STATEMENT OF ALICE M. RIVLIN
DIRECTOR
CONGRESSIONAL BUDGET OFFICE

Before the
Committee on Environment and Public Works
United States Senate

June 22, 1981

Mr. Chairman, I am pleased to appear before the committee to discuss the effect of the pollution control requirements of the Clean Air Act on the conversion of electric generating capacity from oil and gas to coal. Two areas of potential effect are important: the reconversion to coal of generating stations that once burned coal but have since switched to oil or gas; and the replacement of oil- and gas- fired capacity with new coal plants. In my remarks today, I will address the following:

- The importance of reconverting or replacing oil- and gas- fired generating capacity,
- The effect of the Clean Air Act on the cost and economics of reconversion and replacement, and
- Other factors, principally financial and regulatory, that affect the cost and pace of reconversion and replacement.

THE IMPORTANCE OF RECONVERSION AND REPLACEMENT

It is both economic and supportive of national energy goals to reconvert coal-capable oil and gas power plants and to replace most of the remaining oil and gas capacity with coal.

Economic Advantages of Coal Use

Until the 1973 quadrupling of oil prices, electric utilities were encouraged both by fuel prices and by environmental policy to switch from coal to oil and natural gas. The current disparity between oil and gas and coal prices, however, motivates the switch back to coal in boilers capable of burning coal, and in many cases, encourages the replacement of existing oil- and gas-burning plants with new coal-fired generating capacity. Although, coal-fired power plants are relatively more capital intensive and take longer to build than oil- or gas- fired power plants, the potential saving in fuel cost can overcome these capital differences and provide a strong economic motivation for conversion. As we shall see, this is true even under pessimistic assumptions about interest rates and relative fuel costs.

Energy Policy Advantages of Coal Use

Displacement of oil in the utility sector will also reduce our dependence on imported oil. The amount of capacity available for reconversion and replacement is substantial. In 1980, utilities consumed approximately 2.8 million barrels per day of oil and gas equivalent. Of this, the Department of Energy estimates that up to 520,000 barrels per day of oil and gas equivalent are economic for displacement through mandatory or

voluntary conversions, although there is controversy as to the practicality of some of these conversions. Beyond this, up to 1.5 million barrels per day of oil and gas equivalent are burned in plants that cannot convert to coal but that under certain circumstances could be economically replaced by new coal-burning units. The remainder of the oil and gas used in the electric sector, less than one million barrels per day, is burned in units that operate intermittently. This is generally not economic for displacement.

At issue then is whether the Clean Air Act seriously reduces the advantages of greater coal use in the electric sector. In what follows, I shall offer evidence that the Clean Air Act requirements have a significant cost, but that in most cases this cost does not eliminate the economic advantage of conversion to coal.

THE EFFECT OF AIR POLLUTION REGULATIONS ON THE ECONOMICS OF CONVERSION

The Clean Air Act, through state emission control requirements and federal standards for new sources, can substantially increase the cost of reconversion and replacement, although in most cases it does not eliminate the potential savings from using coal. In the case of reconversions, the power plant must meet the state emission control requirements for coal

power plants of its vintage or must negotiate alternative requirements with the state and the Environmental Protection Agency. Thus the pollution control requirements facing individual reconversions may vary. All reconversions, however, must comply with the National Ambient Air Quality Standards of the Clean Air Act.

Replacement plants, by contrast, must all comply with federal New Source Performance Standards, which are uniform throughout the country. Even though states are able to impose more stringent limits than the federal standards, it is usually the federal standards that govern. Hence, requirements for replacement plants are more uniform than for reconversions.

Emission Requirements and The Economics of Reconversion

The cost of reconversion is influenced by the amount of equipment upgrading necessary to permit handling of coal and, more importantly, the stringency of emission limitations imposed on the reconverted facility. Emission standards for reconverted facilities vary according to plant location and existing levels of pollution. In the absence of specific project-by-project analyses, CBO has used surveys of reconversion costs made by industry and by the Department of Energy to examine the economics of reconversion on a generic basis under different air pollution control assump-

tions. Analysis of two prototypical situations can help put boundaries on the effects of the Clean Air Act: reconversions that must meet emission standards more stringent than those affecting many oil-burning facilities; and reconversions that must meet less stringent standards.

More Stringent Emission Standards. In many cases, power plants reconverting must comply with emission standards equal to or more stringent than those affecting plants burning low-sulfur oil. The cost of these reconversions may reach as high as $600 per kilowatt, although in many specific cases the cost could well be lower. For a typical 500 megawatt power plant, the total cost of reconversion could reach $300 million.

Even using extremely conservative assumptions--real capital costs of 10 percent, real increases in the price of coal of approximately 3 percent per year, and no real increase in oil prices--such expensive, stringently controlled reconversions yield lower annualized operating costs than the oil- and gas-fired capacity they replace. The annualized fuel and operating cost from a base-load plant continuing to burn low-sulfur oil is approximately 50.4 mills per kilowatt-hour at today's prices. By contrast, a $300 million dollar reconversion of a typical 500 megawatt facility would result in total generating costs of approximately 48.3 mills per kilowatt-hour, a saving of 2.1 mills per kilowatt-hour over generating costs when using oil.

Less Stringent Emission Standards. In cases where reconverted facilities are subject to less stringent emission control requirements, even greater savings are possible. Here, reconversion might not require the installation of flue gas desulfurization equipment. If flue gas desulfurization is unnecessary to meet standards, then reconversion costs can fall to approximately $150 per kilowatt, or $75 million for a 500 megawatt reconversion project. Reconversion at this price would result in generating costs of approximately 41.2 mills per kilowatt-hour and yield savings of approximately 9.2 mills per kilowatt-hour over previous oil-fired capacity.

These results indicate that while pollution control poses significant costs, it does not generally prohibit reconversions, even under strict air pollution control assumptions. In fact, the result can be substantial savings to the utility and to its customers.

Emission Requirements and The Economics of Accelerated Replacement

New coal-fired powerplants are subject to relatively unambiguous air pollution control requirements. Federal standards for new sources implicitly require installation of flue gas desulfurization equipment, which typically provides equivalent or greater emission control than oil-burning plants. The basic cost for these new coal facilities ranges from $1,110 to $1,210 per

kilowatt, depending upon regional variations in capital charges and the need for new transmission equipment. Of this, the cost of emission control equipment required by the Clean Air Act ranges from $120 per kilowatt to $250 per kilowatt.

Using the conservative assumptions previously mentioned, accelerated replacement would not appear economic, even if federal air pollution emission standards did not apply. Replacement under current standards becomes economic, however, if oil prices continue to rise in real terms over the next 15 years. In its 1980 report to Congress, the Department of Energy estimated that oil prices would rise approximately 2.9 percent per year in real terms through 1995. Assuming only a 2.0 percent real annual increase in oil prices over the next 15 years, replacement of oil fired capacity would yield savings of approximately 11.2 mills per kilowatt-hour on an annualized basis. Replacing gas-fired capacity would result in similar savings, assuming gas prices rise to levels commensurate with oil prices.

It should be recognized that the assumptions we have used in estimating costs of both reconversion and replacement are pessimistic. In particular, a real discount rate of 10 percent is much higher than that typical of most utility investments. It is often used in estimating regulatory effects, however, and we have employed it here to allow comparison with other analyses. A real rate of 6 percent or lower would better represent

true capital charges for utilities. When this is used, plant replacement appears economic based on today's oil prices and current requirements of the Clean Air Act.

Administrative Requirements of Environmental Regulations

Delays in determining the final emission standards and requirements for installation of emission control devices often delay conversions. Companies often seek to relax emission limits in order to reduce pollution control costs, and hence disputes over environmental requirements may delay project starts. The air quality modeling performed to demonstrate that such relaxations will not violate national standards is detailed, requiring time and technical expertise. Overall, federally mandated conversions can require two or more years of administrative activities before conversion begins. For voluntary conversions, delays are more difficult to quantify. In any case, these up-front delays can cost approximately $6.7 million per month in inflation and deferred energy replacement for a 500 megawatt facility, assuming a total conversion cost of $600 per kilowatt. This, however, does not make the conversion uneconomic; it simply raises the question of whether administrative streamlining would be helpful in reducing these time-related costs.

In sum, the Clean Air Act's requirements limiting utility plant emissions do not eliminate the economic benefits of reconversions. Accelerated replacement also yields attractive savings when more realistic discount rates are used or when oil prices are assumed to rise. This conclusion raises the question of why reconversions and replacements are not occurring at a rapid rate. To answer this, we must turn to other matters.

INFLUENCES ON COAL CONVERSION BEYOND THE CLEAN AIR ACT

Several interrelated factors affect the cost and pace of coal conversion activity. These include: the financial condition of the utility concerned; uncertainty over future oil prices; the potential technical risk associated with any new construction project; and the regulatory practices of state utility commissions.

The calculated saving from a coal conversion project can be an inaccurate guide to the financial viability of the project. In particular, the financial condition of the utility has much to do with its ability to convert generating capacity to coal. Even with significant long-term savings, many utilities face difficulty raising the necessary capital to undertake coal conversion projects. High rates of inflation in construction and the very

high cost of capital have exacerbated this problem. Many of the large oil-consuming utilities actually are in poorer financial condition than the rest of the industry, thus exacerbating the problem.

Uncertainty over future oil prices also influences the desirability of conversion. This influence is strongest on accelerated replacement, where the savings are more dependent on real increases in the price of oil.

Exposure to technical risk often discourages conversion activity. The cost associated with a new construction project can be significantly increased if delays are encountered after construction begins. Because funds have already been committed with no offsetting revenues, the cost of delays during construction tends to be somewhat larger than the cost of similar delays before project start-up. The cost of delays caused by such factors as late equipment delivery or labor shortages can be over $7.2 million per month for a 500 megawatt reconversion at $600 per kilowatt, assuming 30 percent completion of the project at the start of delay. This may be compared to a relative savings in operating costs of $4.5 million per month after conversion is complete.

The economic regulation of the utility is probably the most crucial factor affecting conversion, and indeed is central to the other inhibiting factors as well. Decisions made by state regulators often increase the

financial risk of conversion. Practices such as fuel adjustment clauses, low allowed rates of return, and the prohibition on including costs of work in progress in the rate base can discourage a utility from undertaking a conversion project. For example, fuel adjustment clauses allow higher oil and gas prices to be passed on quickly to rate payers. By contrast, capital expenditures for conversion typically require lengthy and uncertain regulatory proceedings before they can be recouped.

Short-run cash flow is another obstacle in the path both of reconversion of coal-capable plants and of the accelerated replacement of others with new coal-fired plants. This is because utilities must incur short-term construction costs before offsetting revenues can be realized. The state public utility commissions have been reluctant to grant the rate increases necessary to cover higher short-run costs.

Capital markets may perceive that such rate-setting practices have contributed to poor financial performance, and impose a higher cost of capital on utilities undertaking coal conversion projects. The net result is a systematic bias against capital investment. Utilities find it preferable to continue to operate oil- and gas-fired power plants at a higher cost that can be recouped rather than to invest in coal conversions with their attendant regulatory and financial uncertainties.

CONCLUSION

In sum, most reconversions are economically attractive under even the most conservative assumptions regarding capital charges, fuel prices, and pollution control requirements. Under these same assumptions, replacement of existing oil and gas plants with new coal plants is attractive only if some moderate increase in real oil price is assumed. While the requirements of the Clean Air Act add significantly to the costs of conversion to coal, they are generally not decisive in eliminating the potential economic advantages. Instead, it appears that the financial ill-health of the utility industry and the way in which it is regulated are closer to the center of the problem.