



Regional Seminar Series Detroit, Michigan, USA



Energy and Process Optimization

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Sun Chemical Corporation

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Empowering Business in Real-time.

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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



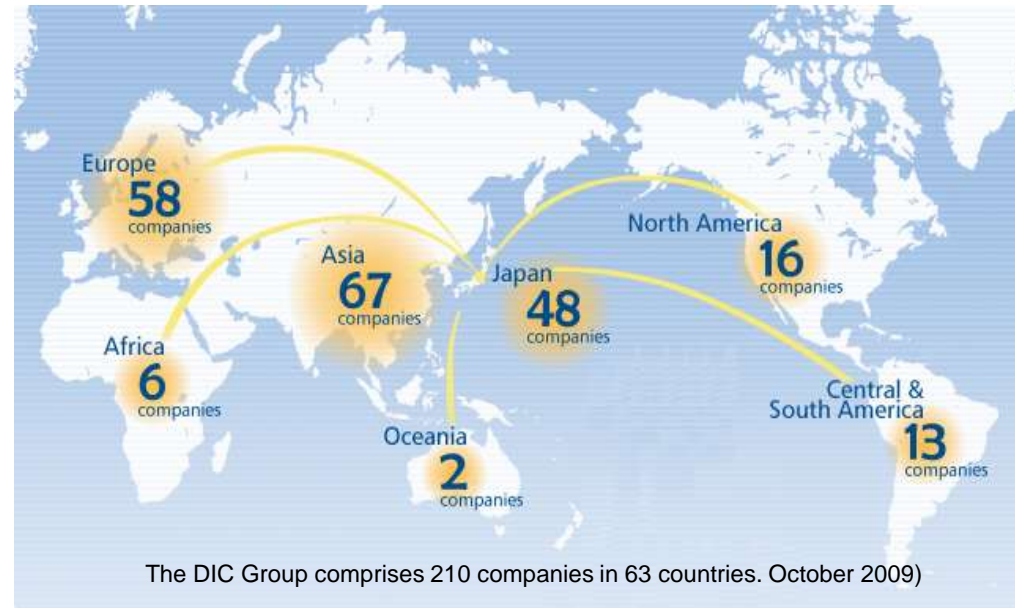
About “Sun Chemical”



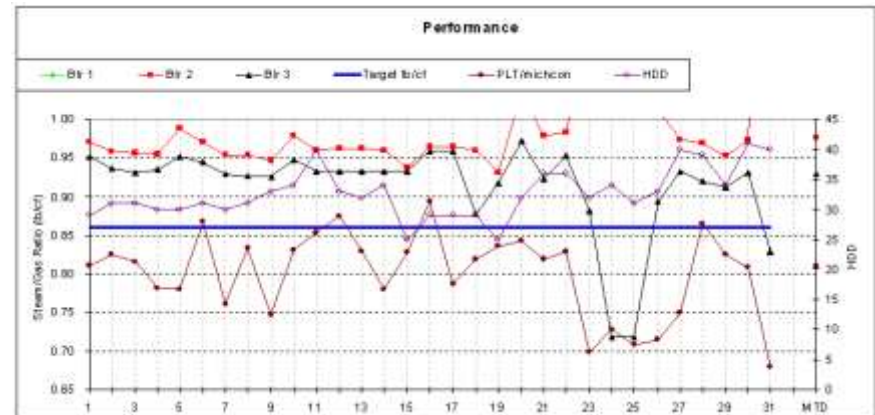
- Annual sales over \$3.5 billion
- more than 10,000 employees
- > 210 locations in 63 countries

Customer needs:

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



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



- 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)

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

Analyze data and verify.

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



PI Energy & Utilities

1/12/2010 11:02:13 AM Refresh Grid 1/12/2010 11:02:15 AM

RCON	PI Tag	Description	Source	Eng. Units	Date RC	Last Value
9583	MUSO_Energy_Meter:E0061.2	Reactor 1 Fuel	SMS3000.06FL310.kWTH	KwH	1/12/2010 6:00:00 AM	99.21541
9584	MUSO_Energy_Meter:E0061.3	Reactor 1 Fuel	SMS3000.06FL350.kWTH	KwH	1/12/2010 6:00:00 AM	0
9585	MUSO_Energy_Meter:E0062	Reactor 2 Fuel	SMS	KwH	10/9/2009 12:00:00 AM	5476
9586	MUSO_Energy_Meter:E0063	Reactor 2 Fuel	SMS	KwH	10/9/2009 12:00:00 AM	7694
9587	MUSO_Energy_Meter:E0064	Reactor 2 Fuel	SMS	KwH	10/9/2009 12:00:00 AM	5945
9588	MUSO_Energy_Meter:E0064.1	Reactor 2 Fuel	SMS3000.06MCC004.kWTH	KwH	1/12/2010 6:00:00 AM	169
9589	MUSO_Energy_Meter:E0064.2	Reactor 2 Fuel	SMS3000.06FL330.kWTH	KwH	1/12/2010 6:00:00 AM	223.4947
9590	MUSO_Energy_Meter:E0064.3	Reactor 2 Fuel	SMS3000.06FL320.kWTH	KwH	1/12/2010 6:00:00 AM	153.3804
9591	MUSO_Energy_Meter:E0064.4	Reactor 2 Fuel	SMS3000.06FL360.kWTH	KwH	1/12/2010 6:00:00 AM	0
9593	MUSO_Energy_Meter:E0066	Full Station Fuel	MAN	KwH	10/9/2009 12:00:00 AM	510
9594	MUSO_Energy_Meter:E0067	Full Station Fuel	MAN	KwH	10/9/2009 12:00:00 AM	1060
9596	MUSO_Energy_Meter:E0070	Full Station Fuel	MAN	KwH	10/9/2009 12:00:00 AM	190310
9598	MUSO_Energy_Meter:E0072	Reactor 1 Fuel	MAN	KwH	10/9/2009 12:00:00 AM	287739
9620	MUSO_Energy_Meter:E0090	Reactor 1 Fuel	SMS3000.03MDP001.kWTH	KwH	1/12/2010 6:00:00 AM	4160.798
9642	MUSO_Energy_Meter:E0103	Reactor 1 Fuel	SMS3000.03MDP001.kWTH	KwH	1/12/2010 6:00:00 AM	10635.83
9643	MUSO_Energy_Meter:E0104	Reactor 1 Fuel	SMS3000.03MCC001.kWTH	KwH	1/12/2010 6:00:00 AM	2593.97
9644	MUSO_Energy_Meter:E0105	Reactor 1 Fuel	SMS3000.03MCC002.kWTH	KwH	1/12/2010 6:00:00 AM	3633.276
9645	MUSO_Energy_Meter:E0106	Reactor 1 Fuel	SMS3000.03MCC003.kWTH	KwH	1/12/2010 6:00:00 AM	170.7561
9105	MUSO_Energy_Meter:G0002	Reactor 1 Fuel	MAN	CCF	10/9/2009 12:00:00 AM	633989
9575	MUSO_Energy_Meter:G0060	Reactor 1 Fuel	PLC	CCF	10/9/2009 12:00:00 AM	56342
9597	MUSO_Energy_Meter:G0071	Reactor 1 Fuel	MAN	CCF	10/9/2009 12:00:00 AM	66722
9599	MUSO_Energy_Meter:G0073	Reactor 1 Fuel	MAN	CCF	10/9/2009 12:00:00 AM	39653
9600	MUSO_Energy_Meter:G0074	Reactor 1 Fuel	MAN	CCF	10/9/2009 12:00:00 AM	594
9601	MUSO_Energy_Meter:G0075	Reactor 1 Fuel	MAN	CCF	10/9/2009 12:00:00 AM	98946
9654	MUSO_Energy_Meter:G0116.2	Reactor 1 Fuel	MUSO_005_2126_003_YEL_DRYR.D0F1703301	CCF	1/12/2010 6:00:00 AM	139460.4
9657	MUSO_Energy_Meter:G0117.2	Reactor 1 Fuel	MUSO_005_2126_003_YEL_DRYR.D0F1702301	CCF	1/12/2010 6:00:00 AM	0
9660	MUSO_Energy_Meter:G0118.2	Reactor 1 Fuel	MUSO_005_2126_003_YEL_DRYR.D0F1701301	CCF	1/12/2010 6:00:00 AM	203548.1
9288	MUSO_Energy_Meter:G0500	Reactor 1 Fuel	MUSO_SPINFLSH1.FIT60601	CCF	1/12/2010 6:00:00 AM	0.6042573
9289	MUSO_Energy_Meter:G0501	Reactor 1 Fuel	MUSO_SPINFLSH2.FIT61601	CCF	1/12/2010 6:00:00 AM	0.664683
9290	MUSO_Energy_Meter:G0502	Reactor 1 Fuel	MUSO_005_YEL_DRYR.D0F1702057	CCF	1/12/2010 6:00:00 AM	543.0206
9106	MUSO_Energy_Meter:G0033.1	Reactor 1 Fuel	PLC	LBS	10/9/2009 12:00:00 AM	117653
9107	MUSO_Energy_Meter:G0033.2	Reactor 1 Fuel	MUSO_068_000_011_UTILITY_BULK1.FQ1.83260	LBS	1/12/2010 6:00:00 AM	32243.4
9108	MUSO_Energy_Meter:G0033.3	Reactor 1 Fuel	MUSO_068_000_011_UTILITY_BULK1.FQ1.83160	LBS	1/12/2010 6:00:00 AM	5318.41
9109	MUSO_Energy_Meter:G0033.4	Reactor 1 Fuel	MUSO_068_2800_006_HVF_RED.FE_2953	LBS	1/12/2010 6:00:00 AM	63204.13
9118	MUSO_Energy_Meter:G0039	Reactor 1 Fuel	MAN	LBS	10/9/2009 12:00:00 AM	1.945969E+07
9124	MUSO_Energy_Meter:G0142.1	Reactor 1 Fuel	PLC	LBS	10/9/2009 12:00:00 AM	2229531

Connection to PI still open

3/9/2010 6:12:37 AM Refresh Data 3/9/2010 10:12:35 PM

PCN	PS Tag	Description	Source	Eng Unit	Units	Last Value
0062	MUSO_Energy_Meter A0120	Instrument Air	PLC	kg	5/2/2010 1:05:4	4567000
0063	MUSO_Energy_Meter A0121	Process Air	PLC	kg	5/2/2010 1:07:2	890
0104	MUSO_Energy_Meter E0001	Water	MAN	Kwh	10/13/2009 6:34	0
0165	MUSO_Energy_Meter E0003	Water	WVF_BLD MLL2_KW_EU	Kwh	3/9/2010 6:00:0	247.9000
0166	MUSO_Energy_Meter E0004	Water	WVF_BLD MLL3_KW_EU	Kwh	3/9/2010 6:00:0	265.0023
0257	MUSO_Energy_Meter E0005	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	0
0453	MUSO_Energy_Meter E0005.1	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	525.5596
0453	MUSO_Energy_Meter E0005.2	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	591.1645
0168	MUSO_Energy_Meter E0006	Water	SMS3000 T1HVT000A Kw/Ts	Kwh	3/9/2010 6:00:0	17705.95
0457	MUSO_Energy_Meter E0007	Water	SMS3000 T1A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	5906.305
0455	MUSO_Energy_Meter E0008	Water	SMS3000 T1A02000 Kw/Ts	Kwh	3/9/2010 6:00:0	0
0458	MUSO_Energy_Meter E0009	Water	SMS3000 T0A02300 Kw/Ts	Kwh	3/9/2010 6:00:0	0
0623	MUSO_Energy_Meter E0010	Water	SMS3000 T0A02400 Kw/Ts	Kwh	3/9/2010 6:00:0	1835.430
0460	MUSO_Energy_Meter E0010.1	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	0
0461	MUSO_Energy_Meter E0011	Water	SMS3000 T0A02500 Kw/Ts	Kwh	3/9/2010 6:00:0	852.3045
0459	MUSO_Energy_Meter E0012	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	862.7020
0169	MUSO_Energy_Meter E0013	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	9325.957
0469	MUSO_Energy_Meter E0014	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	1221.262
0157	MUSO_Energy_Meter E0015	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	204.9330
0160	MUSO_Energy_Meter E0016	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	122.4094
0161	MUSO_Energy_Meter E0017	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	570.1475
0162	MUSO_Energy_Meter E0018	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	620.4995
0163	MUSO_Energy_Meter E0019	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	570.0700
0164	MUSO_Energy_Meter E0020	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	0
0056	MUSO_Energy_Meter E0021	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	0
0056	MUSO_Energy_Meter E0022	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	11494.63
0171	MUSO_Energy_Meter E0023	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	0
0051	MUSO_Energy_Meter E0023.1	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	0
0053	MUSO_Energy_Meter E0023.2	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	0
0054	MUSO_Energy_Meter E0023.3	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	0
0470	MUSO_Energy_Meter E0024	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	0
0471	MUSO_Energy_Meter E0025	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	0
0472	MUSO_Energy_Meter E0026	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	0
0048	MUSO_Energy_Meter E0027	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	0
0104	MUSO_Energy_Meter E0028	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	0
0050	MUSO_Energy_Meter E0029	Water	SMS3000 T0A02200 Kw/Ts	Kwh	3/9/2010 6:00:0	0

PI Energy & Utilities

9/9/2010 6:12:37 AM

Refresh Grid

9/9/2010 10:12:36 PM

RCN	PI Tag	Description	Source	Eng. Unit	Date RC	Last Value
8662	MUSO_Energy_Meter A0120	Inherent Air	PLC	wt	9/2/2010 3:05:4	450.000
8663	MUSO_Energy_Meter A0121	Process Air	PLC	wt	9/2/2010 3:07:2	890
8104	MUSO_Energy_Meter E0001	Boiler and Maintenance	MAN	KWh	10/13/2009 6:34	0
8165	MUSO_Energy_Meter E0003	Boiler #1	HVF_BLL1MILL7_KWh_EU	KWh	9/9/2010 6:00:0	247.905
8166	MUSO_Energy_Meter E0004	Boiler #2	HVF_BLL1MILL8_KWh_EU	KWh	9/9/2010 6:00:0	285.633
8557	MUSO_Energy_Meter E0005	Boiler #3	SMS3000 11AQ12207 kWTH	KWh	9/9/2010 6:00:0	0
8453	MUSO_Energy_Meter E0005.1	Boiler #1 Inlet	SMS3000 09AQ126208 kWTH	KWh	9/9/2010 6:00:0	525.898
8451	MUSO_Energy_Meter E0005.2	Boiler #1 Inlet	SMS3000 11HV73006A kWTH	KWh	9/9/2010 6:00:0	591.1845
8168	MUSO_Energy_Meter E0006	Boiler #1 Inlet	SMS3000 11AQ12200 kWTH	KWh	9/9/2010 6:00:0	5396.303
8457	MUSO_Energy_Meter E0007	Boiler #1 Inlet	SMS3000 11AQ15000 kWTH	KWh	9/9/2010 6:00:0	0
8455	MUSO_Energy_Meter E0008	Boiler #1 Inlet	SMS3000 10AQ13000 kWTH	KWh	9/9/2010 6:00:0	0
8453	MUSO_Energy_Meter E0009	Boiler #1 Inlet	SMS3000 10AQ14000 kWTH	KWh	9/9/2010 6:00:0	0
8623	MUSO_Energy_Meter E0010	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	952.3645
8460	MUSO_Energy_Meter E0010.1	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	352.7551
8451	MUSO_Energy_Meter E0011	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	8201.957
8458	MUSO_Energy_Meter E0012	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	1221.282
8169	MUSO_Energy_Meter E0013	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	264.6202
8463	MUSO_Energy_Meter E0014	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	122.4056
8157	MUSO_Energy_Meter E0015	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	761.6775
8160	MUSO_Energy_Meter E0016	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	570.5475
8161	MUSO_Energy_Meter E0017	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	626.4975
8162	MUSO_Energy_Meter E0018	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	570.4703
8163	MUSO_Energy_Meter E0019	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	11854.63
8164	MUSO_Energy_Meter E0020	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	0
8555	MUSO_Energy_Meter E0021	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	0
8556	MUSO_Energy_Meter E0022	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	0
8171	MUSO_Energy_Meter E0023	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	0
8551	MUSO_Energy_Meter E0023.1	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	0
8552	MUSO_Energy_Meter E0023.2	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	0
8554	MUSO_Energy_Meter E0023.3	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	0
8470	MUSO_Energy_Meter E0024	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	0
8471	MUSO_Energy_Meter E0025	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	0
8472	MUSO_Energy_Meter E0026	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	0
8549	MUSO_Energy_Meter E0027	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	0
8194	MUSO_Energy_Meter E0028	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	0
8195	MUSO_Energy_Meter E0029	Boiler #1 Inlet	SMS3000 10AQ12004 kWTH	KWh	9/9/2010 6:00:0	0

PI Meter Display & Entry

PI Data Archive, Meter Add-on

New Entry

Date & Time

History

Mode

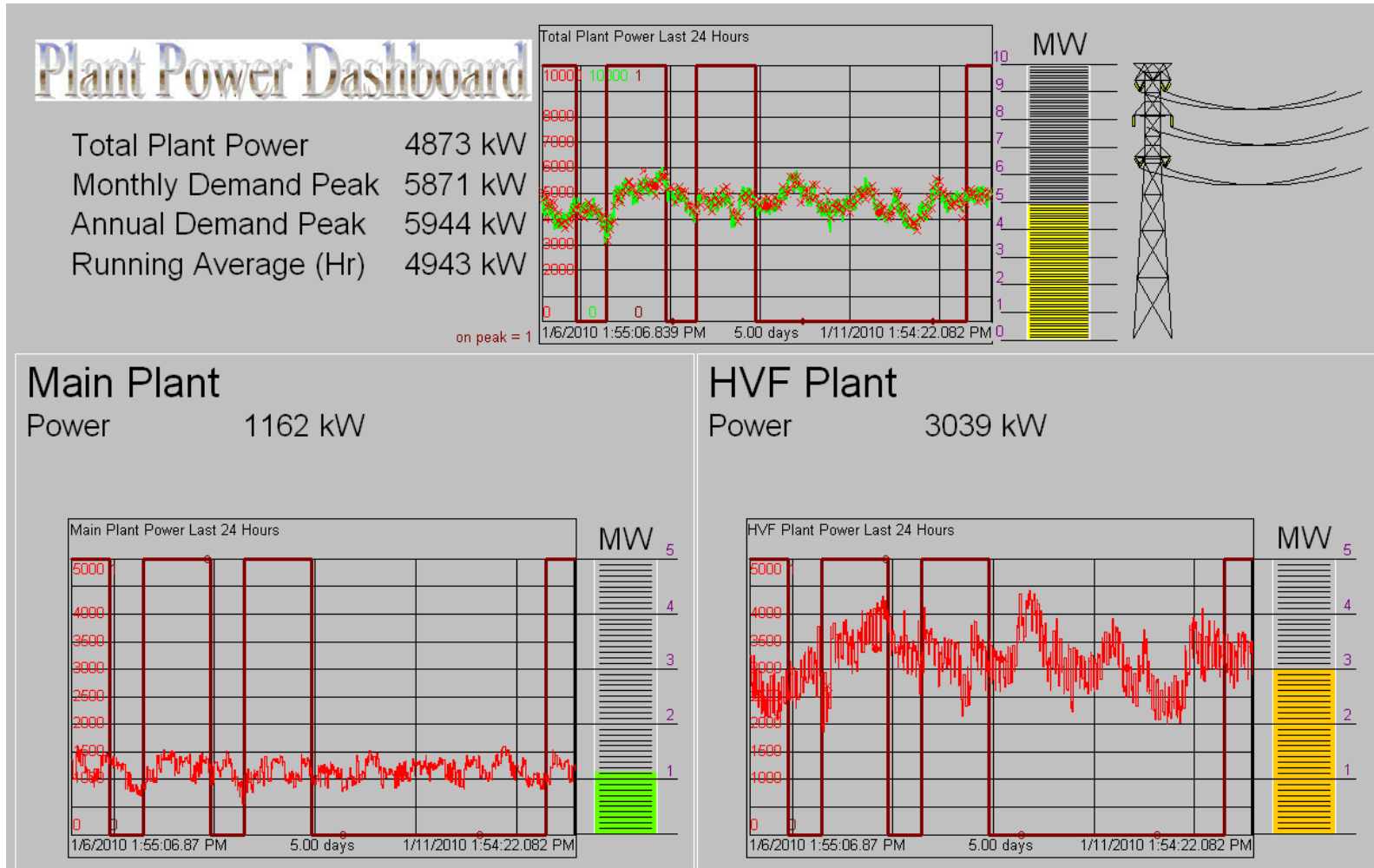
Back

Home

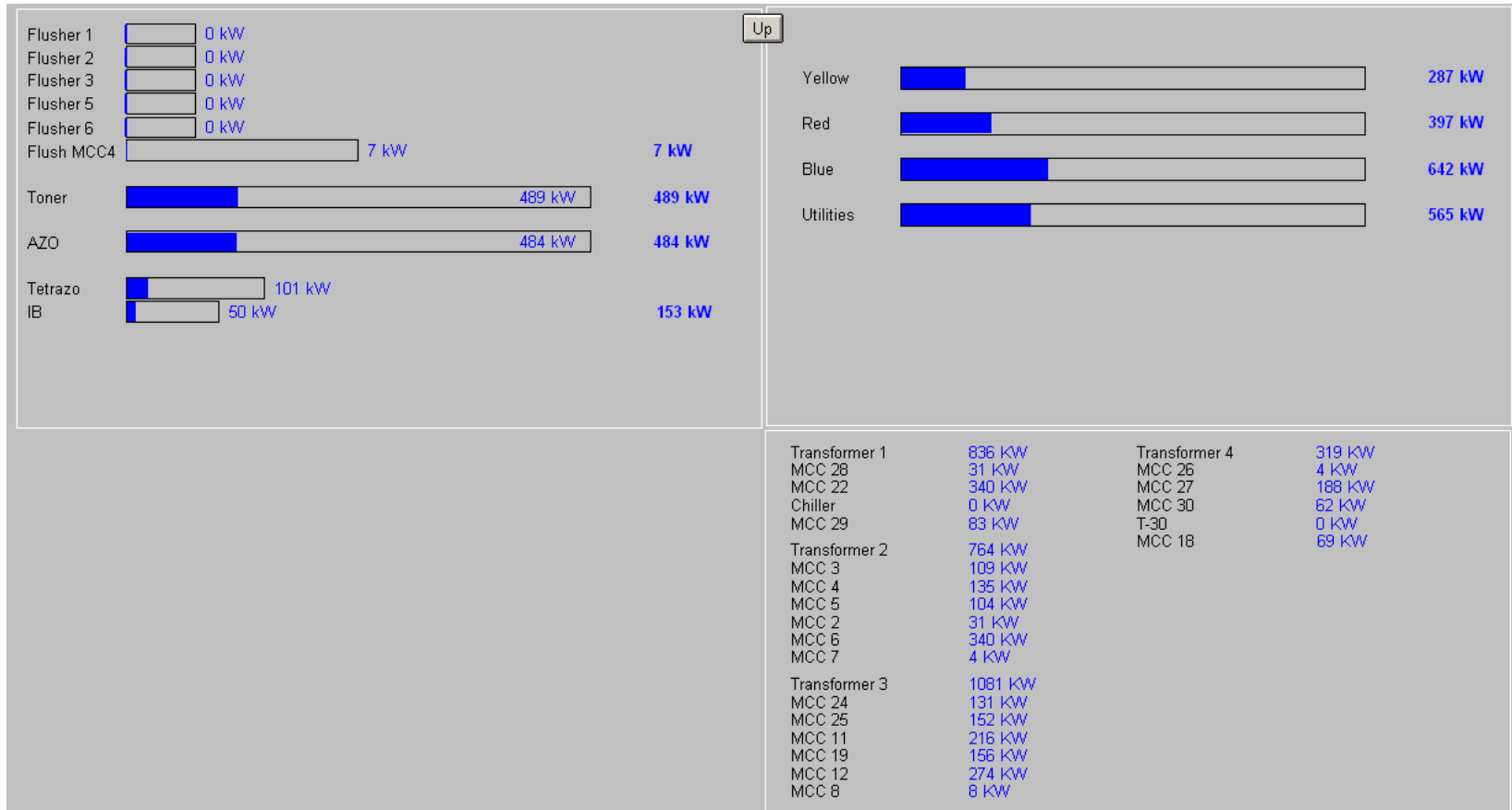
A dashboard that reflects how electricity is billed.

- 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.

Real time data on the power dashboard in PI Processbook



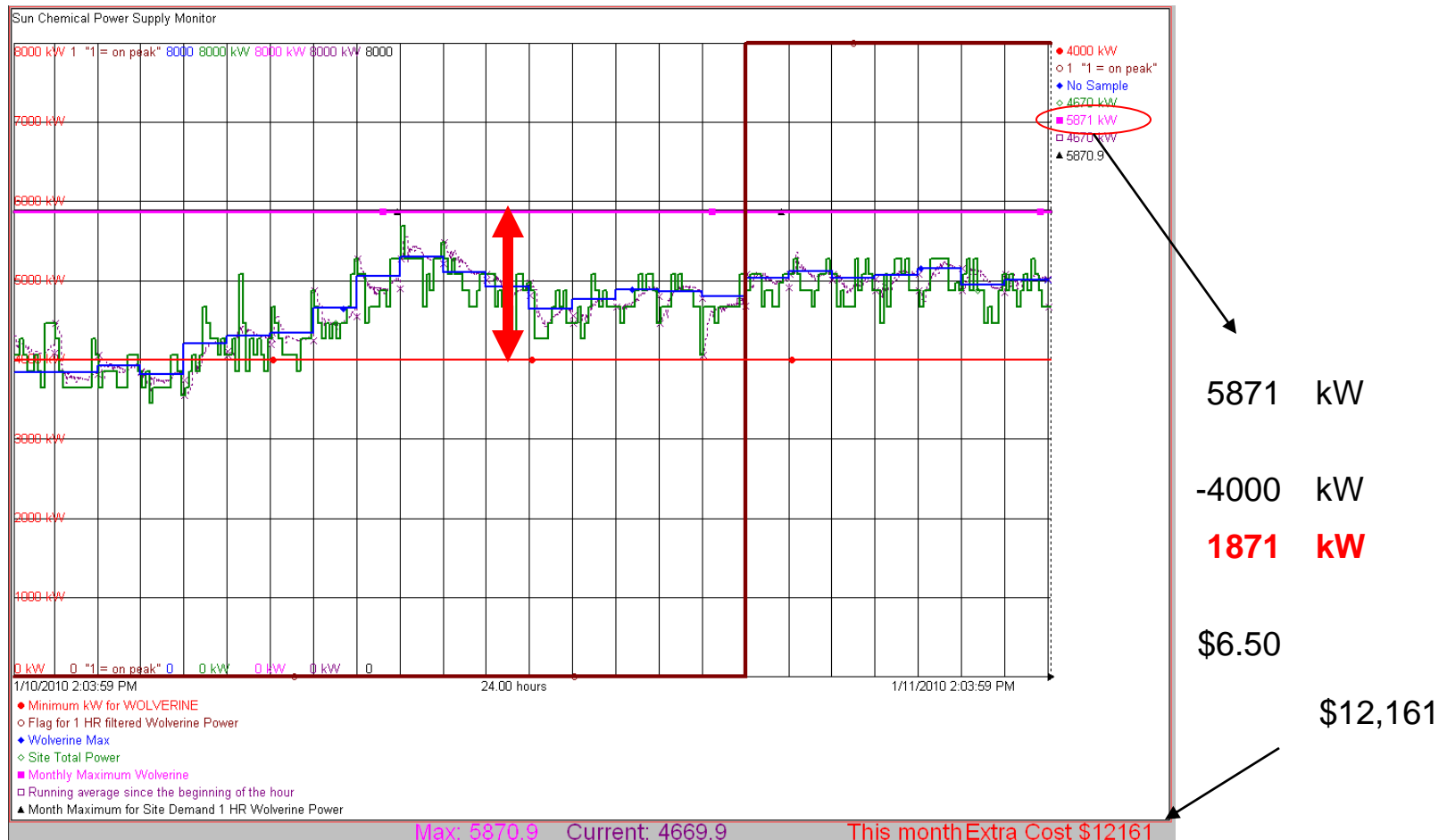
Break down of the plant usages by department or entity.



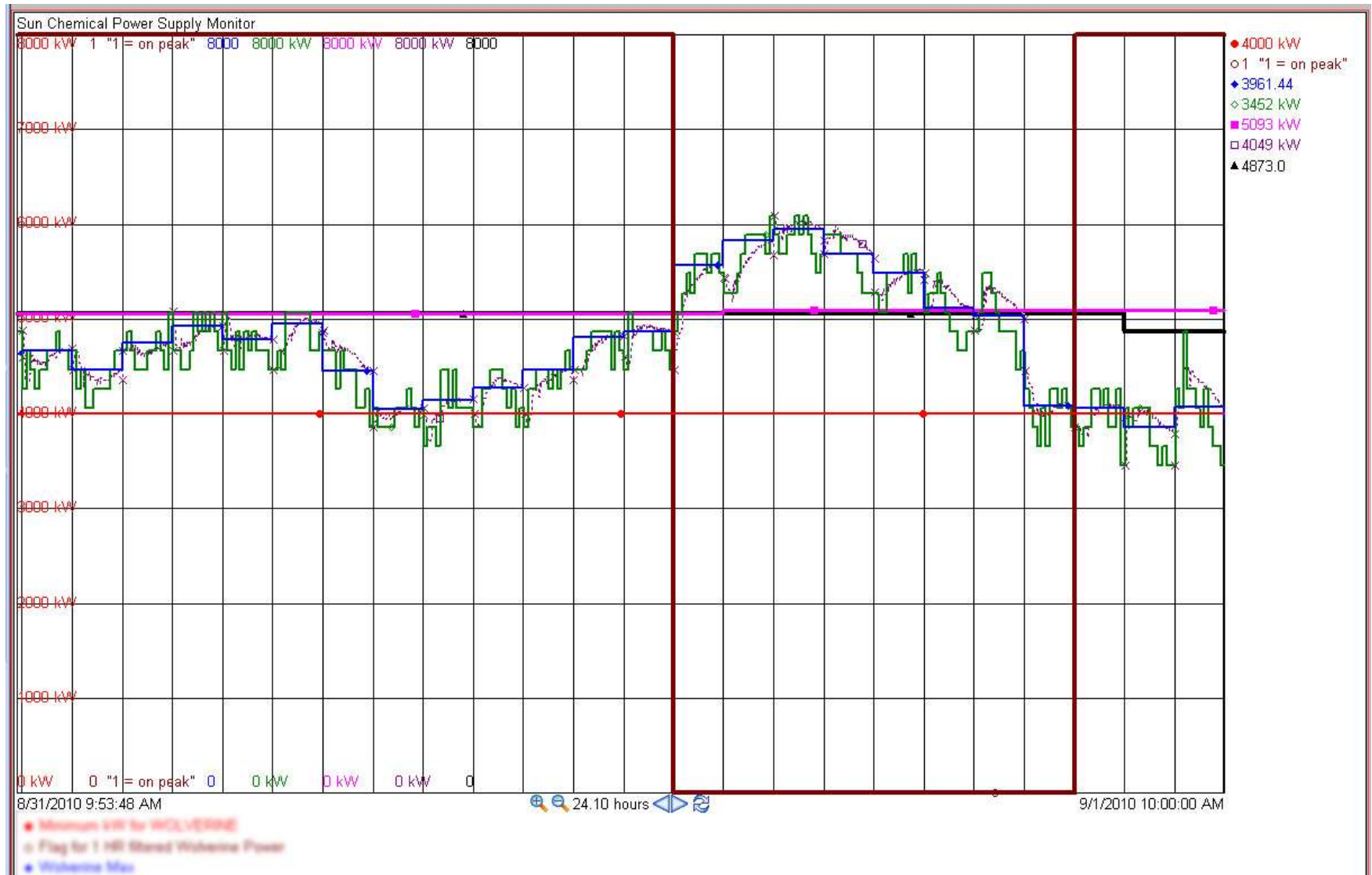
Real time monitoring



Real time energy monitor calculates extra cost



	AB	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1		9/8/10 0:00																					
2			3																				
5																							
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
15		9/8/10 10:30	0	48	53	35	65	13	63	0	46	0	0	0	5093	4088	4345	12555	896	28935	837	22028	1612
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
19		9/8/10 12:30	0	63	0	62	0	61	0	64	0	53	0	0	5093	4097	5147	12555	956	28962	841	20142	1612
20		9/8/10 13:00	0	63	0	62	0	61	0	64	0	48	0	0	5093	4100	5147	12555	1244	28969	841	19750	1612
21		9/8/10 13:30	0	63	0	62	0	50	19	45	0	19	15	0	5093	4099	5253	12555	1450	28976	841	19318	1612
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	6166	12556	335	28996	840	18268	1612
25		9/8/10 15:30	0	63	0	61	0	61	65	64	0	0	0	0	5093	4095	6153	12556	342	29003	839	17913	1612
26		9/8/10 16:00	0	63	12	61	0	35	40	22	0	0	27	0	5093	4098	6247	12556	341	26669	839	17472	3982
27		9/8/10 16:30	25	34	0	41	0	0	0	0	0	0	46	0	5093	4097	6512	12556	341	3665	838	16955	27649
28		9/8/10 17:00	2	0	0	0	0	0	0	0	0	0	0	0	5093	4092	6730	12556	341	7123	838	16437	30182
29		9/8/10 17:30	0	0	0	0	0	0	0	0	0	0	0	0	5093	4090	6729	12555	341	16097	838	15914	30195
30		9/8/10 18:00	34	43	16	49	26	40	0	0	0	0	0	0	5093	4097	7013	12556	341	19547	837	15387	30205
31		9/8/10 18:30	57	35	56	60	54	37	0	0	0	0	0	0	5093	4096	7654	12554	341	19547	837	14966	30201
32		9/8/10 19:00	0	0	0	0	0	0	0	0	0	0	0	0	5093	4091	7781	12551	341	19547	836	14338	30207
33		9/8/10 19:30	58	61	47	47	54	59	64	0	0	0	0	0	5093	4096	8106	12555	340	19547	836	13814	30211
34		9/8/10 20:00	58	62	0	60	0	63	63	0	0	0	0	0	5093	4092	8121	12554	340	19547	836	13292	30215
35		9/8/10 20:30	59	62	0	59	0	63	63	0	0	0	0	0	5093	4090	8120	12553	340	19548	835	12776	30219
36		9/8/10 21:00	59	62	0	60	0	63	35	0	0	0	0	0	5093	4088	8119	12553	340	19548	835	12250	30216
37		9/8/10 21:30	2	63	0	60	0	64	0	0	0	0	0	0	5093	4086	8116	12552	340	19548	834	11722	30214
38		9/8/10 22:00	0	44	0	60	0	43	0	0	0	37	0	0	5093	4094	8119	13084	340	19548	834	11199	30228
39		9/8/10 22:30	0	60	0	37	0	61	0	0	0	59	0	0	5093	4091	8116	13496	339	19548	834	10673	30227
40		9/8/10 23:00	0	61	0	63	0	61	0	0	0	57	0	0	5093	4088	8114	13573	339	19548	833	10152	30224
41		9/8/10 23:30	0	61	56	61	61	60	0	62	37	57	66	0	5093	4083	8113	13573	339	19548	833	9623	30221
42		9/9/10 0:00	2	62	58	61	64	61	15	46	15	51	67	0	5093	4092	8113	13573	898	19549	832	9103	30224
43		9/9/10 0:30	42	62	58	61	64	62	56	60	35	13	67	0	5093	4089	8401	13572	1644	19549	832	8569	30228
44		9/9/10 1:00	59	44	56	62	61	42	64	63	43	49	60	0	5093	4088	9078	13572	1727	19549	832	8047	30232
45		9/9/10 1:30	58	59	33	45	43	60	63	63	47	58	8	0	5093	4088	9858	13570	1401	19549	831	7515	30237
46		9/9/10 2:00	58	60	57	22	60	60	63	63	46	57	46	0	5093	4087	10084	13570	248	19550	831	6984	30241
47		9/9/10 2:30	58	61	57	63	61	59	63	63	46	56	67	0	5093	4086	10085	13568	255	19551	831	6453	30244
48		9/9/10 3:00	58	61	56	61	62	60	63	46	46	56	66	0	5093	4088	10085	13568	629	19552	830	5917	30244
49		9/9/10 3:30	32	62	56	61	63	62	46	60	13	39	65	0	5093	4090	10302	13568	1006	19554	830	5393	30244
50		9/9/10 4:00	58	31	57	61	55	25	61	63	34	14	65	0	5093	4088	11119	13570	1449	19555	829	4864	30244
51		9/9/10 4:30	58	61	42	62	36	63	62	62	41	58	65	0	5093	4088	11592	13571	1665	19556	829	4335	30244
52		9/9/10 5:00	58	61	53	38	59	61	44	62	46	58	17	0	5093	4087	11961	13570	553	19557	829	3805	30244
53		9/9/10 5:30	53	57	52	54	58	57	0	62	43	53	62	0	5093	4087	12078	13570	219	19558	827	3278	30245
54		9/9/10 6:00	0	0	0	0	0	0	0	7	0	0	0	0	5093	4084	12075	13568	580	19562	826	2746	30252
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																					



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

Main Plant Major Valves
Display in Development

Mainplant

Steam

7301 Lbs / Hr
294592 Lbs / 24 Hr

0 Lbs / Hr
0 Lbs / 24 Hr

0 Lbs / Hr
65750 Lbs / 24 Hr

117.2 PSI Boiler 1
408 SCFM
0 SCF
107591 SCF

2.7 PSI Boiler 2
0 SCFH
0 SCF
0 SCF

119.0 PSI Boiler 3
0 SCFH
757 SCF
94134 SCF

2

2

2

Landfill Gas

Landfill Gas
408 SCFM
14 PSI

Natural Gas
0 SCFH
201725 SCF / 24 Hour

Feed water
5.2 GPM
9558 Lbs / Hour
347993 Lbs / 24 Hour

2

Main Plant

HVF

Red A & B
200.5 Lbs / Hr
8731 Lbs / 24 Hr

Red C
&
Yellow A, B & C
0.9 Lbs / Hr
199488 Lbs / 24 Hr

Red A
Sparge
UV-
UV-
LD Jacket

Red B
Sparge
UV-
UV-
LD Jacket

Red C
Sparge
UV-
UV-
LD Jacket

Yellow A
Sparge
UV-
UV-8311

Yellow B
Sparge
UV-
UV-

Yellow C
Sparge
UV-
UV-

1. Landfill Gas only supplies boiler 1 (Green line)
2. Natural Gas supplies all 3 boilers (Yellow line)

Landfill Gas Report

Landfill Gas

Daily usage
chart

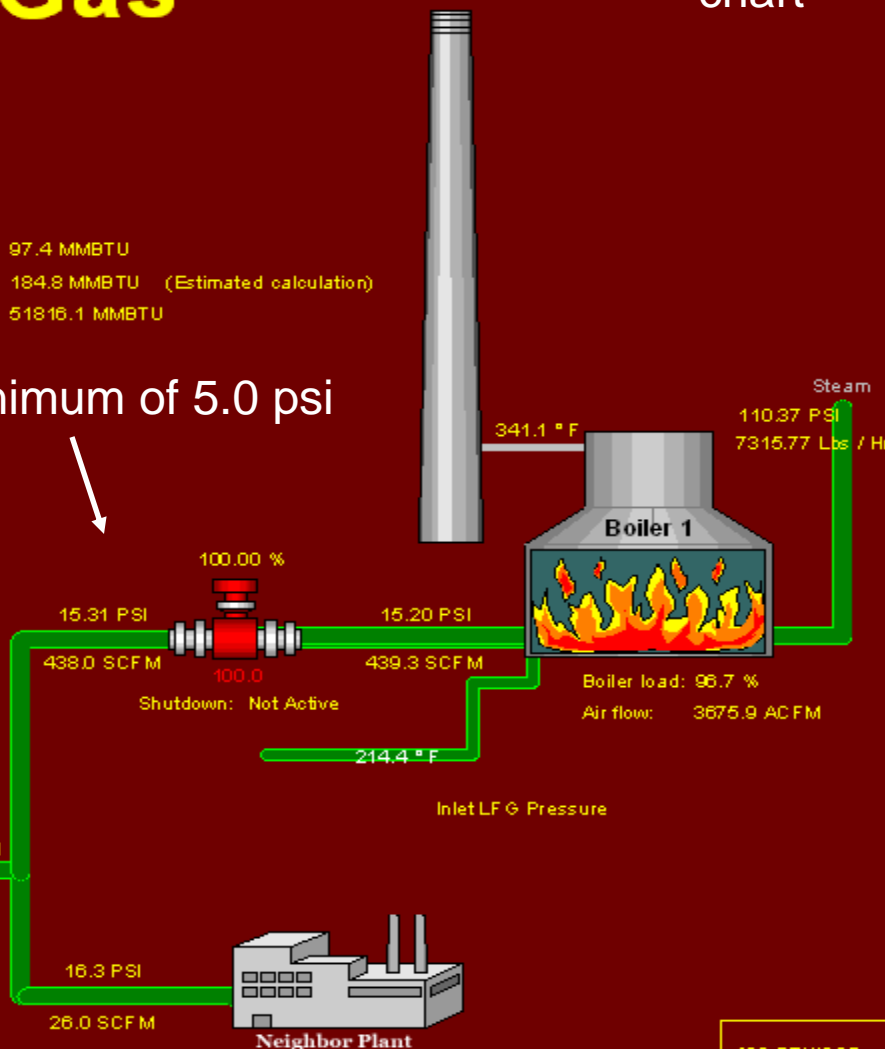
Landfill Gas MMBTU Todays Usage 97.4 MMBTU
Landfill Gas MMBTU Yesterdays Usage 184.8 MMBTU (Estimated calculation)
Landfill Gas MMBTU Total Usage 51816.1 MMBTU

Landfill

CH₄ 48.9 %
CO₂ 36.0 %
O₂ 0.5 %

50.0 DEGF

Minimum of 5.0 psi



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			
8			
9			
10			
11			
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18			
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21			
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27			
28			
29			
30			
31			
463 BTU/SCF	Total 2,114,850 SCF	990 MMBTU	330,273 SCF

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.

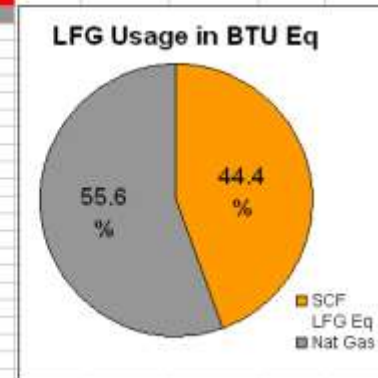
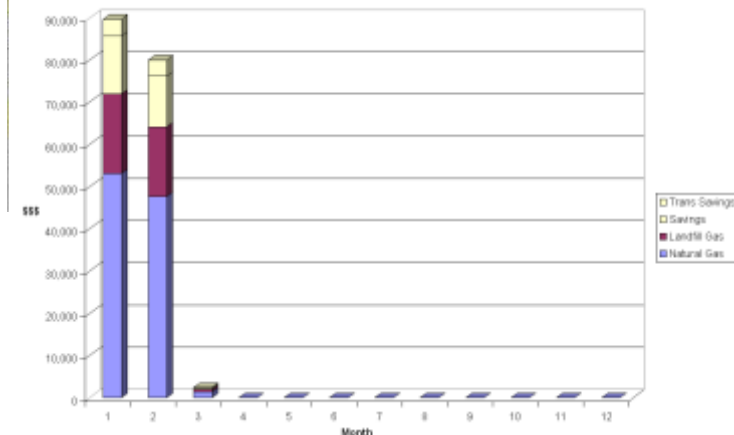
Gas: savings report



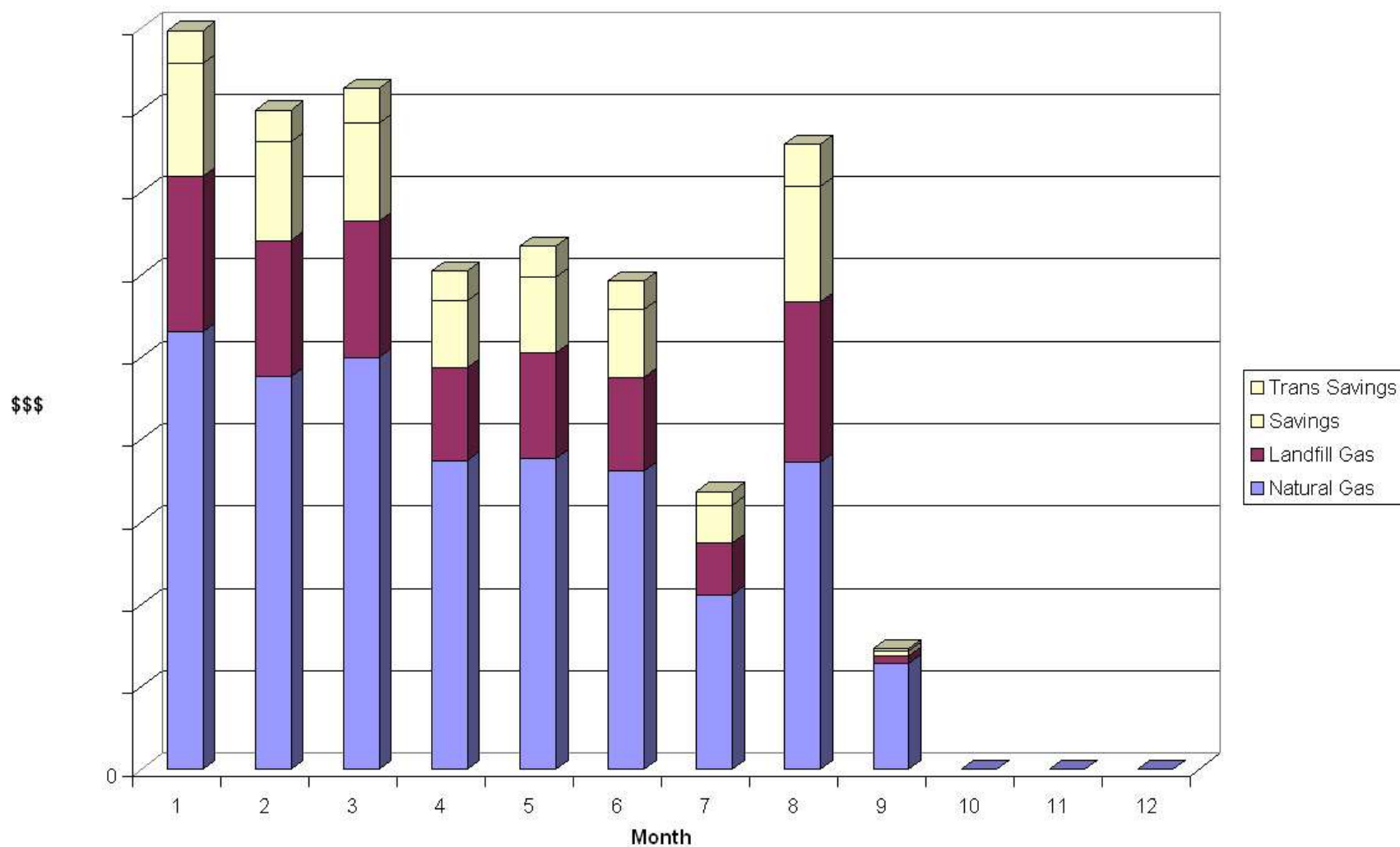
Landfill gas		Year 2010														
		January	February	March	April	May	June	July	August	September	October	November	December	Totals		
Boiler 1	Nymex	5,914	5,274	4,818												
Boiler 1	SCF LFG	11818068	13106100	425785	0	0	0	0	0	0	0	0	0	25349952	25349952	61.5%
Boiler 1	MMBTU	5597	5409	191	0	0	0	0	0	0	0	0	0	11196		
Boiler 1	Nat Gas	4364918	4572937	149414	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%	58.3%										SCF LFG Eq	12674975.98	44.4%
All BTU Eq	% LFG	42.0%	45.9%	47.0%										Net Gas	15883580	55.6%
Boiler 2008		6,116	4,476	4,096	3,831	3,321	5,518	3,940	5,370	3,843	3,731	4,398	4,438			
Net 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
Savings \$\$\$		13,666	11,881	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	Boiler 1	Boiler 1	Boiler 2	Boiler 3	Projected	LFG	Totals for the month	Boiler 1	Boiler 2	Boiler 3
	SCF LFG	Cr MMBTU	Nat Gas	Nat Gas	Nat Gas	Savings	MMBTU	SCF LFG	Cr MMBTU	Nat Gas	Nat Gas
1/1/2010	107485	2024	87776	0	7599	-129.46	53				
1/2/2010	109956	2076	86797	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	2438	160942	0	94619	4.39	196				
1/7/2010	434911	2633	114858	0	108619	15.61	208				

Gas Usage 2010



Gas Usage 2010



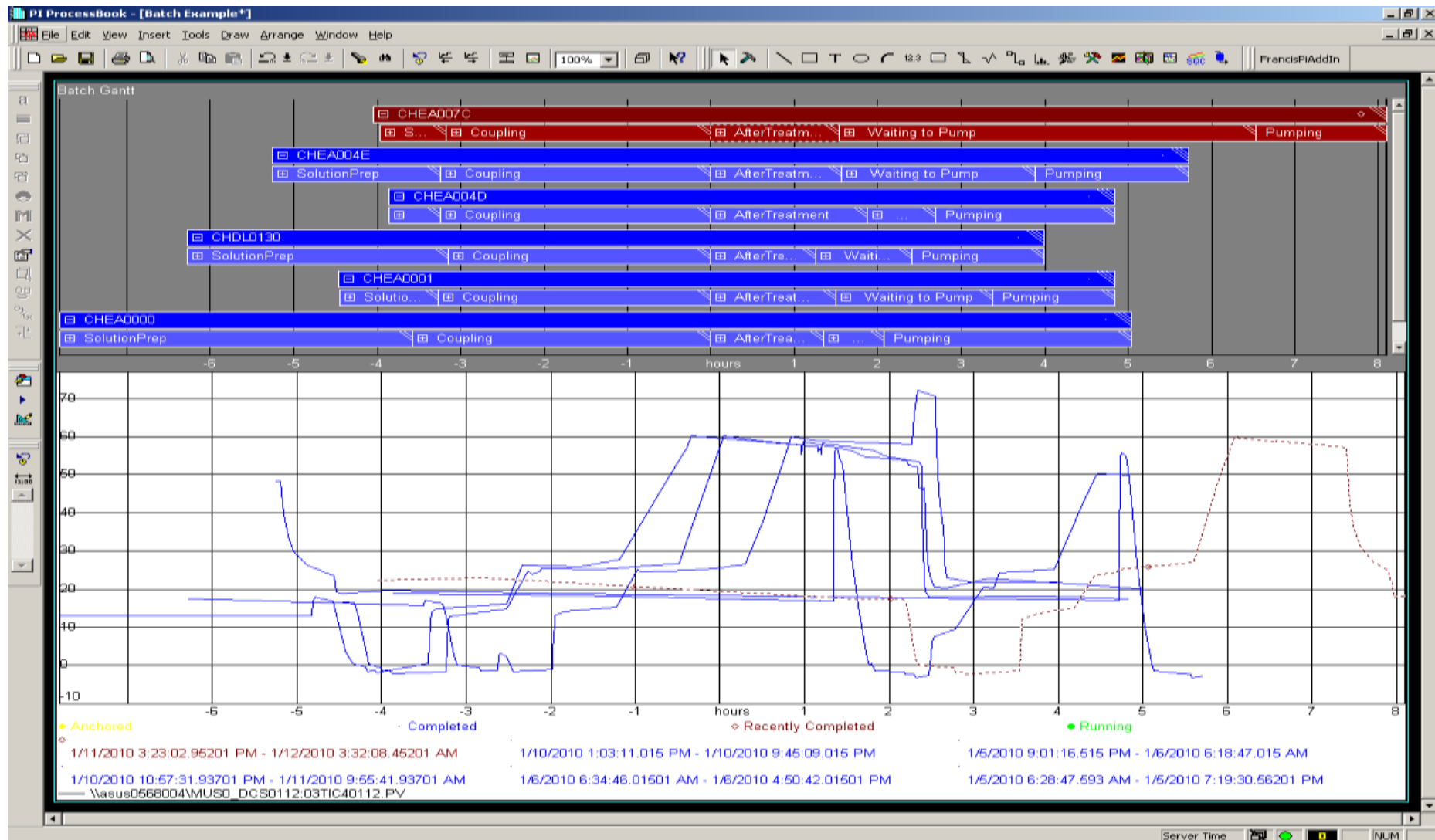
Steam is measured when produced in the boiler house and some reports (for one department) exist that calculate the usage of steam per batch.

Using less steam can be accomplished by:

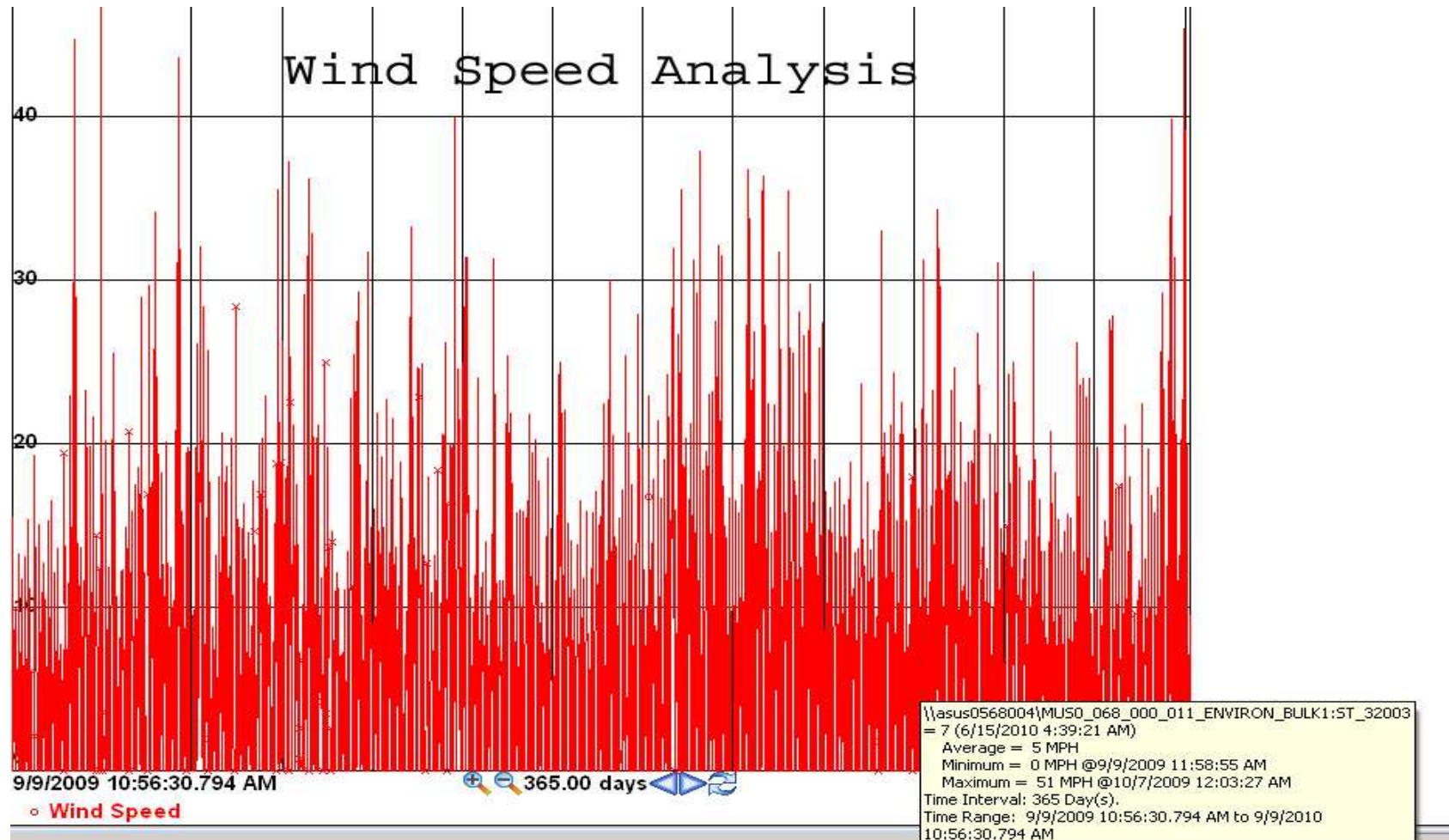
- Fixing steam leaks
- Knowledge of the process and reduce usage.

- 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



- 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



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

- Two separate control networks:

Mainplant controls:

- DCS communicating = OPC to PI
- Fix32 SCADA nodes

High Volume controls:

- Fix32 SCADA nodes
- SMS3000 OPC = Power Logic

- 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% !

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



