upon 15 minutes and hourly averages and calculations.

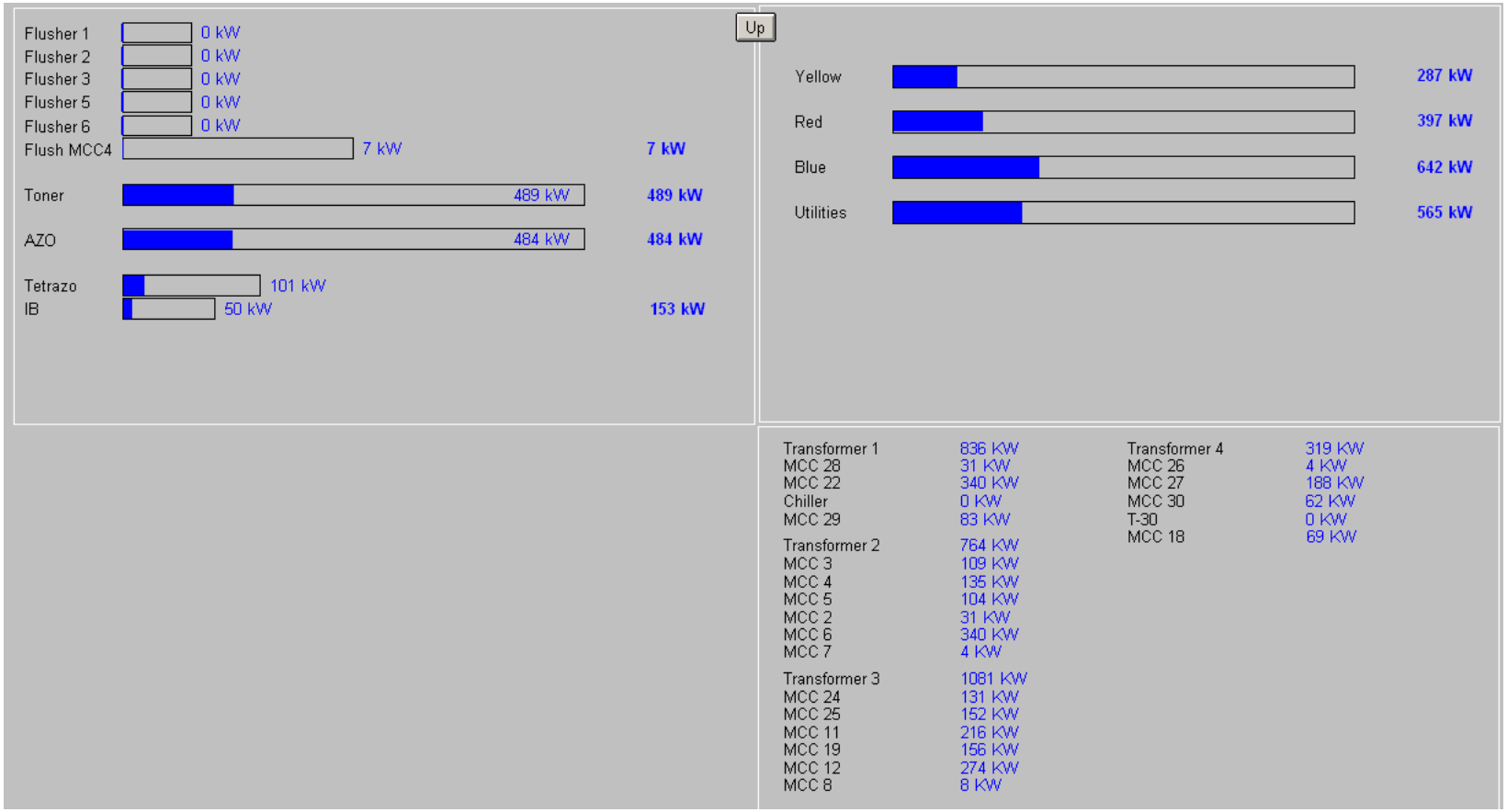
Power dashboard

Real time data on the power dashboard in PI Processbook



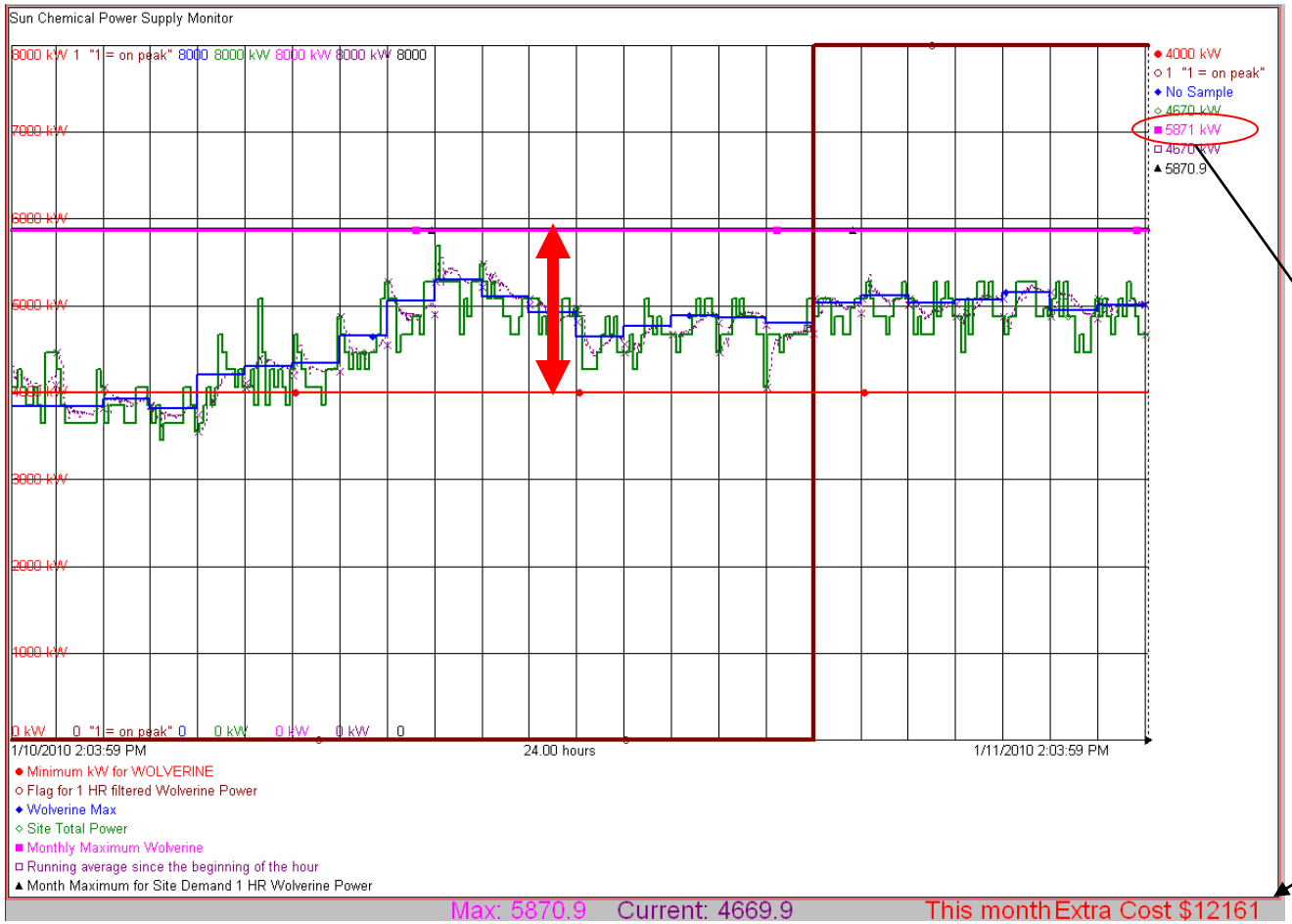
Plant usages

Break down of the plant usages by department or entity.



Real time monitoring

Real time energy monitor calculates extra cost



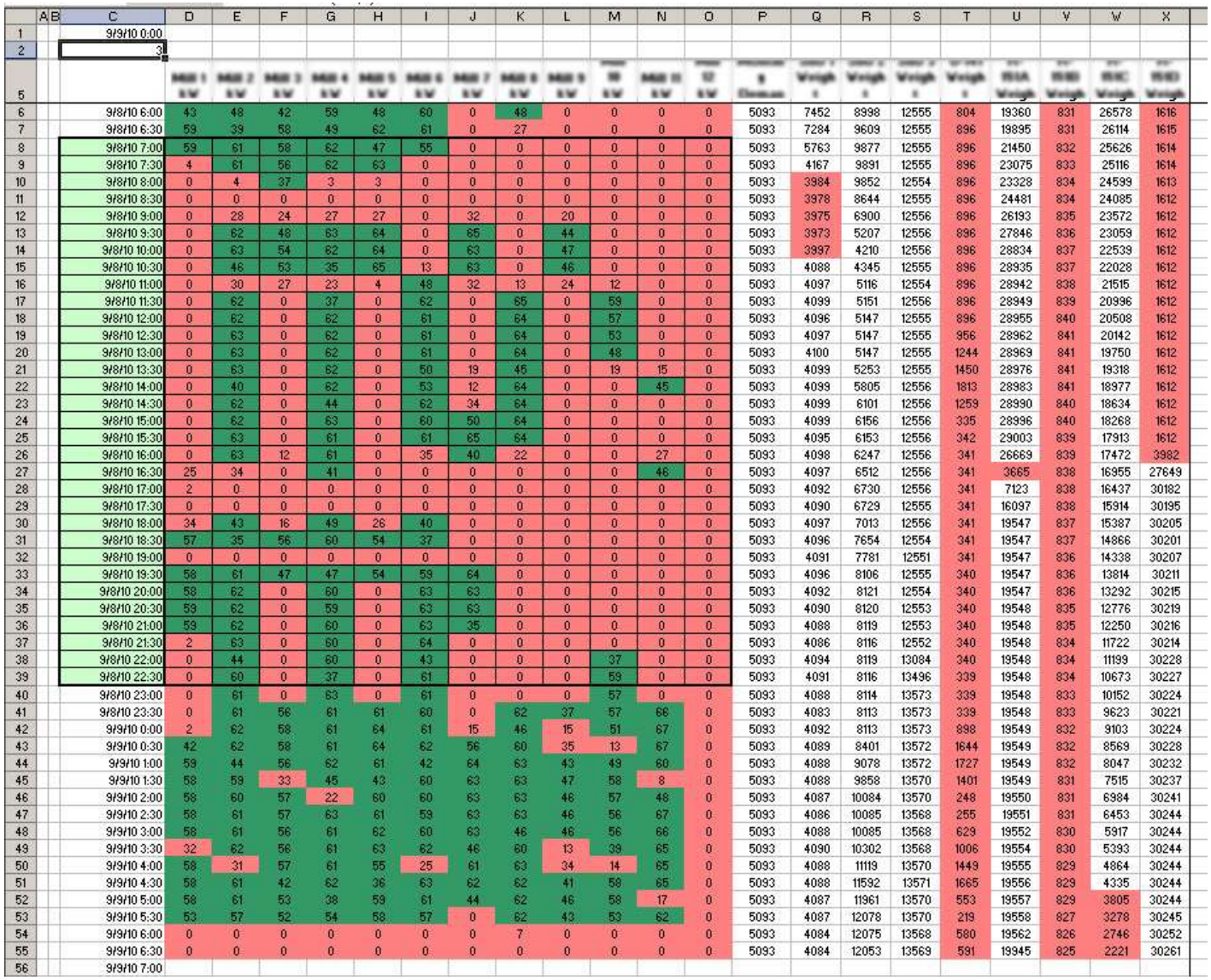
5871 kW

-4000 kW

1871 kW

$6.50

$12,161



	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1	9/9/10 0:00																					
2	3																					
5		[illegible] kW	[illegible] kW	[illegible] kW	[illegible] kW	[illegible] kW	[illegible] kW	[illegible] kW	[illegible] kW	[illegible] kW	[illegible] kW	[illegible] kW	[illegible] kW	[illegible]	[illegible] Weigh t	[illegible] Weigh t	[illegible] Weigh t	[illegible] Weigh t	[illegible] Weigh	[illegible] Weigh	[illegible] Weigh	[illegible] Weigh
6	9/8/10 6:00	43	48	42	59	48	60	0	48	0	0	0	0	5093	7452	8998	12555	804	19360	831	26578	1616
7	9/8/10 6:30	59	39	58	49	62	61	0	27	0	0	0	0	5093	7284	9609	12555	896	19895	831	26114	1615
8	9/8/10 7:00	59	61	58	62	47	55	0	0	0	0	0	0	5093	5763	9877	12555	896	21450	832	25626	1614
9	9/8/10 7:30	4	61	56	62	63	0	0	0	0	0	0	0	5093	4167	9891	12555	896	23075	833	25116	1614
10	9/8/10 8:00	0	4	37	3	3	0	0	0	0	0	0	0	5093	3984	9852	12554	896	23328	834	24599	1613
11	9/8/10 8:30	0	0	0	0	0	0	0	0	0	0	0	0	5093	3978	8644	12555	896	24481	834	24085	1612
12	9/8/10 9:00	0	28	24	27	27	0	32	0	20	0	0	0	5093	3975	6900	12556	896	26193	835	23572	1612
13	9/8/10 9:30	0	62	48	63	64	0	65	0	44	0	0	0	5093	3973	5207	12556	896	27846	836	23059	1612
14	9/8/10 10:00	0	63	54	62	64	0	63	0	47	0	0	0	5093	3997	4210	12556	896	28834	837	22539	1612
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16	9/8/10 11:00	0	30	27	23	4	48	32	13	24	12	0	0	5093	4097	5116	12554	896	28942	838	21515	1612
17	9/8/10 11:30	0	62	0	37	0	62	0	65	0	59	0	0	5093	4099	5151	12556	896	28949	839	20996	1612
18	9/8/10 12:00	0	62	0	62	0	61	0	64	0	57	0	0	5093	4096	5147	12555	896	28955	840	20508	1612
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22	9/8/10 14:00	0	40	0	62	0	53	12	64	0	0	45	0	5093	4099	5805	12556	1813	28983	841	18977	1612
23	9/8/10 14:30	0	62	0	44	0	62	34	64	0	0	0	0	5093	4099	6101	12556	1259	28990	840	18634	1612
24	9/8/10 15:00	0	62	0	63	0	60	50	64	0	0	0	0	5093	4099	6156	12556	335	28996	840	18268	1612
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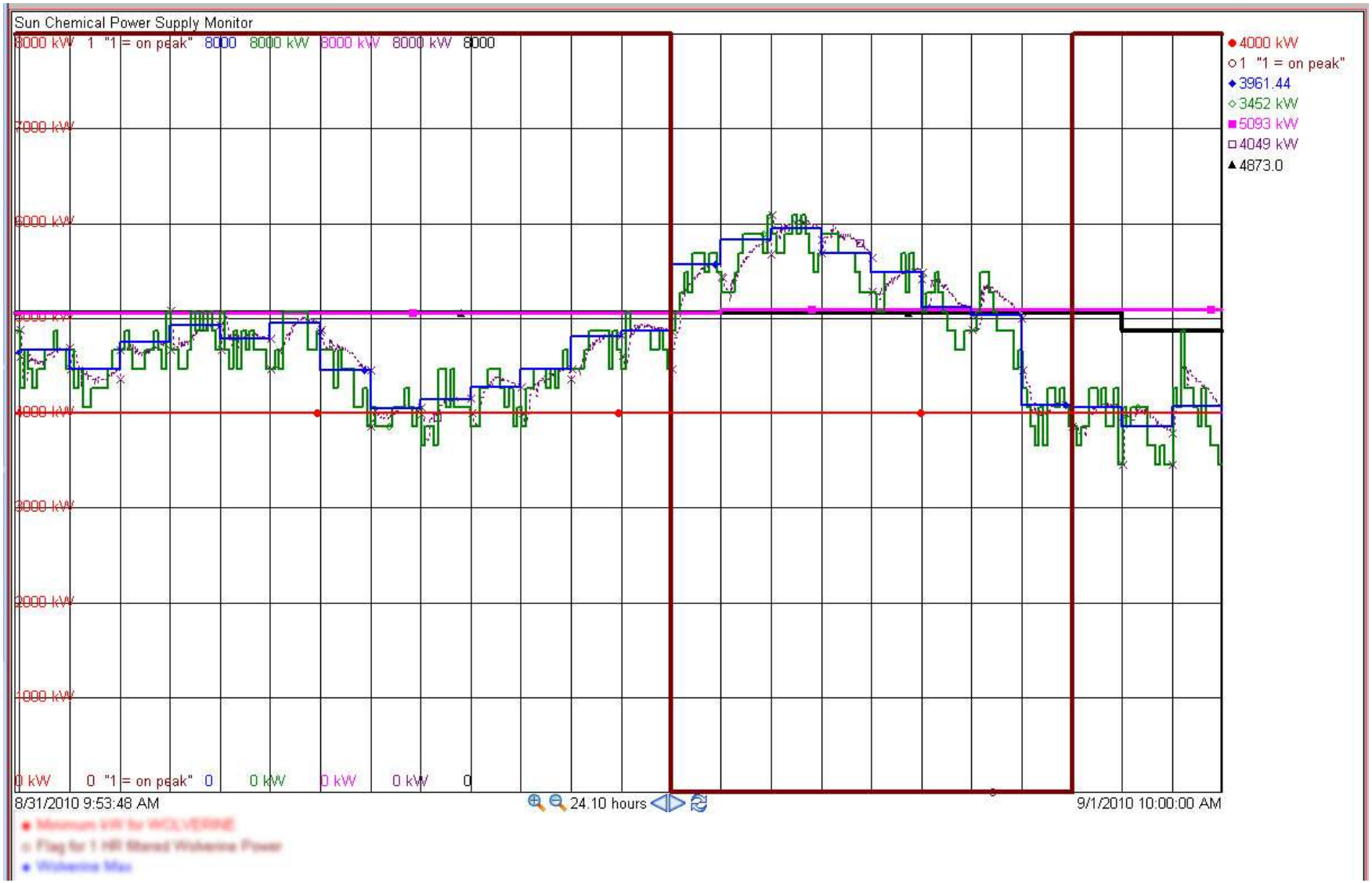
55	9/9/10 6:30	0	0	0	0	0	0	0	0	0	0	0	0	5093	4084	12053	13569	591	19945	825	2221	30261
56	9/9/10 7:00																					



Empowering Business in Real-time.

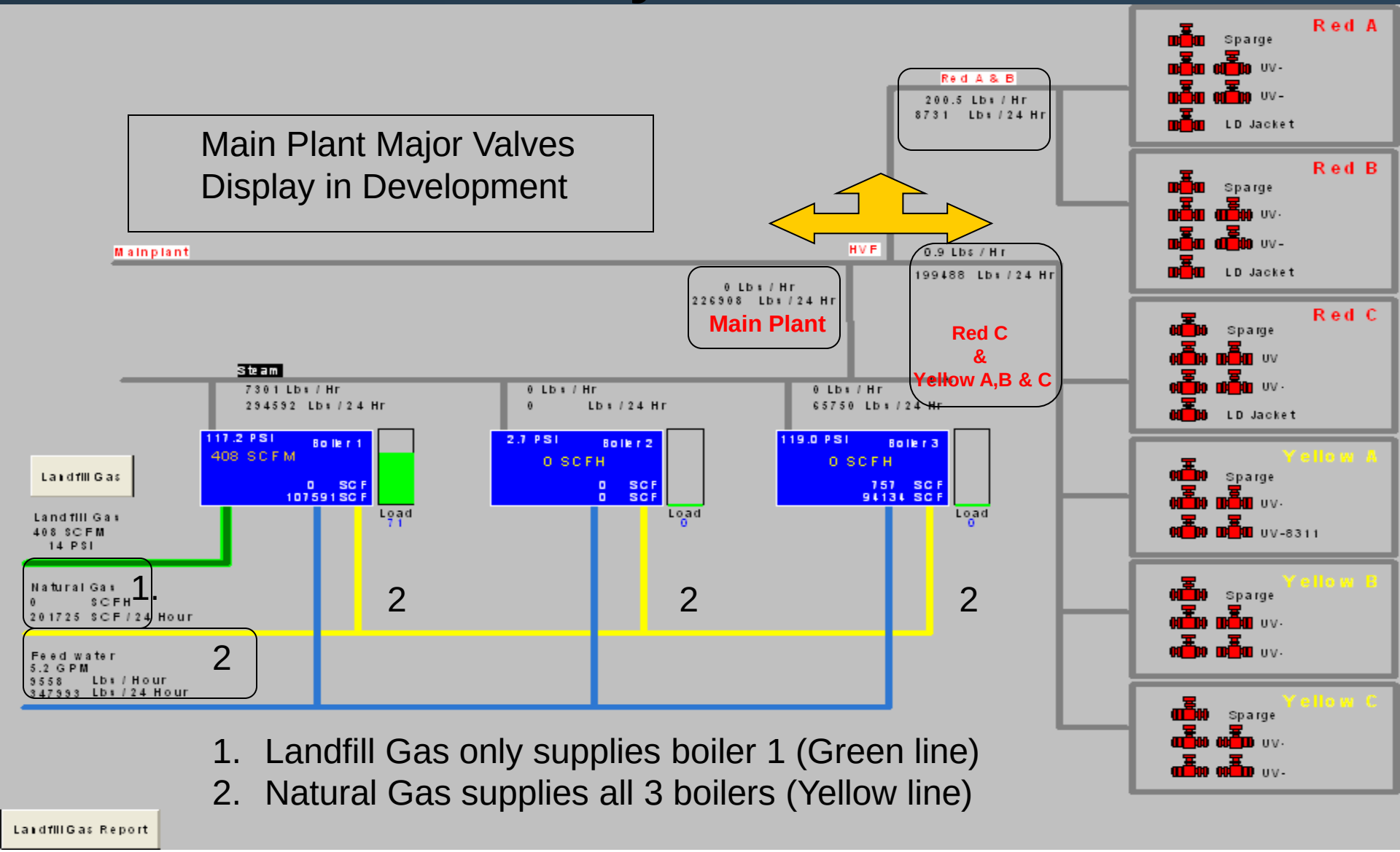
Gas

New project : landfill gas in the area available.

PI data was used to calculate how much gas we used and how much we could replace with landfill gas to save money.

- Landfill gas not used by our neighbor would be available to Sun Chemical.
- Savings in cheaper gas and no transportation costs.
- 1 Boiler was converted to consume landfill gas.

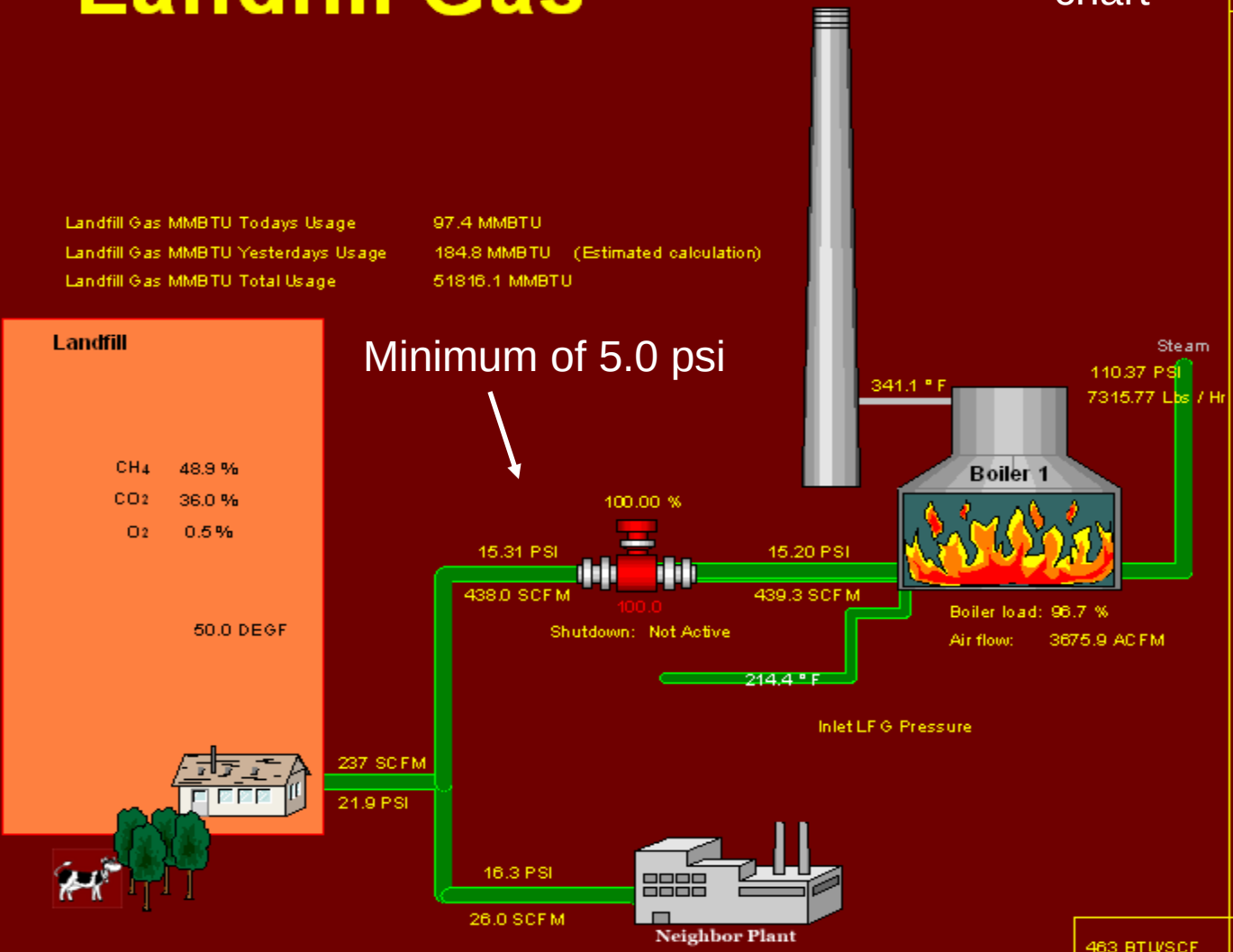
Overview of Steam System



Landfill Gas

Daily usage chart

Landfill Gas MMBTU Todays Usage 97.4 MMBTU
Landfill Gas MMBTU Yesterdays Usage 184.8 MMBTU (Estimated calculation)
Landfill Gas MMBTU Total Usage 51816.1 MMBTU



October	2009		
	Landfill gas	Landfill gas counter	Natural gas
1	371198 SCF	50817 MMBTU	104000 SCF
2	366868 SCF	50994 MMBTU	118159 SCF
3	515699 SCF	51159 MMBTU	0 SCF
4	273774 SCF	51462 MMBTU	0 SCF
5	396239 SCF	51543 MMBTU	47830 SCF
6	419033 SCF	51707 MMBTU	122511 SCF
7			
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463 BTU/SCF	Total 2,114,850 SCF	990 MMBTU	330,273 SCF

Improvements realized

Optimizing boiler house operations:

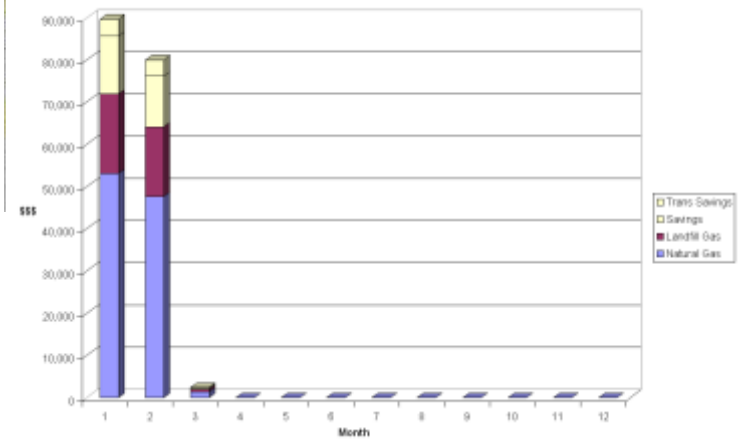
- Major steam leaks were identified and repaired.
- Boiler 2 was shutdown.
- Reduced pressure on boiler 3 to minimize natural gas usage.
- Increased the allowable steam header pressure on boiler 1 to maximize landfill gas.
- Requested a 2 psi pressure increase from the county.
- Increased allowable load on the landfill gas boiler from 60% to 80% to maximize usage of landfill gas.
- Adjusted controls on boiler 1 to keep boiler running during low landfill gas conditions.

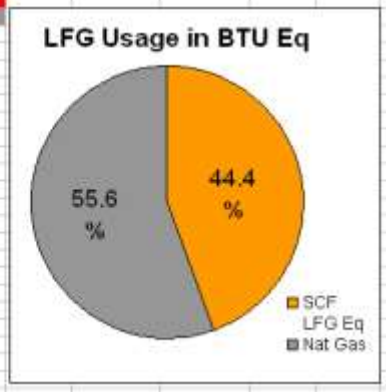
Gas: savings report

Landfill gas — Year 2010

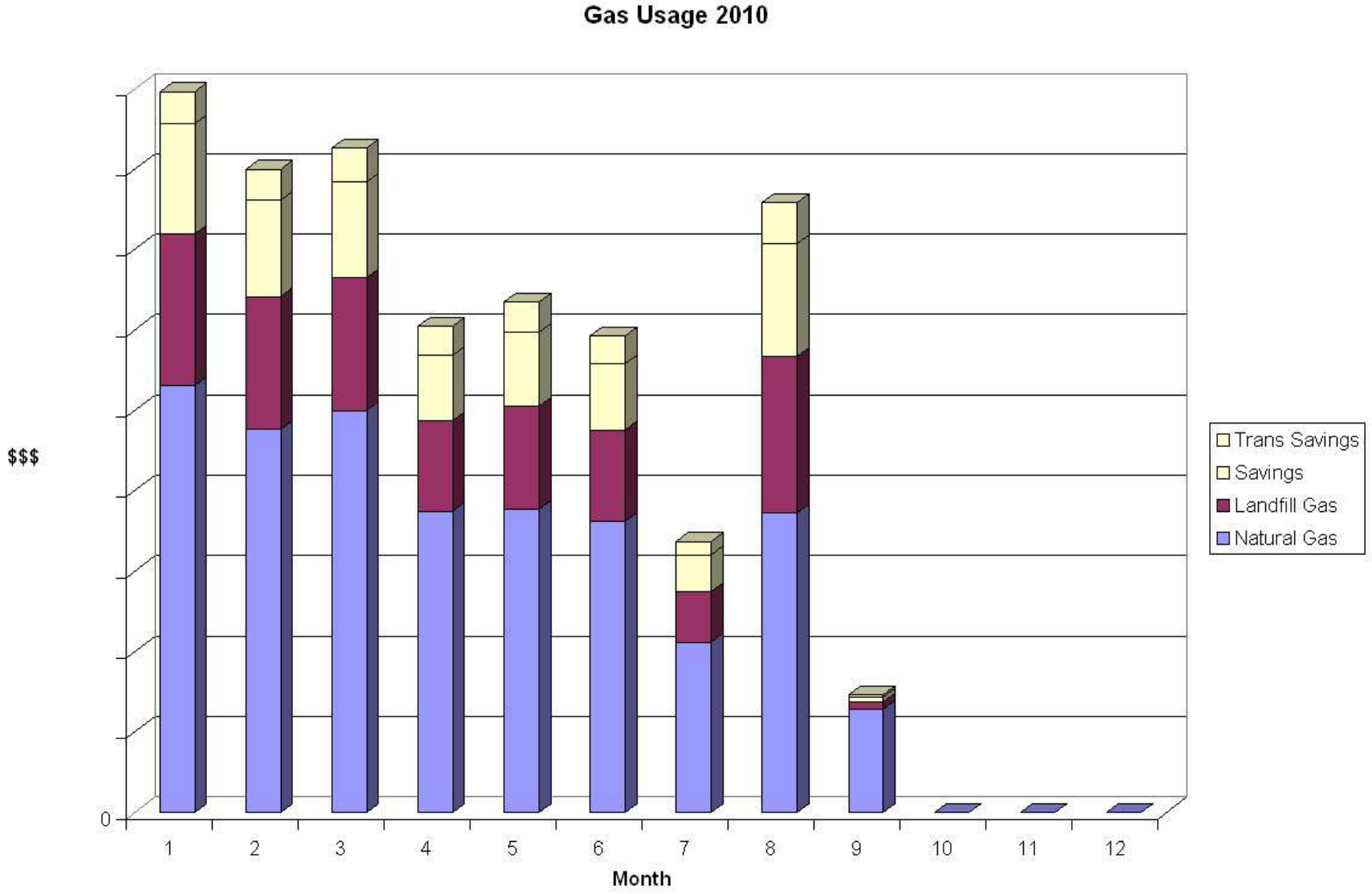
		January	February	March	April	May	June	July	August	September	October	November	December	Totals		
	Nymex	5.814	5.274	4.816												
Boiler 1	SCF LFG	11818068	13106100	425785	0	0	0	0	0	0	0	0	0	25349952	25349952	61.5%
Boiler 1	MMBTU	5597	5409	191	0	0	0	0	0	0	0	0	0	11196		
Boiler 1	Nat Gas	4364818	4572937	148414	0	0	0	0	0	0	0	0	0	9086230	15883580	38.5%
Boiler 2	Nat Gas	50	0	0	0	0	0	0	0	0	0	0	0	50		
Boiler 3	Nat Gas	3546331	3159639	91330	0	0	0	0	0	0	0	0	0	6797300		
Boiler 1 Eq	% LFG	57.5%	58.9%	58.9%										SCF LFG Eq	12674975.98	44.4%
All BTU Eq	% LFG	42.6%	45.9%	47.0%										Nat Gas	15883580	55.6%
	Nymex 2009	6.126	4.476	4.099	3.831	3.321	3.538	3.949	3.379	2.842	3.73	4.288	4.486			
	Nat Gas $$$	53,087	47,601	1,363	0	0	0	0	0	0	0	0	0		102,051	
	Landfill $$$	18,872	16,545	533	0	0	0	0	0	0	0	0	0		35,950	
	Total Gas $$$	71,960	64,146	1,896	0	0	0	0	0	0	0	0	0		138,001	138,001
	Saving $$$	13,666	11,981	386	0	0	0	0	0	0	0	0	0		26,033	
	T Savings $$$	4030	3894	137	0	0	0	0	0	0	0	0	0		8,061	34,094
	Monthly Savings	17696	15875	523	0	0	0	0	0	0	0	0	0			
	YTD Savings	17696	33571	34094	34094	34094	34094	34094	34094	34094	34094	34094	34094			

	Boiler 1 SCF LFG	Boiler 1 Ctr MMBTU	Boiler 1 Nat Gas	Boiler 2 Nat Gas	Boiler 3 Nat Gas	Projected Saving	LFG MMBTU	Totals for the month SCF LFG	Ctr MMBTU	Boiler 1 Nat Gas	Boiler 2 Nat Gas	Boiler 3 Nat Gas
1/1/2010	107485	2024	87776	0	7599	-139.46	53					
1/2/2010	109956	2076	66797	0	5126	-233.91	54					
1/3/2010	115260	2130	86905	0	5588	-230.08	58					
1/4/2010	171952	2188	65673	0	8180	-109.74	82					
1/5/2010	345241	2270	66739	0	64469	-25.95	166					
1/6/2010	415921	2436	160942	0	94619	4.39	196					
1/7/2010	434911	2633	114658	0	108619	15.61	208					





Empowering Business in Real-time.



Steam

Steam is measured when produced in the boiler house and some reports (for one department) exist that calculate the usage of steam per batch.

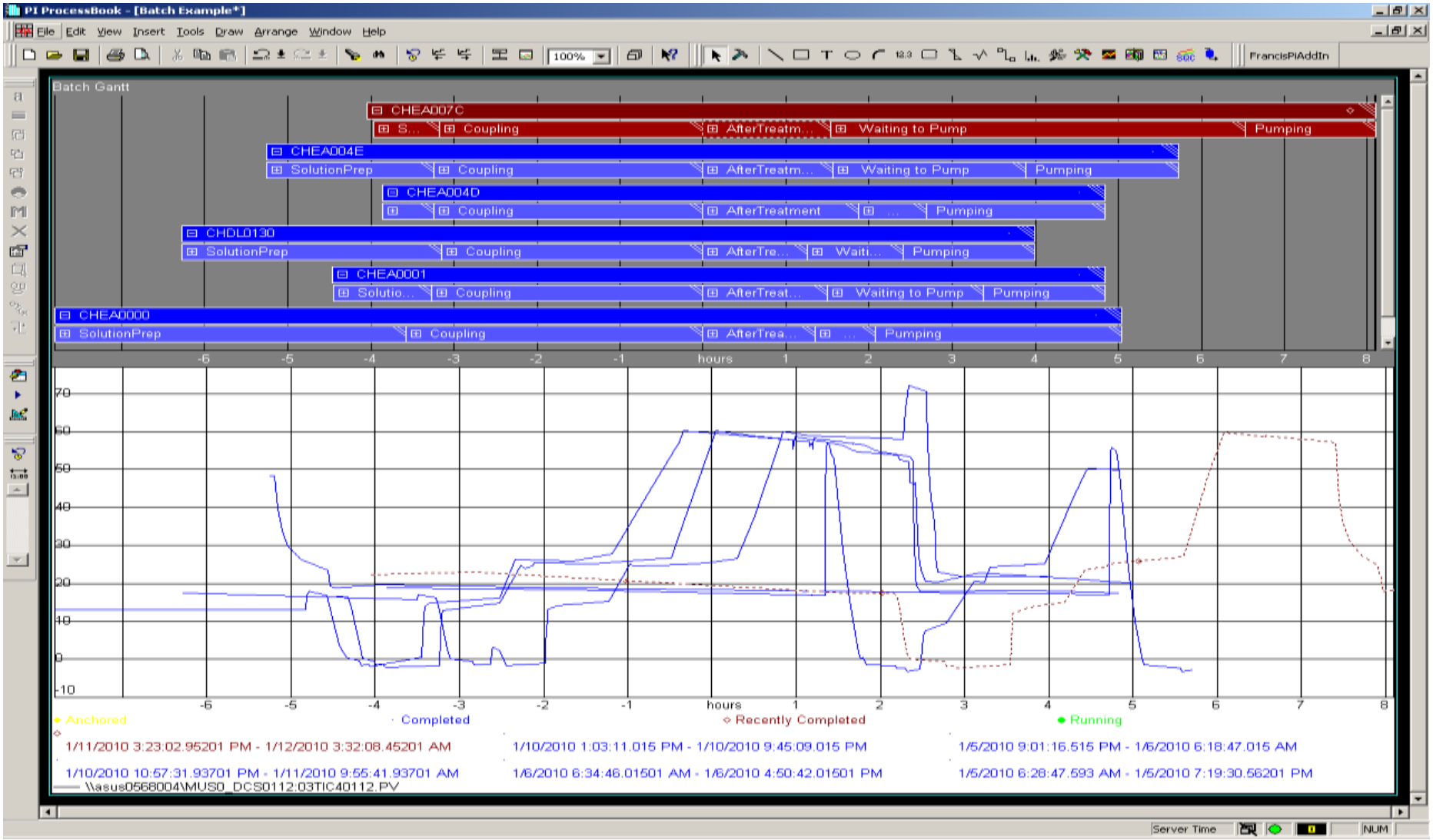
Using less steam can be accomplished by:

- Fixing steam leaks
- Knowledge of the process and reduce usage.

Steam

- Process Optimization is key to save more.
- Better scheduling by improving FPY and cycle times.
- Higher FPY by removing variation and waste.
- High quality and happy customers

Batch View and Trends

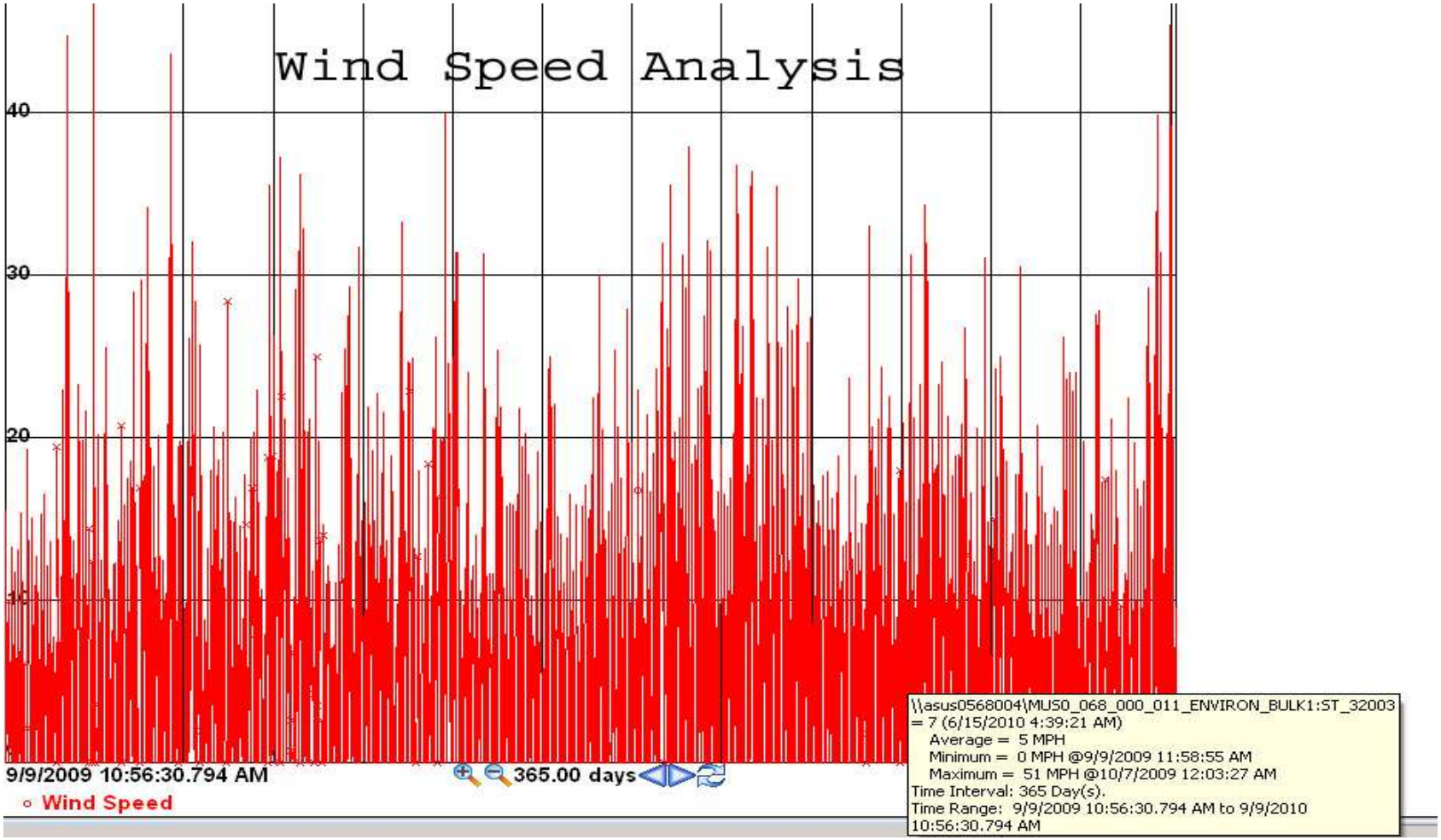


Empowering Business in Real-time.

What's next?

- Continued improvements in strike department
  - Detailed custom templates for specific codes
  - Process Capability improvements
- Next process?
  - More departments are waiting.
  - Our High Volume Plant
- Other uses
  - Mechanical Integrity / Calibration Analysis
  - Energy consumption
  - HSE alarming

Green future?



OSIsoft Software and Services

- PI System with 15000 tags
- Using PI Processbook, Batch Generator and BatchView, DataLink, PI Manual Logger, SQC, PISDK, PIOLEDB, PIODBC

PI System Architecture

- Two separate control networks:
  - Mainplant controls:
    - DCS communicating = OPC to PI
    - Fix32 SCADA nodes
  - High Volume controls:
    - Fix32 SCADA nodes
    - SMS3000 OPC = Power Logic

Tangible Benefits

- FPY improvement
  - Goal for 2009 was to improve 20% on FPY
    - 2008 FPY was 96.27%
    - Goal for 2009 was 97.02%
    - Result was 97.25% or improvement of 26.14% !

Tangible/Intangible Benefits

What does this mean?

- 0.98% higher FPY
- Example: If 20 million pounds are made this is 196,000 pounds more FPY
- Example: If the cost would be for example $1 per pound this would be $196K (considering non FPY is waste) or $0.3 rework cost per pound would be $58.8K

Thank you

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Section Title

Title