

PROGRAM facts

U.S. DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

Clean Coal
Demonstrations

10/2008



CLEAN COAL POWER INITIATIVE (CCPI)

Overview

The CCPI is an innovative technology demonstration program that fosters more efficient clean coal technologies (CCT) for use in new and existing electric power generating facilities in the United States. CCPI accelerates technology adoption by the private sector, filling a crucial gap between small-scale R&D and subsequent commercial deployment. The program addresses leading edge combustion, gasification, multi-pollutant emissions control (including CO₂), fuel processing, and other efficiency improvement technologies, thereby ensuring the continued utilization of coal throughout the electric power sector. Technology demonstrations directly address the various technical, environmental, and economic challenges facing the use of the Nation's abundant coal resources. Technologies emerging from the program will help to meet national environmental objectives embodied in various Presidential initiatives or legislation, including the Global Climate Change Initiative, Clear Skies, the Hydrogen Initiative, and the Energy Policy Act of 2005. By demonstrating technologies offering improved efficiency, lower cost, and high performance emissions controls, CCPI can help the United States achieve a more secure energy future. The outcome of the program will be new and innovative technologies that are readily accepted by industry and regulators and that produce substantial public benefits.

The CCPI, an industry/government cost-shared partnership, responds to the government's commitment to increase investment in CCT. Cost-shared partnerships leverage public/private investment, enhance teamwork, promote technology transfer, and provide the expertise and funding needed to ensure successful development and deployment of new technologies. Priorities include increasing the domestic energy supply, protecting the environment, ensuring a comprehensive energy delivery system, and enhancing national energy security. The CCPI provides an important platform to respond to these priorities.

The CCPI, planned as a multi-year program, is driven by projects proposed by the private-sector in response to government solicitations. Potential applicants include technology developers, utilities and other energy producers, service corporations, R&D firms, software developers, academia, and other interested parties. The private sector cost share must be at least 50 percent. Funding is awarded to applicants, selected as a result of these open competitions, who can rapidly move promising new concepts to a point where private-sector decisions on deployment can be made. The CCPI builds upon the advancements made by previous and continuing clean coal research and ensures the ongoing development of advanced systems for commercial power production. The program helps provide the nation with a reliable, affordable, secure, and sustainable energy supply, solving many of the environmental issues associated with coal use, while providing substantial environmental and economic benefits to the nation and the world.

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DOE Office of Fossil Energy is demonstrating advanced coal technologies that help achieve ...



The CCPI program goals are to:

- Accelerate private sector development of new coal-based power technologies that can meet increasingly stringent environmental regulations.
- Continue to build the technological foundation within the Nation's power industry for near-zero emission coal-based energy facilities.

Planning and Management

The CCPI is administered by the Office of Fossil Energy (FE) and implemented by the National Energy Technology Laboratory's (NETL) Strategic Center for Coal. To ensure programmatic success, stakeholder input is routinely sought through workshops and strategy meetings. These events form an integral part of overall planning providing ample opportunities for stakeholders to communicate with the federal government. Planning input is provided by industry; environmental and state organizations; technology proposers, hosts, and project and technology developers; universities; interested state and federal organizations; and other interested parties.

Program Importance

The government's investment in CCPI recognizes that crucial benefits to our nation's economic stability and security can be achieved through clean coal research. The program, providing opportunity for promising technologies emerging from the FE core R&D program, is a critical strategy for overcoming risk barriers to commercialization. Successful outcomes of the CCPI program provide an important part of the technology needed to supply our energy needs. Over the last 20 years, our Nation has seen a correlation between economic growth and increasing electricity production. Success of the CCPI program provides an important part of the technology needed to supply our immediate and long-term energy needs in support of our economic well being, while improving our environment. When the CCPI concept was introduced in 2001/2002, the U.S. power industry was heavily focused on gas-fired generation growth. Nevertheless, coal-fired units were forecast to provide a significant amount of incremental power generation through 2020.

Today, stringent environmental standards significantly impact coal-burning power plants. For example, first-of-a-kind mercury regulations limiting emissions from coal-fired power plants were unveiled in 2005, National Ambient Air Quality Standards have been revised to reduce levels of airborne particulate matter, and new regulations to reduce regional ozone transport now require many power plants to further reduce NO_x emissions. Moreover, the Clean Air Mercury Rule (CAMR) and Clean Air Interstate Rule (CAIR) impose significant reductions in SO₂, NO_x, and mercury. Clean coal technologies have been and are being developed to meet and exceed the published standards. Improved coal burner and gasifier designs, better gas cleaning systems, higher performance turbines, and lower cost fuel cells, for example, have shown promise for lowering emissions and boosting fuel efficiencies. Advanced control systems based on neural networks and computational intelligence can "fine tune" combustion processes to peak efficiency, reduce air emissions, and lower operating costs. These technologies, while promising, are inherently risky to implement. Prior to the government's cost sharing approach to accelerating technology development, new technologies did emerge from public and private sector R&D. However, mechanisms did not exist to ensure that

the needed technologies would be available and readily implemented by the power generation fleet in a timely manner. The CCPI program will be especially valuable in demonstrating carbon capture and sequestration in and applicable to the power industry.

Program Direction

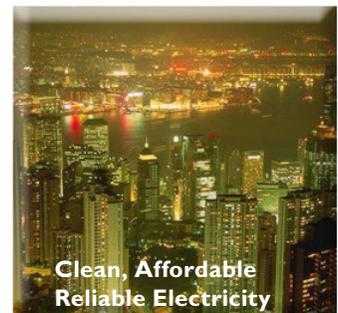
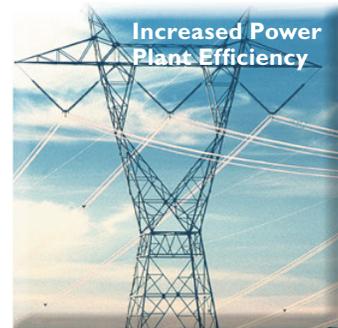
The CCPI fits within the FE, Office of Clean Coal, Strategic Plan to foster economic growth while protecting the environment and to support efficient and sustainable use of domestic energy resources. FE's Clean Coal Technology Roadmap, developed cooperatively with the coal and power industry, addresses short- and long-term needs. The CCPI program takes the most promising technologies emerging from other coal R&D programs and demonstrates them at a scale and in an operational environment sufficient to determine their potential for satisfying technical, economic, environmental, and operational needs of the marketplace. CCPI is integrated with other DOE initiatives such as the Restructured FutureGen, which is driving toward the availability of ultra-clean, fossil fuel-based energy complexes in the 21st century.

Program Implementation

The CCPI is being implemented via successive solicitations (rounds) that target priority areas of interest to meet DOE's Roadmap goals. Demonstrations selected under these solicitations must address needs not met by the private sector, promote technologies that have not been proven commercially, have wide applicability to the existing power plant fleet, and provide substantial public benefit. Demonstrations must "raise the technology bar" over existing technologies in terms of efficiency, environmental performance, and/or cost to ensure that significant advances are achieved. CCPI Round 2 projects, when successfully completed and commercialized, will play an enabling role in the development of technologies to ensure future availability of clean, affordable, domestic electricity and hydrogen. Future CCPI Rounds will build upon the successes of previous rounds, demonstrating technologies that strengthen the Nation's energy security with minimal environmental impact.

Benefits

The CCPI program benefits, when compared to RD&D investment costs, are expected to be substantial. It is estimated that CCT program benefits exceed \$25 billion. As an indication, the cost savings associated with the implementation of SCR technology alone has been valued at \$2.4 billion. The National Research Council has affirmed that the CCT program's benefits have far exceeded its costs, and according to industry sources, future benefits may exceed \$100 billion by 2020 and \$1,300 billion by 2050. The program, by merging public and private-sector interests, will benefit the environment, enhance electricity reliability, bolster energy security, and help to ensure an affordable supply of electricity. Successful completion of this initiative will lead to a stronger, more robust domestic economy. The outcome of the program will be new and innovative technologies that are readily accepted by industry and regulators and produce substantial public benefits. These include reduced fuel costs due to higher plant efficiencies, lower capital costs for repowered facilities and new plants, reduced costs of environmental compliance, avoided environmental costs (e.g., health, infrastructure, and agriculture), enhanced industrial competitiveness leading to increased domestic sales and technology exports, creation of high-quality jobs, and technology spin-offs.



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WEBSITE

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CCPI ROUND 1 PARTICIPANTS

Great River Energy
Underwood, ND
*Increasing Power Plant Efficiency—Lignite
Fuel Enhancement*

NeuCo, Inc.
Boston, MA
*Demonstration of Integrated Optimization
Software at the Baldwin Energy Complex*

WMPI PTY., LLC
Gilberton, PA,
*Gilberton Coal-to-Clean Fuels and Power
Co-Production Project*

Wisconsin Electric Power Co.
Milwaukee, WI
*TOXECON Retrofit for Mercury and
Multi-Pollutant Control on Three 90 MW
Coal-Fired Boilers*

CCPI ROUND 2 PARTICIPANTS

Excelsior Energy, Inc.
Minnetonka, MN
Mesaba Energy Project

NeuCo, Inc.
Boston, MA
*Mercury Specie and Multi-Pollutant
Control*

Southern Company Services
Birmingham, AL
*Demonstration of a Coal-Based Transport
Gasifier*

For project details and benefits,
visit the NETL website

www.netl.doe.gov

Under “Technologies” select
“Coal and Power Systems,”
and then
“Clean Coal Demonstrations.”

For other Coal Power Program information,
visit the Office of Fossil Energy website

www.fe.doe.gov

or
the Strategic Center for Coal
on the NETL Website

www.netl.doe.gov

Under “Technologies” select
“Coal and Power Systems.”