HOBBLING COAL– OR HOW TO SERVE TWO

Richard L. Gordon

WHETHER government intervention has helped or hindered the coal industry, not even the government knows for sure. In a 1977 appraisal of the state of the industry, the General Accounting Office could not determine what the overall effects of public coal policy have been. Here I review that policy and suggest that its net long-term effect on coal production is probably negative (long term being defined as a decade or more). During that long a term, if serious barriers to the use of coal should increase, U.S. energy problems could be exacerbated.

Current policies restraining coal use were designed to attain legitimate social objectives. While we cannot hope to determine in the brief scope of this article whether the socially optimum level of controls has been reached (or exceeded), there is considerable reason to believe that none of the social objectives has been well served. Indeed, it will be truly a remarkable coincidence if the controls outlined here effectively contribute to any of their intended goals. I expect us to endure the worst of all possible worlds—inadequate attainment of our objectives at excessive cost.

Policy-Making for Energy

It is a truism that politically powerful groups have disproportionate influence on actions affecting their interests. What is not generally recognized is that the balance among interest groups in the field of energy policy-making has changed substantially in the last decade or two. The effectiveness of consumer and environmental groups has increased, while the ability of energy producers to influence decisions has greatly diminished. In fact, the strength of producers is now so eroded that although the coal industry still has some supporters strategically placed, even the previously favored, small petroleum producers have lost much of their political influence.

If the energy debates have added anything to what we already knew, it is the depressing fact that it is difficult for pressure groups to have a truly broad viewpoint, even when they are concerned with something as critical and all-encompassing as the environment. Consumerists and environmentalists have imitated other lobbyists in making extreme demands—though, to be sure, some claim their extremism is merely a matter of tactics, an attempt to lay the groundwork for advantageous compromises. It is not at all evident that so sanguine an appraisal is valid. At the very least, consumer and environmental groups have important intrinsic advantages over their corporate opponents. Public virtue is more appealing than commercial gain, and, for that reason if for no other, those purporting to speak for the common good should not need to be as strident as other interest groups. Moreover, there are questions about how well these groups perceive and promote the common good and about their willingness to compromise. By now, indeed, concerns over the elitist nature of environmental and consumer groups have become quite familiar. So also have suspicions that environmentalists are now more interested in claiming victory than in preserving the environment—and, further, that they tend to pre-

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fer unproven alternatives (such as massive conservation and solar energy) to producing more energy from known and proven resources.

For these reasons among others, it should not surprise us that energy policy-making is hindered by the presence of irreconcilable interests. There are those concerned about preventing environmental degradation. There are those who apparently believe that energy producers constitute some sort of evil conspiracy to be thwarted at almost all costs. There are those who are convinced that the world is running out of energy (or at least that available energy sources are located in countries that will restrict output so as to increase prices). There are the numerous U.S. energy producers who are themselves divided in their interests. To them, indeed, critics of the energy industries may seem less of a threat than other producers: coal mining companies fear oil and nuclear energy; the smaller firms fear the larger ones; specialists in extraction have interests different from the interests of those who process fuels.

Along with these irreconcilable interests come irreconcilable goals. Energy policy-makers insist on acting as though the goals can be reconciled and, indeed, as though they can all be attained painlessly. Any resolution of conflicts is delayed or avoided as much as possible. We have simultaneously proclaimed as objectives the need for lessening imports, for abating environmental damages, for protecting the public from high energy prices, for increasing competition, and for preventing industry dislocation and the dislocation of those the industries employ. Aside from questions that can be raised about the wisdom of some of these goals, we must recognize that they are in conflict. We cannot, for example, avoid some environmental degradation if we move toward significantly increasing domestic energy production, particularly of coal. We cannot keep down the price of domestically produced energy if we wish to expand its output.

It would seem then that the idea of a unified energy policy is, as it has been for at least twenty-five years, a chimera. Moreover, so long as a unified policy means developing a detailed long-term master plan like that in President Carter's national energy program, it will remain a chimera. We simply are not smart enough to make as many long-term decisions as that proposal would require; and, indeed, just designing the basic plan requires resolving more disputes than prudent politicians care to handle at once. If, on the other hand, coordination simply means making sensible trade-offs, this is quite feasible in principle but apparently impossible politically.

This article examines the effect upon one industry of our approach to energy decision-making. I conclude that the usual pattern has been to adopt measures that appear stringent and then to lessen their impact by allowing numerous offsets or escape clauses. The escapes may be provided in the statute or in subsequent statutes or regulations. This is, of course, a game that any number can play. It

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has proven almost equally feasible, for example, to nullify measures designed to promote coal use by imposing environmental conditions and to provide escape clauses in environmental regulations so that coal use can be promoted. While this way of making decisions is effective in reducing pressure on legislators, its impact on the attainment of national energy goals is far from beneficial. The difficult decisions are transferred either to the courts or to administrative agencies, bodies that are widely recognized to have their own severe problems with decision-making. The courts often have trouble in dealing effectively with complex technological and scientific issues. Administrative agencies do not always seek expert knowledge and may become overly insulated from broad public scrutiny.

Most of the policies discussed here were enacted in 1977 or are still being debated by Congress, so their effects are yet to occur. This article, thus, provides warning rather than review.

Turning to policy-making for coal, we may begin by listing those that critically affect coal use and coal production. The most publicized (and probably most influential) is increased regulation of the emission of air pollutants, especially sulfur oxides. This affects coal use. The principal issues affecting coal production are health and safety, the effects of mining on land use, and the leasing of federal coal rights. All of these issues affect coal mining generally, but health and safety issues are generally considered to be more a problem with underground mines, while land-use and leasing issues arise primarily in connection with surface mining. In any case, it is to alleviate the effects of pollution regulations on coal use (especially by utilities) and the effects of other regulations on coal production that new laws, including President Carter's energy program, have been designed.

Regulatory Problems in Coal Use: Air Pollution Control

The policy for sulfur dioxide emission control is not only the most important policy affecting coal, but probably the most complex. Two types of complexities may be distinguished. First, many different groups have a stake in and have influenced the policy adopted, both in form and substance. Second, the policy itself has become increasingly convoluted.

The groups include the actual policy-makers, the lobbyists for controls (mostly environmentalists), and the coal-using industries affected. The second of these groups needs little treatment, its success being by now familiar. In contrast, the policy-makers within our intricate regulatory structure and the companies responding to that structure merit fuller review. The principal policy-makers have been the Congress, the Environmental Protection Agency (EPA), and the state governments. (A fourth group—Indian tribes—also has been given some authority.) EPA has naturally pushed vigorously to ensure compliance with congressionally set air-pollution control objectives (although at one point in the 1970s, it is true, it did suggest that the states stop trying to comply more rapidly than necessary with federal requirements). This tendency towards as much vigor as possible suggests that EPA tends to give more weight to the views of its environmentalist supporters than to the views of others.

Coal-using firms have frequently sought relief in the courts and, though the enforcers have ultimately prevailed, the firms have at least won delays in enforcement. In Ohio, for example, when the state pollution control agency was unwilling to impose restrictions as stringent as EPA believed were required, EPA (in 1975) imposed federal restrictions. Several Ohio electric utilities took the matter to court, and the implementation of the restrictions is being delayed while the litigation between those utilities and EPA continues. In the same way a number of utilities won temporary relief from EPA's pressure to use stack gas-scrubbers (discussed below) when district courts found the scrubbers not technologically or economically feasible. Subsequently (in 1976), on appeal, the Supreme Court decided that, since the law was intended to *force* technological developments, feasibility was not germane.

Congressional action on controlling air pollution by coal users has involved the kinds of political conflicts that would be expected. Various senators and representatives compete to assert or maintain a dominant role over policy, and members from coal states try to find ways around the regulations. A blatant example of local protectionism came in the provision of the

1977 Clean Air Amendments that allows states or the federal government to require the maximum possible use of local coal if serious damage to the local economy would thereby be avoided. Either could initiate the action, but the federal government must concur with a state request. In early 1978 the states of Illinois and Ohio were trying to use this provision to prevent local electric utilities from shifting to western coals.

When policy-makers impose goals that seem unreasonable to the industries affected and provide no credible incentives for compliance, it is improbable that the goals will be met. Managers recognize, at least subconsciously, that if their companies' products are essential, extensions will be granted to permit continued operation, even if air pollution regulations are being violated. This seems a powerful incentive for dilatory behavior and apparently helps produce the present complex pattern of stringent goals hedged with numerous escape clauses.

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Sulfur oxide control. To gain some insight into the problem, let us look first at sulfur oxide control policy. At present, EPA establishes the maximum allowable average annual concentration of pollutants in the atmosphere and the deviation (from the annual norm) allowed on any one day—even perhaps in any three- or, indeed, one-hour period. In addition, EPA imposes limits on the increases in pollution allowed in areas with air already significantly cleaner than required by the basic standards. This controlled-increase policy, called "prevention of significant degradation," came into the enforcement process through a court interpretation of the statement in the Clean Air Act that air quality should be preserved. Lacking precise legal guidelines, EPA had difficulty developing workable rules to "prevent significant degradation" and the Congress, in the 1977 Clear Air Amendments, sought to make things easier by establishing rules of nondegradation.

The new rules are based on concepts developed by EPA. The 1977 amendments establish three classes of strictness for pollution control, into which classes all regions or areas are to be placed. All land previously subject to the strictest requirements (including pre-existing national parks exceeding 6,000 acres in area) must be placed in Class I, the strictest class. Others (such as new national parks exceeding 10,000 acres in area) may be placed in either Class I or Class II. All other lands are to be placed initially in Class II, though the governors of the states involved may petition the federal government for up- or down-grading. The 1977 amendments also require more stringent rules for areas not in compliance with air quality regulations than for those that are: new facilities are not allowed in noncompliance areas unless an area can demonstrate that it has tried vigorously to comply or that the facility is vitally needed. In addition to these rules governing overall atmospheric concentrations, specific limits (based on technical feasibility) are imposed on individual facilities. Given the different bases of these various rules, it is unclear whether they will be compatible.

Until 1977, the emission rules for sulfur oxides had required new facilities burning more than 250 million Btu/hour in fuel to limit their emissions to 1.2 pounds of sulfur oxides per million Btu burned.[1] This standard could be met by using coal naturally low in sulfur content, by cleaning the coal to acceptable levels before combustion, or by using devices called stack gas-scrubbers that capture the sulfur oxides after the fuel is burned and thus prevent their discharge. In practice, precombustion cleaning has not been feasible, so that until 1977 the choice was between naturally low-sulfur coal and scrubbers. In the 1977 amendments, the option of using naturally low-sulfur coal was removed by introduction of the concept of the "best available control technology" (BACT)—a requirement that technically feasi-

[1] New facilities are those whose planning was begun after the rules were promulgated in 1971. But the *New York Times* (October 27, 1977) reported that EPA was defining new sources as those started after March 1978, when the implementation plan was expected to be complete, although members of Congress were quoted as thinking that the date the act passed should be the cutoff point. In any case, we now have two vintages of new sources—those covered by the 1971 rules and those covered by the implementation of the 1977 Clean Air Amendments.

ble sulfur removal technologies be employed to the maximum possible extent. EPA initially said it would issue detailed rules in early 1978, but, as of mid-June, these rules had not appeared. EPA officials have said that the rules will combine minimum sulfur removal (probably around 90 percent) and maximum emission (probably about 1.2 pounds of sulfur oxide per million Btu burned). Such rules would both force the use of control techniques and prevent the resort to coal so high in sulfur that, even with treatment, there would be more pollution than before.

It may be asked why the BACT requirements were instituted and what is expected from substituting scrubbed high-sulfur coal for natural low-sulfur coal. BACT supporters seem to have hoped that both requirements would prevent a shift from eastern to western coal—a desirable objective, in their view, either because the shift would plunge Appalachia into still greater poverty than it now suffers or because it would lead to western strip-mining. A better rationale would be that BACT would produce a needed reduction in pollution. Given economic growth, there will be new sources of pollution and if the old standards were retained, total pollution would increase—possibly to undesirable levels. BACT could prevent such an increase. But this rationale would be more valid if BACT rules concentrated on emission rates rather than on rates of sulfur removal.

Even the imperfect models now used for projecting coal industry production patterns show that BACT slows rather than eliminates the growth of western coal use. Growth, though slowed, continues because of the growth of western markets. Such displacement of western coal as is projected generally benefits coal producers in the Midwest more than those in Appalachia. The model-builders believe that resource depletion has seriously eroded Appalachia's ability to expand its production to such an extent that the efforts of local politicians to aid the region's coal industry will have little impact. The models clearly were designed to determine what is readily determinable (the maximum benefits of BACT to eastern coals), and while they should be adjusted on the basis of more realistic assumptions, as it is, they still show little benefit to Appalachia. The difficulty is that no models can adequately handle two problems that are of critical importance. First, BACT offers a powerful incentive for shifting from coal to nuclear power. Conventional modeling approaches base the choice of energy sources on least-cost considerations and produce very high estimates of nuclear construction—so high the modelers doubt whether they are politically feasible. Second, there is no way of determining whether the production problems discussed below will cause eastern mining costs to rise so much that they outweigh the effects produced by the BACT requirement.

The state of scrubber technology. BACT is a curious effort to promote a controversial approach to sulfur oxide control in the face of evidence suggesting that stack gas-scrubbers may not be as effective as their advocates contend. Let us review the evidence. EPA receives from PEDCo Environmental, a research consultant, bimonthly reports on scrubber utilization that include, along with summary data, detailed operating histories of scrubbers actually in place. Scrubber advocates tend to report the summary data and ignore the histories. The summaries show a growing number of "operational" scrubbers (thirty-one as of January 1978), but the details make it clear that PEDCo uses a generous definition of "operational." Units are added to the operational category when test operations begin. No distinction is made among units that are operable, those that are out of commission, and those that fail to remove the required amount of sulfur.

Most of the successful units are engaged in mild scrubbing (50 to 60 percent removal) of sulfur oxides from *low*-sulfur coal. Those successes that have occurred in scrubbing *high*-sulfur coal appear to have come at high cost. Extra units have been installed so that frequent cleaning can occur without the plants being put out of service. (The cleaning is necessary because the units quickly become clogged and corroded.) Long shakedowns are often required to make the scrubbers operational, and even with the shakedowns, frequent outages seem to occur. Finally, since scrubbers capture the sulfur oxides in some absorbent such as limestone, problems arise in disposing of the resultant sludge. In short, scrubbers create cost, reliability, and waste-disposal problems.

How, then, did the devotion to scrubbers arise? The initial liking is easy to explain. Pol-

icy-makers eagerly embraced the arguments of the equipment manufacturers and the coal industry (especially the high-sulfur eastern coal industry) that scrubbers were a cheap solution to the problems of air quality, providing rapid results and low cost while maintaining existing regional production patterns. However, the advocates of scrubbers failed to anticipate the difficulties that arose.

It is often charged that electric utilities "did not try hard enough" to make scrubbers work. Accusations of this sort are too vague to permit reasoned evaluation. However it can be argued that public policy was poorly designed to stimulate vigorous scrubber development. The federal government failed to adopt effective incentives to encourage compliance (such as an emission tax) or to finance scrubber development, and the utility industry had good reason to expect that failure to perfect scrubber technology would simply lead to extended compliance deadlines.

The refusal to back off from scrubbers can be attributed to the interaction of three quite different forces—the usual reluctance of politicians to confess error, the pressures of coal-state legislators to protect local coal, and the desires of environmentalists to limit the development (strip-mining) of low-sulfur western coal. These efforts having failed to stop a shift to western coal, the current justification for BACT has become, as we noted, that it will *slow* this shift. This faith in BACT may, of course, be equally unjustified.

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Goals and escape clauses. In any case, the history of sulfur oxide control strategy to date has involved the setting of goals and the subsequent backing away from them—which is what happens when goals are irreconcilable. Where we are heading cannot be told with certainty. However, the fact that several proposed new coal-burning power plants are having difficulties securing approval on environmental grounds is suggestive. A particularly dramatic example is provided by the problems of developing coal-fired plants to serve California.

Up until now, the emphasis for California's power developers has been on seeking sites outside the state where air pollution regulations are less strict and then transmitting the power into the state. Plants have been built in Arizona, Nevada, and New Mexico, and the last one planned — the Kaiparowits plant — was slated for southern Utah. But in 1973, with environmental objections having grown quite substantial, Secretary of the Interior Rogers Morton indicated he would not approve the plant. Extensive further efforts were made, and in early 1976, the Interior Department released a final environmental impact statement, with a decision expected shortly thereafter. Before this decision could be reached (or at least before it could be promulgated), the participating utilities canceled the project on the grounds that regulatory uncertainties made it too risky. Another group of utilities has proposed an alternative plant in southern Utah, but similar regulatory problems have arisen. Moreover, backers of the proposed first coal-fired plant in Idaho have also been unsuccessful in finding an acceptable site. It will be interesting to see whether the suggestions that coal plants instead of nuclear units be built in California and Maine will ever come to fruition.

Numerous escape clauses in the Clean Air Amendments could delay attainment of the stated goals. It seems safe to conclude that construction of coal-fired power plants is beginning to involve lead times comparable to those already plaguing nuclear power. The question is whether these constraints will cause the inadequate capacity expansion so widely feared by the electric utility industry.[2] What expansion rate the industry requires and what the delays will be cannot be foretold, but it is highly improbable that the required rate will be achieved and the delays held to a minimum. Moreover, it is even less clear what will happen for non-utility users of coal. Indeed, we have almost no idea about the economics of coal use by manufacturing plants under BACT. But what is abundantly clear is that existing policies conflict with the (alleged) goal of greatly encouraging coal use.

[2] Inadequacy is, like an energy gap, the layman's imperfect description of an excess demand created by price controls.

Regulatory Problems in Coal Production

The major threat to coal production has been the sharp increase (probably in the neighborhood of 10 percent per year in constant dollars) in underground mining costs in the eastern United States.[3] This increase has its origins in both regulatory and market influences. The most important influence has been a radical change in labor market conditions. The pool of workers trapped in the coal industry as jobs disappeared (because of falling total output and rising output per worker) itself disappeared some time ago.

Safety and health. In recent years there has been rising total output and falling output per worker (along with retirements), with the result that the coal industry has turned to recruiting younger and less docile workers who demand greater compensation for, or protection from, work hazards. Their demands have resulted in a stricter Federal Coal Mine Health and Safety Act (passed in late 1969), tougher bargaining at the national level, and unilateral action through wildcat strikes at the local level. All of these increase production costs.

The primary but difficult question is whether there is a reasonable chance that cost increases will moderate. Presumably, once the industry has fully adjusted to new labor market conditions, no further direct labor-cost increases should be needed—unless the new conditions retard or eliminate productivity advances.

The 1969 act required changes in every aspect of mining deemed by Congress to affect health or safety. Clearly, the requirements for extra equipment and for devoting more time to health and safety work, as well as the more frequent interruptions of work by mine inspectors, could only increase costs. The magnitude of the act's effects is unknown, even to many of the coal companies affected, since few of them have tried to isolate those effects from other influences on costs. Work on the costs of the act being carried out under my direction at Penn State suggests that the act is the largest source of productivity decline, a conclusion consistent with the view that labor market conditions have had the major influence on costs, since labor market conditions created the act. Edward Denison's estimates of the impact (appearing in *Survey of Current Business,* January 1978) appear to be too large. He assumes that a 5 to 6 percent increase in output per man-day would have prevailed without the act. The observers of the mining industry with whom we have consulted tend to believe productivity growth prospects were far less favorable. In any event, whatever the relative importance of the various causes, rising costs are a serious threat to the competitive position of underground coal mines.

Two further problems affect underground coal production. First, the growing reach of environmental regulations in general has lengthened lead times for mine construction. Numerous permits must be obtained from both the agencies regulating mining and the various environmental authorities, such as those charged with water pollution control. Second, the 1977 Surface Mining Act requires control of the surface effects of underground mines as well as of strip mines.

Restrictions on land use. Obviously, the main effects of the 1977 mining act are on strip mines. Section 515b sets forth twenty-five strip-mine reclamation requirements, including requirements

- to "maximize" initial recovery so that a second disturbance of the surface to recover other seams is avoided,
- to restore land to a condition that allows a use at least as good as the use prior to mining, with extra effort required if the land is considered prime agricultural land,
- to restore land to the original contour, except where impractical,
- to stabilize areas so as to avoid erosion,
- to segregate and preserve the quality of topsoil or of a subsoil of better quality than the actual topsoil,
- to avoid disturbance of hydrologic balance with special emphasis upon alluvial valleys in the West (these being valleys where disruption of water flow would interfere with farming), and
- to revegetate the reclaimed land.

State governments are authorized to prohibit strip-mining on lands if it would produce specific hazards (such as increased chance of floods) or merely if it would be incompatible

[3] The estimate is derived by combining Charles J. Johnson's and my estimates that 1969 prices were in the 18–20 cents per million Btu range, viewing *Coal Week* listings of 1977 quotations for coal selling on long-term contracts, and deflating by the implicit deflator for the gross national product.

with land use plans. The secretary of the interior is required to prohibit new mines in national parks and other classes of federal lands, is authorized to prohibit new mines on the basis of state criteria, and must consider private requests for prohibitions. The act requires that, in cases where federal coal rights were retained when the surface was sold, the surface owner must give written permission for mining. Moreover, if substantial opposition to strip-mining exists among surface owners, the secretary is authorized to prohibit the mining. Finally, to meet the objections of those states that had passed their own stringent laws and saw no need for the federal government to interfere with them the states are allowed to administer their laws if the programs involved are acceptable to the federal authorities.

Opinions of the 1977 Surface Mining Act obviously differ. In a study of a similar 1976 bill, ICF, Inc., noted that that bill would have had somewhat greater effects than existing state regulations, but warned of ambiguities that could be interpreted so as to produce even more severe effects. The coal industry, expecting the worst, has sued the Interior Department for allegedly adopting more severe interpretations of the 1977 act than it requires.

On its face, the 1977 act does seem set up to disrupt coal production. The introduction of the alluvial valley provision, the special treatment for prime agricultural land, and the protection for surface owners appear particularly likely to produce implementation problems. Moreover, Secretary of the Interior Andrus has displayed a clear desire to shift his department from its traditional role as promoter of industrial development to a new role of protector of the environment with all that this implies—including more stringent interpretations of environmental laws.

Land ownership. Other problems affecting western coal grow out of the complexities of land ownership patterns in the region. With the federal government the principal owner of coal rights, substantial difficulties arise simply from the need to contend with federal policies on the leasing and exploitation of government-owned coal. In addition, much of this federal "ownership" consists of mineral rights on lands for which the right to use the surface has been sold. The Surface Mining Act contains, as I mentioned, provisions requiring the consent of the surface owners before mining can proceed —creating a substantial likelihood of obstructionism.

Ownership of coal or coal rights is further fragmented by the long-standing "checkerboard" pattern of grants of land to railroads (so-called because the split between railroads and the federal government looks like a checkerboard when mapped), as well as by the fact that Indian tribes, the states, and other private parties also own coal rights. But the most pressing problem here seems to be difficulty in securing permission to exploit existing leases. Exploitation plans require environmental impact statements and federal approval. Unfortunately, the Bureau of Land Management, which has primary responsibility for approvals, is inadequately staffed to complete the necessary environmental impact statements with any degree of rapidity.

There is, in addition, a long-term problem in the combination of the moratorium on new leases that has prevailed since 1971 and the 1976 amendments to the leasing laws. The moratorium does allow leasing of limited tracts adjacent to previously leased land when these tracts are needed to permit optimal development of the property. However, the Interior Department has been quite dilatory in granting such leases.

The overall moratorium began because of concern that too few leases were being exploited. Delays in resuming leasing were the result of (among other things) a long gestation period for the environmental impact statement covering the overall leasing program (accompanied by Secretary Andrus's desire to reappraise leasing policy) and a still unsettled suit brought by environmental groups attacking the adequacy of the environmental impact statement. The 1976 leasing amendments require greater planning by the Interior Department, increased reporting by firms, and the development of leases within a decade. A federal task force has charted the net effect of all the regulations affecting coal leasing and, as far as I can tell (winding my way through the four gigantic charts, each of which more than covers a large desk), once leasing resumes, it will take a decade to move from setting up a lease sale to producing coal. Thus, both underground and surface mining face the same climate of restraints on expansion endured by users of coal.

This obviously increases the likelihood that coal production goals will not be met.

Regulation and Offsetting Incentives

One could conclude, along with the 1977 report of the General Accounting Office, that restrictions on the coal industry will prevent the opening of enough new coal-mining capacity to meet even the billion-ton output level widely forecast for 1985, let alone exceed this level as President Carter has proposed. Certainly there is considerable doubt whether BACT will be able to reverse the shift to western coal—especially since surveys of coal industry expansion suggest a heavy concentration of new capacity in the West.

Given the prevailing long lead times, it may be difficult to make any radical change in immediate expansion plans. Even if there were sufficient time to shift emphasis back to eastern coal, it is not clear that the shift would be economically attractive. Continued sharp rises in eastern mining costs may erode the incentives provided by the imposition of BACT. Production of western coal may be sufficiently cheap to overcome the cost disadvantage of BACT. It *may* prove significantly cheaper to apply BACT to low-sulfur coals, and in any case, much of the western coal is destined for use in the Southwest, where transportation costs for eastern coal would be prohibitive. Moreover, it appears that the lead times for large new coal-based plants will no longer differ significantly from those for nuclear. In this case, electric utility managements —generally believing that, if time permits, it is cheaper to build nuclear plants—will do so. Thus, those who support policies designed to thwart western coal development may have helped bring about what they often consider to be much worse.

It was to offset the effects of all these policy measures that President Carter called for a program to encourage greater use of coal. The coal-use incentives in the proposed National Energy Act of 1977 are a complex set of prohibitions, taxes, and subsidies. The basic prohibitions are that new electric power plants and new large industrial boilers must use coal and that, after January 1, 1990, electric power plants should cease to use gas. A shift from gas to oil could be allowed only under special circumstances, and conversions to coal earlier than 1990 could be required if feasible. The tax and subsidy elements of the plan include imposing taxes on oil and gas use and then giving tax rebates equal to the amount of the investment made so that coal (or synthetic fuels from coal) could be used. Following the pattern criticized in this article, the plan would exempt many users from the rules.

The proposed tax system would involve several features. First, the oil tax would be different from the gas tax. Second, electric utilities would be treated differently from other industries. Third, the rates would be adjusted for inflation. (With inflation adjustments left out, the electric utility tax system would involve a flat 25 cents per million Btu tax on oil use after 1982, while other taxable oil users would pay a tax that started at 15 cents per million Btu in 1979 and rose in steps to 50 cents in 1985.) All these taxes would be raised at the same rate as the implicit deflator for the gross national product (a measure of the rate of change in prices in all sectors of the economy). The basic gas tax would be ultimately set at the difference (on a per-million-Btu-basis) between number-2 fuel-oil prices in the region and the consumer's actual cost of gas. Again, the taxes would be phased in. Electric utilities would not be covered until 1983 and, from 1983 to 1985,

the tax for them would be 50 cents per million Btu below the level required in the basic formula; that reduction would fall to 25 cents in 1987 and 1988 and disappear in 1989. Other users would start being taxed in 1979 with a reduction set at $1.05 in 1979, falling to 40 cents in 1980 and then, more gradually, to 15 cents by 1984 and to zero (full tax) in 1985. The amount of oil and gas taxed for each user would vary with consumption. Those using less than 500 billion Btu would be exempt from the tax. The exempt amounts would be reduced for larger users, and those using 1.5 trillion Btu or more would pay the tax on all oil and gas used.

Whether anything resembling the President's bill ever will pass seems doubtful. The House-passed energy bill included prohibitions close to those proposed by the President, but the tax provisions were substantially altered. Essentially the same tax on oil was set for electric utilities. Large users of oil and gas as fuel for industrial boilers also were subjected to taxes roughly equal to those proposed by the President, but the House exempted more users and subjected others to lower taxes. A tax per million Btu starting (without inflation adjustment) at a maximum of 65 cents in 1983 and rising to 75 cents in 1985 was set for electric utility gas use. This last tax cannot raise costs of gas above the cost of fuel oil per million Btu.

The efficacy of these proposals for increasing coal use can be questioned. First, they were weakened in the House and further limited in the Senate. Second, the administration may have significantly underestimated the incentive needed to encourage coal use in the face of all the industry's difficulties. Third, good reason exists to suspect that additional restrictions on the production and use of coal will be imposed, since existing programs are likely to be made more stringent and since action might be taken in other areas—notably, air pollution control for nitrogen oxide, carbon dioxide, and trace elements.

Summary and Conclusions

I have argued here that the prospects for coal use have been hindered by growing restraints that have increased costs and lead times. The wisdom and the efficacy of President Carter's proposals to offset these hindrances remain in doubt.

One can dispute the wisdom on various levels. The most fundamental problem is the familiar one—that of embracing ambitious goals (in this case, for controlling the side effects of coal production and use), and then trying to add another (and complex) program to cushion the shock. If coal production and use are so undesirable that their costs should be raised, then offsetting stimuli seem unwise—which, of course, calls the whole proposal for increasing coal use into question. If controls have been overdone, it would be preferable to lessen the controls directly, rather than set up new controls. Given that the administration does not know the full impact of the controls now being imposed on coal (nor does anyone else), the efficacy of its incentive program also remains in doubt. In addition, there may be better ways (such as deregulating oil and gas) to solve our energy problems.

The risks of failure are serious. Not developing coal production as expected will require costly emergency replacements. Certainly our current knowledge is inadequate to indicate whether the controls on coal produce benefits commensurate with their costs. The main economic conclusion reached here on the coal industry itself is that the costs of restricting coal production and use have been underestimated, with the expenses of complying with new regulations inadequately considered. Beyond this, because we are insufficiently aware of how great is the conflict between proposals for expanding coal use and policies that hobble coal, we are not making adequate preparations to resolve that conflict.

Looking at the coal industry as an example of the problems of energy regulation in general, we see a graphic illustration of tangled policy conflicts. The interest groups—here, coal users (mostly utilities), coal producers, and environmentalists—have interacted (one might say, fought) in such a way as to produce highly complex and highly inconsistent policies, aiming at highly inconsistent goals. Certainly this was predictable on the basis of what has happened in earlier energy regulation. But that it should have happened in an industry providing a form of energy hailed as the hope of the (short-run) future and, moreover, have happened during a highly publicized national effort to rationalize our energy policy bodes ill for both energy rationalization and national energy policy. ■