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New Technology for Cleaner Air

Later this year a Clean Air Act will be signed by President Bush. Among its provisions will be requirements for a reduction in emissions by utilities of 10 million tons of SO_2 per year. Depending on details of the act, the United States will be saddled with scrubbers for many old coal-fired plants. Alternatively, this country could have an opportunity to employ innovative technologies that are much more desirable.

The version of the Clean Air Act that has been passed by the Senate requires a relatively speedy reduction in SO_2 emissions. This would be achieved by installation of scrubbers on old existing coal-burning plants. Scrubbers employ moist lime or limestone to remove SO_2. They are poorly effective in removing the more toxic NO_x. The use of scrubbers reduces the electrical output of plants and results in a toothpaste-like solid that must be sent to a landfill. A possible consequence of rapid installation of scrubbers is a series of electric brownouts and blackouts in the eastern half of the United States. Reserve generating capacity in that region is minimal. While scrubbers are being installed, plants must be shut down.

During the past decade the electric utility industry has spent more than $2 billion on innovative technology designed to minimize pollution and to increase efficiency in the production of electricity. A principal agent has been the Electric Power Research Institute, headquartered in Palo Alto. During the past several years, the utilities have been joined by the Department of Energy in developing clean coal technologies. A substantial number of projects have been authorized, implemented, or completed. These include fluidized bed plants and the integrated gasification combined cycle plants. Nearly 100 demonstrations of clean coal technologies are under way in the United States and overseas. The international attention is driven by a growing worldwide clean coal technology market estimated at about $80 billion by the year 2000.

The most interesting of the technologies is the integrated gasification combined cycle. Its effectiveness was demonstrated at Cool Water, California, and elsewhere. The principal products of gasification of coal were CO and H_2 plus H_2S and NH_3. After gasification, sulfur and nitrogen compounds were nearly completely removed. The ashes from the coal were in the form of a glassy impervious frit. The clean synthesis gas can be used to produce liquids, or it can be burned to generate electricity in a combined cycle or in fuel cells. All three of these alternatives have great potential for future improvement and use. In the future, synthesis gas, whether derived from coal, natural gas, or biomass, will serve as the raw material for a host of production in worldwide facilities. Ultimately this country will find it necessary to produce synthetic liquids for transportation fuels and for chemicals. Expenditures for imported oil are projected to rise to $150 billion annually by the year 2000.

The high-temperature technology for gas turbines continues to evolve, and combined cycle production of electricity is superior in efficiency to the old steam boiler technology. Emissions of CO_2 per kilowatt hour could be reduced by as much as 25% if the full potential of the technology is realized. A possible ultimate mode of generation of electricity involves carbonate fuel cells which have superior efficiency for conversion of fuels to electricity.

With attractive alternatives in clean coal technology, why should utilities allow themselves to be saddled with scrubbers? First of all, Congress and President Bush have responded to pressures to reduce emission of SO_2. Will CO_2 be next? Utilities have also been battered by state regulators and are now not, in general, eager to take on new technologies. In the short term, the safest and cheapest course for them is to comply with the Clean Air Act by installing scrubbers.

For the longer term the national interest lies in exploiting the new pollution reducing technologies that could also lead to jobs in this country. In 1967, the United States was world leader in sales of power plant equipment, with 40% of global share. Now Europe and Japan have larger sales, and U.S. sales have dropped 15%. In the power equipment industry, corporate headquarters and their innovative nerve centers are migrating globally.

In the Senate version of the Clean Air Act there are some incentives to employ new technology, but not enough. The House of Representatives should repair this deficiency.

—PHILIP H. ABELSON