Cracow Clean Fossil Fuels and Energy-Efficiency Program

Location: Cracow
Type: Emissions reductions in new and existing heating systems
Size: 300 units; combined capacity of 285 MW
Funding: Total: US$58,400,000
Private: US$23,300,000
Public: US$35,100,000
Objective: To reduce sulfur dioxide (SO_2) and particulate emissions from small, solid-fuel-fired boilers and home stoves.
Duration: 1991–2000
Scale: Urban

Summary

The project reduced average annual air pollutant concentrations at more than 300 small-scale, solid-fuel-fired boilers and home stoves in Cracow by 50 to 60%. Project success is attributed to numerous joint ventures of Polish and United States (US) companies, cost-effective use of available funds, and the environmental consciousness of the people of Cracow.

In-Country Principles That Attracted Nondonor Financing

- Capacity building and informed decision making
- Public participation in, and support of, sustainable development
- Institution building and access to justice and enforcement of laws

A key factor that helped attract private financing was standard commercial operating practices for the energy sector. Such practices included maintenance of financial records consistent with international accounting standards, release of redundant staff, improved cost-recovery techniques, metering systems, skills training, and cost-based pricing.

Increased public knowledge of, and participation in, energy decision making was facilitated through a survey of public opinion regarding local air quality, heating sources, personal incomes, and the willingness and ability to pay for real energy costs and environmental improvement. Information gathered in the program was made available to the public and announced through published brochures and television and radio announcements.

Also important for attracting private-sector support was a comprehensive energy law characterized by basic policies and priorities; separate policy making, ownership, and regulatory functions; and a framework for private investment. Technical assistance allowed corporate restructuring of energy enterprises and helped energy-based nongovernmental organizations to participate in the restructuring process.

The Polish Government's action to lower permitted emission levels for many emission sources forced facilities to either lower emissions or pay fines.

Financing

Total project investment was US$58,400,000. Private funds came from Polish local utilities (US$22,400,000) and boiler house owners and citizens (US$900,000). Public funding sources included Polish environmental funds (US$15,100,000) and US Agency for International Development (USAID) (US$20,000,000).

Local utilities and boiler house owners requested Polish environmental funds (grants or low-interest loans) for equipment installations. Eight teams of American and Polish companies were selected through an open solicitation to participate in the project. Each team provided a 50% cost share for its project task.

The Project

In 1989, the levels of SO_2 and particulates in the ambient air of Cracow exceeded the local standards by several times. The poor air quality, which resulted from emissions from small, low-stack boilers and home stoves and from upwind, high-stack sources (power plants), was harming the health of Cracow citizens and the city's historic treasures. The objective of the project was to reduce emissions from

sources within the control of the local government and Cracow citizens.

The project studied existing heating equipment and options for emissions reductions; surveyed public opinion; demonstrated energy-efficiency measures; gathered and shared data on heating equipment and emissions sources; established a clearinghouse to disseminate energy, heating, environmental, and air quality information to the general public; and prepared a regional plan to continue to improve regional air quality. US-Polish joint ventures provided technical solutions to emissions problems for industrial- and commercial-scale solid-fuel-fired boilers and home stoves.

Residential, utility, commercial, and industrial sectors benefited through upgrades to heating sources that increased efficiency and lowered emissions. Community health was improved and quality of life was improved through installation of radiator valves in apartments, allowing individuals, for the first time, to control the temperature of their apartments.

Technical Data

Technologies included commercial gas- and oil-fired boilers, automatic combustion controls, and high-efficiency particulate collection devices. District heating lines and additional heat exchangers were installed for the district heating distribution utility, and heating load was added for the electrical utility, which provided the source of district heat though cogeneration. Of the 275 boiler houses in the project, 107 were converted from coal or coke to natural gas or oil. The remaining boiler houses were eliminated and replaced by heat exchangers for the district heating system.

Performance Data

The concentration of suspended particulates dropped by nearly 60% and the concentration of SO_2 dropped by 65%. It is estimated that the program resulted in the yearly reduction of 1,771 metric tons of particulates, 1,593 metric tons of SO_2, 296 metric tons of nitrogen oxides, 2,267 metric tons of carbon monoxide, and 67,645 metric tons of carbon dioxide. Solid fuel use dropped by 70% from the 1991 level of 475,000 metric tons. The district heating utility gained more than 180 MW of new load.

Participants and Roles

Key participants included the local utilities and boiler house operators, the Polish government, and USAID. Additional participants from Poland include the Cracow Office of Environmental Protection; Polish Ministry of Environmental Protection, Natural Resources, and Forestry;

City of Cracow; and Naftokrak-Naftobudowa and the Cracow District Heating Distribution Utility (two Polish joint-venture partners.) US participants include the following joint venture partners: LSR Technologies, Honeywell, Control Techtronics, Shooshanian Engineering Associates, and Tecogen. The National Energy Technology Laboratory and Brookhaven National Laboratory of the US Department of Energy (USDOE) provided technical support.

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