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## Power Generation’s Dwindling Natural Resource

The latest energy crisis isn’t related to a shortage of electricity, oil, or coal. It’s about the impending scarcity of a more precious resource: People. The experienced workers who keep the nation’s lights on are about to retire from the power industry in unprecedented numbers. As we transition into an era of environmentally- and technology-centric power generation, this massive retirement wave presents a singular need to rethink and redesign the way power plants operate.

### The beginning of a retirement wave

With nearly half of its workforce approaching retirement, power plants are about to lose people who possess critical plant knowledge.

“We’re seeing the initial stages now with the baby boomers leaving,” said Scott Stallard, Vice President, Asset Management at Black & Veatch. “But many of them are still in the workforce to some degree as contractors. Within the next few years these people will retire completely, and that’s when we’ll really start to feel it.”

That feeling of attrition will be compounded by an expected 45 percent growth in energy demand over the next 15 to 20 years. So the industry will not only face the challenge of talent loss, but they’ll have a need to fill additional positions as new power generation facilities are built.

Optimization is one way that plants are capturing and applying knowledge from experienced plant staff.



A handful of educational institutions and power generation companies have launched power plant training and apprenticeship programs. But even with these programs it’s likely that labor will still be in short supply. As for students graduating from traditional engineering programs, power generators will be competing for their talent with employers in manufacturing and heavy industries.

### Knowledge capture is critical

Capturing the knowledge of experienced employees is critical for power plants to prevent processes, practices, and other valuable information from walking out the door. That’s why proactive power generators are taking steps to record workers’ knowledge. Optimization is one way that plants are capturing – and applying – knowledge from experienced plant staff.

“We’re able to build knowledge from plant staff into the optimizers,” explained John McDermott, Vice President of Product Management at NeuCo. “In this way, the optimizers

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## V2.3 Solutions Provide Deeper Insights into Plant Processes, Enable Proactive Customer Support

Customers with optimizers running on Version 2 (v2) of the ProcessLink platform are getting an upgrade to v2.3 that will facilitate more visibility into the optimizers’ moves, provide benchmark data that better measures optimization effectiveness, and enable proactive customer support. The new v2.3 software is being installed over the next several months at customer sites with v2 optimizers that are covered by Annual Maintenance & Support.

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### Deeper insight into optimizer moves

Knowing the reasons for the optimizer's decisions is critical for getting operators and engineers to trust the system and realize all of its benefits. The Demystifier View in CombustionOpt and SootOpt shows users what's happening and why. While previous versions of these products displayed the top several objectives on which the optimizer was working, v2.3 displays all of the objectives that the optimizer is working toward – giving users additional confidence and valuable context.

### Benchmarks

ProcessLink v2.3 includes a Benchmark View that shows users the optimizer's effectiveness in working towards plant objectives. The Benchmarking View in v2.3 shows users two values for each optimization objective the optimizer is working on. Values display the difference between the actual and baseline benchmarks – which is an estimate of the effect optimization has had. It also shows the difference between the achievable and actual benchmarks – which is an estimate of how much more it could have done.

### Proactive customer support

The technology in V2.3 enables customers to benefit from more proactive customer support by interfacing with NeuCo's Alerts Management System. From NeuCo's Customer Center in Chardon, Ohio, support engineers are continuously alerted to potential optimization issues and opportunities by NeuCo's Alerts Management Technology. They screen optimizer advice, resolve optimizer-related issues, support anomaly diagnosis, and track issue resolution across NeuCo's customer plants.



### Support Services Deliver Maximum Value to v2 Customers

Alerts Management Technology allows NeuCo's Customer Support engineers to monitor and track alerts generated at v2.3 customer sites. Above, alerts from sites are shown line by line. Data in each column is used to determine the priority of each alert. Context data is displayed in the charts.

## Welcome to Electric Power 2008

May 6 – 8, 2008, | Baltimore, MD



### Booth #1735

For the fifth straight year, NeuCo will be exhibiting and presenting at the Electric Power Expo, co-located with the PRB Coal Users Group located at the Baltimore Convention Center. NeuCo and customer presentations include:

#### Tuesday, May 7<sup>th</sup>

2:00 - 4:00 PM **Session 4A: Realizing Results with Integrated Optimization;** Peter Spinney, NeuCo

#### Wednesday, May 7<sup>th</sup>

8:00 - 9:00 AM **Session 15B: Mercury Specie & Multi-Pollutant Control;** John Hudspeth, NRG Energy

1:30 - 3:00 PM **Session 4D: Panel Discussion – Impact of Environmental Restrictions on Unit Operations**

We've also planned a unique Crab Fest event at Mo's Crab & Pasta on Wednesday, May 7<sup>th</sup> at 6:30 PM. If you're planning to be in Baltimore and would like to join us, please RSVP at [info@neuco.net](mailto:info@neuco.net), call Jennifer Hutchings at 617-510-0046 or stop by Booth #1735. *We can't promise a clean bib, but we can promise a good time!*

Also look for us at the NeuCo-sponsored PRB User Group Opening Reception, May 5<sup>th</sup>, 5–7 PM, at the Sheraton Inner Harbor. Please contact us at [info@neuco.net](mailto:info@neuco.net) if you will be attending and don't forget to stop by Booth #1735 and *enter to win some great Storm Survival prizes!*



## Natural Resources *continued from page 1*



are continuously applying years of cumulative knowledge and experience from multiple plant experts."

### Going with the flow & changing how we do business

Many plants are tilting their business models by shifting to distributed knowledge — moving outside of plant confines and working with external resources. Black and Veatch, for instance, has seen an uptick in demand for its PowerPlantMD remote monitoring and diagnostic services. They are also working with NeuCo to develop a unique solution that brings intelligent technologies together with best-in-class diagnostic process management and human expertise.

"We're seeing the initial stages now with the baby boomers leaving," said Scott Stallard, Vice President, Asset Management at Black & Veatch. "...Within the next few years these people will retire completely, and that's when we'll really start to feel it."

"Power generation is being forced to reinvent itself," said Curt Lefebvre, President and CEO of NeuCo, Inc. "An industry that was once pretty static is now highly changeable. Plants need to become more nimble so that they can quickly respond to the fluctuating business environment. Optimization is one way that plants can manage these new complexities while operating in a more holistic fashion." ■

*A full-length paper on the power industry's workforce challenges will be published soon. Email [info@neuco.net](mailto:info@neuco.net) to request a copy.*

## Ask NeuCo

**Q:** Can Optimization help mitigate performance issues caused by switching to PRB coal?

**A:** A: Yes. Boiler optimization can improve a unit's ability to burn off-design PRB low sulfur coal without de-rating while simultaneously maintaining and improving performance.

PRB exhibits a much narrower range of temperatures over which slag forms (sinters), hardens, or in the case of a cyclone boiler, flows to the furnace bottom where it can be removed. The ratio of fuel to air (stoichiometry) also affects slag characteristics. Additionally, PRB coal has a lower energy density than high sulfur bituminous coal, so more of it has to flow through the combustor to release the same amount of heat. This is why plants typically take a substantial capacity de-rate when switching to 100 percent PRB coal.

Optimization can help mitigate these issues, through better control of temperature and stoichiometry and more proactive removal of ash and slag deposits. For one NeuCo customer with large cyclone boilers that were converted to burn 100 percent PRB coal, the challenge was moving toward reduced stoichiometry (lower NO<sub>x</sub> production) while still maintaining slag consistency necessary for good flow into the bottom of the furnace. These stoichiometry, temperature and mass flow challenges all had to be addressed in order to avoid a permanent de-rate. Because there are no reliable temperature or O<sub>2</sub> measurements to provide insight into combustion conditions, standard operating procedure was for a combustion engineer to check the flame color through the sight glass two or three times a day. Failure to catch degrading conditions could result in plugging the lower furnace with hardening slag that could be removed only with an outage and blasting.

NeuCo configured CombustionOpt to meet these challenges by working to maintain the flame scanner quality, the closest available proxy for temperature, above 65 percent while stoichiometry was reduced and to detect the telltale signs of degrading combustion quality and take rule-based action. This strategy improved average flame scanner quality and helped the plant successfully run with 100 percent PRB with no de-rate, fewer slagging events and associated outages, lower average NO<sub>x</sub> and SCR ammonia usage, and improved heat rate. ■

*Please submit "Ask NeuCo" questions to [info@neuco.net](mailto:info@neuco.net).*

## Employee Spotlight



**Tarun Agarwal,**  
*Project Manager,*  
*Product Management Department*

As a Project Manager in NeuCo's Product Management group, Tarun works on a broad range of development and installation projects. He joined NeuCo in 2003, and since then has helped to develop NeuCo's solutions, install and configure ProcessLink at customer sites, and provide support to customers. He works closely with NeuCo's Application Engineering group, and is one of the company's best resources for anyone wanting to learn more about the solution suite and ProcessLink platform.

"My job puts me in contact with people from just about every department at NeuCo," Tarun explained. "Product Management's role is really in the center — it's the hub that connects with the various areas that go into developing and supporting optimization solutions."

Since Tarun is involved with the tactical aspects of developing the latest versions of NeuCo's solutions, he is often one of the first people to have a thorough hands-on understanding of the company's platform developments.

"I'm often working on versions of the software that we're readying for release," Tarun said. "When we launch the new versions - as we've been doing recently with V2.3 — I'm able to help people who implement the upgrades understand all the new aspects of the solutions."

Outside of work, Tarun plays squash, cooks vegetarian food, and runs. The son of an Indian diplomat, he has lived throughout the world, including New Delhi, India; Kuwait City, Kuwait; Thimpu, Bhutan; Ashgabat, Turkmenistan; Abu Dhabi, United Arab Emirates; Rome, Italy; and Montreal, Canada. Changing countries and cultures somewhat frequently helped to prepare him for the rapidly evolving world of technology and software development.

"Because I've lived in a few countries, I think I adapt pretty easily to different environments and cultures. I try to be open to experiencing things that are new or unlike what I'm used to, rather than trying to duplicate what I'm familiar with in the new surroundings."

Tarun has an MS in Telecommunications and Signal Processing (Electrical Engineering) from McGill University in Montreal. He lives in Cambridge, Massachusetts. ■

**Interested in working at NeuCo? Send your resume to [recruiter@neuco.net](mailto:recruiter@neuco.net)**

## NeuCo By The Numbers

*Spring 2008*

**0.5 ton** — Amount of coal used to produce 1MWh of electricity.

**2.75 tons** — Amount of CO<sub>2</sub> generated for each ton of coal burned.

**1.053 billion** — Average tons of coal burned in the US each year, 90% of which is used for electricity generation.

**164 years** — Length of time world coal supply will last, given current production rates.

**\$30** — Average price of carbon, European Union Emissions Trading Scheme (EU ETS), early 2008.

**0.3 - 1.5%** — Average heat rate improvement from comprehensive Boiler Optimization (CombustionOpt and SootOpt).

**218** — Number of units with CombustionOpt® installed.

**4.3 million** — Tons of CO<sub>2</sub> avoided through CombustionOpt.

**10 - 20%** — Typical SCR-related ammonia reduction for units with comprehensive Boiler Optimization.

**130%** — Increase in operating costs from January '07 - January '09 for a typical 350 MW unit (without an SCR or FGD).\*

**183,000 tons** — Amount of NO<sub>x</sub> NeuCo's combustion optimizers have saved customers and the planet.

**\$365 million** — Combined NO<sub>x</sub> costs that NeuCo's combustion optimizers have saved customers.<sup>†</sup>

*\*More details on [TheOptimizationBlog.com](http://TheOptimizationBlog.com), in Peter Spinney's blog post, "Operations Costs Skyrocket for Coal-Fired Generators"*

*†Based on an average NO<sub>x</sub> price of \$2,000/ton with 183,000 cumulative tons of NO<sub>x</sub> avoided.*

## New Members Spotlight

NeuCo would like to welcome these new customers to the ProcessLink users group:

- San Miguel Electric Cooperative, Inc.
- Central Power & Lime
- Alliant Energy — Ottumwa
- First Energy Generation Corp., Bruce Mansfield