



A Monthly Report from EPRI's Generation Sector

November 2007

ADVANCED COAL PLANT PORTFOLIO ISSUE AREA

CoalFleet for Tomorrow-Future Coal Generation Options (Program 66)

Fall meetings include tour of B&W oxy-coal pilot plant, UltraGen feedback.

EPRI's CoalFleet for Tomorrow held its fall general technical meeting in Akron, Ohio Nov. 6-8 as membership continues to grow and strengthen. The week was highlighted by a tour of the nearby Babcock & Wilcox oxy-coal combustion pilot plant. Interest in oxy-coal combustion is strong as power utilities evaluate and predict potential CO₂ regulations. Another highlight was a keynote presentation by Dr. Phil Armstrong, manager of the Air Products ITM program, who gave an overview of the development of the technology and the planned work under the recently approved DOE Phase 3 program. Air Products is a new member of Program 66C, the agenda for which also included the inaugural meeting of the working group for the UltraGen Initiative. Two breakout sessions gathered input for the UltraGen I Project, with main steam conditions around 1120 degrees F, and the later UltraGen projects progressing steam conditions to 1400 degrees F. For more information, contact Jack Parkes (jparkes@epri.com, 650-855-2317).

Steele meets with ITM oxygen, CO₂ injection project groups.

November was a busy month of travel for EPRI Senior Project Manager Dr. Robert Steele. In addition to the CoalFleet technical meetings, Steele was on the road Nov. 1 in Baltimore, Maryland to visit the Air Products 5-tons-per-day oxygen Ion Transport Membrane (ITM) pilot facility and met with the technical team that leads the testing. The site was preparing for the next test phase that is funded by the DOE-Air Products partnership.

Steele, of EPRI's Advanced Generation group, was back on the road again Nov. 9 at Shadyside, Ohio in a visit to FirstEnergy's R.E. Burger coal plant. He met with members of the DOE Midwest Regional Carbon Sequestration Partnership involved with injecting 20 tpd of CO₂ into sandstone formations in the Appalachian Basin. The CO₂ will be separated from the exhaust stream via a new approach – Powerspan's multi-pollutant "ECO₂" unit. The CO₂ will be compressed to supercritical conditions (1200 to 2400 psig) and injected 2,000 yards north of the plant. FirstEnergy, Battelle (Columbus, Ohio), and EPRI are co-leaders of the project; EPRI is providing the guidance for the compression and transportation of the CO₂ to the wellhead. For more information, contact Steele (rsteale@epri.com, 704-595-2025).

CO₂ Capture & Storage (CCS) (Program 165)

EPRI reviews four emerging CO₂ capture processes.

To the extent possible with the data provided on these processes, EPRI has conducted detailed energy analyses (energy is the main cost driver for CO₂ capture) of Skyonics' SkyMine (produces a solid product plus hydrogen and chlorine for use), Carbozyme's contained liquid membranes, a solvent being developed under the European Union's CASTOR program, and the University of Wyoming's carbonaceous sorbents.

The Generation “Showcase Technology Innovation” project continues to review emerging post-combustion capture technologies and concepts. EPRI staff members are systematically meeting with and interviewing technology developers and collecting pertinent information about each process and, when possible, witnessing demonstrations. With this information, EPRI is conducting internal independent analyses of each technology including the total energy needed to remove CO₂ from flue gas. Power companies are encouraged to contact EPRI to share information about newly discovered and emerging CO₂ capture processes. For more information, contact Brice Freeman (bfreeman@epri.com, 650-855-1050).

OPERATIONS AND MAINTENANCE ISSUE AREA

Maintenance Management and Technology (Program 69)

PRO evolves into new Operations and Maintenance Excellence (OMX) initiative.

2007 brought not only a new name but also new areas of focus for EPRI’s successful Plant Reliability Optimization (PRO) program. Working with its program committee advisors and generation sector council members, EPRI has expanded the program area focus to include a more holistic view of the combined operations and maintenance functions at fossil generating facilities. This new EPRI program area initiative, “Operations and Maintenance Excellence (OMX),” includes four main elements:

- Continuation of the traditional PRO implementation support in maintenance and work execution;
- New process development in areas of equipment diagnostics, condition assessment, risk-informed decision support, and continuous improvement;
- Expanded use of enterprise tools such as EPRI’s PlantView software to effectively deploy these new processes on an enterprise-wide basis, and
- Increased collaboration among peers facilitated by EPRI’s Plant Reliability Optimization Users Group, and the new plant managers working group.

In 2008 and 2009, EPRI will update the new process specifications and their deployment in PlantView. Participants in the supplemental project “OMX-PlantView Applications” are contributing to the list of new features and will be early adopters of the updated software.

The next major revision of PlantView will facilitate a more rigorous implementation of Condition-Based Maintenance (CBM), to include not only traditional Predictive Maintenance (PdM) but enhanced use of on-line monitoring of critical plant equipment. Included in the expanded use of CBM will be a more formal application of risk-informed methodologies for prioritizing maintenance activities at all levels (backlog, outage scope planning, capital projects, and interval optimization). And PlantView’s expanded functionality will integrate the capabilities of commercial on-line monitoring software, advanced pattern-recognition tools, and computerized maintenance management systems. For more information, contact Stephen Hesler (shesler@epri.com, 704-595-2183).

ENVIRONMENTAL CONTROLS ISSUE AREA

Integrated Environmental Controls (Program 75)

Early tests on impact of bromide impact on FGD materials promising.

Bromide addition can enhance mercury removal by the FGD, but also could increase corrosion in the scrubber. Initial tests suggest bromine causes the same or less corrosion than chlorine on FGD absorber alloys. The addition of bromide salts into the boiler has been shown to be an effective way of oxidizing mercury into soluble forms that can be readily scrubbed in a downstream wet scrubber (FGD). However, bromide concentrations in the FGD liquor could be comparable to current chloride concentrations. FGD materials of construction typically are selected based on expected maximum chloride concentrations in the FGD liquor, but little information is available on the effects of elevated bromide concentrations in combination with chloride.

An electrochemical pitting test has been devised to provide a rapid screening method for comparing different environment conditions and concentration of halide (chloride and bromide) ion on the corrosion potential of various alloys used in FGD. Five common FGD alloys representing a range of chloride pitting resistance were selected for testing. To date, tests on two steels showed the bromides are similar to, if not slightly less, corrosive than chlorides. Further tests are planned to vary the solution composition, temperature, and pH. Plans are to eventually develop an equivalence factor for comparing bromide concentration effects on FGD alloy corrosion to chloride effects. For more information, contact Ramsay Chang (rchang@epri.com, 650-855-2535).

First test of SCR catalyst regeneration on mercury oxidation shows no impact.

The first of several tests to determine if SCR catalyst regeneration (to extend its NO_x performance life) impacts its mercury oxidation capabilities has shown no difference between pre- and post-regeneration samples. Parallel tests on the impact of catalyst age did show a reduced oxidation rate with age. The test plan has been modified for the second catalyst type to help understand this observation. For more information, contact Chuck Dene (cdene@epri.com, 650-855-2425).

Particulate and Opacity Control (Program 76)

SmartAsh™ hopper monitoring system can improve ESP performance.

High ash levels in electrostatic precipitator (ESP) hoppers are notorious for increasing particulate matter (PM) emissions and plume opacity. Conventional means of monitoring hopper ash levels and fly ash handling system performance have been time-consuming and problematical. Neundorfer, Inc. has developed SmartAsh™, a monitoring package for fly ash conveying systems, that provides improved monitoring of the ash removal process, including graphical depictions of its performance. Additionally, the ability to monitor hopper ash levels over time can provide valuable information for troubleshooting the other ESP performance problems.

EPRI report #1014176 documents demonstration of this technology. The study in this report found the SmartAsh™ System could facilitate troubleshooting and performance improvements of this equipment. Information on ESP operation at the hopper level of detail helps diagnose a number of common ESP operating problems, making it more valuable than a system that monitors only the mechanical operation of the ash removal system. However, it is not a simple system that can be installed and left to operate on its own; its successful implementation requires staff with the time and motivation for implementation, day-to-day operations and troubleshooting. For more information, contact Ralph Altman (raltman@epri.com, 423-899-0072).

Continuous Emissions Monitors (Program 77)

Reference Methods for auditing mercury CEMS finalized.

At the direction of Program 77 members, EPRI has been running the tests and analyzing the data on alternatives to the cumbersome and expensive Ontario Hydro Method (OHM), EPA's original Reference Method. Based in large part on the finding that these alternatives were as good or better than the OHM, EPA developed a rule allowing their use as Reference Methods – specifically Methods 30A (an instrumental reference method) and 30B (a sorbent trap method), which became final on November 6. For more information, contact Chuck Dene at 650-855-2425 (cdene@epri.com).

Technology-Based Business Planning Information and Services (TAG) (Program 9)

EPRI publishes new edition of TAG: Advanced Technologies.

The latest edition of EPRI's *Technical Assessment Guide: Advanced Technologies* (1014116) has been published. It provides a concise, executive-level overview of electricity industry technology options that may become commercial over the next 5 to 20 years. A large number of competing technologies are emerging to fill the need for future generation requirements. This report covers advanced gas-cooled nuclear reactors, pebble-bed small-scale nuclear reactors, high-efficiency combustion turbines, ultra-supercritical pulverized coal power plants, hybrid gas turbine and fuel cell power plants, on-site hydrogen production, in-combustor NO_x control technologies, and integrated multi-pollutant control technologies (SO_x, NO_x, particulates, and Hg). For information contact Ram Ramachandran (gramacha@epri.com, 650-855-2722).

LEGISLATIVE ACTIVITIES

Novak meets with Congressional staffs.

In September, October and November, John Novak, EPRI Executive Director of Federal and Industry Activities for Environment and Generation, held meetings with Senate and House staff members to present the results of the Prisms/MERGE analysis showing the importance of advanced coal with CO₂ capture and storage (CCS) in addressing global climate change. He also provided details on the RD&D program and funding needs developed under EPRI's *CoalFleet for Tomorrow*® program and compared them with provisions of the House and Senate versions of energy bills. For more information, contact John Novak (jnovak@epri.com, 202-293-6180).

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