DOE/FE-0215P-22 Issue No. 22, Summer 1996

CLEAN COAL TODAY

U.S. Clean Coal Technology Demonstration Program Office of Fossil Energy, U.S. Department of Energy

Piñon Pine IGCC Plant Construction On Schedule

The Piñon Pine IGCC Power Project, an advanced generation integrated gasification combined cycle (IGCC) system, soon will begin its demonstration at a Sierra Pacific Power Company (SPPC) site near Reno, Nevada. This project, selected under Round IV of the U.S. Department of Energy (DOE) Clean Coal Technology (CCT) Program, began design and permitting activities in mid-1992. Construction began in February 1995 and currently all critical milestones, such as major equipment deliveries, excavation/erection, and staffing/training, are being met. Overall, construction is approximately 75 percent complete and progressing well toward completion and plant startup by the end of 1996. The demonstration plant will run to 2000; the plant then will continue in commercial operation.

Northwest view of Gasifier Island with coal storage dome in background.

The advanced IGCC system will utilize a Kellogg-Rust-Westinghouse (KRW) [changed later to KRW Energy Systems] pressurized fluidized-bed coal gasification process operating in an air-blown mode, with in-bed desulfurization and full stream hot gas cleanup. A western bituminous coal is the design fuel, but testing also will be performed on a high-sulfur eastern or midwestern coal. During periods of gasifier maintenance/outages, Piñon Pine has the capability to continue operation as a gas combined-cycle unit.

The Piñon Project is being constructed and operated as a baseload unit at SPPC's Tracy Power Station, an existing power generation facility located on a rural 724 acre plot approximately 17 miles east of Reno, Nevada. The Station has a current installed capacity of 436 MWe using either natural gas or oil as fuel. The Piñon unit will be a stand-alone facility and will add approximately 100 MWe to the capacity of Tracy Station.

SPPC, the project Participant, has contracted with Foster Wheeler USA Corporation for overall project management, engineering, procurement, and construction of the project. Foster Wheeler, in turn, has subcontracted with

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Clean Coal Briefs

Construction of the 250-MW IGCC Project at **Tampa Electric** is 95 percent complete. The power island checkout is nearly completed with the first turbine roll scheduled for June 1996. First fire of the gasifier is scheduled for mid-July 1996. Reclamation of the 4,400 acre site, including the 880 acre cooling pond, is complete. Tampa is on schedule to begin its demonstration phase in late September 1996.

American Electric Power and the vendors for the utility-scale (350 MWe) pressurized fluidized-bed combustion (PFBC) technology have completed a large amount of critical value engineering that has the potential to significantly lower the cost of the PFBC technology. Because of the value engineering success, DOE has recently agreed to move ahead with this project subject to more definitive site, teaming, and financing arrangements. U.S. Generating will be leading the effort to complete these arrangements by the end of 1996.

See "Clean Coal Briefs" on page 4. . .

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The M.W. Kellogg Company for the engineering and procurement of key components of the gasifier island. SPPC will be the owner-operator of the Piñon Project.

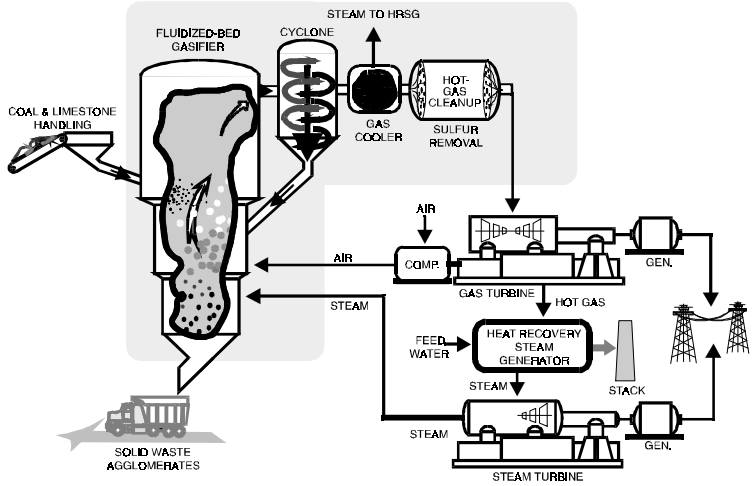
Technology Background

The Piñon Pine Project integrates a number of technologies developed by DOE. Among these are the KRW Energy Systems fluidized-bed gasifier, in-bed desulfurization using limestone sorbent, and zinc-based sorbent sulfur removal from a hot gas stream. DOE and its predecessor agencies have supported development of this fluidized-bed gasification technology since 1972 when the design of a process development unit (PDU) was first initiated under a contract with Westinghouse Electric Corporation. Construction of the PDU was completed in 1975 at Westinghouse’s Waltz Mill Facility near Madison, Pennsylvania. During the 1980s, the addition of dolomite and limestone to the gasifier for in-bed sulfur removal was successfully demonstrated at the PDU.

Pilot plant tests indicated that 85-90 percent sulfur removal efficiencies could be routinely achieved while using coal feedstocks containing 2-4.5 percent sulfur. In addition, the use of these sorbents in the gasifier was found to increase the product gas heating value while decreasing the production of ammonia, a major contributor to NO_x emissions. In the same time period, DOE also devoted a significant effort to developing numerous zinc based sorbents for “polishing” (the final desulfurization step) hot gas streams of trace sulfur compounds that are not captured by the in-bed sorbents. Various improvements to sorbents and configurations have evolved from these early developments.

The Piñon Project has been designed to use a transport reactor for both contacting powdered sorbent and gasifier effluent gas and for regenerating the spent sorbent. Finally, the trace levels of particulates remaining after cyclones and sulfur polishing are removed with ceramic candle filters. This sub-system is being provided by Westinghouse which, with assistance from DOE, developed high temperature filtering technology. Another feature of the Piñon Pine Project is the use of a new generation of high firing temperature gas turbines. The GE-6FA combustion turbine was developed with assistance from DOE, and has a firing temperature of 2,350°F.

Piñon Pine IGCC Power Project Schematic



Technology Benefits

The KRW process improves upon conventional IGCC systems in several aspects. Its pressurized, air-blown fluidized-bed gasification technology will provide a higher thermal efficiency than a similar oxygen-blown system because it consumes less auxiliary power. Also, unlike conventional gasifiers a portion of the sulfur is captured within the fluidized-bed before the gasifier. Additional impurities are removed through an advanced hot gas cleanup system, which operates with a regenerative sulfur sorbent to further remove sulfur compounds. Barrier filters are used to remove particulates. The Piñon Pine Project is unique among DOE Clean Coal projects in that the entire gas volume is cleaned at high temperatures, thus avoiding the penalties of cooling/reheating. In addition, the inherent modular design of the system and simple process configuration are expected to yield significantly lower engineering and construction costs.

Integration Benefits

The Piñon Pine Project will demonstrate the advanced IGCC technology in a fully integrated, full load configuration. This was deemed necessary in order to evaluate the adequacy of integrated control concepts and to measure actual performance of a complete power generation system on a utility grid. The modular concept of this project will also provide information that is directly applicable to other commercial plants, since such plants will incorporate one or more features of this plant’s configuration. Most other IGCC demonstration plants

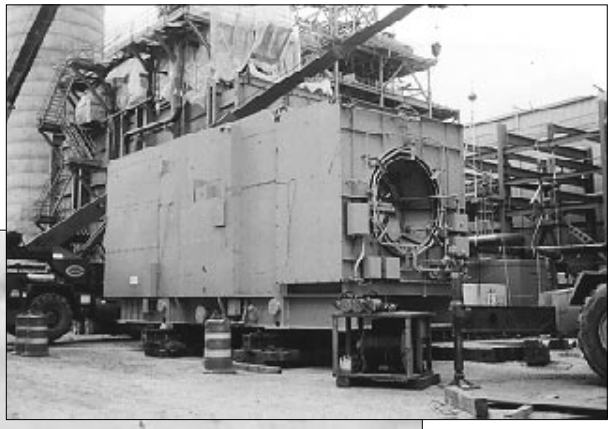
have been designed around a more conventional approach, i.e., gas produced in the gasifier was either quenched or cooled and scrubbed for low temperature removal of sulfur compounds and particulates.

Project Status

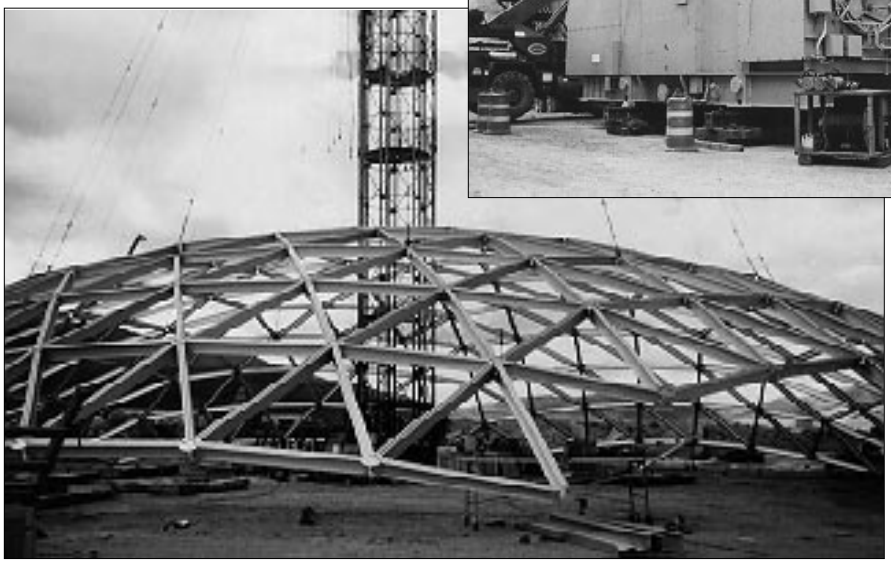
The National Environmental Policy Act (NEPA) process was conducted by DOE prior to construction. An Environmental Impact Statement was developed and the Record of Decision was issued in late 1994. After gaining final approval by the Public Service Commission of Nevada, the Project moved into construction in February 1995.

Steel erection was started in late 1995 and progressed rapidly with an appropriate "topping out" (highest point for installing steel support beams) ceremony occurring in February 1996. Consistent with an environmentally pristine area, all solid feedstocks and products will be unloaded, conveyed, and stored in completely enclosed subsystems. Major pieces of equipment, including the gasifier, syngas coolers, particulate filters, cyclones, and two turbines, were vendor-fabricated, shipped to the site, and lifted into place consistent with an overall modular mechanical and erection schedule.

The combustion turbine and steam turbine each have been installed, aligned with turbo generators, and made ready for commissioning. Operator training for the combustion turbine has been ongoing since mid-April in preparation for start-up on natural gas in mid-August. The switch to coal gas will be made as the gasification island becomes operational in the fourth quarter of 1996.



Unloading of advanced gas turbine GE-6FA at the Piñon Pine Demonstration Project site.



The erection of a novel geodesic dome for enclosed storage of feed coal in the Piñon Pine Project.

Local/Regional and Economic Benefits

In addition to gaining industry confidence to accept advanced clean coal technologies, the Piñon Pine Project is designed to provide substantial benefits to the customers of SPPC in the long term, as well as to the Reno, Nevada, area during the relatively short construction period (2 years). Peak construction has required as many as 500 workers. The Piñon Pine Project has made a unique agreement with local trade unions that allows the use of a much higher than normal percentage of apprentices, including entry levels, than typically used in construction projects. To ensure that many of these apprentice positions are filled by minority and disadvantaged individuals, SPPC is publicizing the apprentice programs to community groups such as the Inter Tribal Council, NAACP, and Progressive Leadership Alliance of Nevada. At a recent "Topping Ceremony," it was stated that SPPC's goal was to provide women, minorities, and disadvantaged individuals with a career instead of just a job

Demand for power in northern Nevada continues to increase, not only due to urban growth but to power-intensive metals, mining, and extraction industries (Nevada is the nation's largest supplier of gold and silver).

Due to the low cost of coal as a fuel and an expected heat rate of 8,096 Btu/Kwh (Low Heating Value), Piñon Pine will operate as a baseload generator. With this additional capacity, SPPC's dependence on imported power will drop to less than 50 percent. The Piñon Pine Project will further benefit the surrounding region by using bituminous coal from Utah and limestone from eastern Nevada as the baseline feedstocks. ✯

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ENCOAL Corporation made its first shipment of neat Process Derived Fuel (PDF) using a newly installed “car-topping” method for applying ENCOAL’s proprietary dust suppressant. The shipping, transloading rail-to-barge, and combustion were all completed satisfactorily. Also, USX Steel Company successfully tested ENCOAL’s Coal Derived Liquid (CDL) as a blast furnace fuel injectant.

The Generic NO_x Control Intelligence System (GNOCIS) has been installed at Georgia Power Company’s Hammond Unit 4 on **Southern Company Services’** Demonstration of Advanced Combustion Techniques for a Wall-Fired Boiler Project. In open- and closed-loop testing in early 1996, GNOCIS showed the ability to optimize plant performance in terms of NO_x emissions, unburned carbon in fly ash, and overall plant efficiency. Several U.S. utilities are discussing commercial GNOCIS installations, including applications to other boiler types and for other fuels, such as natural gas.

Custom Coals International’s design capacity of 500 tons per hour has been reached at the Custom Coals Laurel facility, located near Central City, Pennsylvania. Although the facility is not continuously operating at the designed capacity, commercial raw bituminous coal is being processed, cleaned, and sold. Custom Coals International expects to have contracts in place for nearly 75 percent of the facility’s capacity.

Environmental testing is nearly complete at the **Wabash River Coal Gasification Repowering Project**. So far, the sulfur removal efficiency has been measured as high as 97 percent, equivalent to SO_2 emissions

See “Clean Coal Briefs” on page 8. . .

Milliken Clean Coal Project Under Way

The startup of a unique flue gas desulfurization (FGD) system at the New York State Electric & Gas Corporation (NYSEG) Milliken Station ushers in a new generation of innovative pollution control technologies that offer a comprehensive approach to the cleanup of power plant emissions.

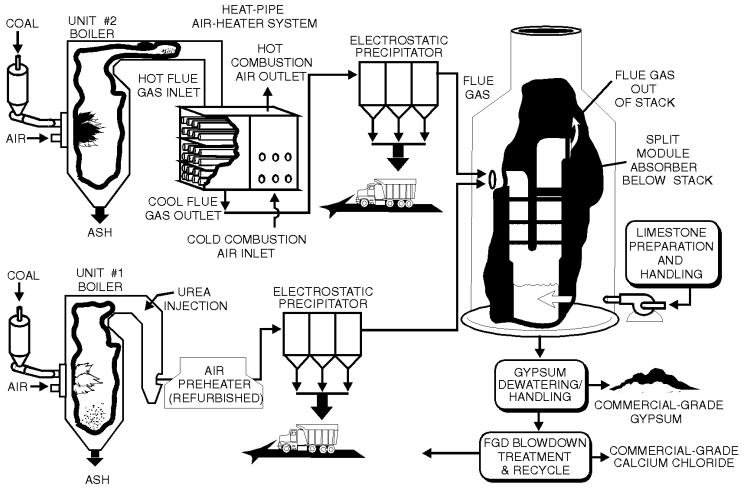
NYSEG, in partnership with Saarberg-Hölter-Umwelttechnik (S-H-U) of Saarbruken, Germany, and Houston, TX, Consolidation Coal Company of Library, PA, and The Stebbins Engineering and Manufacturing Company of Watertown, NY, is demonstrating the project at Milliken Station’s 150-megawatt tangentially-fired Units, 1 and 2, built in the 1950s. DOE selected this $159 million project in Round IV of the CCT Program. DOE’s share of the cost is $45 million (28%), and the participants will contribute nearly $114 million (72%).

The Milliken Clean Coal Project is unique because it demonstrates a full range of innovative emission-control technologies to reduce SO_2 and NO_x emissions from a coal-fired steam generator while maintaining station efficiency. This total environmental/energy management concept encompasses low emissions, low energy consumption, improved combustion, upgraded boiler control, and reduced solid waste. The system generates no wastewater discharge and produces marketable by-products, such as commercial-grade gypsum, calcium chloride, and fly ash.

An S-H-U FGD process, which has been installed on Units 1 and 2 to reduce SO_2, is the only currently existing wet-limestone FGD process designed specifically to employ low-pH operation, formic acid enhancement, single-loop cocurrent/countercurrent absorption, and *in-situ* forced oxidation.

For the demonstration, at least three different Pittsburgh seam coals, with a sulfur content ranging from 1.6 to 4.0 percent weight, will be burned. The first tests will use the lower sulfur coal, followed by a coal with a nominal sulfur content of about 3.0 percent. The high-sulfur coal testing will be conducted

Milliken Clean Coal Technology Project Schematic



on Unit 2 during a scheduled outage on Unit 1. High-sulfur coal will be burned to demonstrate operability of the process.

In conjunction with the S-H-U process, two NO_x removal technologies, micronized coal reburning and NO_xOUT®, will be installed, one on each unit. The reburning tests at Milliken Station are part of a separate clean coal project — Micronized Coal Reburning Demonstration for NO_x Control — which recently was relocated from the Tennessee Valley Authority's Shawnee Plant in Kentucky to Milliken Station and to an Eastman Kodak site in Rochester, New York.

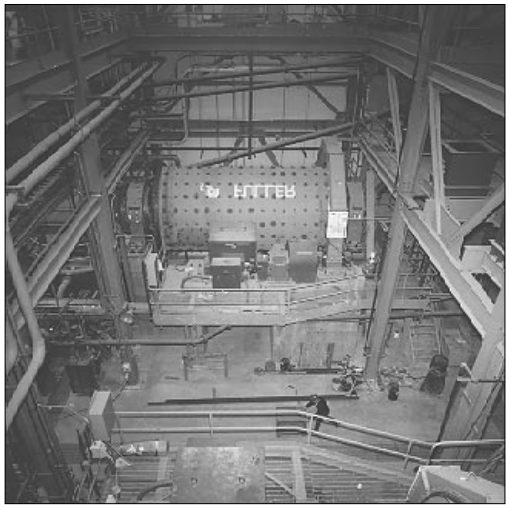
NO_xOUT® is a selective noncatalytic reduction technology that removes NO_x by injecting urea into the boiler gas. In micronized coal reburning, a row of coal burners is installed above the main combustion zone to create a second reburn zone where finely milled coal (micronized, 85 percent less than 325 mesh) is injected, along with overfired air, to break down the NO_x.

In the S-H-U process, flue gas is scrubbed with the limestone solution in a cocurrent/countercurrent absorber vessel. By adding formic acid to the absorber, the S-H-U solution is maintained at a low pH. Formic acid, which acts as a buffer, enhances the overall process in several ways. Enhancements include better SO_2 removal efficiency with limestone, lower limestone reagent consumption, lower blowdown rate, freedom from scaling and plugging, higher availability, lower maintenance, production of wallboard-grade by-products, and improved energy efficiency compared to conventional FGD technologies.

The initial test results and the technical and economic benefits inherent in the S-H-U process make it an attractive FGD alternative for U.S. utilities, particularly since they will face increasingly more stringent air quality standards. These new standards will affect the amount of SO_2 and NO_x that can be released — both contribute to acid rain. In the Adirondack and Catskill Mountains, near Milliken Station, acid rain is a particular concern.

The combined SO_2/NO_x control process demonstration at the 300-MWe Milliken Station (two 150-MWe tangentially-fired units) began in January 1995.

Among other advantages of the scrubber process is its cost competitiveness with other wet limestone FGD technologies that can be retrofitted to generation units in the 300-500 megawatt range. Capital costs can be expected to be under $200 per kilowatt, which compares favorably to other wet limestone FGD applications. There is also potential for additional savings because the scrubber can be housed totally in one building, reducing the amount of plumbing, wiring, and duct work required. A further advantage is that the process generates less wastewater during operation than do other wet limestone FGD systems.



A split-module scrubber constructed of tile-lined concrete is featured at Milliken Station.

Objectives of the three-year demonstration project are a 98 percent sulfur removal efficiency while burning high-sulfur coal; up to a 70 percent overall NO_x reduction (low-NO_x burners with either NO_xOUT or reburn); production of market-grade gypsum, calcium chloride, and fly ash; and maintenance of station efficiency by using a high-efficiency heatpipe air heater system and a low-power-consuming scrubber system.

The demonstration will evaluate effectiveness of the process under a variety of operating conditions, and will look at long-term reliability and performance characteristics. To date, demonstration results of the S-H-U FGD process show that SO_2 removal objectives are being met and a high quality gypsum by-product is being generated and sold.

Engineering and design work for the project began in January 1992. Construction, which started in April 1993, was completed in time to begin scrubbing the first unit in January 1995. NO_x control testing using the reburn technology is scheduled to begin this fall, and the demonstration is expected to run through mid-1998. ✯

Cleaner Iron-Making Process In Full-Scale Testing

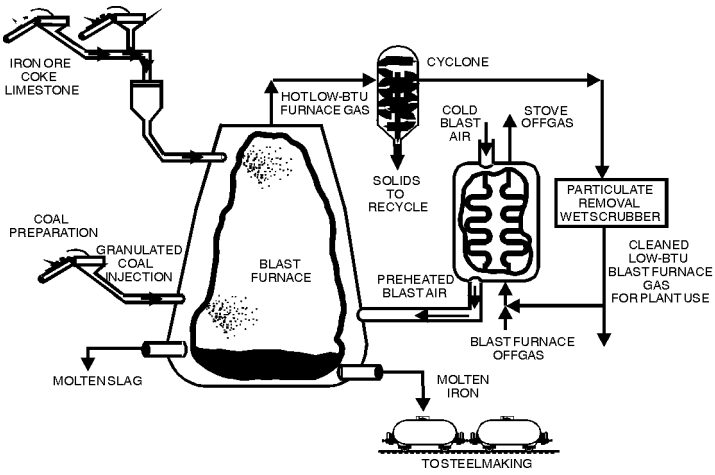
An innovative technology that could sharply reduce future air pollutants from the nation's iron-making industry has moved into full test operations at a Bethlehem Steel Corporation plant in Chesterton, Indiana. The Blast Furnace Granulated Coal Injection System Project has steadily progressed since formally entering the operating phase in late November 1995. The project is the 25th to begin operations in DOE's CCT Program. The Bethlehem Steel project is testing a way to retrofit existing iron-making blast furnaces with a technology that directly injects crushed coal.

Conventional iron-making requires that coal first be converted into coke, a process that can release significant emissions of airborne toxic impurities along with nitrogen- and sulfur-based pollutants. Because the "granulated coal injection system" can replace up to 40 percent of the coke required in a blast furnace, it has the potential for significantly lowering air emissions while enhancing blast furnace production. This technology is viewed by the steel industry as one of the most promising new approaches for modern-day iron-making — a process that will simultaneously reduce domestic dependence on imported coke, reduce emissions, and increase performance.

To prepare for the 32-month test operation, Bethlehem Steel retrofitted two high-capacity blast furnaces at its Burns Harbor plant with the new technology. Each unit is capable of producing 7,000 net tons per day of hot metal (NTHM). One of the two furnaces was equipped with a high-density cooling system to allow for high injection rates. Currently, this furnace is operating at a coal injection rate of approximately 265 pounds of coal per NTHM produced and at coke rate of about 670 lbs/NTHM. The furnaces originally were operated with natural gas as an injectant and a coke rate in excess of 800 lbs/NTHM. The savings in both energy and coke have been significant and the savings will be higher when the injection goal of 400 lbs/NTHM is obtained.

Bituminous coals from West Virginia, Illinois, and Kentucky are scheduled for tests, with the possible addition of a subbituminous coal from the western United States. One goal of the project is to determine if the direct coal injection process will allow for the use of a wider range of relatively inexpensive coals, in contrast to coke, which can be made only from certain high-quality coals. Sulfur from the coal is removed by limestone flux added to the blast furnace, and is retained by the slag, which is a saleable by-product.

Blast Furnace Granulated-Coal Injection System Schematic



In addition to replacing coke, the new technology also improves performance of the blast furnace. Conventional blast furnaces use natural gas or oil as fuel supplements. Because coal contains less hydrogen than either natural gas or oil, it does not cause as severe a reduction in temperatures in critically important zones, called "raceways," inside the blast furnace. Thus, using coal will allow for more stable temperatures in the raceways, thereby improving the efficiency of the iron-making process.

Granulated coals should minimize heat loss at blast furnace walls because large grains will not pass through the coke bed so readily. Bethlehem Steel hopes to demonstrate that granulated coal can be a lower cost alternative to pulverized coal systems currently used by a few producers. These technical and economic goals are an integral part of this clean coal technology demonstration.

If successful, the granulated coal injection system could be applied to a majority of U.S. blast furnaces. The technology can use any type of coal commercially available in the United States with the exception of various high-moisture coals. As part of the agreement with DOE, Bethlehem Steel will share the results of the project with other U.S. steel companies. ✯

FE Plays Key Role In WPFF International Activities

Patricia Fry Godley, Assistant Secretary for Fossil Energy, has prepared four initiatives to be undertaken during her tenure as Chair of the Working Party on Fossil Fuels (WPFF) in the 1995-1997 timeframe. The WPFF is an advisory body to the Committee on Energy Research and Technology (CERT) of the International Energy Agency (IEA). These four initiatives — Collaborative Research and Development (R&D), Technology Cooperation, Financing Strategies for the Deployment of Fossil Fuels Technology, and Recognition and Awards — are part of the IEA "Fossil Fuels Strategy for the 21st Century."

Under each initiative, there are planned and ongoing activities to attain the specific goals. The goals of the Collaborative R&D initiative are to increase R&D collaboration among IEA member countries and identify R&D opportunities with non-member countries. As governments reduce funding for R&D, collaboration becomes increasingly important to continue vital research. Experts work together on common problems and share the results of their efforts. Through collaboration, the WPFF can work with developing countries to adapt technologies to meet their specific energy needs. Clean coal technologies and natural gas utilization are activities that are being pursued under this initiative.

The Technology Cooperation initiative centers on developing countries. The goals of this initiative are to disseminate information and raise the profile of advanced fossil fuel technologies in non-member countries and to promote timely market deployment of advanced fossil fuels technologies. A workshop on energy in Southern Africa is being developed, with the aim to address fuel and technology options that will assist the area in addressing future regional energy demands. Since the largest growth from fossil fuels consumption is occurring in developing countries, it is essential that fossil fuel technologies be adopted that are environmentally responsible. Information exchange is essential between the industrialized and developing countries in order to advance sustainable development.

Two goals are being pursued under the third initiative — Financing Strategies for the Deployment of Fossil Fuels Technologies. The first goal is hosting conferences and workshops with multilateral bank representatives, potential investors, host country officials, and other stakeholders to identify and address issues impeding fossil energy projects. The second goal is to make recommendations regarding member countries' international lending and financing policies. No one institution can finance a major energy project in a developing country. Until strong investment climates can be developed in these countries, new financing strategies must be created in order to overcome barriers to financing. An IEA Conference on this topic is currently being discussed.

The Recognition and Awards Initiative is an original concept. The goal of the initiative is to give recognition for successful international energy projects that have made significant progress in responding to environmental and technical challenges, through a newly developed IEA awards program. It will give global recognition to the role that clean fuels and technologies play in economic development, energy security, and environmental protection.

IEA/WPFF Background

The IEA was established in 1974 by the 23 member countries of the Organization for Economic Cooperation and Development, after the oil shortage of 1973-1974, to safeguard collective energy security. The goals of the IEA include:

- Promote diversity, efficiency and flexibility within the energy sector;
- Develop the ability to respond promptly and flexibly to energy emergencies;
- Minimize the adverse environmental impacts of energy activities;
- Encourage and develop more environmentally acceptable energy sources;
- Improve energy efficiency;
- Continue research, development, and market deployment of new and improved energy technologies;
- Promote undistorted energy prices;
- Encourage free and open trade; and
- Develop cooperation among all energy market participants.

To pursue these goals, the IEA is divided into standing groups, committees, and industry advisory boards. CERT, one of the standing committees for which the WPFF serves as an advisory body, was formed to encourage international cooperation on energy technology. The WPFF provides a means for international collaboration on fossil fuel-oriented subjects through joint activities, which include:

- Research, development, and demonstration projects;

See "FE International" on page 8. . .

. . .*"FE International" from page 7*

- Studies/technology assessments;
- Expert groups;
- Workshops and conferences; and
- Information dissemination.

Among the objectives of the WPFF are the following:

- Identify fossil fuel technology-related priority interests common to member countries;
- Promote collaborative R&D;
- Coordinate IEA fossil fuel-related studies, information exchanges, and workshops; and
- Review, evaluate, and participate in fossil fuel-related activities that are being conducted by other groups within IEA.

The WPFF implements some of its activities through Implementing Agreements (IA), which provide a legal framework between contracting parties to pursue international collaboration in energy technology RD&D and information exchange. The Office of Fossil Energy participates in the following IAs:

- Coal combustion sciences;
- Coal/liquid mixtures;
- Greenhouse gases derived from fossil fuel use (greenhouse gas R&D programme);
- IEA coal research; and
- Multi-phase flow sciences.

U.S. Participation

Barbara McKee, Director, International Program Coordination, Office of Fossil Energy, serves as the U.S. representative to the WPFF.

Within the framework of the WPFF and under the four initiatives being pursued from 1995-1997, the United States can leverage resources, work cooperatively with developing countries, and continue to ensure that U.S. goals are being met in the international arena. ✯

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of only 0.06 lb/MMBtu. Through April, the facility has logged more than 1,000 hours on coal feed.

The **Coal Quality Expert (CQE)** fuel assessment tool was released in December 1995 and is being offered commercially. The second commercial sale of the Acid Rain Advisor was made recently to Virginia Power. Thirty five U.S. utilities and one U.K. utility have received CQE through their membership in the Electric Power Research Institute. The project team currently is analyzing worldwide marketing opportunities.

During the month of April 1996 alone, the **Rosebud SynCoal Partnership's** Advanced Coal Conversion Process Demonstration produced over 22,700 tons of SynCoal® products. Total sales of SynCoal® products were over 24,340 tons, which are delivered to regular industrial and utility customers who have successfully tested the product, and continue to see excellent operating results.

DOE has taken steps to close out the **ABB-Combustion Engineering IGCC Project** in Alabama. Economic studies, preliminary design work, and commercial cost estimates completed on the project have added to the database to benefit future coal gasification-based power projects.

Correction: We forgot all of our "dots" in Internet addresses in the Spring issue of *Clean Coal Today*. For additional information on Coal Outreach, you may contact Jerry Pell at: Jerry.Pell@hq.doe.gov via the Internet. To direct any questions electronically that pertain to *Clean Coal Today*, contact the editor at: Phoebe.Hamill@hq.doe.gov through the Internet. ✯

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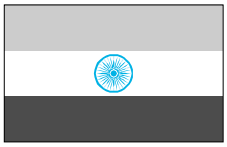


Clean Coal Goes to India

The Office of Fossil Energy (FE) is negotiating sponsorship of a day of Coal Technology workshops in conjunction with the Confederation of Indian Industry at the **"Energy Summit '96 International Exhibition and Conference"** in Madras, India, September 11-14. 1996. Planned technical sessions on "Advanced Power Generation" and on "Advanced Industrial and Clean Fuels Technologies That Utilize Coal," will describe how U.S. coal technologies can supply India's energy needs. The Clean Coal exhibit and materials also will be on display.

FE then will travel to **"POWER-GEN Asia '96"** in New Delhi, India, September 17-19, where DOE will participate in the technical program and the conference exhibition.

If you want to reserve exhibit space, or if you are interested in coordinating the display of your exhibit materials at either event, contact Dr. Jerry Pell by phone: (301) 903-9447; or use e-mail: Jerry.Pell@hq.doe.gov via the Internet.

Arrangements must be made *now!*

Status of CCT Demonstration Projects

Advanced Electric Power Generation

The Appalachian Power Co.
PFBC Utility Demonstration Project. Efforts continue to restructure and re-site the project. (Site to be determined)

DMEC-1 Ltd. Partnership
PCFB Demonstration Project. In combination with the Four Rivers Project, this project is being restructured and re-sited. (Site under negotiation)

Four Rivers Energy Partners, L.P.
Four Rivers Energy Modernization Project. The project is being restructured and re-sited. (Site under negotiation)

The Ohio Power Co.
Tidd PFBC Demonstration Project. The project ended December 31, 1995. DOE released the Final Report and will close out the project after a final audit. (Brilliant, OH)

Tri-State Generation and Transmission Association, Inc.
Nucla CFB Project. The project was completed April 1992. (Nucla, CO)

York County Energy Partners, L.P.
AFBC Demonstration Project. Discussions are under way with a major utility to re-site this project. (Site under negotiation)

ABB Combustion Engineering, Inc.
Combustion Engineering IGCC Repowering Project. The cooperative agreement ended May 31, 1996. (See "Briefs")

Clean Energy Partners, L.P.
Clean Energy Demonstration Project. The project is being restructured. (Site under negotiation)

Sierra Pacific Power Co.
Piñon Pine IGCC Power Project. The project is in its construction phase. By mid-1996, plant construction had reached a 60 percent completion point. (Reno, NV)

TAMCO Power Partners
Toms Creek IGCC Project. The Cooperative Agreement ended effective March 31, 1995. (Coeburn, VA)

Tampa Electric Co.
Tampa Electric Integrated Gasification Combined-Cycle Project. Construction is 95 percent complete. The project is on schedule for September 1996 startup. (Lakeland, FL)

Wabash River Joint Venture
Wabash River Coal Gasification Repowering Project. The project is in the commercial operations phase. (West Terre Haute, IN)

Alaska Industrial Development and Export Authority
Healy Clean Coal Project. Construction resumed in March of 1996 following a four-month planned winter stoppage. The erection of structural steel and fabrication and delivery of equipment is continuing on schedule. (Healy, AK)

Arthur D. Little, Inc.
Coal Diesel Combined-Cycle Project. Arthur D. Little (participant) and Cooper-Bessemer (technology vendor) have requested that the project be moved to a promising site at the University of Fairbanks, Alaska.

Pennsylvania Electric Co.
Warren Station Externally Fired Combined-Cycle Demonstration Project. Project activity has stopped as DOE and Penelec assess the technical readiness of the ceramic air heater — the critical element of the power island. (Warren, PA)

Environmental Control Devices

The Babcock & Wilcox Co.
Demonstration of Coal Reburning for Cyclone Boiler NO_x Control. The project is complete. The final report has been received. (Cassville, WI)

The Babcock & Wilcox Co.
Full-Scale Demonstration of Low-NO_x Cell Burner Retrofit. The project was completed in September 1995. (Aberdeen, OH)

Energy and Environmental Research Corp.
Evaluation of Gas Reburning and Low-NO_x Burners on Wall-Fired Boiler. Testing was completed in December 1995. The final report of the project is in preparation. (Denver, CO)

Southern Company Services, Inc.
Demonstration of Advanced Combustion Techniques for a Wall-Fired Boiler. Long-term testing of the advanced overfire air (AOFA), low-NO_x burners (LNB), and combined LNB and AOFA systems are complete. Installation of the Generic NO_x Control Intelligence System (GNOCIS), an artificial intelligence-based software system for plant optimization, and several on-line monitors for measuring unburned carbon in fly ash are also complete. A combined preliminary and final Public Design Report was approved and will be issued soon. (Coosa, GA)

Southern Company Services, Inc.
180-MWe Demonstration of Advanced Tangentially-Fired Combustion Techniques for the Reduction of NO_x Emissions from Coal-Fired Boilers. The project was completed in June 1994. (Lynn Haven, FL)

Southern Company Services, Inc.
Demonstration of Selective Catalytic Reduction Technology for the Control of NO_x Emissions from High-Sulfur-Coal-Fired Boilers. The project was completed in December 1995. (Pensacola, FL)

Tennessee Valley Authority
Micronized Coal Reburning Demonstration for NO_x Control. TVA and New York State Electric & Gas (NYSEG) in association with Eastman Kodak Company have agreed to host the project. Testing will be performed at NYSEG Milliken Station on a 150-MWe tangentially-fired unit and on an 85-MWe equivalent cyclone boiler at Kodak's Rochester New York production facilities. Preliminary testing is scheduled to begin at Milliken Station by the end of 1996. (Lansing and Rochester, NY)

AirPol, Inc.
10-MWe Demonstration of Gas Suspension Absorption. The project was completed in June 1995. (West Paducah, KY)

Bechtel Corp.
Confined Zone Dispersion Flue Gas Desulfurization Demonstration. The Final Report is being prepared for distribution. (Seward, PA)

LIFAC-North America
LIFAC Sorbent Injection Desulfurization Project. The Final Report is in preparation. (Richmond, IN)

Pure Air on the Lake, L.P.
Advanced Flue Gas Desulfurization Demonstration Project. The Final Report has been prepared and is in review. (Chesterton, IN)

Southern Company Services, Inc.
Demonstration of Innovative Applications of Technology for the CT-121 FGD Process. The Final Report is in preparation. (Newnan, GA)

ABB Combustion Engineering
SNOX™ Flue Gas Cleaning Demonstration Project. The project operations are complete. The Final Report is scheduled to be released in the summer of 1996. (Niles, OH)

The Babcock & Wilcox Co.
LIMB Demonstration Project Extension and Coolside Demonstration. The project was completed in November 1992. (Lorain, OH)

The Babcock & Willcox Co.
SOx-NOx-Rox Box™ Flue Gas Cleanup Project. The project was completed in September 1995. (Dilles Bottom, OH)

Energy and Environmental Research Corp.
Enhancing the Use of Coals by Gas Reburning and Sorbent Injection. All required restoration has been accomplished. Illinois Power has chosen to keep the gas reburn system at its Hennepin Station. City, Water, Light & Power has chosen to keep both the gas reburn and sorbent injection system at its Springfield, Lakeside station. The final report will be released this summer. (Hennepin and Springfield, IL)

New York State Electric & Gas Corp.
Milliken Clean Coal Technology Demonstration Project. Total scrubber operations are underway. Operations are scheduled to continue until July 1998. (Lansing, NY)

NOXSO Corp.
Commercial Demonstration of the NOXSO SO_2/NO_x Flue Gas Cleanup System. Detailed design and procurement activities are on-going for both the NOXSO plant and the Liquid SO_2 plant. Construction began in the spring of 1996. (Newburgh, OH)

Public Service Company of CO.
Integrated Dry NO_x/SO_2 Control System. Testing was completed in early March. The sponsor has requested a no-cost time extension to do additional testing of another urea lance design. (Denver, CO)

Coal Processing for Clean Fuels

ABB Combustion Engineering, Inc. and CQ Inc.
Development of the Coal Quality Expert (CQE). CQE was released in December 1995 and is now being offered commercially. The final report on the project is being prepared. (Homer City, PA)

Custom Coals International
Self Scrubbing Coal™: An Integrated Approach to Clean Air. The plant has processed 26,000 tons of raw coal and produced 17,000 tons of clean coal with a clean coal quality averaging 8.5 percent ash and 1 percent sulfur during the month of April 1996. Performance testing is nearing completion and first test coal operatons should begin this summer. (Central City, PA; Lower Mt. Bethel Township, PA; Richmond, IN; Ashtabula, OH)

Rosebud SynCoal Partnership
Advanced Coal Conversion Process Demonstration (ACCP). The ACCP demonstration facility continues to process raw subbituminous coal, producing over 725,000 tons of SynCoal® product to date. (Colstrip, MT)

ENCOAL Corp.
ENCOAL Mild Coal Gasification Project. ENCOAL's plant continues to operate satisfactorily. To-date, the plant has operated more than 9,000 hours on coal, and has shipped 2.4 million gallons of liquid product and 52,000 tons of solid product. (Gillette, WY)

Air Products Liquid Phase Conversion Company, L.P.
Commercial-Scale Demonstration of the Liquid-Phase Methanol Process. Detailed design, procurement, and construction activities for the LPMEOH™ Process Demonstration Facility are at their peak. Installation of structural steel, piping, and equipment is in progress. Startup is expected to begin in late-December 1996. (Kingsport, TN)

Industrial Applications

Bethlehem Steel Corp.
Blast Furnace Granulated-Coal Injection System Demonstration Project. The Plant is operating smoothly at coal injection rates of 265 lbs/net ton of hot metal (#/NTHM) on 'C' Furnace and 200 #/NTHM on 'D' Furnace. (Burns Harbor, IN)

Bethelehem Steel Corp.
Coke Oven Gas Cleaning System. DOE and Bethlehem Steel Corporation executed a mutual termination of the Cooperative Agreement on April 10, 1995. (Sparrows Point, MD)

Centerior Energy Corp.
Clean Power from Integrated Coal/Ore Reduction (COREX®). A decision to award is pending final review of documentation. (Vineyand, UT)

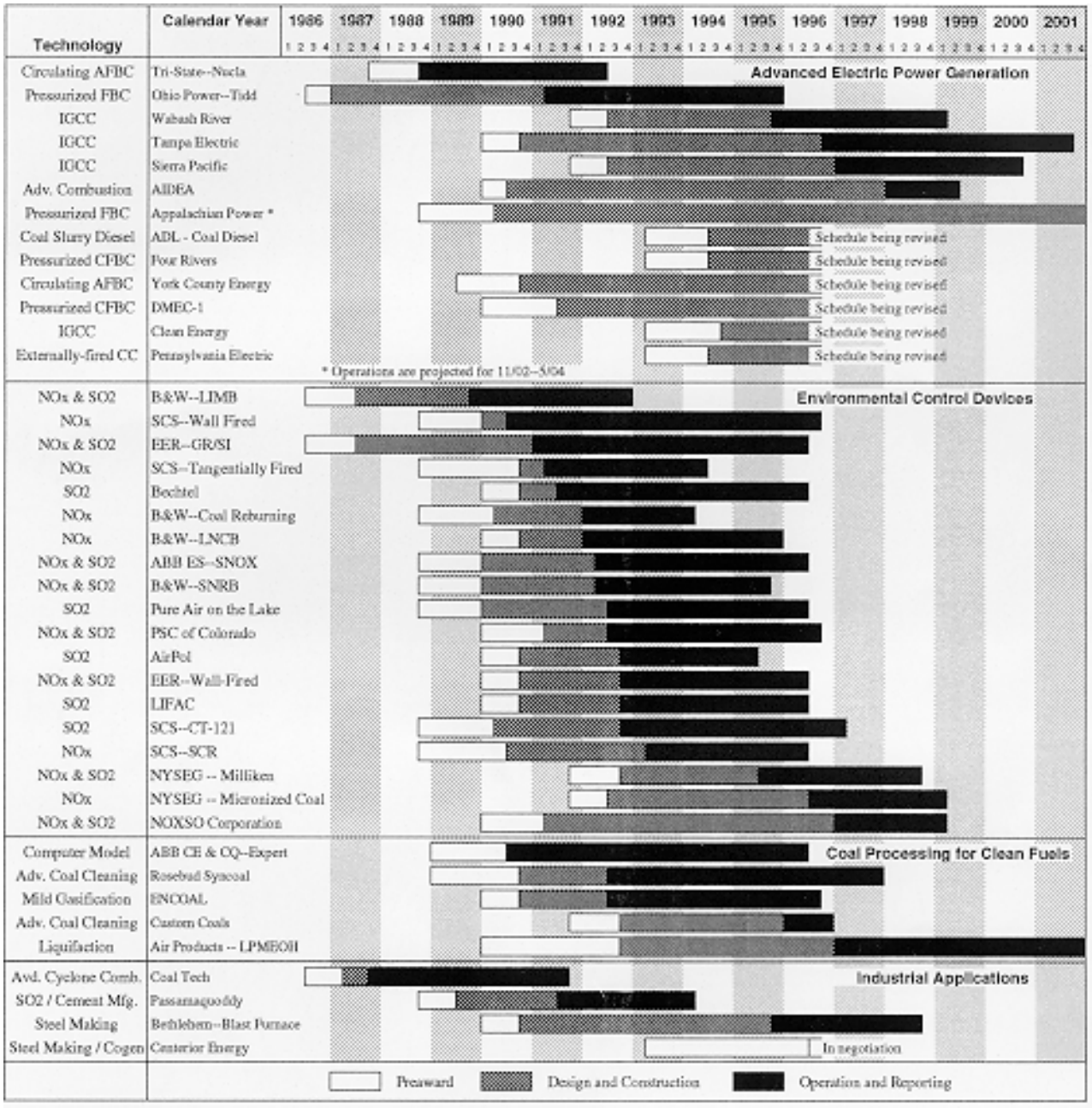
Coal Tech Corp.
Advanced Cyclone Combustor with Internal Sulfur, Nitrogen, and Ash Control. The project was completed in September 1991. (Williamsport, PA)

Passamaquoddy Tribe
Cement Kiln Flue Gas Recovery Scrubber. The project was completed in February 1994. (Thomaston, ME)

ThermoChem, Inc.
Demonstration of Pulse Combustion in an Application for Steam Gasification of Coal. The Cooperative Agreement ended on March 21, 1996. (Silver Bay, MN)

CCT Project Schedules

Arranged by Application Category



Recent CCT Publications

CCT publications are available to the general public from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161; for information, call (703) 487-4650. CCT publications are available to DOE contractors from the Office of Scientific and Technical Information, P.O. Box 62, Oak Ridge, TN 37831; prices are available by calling (615) 576-8401.

August 1995	DOE/MC/24132-5091	Tidd PFBC Demonstration Project Final Report, Including Fourth Year of Operation
October 1995	DOE/MC/26042-5130	Tidd PFBC Hot Gas Cleanup Project Final Report

Upcoming CCT Events

Date	Event	Contact
July 16-18, 1996	Advanced Coal-Fired Power Systems '96 Contractor Review Meeting	Thomas Dorchak, 304-285-4305 Morgantown Energy Technology Center
Aug. 20-21, 1996	Fuel Cells '96 Contractor Review Meeting	Mark Williams, 304-285-4747 Morgantown Energy Technology Center
Sept. 11-14, 1996	Energy Summit '96 International Exhibition and Conference	Jerry Pell, 301-903-9447 USDOE, FE-22

Fifth Annual Clean Coal Technology Conference

Powering the Next Millennium

January 7-10, 1997 – Tampa, Florida

The focus of the Fifth Annual CCT Conference will be on the strategies and approaches that will enable clean coal technologies to resolve the competing, interrelated demands for power, economic viability, and environmental awareness in the post-2000 era.

The Tampa Electric Company will host the '96 conference plant tour.

The conference will be held at the Hyatt Regency, Westshire. Special room rate of $100.00 plus tax (single or double occupancy) is available by making hotel reservations on or before December 12, 1996. For hotel information, call 800-233-1234 (mention the Clean Coal Conference).

For further conference information, please contact Ms. Faith Cline at U.S. DOE, Office of Fossil Energy, 202-586-7920 (phone), or 202-586-8488 (fax).