

CLEAN COAL TODAY

A NEWSLETTER ABOUT INNOVATIVE TECHNOLOGIES FOR COAL UTILIZATION

NEWS BYTES



*New ASFE,
Jeffrey D. Jarrett*

On December 17, 2005, **Jeffrey D. Jarrett** was sworn in as the new **Assistant Secretary for the Office of Fossil Energy**.

For details, see page 3. Fossil Energy's **National Energy Technology Laboratory**, (NETL) also has a new **Director, Carl O. Bauer**, appointed last September. Bauer had been Acting Director of NETL since February 2005. Bauer brings to his new position over 30 years of experience in technical and business management from both the public and private sectors.

The U.S. Department of Energy's **updated database on planned coal-fired power plants shows 129 new plants in the planning stages**,

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CLEAN COAL CONFERENCE HIGHLIGHTS TECHNOLOGY PROMISE

On November 21–22, 2005, stakeholders from industry, government, Capitol Hill, and the international community gathered in Washington, D.C. for the 2005 Clean Coal and Power Conference. The conference was jointly sponsored by the U.S. Department of Energy (DOE) and the United States Energy Association. The first day covered a variety of topics in a policy context — including the Energy Policy Act of 2005 (EPACT '05) energy security, promising technologies, economic and financial concerns, and transition modes to a sustainable energy future. The second day of the conference featured discussions of specific technologies and R&D progress made by DOE and its private sector partners.



U.S. Energy Secretary Bodman addresses Clean Coal and Power Conference

Speakers agreed the conference came at a promising time for coal. Natural gas prices are at a record high, increasing the attraction of coal. Steady progress in coal R&D has led to the FutureGen prototype. The goal of a hydrogen economy, in which coal plays a significant role, is being pursued by various DOE organizations and international partners. Carbon sequestration — through the Regional Partnerships — is taking shape domestically, while the Carbon Sequestration Leadership Forum is growing in stature internationally. Providing a coherent framework for these efforts is the first energy law in 15 years — a law that offers incentives for a variety of coal-based programs such as grants, loans, and tax credits (see Clean Coal Today, Fall 2005).

Secretary of Energy Samuel W. Bodman, delivering keynote remarks, struck a note of optimism observing that Congress shares, and even surpasses, DOE's interest in coal. Appropriations for coal R&D have exceeded DOE's budget requests. Coal plays a key role in our nation's economic success and, due to our vast supplies, is a cornerstone in our energy security. Bodman heralded the FutureGen Alliance for assembling a wide and talented team of partners. Efforts such as FutureGen, and other successful R&D ventures, are based on science and technology innovations, and are making coal a clean reliable part of our diverse energy portfolio. While coal use is increasing, Bodman

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...“Conference” continued

cited IEA figures showing a 2.6 percent decrease in greenhouse gas intensity in 2004, on top of a 2.1 percent decrease in 2003.

Conference speakers stressed the importance of a pro-innovation, pro-technology approach to energy supply and climate change concerns. Senator Chuck Hagel (R-Nebraska) addressed the plenary session on the



new energy law, EPACT '05, and climate change, and stated that arbitrary deadlines are not workable because they are not based on technology availability. Hagel stressed the necessity of public-private partnerships as a means to pursue new technology over the next 20 years, and highlighted the importance of a geopolitical perspective on energy and environmental issues. Political destabilization, he warned, will take place if there is no economic growth in developing countries. Speaking on similar lines, General Richard Lawson stated that the United States produces 28 percent of the world's national product and has a responsibility to “transfer our prosperity to the planet.”

In terms of technologies to be emphasized, both in the U.S. and ultimately worldwide, participants saw the advisability of keeping coal options open. They saw promise in a variety of greenfield and retrofit applications. Several speakers stressed the importance of increasing efforts

toward coal liquids. Coal-to-liquids could be an important product of “polygeneration” process wherein a multipurpose coal plant can be configured to produce electric power, hydrogen, and liquid fuels. EPACT '05 provides incentives for development of both coal-to-liquids and biomass fuel technology.

Frank Alix of Powerspan, another keynote speaker, noted that the United States has 300 GW of pulverized coal (PC) capacity, and it would be prohibitively expensive to replace, rather than retrofit, all this capacity with cleaner technologies. He traced the changing nature of energy markets beginning with the popularity of nuclear power (“too cheap to meter”) in the 1960s to the widespread use of natural gas combined-cycle plants in the 1990s. He noted that CO₂ emitted from pulverized coal is dilute, and it is very costly to retrofit carbon capture systems. However, promising retrofit clean coal technologies are coming out of the R&D pipeline. One promising process that uses dilute ammonia, for example, can capture 90 percent of CO₂, at an estimated cost of \$10–15 per ton. The ammonia process is able to effectively capture dilute CO₂ because it absorbs at a much faster rate than other solutions. Oxycombustion, another method with potential, provides a more concentrated stream of CO₂ that could theoretically be sequestration-ready.

For new plants, integrated gasification combined-cycle (IGCC) technology was emphasized by a number of speakers, while others said circulating fluidized-bed (CFB) and PC plants with advanced CO₂ capture could be competitive with IGCC coupled with CO₂ capture. IGCC is the basic technology to be

used in FutureGen because it offers high efficiency and low emissions, and the ability to produce a concentrated CO₂ stream that can be captured and sequestered; produces saleable by-products; and allows for co-production of hydrogen and transportation fuels. It is reported, however, to cost at least 20 percent more than building a PC plant. Stu Dalton of EPRI, speaking on the role of gasification in zero emission technology, listed various coal-based IGCC/gasification commercial ventures. Two plants are operating in the U.S. (Indiana and Florida) and two in Europe (Spain and the Netherlands). Dalton is encouraged that both AEP and Cinergy have 600-MW plants in development in the United States. Several other projects are being planned. Excelsior Energy (a Clean Coal Power Initiative (CCPI) project in negotiation with DOE), plans a 531-MW plant with oxygen-blown ConocoPhillips E-Gas gasifier in Minnesota. Another CCPI project in negotiation, the Waste Management and Processors Inc., Gilberton Coal-to-Clean Fuels and Power Project in Pennsylvania, employs coal waste gasification. Steelhead (Madison Power and ArcLight Capital) intends to build a coal-fired 600-MW IGCC plant in Illinois that will co-produce 95 million scfd of SNG. Also in Illinois, Royster Clark/Rentech will build a plant to co-produce 1,000 tons per/day of ammonia, 2,000 barrels per day of Fischer-Tropsch liquids, and some electric power.

Woodrow Fiveland, of Alstom, noted that many coal combustion technologies besides IGCC have made significant advances in thermal efficiency, environmental performance, cost of electricity, and reliability/availability. He outlined

multiple paths to near-zero emissions including ultra-supercritical, PCs and CFBs, oxygen-fired PCs and CFBs, and advanced CFBs with chemical looping. To all of these, CO₂ capture could be added. Supercritical and CFB technology, he said, are the lowest cost solutions for CO₂ reduction. Large-scale plants in this type have been popular in foreign countries.

Peter Rigby of Standard and Poor's spoke of the difficulties inherent in financing large plants, including IGCC plants, in spite of the incentive being created by high natural gas prices. He concluded, however, that new coal plants are likely both necessary and financeable, for investment-grade players. Risks include: cost growth, construction delays, coal and water supply, siting uncertainties, and environmental regulations that may

change over the 15–20 year financing lifetime. The financing community does not, Rigby stressed, have a favored technology. In general, the better projects will be those that can allocate cost growth, completion risk, performance risk, and delays to the engineering, procurement and construction contractors. The most financeable plants are those that become part of a regulated utility's rate base, and especially those that receive pre-construction approval from regulators. Next in line would be independent power producers with long term sales agreements with creditworthy utilities. The most risky investments would be prospective merchant power plants — those without long-term contracts and that are constantly exposed to uncertain prices.

The views of IGCC decisionmakers on the financial and other perspectives of IGCC were revealed in a DOE-supported survey conducted by Deloitte, Inc. Katheryn Alsegaf of Deloitte spoke on the findings. Key stakeholders, she said, were not looking for a particular benchmark number at which point IGCC would become desirable. Rather, they saw IGCC in the large context, as part of an overall strategy including hedges against risk, compliance with possible carbon regulation, and portfolio diversity.

Overall, the conference reinforced the theme that all domestic energy sources and technologies should be pursued to decrease reliance on imports and promote energy security.

NEW U.S. DEPARTMENT OF ENERGY ASSISTANT SECRETARY ON BOARD

The U.S. Department of Energy, Office of Fossil Energy welcomes a new Assistant Secretary, Jeffrey D. Jarrett. Assistant Secretary Jarrett was sworn in on December 17, 2005. As Assistant Secretary for Fossil Energy, Jarrett will serve as the primary policy advisor to the Secretary and the Department on issues involving federal coal, oil, and natural gas programs, including extensive R&D efforts in those areas. His responsibilities will include managing the nation's Strategic Petroleum Reserve and the Home Heating Oil Reserve, coordinating and implementing elements of the National Energy Policy Act of 2005, managing the FutureGen initiative, and overseeing the Fossil Energy organization of about 1,000 scientists, engineers, technicians, and administrative staff located throughout the nation.

Jarrett is a West Virginia native and most recently was Director of the Department of Interior's Office of Surface Mining (OSM), having been confirmed to that office in January 2002. As Director, Jarrett had policy and executive responsibility for developing and enforcing surface coal mining regulations under the Surface Mining Control and Reclamation Act. The agency operates with an annual budget of more than \$300 million and a work force of more than 600 employees nationwide.

At the time he was nominated by President Bush to become OSM Director, Jarrett was Deputy Secretary for Mineral Resources Management of the Pennsylvania Department of Environmental Protection. He also has served as a Deputy Assistant Director of OSM's Regional Office in Pittsburgh, Pennsylvania. Earlier, Jarrett was director of planning, division manager, and reclamation director for the Cravat Coal Company and was reclamation supervisor for The Drummond Company. A native of West Virginia, Jarrett received a B.S. degree in Human Resource Management from Geneva College in Pennsylvania and an A.A.S. degree in Land Stabilization and Reclamation from Belmont Technical College in St. Clairsville, Ohio.

FUTUREGEN PROJECT TAKES SHAPE

In December 2005, Secretary of Energy Samuel Bodman announced that the Department of Energy has signed a cooperative agreement with the FutureGen Industrial Alliance Inc. to conduct the initial phase of the FutureGen project. The government-industry consortium will build and operate a \$1 billion 275-MW prototype plant that will use coal to generate both electricity and hydrogen, with near-zero emissions, and at the same time sequester CO₂ underground. The FutureGen initiative was first announced in February 2003, and responds to the Administration's programs being implemented to achieve a hydrogen economy — the Hydrogen Fuel Initiative and FreedomCar — as well as the Global Climate Change Initiative.

Coal gasification would be one of the basic technologies employed, turning coal into a hydrogen-rich synthesis gas. The gasification process captures SO₂ and NO_x, both useable in the production of by-products such as fertilizers and soil enhancers. Hydrogen can be extracted from the synthesis gas and burned directly and more cleanly than burning coal itself. Alternatively, the hydrogen could be used directly in a fuel cell to produce clean electricity. Very importantly, the FutureGen plant would serve as a user facility for testing a variety of cutting edge technologies. Key technical challenges are scale up of the advanced technologies and integration of plant operations with carbon sequestration.

FutureGen Project

Leading Edge Technologies Will be Considered

Traditional Examples

Cryogenic separation
Amine scrubbers
Amine scrubbers
Syngas turbines
Fuel cell (\$4000/kW)
Enhanced oil recovery
Current generation gasifiers
System Integration
Plant controls



Leading Edge Examples

O₂ membranes
H₂ membranes
Clathrate-based separations
H₂ turbines
SECA fuel cell (\$400/kW)
Sequestration technology
Advanced gasifier designs
"first of kind" integration
"Smart" plant controls

Excerpt from presentation of Michael J. Mudd, Acting Chief Executive Officer of the FutureGen Industrial Alliance, at the Clean Coal and Power Conference, November 22, 2005

An over-arching goal of FutureGen is to use coal, our nation's most abundant energy resource, to achieve a clean and secure energy future. To this end, FutureGen sets ambitious pollution reduction goals for criteria pollutants such as mercury, sulfur, nitrogen oxides, and particulates down to essentially near-zero levels. In addition, at least 90 percent of total CO₂ produced at the plant (approximately 1–2 million metric tons/year) would be sequestered, thus validating large-scale geological sequestration from this integrated plant.

Industry (the Alliance) has pledged to provide \$250 million in support of the project. FutureGen will be supported by DOE's Office of Fossil Energy ongoing R&D program, whose work with private sector participants over the past 30 years in gasification, high-efficiency turbines, and fuel cells have produced many of the technologies expected to be tested at the prototype plant. The initial phase cooperative agreement will focus on siting, conceptual design, National Environmental Policy Act compliance, and definition of remaining scope of the project. Negotiations on a follow-on cooperative agreement should be completed by the Fall of 2006.

The Alliance, formed in July 2005, consists of eight charter members including one foreign company. International participation is seen as key to gaining worldwide acceptance of the concept of FutureGen and offering developing nations a model for lower cost fuel from coal, which is more plentiful worldwide than oil or natural gas. Alliance members include: American Electric Power, Southern Company, Consol Energy, Inc., Kennecott Energy Company, Peabody Energy, BHP Billiton, Foundation Coal Corp., and China Huaneng Group. Alliance members collectively produce over 40 percent of the coal mined in the United States, while the utility members own more than 15 percent of U.S. coal-fired generation.

The plant location and the precise technologies to be tested are yet to be determined. The Alliance plans to issue a competitive site selection solicitation in early 2006 and make a final site selection by mid to late 2007. The March 2004 DOE *Report*

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NEW DOE EFFORTS ON POWER PLANT WATER MANAGEMENT

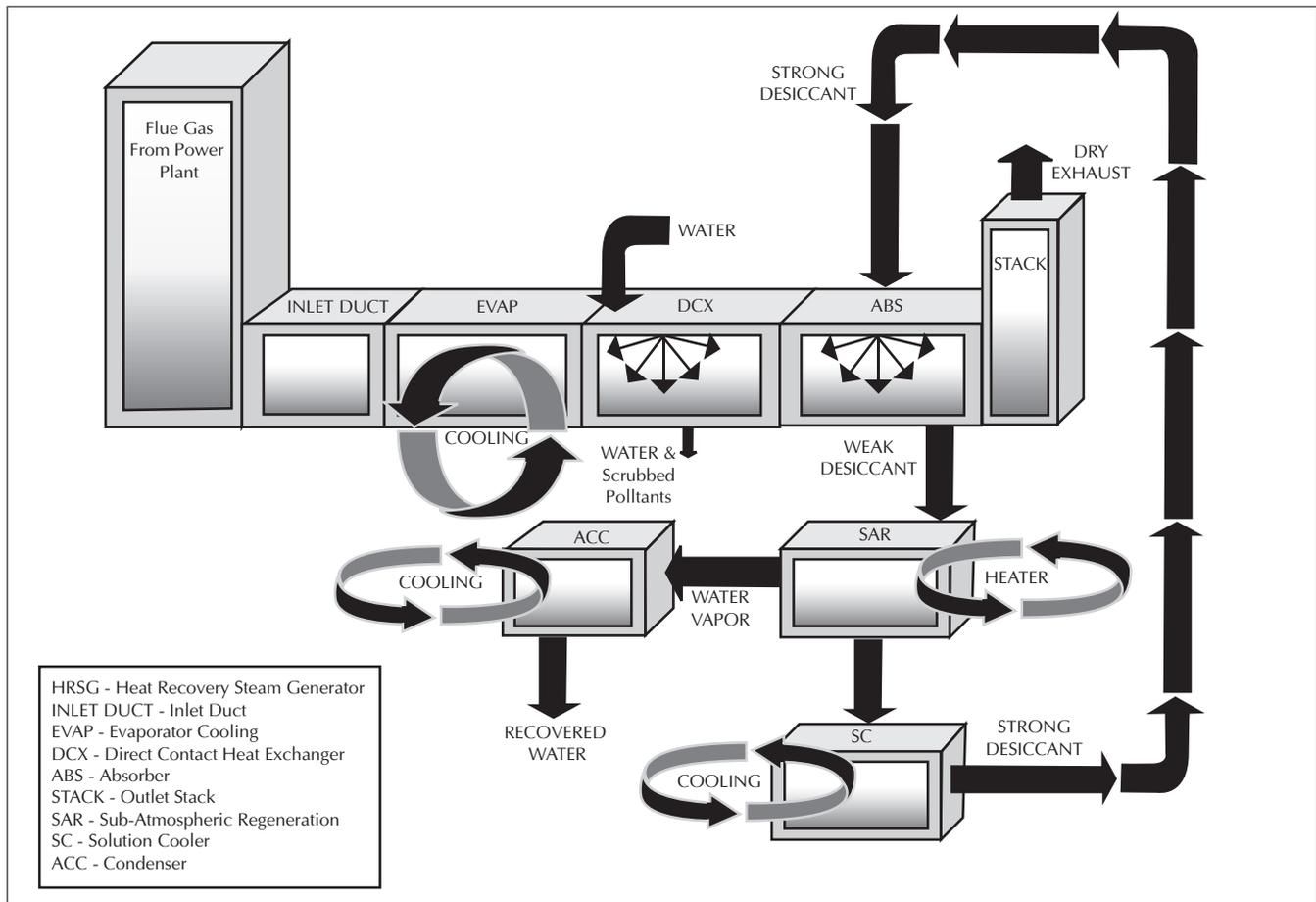
The U.S. Department of Energy’s Innovations for Existing Plants (IEP) program has traditionally focused on the development of advanced emissions control technologies and coal combustion by-products research related to the current fleet of coal-fired electric utility boilers. However, in 2003, DOE’s National Energy Technology Laboratory (NETL) began a new effort directed toward a reduction in freshwater needed for power plant operations and minimization of associated potential water quality impacts. This research encompasses laboratory and bench-scale activities through pilot- and full-scale testing as well as engineering assessments. The activities are built around four areas of research: non-traditional sources of process and cooling water; innovative water reuse and recovery; advanced cooling technology; and advanced water treatment and detection technology.

Thermoelectric power generation requires large quantities of cooling water. It is estimated that each kWh of electricity generated uses an average of 25 gallons of water. According to United States Geologic Survey (USGS) estimates, U.S. thermoelectric generation accounted for the withdrawal of approximately 136,000 million gallons per day (MGD) of freshwater in

2000, making it the second highest freshwater user, just behind agricultural irrigation. Conflicts associated with the allocation of freshwater are expected to increase over time throughout the nation, particularly in the West, Southwest, and Southeast regions. As a result, the reduction, recovery, and reuse of production and plant cooling water will become increasingly important. Section 979 of the Energy Policy Act of 2005 speaks to the importance of water and energy issues. The Act instructs the DOE to address issues related to adequate water supplies, optimal management, and efficient use of water and energy.

As a result of a 2003 competitive solicitation, NETL put in place five

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University of North Dakota Energy & Environmental Research Center has tested dehumidification technology to recover water from flue gas and use it as makeup water

...*“Water” continued*

projects addressing power plant water management issues. Three of these projects were completed in 2005. West Virginia University’s Water Research Institute completed a feasibility study on using underground mine water for power plant cooling. Eight sites were shown to have potential. The Electric Power Research Institute (EPRI) evaluated the potential of natural gas and oil produced waters to provide make-up cooling water for Public Services of New Mexico’s San Juan Generating Station. In the third project, the University of North Dakota’s Energy & Environmental Research Center (UNDEERC) completed pilot-scale testing of a liquid desiccant-based dehumidification technology to recover water in plant flue gas, and determine how this technology could be integrated to recover water, improve efficiency, and reduce stack emissions of acid gases and CO₂ (see schematic on page 5).

The two other projects are ongoing. The New York State Education Department is completing a three-year study to evaluate a naturally occurring bacterium, *Pseudomonas fluorescens*, which has shown to be selectively lethal to invasive zebra mussels that clog water intake structures (see *Clean Coal Today*, Fall 2004). Testing is being conducted on the service water treatment system for Rochester Gas and Electric Corporation’s Russell Station.

Finally, the Tennessee Valley Authority is evaluating a passive treatment technology to remove trace levels of arsenic, mercury, and selenium, as well as ammonia and nitrate from fossil power plant wastewater.

Expanding on this research, the IEP program selected seven additional projects in November 2005 aimed at reducing the amount of freshwater used by thermoelectric generating power plants. Building on past studies demonstrating that mine water can be cost-effective and improve cooling efficiency, the National Mine Land Reclamation Center at West Virginia University will develop a framework to assess the costs, as well as the technical, regulatory, and environmental benefits, of using mine water as make-up for thermoelectric power generation. In another project, Lehigh University will investigate the use of condensing heat exchangers to recover water from boiler flue gas. Regenerative heat exchangers will be studied by the URS Group in an effort to reduce evaporative losses in coal-fired power plants equipped with wet flue gas desulfurization systems.

In another newly awarded project, Marley Cooling Technologies, Inc. will evaluate the performance of its patented Air2Air™ condensing technology as applied to an existing wet evaporative cooling tower at a coal-fired power plant. Novel membrane separation and scale-inhibitor technologies will be investigated by the Nalco Company to help determine whether impaired water (of inferior quality) hold promise for cooling applications. Three varieties of impaired water — secondary treated municipal wastewater, passively treated coal-mine drainage, and ash pond effluent — will be examined using small pilot-scale cooling towers as part of another project by the University of Pittsburgh. Drexel University is to develop a scale-prevention technol-

ogy and a novel filtration method to enable an increase in the cycles of concentration in power plant cooling water systems. Operating at a higher cycle of concentration reduces cooling tower blowdown water requirements, which in turn reduces the need for freshwater make up.

The link between water and reliable and secure fossil-based thermoelectricity is a topic receiving increased attention as part of a broader discussion of the energy-water nexus.

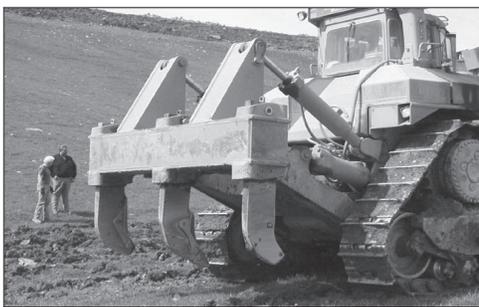
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to Congress, FutureGen-Integrated Hydrogen, Electric Power Production, and Carbon Sequestration Research Initiative, lists a number of critical enabling technologies being developed for FutureGen including but not limited to advanced gasification, oxygen production, hydrogen production, gas cleanup, hydrogen turbines, fuel cells and fuel cell/turbine hybrids, carbon sequestration (including CO₂ capture, transport, storage, measuring/monitoring/verification, infrastructure development), advanced materials, instrumentation, sensors and controls, and by-product utilization. These examples and others were provided by Mike Mudd, Acting Chief Executive Officer of the FutureGen Industrial Alliance Inc., speaking at the recent Clean Coal Conference.

For further information on FutureGen, as well as the chronology of Presidential announcements, official reports, and *Federal Register* notices, see <http://www.fe.doe.gov/programs/powersystems/futuregen/index.html>

APPALACHIAN MINE LAND RESTORATION DEMONSTRATES SEQUESTRATION BENEFITS

This spring marked the final planting of nearly 600 acres of surfaced mined lands in the Appalachians with native hardwood trees to demonstrate that carbon sequestration and the establishment of natural forest ecosystems on surface mine lands are possible. University of Kentucky (UK), Virginia Polytechnic Institute and State University (VPI), and the Tennessee Valley Authority (TVA), have been working over the past 3–5 years to install research plots in Kentucky, Virginia, West Virginia, and Ohio that demonstrate practices that would encourage the growth of native hardwoods at previously and actively mined sites. Each of these organizations has been funded by the U.S. DOE under separate cooperative agreements.



At Brent Mountain project, mechanically ripping material prior to planting

The University of Kentucky has reforested over 550 acres of mine lands in the eastern and western coal fields of Kentucky with high-value hardwood tree species. The area is an actively mined site, still under bond. This work is being done in collaboration with the Office of Surface Mining and Reclamation Enforcement to evaluate that agency's recommended Forestry Reclamation

Approach (FRA). That approach calls for 6 feet of loose material as the uppermost soil level, achieved either by depositing overburden material on the soil or mechanically ripping the soil. Experimental plots were established on land previously reclaimed to grasslands and lands which were being actively reclaimed. Previously mined sites were treated by ripping the soil using various mechanical techniques and at different levels of intensity to create a growth medium. Actively mined sites are being reclaimed by dumping loose overburden materials upon a compacted sub grade. During 2003–2005, hardwood trees were planted at both categories of sites.

The experimental plots varied in terms of treatment techniques, such as types of seedlings planted, inoculation of barren soils, and the use of soil amendments, pesticides or herbicides. Inoculation did not show significant benefit; however, mechanical treatment successfully created lower-density soil where water could percolate and roots become established. Sequestration is measured by determining the dry weight of aboveground biomass and litter, as well as biomass in tree root systems. Approximately half this weight is carbon.

The Virginia Polytechnic Institute and State University has reclaimed approximately 45 acres of mined lands already restored to grassland at sites in Ohio, Virginia, and West Virginia. A major purpose is to demonstrate that the FRA can be used on previously mined lands to sequester carbon in native hardwood forests. Experimental plots were established representing

varying soil types and slope. The research has shown that, depending on Site Index (SI) value (a measure of soil fertility), carbon sequestration is possible at no additional cost, or even at a profit, since wood products can offset the costs of reclamation. With proper remediation techniques, the SI of mined lands can be as good as or exceed that of native soil.

The TVA began work in 2000 on its Carbon Capture and Water Emissions Treatment System project. The primary goal was to reclaim 40 acres near TVA's Paradise Fossil Plant on marginally reclaimed surface coal mine lands in Kentucky. TVA used gypsum from the flue gas desulfurization (FGD) process as a soil amendment and mulch and coal fly ash settling pond water for irrigation. The TVA system is growing commercial grade trees and cover crops and is expected to sequester 1.5–2.0 metric tons per hectare of carbon per year over a 20-year period. The concept could be used to meet a portion of the timber industry's needs while simultaneously sequestering carbon in lands which would otherwise remain non-productive.

Together, the various research projects have shown that more carbon is sequestered by converting mined land to native hardwood forest, rather than to grasslands. Reclamation to forests also provides wood products, and ecological assets such as improved wildlife habitat and water quality. When reclamation is done properly — with sufficient soil mixing — it is possible for trees to grow faster than on native sites. Feasibility of reclamation depends on site economics; in some cases, market-based incentives for carbon sequestration would be needed to make the operation profitable.



INTERNATIONAL INITIATIVES



CSLF EXPANDS PARTICIPATION

The Carbon Sequestration Leadership Forum's (CSLF) Policy and Technical Groups held their annual meeting in Berlin, Germany, September 27–29, 2005, and made significant strides toward enhancing stakeholder involvement, as well as increasing developing country participation in the CSLF. The CSLF was launched by the U.S. Department of Energy and the U.S. State Department in February 2003 as a Ministerial-level international forum. The organization's purpose is to make carbon capture and storage commercially competitive and environmentally safe, through international collaborative efforts in data gathering, R&D, and joint projects. The CSLF has grown from 13 to 22 member nations. At the Berlin meetings, seven new projects were officially endorsed, bringing the total of approved projects to seventeen. While CSLF does not provide funding, project endorsements are evidence of meeting a standard of excellence, and can increase visibility, as well as public acceptance, of sequestration projects. Following the Berlin meetings, the 1st International Workshop on CSLF Projects was held in Potsdam, reviewing progress on the projects under way.



Fourth annual CSLF Technical and Policy groups meet in Berlin, Germany, September 2005

Speaking at the Berlin meeting, former FE Principal Deputy Assistant Secretary Mark Maddox, Policy Group Chair, itemized developments showing new international recognition of CSLF's role. The G8 Gleneagles Plan of Action on Climate Change, Clean Energy and Sustainable Development — a document developed at the Gleneagles, Scotland, meeting of G8 nations in July 2005 — endorsed the objectives and activities of the CSLF and invited it to work with the International Energy Agency to hold a workshop on short-term opportunities for carbon capture and storage in the fossil fuel sector, as well as to collaborate in determining the cost and scope of a CO₂ capture-ready plant. The Intergovernmental Panel on Climate Change (a U.N. organization) also reached favorable conclusions as to the technological importance of carbon capture and storage. Their special report on CO₂ capture and storage prepared for the 11th Conference of Parties of the United Nations Framework Convention on Climate Change, concluded the technology is applicable not only for the long term but for the short and medium term, and certainly well before 2020. Other agreements validating the emerging CSLF role are the Mainz Declaration, signed by Germany and the U.S., on energy security, pollution, and greenhouse gas emissions; and the U.S. – E.U. Summit's Joint Statement of Intentions on Energy Security, Economic Growth and Environment. CSLF member nations are also a key part of the new Asia-Pacific Partnership on Clean Development and Climate.

While the CSLF has been primarily an organization of government officials, the actual projects are usually undertaken in partnership with the private sector. The Policy and Technical groups agreed that stakeholders benefit the CSLF; thus more transparency would be advantageous. Stakeholders will be included on task forces as needed, and a stakeholder session will be on the agenda when Policy and Technical groups meet. Other new stakeholder features will include a stakeholder registry and a web site open to all (see www.cslforum.org).

Participation of developing countries was also emphasized at the Berlin meetings. Two of the new projects endorsed are located in China. The Technical and Policy group meetings resulted in the recommendation that Greece and South Korea be admitted to membership. Saudi Arabia is also a new member. A new task force has been created to assess specific capacity needs, and develop country action plans for each CSLF emerging economy member. The Technical Group also embarked on an important survey in

process integration for advanced power systems, an area identified by their ongoing studies as a “technology gap.” The survey will draw on commercial power project experiences of several Technical Group members in order to provide a lessons learned document to help new projects in the design phase. The Technical Group also established a new team for project interaction and review, tasked with looking at published results of CSLF projects and recommending update to the Technology Roadmap. The team will also take over duties of evaluating projects seeking CSLF endorsement.

The next meeting of the Policy, Technical, and Stakeholder groups will take place in New Delhi, India in April 2006.

MEETING OF INDIA–U.S. COAL WORKING GROUP

Since the launch of the U.S. – India Energy Dialogue on May 31, 2005, the five Working Groups, including several related to the Office of Fossil Energy’s interests, have met and begun identifying mutually beneficial areas of cooperation, along with schedules and estimates of resource requirements. The Coal Working Group (CWG) first met in July 2005 via a televideo conference. The second CWG meeting was held in Washington, D.C., on November 17–23, 2005, and was co-chaired by Mark Maddox, former Principal Deputy Assistant Secretary, Office of Fossil Energy, and Pradeep Kumar, Additional Secretary of India’s Ministry of Coal. More than 40 participants from the U.S. and Indian governments, industry, universities, national laboratories, and research institutions participated in this meeting.

Participants discussed overall goals and objectives of the CWG, its structure, scope of activities, and membership, and finalized the CWG’s Terms of Reference. The CWG committed to establishing a Business Advisory Council as a resource to the group consisting of representatives from business, industry, academia, and other non-government organizations. The Council would be co-chaired by a representative from each country, and consist of U.S. and Indian members who could provide expert guidance on the priority items of interest identified by the CWG. Current collaborations between U.S and Indian companies, research agencies, and government agencies were reviewed, and a number of areas for enhanced collaboration were proposed. These include development and demonstration of improved technologies for coal beneficiation and power generation utilizing coal wastes; coal liquefaction and in-situ coal gasification, and utilization of coal-bed, coal-mine, and abandoned-mine methane. Also considered was training of Indian industry personnel on U.S. methods and regulations related to safety and productivity in coal mines, and proper coal mine closure and reclamation.

The next CWG meeting is scheduled for New Delhi in April 2006, and will include a discussion of the CWG high-level work plan. The CWG will meet in conjunction with the next Carbon Sequestration Leadership Forum meeting.



Signing of the CWG Record of Meetings by FE Principal Deputy Assistant Secretary, Mark Maddox (front left), and Additional Secretary, India Ministry of Coal, Pradeep Kumar (front right)

... “News Bytes” continued

representing 77 GW of power. The Energy Information Administration estimates that 87 GW of new coal capacity will be needed by 2025. For a copy of the report, see www.fe.doe.gov, click on Clean Coal & Natural Gas Power Systems, and find document under Key Publications.

Well attended **public hearings were held in January 2006 at two locations in Pennsylvania on the topic of the draft EIS for the WMPI Gilberton Coal-to-Clean-Fuels Power Co-Production Project.** The project was awarded under the first round of the Clean Coal Power Initia-

tive, and uses coal waste as feed to a gasification facility that generates fuel gas for clean power, thermal energy, and clean liquid fuels. A Federal Register notice was published on December 9, 2005, announcing the hearings and the availability of the draft EIS for comment.

ACTIVE CCT DEMONSTRATION, PPII, AND CCPI PROJECT STATUS

CCT DEMONSTRATION STATUS

JEA – ACFB Demonstration Project. This project has been successfully completed. The final report is posted on the Clean Coal Technology Compendium, and the project is in closeout. (Jacksonville, FL)

Kentucky Pioneer Energy (KPE), L.L.C. – Kentucky Pioneer Energy Project. The Cooperative Agreement has expired. The Draft Final Report is in progress. (Trapp, KY and West Terre Haute, IN)

TIAX, LLC (formerly Arthur D. Little, Inc.) – Clean Coal Diesel Project. TIAX has sent a letter requesting that the project be terminated because of the inability to reach an agreement with the University of Alaska and Fairbanks Morse Engine over the issues of cost-share and facility commitments to complete Phase 3. (Fairbanks, AK and Beloit, WI)

PPII STATUS

Otter Tail Power Company – Demonstration of a Full-Scale Retrofit of the Advanced Hybrid Particulate Collector (AHPC) Technology. After completing more than two years of commercial demonstration, Otter Tail Power Company has made modifications to the unit to provide more ESP and fabric filter surface for particulate removal. To date, the AHPC has demonstrated superior particulate removal when the integrity of filter bags remains intact. However, superior particulate removal has been accompanied by greater operating costs due to increasing overall pressure drop or premature bag failure. During a scheduled plant outage in December 2005, the system manufacturer (SEI) performed some additional maintenance and adjustments on the

unit. The operations have not improved significantly. Stakeholders are discussing plans for moving forward on the project (Big Stone City, SD)

Sunflower Electric Power Corp. – Demonstration of a 360-MWe Integrated Combustion Optimization System. The combustion optimization sensors package is operational. Data are being archived on the MKE computer and by EtaPRO. The low-NO_x burner modifications and coal-balancing dampers have been installed and are operating successfully. All five pulverizers are equipped with an automated coal-flow balancing system, and are successfully operating. Due to larger than anticipated costs for installation of new low-NO_x burners and overfire air systems, Sunflower has withdrawn the continuation application to DOE for proceeding to Phase III Budget Period 2 of the project, and DOE has accepted Sunflower's withdrawal position. The project is now in closeout. A final report is in progress. (Garden City, KS)

Tampa Electric Company, Big Bend Power Station Tampa – Neural Network Sootblower Optimization Project. This project has concluded and the final project report has been completed. (Apollo Beach, FL)

Universal Aggregates, LLC – Commercial Demonstration of the Manufactured Aggregate Processing Technology Utilizing Spray Dryer Ash. The project is in the operations phase. Universal Aggregates has successfully run the entire plant process including mixing, extrusion, curing, crushing, screening, and recycling screened fines. The plant has shipped finished product to its distributor on a limited basis. The facility now is staffed 24/7 as efforts are made to adjust material additives and equipment configurations to produce a consistent product using the spray

dryer ash removed from the Birchwood Power Generation Facility. Universal Aggregates has requested and been granted a no-cost extension until June 30, 2006, to allow modifications and improvements intended to increase throughput capacity and extend the continuous run time of the plant. (King George, VA)

CCPI STATUS

NeuCo, Inc. – Integrated Optimization Software. The project at Dynegy's Baldwin Energy Complex has completed the efforts planned in Budget Period 1 within budget and on schedule. The Combustion Optimization module achieved the NO_x reduction goal of 5 percent along with improvements in cyclone stability. NeuCo has shown that by using their SCR Optimization module, they are reducing ammonia consumption by 18 percent. NeuCo has installed the Sootblowing Optimization module on two separate units, with and without an intelligent sootblowing control system. This dual approach allows NeuCo to address a wide range of sootblowing issues. During Budget Period 1, substantial effort was focused on getting the software for the PerformanceOpt module developed and tested. Approval has been granted for this project to transition to Budget Period 2. The overall goal of Budget Period 2 is to improve the individual modules beyond the baseline established in Budget Period 1 and to quantify the improvements provided by each new release of each module. (Baldwin, IL)

University of Kentucky Research Foundation – Advanced Multi-Product Coal Utilization By-Product Processing Plant. During this past year, the quantity and quality of ash in the 100+ acre lower pond at Ghent Power Generating Station has been determined using an

innovative vibracoring technique and three-dimensional computer modeling to create layered iso-grade maps and stratigraphic columns and profiles. Resource reserve estimation indicates there are over 7 million tons of high-quality ash in the pond, 1.8 million tons of which are less than 10 μm in diameter. Thus, the pond is an excellent source of feedstock. Trailer mounted pilot test equipment—consisting of a 1,000 gallon feed system, a primary classifier, six 8-ft³ froth flotation cells, a secondary classifier, a dewatering screen, a 1,500 gallon thickener and a drum filter—has been installed on the perimeter of the pond and has operated throughout the late summer and fall of 2005. The field tests have been conducted to generate the data necessary to finalize the details of the process circuits, as well as provide critical scale-up data for the project plant. Data has been generated for each of the unit processes and two of three circuit configurations have been tested. Initiated in November 2004, the first budget period, Project Definition, runs through May 2006. (Ghent, Carroll County, KY)

We Energies – *TOXECON™ Retrofit for Mercury and Multi-Pollutant Control*. This project has entered the operations phase. Work constructing the baghouse, ductwork, and balance of plant has been completed. Operations were initiated on December 17, 2005, when flue gas from Unit 7 was directed to the TOXECON™ baghouse. Unit 8 was put on line in early January, and Unit 9 is scheduled to come on line in late January, followed by activated carbon sorbent injection. During calendar year 2006, the project will focus on evaluation of mercury control using activated carbon injection, and will perform acceptance testing, baseline performance evaluation, parametric testing, and evaluation of long term performance. (Marquette, MI)

Western Greenbrier Co-Generation, LLC—Western Greenbrier Co-Production (WGC) Demonstration Project. WGC continues to work to develop key project areas including arrangements for sale of power to support a public tax-exempt bond sale to fund the project. In addition, work continues to develop the preliminary process design, EPC bids, and a satisfactory credit/completion assurances package. Environmental information related to water/fuel availability, treatment, reclamation, and processing is being developed. Efforts continue to select an O&M contractor and negotiate an O&M agreement. Also in development are transmission and interconnection agreements, and commercialization plans. WGC has requested and has been granted a no-cost extension of the cooperative agreement until the end of April 2006 to complete their Phase 1 milestones and incorporate design changes into the fuel processing system. The changes are expected to save capital and operating costs. (Rainelle, WV)

Great River Energy (GRE) – Lignite Fuel Enhancement. GRE completed the prototype dryer installation and system integration at the Coal Creek Station in December 2005. Equipment suppliers and design engineers have initiated acceptance tests and control system loop checks. Startup and commissioning of the total system is scheduled to begin in January 2006. (Underwood, ND)

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University of Kentucky Research Foundation test equipment at Ghent Power ash pond

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