Coal News and Trends

September 2009

Upcoming Industry Events:

- **Bluefield Coal Show, Bluefield, WV, September 16-18, 2009**

  The Bluefield Coal Show is considered as one of the major regional coal shows in the United States. The event features approximately 230 exhibitors displaying the latest, innovative equipment and technologies being developed by the coal industry. For additional information on the event, please refer to: http://www.bluefieldchamber.com/csinformation2009.html, or contact Leslie.Drake@mail.doc.gov, 304-347-5123.

- **International Pittsburgh Coal Conference, Pittsburgh, PA, September 20-23, 2009**

  The International Pittsburgh Coal Conference is hosted by the University of Pittsburgh, Swanson School of Engineering. As an outgrowth of a series of conferences spanning more than three decades, this annual event highlights coal utilization both in the United States and internationally. The conference is dedicated to providing a unique opportunity for in-depth and focused exchange of technical information and policy issues among international representatives from industry, government, and academia. For additional information or to register for the event, please refer to: http://www.engr.pitt.edu/pcc/2009conf.html, or contact Shannon.Fraser@mail.doc.gov, 202-482-3609.

- **Coal Market Strategies Conference, Henderson, NV, October 12-14, 2009**

  The American Coal Council's 2009 Coal Market Strategies Conference will examine the many and varied dynamics at play in today's U.S. coal industry and focuses on how coal producers, utilities, railroads, ports and barge operators are addressing the burning issues they face. Attendees will benefit from the opportunity to learn about a broad spectrum of the industry's most pressing issues. The conference serves as a forum for senior level executives from the supply, utility and industrial consumption, financial market, transportation and port/terminal sectors of the coal industry. For additional information and to register for the conference, please refer to: http://www.coalmarketstrategies.com.

- **ASTM International Training Course on Coal Chemistry, Atlanta, GA, October 21-22, 2009**

  The implementation of new regulations for power plant emissions will increase the demand for testing of fossil fuels and plant emissions. Until now, comprehensive training on the coal characterization standards that are used every day around the world was not available outside of the laboratories that use these standards. Now ASTM is offering the opportunity to receive a comprehensive review of good laboratory practices in coal chemistry focusing on the standards most frequently used in coal chemistry labs. Laboratory technicians and chemists, professionals new to testing, and anyone working in fossil fuel testing laboratories will benefit from this course. A B.S. Chemist degree or a Chemical Technician degree or equivalent with 3-5 years experience is recommended. For additional information and to register for the training course, please refer to: http://www.astm.org/TRAIN/filtrexx40.cgi?P+ID+54+/usr6/htdocs/astm.org/TRAIN/traindetail.frm.

Policy Analysis:

DOE Announces More than $8.4 Million for Regional Sequestration Technology Training Projects
Selected Projects Will Advance U.S. as Leader in Technology to Address Climate Change
http://fossil.energy.gov/news/techlines/2009/09062-DOE_Awards_CCS_Training_Projects.html

Washington, D.C. – U.S. Department of Energy Secretary Steven Chu recently announced more than $8.4 million in funding to develop regional sequestration technology training projects. The seven projects will facilitate the transfer of knowledge and technologies required for site development, operations, and monitoring of commercial carbon capture and storage projects.

The funding, which includes $6.9 million from DOE as part of the Recovery Act, will advance the United States in its position as the leader in technology for addressing climate change and for developing near-zero emission technologies to significantly reduce carbon dioxide (CO2) emissions from power plants.

"These projects will train workers for a clean energy economy and help position the United States as a leader in carbon capture and storage technologies for years to come," said Secretary Chu.

The training activities will focus on the applied engineering and science of carbon capture and storage for site developers, geologists, engineers, and technicians, providing a technology transfer platform for CO2 sequestration. The selected awards will produce the workforce necessary for the CCS industry with skills and competencies in geology, geophysics, geomechanics, geochemistry and reservoir engineering disciplines. The projects selected successfully addressed five activity areas:

- **Implement an Organized Sponsorship Development Program** – _Develop a self-sustained long term technology program, without federal government support._
- **Short Courses on CCS Technologies** – _Work with experts in the field to identify and develop training materials for professionals._
- **Regional Training—Outreach and Networking** – _Conduct training of carbon capture and storage technologies._
- **Perform Regional/Basin Technology Transfer Services –** _Transfer technology with various outreach materials and coordination of regional/basin efforts._
- **Plan and Manage the Recipient's Regional Program**

The total funding value of the projects is approximately $8.47 million over three years. The work will be managed by the Office of Fossil Energy's National Energy Technology Laboratory. The projects selected under the announcement include:

Regional Sequestration Technology Training Projects:

- **Board of Trustees of the University of Illinois (Champaign, IL)**—Create the Midwest Geological Sequestration Consortium Sequestration Technology Training Center. Training will utilize a modular multi-track approach allowing different professional participants to customize individual programs. Training will benefit the Illinois Basin region by providing curriculum, outreach, and networking on five focal areas for carbon sequestration technology development. _DOE share: $994,991; Duration: 36 months._

- **Environmental Outreach and Stewardship (EOS) Alliance (Seattle, WA)** —Facilitate the development of a carbon capture and sequestration workforce through regional CO2 sequestration technology training in the northwest, focusing on 12 to 14 key topics related to long-term underground CO2 storage. EOS will implement an organized sponsorship program, develop short courses on CCS technologies, provide regional training, outreach and networking, perform regional technology transfer services, and plan and manage the regional program. Courses will also cover the intricacies of storage in basalts since they are found in the region. _DOE share: $995,000; Duration: 36 months._

- **New Mexico Institute of Mining and Technology (Socorro, NM)** —Develop the Southwestern U.S. Geologic CO_2 Sequestration Training Center. A holistic approach will be utilized to conduct outreach and training for current professionals, inclusive of industry, non-governmental organizations, the general public and media. The training will also engage students at all levels, from K-12 to college students, and provide training and tools to secondary education teachers. *DOE share: $994,219; Duration: 36 months.*

- **Petroleum Technology Transfer Council (Tulsa, OK)**—PTTC Regional Technology Training Program will focus on the development and delivery of technology training for the Permian Basin. Multiple methods to transfer knowledge include regional workshops, an extended CCS course, research-oriented workshop, online certificate program, and webinars/e-symposia. *DOE share: $994,998; Duration: 36 months*

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- **Southern States Energy Board (SSEB) (Norcross, GA)**—The Southeast Regional CO_2 Sequestration Technology Training Program will develop short courses on CCS technologies, participate in regional training and other activities through outreach and networking, and perform internet-based and electronic regional/basin technology transfer services. The training will address the most promising sequestration options in the southeast region, various sources of CO_2, regional transportation infrastructure, and legal, regulatory and institutional frameworks. *DOE share: $994,368; Duration: 36 months.*

- **The University of Texas at Austin (Austin, TX)**—Create an alliance for Sequestration Training, Outreach, Research and Education (STORE), as part of the Gulf Coast Carbon Center, to promote the transfer of scientific knowledge and applied engineering technologies related to CO_2 storage in the Gulf Coast region. The focus will be on four primary objectives needed for emerging CCS industry in the Gulf region including sequestration workforce training, public outreach, research and technology dissemination, and workforce pipeline education. *DOE share: $994,702; Duration: 36 months.*

- **University of Wyoming (Laramie, WY)** — Develop the Wyoming CCS Technology Institute (WCTI) to implement training and technology transfer in the Wyoming and Rocky Mountain regions. The WCTI will utilize an industry-wide model to train a professional workforce, provide pathways for graduates and professionals from allied fields, and create a vehicle for communicating regional CCS knowledge and technology within the growing industry. *DOE share: $994,910; Duration: 36 months.*

Carbon Sequestration Documentary Wins Coveted Aurora Award
http://fossil.energy.gov/news/techlines/2009/09061-CCS_Documentary_Wins_Award.html

Washington, D.C. – A film about carbon sequestration produced with support from the U.S. Department of Energy (DOE) has received a 2009 Gold Aurora Award in the documentary category for nature/environment. Titled *Out of the Air – Into the Soil: Land Practices That Reduce Atmospheric Carbon Levels*, the documentary discusses the effects that proper landscape management can have on carbon absorption. Documentaries such as this are an important tool in educating the public on steps being taken to mitigate climate change.

Co-produced by Prairie Public Broadcasting, Fargo, N.D., and the Plains CO_2 Reduction (PCOR) Partnership, which is led by the University of North Dakota's Energy & Environmental Research Center, Grand Forks, N.D., the documentary was a deliverable under Phase II of DOE's Regional Carbon Sequestration Partnerships program.

The 30-minute documentary, which premiered on Prairie Public Television on September 26, 2008, is the third in a series of documentaries being produced by the PCOR Partnership and Prairie Public Broadcasting. *Out of the Air – Into the Soil* also won a 2009 Communicator Award for its high level of quality and excellence in communications.

The Aurora Awards are an international competition designed to recognize film and video excellence. Judging of entrants is performed by panels of working film and video professionals, mostly previous award winners.

The PCOR Partnership includes more than 90 public and private partners and covers all or part of nine states (North Dakota, South Dakota, Minnesota, Montana, Wyoming, Nebraska, Iowa, Missouri, and Wisconsin) and four Canadian provinces (British Columbia, Alberta, Saskatchewan, and Manitoba).

DOE Selects Projects to Develop Sensors and Controls for Next-Generation Power Plants
http://fossil.energy.gov/news/techlines/2009/09059-DOE_Selects_Sensors_and_Controls_P.html

Washington, D.C. – The U.S. Department of Energy has selected seven projects to develop sensors and controls to support the full-scale implementation and operation of highly efficient power generation technologies with near-zero emissions. The total award value of the projects is nearly $7 million, which includes $1.4 million in cost-sharing from the recipients. The projects will be managed by the Office of Fossil Energy's National Energy Technology Laboratory.

Future power generation facilities are expected to be very complex, requiring a high level of system integration for efficient operation. To manage complexity and achieve performance goals, advances in instrumentation, sensors, and process controls are vital. In the newly selected projects, investigators will conduct research and development aimed at making these advances and enhancing the performance of next-generation fossil energy power systems. As an added benefit, the projects will support 25 jobs over their 3-year duration.

The projects will address four specific research areas: (1) advanced materials development for high-temperature sensing; (2) novel sensor constructs for harsh environments; (3) modeling the placement and performance of sensors; and (4) multi-zonal reduced order model development for gasification and combustion reactors. These research areas, and the projects selected under each, are described below:

Area of Interest 1: Advanced Materials Development for High Temperature Sensing
Real-time monitoring of the composition of combustion gases is important for improving the efficiency of the combustion process and reducing the emission of pollutants, but new materials are needed for sensing in harsh environments. Projects in this area of interest will seek to identify and develop materials that can be engineered for high temperature (700 °C – 1,600 °C) sensing applications.

- **University of Connecticut** (Storrs, Conn.)—The aim of this proposal is to develop nanostructured materials that can serve as the basis for in situ and real-time gas sensors. Researchers will investigate the utility of multifunctional metal oxide/perovskite core-shell composite nanostructures for industrial and combustion gas detection at high temperature. *DOE share: $795,607; recipient share: $215,165; project duration: 36 months*

Area of Interest 2: Novel Sensor Constructs for Harsh Environments
These projects will focus on the development of novel sensors that enable online, in situ sensing of harsh environments produced in the combustion of fossil fuels. Researchers will use novel approaches to conduct real-time multidimensional mapping of key parameters via sensor networks, imaging techniques, and/or distributed and heterogeneous sensors designed for harsh environments.

- **Missouri University of Science and Technology** (Rolla, Mo.)—Researchers at the Missouri University of Science and Technology (formerly the University of Missouri-Rolla) will develop and demonstrate robust, multiplexed, micro-structured, single-crystal sapphire fiber sensors for deployment into the hot zones of advanced power and fuel systems to measure high temperatures and dynamic gas pressure. The University of Cincinnati will collaborate on this project. *DOE share: $896,838; recipient share: $234,962; project duration: 36 months*

- **Prime Research** (Blacksburg, Va.)—In partnership with the Virginia Tech Antenna Group, Prime Research aims to develop a revolutionary wireless sensor technology capable of operating at extreme temperatures and in highly corrosive environments. Completely eliminating the need for cables connecting to the sensors, the technology is enabled by recent developments in radio frequency identification, high-temperature materials, and frequency selective metamaterials. The technology has the potential to completely transform how sensing is performed in harsh environments. *DOE share: $648,754; recipient share: $162,188; project duration: 36 months*

- **Stanford University** (Stanford, Calif.)—In this project, Stanford researchers will design, build, and test a new class of optical sensors—tunable diode laser (TDL) sensors—based on absorption of near-infrared laser light. The sensors will be able to provide real-time in situ monitoring of temperature and gas composition in a slagging, entrained-flow coal gasifier. *DOE share: $877,856; recipient share: $219,465; project duration: 36 months*

- **University of Central Florida** (Orlando, Fla.)—This research project aims to develop accurate and robust wireless, passive high-temperature microsensors for in situ measurement of temperature and pressure inside combustion turbines for power generation systems. Two types of wireless passive high-temperature micro electromechanical system sensors—a temperature sensor and a pressure sensor—will be investigated based on recently developed multifunctional polymer-derived ceramics. *DOE share: $811,186; recipient share: $202,807; project duration: 36 months*

Area of Interest 3: Modeling the Placement and Performance of Sensors
Modeling and simulation are performed on advanced energy systems to assist in design, scale-up, performance, and control of individual components and integrated systems within a power plant. Research in this area of interest will focus on developing new fundamental algorithms and hybrid sensor architectures capable of describing and initiating new sensor-to-sensor communication networks based on intelligent sensors.

- **Oregon State University** (Corvallis, Ore.)—Oregon State researchers will work to provide a comprehensive solution to the problem of sensor coordination by deriving criteria for assessing sensor effectiveness and system impact and by demonstrating effectiveness and reconfigurability of sensors to changing performance criteria. *DOE share: $708,218; recipient share: $178,389; project duration: 36 months*

Area of Interest 4: Multizonal Reduced Order Model Development for Gasification and Combustion Reactors
Advanced modeling and simulation solutions are needed to foster rapid technology development, reduce pilot and demonstration-scale facility design time and trial runs, and lower the cost and technical risk in realizing high-efficiency, near-zero emission plants of the future. These projects will develop process simulation and computational fluid dynamics software tools to solve the critical engineering and operating problems that arise throughout the lifecycle of a plant.

- **Reaction Design** (San Diego, Calif.)—Reaction Design will enable an advanced form of reduced-order modeling for representation of key unit operations in flow-sheet simulations. Using high-fidelity fluid-dynamics models as input, Reaction Design will extend its existing technology which is designed to automatically extract equivalent reactor networks (ERNs) from the computational fluid dynamics solution. A key component of the project will be to encapsulate the CHEMKIN-based ERN models as CAPE OPEN–compliant objects that can be used in general flow-sheet simulation software. *DOE share: $817,384; recipient share: $218,723; project duration: 36 months*