The Journey from Historian to Business Intelligence

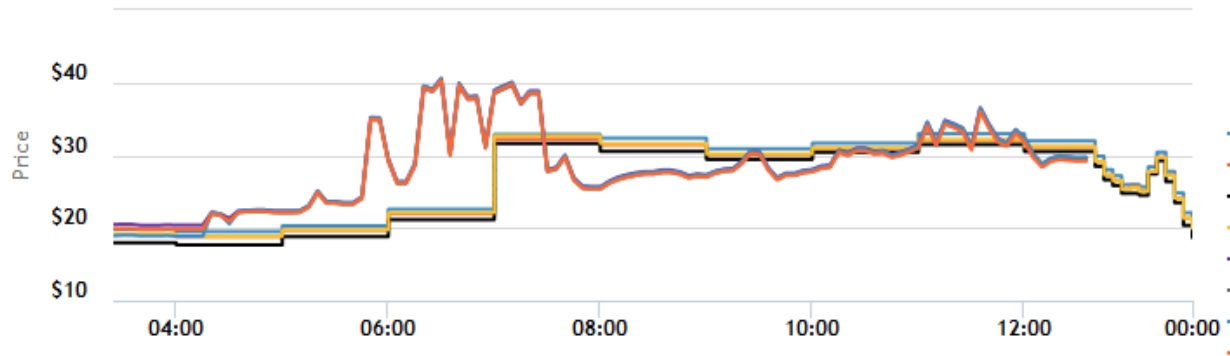**Jeff Campbell, Engineering Manager**

OSIsoft.

Scrubgrass Generating

- Located in Northwest PA
- Constructed in 1993
- 85 mw Fluid Bed boilers
- Designed to burn waste coal
- Sells power to PJM grid
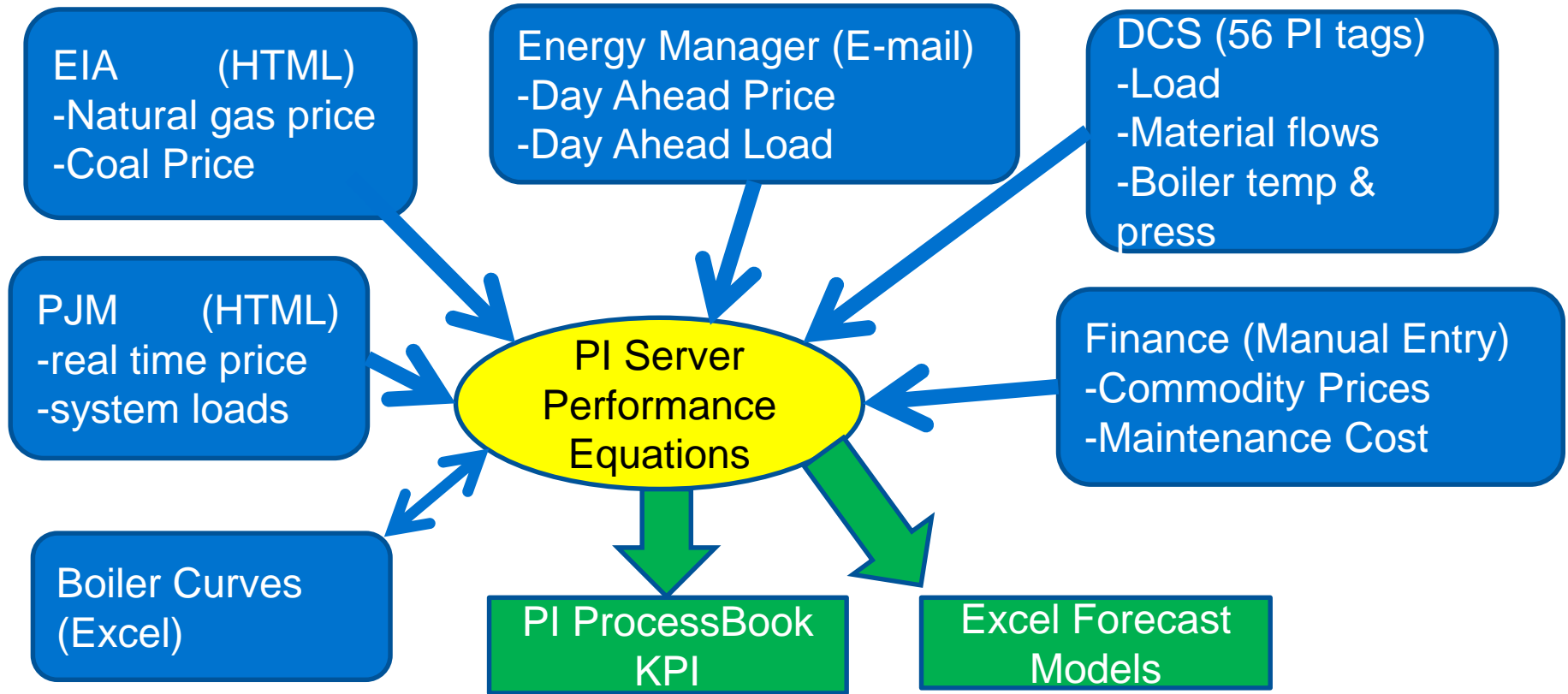- 35 employees

A New Business Challenge

- Plant payment structure changed from fixed payment to market based

- Power pricing changes every 5 minutes

- The plant needs to adjust load to react to pricing changes

A simple project

- Give control room a cost management tool
  - Show real time production cost
  - Show optimal run point for price
  - Show how costs are built up (troubleshooting tool)
- Requirements
  - No daily hand entry of information
  - No "monthly average" shortcuts on cost buildup
  - Results instantaneously available to ops

Tags Required to Calculate Real Time Price

EIA (HTML)
-Natural gas price
-Coal Price

Energy Manager (E-mail)
-Day Ahead Price
-Day Ahead Load

DCS (56 PI tags)
-Load
-Material flows
-Boiler temp & press

PJM (HTML)
-real time price
-system loads

PI Server Performance Equations

Finance (Manual Entry)
-Commodity Prices
-Maintenance Cost

Boiler Curves (Excel)
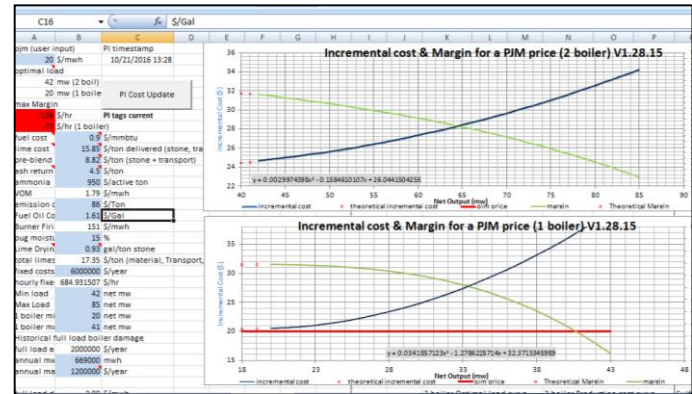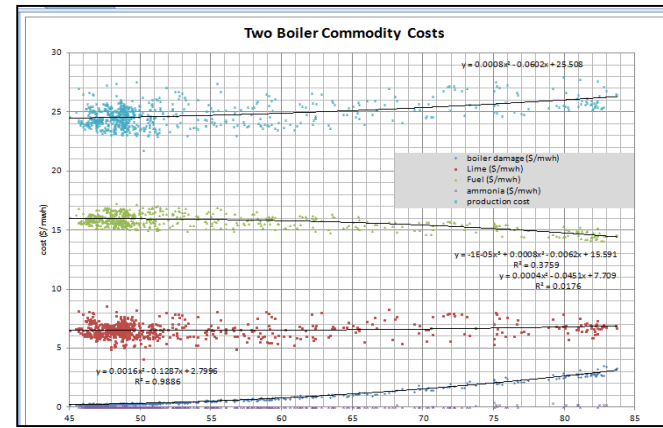
PI ProcessBook KPI

Excel Forecast Models

PI System Components

- DCS interface - existing process tags
- HTML Interface - Gas $, PJM $, system loads
- Performance equations – 63 tags configured on PI Server
  - Effective full power hour calc
  - Target and actual cost calcs
- PI DataLink – Links tags to analysis spreadsheets
- PI ProcessBook – Control room & Admin visualization
- Excel spreadsheet macros - (Developed in-house) downloads characteristic curve coefficients to PI Tags
- Visual Basic E-mail downloader (Developed in-house)

Calculation Process

- Use PI DataLink to create process data curves in Excel
- Calculate curve derivatives to create incremental cost curves
- Export incremental curves to PI Tags (automated excel macro)
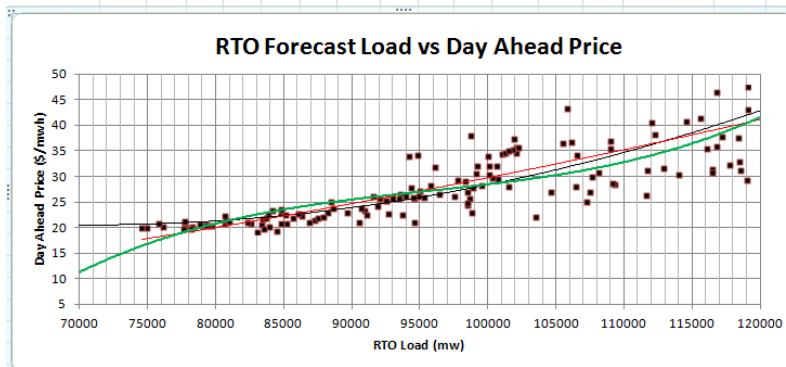- Use Performance Equations (PE) to calculate target and actual costs

Resulting PI ProcessBook Display

	NOW		Commercial Availability	
Ash Return Cost	4.5 $/ton			Net Heat Rate 13156 btu
Ammonia Cost	940 $/Active ton			Gross Heat Rate 11351 btu
Fuel Oil Cost	1.61 $/gal			Corrected Turbine Heat Rate 8781 btu
Variable O &M Cost	1.79 $/Mwh			
Emissions Cost	86.00 $/ton			

	Commodity Costs	Production Costs	Commercial Availability 105 % Available	Net Heat Rate ...
Current Fuel Cost	1061.38 $/hr	15.58 $/MWh	**Target Margin**	**Target Load**
Current Limestone Cost	325.10 $/hr	4.74 $/MWh	**203 $/Hr**	**70 Net Mw**
Current Ammonia Cost	-0.30 $/hr	0.00 $/MWh		**Net Output**
Current Fuel Oil Cost	0.00 $/hr	0.00 $/MWh	**10 Min Avg Margin**	**68.1 MWe**
#1 Boiler Wear	22.99 $/hr	0.66 $/MWh		
#2 Boiler Wear	24.44 $/hr	0.73 $/MWh	**414** $/Hr	
#1 Boiler Emissions	4.55 $/hr	0.13 $/MWh		
#2 Boiler Emissions	6.07 $/hr	0.18 $/MWh		
Variable O &M Cost	122.19 $/hr	1.79 $/Mwh		
Total Cost	1563.62 $/hr	22.95 $/Mwh	**Day Ahead PJM**	**Day Ahead Load**
Target Cost	1784.26 $/hr		**27.31 $/MWh**	**57 Net Mw**

Energy Revenue DA	1556.67 $/hr	Target Revenues	**Real Time PJM**	**Real Time Load**
Energy Revenue RT	322.33 $/hr	390.71 $/hr	**31.14 $/Mwh**	**11.1 Net MW**
Energy Revenue TOTAL	1879.00 $/hr	1947.38 $/hr	RT Hour Average	**RT Target Load**
Margin (Gross Margin + VOM)	**315 $/hr**	Green = operating & manpower Orange = operating cost covered Red = loss	**29.51 $/Mwh**	**13.2 Net MW**

PJMPriceRT_MCC   Failed
PJMPriceRT_MLC   -0.04 $/Mwh
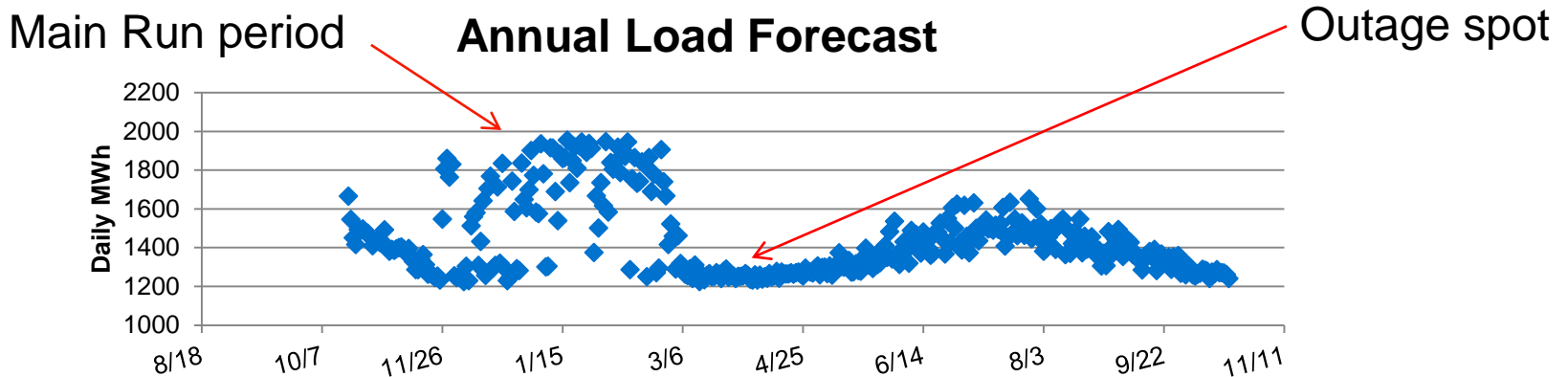
Forecasting using merged data streams

- Next week's weather looks like it will be a loss so we'll take a boiler off line.

- This 20 second check took 2 - 4 hours without the PI System

- The merged data shows pricing will be higher than expected next week… so we'll keep the boiler on line.

- That 20 second check translates into $160K additional revenue for the week

Long range forecasts

- With Gas price, system loads, and boiler curves all in the PI System, it becomes possible to perform long range operational forecasts.

- This helps with scheduling of outages, fuel, and manpower.

Main Run period

Outage spot

Annual Load Forecast

Future Plans

- Upgrading PI Server to install the 2016 version (Future Data).
- Build AF database to simplify cost templates.
- Market consolidated reports to member plants.
- Migrate to PI Coresight to allow external customers access to data.

Reclaimed Fuel Site

Conclusions

- Merging market and process data allows end users to spend time analyzing results – instead of synchronizing databases.

- The resulting merged data reveals new trends not seen on individual streams.

- Everyone in the plant now knows how much $$$ they will make, are making, and have made with no lag.

- This is a main reason Scrubgrass is still operating.

Summary

COMPANY and GOAL

Scrubgrass Generating Plant Generates power by reclaiming abandoned coal piles.

Scrubgrass needed **Real time feedback on revenue and costs**

Finance data is separate from process data
Finance results lag 2 months behind production
Incompatible data formats for external market data

CHALLENGE

Calculate plant revenue and margin real time

SOLUTION

Consolidated 6 data sources to allow real time cost calculations

- PI HTML web scraping
- PI DataLink tag upload and download
- PI ProcessBook visualization

RESULTS

Plant now has a tool to guide them to optimal run conditions

- HTML interface purchased
- In house development of cost tools (engineering department)
- Resulted in decision to continue running facility instead of mothballing

Contact Information

Jeff Campbell

Jeff.Campbell@Scrubgrass.com

Engineering Manager

Scrubgrass Generating Company,

an affiliate of National Energy & Gas Transmission, Inc.

Questions

Please wait for the **microphone** before asking your questions

State your **name & company**

Please remember to…

Complete the Online Survey for this session

Download the Conference App for OSIsoft Users Conference 2017

- View the latest agenda and create your own
- Meet and connect with other attendees

Download on the App Store

GET IT ON Google Play

5 HTML

search **OSISOFT** in the app store

http://bit.ly/uc2017-app