NeuCo/GE Boiler Optimization
Technology Overview and Results

July 18th, 2016

Imagination at work

NeuCo, Inc./GE Power Collaboration

NeuCo - Power Optimization Market Leader

- Only company 100% dedicated to power optimization software
- More than 120 active optimization systems
- 100% technology ownership and strong patent position
- Two U.S. Dept of Energy projects totaling $38M investment

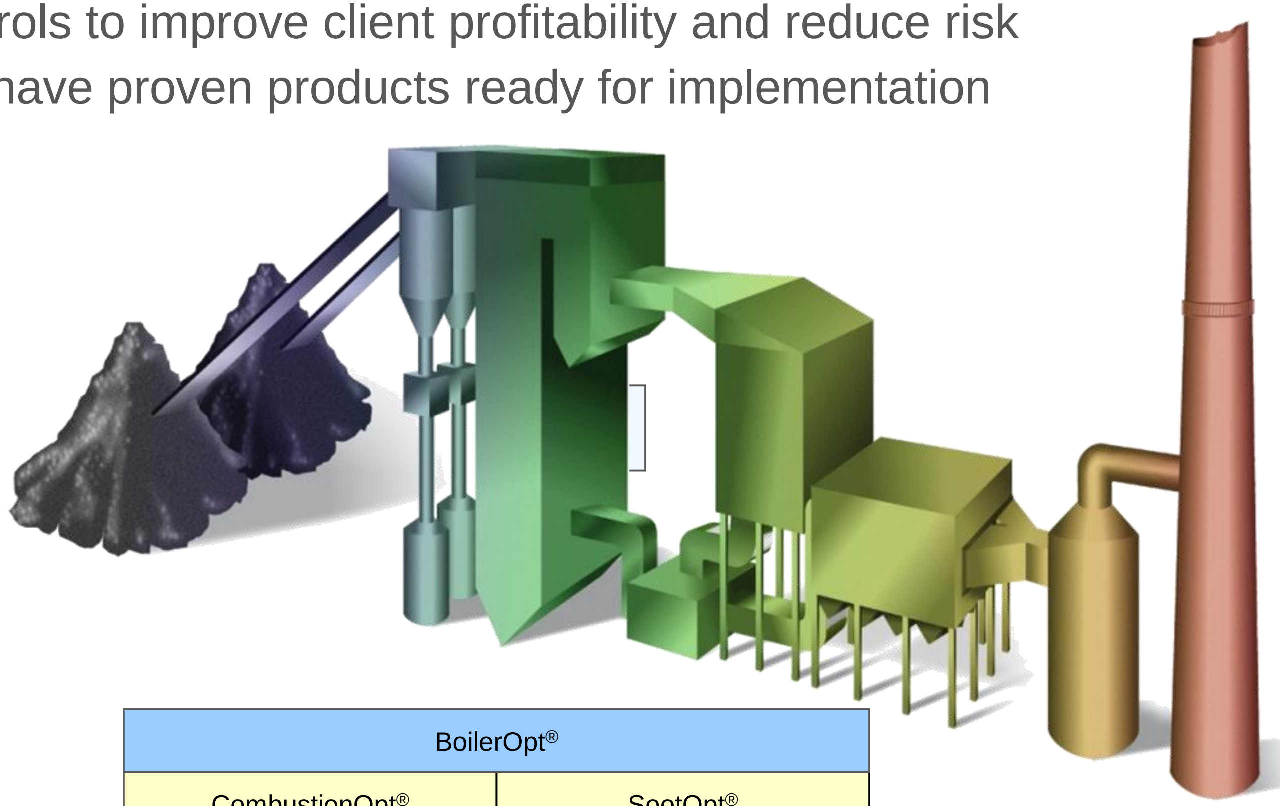
NeuCo / GE Power technology Operating at Cholla and Jim Bridger

GE Power

- Leader in Industrial Internet design with defined the technical roadmap for exploiting big data
- Coal-fired boiler OEM and engineering services leader
- Asset monitoring capability
  - 2000+ units monitored remotely 24 X 7 X 365
  - Local Field Service presence

Boiler Optimization

- Coal units are tightly regulated and unique
- NeuCo and GE collaborating on advanced artificial intelligence and controls to improve client profitability and reduce risk
- We have proven products ready for implementation



BoilerOpt®	
CombustionOpt®	SootOpt®
Optimizes fuel and air mixing to reduce emissions and improve efficiency	Dynamically directs boiler cleaning actions to achieve unit reliability, efficiency and emissions goals

ProcessLink® Platform

NeuCo

Comparison of Functionality for Historical and Current Boiler Optimization Systems

Functionality	PowerPerfecter	CombustionOpt V1	C'Opt Basic Fuel & Air Optimizer	BoilerOpt
Modeling & Optimization Method	MPC Only	Neural Only	Neural + MPC	Neural + MPC + Rules Engine
Parametric Testing	Manual Step Testing	Automated Design of Experiments (DOE)	Automated DOE w/Confidence Testing	Automated DOE w/Confidence Testing
Model Validation	NA	Committee Validation	Committee + Cross Val + MV Confidence	Committee + Cross Val + MV Confidence
Data Storage	Reliance on 3rd Party Historian	Reliance on 3rd Party Historian	Integrated Scaleable Historian	Integrated Scaleable Historian
Data Communications	Limited Communications Options	Limited Communications Options	OPC and Many Additional Paths	OPC and Many Additional Paths
Support	Software Support Only	One Level of Customer Support	Tiered CSS Offering	Tiered CSS Offering
Remote Monitoring	No Support Monitoring	Ad Hoc Support Monitoring	Automated Alerts Management	Automated Alerts Management
Alerts	No Phone/Email Alerts	Ad Hoc Phone/Email Alerts	Automated Email/Smartphone Alerts	Automated Email/Smartphone Alerts
Reporting	Customer-Generated Reports Only	Quarterly Reports	Weekly KPI-Oriented Reports	Weekly KPI-Oriented Reports
Scope of Systems Optimized	Combustion-Only, Limited # of MVs	Combustion-Only, Unlimited # of MVs	Combustion-Only, Unlimited # of MVs	Integrated Combustion & Boiler Cleanliness
Zone Selection Method	NA	NA	NA	Rule-Based Zone Selection
Blower Selection Method	NA	NA	NA	Rule/Neural Blower Selection
Blower Selection Criteria	NA	NA	NA	Time Constraints &Cleaniness Factors
Sootblower Problem Detection	NA	NA	NA	Sootblower Health Email Alerts
Sootblower Analysis Tools	NA	NA	NA	Blower Effectiveness Analysis

BoilerOpt Results

Illustrative BoilerOpt Results

Plant/Unit	Boiler Type	Gross MW	Priority At Time	Heat Rate Reduction	NOx Reduction
Big Cajun II Unit 2	Riley Turbo	575	NOx	0.50%	15.4%
Spruce Unit 1*	CE T-Fired	600	HR	1.00%	4.7%
Deely Unit 2	CE T-Fired	446	NOx	0.60%	19.4%
Tolk Unit 2	CE T-Fired	600	NOx	0.81%	12.5%
Harrington Unit 2	CE T-Fired	360	NOx	0.56%	14.0%
Belle River Unit 2**	B&W Opposed	648	HR	1.63%	20.0%
Jim Bridger Unit 2***	CE T-Fired	648	HR	0.69%	4.0%

* Initial Spruce 1 CombustionOpt-only NOx reduction was 16.1% when NOx was top priority

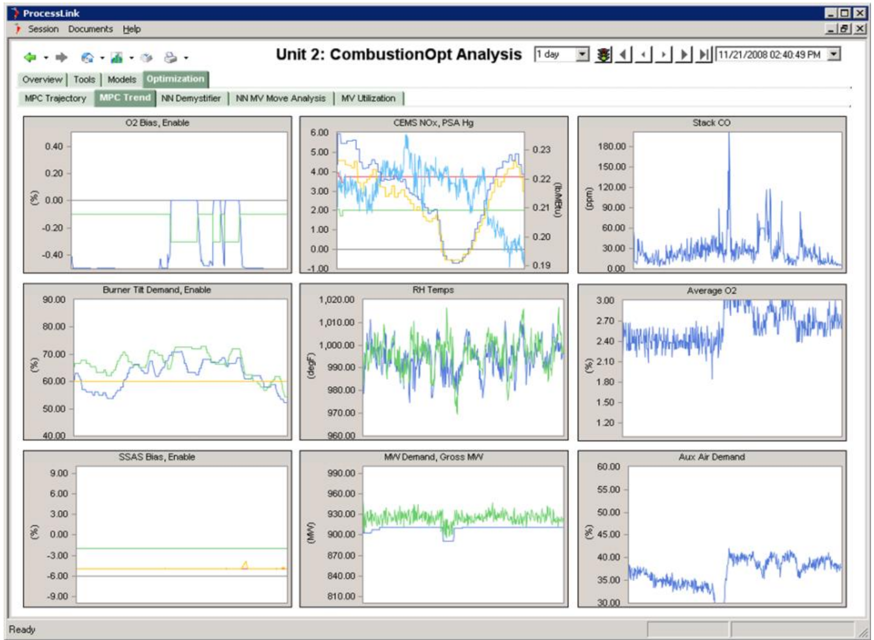
** Belle River 2 results measured by 3rd-party engineering firm as part of US-DOE CO2 study

*** Current Jim Bridger Unit 2 results are CombustionOpt-only

CombustionOpt

Results achieved through Optimal mixing of fuel and air through MPC, adaptive neural networks and condition-based rules

- NOx reductions of 10-15%
- Boiler efficiency increase of 0.5% - 1.5%
- CO controlled to desired limit
- Better ramping and load-following performance
- Reduced opacity excursions
- Better control of LOI
- Better adherence to fan and
- Improved situational awareness
- Avoided tail-chasing behavior



ProcessLink

Session Documents Debug Help

Unit 2: CombustionOpt Analysis

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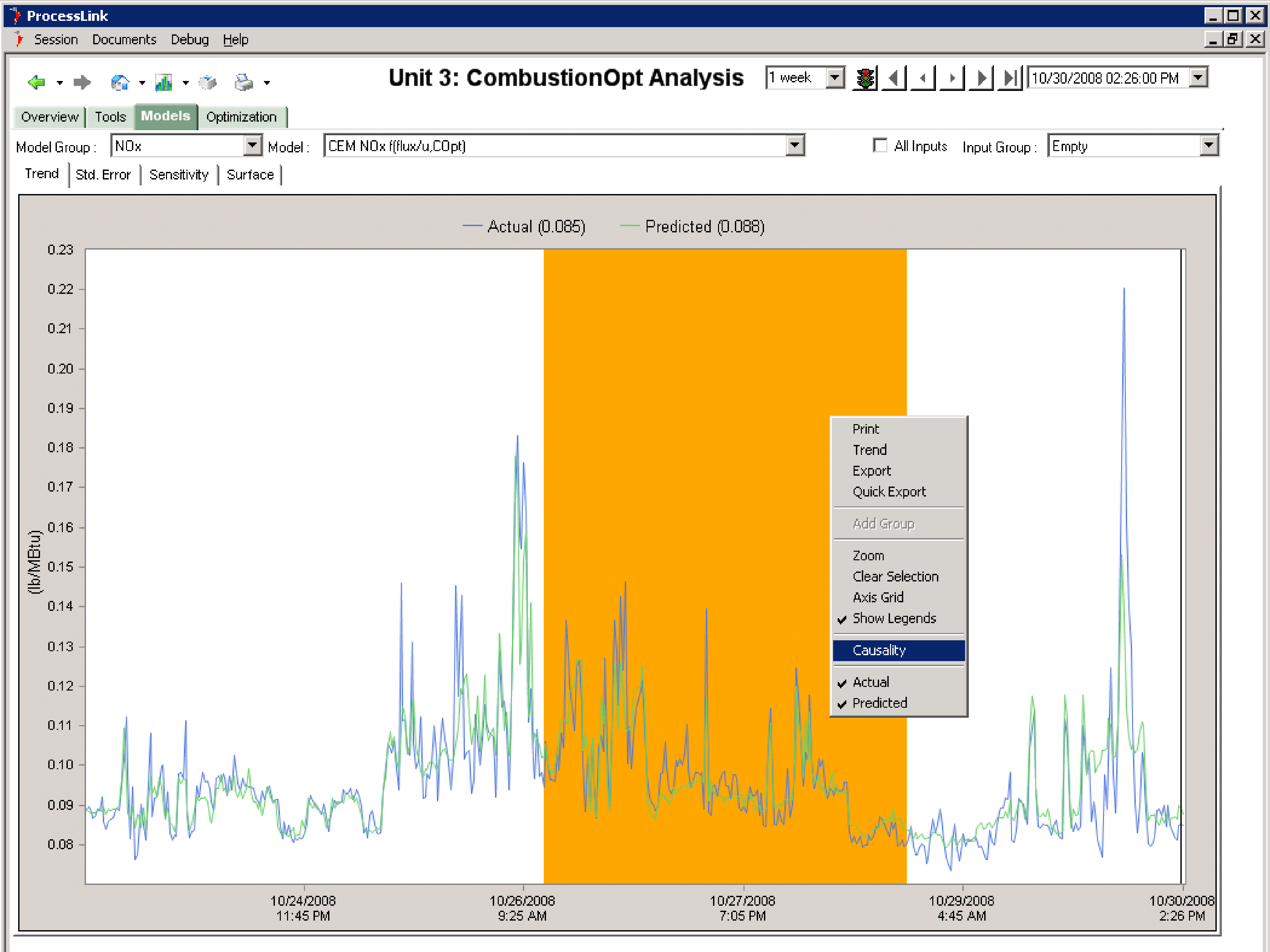
Overview | Tools | Models | **Optimization**

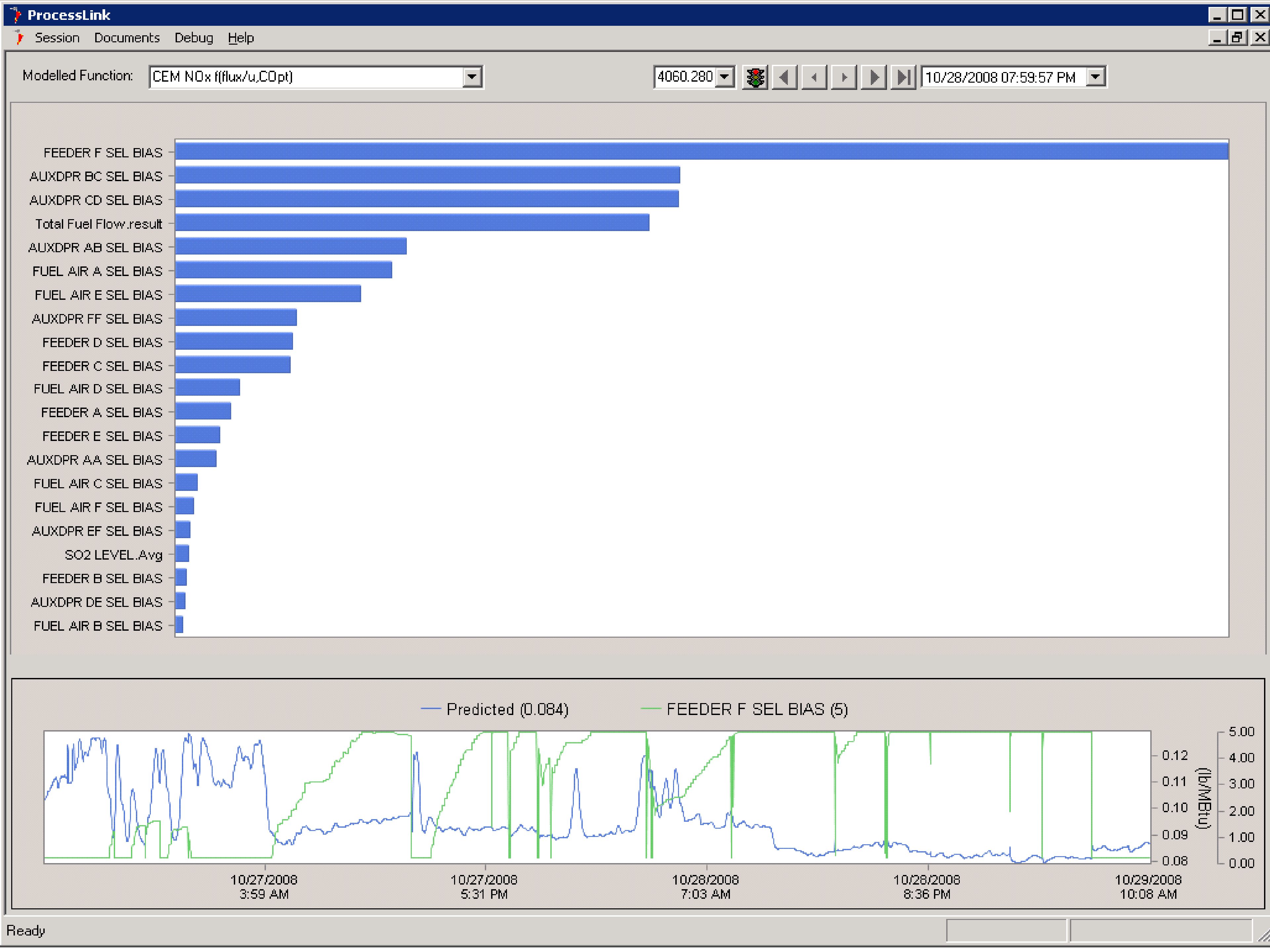
MPC Trajectory | MPC Trend | NN Demystifier | **NN MV Move Analysis** | MV Utilization

Supervisory Profile:10/30/2008 12:52:09 PM

MV Name	Pre-Move Value	Post-Move Value	Delta Move	Step Size	Low Limit	High Limit	Heat Rate	NOx	Opacity	O2
FUEL AIR A SEL BIAS	4.027	5		2	-5	5				
FUEL AIR C SEL BIAS	-4.027	-5		2	-5	5				
FUEL AIR B SEL BIAS	-4.027	-5		2	-5	5				
AUXDPR DE SEL BIAS	0.625	0.75		2	-10	10				
FEEDER A SEL BIAS	-7.085	-7.21		0.5	-8	5				
FUEL AIR D SEL BIAS	-4.029	-3.731		2	-5	5				
FEEDER B SEL BIAS	1.115	1.225		0.5	-8	5				
AUXDPR EF SEL BIAS	0.25	0.312		2	-10	10				
AUXDPR CD SEL BIAS	-0.375	-0.437		2	-10	10				
FUEL AIR E SEL BIAS	4.029	3.966		2	-5	5				
FEEDER E SEL BIAS	2.318	2.193		0.5	-8	5				
AUXDPR BC SEL BIAS	-0.469	-0.594		2	-10	10				
FEEDER C SEL BIAS	0.899	0.883		0.5	-8	5				
FEEDER D SEL BIAS	1.153	1.184		0.5	-8	5				
FEEDER F SEL BIAS	1.593	1.718		0.5	-8	5				
AUXDPR AB SEL BIAS	-0.11	-0.142		2	-10	10				
AUXDPR FF SEL BIAS	0.038	0.069		2	-10	10				
FUEL AIR F SEL BIAS	-0.657	-0.658		2	-5	5				
AUXDPR AA SEL BIAS	0.036	0.034		2	-10	10				
G SOFA TILT SEL BIAS	0	*MV Disabled*		1	-5	5				
GA SOFA DMPR SEL BIAS	0	*MV Disabled*		3	-15	15				
GB SOFA DMPR SEL BIAS	0	*MV Disabled*		3	-15	15				
H SOFA TILT SEL BIAS	0	*MV Disabled*		1	-5	5				
HA SOFA DMPR SEL BIAS	0	*MV Disabled*		3	-15	15				
HB SOFA DMPR SEL BIAS	0	*MV Disabled*		3	-15	15				
O2 TRIM SEL BIAS	-0.57	*MV Disabled*		0.1	-0.5	-0.2				
WB FURN SEL BIAS	0	*MV Disabled*		0.1	-2	2				

Ready


ProcessLink
Session
Documents
Debug
Help
Unit 3: CombustionOpt Analysis
1 week
10/30/2008 02:26:00 PM
Overview
Tools
Models
Optimization
Model Group :
NOx
Model :
CEM NOx f(flux/u,COpt)
All Inputs
Input Group :
Empty
Trend
Std. Error
Sensitivity
Surface
Actual (0.085)
Predicted (0.088)
(lb/MBtu)
0.23
0.22
0.21
0.20
0.19
0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.08
10/24/2008 11:45 PM
10/26/2008 9:25 AM
10/27/2008 7:05 PM
10/29/2008 4:45 AM
10/30/2008 2:26 PM
Print
Trend
Export
Quick Export
Add Group
Zoom
Clear Selection
Axis Grid
Show Legends
Causality
Actual
Predicted


ProcessLink
Session
Documents
Debug
Help
Modelled Function:
CEM NOx f(flux/u,COpt)
4060.280
10/28/2008 07:59:57 PM
FEEDER F SEL BIAS
AUXDPR BC SEL BIAS
AUXDPR CD SEL BIAS
Total Fuel Flow.result
AUXDPR AB SEL BIAS
FUEL AIR A SEL BIAS
FUEL AIR E SEL BIAS
AUXDPR FF SEL BIAS
FEEDER D SEL BIAS
FEEDER C SEL BIAS
FUEL AIR D SEL BIAS
FEEDER A SEL BIAS
FEEDER E SEL BIAS
AUXDPR AA SEL BIAS
FUEL AIR C SEL BIAS
FUEL AIR F SEL BIAS
AUXDPR EF SEL BIAS
SO2 LEVEL.Avg
FEEDER B SEL BIAS
AUXDPR DE SEL BIAS
FUEL AIR B SEL BIAS
Predicted (0.084)
FEEDER F SEL BIAS (5)
0.12
0.11
0.10
0.09
0.08
(lb/MBtu)
5.00
4.00
3.00
2.00
1.00
0.00
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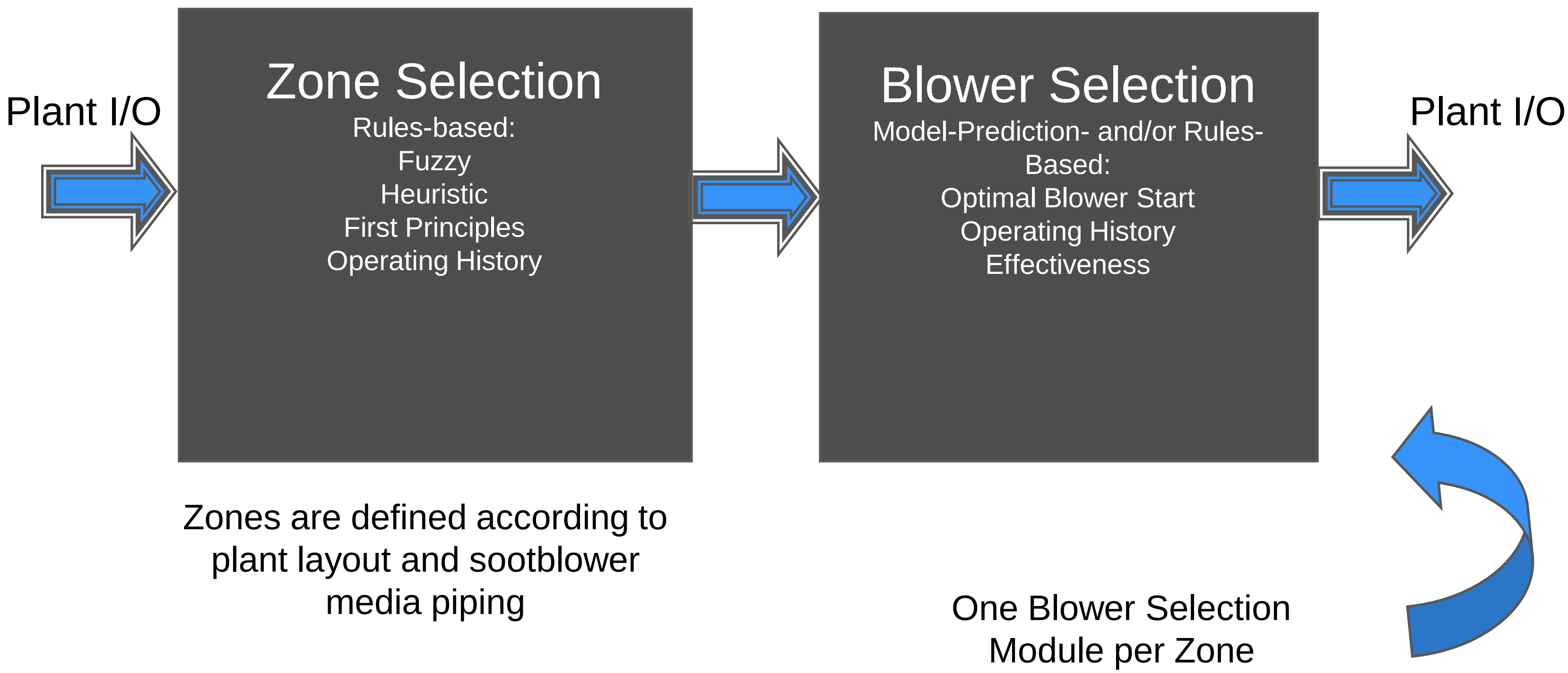
10/28/2008 7:03 AM
10/28/2008 8:36 PM
10/29/2008 10:08 AM
Ready

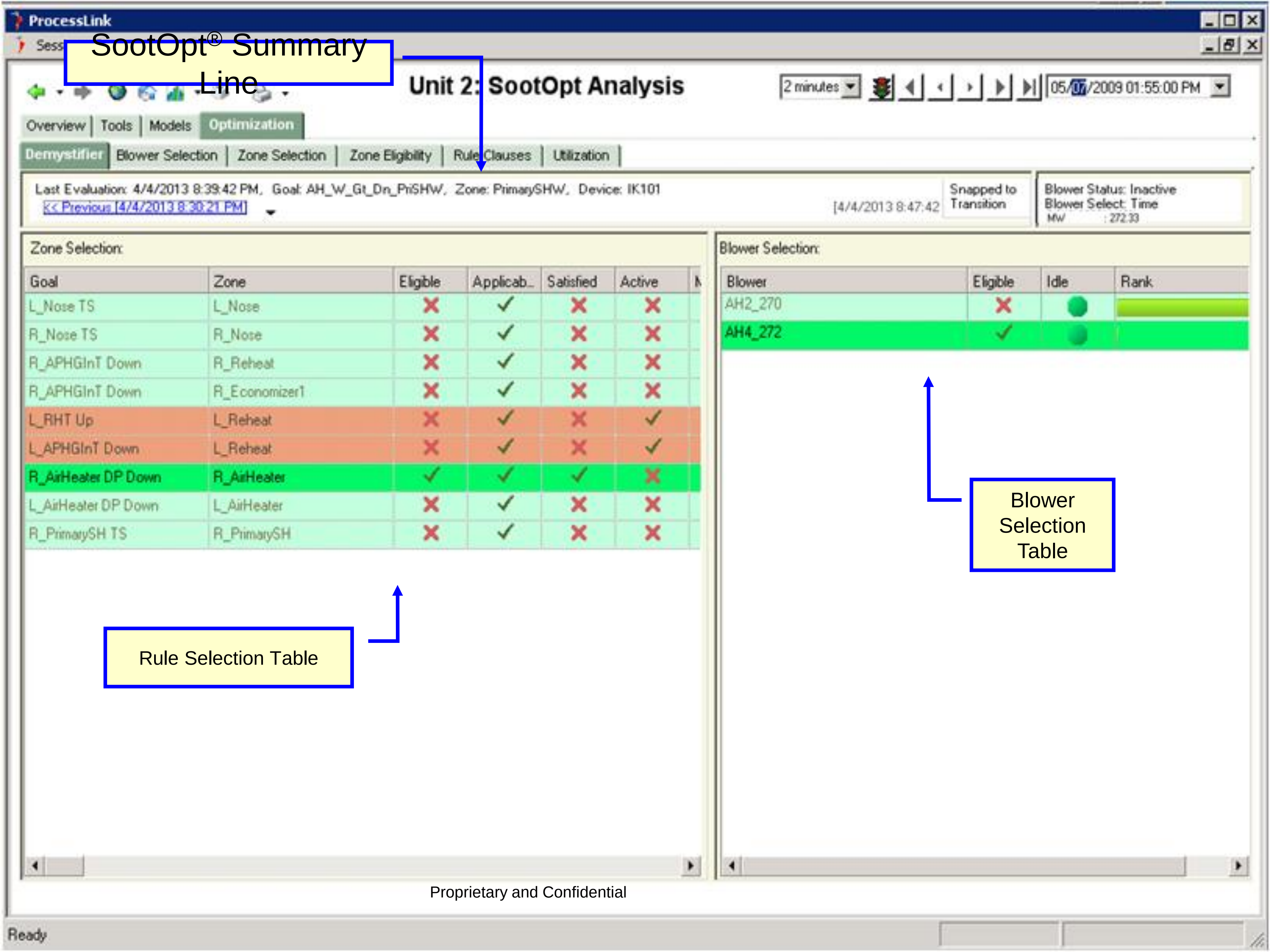
SootOpt ®

Real-time closed-loop optimization of boiler cleaning equipment using expert rules, thermal calculations and neural networks

- Reduced and more tightly controlled APH temperatures
- Improved SH and RH steam temperature control
- Reduced attemperation sprays
- Heat rate reduction of 0.75% - 1.50%
- Incremental NOx reduction of 2.5% - 5%
- Avoided opacity excursions
- Reduced blowing of 10% - 35%
- Avoided thermal stress from blowing surfaces
- Fewer tube-leak failures
- Improved situational awareness insight

Overview: How SootOpt Works




SootOpt® Summary Line
Rule Selection Table
Blower Selection Table
ProcessLink
Unit 2: SootOpt Analysis
2 minutes
05/07/2009 01:55:00 PM
Overview | Tools | Models | Optimization
Demystifier | Blower Selection | Zone Selection | Zone Eligibility | Rule Clauses | Utilization
Last Evaluation: 4/4/2013 8:39:42 PM, Goal: AH_W_Gt_Dn_PriSHW, Zone: PrimarySHW, Device: IK101
<< Previous [4/4/2013 8:30:21 PM]
[4/4/2013 8:47:42
Snapped to Transition
Blower Status: Inactive
Blower Select: Time
MW : 272.33
Zone Selection:
Goal | Zone | Eligible | Applicab.. | Satisfied | Active
L_Nose TS | L_Nose
R_Nose TS | R_Nose
R_APHGlnT Down | R_Reheat
R_APHGlnT Down | R_Economizer1
L_RHT Up | L_Reheat
L_APHGlnT Down | L_Reheat
R_AirHeater DP Down | R_AirHeater
L_AirHeater DP Down | L_AirHeater
R_PrimarySH TS | R_PrimarySH
Blower Selection:
Blower | Eligible | Idle | Rank
AH2_270
AH4_272
Ready

ProcessLink

Session Documents Debug Help

Unit 3: SootOpt Analysis

1 day | 08/27/2008 01:28:00

Overview | Tools | Models | **Optimization**

Demystifier | Blower Selection | **Zone Selection** | Zone Eligibility | Rule Clauses | Utilization

Goal	Zone	pray flo...	✗ SH temp high	✗ RH temp high	✗ SH temp low	✓ RH temp low	✓ RH temp bel...	✗ APH 3A DP...
Lower RH Steam Temp	RH_Platen			✓				
Lower RH Steam Temp	RH_Furnace			✓				
Reduce APH 3A Gas In Temp	SH_Convection		✗					
Reduce APH 3A Gas In Temp	SH_Economizer		✗					
Reduce APH 3A Gas In Temp	SH_Platen				✗			
Reduce APH 3A Gas In Temp	SH_Furnace				✗			
Raise RH Steam Temp	RH_Convection					✓		
Raise RH Steam Temp	RH_Economizer					✓		
Raise SH Steam Temp	SH_Convection				✓			
Raise SH Steam Temp	SH_Economizer				✓			
Lower SH Steam Temp	SH_Furnace		✓					
Lower SH Steam Temp	SH_Platen		✓					
Reduce APH 3B Gas In Temp	RH_Furnace					✗		
Reduce APH 3B Gas In Temp	RH_Platen					✗		
Reduce APH 3B Gas In Temp	RH_Convection						✓	
Reduce APH 3B Gas In Temp	RH_Economizer						✓	
Limit Idle Time SH Furn	SH_Furnace				✗			
Limit Idle Time SH Platen	SH_Platen				✗			
Limit Idle Time SH Conv	RH_Convection		✗					
Limit Idle Time SH Econ	SH_Economizer		✗					
Limit Idle Time RH Furn	RH_Furnace					✗		
Limit Idle Time RH Platen	RH_Platen					✗		
Limit Idle Time RH Conv	RH_Convection						✓	

Ready | Data Engine Busy

Strategic Investment with Measurable ROI

Reduces CO_2 footprint

- 1% heat rate reduction saves fuel and reduces CO_2 emissions 1%
- CO_2 reductions made after 2012 are recognized by EPA Clean Power Rule

Lowers cost and increases reliability of NO_x / CO control

- BART / NAAQS
- Lower fleet NO_x and required SCR / SNCR investment

EPA recognizes neural-net technology as a best practice technology

- Required in many consent decrees
- Included in DOE long term technical roadmap
- Encouraged by MATS rule

MATS compliance risk and cost reduction

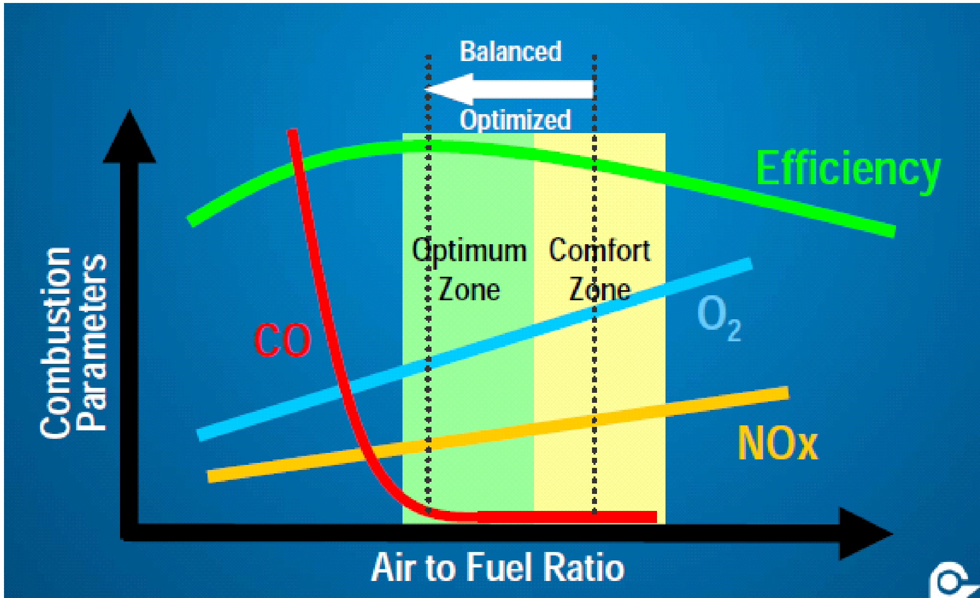
- Reduce EPA data retention, required compliance tasks, frequency

DTE Belle River Case Study

Imagination at work

DTE Belle River Unit 2 Problem History

- Imbalanced combustion creates areas of high slagging in SH and RH pendants
- Multiple cleaning outages required every year
- Boiler operated in high excess air (30-35%) "comfort zone" to minimize slagging
  - Less potential for low air / high slag areas
  - Lower FEGT
  - High NOx, Heat Rate, CO2 emissions, etc.
  - Very large imbalances still resulted in slagging
- Limited success with boiler tuning
  - Little process data
  - Engineer's / Operators stuck making "educated guesses"
  - Boiler conditions constantly changing
  - Constant "retuning" required
- Needed to find a way to exploit available data and control functionality



				Manual Tuning		Neuco Tuning	
	Baseline Heat Rate Test 07/27/10	Manual Tuning Heat Rate Test 07/28/10	Neuco Tuning Heat Rate Test 07/30/10	Manual Tuning Change (Absolute)	Manual Tuning Change (Relative, %)	Neuco Tuning Change (Absolute)	Neuco Tuning Change (Relative, %)
Gross Load, MW	647.954	647.948	645.058	-0.006	0.00%	-2.896	-0.45%
Net Load, MW	606.641	608.604	607.743	1.964	0.32%	1.102	0.18%
Auxiliary Power, MW	41.313	39.343	37.315	**-1.970**	**-4.77%**	**-3.998**	**-9.68%**
Raw Net Unit Heat Rate (Heatloss), BTU/kWhr	10517	10402	10331	-115	-1.10%	-186.0	-1.77%
Corrected Net Unit Heat Rate (Heatloss), BTU/kWhr	10393	10286	10224	**-108**	**-1.0%**	**-169.184**	**-1.63%**
Net Unit Heat Rate (Input/Output), BTU/kWhr	10493	10362	Not Avail.	-131	-1.25%	Not Avail.	Not Avail.
Corrected Net Unit Heat Rate (Input/Output), BTU/kWhr	10458	10358	Not Avail.	-100	-0.96%	Not Avail.	Not Avail.
Nox, lb/MBTU	0.2513	0.2025	0.2010	**-0.0488**	**-19.43%**	**-0.050**	**-20.02%**
CO, PPM	88	78	157	-10	-11.18%	68.200	77.18%
CO2 Intensity, Tons CO2/MWhr	1.069	1.047	1.043	**-0.02**	**-2.06%**	**-0.03**	**-2.43%**
Total Boiler Air Flow, klb/hr	6313	5926	5483	-387	-6.13%	-830	-13.14%
Average Excess O2, %	4.39%	3.23%	2.45%	-1.15%	-26.31%	-0.019	-44.18%
Excess Air, %	30.50%	20.75%	15.12%	**9.75%**	**-31.97%**	**-15.38%**	**-50.43%**

APS Four Corners Case Study

Imagination at work

APS Four Corners Case Study

Initial success with CombustionOpt at Unit 3 led initially to deployment on Units 1-2

- All older front-fired 170-200 MW pulverized coal boilers

Success on Units 1-3 led to adding Units 4-5

Initial Objectives: HR & Opacity, NOx added later

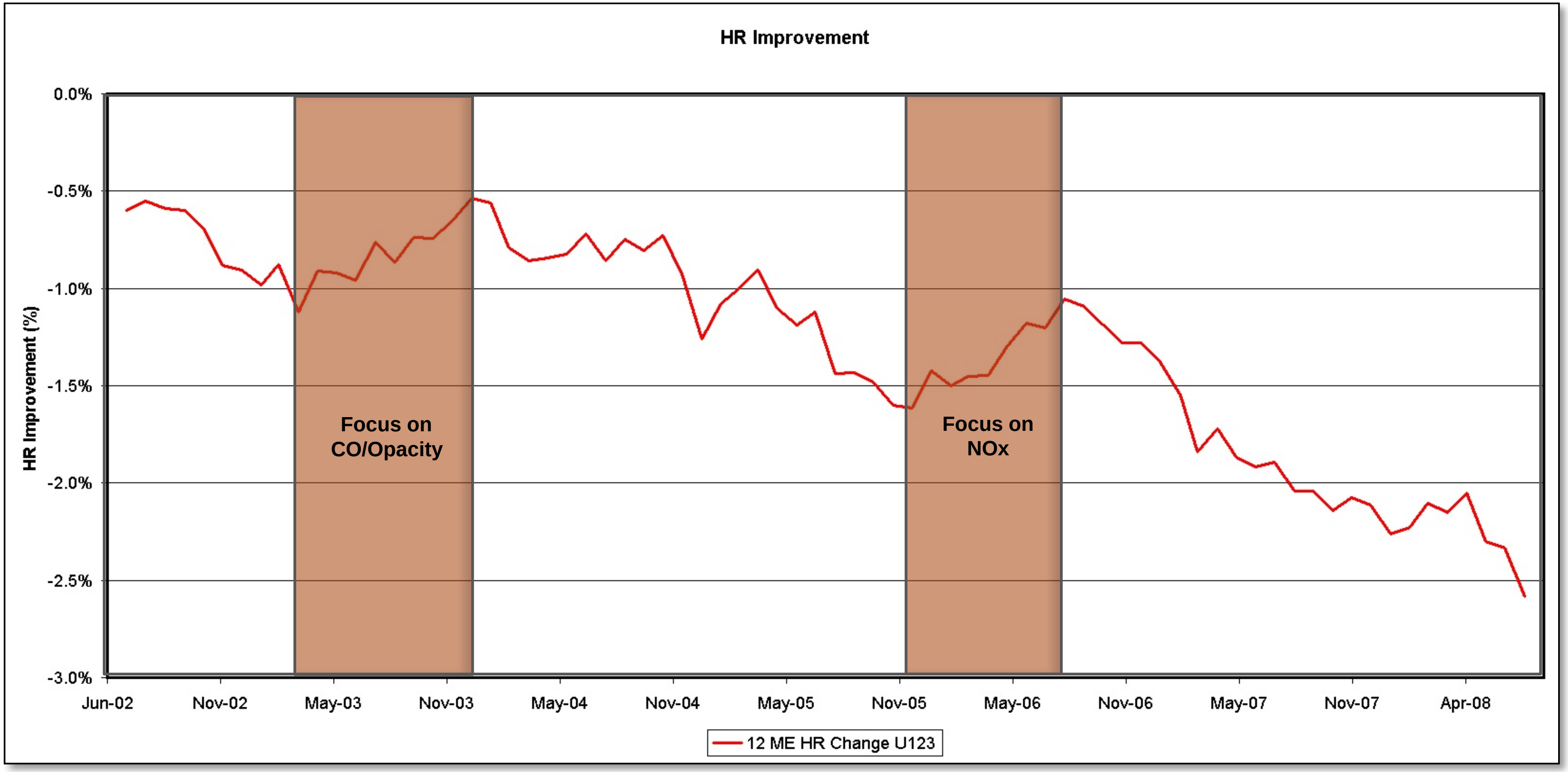
Ten years of benefits led to widespread roll-out of new optimization products

- SootOpt, M'Opt, P'Opt at all five Four Corners Units
- C'Opt, SootOpt, P'Opt at all three APS-owned Cholla units

Also populating centralized fleet monitoring center

- "Extra eyes" and subject experts for coal units
- Remote monitoring and optimization for gas-fired units

APS Four Corners Heat Rate Improvement Over 7 Years



Overall APS Fossil Objectives & Initiatives

Fossil-wide performance improvement team established.

DTE Belle River Unit 2

B&W opposed wall-fired, balanced draft boiler

- Built in 1984
- Normal full load of 645 gross MW, Max load with overfire of 685 gross MW (turbine limited)
- Pulverized coal from 8 B&W MPS-89 pulverizers, 7 operate during normal operation
- 5 burners per mill, 40 total
- Originally 4 burner levels per wall, burners replaced with LNB and redistributed into 3 levels
- Top level of burners replaced with OFA ports (1/3 and 2/3 control dampers in each port)
- 6 single-point extractive type O2 probes at economizer exit
- LAND CO monitor and CEMS CO2 measurement in the stack

ABB INFI 90 distributed control system (DCS) with remote position control of

- Burner secondary air shrouds and OFA dampers
- OFA ratios / compartment dampers
- Mill feeder speeds and primary air dampers
- FD Fan inlet vanes for excess air/O2 control

PI system stores plant data

CPS San Antonio Case Study

Optimization History at CPS Energy

CombustionOpt initially installed on all existing coal-fired units

- Spruce: 546 MW CE t-fired w/Ovation DCS
- Deely: 2 x 446 MW CE t-fired w/Honeywell DCS

First installed at Spruce 1 in 2001

Installed at both Deely units in 2004

Primary objective of NOx reduction

Multivariate predictive control added in 2007

Additional objectives addressed through MPC

- Explicit steam temperature control
- Minimize attemperation sprays
- Incremental heat rate and NOx reduction

SootOpt added to Spruce in 2010 and Deely in 2011

Spruce 2 project now getting underway

J.K. Spruce Power Plant

Calaveras Power Plant Complex, South East of San Antonio, TX

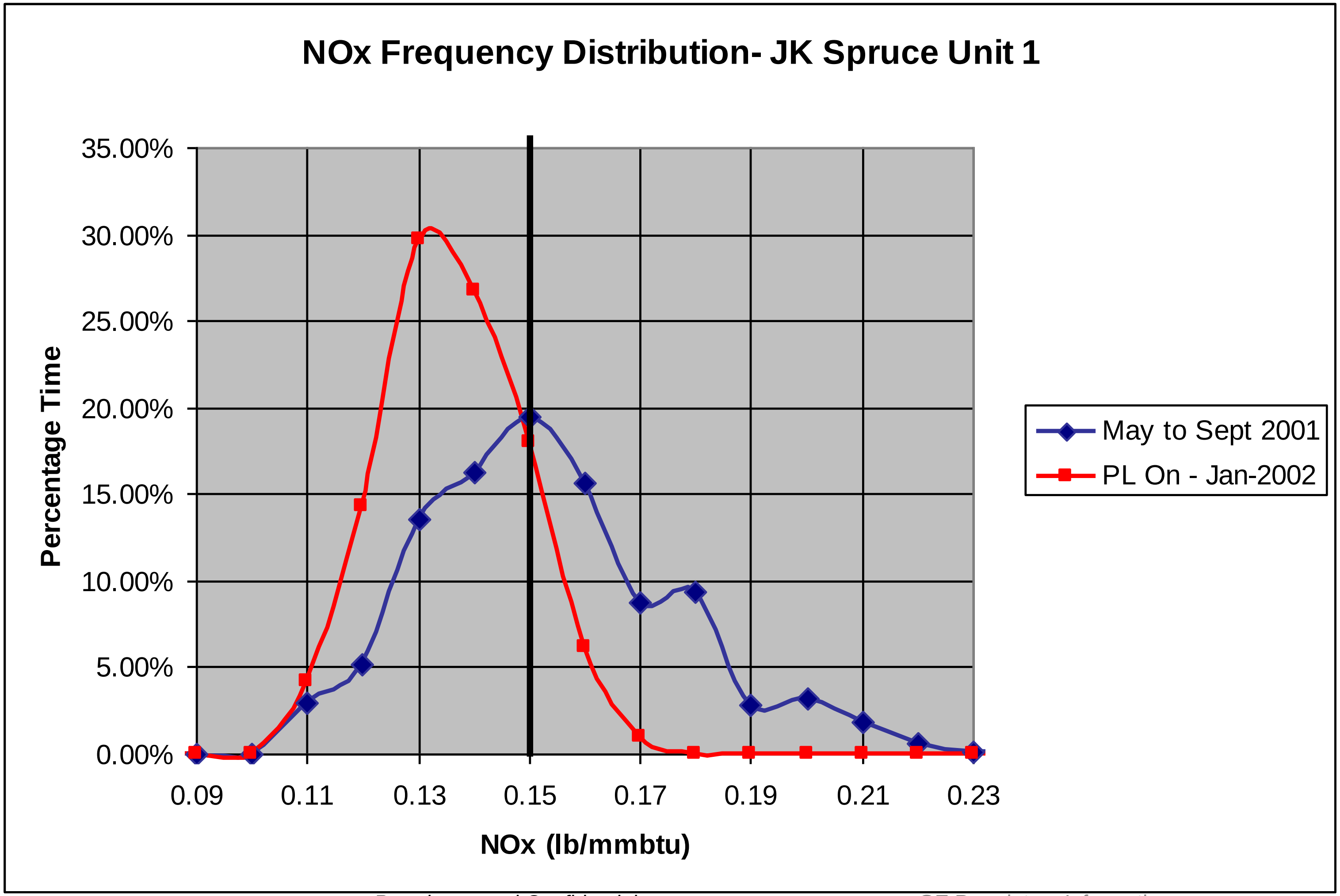
J.K. Spruce 1 commissioned in 1990

600 MW Alstom-CE T-fired unit

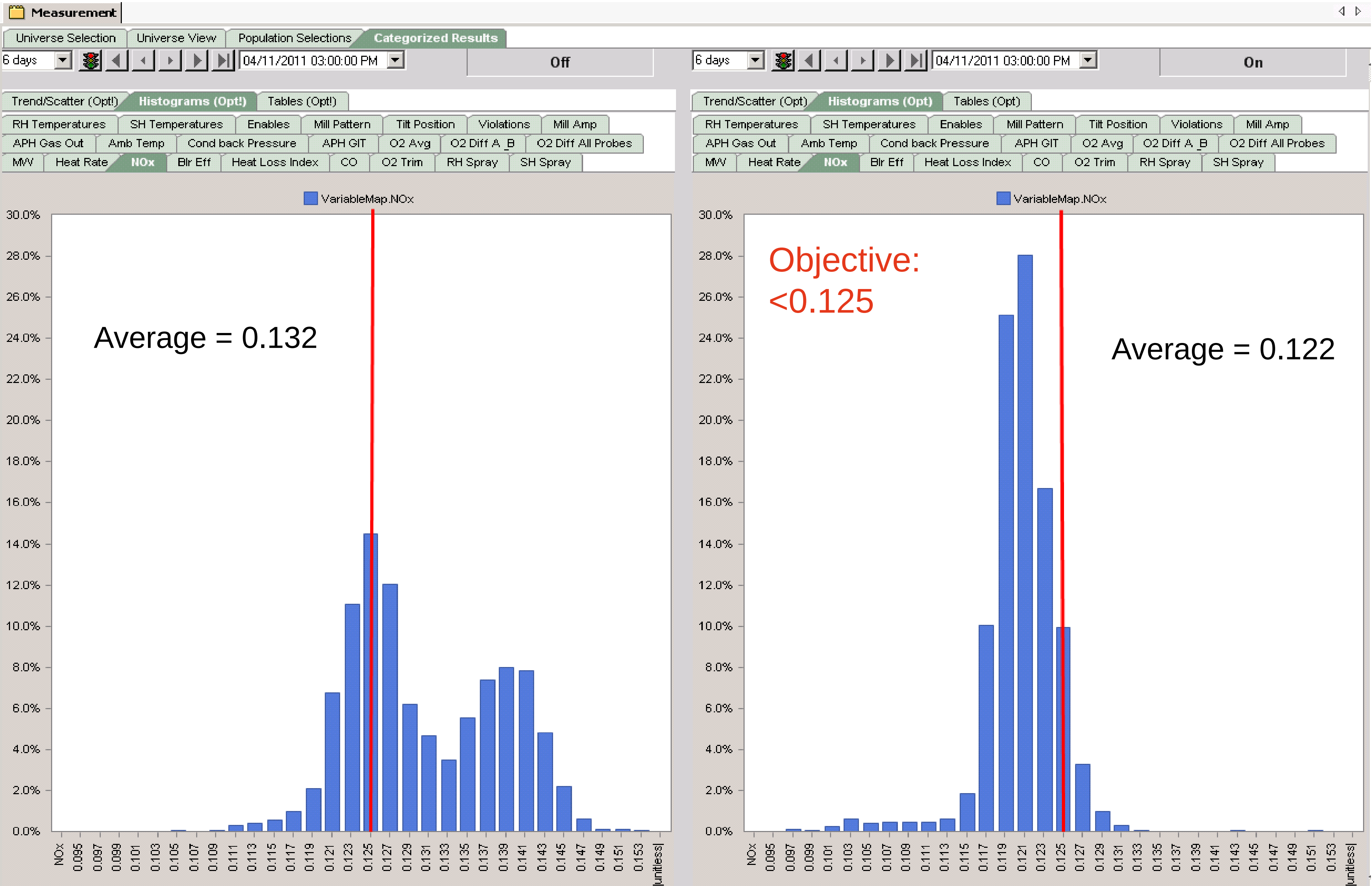
Emerson Ovation DCS

Spruce 2 commissioned 2011: 750 MW CE T-fired boiler with SCR

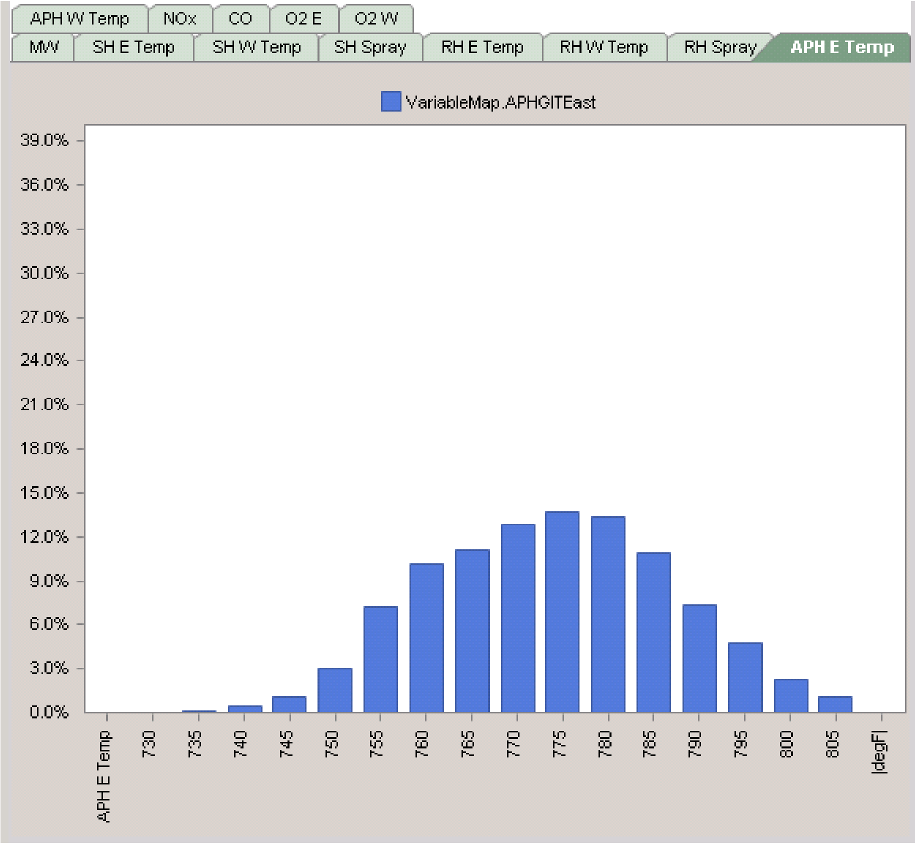
Initial CombustionOpt NOx Results at JK Spruce

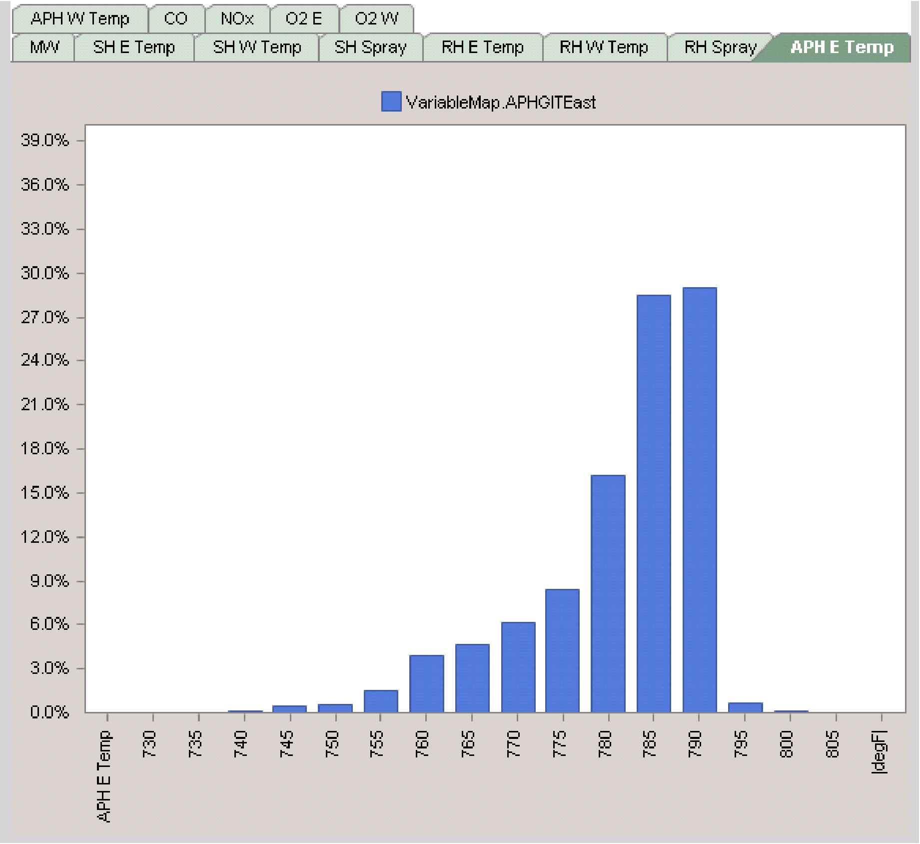


BoilerOpt Impact on Spruce 1 NOx



Spruce 1 East APH Temp SootOpt





BoilerOpt Impact on Spruce 1 Heat Rate

Spruce 1 BoilerOpt KPI Summary

Spruce Unit 1					
KPI	**Units**	**OFF**	**ON**	**Delta (ON - OFF)**	**Delta (%)**
Gross MW	MW	571.15	564.57		
Heat Rate	Btu/kWh	9661.32	9556.74	-104.58	-1.08%
Blr Eff	%	83.99	84.77	0.78	0.93%
NOx	#/MMBtu	0.127	0.121	-0.006	-4.72%
CO	ppm	107.06	123.06	16	14.94%
O2 Avg	%	2.277	1.912	-0.365	-16.03%
RH Temp E	degF	1003.64	1003.88	0.24	0.02%
RH Temp W	degF	1002.96	1003.33	0.37	0.04%
RH Spray	klb/h	91.43	87.54	-3.89	-4.25%
SH Temp E	degF	1003.26	1004.12	0.86	0.09%
SH Temp W	degF	1000.16	1003.84	3.68	0.37%
SH Spray	klb/h	14.9	21.89	6.99	46.91%

JT Deely Power Plant

Calaveras Power Plant Complex, South East of San Antonio, TX.

J.T. Deely 1 & 2 plants commissioned in 1977 & 1978

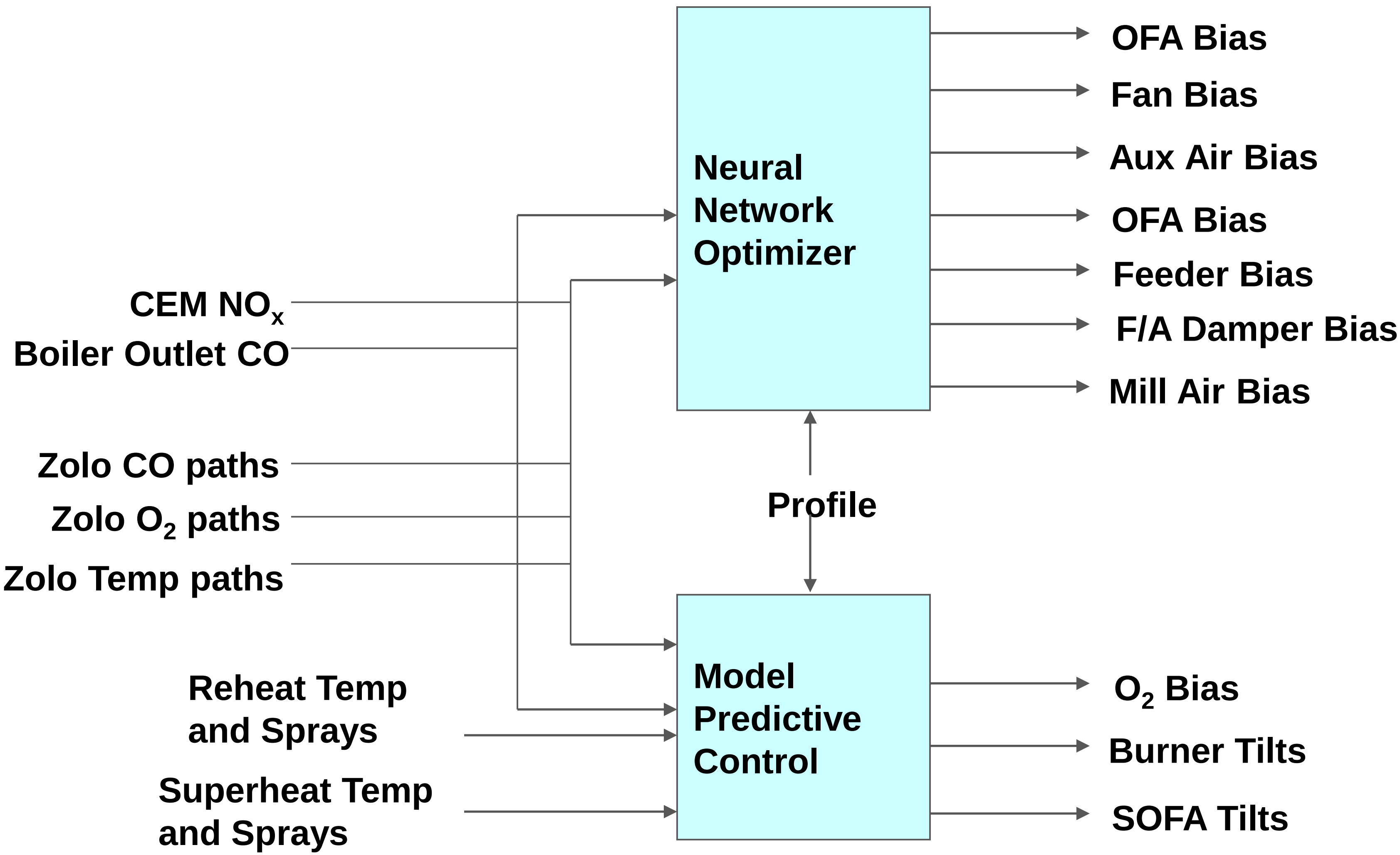
Boilers are identical 446 MW Alstom-CE T-fired units

Common stack

Low-NOx burner tips and

Honeywell DCS

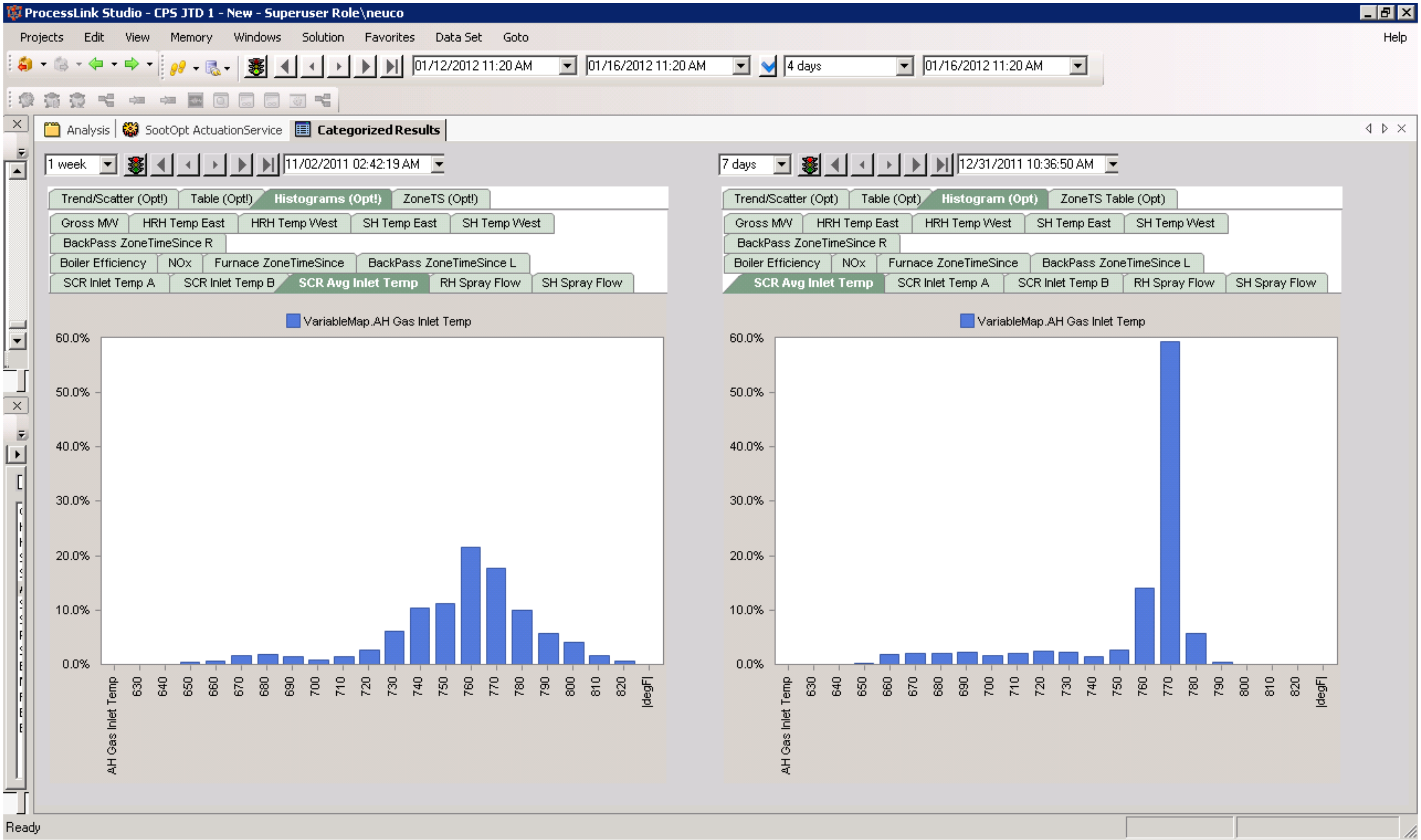
Adding MPC to CombustionOpt at Deely



On vs. Off Results after Adding MPC at Deely

Performance Parameter	OFF	ON	CHANGE
NO_X lbs/mmBTU at stack	0.138	0.112	-19%
CO PPM at stack	8	52 (within limit)	44 ppm
O_2% in back pass	2.7	2.3	-14.6%
PerfIndex (Fuel Efficiency Index)	776	772	-0.6%
MW Load	Full	Full	Minor fluctuations

Deely 2 SCR Inlet Temps



SCR/SNCR Systems & Optimization

Reduce Reagent Usage

Lengthen Maintenance Intervals

Avoid Ammonia Slip

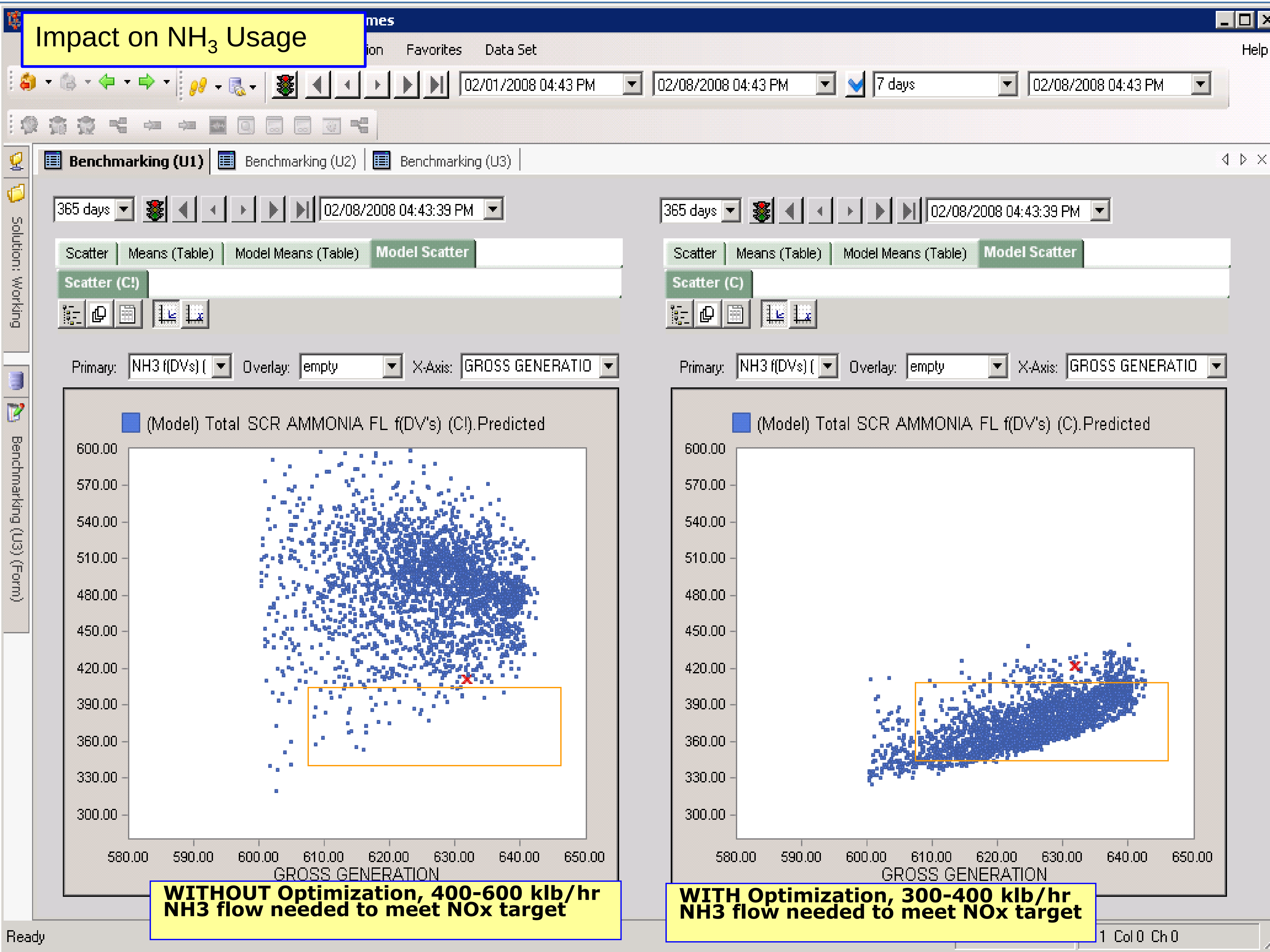
Reduce risk of Ammonium Bisulfate & Sulfur Trioxide deposits

Control “Blue-Plume” Opacity Excursions

Tighter, condition-based gas temperature control

Better Manage Interactions

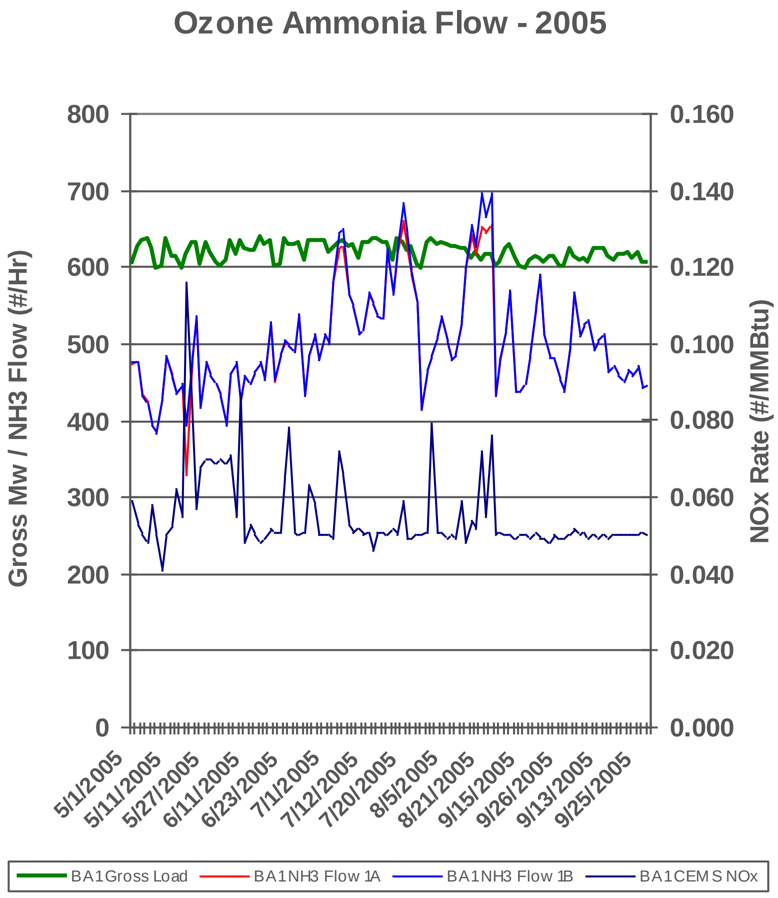
Impact on NH_3 Usage

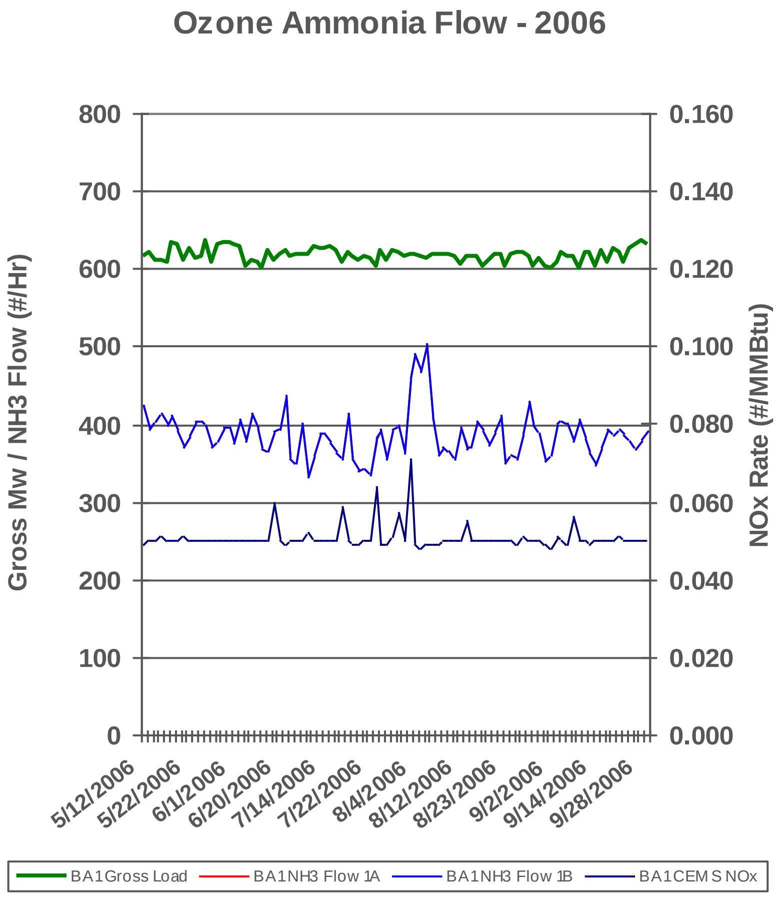


WITHOUT Optimization, 400-600 klb/hr NH3 flow needed to meet NOx target

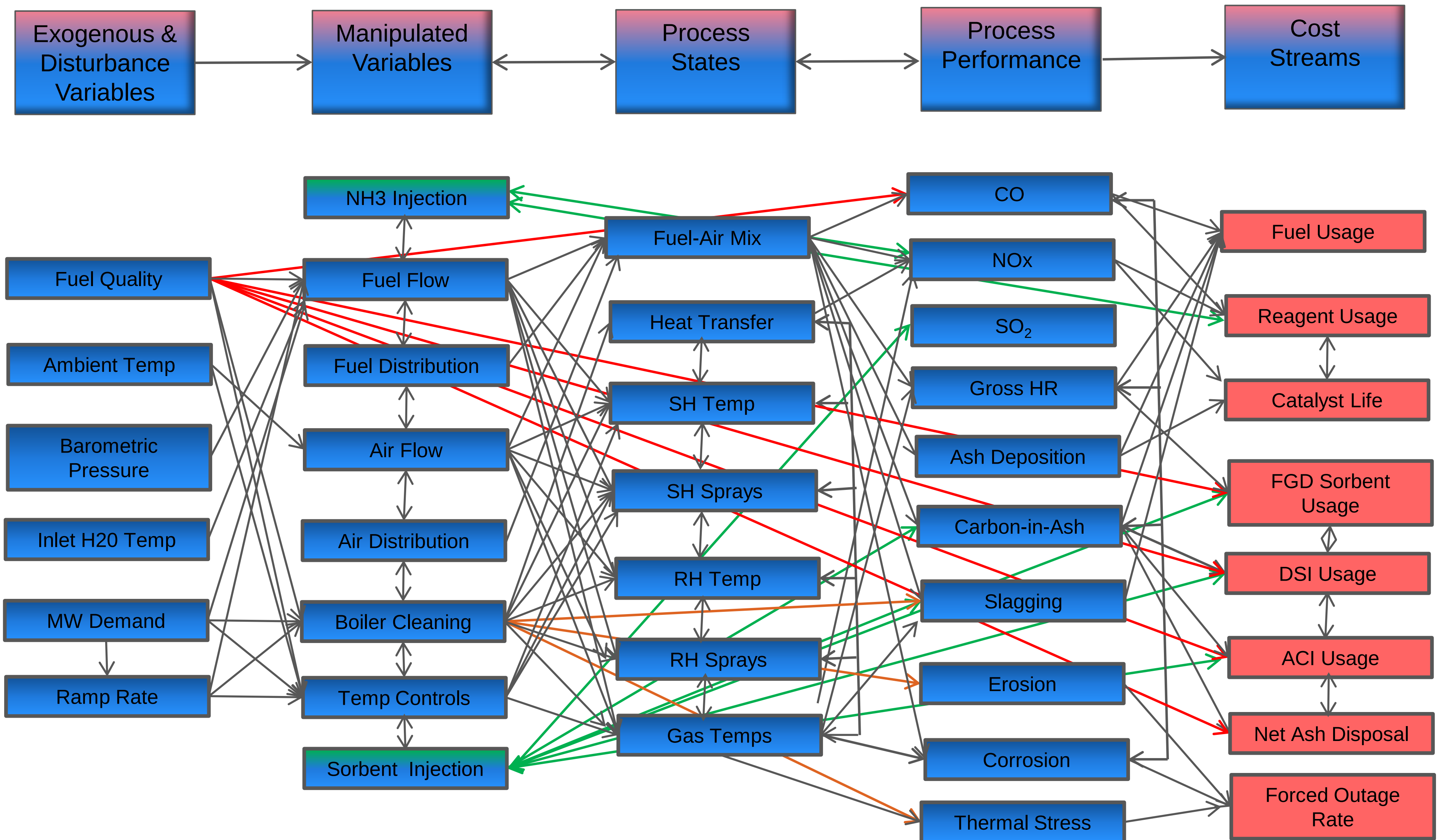
WITH Optimization, 300-400 klb/hr NH3 flow needed to meet NOx target

CombustionOpt Ammonia Reduction





Boiler and Back-end Processes



Xcel Energy Case Study

Imagination at work

Overall Xcel Optimization Initiative

Xcel SPS decided to adopt boiler optimization software (fuel-air and heat transfer components)

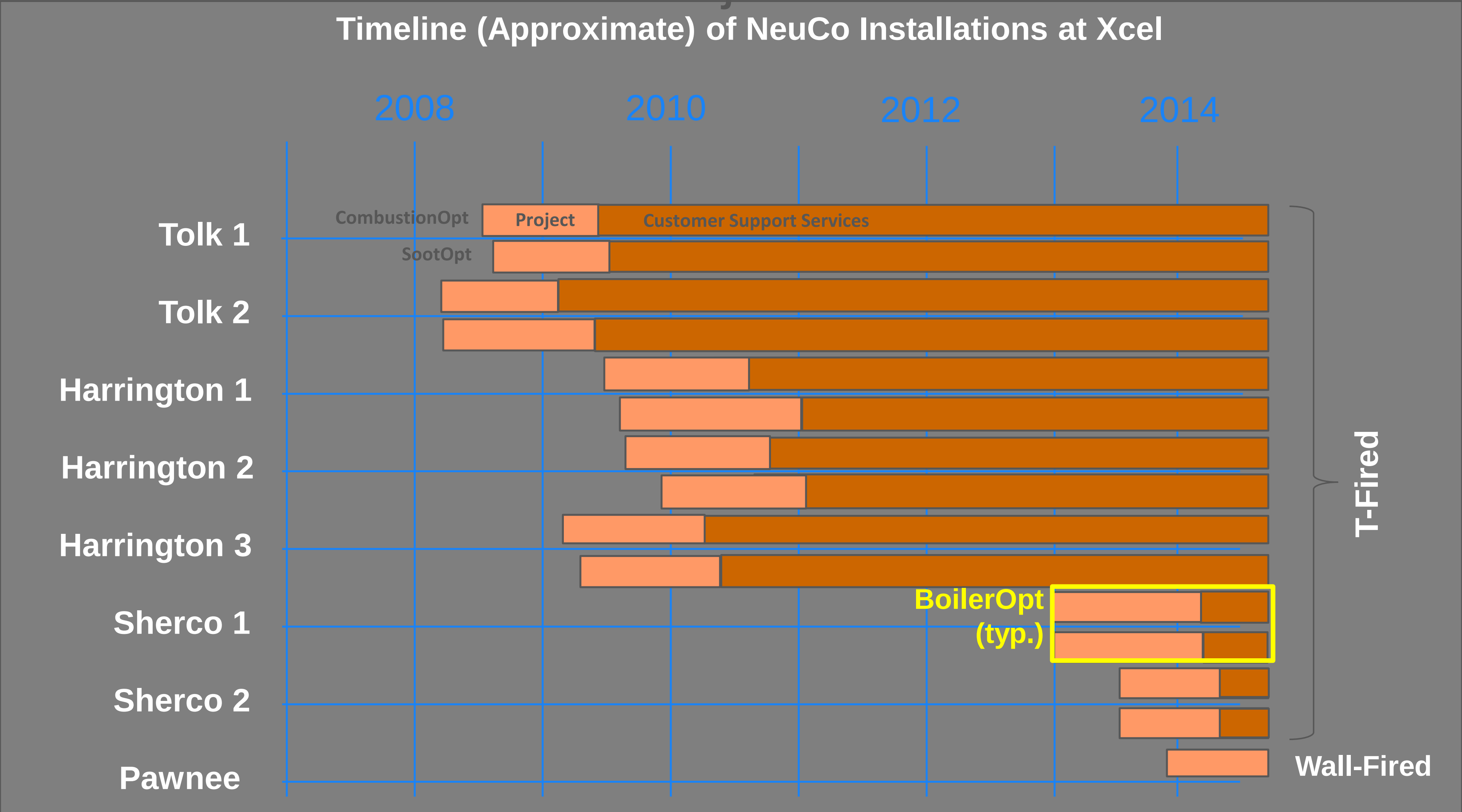
Tested NeuCo's BoilerOpt® system at Tolk station early-mid 2009

Applied to Harrington Unit 3 in October 2009

Rolled out to Harrington Unit 2 and Unit 1

Xcel subsequently standardized on BoilerOpt as part of their fleet-wide boiler reliability program, with additional installations in Minnesota and Colorado completed and underway now

NeuCo at Xcel Energy Project Timeline



BoilerOpt at Xcel Harrington

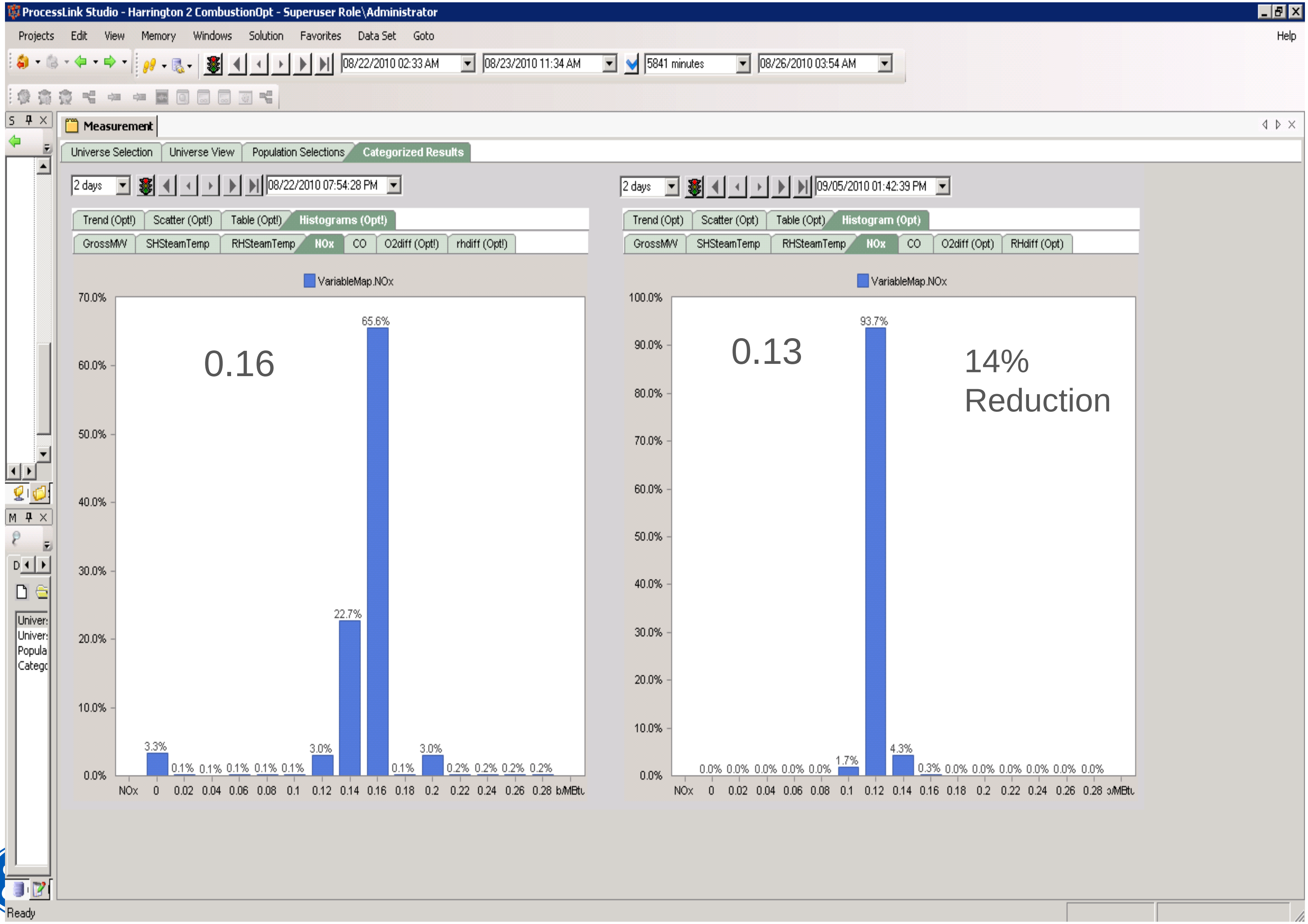
Units 1, 2 and 3 similar units:

- CE T-Fired boilers
- 360 MW each
- Often on AGC between 180 and 360
- 5 Pulverizers
- LNBs, CCOFA and SOFA
- Foxboro I/A DCS

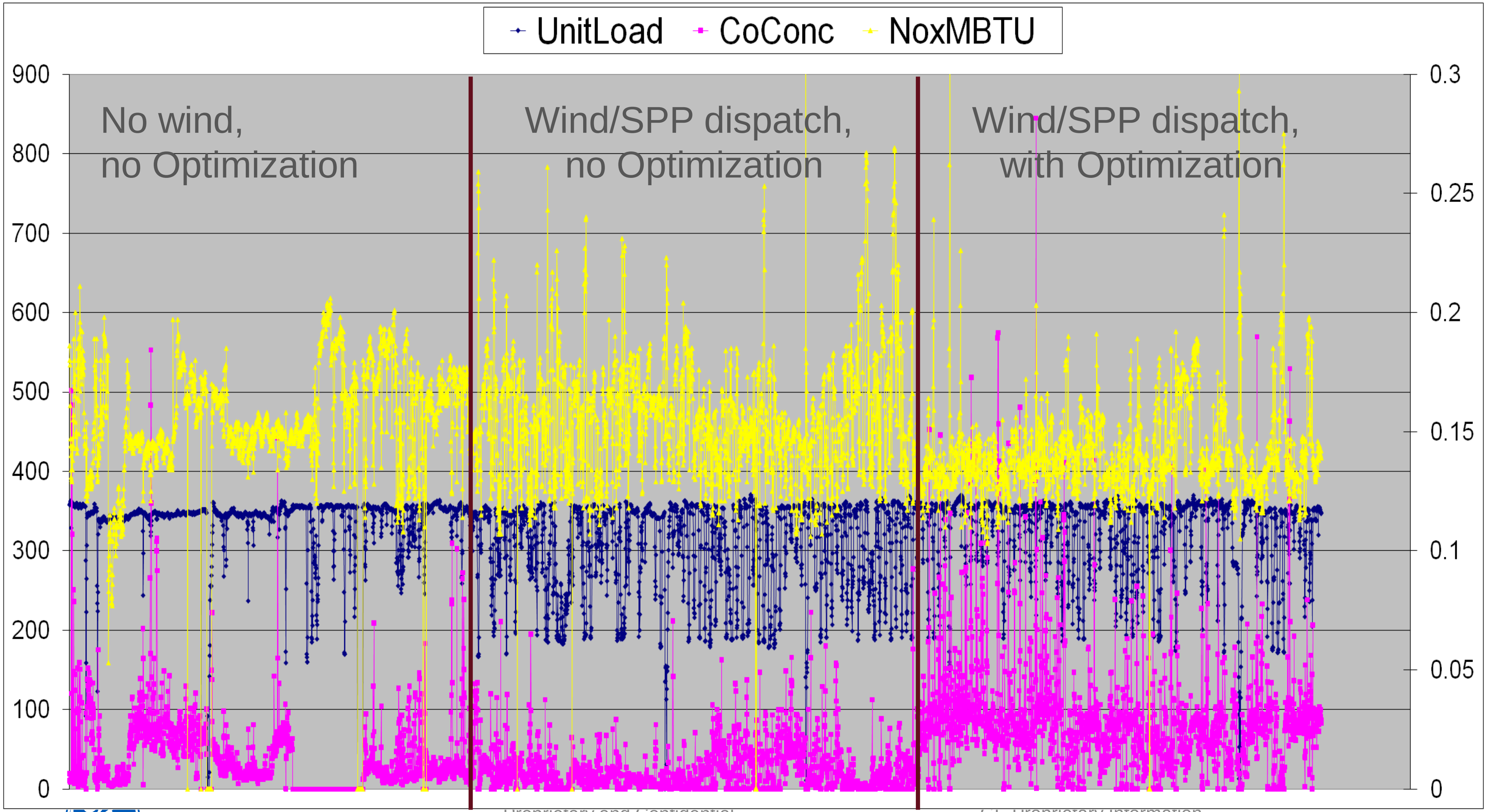
Baghouses on U2 & U3

ESP on U1

Harrington Unit 2 NOx ON/OFF



Harrington Unit 3
Long-Term Trends



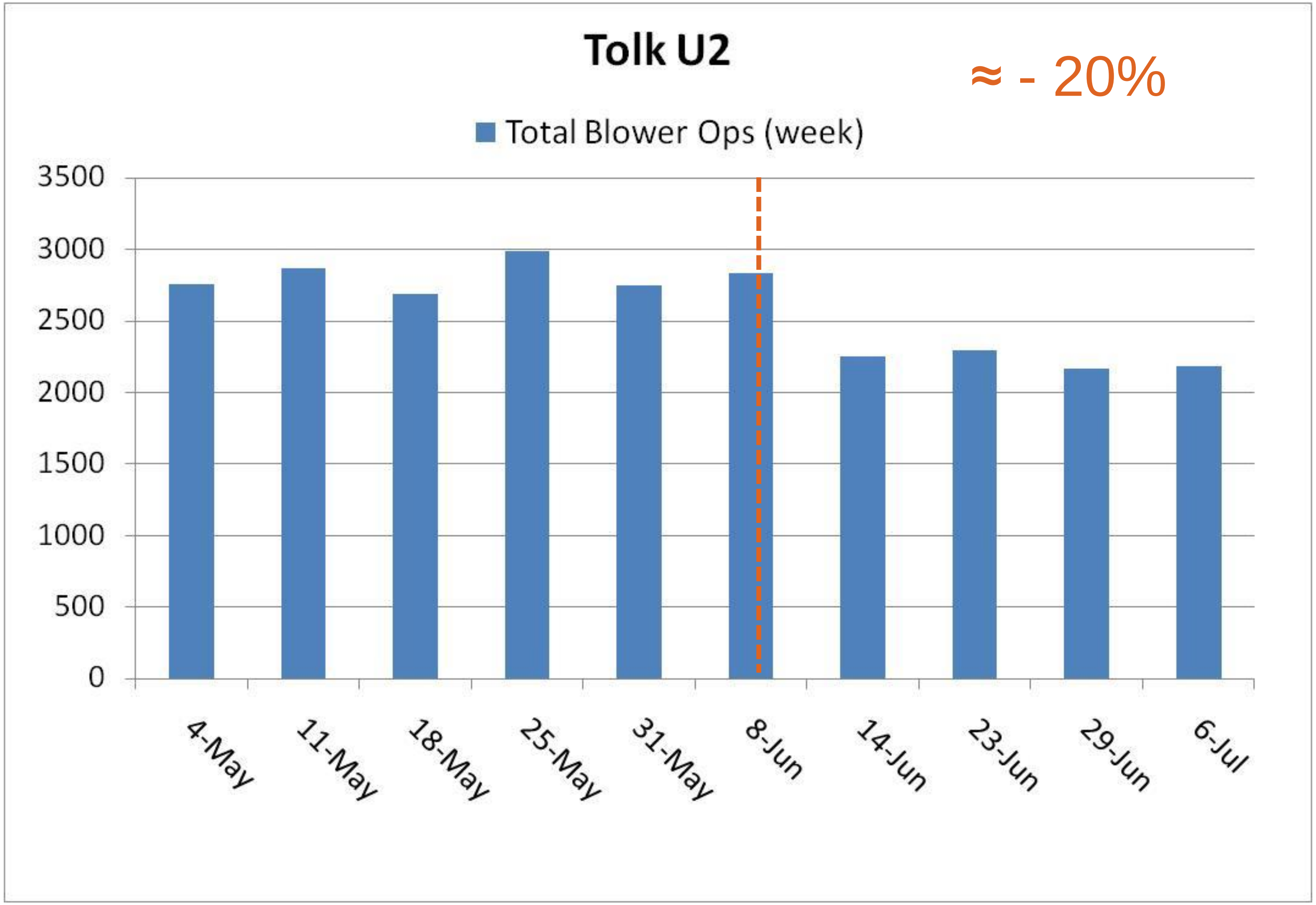
Continuous Improvement
Xcel Tolk example

Using new knowledge

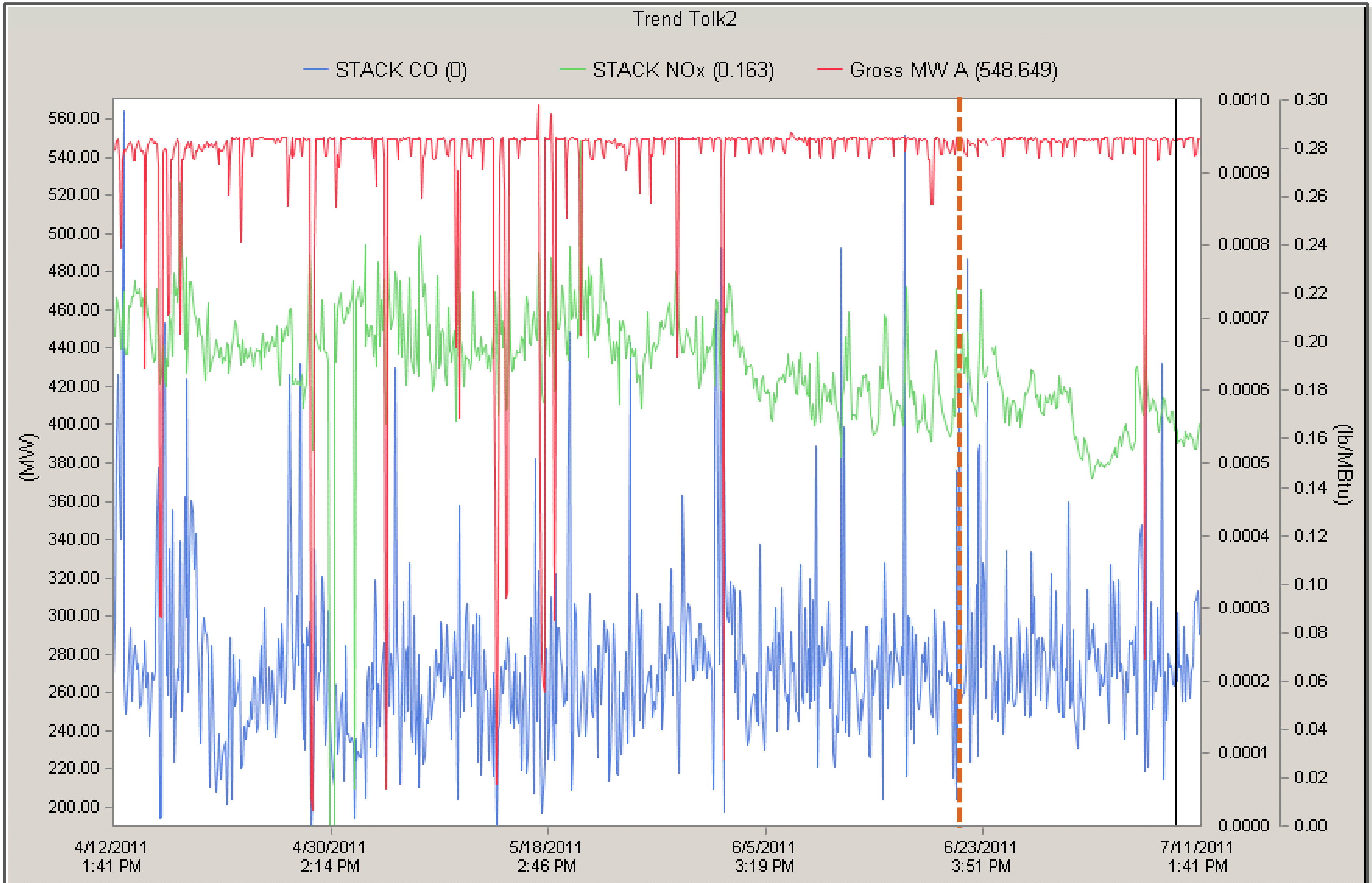
After reviewing the results and our recommendations with plant

- Adjustments were made to the existing Zone/blower map in SootOpt to account for blowers affecting both RH and Platen sections.
- Adjustment were made to deal with a cross-over between DivSH and PlatenSH that had a noticeable effect
- Adjusted existing rules and thresholds
- Added rules that inhibit cleaning when section deltaTemp is at or above it's normal mean, given operating conditions
- Added rules that propose cleaning when section deltaTemp is sufficiently below it's normal mean

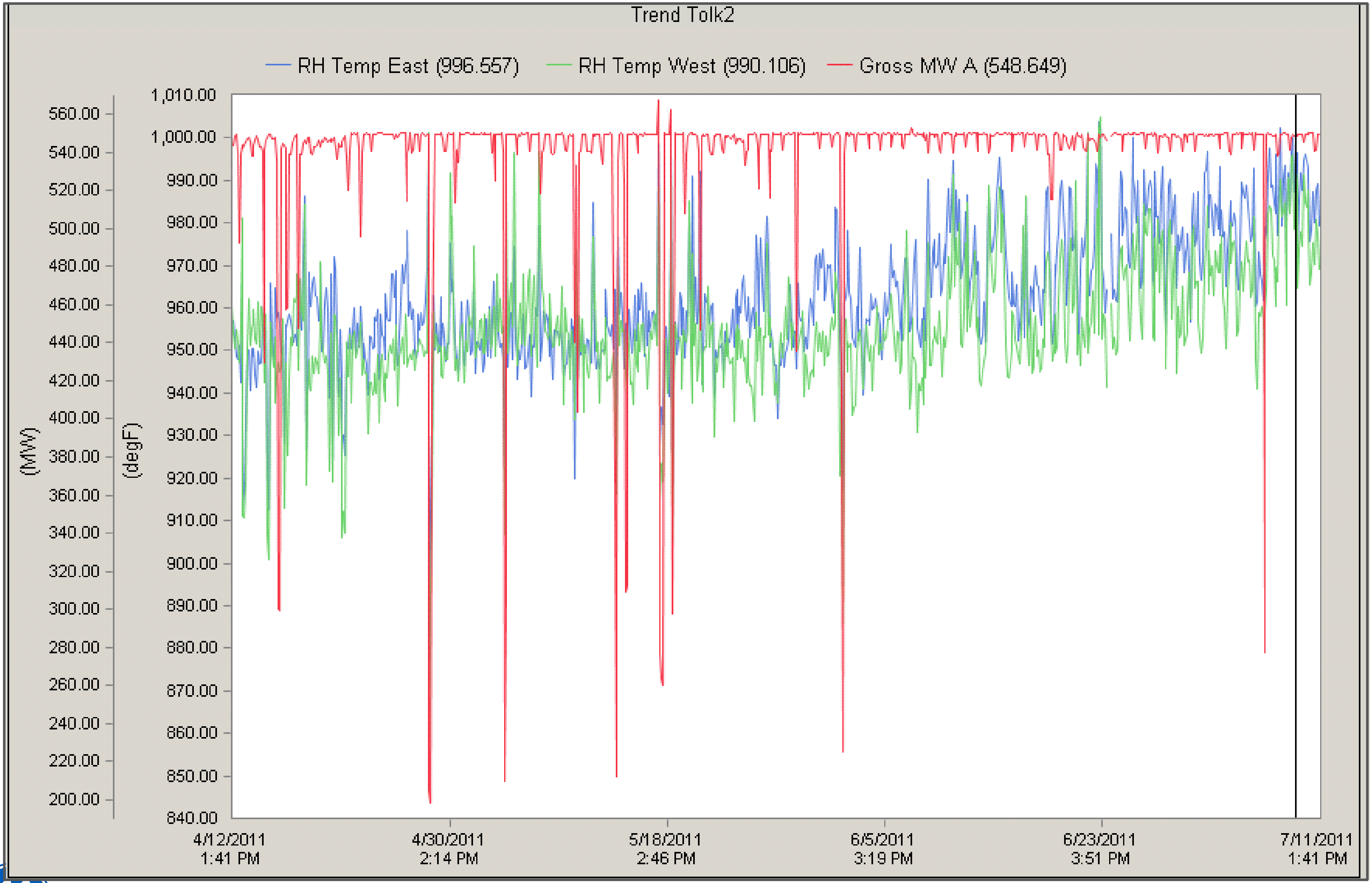
Recent Results Tolk Unit 2: Blower Counts



Recent Results: NOx, CO



Recent Results: RH Temps



Recent Results: Heat Loss Index

Standardize to Improve Fleet Performance

Best operator performance 24 X 7

Fleetwide KPIs and best practices instantiated in software

- KPI tracking common to all units
- Helps newer operators to master operating processes

Lower NOx and heat rate with less stress improves reliability

- Reduces tube leak related unplanned outages
- Minimizes volatility of operations

O&M flexibility and lower O&M cost

- Lengthens interval between required MATS testing, tuning and repair
- Advanced analytics enable early problem detection
- Secure web interface enables leverage on GE engineering expertise

Chehalis Power Project and Currant Creek Power Plant operation supported by GE monitoring center ioutside Atlanta, Ga.

Favorable Regulatory Treatment

Lowers cost to end customer

- Reduces fuel and reagent costs
- More discretion in O&M expense and frequency
- Reduces CO_2 and long-term Clean Power Rule compliance cost

In line with EPA approved technologies

- In rules, consent decrees and long term technology roadmap

Offered with flexible commercial terms to meet PUC requirements

- Capital purchase of perpetual license
- Annual service fee
- Lagged benefits sharing – enables payments after benefits accrued

NERC CIP compliant installation / operation