OFFICE OF COAL DEVELOPMENT
FISCAL YEAR 2003 ANNUAL REPORT

DCEO’s Office of Coal Development (OCD) provides technical and financial support to the Illinois coal industry. OCD awards funding for basic research and development on coal and its utilization, as well as commercial-scale demonstration of promising coal utilization technologies. Investment within the Illinois energy sector is stimulated through financial incentives provided by some OCD programs. Education and marketing programs are conducted to develop and convey appropriate messages about the importance of Illinois coal in the state’s job development efforts and in meeting domestic and international energy needs.

COAL INDUSTRY INFRASTRUCTURE

FY2003 marks the seventh year of the Illinois Coal Infrastructure Program, aimed at making Illinois coal more competitive in domestic and offshore markets. This program, administered by OCD, encourages coal producers and support industries to reinvest in Illinois. State funding to the Infrastructure Program has grown steadily, and it is now one of OCD’s most effective and far-reaching programs of support for the Illinois coal industry.

Through the Illinois Coal Infrastructure Program, businesses are given incentives to improve and expand the coal mining and transportation systems within Illinois. In FY2003, OCD awarded $17.2 million in state funds for 37 coal production and transportation infrastructure projects. These grants leveraged more than $128 million of private investment in infrastructure improvements and expansions across Illinois.

Since its inception in 1996, the Coal Infrastructure Program has leveraged more than $549 million in private investment in the coal industry.
The Illinois Coal Infrastructure Program exemplifies successful cooperation between the public and private sectors to overcome adversity. Each project, in addition to bringing immediate benefits to the communities and businesses involved in coal mining, lays the groundwork for the long-term recovery and growth of the Illinois coal industry. Notable projects funded in FY2003 include:

- Old Ben Coal Company in Randolph County received a grant of $270,000 to assist with upgrading its clean coal storage facility, as well as completing necessary rail spur modifications. A new coal silo increased ground storage capacity from 10,000 tons to 20,000 tons and increased the reclaim capacity from 1,000 tons to 5,000 tons per hour.

- Central Illinois Energy received a grant of $750,000 to assist with the $20 million construction costs of a new ethanol production facility in Fulton County. The plant will produce 30 million gallons of ethanol per year using waste coal while cogenerating electricity on site. The project will help create 49 permanent jobs at the site as well as 25 secondary jobs.

- American Coal Company in Saline County received a grant of $900,000 to replace the longwall roof support shields at the Galatia Mine. The project has created 60 new permanent jobs to date and will improve reliability and mine safety at the working face.

- Vigo Coal Company in Wabash County received a grant of $526,000 to assist with construction costs for a coal cleaning preparation plant that uses air as a cleaning medium rather than water. Pyritic sulfur is removed by floating the coal on a bed of air over a vibrating screen. The lighter coal particles float to the surface and the heavier rock and pyrite sink to the screen deck. The plant will clean 200 tons of coal per hour. Sulfur and ash will be removed, increasing the coal’s Btus and making the coal mine more competitive by delivering a better coal to market. The project allowed Vigo Coal Company to retain 50 employees at the Friendsville Mine.
• Wabash Mine Holding Company in Wabash County received a grant of $710,000 to upgrade roof supports and existing beltl ine leading to the Western Reserve area and $455,000 to perform equipment rebuilds and replace continuous miners, mantrips, ramcars and roof bolters at the Wabash mine. Total project costs will exceed $9 million and 230 high-paying jobs will be retained.

  *Belt rollers for the Wabash Mine*

• Corn Products International, Inc. in Cook County received a grant of $2,234,557 to design, engineer and construct a new, circulating-fluidized bed coal boiler that will replace existing coal boilers at the Argo Plant in Bedford Park. The installation of the new coal boiler will preserve the existing market of 300,000 tons of Illinois coal with the potential to use up to 500,000 tons annually. The plant employs 290 hourly union workers and has 120 salaried and 100 contractual employees. The total project cost is approximately $100 million.

• Black Hills Mining Company, LLC in Gallatin County received a grant of $950,000 to develop an underground mine adjacent to the Willow Lake Mining Complex. Funding from OCD will assist with the purchase of underground equipment and support facilities at the site. The project will create 120 new mining jobs.

• Indeck-Elwood, LLC in Will County received a grant of $500,000 to assist with the development phase of a new electric generating station planned for the former Joliet Arsenal site in Elwood. The planned power plant will employ two state-of-the-art, coal-fired, fluidized bed boilers to generate 660 megawatts of electricity. The new plant is expected to create 130 permanent power plant jobs and would use 2.1 million tons of Illinois coal annually. The total project cost is approximately $966 million.

• The Gas Technology Institute received a grant of $500,000 for the construction of a state-of-the-art, $12 million, Flex-Fuel Gasification Test Facility in Cook County. The facility will evaluate advanced and innovative gasification processes employing a variety of low-cost, solid carbonaceous fuels. The facility’s flexible design will allow testing of a variety of cleanup systems that will be needed to condition the syngas coming from the gasifier.

  *Gas Technology Institute Gasification Test Facility*
COAL EDUCATION

OCD strives to heighten awareness and understanding of the importance of the coal industry to the socioeconomic structure of Illinois and create a positive image for the mining and use of coal to provide for our state’s energy needs. The following projects promote education and awareness of the advantages of Illinois coal to educators, state legislators, coal industry and utility professionals and communities throughout Illinois.

- The Sixth Annual Illinois Coal Education Conference was held at Rend Lake Resort with 78 educators attending. The three-day conference consisted of lectures, tours and hands-on activities that were correlated to the Illinois Learning Standards. Topics addressed during the conference were the formation and geology of coal, a historical look at coal mining, reclamation, clean coal technology, generating electricity and coal and the environment. Educators toured a surface mine, an underground coal mine and a power plant. Teachers used the information they gathered from the conference to write lesson plans for use with their classes.

- OCD sponsored the Coal Essay division of the Illinois Junior Academy of Science Contest. The final judging of the State Paper Session presentations was conducted in May at the University of Illinois-Urbana campus. Five state winners for the Coal Division were chosen. The competition is open to students in grades 7-12 whose schools belong to the Junior Academy of Science. This year’s topic was clean coal technology.

- The Fifteenth Annual Art and Essay Calendar Contest was held by OCD with more than 3,000 entries from students in grades five through eight. The contest brings to the communities an awareness of coal, the coal industry and the positive role coal plays in our day-to-day lives and the economy of Illinois. An award ceremony recognizing the 25 winning students, their teachers and the two winning schools was held at the Executive Mansion in Springfield.

- OCD’s ongoing coal marketing theme Illinois Coal: Discover the Power highlights the three principal qualities of coal mined in Illinois: high-energy fuel, stable supply and
reliable delivery. In addition to meeting with state legislators, electric utility professionals and coal industry officials, OCD staff displayed program materials and met with constituents at the PowerGen 2002 tradeshow and conference in Orlando, Florida, and the CoalGen 2002 conference in St. Louis, Missouri.

- An OCD grant allowed the Museum of Science and Industry to update the Coal Mine exhibit. A clean coal technology photomural near the mine exit and a display case in the Coal Mine Control Room were added to the exhibit. Both areas showcase bricks, ceramic tiles and other items made from coal combustion byproducts. The updates allow the Museum and OCD to further promote Illinois coal and to educate the public on the benefits and applications of clean coal technology.

Clean Coal Technology Exhibit at MSI showcases coal combustion byproducts.

COAL RESEARCH AND DEVELOPMENT

In support of the Illinois coal industry, OCD oversees the largest state-sponsored coal research and development program in the United States. Laboratory-scale projects initiate and advance technologies. Development-scale projects selected for funding must show promise for advancing clean-coal technologies from research through the proof-of-concept stage and on to the near-commercial demonstration stage. Development processes include technology maturation, technology transfer and related projects. This program is administered by OCD and is under the technical oversight of the Illinois Clean Coal Institute (ICCI). In FY2003, OCD awarded $2.6 million in state funds to conduct 17 clean-coal technology laboratory and field research / development projects. The program's success continues to gain the interest of Illinois coal and electric utility companies. Notable research and development projects are described below.

- The Illinois State Geological Survey (ISGS) is investigating Autoclaved Aerated Concrete (AAC) in a $109,083 project entitled Manufacturing Energy Efficient Construction Products from Illinois Coal Fly Ash. This material is a lightweight, energy-efficient and fire-retardant construction material that is used widely in Europe. Regular AAC is produced with sand as a major component. The overall goal of this project was to determine the technical and economic feasibility of producing AAC using Illinois coal fly ash. Industry partners include: Babb International (one of the four AAC companies in the USA), AmerenEnergy Fuels & Services Company, Dynegy Midwest Generation and Cinergy PSI. The ISGS tested fly ash samples, that were generated from burning Illinois coals and collected from electrostatic precipitators or ponds at more than four different sources. AAC blocks containing up to 72-weight-percent of fly ash were successfully produced. The AAC blocks produced with fly ash show densities, porosities, strength and shrinkage rates comparable to those of the regular AAC blocks, which contain no fly ash. All the fly ash samples tested appear to be suitable for use in the production of low-density
AAC blocks. For higher density AAC panel production, only two fly ashes are suitable, and these ashes will be selected for pilot-scale production demonstration in 2004. Leaching tests, using simulated acidic rainwater, show that the amounts of leachable metal ions such as arsenic, mercury and lead from the blocks were below the limits set by the US EPA for solid waste materials. The results imply that AAC blocks produced with Illinois coal fly ashes are environmentally safe construction materials.

- ISGS, in a $136,067 project entitled Commercialization of Fired Bricks with Fly Ash from Illinois Coal, is developing commercially fired bricks using Illinois fly ash. The process will provide an alternative use for millions of tons of Illinois coal fly ash currently being landfilled. Using a tunnel kiln at Streator Brick Company, about 2,800 10-hole building bricks containing 10 or 20 weight percent of fly ash were successfully extruded and fired. The bricks met or exceeded minimum specifications for commercial face bricks. According to the American Society for Testing Materials international specifications, the bricks can be classified as Grade SW, suitable for use under severe weathering conditions. Further tests, with higher levels of fly ash substitution, are in progress at Streator Brick Company. OCD and the ICCI are also actively working with a major brick manufacturer in Illinois who would like to implement this technology in their planned plant expansion in 2005.

Left: Extruded brick made from Illinois fly ash, exiting the extruder and ready to move into the cutter. Right: The final fired bricks.

- Southern Illinois University-Carbondale (SIUC), in a $241,581 project entitled Reducing Underground Production Costs Through Enhanced Face Productivity, continued research on surge cars, dust suppression technologies, and techniques to decrease out-of-seam dilution, which could reduce the production costs of Illinois coal. This work has strong industrial support as shown by the active participation and cost-sharing of various coal mine personnel in the project. Among the sub-parts of the project, the surge car, which is stationed at the rear of the continuous miner and stores coal until it can be emptied into a shuttle car, could prove most beneficial in increasing production. The cableless shuttle car should also prove beneficial because of payload size and flexibility in haulage.
• SIUC received $157,372 for a project entitled *Upscaling Novel FGD Scrubber Sludge Materials*. The project is using scrubber sludge from Springfield City Water, Light and Power to develop paperless wallboard materials. Three approaches were tested for reducing the wallboard’s density, i.e., water-to-sludge ratio, commercial water reducer chemical, and air-entrapment chemicals. By controlling the water-to-sludge ratio, the density of the product could be varied between 562 kg/m$^3$ to 1200 kg/m$^3$. The commercial water reducer chemicals were found unsuitable for controlling the density. However, air-entrapment chemicals derived from natural byproducts showed considerable effectiveness in controlling the density of the product. The 2 ft. by 4 ft. die demonstrated that it is possible to form large-size paperless wallboards. The design and fabrication of a 4 ft. by 8 ft. die has also been completed, and the production of full size samples is currently being pursued.

![Left: Dr. Vivak Malhotra of SIUC, principal investigator, with a 2-ft by 4-ft wallboard made from 90% FGD material. Right: Framework for the 4-ft by 8-ft die that will be used for manufacturing full-scale samples.](image)

• The Air Pollution Prevention and Control Division of the USEPA received $90,180 for a project entitled *Evaluation of SCR Catalysts for Combined Control of NOx and Mercury*. The research team investigated the effect of Selective Catalytic Reduction (SCR) catalysts on mercury speciation using a spectrum of Illinois coal with varying amounts of sulfur and chlorine. A bench-scale reactor was used to simulate combustion, evaluate mercury oxidation and select SCR catalysts for additional testing. A pilot-scale Innovative Furnace Reactor quantified the high level of mercury oxidation achievable during combustion tests on coal from three Illinois mines. Pilot-scale testing was also performed to develop continuous monitoring systems for mercury.

• ISGS Energy and Environmental Engineering researchers received $138,044 for a project entitled *Optimum Filtration in the ISGS Filter Press with Dewatering Agents*. ISGS completed testing to define optimum operating parameters and dewatering agents for producing a low moisture product in the laboratory scale ISGS Intelligent Filter Press. The project concluded with the design and purchase of an industrial scale filter press for further testing in field demonstrations.
Construction Technology Laboratories, Inc. (CTL) received $192,955 for a project entitled *Implementation of High-Carbon Fly Ash Technology in Cement Manufacture*. CTL has completed two successful commercial demonstrations of a technology that uses high-carbon fly ash from the combustion of Illinois coal to manufacture Portland cement. The fly ash used in the trials had a LOI (Loss On Ignition) of 12 percent and a 1,172 Btu/lb heating value. In one trial at Illinois Cement Company, nearly 200 tons of the fly ash were added at a rate of 3.5 percent by mass of the raw feed. The second trial was conducted at Dixon Marquette Cement and consumed over 400 tons of fly ash at a 5 percent feed rate. Several plant parameters were monitored during the trials to gauge the material, operational, environmental and product benefits. The plant operations were noticeably efficient, stable and predictable. Small increases in fuel efficiency and an increase in cement production were observed. The produced cement is comparable to the normal product. During the next few months, discussions with both companies will continue to see how this technology can be implemented on a permanent basis at their plants. Based on the assumption of a 5 percent addition of fly ash, one cement company can use 40,000 tons of fly ash per year, or half of an average utility’s annual fly ash output. Other cement companies have shown interest in implementing this technology at their plants if the results from this research are favorable.

ISGS received $89,826 for *Design, Fabrication and Testing of an Automated Motorless/Rotorless (MR) Cell for Use with the ISGS Washer*. The innovative cell is made of off-the-shelf components and contains no moving parts. Intense mixing of the fine coal slurry is achieved using “eductors” to create a low-pressure zone at the feed nozzle that recycles material already in the cell. When fitted with the previously developed ISGS Inclined Washer, the MR Cell achieves greater throughput and more efficient fine coal recovery than conventional flotation devices.

SIUC was awarded $125,530 for *Evaluation of a High-Efficient Fine-Coal Dewatering Technology*. Initial testing evaluated the dewatering performance characteristics of a prototype Steel Belt Filter unit with regards to product moisture content and loss of solids.
Statistically designed experimental programs were then used to optimize these performance parameters while maximizing unit throughput. Tests were performed on fine-clean-coal and fine-waste-tailings from an Illinois mine as well as fresh fly ash slurry from a local utility. The work was used to develop a fine-coal cleaning circuit for implementation at Illinois mines currently discarding that material. If successful, the fine-coal dewatering technology would produce a saleable, clean coal product for the mine with profitability and environmental benefits.

- SIUC was awarded $45,797 for a project entitled *Viability of CO₂ Sequestration and Methane Production in Illinois Coal*, which is a relatively new area of research in Illinois. The project ties in with the FutureGen efforts, using CO₂ to drive out methane, thus getting two benefits: the sequestration of CO₂ and the generation of saleable natural gas. Laboratory tests measured the preferential gas retention and release properties for Illinois coals, specifically with regard to methane and CO₂. Gas flow characteristics and changes in physical structure of the coal also were measured. Laboratory results were used in a simulation exercise to determine CO₂ sequestration potential, the impact of sequestration on coal bed methane production, and the composition and quality of recovered gases.

**COAL DEMONSTRATION**

During fiscal years 1982 through 2003, the state of Illinois has provided more than $134 million to bring advanced coal utilization technologies to commercial readiness. With funding for the Illinois Coal Demonstration Program provided through the Coal and Energy Development Bond Fund, the Capital Development Bond Fund and the General Obligation Bond Fund, 26 projects have been funded to date. In addition to leveraging significant public and private investment dollars, each project returns near- and long-term benefits to the state of Illinois that include economic growth, cleaner air and energy conservation.

The following projects exemplify efforts to bring state-of-the-art advanced clean coal technologies to commercial readiness while providing near-term benefits to the state and local communities. The technologies demonstrate proven means of complying with the Clean Air Act Amendments of 1990 and other environmental regulations when burning Illinois coal.

- OCD awarded $6 million in FY2002 coal bond funds to assist with repowering Southern Illinois Power Cooperative's Marion Power Station in Marion, Illinois. The $89.6 million coal-fired, fluidized-bed combustion boiler construction project is substantially complete. Test runs began on June 14, 2003. Performance tests for continuous operation are ongoing.
The 120-MW boiler will burn approximately 1.2 million tons of Illinois bituminous coal and bituminous coal refuse per year. It will be supplemented at times with small amounts of petroleum coke, sub-bituminous coal, tire-derived fuel, waste oil and wood chips. The plant is now in compliance with stringent new source performance clean air standards. Through the efforts of OCD and Southern Illinois Power Cooperative, the marketability of Illinois high-sulfur coal is improved and low-cost electricity is maintained to ratepayers in the Illinois area south of Interstate 70.

• OCD has joined with the U.S. Department of Energy and Corn Belt Energy Corporation to demonstrate the nation’s first Low-Emission Boiler System (LEBS) to burn coal at a 91-megawatt, mine-mouth electric generating plant in southern Logan County. OCD has awarded $23.5 million in coal bond funds to construct one of the cleanest coal-fired power plants in the country. The $142.5 million LEBS power plant will create a new market for 370,000 tons of Illinois coal annually and create roughly 150 construction jobs and 24 permanent jobs in Logan and Sangamon counties. The design and engineering phase are complete, and a construction permit has been issued. An Environmental Impact Statement is to be released at the end of December 2003. Groundbreaking is expected to take place in the early part of 2004.

**COAL REVIVAL**

The Coal Revival Program, initiated in FY2002, provides financial assistance in the form of grants to assist with the development of new, coal-fired electric generation capacity in Illinois. In July 2003, Governor Rod Blagojevich signed legislation, PA93-0167, to further the development of Illinois’ abundant coal reserves by offering $300 million in new bond funds to help finance the construction of advanced technology coal-fueled projects.

*Governor Blagojevich signs coal legislation*

To be eligible, businesses must propose to construct a new electric generating facility or an expansion at an existing electric generating facility, including transmission lines and associated equipment, to provide baseload electric power. The proposed new facility or facility expansion must have an aggregate nameplate generating capacity of 400 megawatts or more for all units at one site, use coal or gases derived from coal as its primary fuel source at the proposed facility and support the creation of at least 150 new Illinois coal-mining jobs.

Financial assistance through the program will be provided in the form of a grant based on State Retail Occupation Taxes that will be paid on Illinois coal purchases for new electric plants. Qualifying facilities may be eligible for grants roughly equal to the present value of future sales taxes paid on Illinois-mined coal over a 25-year period, up to a maximum amount of $100 million. Grant proceeds may be used for capital facilities consisting of buildings, structures,
durable equipment and land at the new or expanded generation facility. Two projects have made significant progress to date:

- Peabody Energy is considering construction of a mine-mouth power plant consisting of two 750-megawatt conventional pulverized coal-fired generators. The proposed facility would be built near Marissa, Illinois in Washington County. The estimated cost to construct the facility is $1.4 billion. The project would generate 1,500 permanent construction jobs during the construction period and 500 permanent jobs. The facility will utilize 6 million tons of Illinois coal per year. Peabody applied for an air permit on October 19, 2001.

- Indeck Energy is in the process of developing a power plant consisting of two 330-megawatt circulating fluidized bed coal-fired boilers. The proposed facility will be located in the village of Elwood in Will County. The estimated cost to construct the facility is $966 million. The facility would create approximately 1,000 construction jobs for a four-year construction period and 130 permanent power plant jobs. The facility will utilize up to 2.1 million tons of Illinois coal per year. On March 21, 2002, Indeck submitted an air permit application. IEPA issued an air permit on October 10, 2003. Indeck Energy has received two infrastructure grants, one in FY02 and one in FY03, for costs associated with development activities. Each grant was for $500,000.

As a result of these efforts, promising developments are unfolding. The Illinois coal industry is reinventing itself and is now more productive and competitive than ever before. Through the use of clean-coal technologies and cleaner coals, sulfur dioxide emissions have been reduced by 55 percent in Illinois since 1990. And new uses for coal combustion byproducts are being researched and perfected. These successes only serve to spur the Coal Development Office forward in the quest to fulfill its mission.

For additional information:

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