PROJECT facts

ADVANCED power
SYSTEMS

CARNEGIE MELLON'S COMPUTER MODEL FOR CHOOSING THE BEST, MOST ECONOMICAL POLLUTION-CONTROL TECHNOLOGY

Project Description

Cost-effectiveness in electric power generation reaps a reward from the 1990 Clean Air Act Amendments. In addition to setting new standards for sulfur dioxide and nitrogen oxides emissions from coal-fired power plants, the law establishes an "emissions trading" program that puts a premium on the most economical technologies. Accurate, reliable information will be critical to meeting these Clean Air Act standards and obtaining trading power.

With funding from the Department of Energy's Office of Fossil Energy, researchers at Carnegie Mellon University are developing a powerful, user-friendly computer model to predict the performance of advanced pollution-control technologies. Plant designers will be able to use the model to choose the best clean coal technology, or combination of technologies. Plant operators can use it to optimize the performance of the power plant once the technology is installed.

By giving utilities and equipment vendors an accurate and reliable way to determine how effective an innovative technology might be when installed in a commercial power plant, Carnegie Mellon's computer model could help speed the market acceptance of these advanced concepts--several of which have shown the potential for cheaper and more effective ways to comply with upcoming clean air standards.

Program Goal

Tighter environmental standards to take effect in the year 2000 will require U.S. coal-based power plants to be much cleaner and more efficient than today's technology allows. By 2010, DOE's Advanced Power Systems Program seeks to develop power systems that are at least 10 times cleaner than today's technology, and at least 50% more efficient.

Carnegie Mellon's computer model will use probability equations to predict how various advanced pollution-control technologies might perform in different power plants. The model will evaluate both the technical and the economic performance of individual or combined technologies, including precombustion coal-cleaning, combustion improvements, and post-combustion emissions controls. This computer model will also be useful to research organizations, such as DOE and the Electric Power Research Institute, in determining which promising new technologies need additional research and development, and which activities will yield the largest payoff for cost savings and lower emissions.

PRIMARY PROJECT PARTNER

Carnegie Mellon University
Pittsburgh, PA

MAIN SITE

Carnegie Mellon University
Pittsburgh, PA

TOTAL ESTIMATED COST

$1,325,000

COST SHARING

DOE $1,325,000

Non-DOE   —

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CONTACT POINTS

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Project Benefits

As U.S. utilities examine their options for complying with the 1990 Clean Air Act Amendments, they will be challenged to find the most effective and economical methods for meeting new standards while keeping costs as low as possible for ratepayers.

The menu of clean air technologies being developed through DOE's Clean Coal Technology Program is expanding. Some of these innovative approaches clean the potential pollutants from coal before it is burned. Others modify the combustion process to reduce formation of pollutants. Still others capture pollutants from the boilers' coal-combustion gases.

Which of these new technologies to implement? The decisions can be difficult and expensive because the performance of a particular technology can vary from one power plant to another, depending on how each specific plant is configured. In addition, a plant's overall performance—and ultimately the cost of power—can be affected by the particular combination of systems, the type of coal burned, and a myriad of other factors.

The Carnegie Mellon computer program is designed to take all these factors into account. It will be able to predict how well a particular technology can perform, without having to replicate it for the different configurations at each site. The flexibility of this predictive model can save the Nation's ratepayers millions of dollars.

This low-cost predictive tool will give power companies the ability to make better decisions about new power-plant designs or about the type of retrofit technology to install on existing plants. The computer model will also be a valuable and effective research tool. Its ability to consider all possibilities will provide a unique capability to assess the potential risks and benefits of an emerging technology, and will help focus government and private research efforts on those specific areas that will most effectively reduce the risks and enhance the benefits.

Cost Profile (Dollars in Thousands)

	Prior Investment	FY95	FY96	FY97	Future Funds
Department of Energy *	$540	$300	$242.5	$242.5	—
Private Sector Partners	—	—	—	—	—

* Appropriated Funding

Key Milestones

FY92	FY93	FY94	FY95	FY96
	Phase I			Phase II

Initiated 8/92

Beta-version of model delivered 9/95

Initiated 2/96