Fossil Energy Research Benefits

Clean Coal Technology Demonstration Program

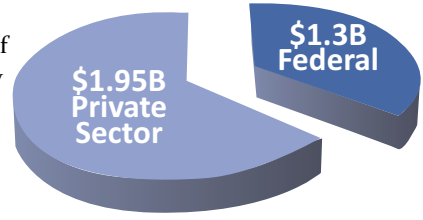
The Office of Fossil Energy's (FE) **Clean Coal Technology Demonstration Program** (1986-1993) laid the foundation for effective technologies now in use that have helped significantly lower emissions of sulfur dioxide (SO_2), nitrogen oxides (NO_x) and airborne **particulates (PM_{10})**.

The program forged cost-sharing partnerships between the U.S. Department of Energy, industry, universities and technology suppliers and users.

The **U.S. General Accounting Office** said the program demonstrated "how the government and the private sector can work effectively together to develop and demonstrate new technologies."

75 percent of domestic coal-fired power plants include technology with roots in FE's Clean Coal Technology Demonstration Program.

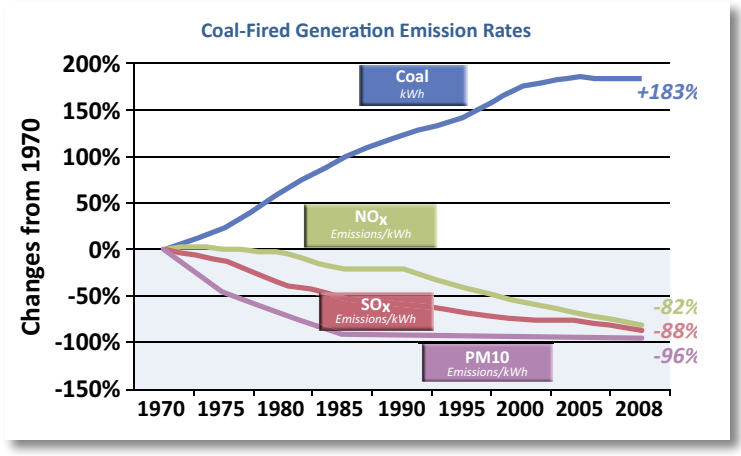
CCTDP Total Cost: $3.25B



While the cost-sharing requirement for the program was a 50/50 split, the private sector provided 60 percent of CCTDP dollars for the 33 successfully completed projects.

Program Benefits

- ✓ **33** successfully completed demonstration projects.
- ✓ More than **20 innovative technologies** tested during the original program achieved commercial success.
- ✓ Contributed to **significant SO_2, NO_x reductions**, U.S. air quality improvement.
- ✓ Benefits from emissions reductions attributable to FE Clean Coal Program, 2000–2020 = **37 million tons** and **$9 billion** for SO_2; **16 million tons** and **$16 billion** for NO_x (Source: Management Information Systems, Inc., 2009).



Source: Southern Company

Technologies from the FE Coal R&D program, combined with other factors, have helped to dramatically reduce potentially harmful emissions, even as coal use for electricity generation has risen substantially.

Key Technologies Demonstrated and Commercialized by the FE Clean Coal Technology Demonstration Program

Low NO_x Burners	Reduce NO_x levels from coal combustion by 65 percent at relatively low cost; have been installed on 75 percent of U.S. coal-fired power plants.
Selective Catalytic Reduction	Up to 95 percent NO_x reduction; costs have been halved since 1980s; SCR and selective non-catalytic reduction systems installed on 48 percent of U.S. coal generation (MWh) as of 2011. (Source: U.S. EPA)
Flue Gas Desulfurization	Installed on 61 percent of U.S. coal generation (MWh) as of 2011 (Source: U.S. EPA); 95 percent or more reduction of SO_2 in flue gases.
Fluidized Bed Combustion	Competitive efficiencies, low NO_x and SO_2 levels; more than 600 large boilers with total installed thermal capacity of more than 70,000 MW have been built worldwide.
Integrated Gasification Combined Cycle	Inherently lower emissions of SO_2, NO_x, mercury; evolving technology in early stages; 7,600 MW coal-based IGCC operating or under development worldwide. (Source: Siemens AG, 2009)