NeuCo
The Optimization Standard™

OPTions

Volume 7 WINTER 2008

Endings and Beginnings

The past year was significant for NeuCo and for optimization. We celebrated our company's tenth anniversary, opened a Customer Center in Ohio, and launched three new solutions. We also advanced the field of optimization by successfully concluding a four-year Clean Coal Power Initiative (CCPI) project. As the first completed CCPI project in the nation, the five optimizers in place at Dynegy's Baldwin Energy Complex are demonstrating the value that integrated optimization can provide.

In this new year the power generation industry faces considerable hurdles: new market dynamics, increased competitive pressures, additional regulations, and changing ways of doing business. As always, we are working with customers and others in the industry to develop and implement optimization solutions that will help plants brace for a "perfect storm" of challenges and thrive in this next year.

This issue of OPTions reflects on the accomplishments of 2007 and explores some of the developments that will influence power generation in 2008. And while the next year promises change and abounds with uncertainty, one thing is for sure: this is an exciting time to be in the power industry.

Curt Lefebvre, *President & CEO*

INSIDE

What will the "big" issues be in power generation this year?

We asked a few subject matter experts what they foresee as the emerging and most important issues facing the industry in 2008 and beyond.

Power Industry Workforce Crisis

- In 2008, the soon-to-retire workforce in the US utility industry will continue to worry management. Many companies are struggling with how to replace those very experienced people quickly enough to continue smooth operations. The workload is increasing and a less experienced workforce will have to handle the variety of technical and operations issues. Tools must be deployed to help train and assist the new personnel in accomplishing the tasks required to assure smooth operations.
  — Ray Johnson, Vice President of Business Development, NeuCo

- An issue that is festering but will become epidemic is engineering resources for the power industry. With fewer engineers graduating and significant numbers of engineers retiring in the next five years, utilities will have to be more competitive with their compensation which means fewer engineers doing the same or more work. Some of these plants will address the workforce crisis with optimization, since it provides tools for the engineers to work more effectively and efficiently.
  — Gary Lang, National Account Manager, NeuCo

Climate Change, Energy Policy & Emissions

- Every incremental heat rate improvement will count, since that means less tons of NO_x, SO_x Hg, and CO_2.
  — Kandi Forte, Director of Operational Excellence, Mirant

- Concerns about global warming and related emissions will continue to increase. Many plants are already addressing these issues with hardware-based solutions (e.g. scrubbers, precipitators and absorption systems). But in 2008, we'll see more power generators looking to integrate their hardware with optimization and software-based solutions that can address emissions issues and cost factors.
  — Mahesh Mistry, Application Engineer, NeuCo

- The US Congress will pass cap and trade legislation this year. We'll also see more power generators participating in voluntary carbon trading. Power generators will also be "racing to the CAIR finish line." They'll be transitioning from how to comply with environmental regulations, to how to manage the operations impacts of those compliance strategies.
  — Peter Spinney, Director of Market & Technology Assessment, NeuCo

Continued on page 2, ***Big in 2008***

BIG in 2008

continued from page 1

Climate Change, Energy Policy & Emissions (cont.)

- The biggest story will be the election of a new president and the direction of the US energy policy for the next several years. With likely increases in oil prices due to greater worldwide demand, there will be more indirect pressure for increased electricity generation. The next administration's policy towards emissions and efficiency in the power industry will have a significant affect on the mix of fuels (coal, nuclear, gas, or renewables) and emissions control technology.
  — Steve Piche, Director of Research & Development, NeuCo

Alternative Energy Sources

- Recent buzz on global warming is likely to bring more competition from alternate sources of power generation (like nuclear power) and in order to stay competitive, the fossil fuel fired power producers would need to run their assets not only with the least possible emissions but also with the best possible efficiency and reliability.
  — Vikas Malik, Director, Customer Center, NeuCo

- Currently, I see no real alternatives to meeting the country's electricity demands other than adding coal-fired facilities. Nuclear facilities take years to come on-line. Oil and gas units are not currently financially viable. Hydro cannot be significantly increased. Wind farms can help augment the supply, but cannot be deployed in sufficient quantities to replace the coal-fired units.
  — Ray Johnson, Vice President of Business Development, NeuCo

The Integrated Plant

- I think that we'll see more power generators coordinating their missions. There will be a move towards integrating the functionalities of operations, performance, maintenance, and environmental "information silos" into a more cohesive platform with a decision matrix support.
  — Jim Bourque, National Account Manager, NeuCo

- The required level of optimization will no longer be limited to particular equipment or area within a power plant. With aging fleets and ever reducing manpower and resources, this will be no easy job.
  — Vikas Malik, Director, Customer Center, NeuCo ■

To read more power industry trends for 2008, or to let us know what you think will be the biggest issues in power generation this year, visit The Optimization Blog: www.theoptimizationblog.com

Completed CCPI Project Addresses Greenhouse Gases, Improves Power Plant Performance

NeuCo has completed installation of five optimization software modules at Dynegy Midwest Generation's Baldwin Energy Complex in Baldwin, Illinois. The four-year, $19.1 million technology development and demonstration project was a cost-shared effort between the Department of Energy (DOE) and NeuCo, Inc., and hosted by Dynegy's Baldwin plant. It is the nation's first completed Clean Coal Power Initiative (CCPI) project.

The real-time, process optimizers address combustion, sootblowing and SCR operations, unit thermal performance and plant-wide economic optimization. Data analysis is being finalized, and NeuCo will present the results to the industry in the coming months. ■

People Are Talking: TheOptimizationBlog.com

NeuCo, customers, and people interested in asset optimization are connecting at The Optimization Blog.

The Optimization Blog is a feature of NeuCo's website where optimization experts are blogging about everything from optimization applications, emissions regulations, and NeuCo's own product development to trends in the power generation industry. It's also a place where customers can share their thoughts and insights on power industry issues, and talk to NeuCo about their own optimization experience.

Connecting with customers is fundamental for providing solutions that address your most important power plant needs. So join the conversation at www.theoptimizationblog.com, or click the blog link at www.neuco.net.

The Optimization Blog is now featured on Power Engineering Online. Go to http://pepei.pennnet.com and click on "Blogs." ■

CAIR, SCR Systems, and Optimization

One year from now the Clean Air Interstate Rule (CAIR) will begin taking effect. This EPA formal mandate will demand the largest reduction in NO_x (nitrogen oxide) and SO_2 (sulfur dioxide) from power generation in US history. Power generators have started installing highly effective, and highly expensive, hardware to help meet these new emissions standards. Innovative power generators are combining hardware solutions with real-time optimization software as an even more effective way of addressing CAIR regulations while improving operations.

Preparing for CAIR

CAIR requires a reduction of both NO_x and SO_2 levels. The first phase of NO_x reductions begins in 2009 and the first phase of SO_2 reductions begins in 2010. To give an idea of CAIR's significance, federal regulations between 1970 and 2003 decreased US NO_x levels by 41 percent. That's 33 years that power plants had to cut NO_x emissions not quite in half. CAIR by contrast, requires a *60 percent reduction in just six years* (2009-2015). Power plants in the District of Columbia and the 28 states affected by these regulations will have to make substantial provisions in order to comply with these new standards.

To help prepare for CAIR, power generators are installing SCR (Selective Catalytic Reduction) systems beyond those already operating. SCRs convert NO_x in the flue gas boiler into harmless diatomic nitrogen (NO_2) and water. An effective SCR system can lower NO_x by up to 85 - 90 percent. While SCR systems can be highly effective, they have also turned out to be far more expensive than initially anticipated, both in terms of capital and operating costs.

Considerations for SCR systems

The demand for SCRs due to CAIR, combined with massive demand for steel and craft labor, are not only increasing the cost of SCRs but impinging on their timely availability. In addition, SCR systems require reagents such as ammonia — the price of which has more than doubled in recent years. Operations issues such as ammonia slip, the formation of ammonium sulfate and ammonium bisulfate, and SO_3 (sulfur trioxide) related opacity can all result from SCR use. Many SCR systems were designed to operate during the SIP (State Implementation Plan) five-month Ozone Season, giving generators seven months to get their SCRs in shape for the next season. CAIR is a year-round mandate, and will force generators to push these systems harder and operate them more frequently. As power generators begin running SCRs year-round, operations costs and negative operational impacts will correspondingly increase.

Combining Optimization with SCR systems

CombustionOpt® and SootOpt® are comparatively inexpensive software solutions that reduce NO_x at the source — typically lowering NO_x between 10 - 25 percent. Power generators are adding these optimizers to lower SCR-related costs and mitigate negative operational side-effects, and to help better manage the interactions between combustion and post-combustion systems. When an SCR is in place, these optimizers may allow power generators to run SCRs less aggressively. Power plants with optimizers minimize their SCR-related costs by more closely matching boiler outlet temperature and NO_x profiles to actual catalyst effectiveness and reagent distribution as they change over time. The result is reduced ammonia usage, fewer negative SCR-related side-effects, and simultaneous improvements in combustion and sootblowing operations. At Dynegy's Baldwin Energy Complex, optimization has helped reduce SCR-related ammonia usage by 15 - 20 percent.

While power plants are looking for "big" solutions to deal with CAIR's enormous implications, it's important to keep an eye on all the pieces of a NO_x-lowering solution. Power generators investing in SCRs — the "big guns" of NO_x reduction — actively need to plan for and manage SCR-related costs and operations impacts. This point is highlighted by the fact that much of the "low-hanging fruit" for NO_x reduction at many generating units has already been harvested in complying with earlier regulations. Meeting CAIR's challenges in a cost-effective manner and remaining competitive will require every remaining tool in the compliance arsenal.

This article is based on a blog post by Peter Spinney, Director of Market & Technology Assessment at NeuCo. To read his original post, visit www.theoptimizationblog.com. ■

At Dynegy's Baldwin Energy Complex, optimization has helped reduce SCR-related ammonia usage by 15 – 20 percent.

Customer Center Offers One-on-One and Group Training

A big piece of feedback we received from customers at last year's Users Summit was: "We'd like more one-on-one training sessions." Some customers felt they were ready to take the next step in becoming more advanced ProcessLink® users. Well, that day has arrived! While the Customer Center has been the hub for NeuCo's support services for several months, the Center recently launched a customer training program.

Super User Training

Customers recently participated in NeuCo's first-ever "super user" training. Customers from Ameren and Alliant Energy participated in a five-day ProcessLink training class at the Center. The sessions — led by NeuCo's Rob James, Steve Piche, Vikas Malik, and Tarun Agarwal — included an optimization technology review, an introduction to ProcessLink Studio and the ProcessLink object suite, and CombustionOpt® tuning and application configuration. This was an opportunity for customers to get an in-depth, "under the hood" look at the ProcessLink platform's technologies and capabilities.

Open House Event This Spring

NeuCo is planning an open house event at the Customer Center this Spring. We welcome users of all levels to experience the facility, and encourage them to attend the training sessions. "Helping customers understand and use the technology better will enable them to get even more value out of the optimizers" said Vikas Malik, director of the Customer Center.

Employees at the Customer Center include Siva Alagarsamy, Eric Beiler, Dazhang Gu, Moe Herbawi, Vikas Malik, Don Phillips and Michael Wheeler.

Be sure to check NeuCo's website at www.neuco.net for Customer Center news and events. If you are interested in personal training sessions, please email info@neuco.net or call Vikas Malik at 440-279-1240. ■

Artificial Intelligence & Optimization Featured in *Electric Light & Power Magazine*

The November/December edition of *Electric Light & Power Magazine* includes a full-length article on A.I. (artificial intelligence) and optimization. Authored by Peter Spinney, NeuCo's director of market and technology assessment, the article discusses how A.I.-based optimization helps the power industry deal with workforce challenges, tightening emissions regulations, and facilitates improved efficiency, reliability and data management. The piece also examines how A.I.-based optimization has been applied to optimize combustion, soot blowing, SCR, unit performance, and maintenance processes at Dynegy's Baldwin Energy Complex.

Download a pdf of the complete article from the link on NeuCo's homepage. If you'd like a hard copy of the article, email info@neuco.net. ■

Webcast

Thursday, March 6, 2008
3:00 - 4:00 PM EST

Power Engineering Online: Digital Power Plant Revolution

Fleet-Wide O&M Issues & Solutions

Join NeuCo, DTE Energy, and the Gartner Group on Thursday, March 6th, 2008 for a webcast on "Fleet-Wide O&M Issues and Solutions." Hosted by Power Engineering Online, this webcast is the third installation in their "Digital Power Plant Revolution" series. These webcasts review some of the key digital technologies and data management strategies that are changing the way power plants address O&M.

NeuCo will present "Revolutionizing Fleet-Wide Management with Artificial Intelligence-based Optimization." NeuCo's president and CEO, Curt Lefebvre, will discuss the role of A.I.-based optimization in the digital power plant revolution and in fleet-wide O&M strategies. This presentation will examine how optimization is already being used for broad scale O&M management across multiple generating units at several power plants.

To sign up, visit Power Engineering Online's webcast page at: http://pepei.pennnet.com/webcast ■

co.net or email us at info@neuco.net.