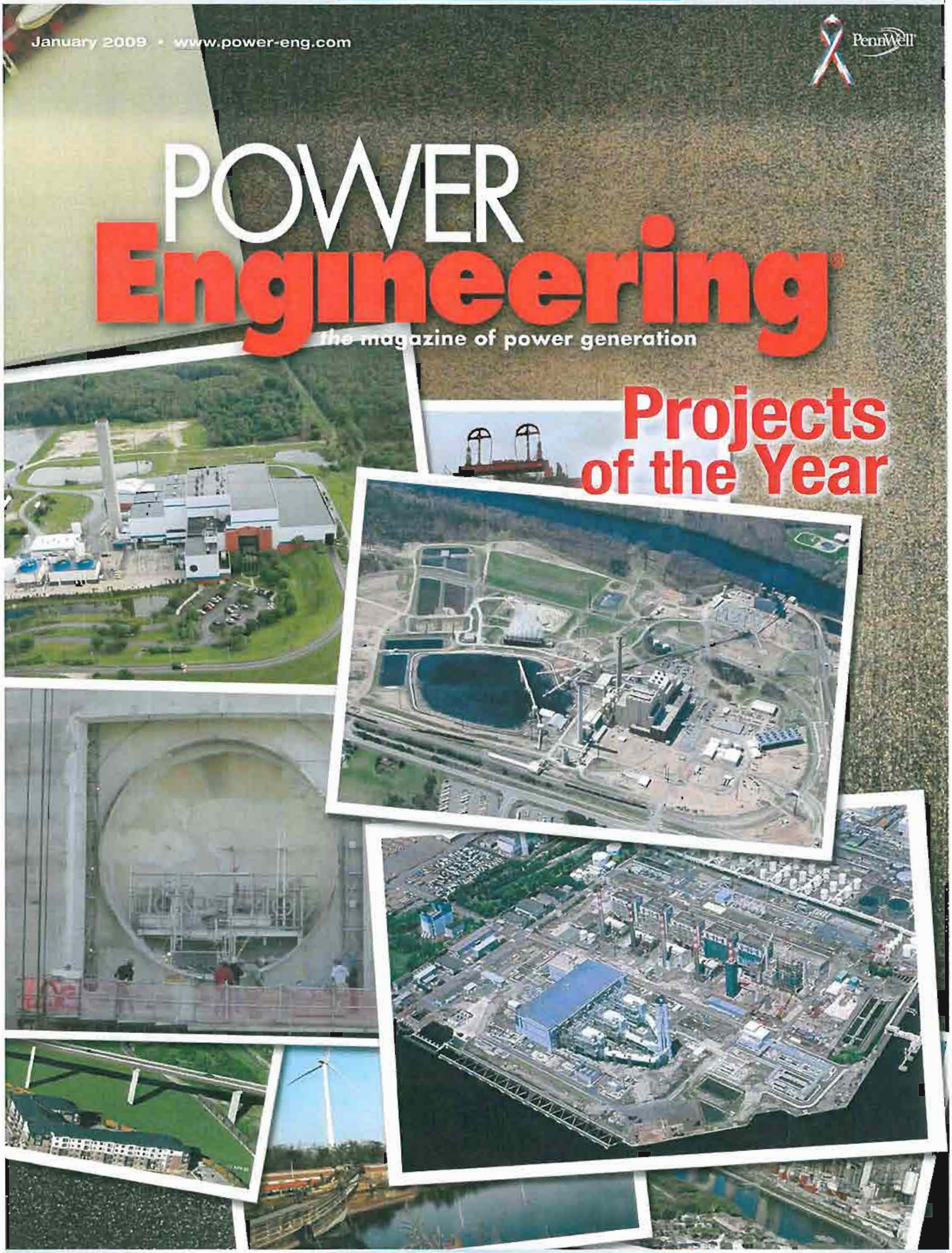
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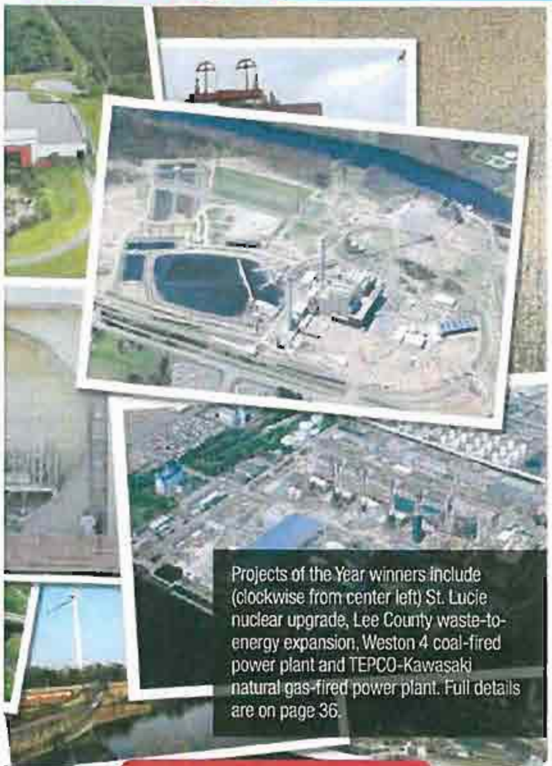
Projects of the Year



Projects of the Year winners include (clockwise from center left) St. Lucie nuclear upgrade, Lee County waste-to-energy expansion, Weston 4 coal-fired power plant and TEPCO-Kawasaki natural gas-fired power plant. Full details are on page 36.

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COVER STORY

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Industry News: Updated through the day the nation to deliver power, thus they feel that they do not fall under these new regulations. Some of these smaller- to medium-sized organizations might also find these new regulations challenging due to the technical expertise, manpower and budget needed to tackle some of these requirements. I think there will be some stricter guidance on who is and isn't covered by the regulations and unfortunately some of these small to medium-sized organizations will find that they will have to comply.

PE: Can you provide some detail as to the technical problems and issues posed by balancing the advantages open SCADA systems provide to asset owners and the need for security?

Woods: Many times security will come at the cost of ease and usability. So if security imposed on a system makes it less usable, the operator is more prone to error. For example, let's say an engineer has to access a SCADA system from a substation. In the pre-CIP days maybe he could pull it up from the terminal in the field. But under CIP, he may have to connect via VPN to the Electronic Security Perimeter using two-factor authentication before being able to access the systems. That's not such a big burden if it is a rare occurrence and if the engineer isn't under any stress.

But in an emergency, there may be any number of issues he's dealing with, from dropped connections to forgetting a recently changed password to getting locked out of a system. Maybe he finally gets to the screen he needs to use but has to cut some of his other procedures short which ensure the safety and security of the bulk power system. That could exacerbate an existing problem with the grid rather than make it better.—Steve Blankinship

Supersonic Emissions Control

A symbiosis of chemistry and physics might someday remove emissions from coal—including carbon dioxide (CO_2)—more efficiently than is being done today while producing revenue streams for the pure concentrations of materials removed. The concept has evolved from an unusual fusion of chemistry and aerodynamics and the scientists/engineers behind the idea have enough credibility to merit a close look at their idea.

The group of physicists and engineers with backgrounds in aerospace science and aerodynamics has invented the enabling technology that causes extremely rapid reactions designed to match select pollutants with select reagents that their chemical engineer co-inventors have developed. The process removes virtually all pollutants and other materials from coal when burned. The inventors believe the process can also produce commercial grade end-products in large quantities, meaning the process can become a profit center instead of a cost center.

Products that can be captured in high concentrations include barium, vanadium, aluminum, uranium, selenium, potassium sulfate, potassium nitrate (used in fertilizers) and CO_2. The process aims to remove coal combustion emissions of SO_2, NO_x and mercury at levels above 99 percent. Developers believe the process encourages burning cheaper, high sulfur coals such as Illinois Basin coal and Texas lignite, as well as waste coals, agricultural and animal wastes and municipal biomass wastes.

Key to the process is aerodynamic physics, which enables and complements the chemical reaction. The process injects a slipstream of steam at supersonic velocity into a relatively slow moving flue gas. Atomizing nozzles direct small liquid droplets of select reagents into a supersonic shock wave region. When the droplets contact the supersonic shock waves, they shatter into extremely small droplets and envelope whatever target compound-molecules in the flue gas they contact. After reforming into spherical shapes, they are then accelerated by the shock waves at high speed to an in-line subsonic nozzle forming an ejector pump that forces the emission-laden gas and the fine liquid droplets to pass through the subsonic nozzle.

Turbulent conditions within the subsonic free jet allow droplets containing the sub-micronic particulates and aerosols to grow rapidly. This is because those conditions create multiple collisions, impactions, nucleations, envelopment and further condensation. Such a condition of rapid drop in pressure and temperature resembles an "aerospace" reaction, which allows extremely close contact and mixing of the molecules with each other and promotes the reactions that form the desired liquid reaction product. The droplets quickly grow large enough to be easily separated from the effluent gas stream. Separation of the product-containing liquid from the remainder of the flue gas is performed by an aerodynamic coalescer in the system.

CEFCO—short for Clean Energy Fuels—was formed to further develop and commercialize the process.

"Current technologies for carbon capture and sequestration (CCS) and air quality control systems (AQCS) are dominated by conventional chemistry and thermodynamics," said CEFCO chairman Don Degling. Current technologies require heat or energy input and the use of chemical reactants over time in one or more batch-like processes. And they often require using catalysts to make one or more chemical reactions produce specific results.

"Very often in large batch processes some chemicals produce side reactions that compromise the intended purpose," said Degling. "That requires additional steps to isolate or eliminate undesirable results and neutralize side reactions." He said the CEFCO process can remove any chemical compound in coal and produce it as a product in pure concentrations. And it can do it efficiently and cheaply. Parasitic load is about 10 percent with a very low drop in total system pressure.

While developers of the CEFCO process emphasize its ability to efficiently remove all materials in pure concentrations, CO_2 is what generates most attention today. Degling said the same aerodynamic mechanism that removes other emissions is also used for CO_2. "The only difference is a small number of target-selection parameters and the exact chemical reagents used," he said. Conventional catalysts would not be needed. Furthermore, the space and footprint for the system would be a fraction of current conventional designs because all the multi-chambered combined reaction "dwell-times" will be designed to be less than five seconds in the travel of the flue gas from the electrostatic precipitator to the flue stack.

A process engineer's independent evaluation led it to believe the CEFCO process could solve many problems that now exist with using coal cleanly. The process engineer plans to modularize the system design to treat flue gas emission streams from up to 200 MW. The modularization will allow combining units in multiple parallel tandems to retrofit existing plants or for new power plants of any size. Thus plants of 1,000 MW or 5,000 MW could be treated by such tandem combinations.

The next challenge is to combine several known technologies into a fully integrated system for total pollution management and carbon capture. A small-scale pilot test facility capable of processing 100 or 250 lbs/min of flue gas is now needed to demonstrate practical application.—Steve Blankinship

Business Briefs

Rather than engage in a potentially lengthy legal battle, **Energy Future Holdings** has signed a deal with the Sierra Club negotiated by Public Citizen to install maximum achievable control technology for mercury emissions on two new coal units at its Oak Grove site in Texas.

Emerson Process Management and Fluor Corp. will jointly develop and use processes to improve management and execution of capital projects. As a Fluor preferred automation and control supplier, Emerson