Chapter VIII
POLICY OPTIONS

Chapter VIIL- POLICY OPTIONS

TABLES

Chapter VIII

POLICY OPTIONS

Each of the national energy supply and demand scenarios in this assessment involves a very substantial increase in coal use over the next two decades. There is no doubt that the resource to sustain a high level of use over that period is physically present and accessible. It is also clear that from an engineering standpoint coal can be extracted, processed, and burned at an economic cost that will make it very competitive with alternative fuels. What is not so clear is how the external costs, institutional and social constraints, and other nonmarket factors associated with coal use will affect the validity of the economic and technological analysis. At the extreme, increased coal use could pose such serious external costs to the environment and public health that would make it unacceptable. At a minimum, the process of reducing external costs (e. g., by imposing pollution controls) and coping with internal constraints (e. g., labor-management problems) will moderately increase the economic costs of coal utilization. Given the central place of coal in future U.S. energy planning, it makes a great deal of difference where we ultimately come out on the continuum between minimum and maximum constraints on coal use. In short, the stakes involved in formulating a national coal policy are very high.

The tasks of policy analysis in this area are to identify the potential problems and constraints and to examine the range of governmental policies that offer some promise of ameliorating them. This study does not recommend specific policies, but it identifies policy options, the sorting criteria for choosing among them, and the implications of available choices.

The sorting criteria are of three basic types: 1) national objectives concerning the level of coal production and use, 2) political and normative values, and 3) pragmatic calculations concerning the relative efficacy of policies and technologies in stimulating production and use and/or minimizing adverse impacts. These are analyzed in sequence.

NATIONAL ENERGY OBJECTIVES

National objectives concerning the magnitude and timing of coal use set the context for formulating coal policy. For example, acceptable policies for the leasing of Federal coal reserves, workplace health and safety, and clean air legislation may be different in kind or degree depending on whether the Nation seeks 100, 125, or 150 quadrillion Btu (Quads) of energy supply. Similarly, policies designed to compel the conversion of existing industrial boilers from gas and oil to coal mayor may not be necessary depending on the Government's timetable for increased coal use.

In actual fact a sufficient supply of coal should be available to meet the three coal use scenarios cited above while satisfying existing and pending environmental, health and safety, leasing, and related legislative and regulatory requirements. Nevertheless, there are actions that will provide an additional margin of safety against the possibility that these supply projections are overly optimistic or that it becomes necessary to raise coal's fraction of U.S. total energy supply above the levels posited in this report. Many of these measures have merit independent of their potential effect on coal supply. The list includes efforts to: 1) mitigate the adverse community impacts that might constrain coal development, 2) remedy the sources of labor-management disputes and promptly settle strikes that do occur, 3) anticipate and avert potential coal transportation bottlenecks by upgrading existing modes (e.g., railroads) and facilitating the creation of new ones (e. g., slurry pipelines), 4) expedite the formation of a leasing policy and the designation of eligible tracts, 5) streamline the permit-

ting process for new mines, and 6) develop procedures for anticipating and accommodating potential objections to new coal facilities in order to avoid extensive litigation and delay.

Demand is more likely to be a constraint on coal development over the next two decades than is supply. While demand will probably be adequate to sustain all but very high energy scenarios, this is far from certain. Several broad policy options are available to strengthen the future market for coal. These include: 1) tax pressures and incentives to induce utility and industrial conversion to coal; 2) R&D support for technologies, e.g., fluidized-bed combustion (FBC) and solvent-refined coal (SRC) that can help make coal an acceptable fuel for small users; 3) RD&D support for improved, less expensive emission control technologies; 4) RD&D support for coal gasification and liquefaction technologies; and 5) higher prices for natural gas and fuel oil.

In general, however, the different plausible targets regarding coal production and use for the remainder of the century do not emerge as a critical basis for sorting among legislative and regulatory policy options.

POLITICAL AND NORMATIVE VALUES

Values play a critical role in the policymaking process, yet policy analysis often proceeds under the assumption that policymaking is or can be a clinically objective, value-free process. In fact, the choice between conflicting courses of action will often and inescapably reflect subjective judgments concerning what is desirable. With regard to coal policy, the most important value conflict involves the relative priority assigned to increasing production as opposed to reducing adverse impacts. Taken together, existing legislation and regulations define a rough but discernible balance between these two value sets. In broad terms future policy must either accept that balance or shift it in favor of production or impacts amelioration. This tradeoff, perhaps more than any other, lies at the heart of national coal policy. In one sense, however, the dichotomy is a false one. Adverse impacts lead to constraints on coal use, and a major reason for controlling them is to facilitate coal development. The environmental goal conflicts with the production goal only when protection measures increase the cost of coal sufficiently to dampen demand. Other potential value conflicts involve the proper allocation of decisionmaking authority between the public and private sectors and among Federal, State, local, and tribal governments. Conflicts may also occur between various impacts-related values; e.g., operating a new coal mine may help solve a number of community problems, including unemployment, but may have serious adverse impacts on the physical environment.

What follows is a more detailed examination of three conflicting value sets: 1) production maximization or impacts amelioration, 2) the allocation of decisionmaking responsibility concerning coal development between Federal or State and local authorities, and 3) the allocation of decisionmaking between the public or private sectors. The first choice between production and impacts values can be analyzed in terms of specific tradeoffs.

The first tradeoff is between coal extraction and environmental quality. Mining has a number of inevitable adverse environmental impacts. To some extent these are specific to either surface or underground, but both forms of mining have a range of effects. Although complete control over these effects is impossible, all can be greatly reduced with existing technologies and procedures. But these technologies have both costs and limitations. They will certainly make coal more expensive. Higher prices for coal can have secondary impacts on much of the economy, including inflation and unemployment levels. The limitations of reclamation and control technologies mean that mining certain coal reserves (e. g., under prime farmland) may be precluded altogether.

On the other hand, failure to employ available controls has its own costs. These can in-

elude scarred landscapes (often permanent), subsidence (some of it continuing for a century or more), pollution and siltation of surface waters, pollution and disruption of aquifers, and in some cases, flooding. Secondary costs can include a reduction in tourism, damage to agriculture, dim in i shed opportunities for recreation, esthetic impairment, and the need for control and reclamation. Whereas costs of employing controls in the form of higher energy prices are borne by the beneficiaries of coal use, the costs of not using controls tend to fall disproportionately on the coalfield communities and their inhabitants.

The second tradeoff is between coal combustion on the one hand and environmental quality and public health on the other. Burning coal to produce energy will unavoidably generate emissions with potential adverse impacts on health and the environment. Some emissions cannot be practicably controlled with known technologies, while the others can be partly, but not entirely, eliminated. Carbon dioxide (CO_2) emissions belong in the first category and sulfur oxides (SO_x) and nitrogen oxides (NO_x) in the second. Nevertheless, most immediately threatening emissions can be minimized with present or pending technologies. There are costs. Coal becomes more expensive to burn; environmental problems are created by the need for disposal of flue-gas desulfurization (FGD) sludge; and the process of coal conversion by plants is made more expensive and time consuming.

The costs of not controlling emissions include agricultural crop losses, damage to forests and freshwater fisheries, adverse impacts on esthetic and property values, possible alteration of global climate over time, and possible increased incidence of human illness and mortality due to lung and other diseases.

To the extent to which powerplants are located in urban areas, there is a basic symmetry between the costs and benefits of emission control. The urban consumer population bears the primary burden of increased energy costs and benefits from the reduction in pollution from nearby plants. The increasing tendency, however, is to site new plants in rural areas or on the outer fringes of urban centers. Under these circumstances the symmetry is overturned with potential implications for the balance of political pressures concerning the tradeoff between energy price and pollution control.

Where the policy maker or analyst ultimately draws the balance in the tradeoff between energy availability and cost on one side and environmental and health considerations on the other depends on four considerations:

1, The severity of the specific impacts being analyzed and the equity of their distribution.
2. Personal values, e.g., economic growth as opposed to conservation.
3. Attitudes toward risk. The economic costs of imposing various controls are reasonably predictable, but the environmental and health costs of foregoing those controls are not, and the range of possible consequences is very wide. Consequently, policy choices often involve tradeoffs between the known and unknown or partially known.
4. Relative value assigned to present and future costs and benefits. The economic consequences of higher coal prices will be felt in the short term, while many of the most important and environmental effects (e.g., from carcinogens) will not be felt for years or even decades.

The third tradeoff is between coal extraction and community well-being. Mining can have substantial community benefits relating to economic growth and employment. The costs can be high as well, including overloaded community services, economic dislocation, and social disruption. Which effects will tend to predominate depend on the circumstances of the particular community. The costs of alleviating community distress related to coal development tend to take the form of transfers of State and Federal resources to the locality– e.g., through loans, grants, and bond guarantees. A bill submitted to the 95th Congress would have allotted $1 billion over the next decade for this purpose.

The costs of doing nothing are also real, though not readily quantifiable. These costs in-

elude worker dissatisfaction (with consequent high turnover and unrest), alcoholism and related social ills, rapid inflation in the coalfields, disruption of the local economy, opportunity costs due to losses in potential income from noncoal economic activities (e.g., declines in tourism), and congestion and disruption of settled community life. The decision of where to place the burden of dealing with these community problems hinges partly on whether future coal development revenues are seen as ultimately sufficient to cover the community costs or not. If so, the choice may be sidestepped by providing loans to cover the immediate "front-end" costs, which can be repaid out of future revenues. If not, a choice must be made where the burden will fall —on the society as a whole, which presumably benefits from the increased availability of energy; on the individual coalfield communities; or on the utilities and mining companies and, through them, on the direct consumers of the energy.

The fourth tradeoff is between coal extraction and workplace health and safety. A certain number of casualties in the form of injuries, deaths, and occupational disease among miners is an inevitable result of coal production. Mining, particularly underground, is an inherently dangerous occupation. Nevertheless, with current technologies and procedures (e. g., dust sampling and control, safety training, inspections) the risks can be lowered, The costs of doing so include higher priced coal, and possibly a dampening of productivity and output. The latter relationship has yet to be clearly demonstrated. The costs of not acting to reduce the risks to miners are a higher incidence of accident and disease, which could result in increased labor unrest. Once again policy makers face a choice between allocating the costs of ameliorating impacts to society as a whole through increased energy prices or allowing the costs to fall upon a single group– the miners.

The policy implications of these tradeoffs are simply illustrated by positing two opposite ideal types of policymaker — an "impacts minimizer" and an "energy maximizer. " I n addressing the major issues involved in coal policy the impacts *minimizer* will favor such measures as stringent standards (requiring the best available control technology (BACT)) under the Clean Air Act for removal of SO_x and NO_x, application of Federal point source air emission standards to existing as well as new facilities, the imposition of stringent and detailed regulations implementing the Surface Mining Control and Reclamation Act (SMCRA), the classification of sludge as a hazardous substance subject to rigorous disposal standards, and the enforcement of strict criteria (e.g., regarding the impact on water availability in arid regions) in selecting sites for coal facilities.

With regard to community effects of coal development, the impacts minimizer will favor policies that cause the coal companies to internalize an increased portion of the public costs (e. g., concerning roads and housing) consequent to their activity. He or she will tend to favor the use of State eminent domain powers to obtain coal company lands for housing in Appalachia and in both the East and West will support increased community participation and control concerning the decisions of coal companies that significantly affect the community. A go-slow, careful approach to further leasing of Federal coal lands will be preferred. In the tension between production/output objectives on the one hand and health/safety goals on the other, the impacts minimizer will give preference to the latter. Examples include the application of more rigorous dust control standards and procedures and the use of more Federal safety inspectors in the mines. With regard to labor/management disputes over such questions as mine safety and health care centers, the tendency will be to support the miners.

The energy maximizer is defined as the mirror image of the above and, as such, would embrace an opposite set of policies. The above list of policy issues is merely illustrative and is far from complete. Moreover, not all policies sort in terms of production and impacts values.

A second set of competing values relevant to coal policy relates to Federal Government regulation of the private sector—a classic issue of political ideology. For the sake of convenience, the two competitive perspectives

Photo credit: EPA Documerica

Minemouth powerplants represent one option in an intricate tradeoff of costs and benefits

can be called "proregulatory" and "anti regula - tory" — recognizing that these are oversimplified caricatures. In recent years the *proregulatory* perspective has been the predominant influence on national policymaking concerning coal. Rooted in the liberal political tradition, proponents of this view tend to give less priority to the production of coal than to the mitigation of its adverse impacts. They see major tensions between the interests of the coal companies and the public and are generally skeptical of the will or ability of these corporations to avoid actions detrimental to the public interest without strong Government pressure to do so. They have a high regard for the value of public, grassroots participation in decisions affecting coal development. Regulations are viewed positively as an indispensable means of protecting the environment and public health and safety. They provide a uniform, detailed, obligatory code of conduct on the coal companies that is enforceable in the courts.

in contrast, adherents of the *antiregulatory* perspective are associated with the conservative part of the political spectrum, tend to value energy production over impacts mitigation, and see the public interest as being best served by according maximum freedom of action to the productive genius of the private sector. Government attempts to regulate economic activity are seen as a recipe for higher costs and reduced productivity to the detriment of all. Some regulation of coal development may be unavoidable, but it should take the form of general performance criteria that leave to the private company freedom to determine how best to achieve the standard. Wherever possible, broad guidelines and reliance on voluntary compliance should be the rule.

These two contrasting philosophies lead to very different approaches to specific problems. Three illustrative examples are noise abatement, air pollution control, and coal facility siting. With regard to noise, advocates of the first perspective tend to favor detailed requirements concerning the devices and procedures that must be used to achieve a reduction in noise levels in a mine. Scorning this "cookbook" approach, the antiregulators favor only performance standards, e.g., miners must not be exposed to sounds above a certain decibel level. How the company achieves this objective is not the Government's concern. Similarly, with regard to air pollution, the proregulators argue for BACT requirements whereas their counterparts favor simple emission standards. As for siting, the first perspective sees merit in detailed uniform site selection criteria whereas the second viewpoint tends to favor case-by-case negotiation of sites by interested parties within very general guidelines.

A final value choice concerns how decisionmaking authority over coal development should be allocated among the various levels of government: Federal, State, local, and tribal. Considerations that argue for a growing Federal role include: 1) there is a clear need for a national policy concerning coal development and use, *2)* a substantial portion of known coal deposits underlie Federal lands, 3) Federal money plays a key role in R&D concerning coal, and 4) scientific evidence increasingly documents the regional/interstate nature of the pollution problem. Coal burned in Ohio produces acid rain in New Hampshire. Pesticides entering the Mississippi River in Illinois eventually pollute the drinking water of New Orleans, La. The failure to impose minimum national standards would permit one State to attract industrial investment by lowering its environmental standards, thereby becoming a pollution haven to the economic and perhaps environmental detriment of its neighbors. Moreover, it is argued that the scenic quality of a State like Utah is a national treasure and, as a consequence, the Federal Government has a responsibility to protect it.

On the other hand, the potential costs of an increased Federal role are: 1) reduced State and local initiative, 2) a diminished ability to fine-tune policy to fit local and regional conditions, 3) the possibility of a halfhearted State and local commitment to the successful implementation of national coal policy, 4) a risk of creating a precedent for increased Federal intervention in regional and local affairs generally, and 5) a belief that Federal requirements concerning air quality, surface mining, water quality, and potentially, land use unjustly in-

terfere with the right of States to develop their resources, attract economic investment, and draw their own balance between energy and environmental goals. For example, the prevention of significant deterioration (PSD) requirements under the Clean Air Act limit the scope for industrial development in Utah and Montana. Provisions of SMCRA constrain the ability of Kentucky to exploit in-State coal reserves. Rising pressures on State budgets for fiscal austerity exacerbate the problem because much Federal environmental legislation sets standards and then mandates implementation by the States— at the latters' expense. Despite this difficulty the potential tradeoff between national and subnational decisionmaking can be at least partly sidestepped by setting broad Federal standards of performance to be elaborated and applied by the States. This strategy has been followed in recent legislation concerning coal development.

EFFICACY CRITERIA

The remaining type of criteria for selecting among available policies and associated technologies involves an assessment of their utility in solving the specific production, utilization, and impact problems associated with coal. Unlike the previous two sets of criteria, which are to a significant degree discretionary, the third class of criteria involves a determination of fact, i.e., an assessment of the feasibility and effectiveness of various policy options. The unevenness of the data base means that the gaps in relevant knowledge must be clearly identified during the analysis.

Five major areas of policy concern have been identified, each with a potential for significant influence on efforts to expand the production and combustion of coal. They include environmental impacts, community and social impacts, labor-management relations, workplace health and safety, and leasing of Federal coal reserves. The policy options relevant to these areas of concern are analyzed in terms of the efficacy criteria cited above.

ENVIRONMENTAL IMPACTS

Environmental considerations are an important potential constraint on any substantial increase in coal production and combustion. A number of special characteristics tend to distinguish environmental from other concerns. One is the range and scale of potential impacts–from minor aggravations to global catastrophe. Perhaps the best known example in the latter category is the possible climatic effects resulting from increased concentrations of atmospheric CO_2. The potential time scale of environmental damage covers a similarly broad range from virtually instantaneous and short-lived phenomena to impacts that are slow in developing but that wit l endure for centuries. Environmental issues relate directly to matters of great importance to people. What for the environmentalist is a question of public health and the quality of life is for the developer a matter of personal livelihood.

Governmental concern for the environment is evidenced by an imposing body of legislation and regulation administered by a substantial bureaucracy. To a remarkable degree the legislation has kept pace with advances in scientific knowledge. In terms of control technology, legislation has more than kept pace, i.e., it has in some instances assumed a technology-forcing function.

Achieving a policy consensus on environmental questions is always difficult. This reflects, in part, the value conflicts noted above. It also reflects important gaps and ambiguities in the scientific evidence, for example, with regard to the health effects of chronic long-term exposure to relatively low levels of certain pollutants. The sheer magnitude and unprecedented nature of some of the potential impacts tend to induce skepticism regarding the available data. The combination of strong emotional commitments and uncertain data is a sure recipe for political conflict. This tendency is exacerbated in the case of coal by the

time, effort, and cost involved in developing and implementing environmental controls.

Many of the participants in the policy process approach environmental issues from quite different perspectives. One viewpoint assumes the worst regarding potential adverse impacts on the environment from coal development and use. The burden of proof concerning the environmental acceptability of coal is placed on the industry. Adherents to this perspective would sharply limit coal development until control technologies have proven their effectiveness. As such technologies become available their universal application would be a condition of coal development. The alternative perspective is the mirror image: impacts are assumed to be acceptable and manageable pending clear evidence to the contrary, the costs of environmental controls are emphasized, and control technologies must meet a test of economic acceptability as well as effectiveness. The threshold tolerance of environmental disruption is predictably higher among supporters of the second perspective.

A final factor complicating the task of environmental policy analysis is the sheer complexity and comprehensiveness of the field. Policy options designed to minimize the adverse environmental impacts of increased coal use range from very specific technological or managerial actions (e. g., lining of ponds used to hold toxic wastes) to regulatory modifications (e. g., regulation of stack plume opacity), to broad questions of strategy and philosophy (e. g., the use of effluent charges and other market-oriented mechanisms in lieu of regulated controls).

The era of unregulated environmental impacts is clearly past for coal, as for other fuels. There is in place an elaborate, though still incomplete, framework of legislation, regulation, and implementing institutions that constitute a national policy system for managing the environmental impacts of increased coal use. The relevant control technologies are at various stages in their evolution from conception to maturity— but most have at least reached the point where a first generation technology can actually be applied in coal industry operations. Control technologies for combustion emissions are particularly important and, while existing technologies may not be optimal, they are workable and effective and the outlook-for improvement is reasonably promising. In short, after the investment of substantial economic, technological, and human resources over recent years, the foundation for a viable environmental policy for coal now exists.

Under these circumstances the priority task of policy analysis is to identify ways the existing policy system can be upgraded. Five major tasks appropriate to this effort are:

1. Identify gaps in present knowledge re garding the nature and magnitude of the risks to the environment associated with coal utilization and the data required to fill those gaps.
2. Indicate the prospects and priority needs for the development of specific control technologies as a guide to possible Federal support.
3. Examine the existing body of law and regulation for omissions, inconsistencies, and unproductive or counterproductive requirements.
4. Analyze the prospects for effective implementation.
5. Identify those specific major issues that warrant the priority attention of policymakers.

A discussion of preliminary findings relevant to each of these tasks follows.

Data Gaps and Needs

Present scientific understanding of the environmental impacts associated with coal is deficient in a number of areas. The relevant policy response by the Federal Government would be support for research designed to supply the required data. The following is a preliminary list of areas where such additional research is needed:

- rate of accumulation of atmospheric CO_2 and its impact on climate;
- atmospheric transport of pollutants, the chemical transformations they undergo, and the paths they travel;

- correlation between particular pollutants or levels of pollutants and human health (dose-response relationships);
- relationship between coal combustion, acid rain, and the productivity of croplands, forests, and freshwater fisheries;
- patterns and consequences of plume touchdowns;
- impacts of SO_x and photochemical oxidants on human health and agricultural productivity;
- impacts of fine particulate on human health;
- role of coal combustion in the formation of hydrocarbons and their impact on human health; and
- physical and chemical interaction of different pollutants, soils, and hydrological configurations (i. e., the role of site characteristics in determining the impact of pollutants and pollutant disposal methods on ground and surface waters).

Development Priorities for Control Technologies

A variety of control technologies and techniques is presently or prospectively available for dealing with the multiple assaults on the environment from coal development. These vary widely in effectiveness, stage of development, and future promise. The task from a policy standpoint is to identify those areas where problems remain, where technological innovation and development are needed, and where Federal actions should make a difference.

With regard to control of the combustion products of coal the priority needs are for improved NO_x control technologies, electrostatic precipitator designs that are effective against small particulate and low-sulfur coal, lower cost baghouses, techniques for minimizing hydrocarbon emissions from small boilers, and the improvement of new technologies for combustion (FBC) and fuel cleaning (SRC). The prospects in each case are sufficiently promising to warrant the commitment of substantial R&D funds. There is also need for continued upgrading of FCD scrubbers with regard to their reliability, maintenance requirements, and costs. One major emission from coal combustion, CO_2, is not susceptible to practical control by any known technology.

A similar agenda of priority needs can be identified with regard to the control of adverse environmental impacts of mining. They include ways of making constructive use of land that is subject to uncontrolled subsidence, materials and methods for backfilling and/or sealing abandoned mines, improved techniques for the safe burial of mine wastes, new methods for constructive use or recycle of mine wastes, improved techniques for controlling acid mine drainage, and methods for reclaiming particularly sensitive land forms (e. g., steep slopes, prime farmland, etc.) after surface mining.

Other control technologies that warrant attention and the commitment of resources are regenerable scrubbers, impermeable land fills for FGD sludge, and water-conserving designs , for energy facilities including dry and wet/dry cooling systems.

Adequacy of Existing Law and Regulations

A substantial body of law and regulation relevant to the control of environmental impacts from coal development is presently in place. There remain, however, areas of omission, inconsistency, and weakness that warrant congressional attention. I n part, the problems transcend coal and relate to a lack of Federal policy in such major related areas as water resource management, conservation, land use, and energy facility siting. Mechanisms for long-range planning and for resolving interstate and interregional problems are generally weak. There is, moreover, still no comprehensive, consistent national policy toward energy generally and coal specifically. For example, there is no Federal policy to have the prices of all fuels reflect their true relative costs or to provide a consistent regulatory framework for all modes of transporting coal. Federal legislation and regulation on coal reflect an unresolved tension between the goals of environmental protection and energy development, with the task of drawing the balance left to the courts.

Agency mandates and jurisdictions overlap, as with the Department of Energy (DOE) and

the Department of the Interior responsibilities for leasing and the Department of the Interior and the Environmental Protection Agency (EPA) jurisdictions over the implementation of SMCRA. In some cases legislation has resulted in environmental programs seemingly at cross purposes. In the past, environmental legislation tended to focus on a specific media and be blind to the effects of control efforts on other media. More recent legislation has attempted to address this problem, e.g., in formulating New Source Performance Standards (NSPS) regulations, their impact on nonair environmental quality must be taken into account. The problem is in a sense irresolvable because it is an immutable physical law that matter cannot be destroyed. Thus the Clean Air Act amendments that in effect mandate FGD scrubbers create a substantial land and water pollution problem in the form of large quantities of sludge.

Existing law deals creatively with another tension—that between the need for uniform national standards and States rights— by mandating State implementation of Federal environmental guidelines. This solution may be threatened, however, by an increasing inability or unwillingness of States to bear the costs of such programs in a time of financial stringency.

There are some specific areas of omission in environmental legislation and regulations concerning coal. Current regulations under the Clean Air Act do not deal with the long-range transport and transformation of combustion products. Thus the regulations control sulfur dioxide (SO_2) but not the more dangerous transformation product—sulfates. They also leave small (respirable) particulate and trace hydrocarbons inadequately regulated. The small boilers that would be the principal source of hydrocarbons are not federally regulated. Other areas where the present legal-regulatory framework is incomplete include leasing policy and whether sludge will require disposal as a hazardous substance.

Table 62 presents a summary of key problems and possible new policy initiatives organized around specific pollutants in each medium.

Table 62.–Environmental Impacts (Land)

Problem	Impacts	Solutions/policies
Subisdence	Disrupts surface use, damages structures, lowers property values.	• Prohibition of underground mining beneath densely populated areas pending demonstrated ability to prevent subsidence. • Alter law to make mine owner directly responsible to surface owner. • Government-financed insurance to compensate surface owners for damage resulting from subsidence. • Tax on underground mining to compensate for future damages. • Research regarding controlled subsidence: Planned subsidence for active mines; induced subsidence for inactive mines. • Increased research regarding preventing subsidence by using FGD sludge, FBC sorbent, or other materials, to backfill abandoned mines. • Research regarding productive uses for land subject to uncontrolled subsidence.
Disposal of mine wastes (gob, preparation plant wastes, sludge from treatment of acid mine drainage) and combustion products (ash, slag, FGD sludge, FBC sorbent)	Surface disposal source of declining esthetic and property values, erosion, landslides, and gob pile fires. All disposal methods risk pollution of surface, ground water by leaching.	• R&D regarding reuse of waste materials (e.g., in highway pavement, as a mineral source, and as backfill for underground mines. Major objective is to find methods to prevent leaching of toxic materials, to allow disposal under RCRA.

Table 62.— Environmental Impacts (Land) —Continued

Problem	Impacts	Solutions/policies
Reclamation of surface-mined lands	Inadequately reclaimed land is less productive and may be subject to erosion, landslides, and acid **mine runoff.** **Have had enforcement problems with smaller mines.**	• Monitor implementation of Surface Mine Control and Reclamation Act (SMCRA). • RD&D regarding feasibility of fully reclaiming and arid Western forest lands, steep slopes, prime farmland and alluvial valleys. • Limit surface mining to lands where reclamation to former higher use is virtually certain. Develop criteria by which all coal lands can be classified in terms of their eligibility for surface mining. SMCRA would accomplish this if State programs are strong. • Adopt measures that favor underground mining (e.g., requirement that FGD scrubbers be placed on existing as well as new plants).

Environmental Impacts (Water Quality and Quantity)

Problem	Impacts	Solutions/policies
Acid mine drainage	Pollution of surface and ground water to the detriment of both flora, fauna, and community drinking water. Problem most acute regarding abandoned underground mines in pyrite rich strata. Have had enforcement problems with smaller mines.	• **Active mines: Strengthen enforcement effort to insure full coverage of small mines, detection of illegal mining.** • **Abandoned mines: Lengthen bonding period to ensure permanent acid control.** • **Establish a fund to pay for control failure, paid for by tax on mining.** • **RD&D regarding improved control methods and technologies.**
Land disposal of ash and FGD sludge	Leaching of salts and toxic trace elements into ground water and salts, trace elements, and small particles into surface flows.	• (See disposal of mine wastes and combustion products under land impacts above.) • Research regarding pollutants, soils, and hydrology to obtain detailed understanding of site factors that influence impacts. • Incentives to use regenerable scrubbers or to recycle waste from nonregenerable systems. • Monitor employment of existing technologies to determine if present incentives are adequate.
Water consumption requirements of plant cooling systerns	Stress on limited water supplies in arid regions (e.g., Upper Colorado River Basin).	. Require water conservation in the design and operation of energy facilities (e.g., dry and wet/dry cooling) in water-short areas. • Water conservation in arid lands agriculture as a means of freeing additional water supplies. Methods include: • More efficient irrigation. • Switching to less water intensive crops. • Adding irrigation efficiency and/or water use requirements to rules governing Federal water projects. • Reexamination of new impoundment and irrigation projects designed to supply low cost water to farmers.

Table 62.—Environmental Impacts (Air Quality) —Continued

Pollutant	Impacts	SO Solution/Policies
CO_2	Possible atmospheric heating with consequent climatic shifts.	• Pursue energy strategies that preserve non-fossil fuel options.
SO_x	**Stunts agricultural crops.** **Possible adverse health effects.** **Acid rain.** **Visibility degradation.**	• Increased research regarding SO_x chemistry and transport. • Increased research regarding environmental effects. • Increased research regarding health effects (demographic studies). • Upgrade air quality monitoring network. • Upgrade capability for modeling long-range transport. • Designation of "regional problem areas" forcing upgrading of SIPs including stricter emission standards for existing plants and more stringent siting criteria.
NO_x	Photochemical oxidants that have adverse effects on health and agricultural productivity.	• Use of Japanese scrubbing technology. • Increased R&D regarding NO_x controls; maximum priority given to demonstrating low NO_x combustion. • Increased research regarding health and environmental effects of photochemical oxidants. • Increased research regarding NO_x chemistry and transport. • Continue R&D regarding new combustion technologies and fuels. • Increased research effort regarding environmental effects of acid rain.
Particulates	**Adverse health effects of fine particulate.** **Visibility degradation.**	**• Institute particulate emission standards that distinguishes by particle size.** **. Require baghouses on new plants.** **. R&D regarding new designs for electrostatic precipitators.**
Hydrocarbons	**Possible high levels of hydrocarbon emissions from small boilers with consequent adverse impacts on health.**	**. Increased research regarding chemistry of formation and health impacts.** **• Increased research regarding levels of hydrocarbon emissions from small boilers.** **. Establish design standards for small units.** **• R&D regarding emission controls for small units.** **• Devise system for monitoring and inspecting small units.** • Avoid promoting coal use in small boilers.

Implemental ion

Data may be adequate and regulations appropriate, but if the law is not implemented litble will be achieved. The process of implementing environmental rules will require careful at**tention because implementation questions will loom increasingly large as the basic framework of environmental legislation and regulation is put** in place. In the simplest case implementation involves the installation of a particular piece of equipment–with Government **im-**

posed sanctions the price of failure or recalcitrance. Increasingly, however, implementation rests on more complex and less tangible actions–planning, management, and general procedures. This is due to the site-specific nature of activities related to coal development (e. g., reclamation) and the interaction of environmental impacts with social, political, and economic concerns. To the extent that implementation (e. g., of combustion controls) can be based on technical hardware, it will be easier than if it depends on procedures. Implementation questions will focus on the various major items of recent legislation and regulation, notably the SMCRA, the Clean Air Act amendments, the revised requirements and procedures for environmental impact statements (E IS), and the Toxic Substances Control Act. The stringency and vigor, including timetables, with which these are interpreted and enforced will have a major influence on the way the balance is drawn between coal development and environmental protection. This in turn will depend in part on how effectively the responsible executive agencies (EPA, DOE, the Department of the Interior, and the Council on Environmental Quality **(CEQ)) can coordinate** their activities. More specific implementation questions relate to the content of forthcoming regulatory decisions regarding leasing and whether sludge will be classified as hazardous. Also, the thorny issue of how to deal with a State that is out of compliance with Federal clean air standards as a consequence of pollution transported from out of State will have to be addressed.

Major Policy Problems

Among the many policy issues relating to the control of the environmental consequences of coal development, three stand out:

1, the utility of cost/benefit analysis,
2. the role of Government relative to the private sector in the development of control technologies, and
3. whether national point source emission standards should be imposed on existing as well as new facilities.

These are addressed **in turn.**

THE ROLE OF COST/BENEFIT ANALYSIS

All environmental decision making involves at least an implicit weighing of costs and benefits. Even a conscious decision not to measure costs — as in the Clean Air Act's requirements for establishing ambient air quality standards to protect public health — can be interpreted as a decision that the benefits of health are so high that they must outweigh any costs incurred in its protection.

Much environmental legislation contains language requiring a consideration of "costs" in standard-setting. For example, the Clean Air Act requires EPA to consider, in specifying a NSPS for controlling air pollution, "the cost of achieving emission reduction(s), any nonair quality health and environmental impact, and energy requirements. " However, in **virtually** every case the costs of control are described as a constraint rather than as a factor to be balanced against benefits. In all ai and water legislation spelling out the terms for selectin$_g$ emission limitations, EPA is asked to select the "best technology available," not the most cost-effective.

In most public opinion surveys, Americans have supported spending for environmental improvement, even when such spending causes some economic hardship. However, this support is based on the public's perception that the benefits of environmental standards outweigh their costs. I n the wake of a variety of regulatory decisions (e. g., the Clean Air Act amendments and the new proposed NSPS for control of SO_x, the proposed mining regulations issued by the Office of Surface Mining) designed to strengthen environmental controls, the industries subject to them have attempted to change public perception about the balance of costs and benefits. In addition, there have been many calls for requiring regulatory agencies to balance costs and benefits and explicitly defend their selected regulatory strategies in these terms.

Arguments raised in favor of requiring cost/benefit analysis include the following:

1. While general quantitative understanding of environmental impacts of coal development may not be well developed, many

individual areas of impact can be measured. (E. g., some of the costs of reclamation failure, pollution crop damages, costs to municipalities of pollution of drinking water sources.) Thus, cost/benefit type analyses may be appropriate for some standards, if not for al 1.

2. The problems currently associated with identifying and appropriately quantifying benefits may never be resolved unless regulatory agencies are forced to take benefits into account in their decision-making. With a limited research budget, the environmental agencies are not likely to pursue vigorously research that is not directly required for their regulatory functions. For example, EPA virtually abandoned its research program on environmental benefits and disbanded the responsible organization (the Washington Environmental Research Center) in a 1975 reorganization. (Some funding has recently been restored to this research area.)
3 Analytical techniques for dealing with risk and uncertainty can address many of the problems associated with cost/benefit analysis.
4. Public acceptance of expensive environmental controls may 'be jeopardized unless the benefits that these controls provide are clearly identified.

There are a number of arguments against requiring such a formal weighing of costs and benefits in environmental standard-setting:

1. The cost/benefit calculations performed in the past by public works agencies such as the Bureau of Reclamation and the Army Corps of Engineers have produced a widespread aversion to this form of analysis. Environmental benefits, being inherently difficult to quantify, have tended to be neglected in quantitative evaluations to the detriment of environmental values.
2 Knowledge about some of the most critical environmental effects of coal development is inadequate. Major controversies rage as to the magnitude and even the existence of specific environmental and health impacts. A prominent example is the controversy surrounding the association that has been claimed between community death rates and sulfate pollution levels. Respectable scientific support can be found for estimates of annual deaths caused by today's air pollution ranging from zero to tens of thousands.
3. Even when environmental impacts can be quantified in physical terms, it is difficult to translate these impacts into a "language" that allows comparison with monetary costs of control. The state of the art of such translation is not well advanced.
4. The level of uncertainty involved in identifying and quantifying the benefits of pollution control could considerably increase the incidence of judicial rejection of environmental standards. For example, EPA has had considerable difficulty in promulgating enforceable effluent guidelines for water pollution control, which require mainly technical and economic analysis. A requirement for a careful balancing of costs and benefits could make matters far worse.
5 Any requirement to determine costs and benefits and/or to balance them in arriving at regulatory decisions may substantially delay the standard-setting process. Aside from the environmental damage that may occur, delays could hamper energy development by adding to the uncertainty currently faced by entrepreneurs.

At least two options are available for dealing with these questions short of requiring explicit cost/benefit analysis for all standards. Congress could:

Option A.

Require regulatory agencies to state the expected benefits of their proposals. This would avoid the need for the agencies to conduct the difficult analysis involved in balancing economic costs and poorly quantified benefits (such as esthetic improvements, statistical risks of health injuries, etc.), but would force an explicit public discussion of benefits and probably would provide incentives for benefits research.

Option B.

Establish an independent commission that will decide which, if any, forthcoming environmental standards must be set by an explicit balancing of costs and benefits. The basis for the commission's decisions would be the state of the art of impact assessment for the pollutants in question. This would take into account the sharp variations in the state of environmental research, although it may not provide an incentive for more vigorous research (actually, it could provide a negative incentive if the agencies perceive cost/benefit analysis as an undesirable requirement). The commission could be given the authority to review the environmental research programs of the regulatory agencies to ensure that fruitful areas of research are appropriately pursued.

WHO SHOULD DEVELOP POLLUTION CONTROLS?

Interest in the control of SO_x and NO_x emissions has led to the development of flue-gas SO_x and NO_x scrubbers, new combustion technologies such as fluidized-bed combustion, and new fuels such as SRC. Many of these technologies are in early stages of development, and all will undergo continued refinement so long as they are considered desirable. The continued rapid development of such control technologies is critical to maintaining an effective environmental protection strategy, but the most efficient means to achieve such development has been a subject of considerable debate within the Government. The major issue is the role Government should play in either carrying out the required development itself or supporting comparable efforts by industry. This debate is equally applicable to water and land pollution control. Positions range from advocacy of Government "in house" development to the commercial stage, to total reliance on industry. (For example, EPA and the Office of Management and Budget (OMB) have argued for years over E PA's active role in developing scrubbers.)

The major arguments in favor of active Government participation are:

- NSPS must be based on demonstrated technologies; therefore, industry has an incentive to avoid demonstrating new controls or improvements in existing controls.
- An equipment manufacturer cannot "demonstrate" a control technology unless he places it on a commercial-scale plant. To do this he needs the cooperation of the polluting industry, which might not be forthcoming without Government intervention for the reason just indicated.
- EPA has been generally quite successful in its control development and demonstration program. Examples of successful controls developed or improved through this program include combustion modification for NO_x control and flue-gas scrubbers for SO_x control.
- An active R&D role by EPA and DOE is necessary in order to maintain the in-house expertise to allow competent, informed policymaking about control levels and technologies required under the Clean Air and Water Acts.
- In those areas where the polluting industries are public utilities, the behavior of their regulatory commissions can skew their behavior away from searching for the most efficient, least expensive controls. For instance, widespread allowance of fuel transportation cost "pass-throughs" and delays in granting rate increases for capital expenditures tend to push utilities away from capital-intensive control solutions even if these are the least costly and most effective options in the long run.

The major argument in favor of allowing industry to be the prime mover in developing control technologies is that Government should not attempt to do what private industry can do as well or better:

- The polluting industries have the largest reserve of personnel who are intimately familiar with the processes to be controlled and in an ideal position to develop the most efficient technologies possible. In addition, the industries have the strong incentive to develop controls that are inexpensive and conserving of their resources; this incentive may be weak in Government-research activities.

- A private pollution control industry exists that will pursue control technology development even if the polluting industry does not wish to. Also, there are cases of industries generating considerable profits from marketing controls they have developed for their own plants; this phenomenon adds considerably to their incentive for successful and efficient operation of control innovations.
- Private entities such as the Electric Power Research Institute (EPRI) are heavily involved in pollution control R&D, apparently at a high level of professional competence.
- The need to get facility siting approval in difficult areas— with bad meteorology, pre-existence of high levels of air and water pollution, or proximity to sensitive ecological areas — provides a continuing incentive for industry to develop improved pollution controls.
- The Clean Air Act allows exemptions to NSPS and BACT requirements for firms installing promising experimental equipment, providing additional incentive for private development.

The options available for dealing with this question are:

Option A.

Maintain the status quo, i.e., continue Government spending in control development at its current level while continuing to cooperate with private development of controls (for instance, EPA and EPRI have a cooperative agreement for sharing research results). This option recognizes the value of encouraging a "dual track" of control development and accepts the existing incentives for industry development of controls as requiring Government participation.

Option B.

Substantially increase Government spending in pollution control technologies, especially in areas where control development does not appear to match the seriousness of pollution problems. Although spending for controls on energy-producing industry is high, the environmental impacts of energy development depend strongly on the extent of control of nonenergy industry. Thus the environmental hazard posed by SO_2 emissions from a powerplant may be great or slight depending whether there are other sources of sulfur emission (e. g., smelters) nearby. EPA's control program for industrial processes has been at a low level of support for several years; increased spending in this area could conceivably have an eventual payoff in removing some constraints from energy development (e. g., in present nonattainment areas). A corollary of this option could be to restore E PA's authority to pursue large-scale demonstration of energy-related pollution controls; at the moment, DOE has this responsibility. Although DOE has recently indicated an interest in pursuing the development of improved controls for existing conversion technologies, its major emphasis in the past has been on new technologies such as FBC, gasification, etc.

This option clearly dismisses the argument that Government should not be heavily involved in activities that private industry is capable of doing (however, it must be recognized that most of the actual work sponsored by the Federal Government is contracted out rather than being conducted in-house).

Option C.

Substantially decrease Government spending in pollution control development, while taking steps to provide increased incentive for industry to expand its efforts. These incentives might include: 1) changing the language of the Clean Air Act to make control requirements more "technology forcing" (as has been done with requirements for automobiles); 2) using economic inducements such as accelerated rates of depreciation for experimental technology, liberal Federal support for capital and operating costs of industry demonstration projects, Federal assistance in persuading local rate commissions to allow utilities to imme diately incorporate the expense of new technologies into their rate base, and tax credits for testing of new technologies.

This option clearly is derived from the philosophy that private industry is the ideal devel-

oper of controls for its own technologies, while recognizing that the nature of the marketplace requires special incentives to encourage this development. This option accepts the risk that industry could choose to avoid development of new controls and presents the Federal Government with the choice of either taking harsh measures (fines or plant closings) or delaying or loosening control requirements.

NATIONAL CONTROL STANDARDS FOR EXISTING FACILITIES

Under the present regulatory structure for control of air pollution jurisdiction over new sources is shared by the States and EPA but control over existing sources is the exclusive responsibility of the States. This has created concern about control of long-range, interstate transport of pollution and our ability to construct a rational, cost-effective strategy for emissions reductions. The divided regulatory structure may be adequate for protecting local air quality from locally produced pollution, but it contains no effective mechanism for protecting against air quality degradation caused by the interstate transport of pollution from existing sources. This happens because the characteristics that tend to lead to long-distance transport—tall stacks and persistent winds — also tend to minimize impacts on local air quality. Pollution sources with these characteristics usually would be loosely controlled by their SIPS. For example, large coal-fired powerplants in the Ohio River Basin have been associated with elevated sulfate levels hundreds of miles downwind, while their SIPS allow them to burn high-sulfur coal with no controls.

Because of EPA's lack of direct control of existing sources; national strategy must concentrate mainly on restricting emissions from new sources. The Clean Air Act's requirement for continuous technological controls leads to a high cost of SO_2 emission reduction for new sources; estimates of the cost of the EPA and DOE proposals range up to $1,000/ton of emissions reduced, and total costs of the NSPS controls will be several tens of billions of dollars by 1990. Although these controls will slow the rise of SO_x emissions in the face of expanding coal use, the large **quantity of emissions from existing powerplants will remain unaffected by** NSPS and is not expected to decrease substantially in this time period. The questionable wisdom, from a national perspective, of simultaneously requiring maximum controls on new powerplants and lenient or no controls on a number of large existing plants is highlighted when the potential costs of controlling some of the existing plants are examined. For example, if a utility currently using 4 percent sulfur coal could obtain 2 percent sulfur coal at a $10/ton premium, it would achieve a 50-percent reduction in SO_2 emissions at a cost of $250/ton of emissions reduced.

Because long-term stabilization and reduction of SO_x emissions depend on the gradual movement to reduced operations and eventual retirement of the older uncontrolled plants, changes in their expected operational patterns and retirement schedules can have severe effects on national emissions levels and air quality. The sharp differences between the operating costs of old and new plants due to emission control requirements or the latter may make the intensive operation of older plants more attractive to the utilities. NSPS requirements could have a perverse effect of increasing the emissions in some areas by encouraging a shift of baseload operations to the older, poorly controlled plants and by discouraging their retirement. Computer modeling has tended to confirm the potential for this effect.

Individual States are unlikely to change voluntarily their SIPs to eliminate these potential problems. An increase in control requirements would trade an economic cost to a State's constituents for a benefit to the residents of other States. In some cases, increased control of SO_x could require a shift to out-of-State sources of coal, hurting in-State producers and miners. Finally, there is substantial controversy surrounding the impacts of long-range transport (acid rain, sulfate, health effects, etc.) so that the known benefits of emission reductions are less tangible than the costs. The options available to Congress for dealing with the issue of further controls on existing facilities are:

Option A.

Maintain the present divided regulatory structure and forego additional reductions in emissions from existing sources until either further research results are obtained or less expensive or disruptive control alternatives are developed. This option can be combined with increased funding for research on the impacts and mechanisms of long-range pollutant transport and for development of controls. Control development would focus on low-cost alternatives suitable for retrofit. Examples are competitive low-sulfur/low-ash fuels like SRC, low-NO_x burners, and modifications to electrostatic precipitators to provide better fine-particle control. This option avoids additional regulatory costs unless they are absolutely necessary or unless new controls can sharply reduce costs. The option is essentially a delaying tactic until more information is obtained and more options are available. It can be supported by recognizing that emissions are not expected to rise rapidly in the next decade or so. However, it involves the implicit acceptance of the risk that present emission levels are causing significant levels of health and environmental damage. These risks are discussed in detail in chapter V.

Option B.

Amend the Clean Air Act to provide for Federal control of existing pollution sources. Require existing facilities to satisfy the same emissions standards as new facilities. Exempt plants that are close to retirement from full compliance, but require fuel switching to clean or cleaned coals when this alternative is available. Successful implementation of this option would drastically cut emissions of SO_x and particulate. But because retrofit of controls is more expensive than incorporating the controls in the plant design, and the existing coal-fired capacity will represent the majority of total coal-fired capacity for several decades, the cost of this option should be in excess of that predicted for the proposed NSPS for steam electric utility boilers through 1990, or several tens of billions of dollars. For some plants, electricity production costs would increase by 20 percent or more. This option embodies the idea that risks of the type associated with coal pollutants are unacceptable. However, implementation would be difficult. Besides the cost, the option would present substantial resource problems: the need to quickly construct large numbers of scrubber installations, the requirement to safely dispose of large quantities of scrubber sludge, and the need to train large numbers of operating personnel for new control systems. Given the difficulties that American utilities have had in operating scrubbers, this resource problem could substantially delay implementation.

Option C.

Amend the Clean Air Act to provide for Federal control of existing pollution sources. Selectively increase controls on large facilities where the SIPs have been determined to be lenient or when the facilities have been determined to be a major source of problems associated with long-range transport of pollutants. Also, increase pressure to enforce SIP deadlines with tight enforcement resources and/or economic incentives. The SO_x controls envisioned in this option would be primarily low-sulfur coals, cleaned coals, and eventually, SRC. Selective use of scrubbers might be justified for newer plants. Also, the R&D program described in Option A would be adopted. As in Option B, this course of action places a high premium on risk avoidance. It considers the potential dangers attributed to acid rain, fine particulate, and sulfates as significant enough to warrant considerable expenditure of control funds, but attempts to keep expenditures significantly below the costs of total control. It recognizes the variations among SIP regulations and the role that location plays in determining the seriousness of impacts. Nevertheless, it remains (like scenario B) an expenditure of considerable funds to combat impacts that for the most part have yet to be definitely proved; it can be expected to produce considerable opposition from utilities and industry on these grounds. Also, it can be expected to be opposed by Midwestern States whose powerplants, now burning local coal, might be asked to shift to low-sulfur coals from out-of-State sources. This latter problem can be overcome by speeding up the demonstration of ad-

vanced coal-cleaning processes and allowing the States to require their use in favor of out-of-State coals.

COMMUNITY IMPACTS

The impacts of coal development on local communities and the response of those communities will be a significant factor influencing the future of coal as a national energy source. Some of the impacts— notably the generation of investment and employment in economically depressed areas — are almost universally viewed as positive. The adverse impacts, however, are of greatest concern to policymakers because they may jeopardize the projected conversion to coal and require ameliorative action by Government. The dislocations and social ills associated with boomtowns may lead to high worker turnover and low productivity in western mining areas. The utter inadequacy of such basic social infrastructure as housing, roads, and sewers may severely inhibit efforts to rapidly expand Appalachian coal production. Community resistance to siting of coal-fired powerplants may induce further slippage in already lagging construction timetables. Consequently, a viable national energy program would logically include policies designed to alleviate the negative community impacts associated with coal development.

Such policies, if they are to be effective, must recognize two basic characteristics of the present situation. First, there is considerable uncertainty regarding the nature of coal development impacts and the balance of benefits and costs that will accompany them. Policy perspectives vary accordingly. Proponents of community aid programs contend that future tax revenues and other economic benefits of coal development will never cover all the costs to the locality, thus necessitating a real net transfer of Government funds. An alternative view sees energy growth as similar in its impacts to other sources of growth and more likely than most to pay its own way in terms of community costs and benefits. From this perspective, the Federal Government role should be limited, except in special circumstances, to supplementing existing policy mechanisms. Second, value disagreements concerning what are positive and what are negative impacts result even where the nature of these impacts is understood. Whether economic growth should be viewed as a positive or negative phenomenon is itself the subject of dispute. Value conflicts extend to other areas. For example, should community impact costs be borne by energy consumers through forcing the coal companies to internalize such costs and pass them along in the form of higher prices? Or should such costs be paid out of general tax revenue in the form of Government loans and grants to impacted communities? What is the extent, if any, of Government obligation to assist communities that will ultimately benefit economically from Federal policies to stimulate coal use but are unable to adequately cover the "front-end" costs of infrastructure and community service development in the short term?

Clearly, policies designed to ameliorate adverse impacts must recognize these uncertainties and value disagreements. This can be done with a policy approach that is basically accommodational, that seeks to anticipate the concerns of interested parties and deal with them in a way that encourages compromise. Such an approach has two principal characteristics.

First, all parties affected by increased coal use are able to participate in decisions concerning the location, timing, and scale of coal developments that directly concern them. Second, Federal policies are designed to distribute the risks, costs, and benefits equitably among all parties affected by increased coal development. The process of participation and consultation has two drawbacks; it can be expensive and time consuming. However, to the extent that adverse impacts can be anticipated and forestalled through consultation with the affected communities, the economic costs of ameliorating those impacts will be lessened. Moreover, the result can be a general upgrading of community capabilities.

Adverse community impacts associated with coal development take three major forms: 1) community services and infrastructure are

overloaded, 2) local economies become overheated and distorted, and **3)** social instability accompanies a decline in some aspects of the quality of life. These are briefly summarized as a prelude to the analysis of possible policy responses.

Overload of Existing Community Services

In many parts of the Eastern coalfields existing services are incapable of coping with the effects of a rapid expansion in coal development. The weakness has multiple dimensions. Local government services and infrastructure (utilities, police, roads, flood control, etc.) are often woefully inadequate. Public utilities are frequently incapable of meeting any significant additional demands without an overhaul of the entire system. Consequently the marginal costs of increased utility services are often very high. The commercial services and the supporting infrastructure in the private sector are also weak. Professional and skilled personnel are difficult to attract, given the living conditions in the coal towns. Private investment is discouraged by the risks associated with the historic boom and bust cycle of the coal industry. Local financial institutions have very limited resources. The tax system, particularly as it relates to the coal industry, is inadequate, reflecting a general weakness in local political institutions. Coal lands and enterprises are characteristically taxed at low, sometimes spectacularly low, rates. In many locales housing is in desperately short supply due to rugged topography, large landholdings by coal companies, a shortage of mortgage money, high utility costs, a low volume capacity of local builders, the absence of public housing programs, and other causes. Thus, in coping with the impacts of increased coal production the Eastern coalfield communities begin in a serious deficit situation with already inadequate services and supporting infrastructure. This situation rests, in turn on basic economic, social, and political underdevelopment rooted in a lack of economic diversification and absentee ownership of coal-related resources.

The Western coalfields present a different, although still troubled, picture. Community services and infrastructure are often extremely limited because of the characteristically small size and isolated location of Western coal towns. The explosive increase in demand for community services associated with large-scale coal development will occur before coal revenues become available. This front-end financing problem is exacerbated by the present small tax base and lack of bonding history or authority of the communities in question and the long leadtimes required to initiate coal production. The problem is in some instances aggravated by jurisdictional mismatches where the productive enterprise (and consequently the tax revenue) is located in a different political jurisdiction from the locality that must bear the brunt of the social costs. As in the East, supplying sufficient housing is a serious problem. The principal causes are inadequate sources of financing and the limited volume capacities of local builders. In sum, western efforts to provide community support to coal development must start largely from scratch. Compared to the East there is virtually no capability in place, but often there is also no service deficit to make up and no antiquated infrastructure that must be dismantled. Further, there is nothing comparable to the pervasive constraint in the East imposed by the high and virtually irreducible ratio of population to habitable land.

Economic Dislocation

For the coal towns the benefits of a rapidly expanding coal industry are principally economic, but there are economic costs to the community as well. In the East as coal-related incomes and demand for goods and services rise, the commercial sector is often unable to keep pace, with rapid inflation the result. For those in the community on fixed incomes or otherwise not positioned to benefit from the income effect of an expanded coal industry, the consequences can be devastating. Other costs of coal growth can include a reinforcement of the existing single primary product economy, with its associated vulnerabilities. There are opportunity costs as coal development inhibits or forecloses other beneficial economic activities, notably recreation and tourism.

In the coal boomtowns of the West severe inflation is also a problem. Opportunity costs are present here as well, particularly disruption of the rural ranching economy because of coal development.

Social Instability and Quality of Life

For many citizens of the community the social and psychological costs of rapid coal development may be the most difficult to bear. Heavy coal truck traffic on eastern rural roads not designed for such use can pose a growing threat to public safety and convenience. Overloading of local services plus sheer congestion can mean increasing emotional stress and even mark a perceived decline in the quality of life of established eastern communities. The boom and bust history of the industry can induce a basic mood of **uncertainty about the future that contributes to the social and psychological malaise. In** the West, boomtown conditions can lead to crowding, emotional stress, family problems, juvenile delinquency, crime, alcoholism, and other social ills rooted in a pervasive sense of rootlessness and impermanence. The situation is exacerbated by the tendency of coal development to erode the settled ranching culture of the area. Here too, uncertainties about the future of the industry can reinforce other problems.

These factors can adversely influence coal output in a number of ways, but particularly in terms of their impact on the work force. Miner dissatisfaction with community living conditions can translate into high worker turnover, absenteeism, low productivity, and strikes.

The policy options available for dealing with these problems fall into two categories: generic measures designed to improve the process of coping with coal development impacts nationally and specific initiatives designed to solve particular problems, some of which are peculiar to one geographical area. These two categories are discussed in turn.

General Policy Options

Five major **policy initiatives of this type can be identified:**

First, improve the access of communities to information concerning coal development impacts. One way would be to establish a single national energy facility siting schedule, perhaps as part of a national energy information service. The objective would be to provide advance information about energy development plans to potentially affected communities. In this regard, DOE might be empowered to gather and disseminate energy-impact-related data available within the Federal Government, including OCS and BLM leasing plans and industry projects submitted for Federal licensing or approval. (Some regional efforts of this nature exist, For instance, E PA's Region 8 office in Denver publishes a continually updated list of planned facilities). On request the Federal Government might provide any locality scheduled to be impacted by a major new energy facility with an assessment of the effect of that development on the community. Such an assessment might be conducted as a joint Federal-State-local effort. This could be accomplished through existing E IS procedures if they were modified to give added weight to community impacts along with the existing attention to impacts on flora and fauna.

Second, increase opportunities for local authorities and citizens to participate in decisions concerning the siting, construction, or expansion of coal facilities. This might involve support, in the form of financial assistance and access to information, of citizen interest groups acting as interveners in Government proceedings concerning facility siting, and related decisions. Similarly, mechanisms might be established for giving State, local, and tribal authorities earlier access to relevant Government deliberations than is now commonly available. Consideration might also be given to supplementing the modified E I S procedures suggested above with a requirement that companies planning to construct energy facilities propose actions they will take to alleviate those adverse community impacts that have been identified.

Third, improve the capability of localities to manage coal development impacts. This might take the form of Federal technical assistance for development, planning, and impact assess-

ment. The Government could also ease the financial burden on localities seeking to cope with adverse impacts. This might involve grant and loan programs to finance public sector personnel, construction, and other costs. The eligibility requirements of existing Federal community assistance programs might be modified to give priority to coal-impacted communities. The Federal tax code could be amended to encourage prepayment of State and local taxes by industries planning coal facilities. Also Federal programs can be used to encourage State initiatives to deal with community impacts, e.g., by according priority to States that have established mechanisms for State assistance to coal communities. Finally, Federal assistance could facilitate direct communication between responsible officials from different coal communities, thereby enabling community governments to share experiences in dealing with energy development impacts.

Fourth, improve coordination of Federal assistance programs. A variety of steps might be taken in this regard. DOE, for example, could be designated as the lead Federal agency with responsibility for coordinating Federal impact assistance programs through an interagency board at the regional level. An office within DOE could be established to coordinate community impact assistance planning with other energy-related planning. The Federal Regional Commissions could be asked to sponsor regular assessments of coal-related community impacts on a regional basis. The Commissions might also be accorded a substantive voice in the allocation of Federal impact assistance. Federal-State coordination might be improved by a requirement that Federal decisions affecting the siting or expansion of energy facilities be compatible with federally approved State impact mitigation strategies.

Fifth, modify the point criteria by which the eligibility of communities for Federal assistance is determined. These criteria are presently designed to permit assistance to communities in economic decline by basing eligibility on such measures as unemployment and the percentage of substandard housing. Programs under the Department of Housing and Urban Development and the Economic Development Administration of the Department of Commerce are prominent examples. A community suffering the dislocations of a coal boom cannot qua! if y under these criteria.

Specific Policy Options

Listed below are specific Federal actions that might alleviate some of the potential adverse impacts associated with coal development. These are in addition to the broader generic actions outlined above.

COMMUNITY SERVICES AND INFRASTRUCTURE

- Target Federal highway funds toward road construction (including overpasses), improvements, and repairs necessitated by coal development.
- Increase Federal funds available through the Farmers Home Administration for water and sewage systems in coal-impacted localities and broaden eligibility for such assistance to include communities with over 10,000 population. Larger communities do not presently qualify for FmHA funding.
- Establish a new Federal loan program to finance the construction of public works needed to meet demands resulting from coal development. An alternative would be to provide a Federal guarantee of local bonds to finance such construction.
- Compel coal development companies to internalize some of the risk associated with front-end financing by prepayment of taxes, provision of certain community services, or guarantees of municipal bonds as a condition for obtaining needed Government licenses and approvals. Alternatively, an attempt could be made to induce such actions by coal companies in return for tax breaks or other inducements.
- Expand Federal subsidy programs for low- and moderate-income housing such as the FmHA homeownership program, Other possible Government initiatives to alleviate the shortage of housing include the use of Federal and State eminent domain authority to obtain land, encouragement of community nonprofit housing corporations with subsidies, modifications of the

tax laws to encourage coal development companies to provide employee housing, and Federal subsidies or guarantees designed to make mortgage loans with low downpayments available to young couples.
- Impose a Federal severance tax on coal with revenues going to States or localities to provide needed community infrastructure and services. Use funds generated by leases of Federal coal lands for the same purpose.

ECONOMIC DISLOCATION

- Create a stable and predictable demand for coal by means of a national energy policy clearly committed to substantially increased coal use through the end of the century.
- Encourage non-coal-related private investment in the coal field communities by use of tax incentives, preference in awards of Federal contracts, etc.
- Give preference to coal-producing areas in siting of Federal installations.
- Levy a national severance tax or royalty on coal production and use the revenues to establish development banks or trusts for investment in coalfield communities.
- Provide compensatory payments to communities that bear the social costs of mining federally owned coal or of coal development in adjacent Federal lands.
- Upgrade the capabilities of the Appalachia Regional Commission and its western counterparts to support a broad range of development programs.
- Help coalfield communities identify and develop alternative sources of economic growth (e. g., reconstruction of a historic narrow gauge railway as a tourist attraction).

SOCIAL INSTABILITY AND QUALITY OF LIFE

- Provide loans, grants, bond guarantees, etc., to assist coal communities in establishing recreational and social service programs (e. g., family counseling, day care centers, adult education, parks).
- Assist community self-help projects (e.g., civic beautification).
- Fund study by Federal Regional Commissions concerning possible regional approaches to preserving existing farms and ranches.
- Fund joint study by Federal and State governments and Indian tribal governments regarding ways of limiting the corrosive impact of energy development on Indian culture and social systems.

Any comprehensive program to deal with the community consequences of coal development will have at least two objectives: the mitigation of specific adverse impacts and the diversification of the local economy. Clearly, such an effort will strain the resources of local jurisdictions and may require supplemental Federal funding– ing the form of loans, grants, or both.

If it is assumed that revenues generated by coal development ultimately will prove adequate to cover the costs of impacts amelioration, the money can be raised by local taxes on the activities of the coal companies supplemented, if necessary, by Federal loans to cover front-end costs of public works and other infrastructure. The coal companies will presumably pass along the cost of taxes to consumers in the form of higher coal (i. e., higher energy) prices. This, in effect, puts coal development on a pay-as-you-go basis with the ultimate beneficiaries of coal production, the energy consumer, paying most of the bill. The feasibility of the pay-as-you-go option will depend on:

1. how heavily coal development activities can be taxed without pushing the price of coal to uncompetitive levels,
2. whether coal communities are willing and able to impose those levies that will capture the potential revenue, and
3. the availability of Federal loans.

If it is assumed instead that coal develoDment revenues will not cover the external costs involved, the choice is between turning to the Federal or State governments for some sort of net transfer of funds or continuing the past practice of allowing the costs to fall on the

local communities in the form of environmental and social deterioration. The limiting factors will be the availability of Federal or State funding and the absorptive capacity, in terms of environmental and social pressures, of individual coal communities.

Policy makers will also have to consider how the needed funds will be acquired and distributed. In practical terms, the communities have two methods of raising revenue from coal development, a property tax on company-owned coal lands and facilities within the local jurisdiction, and a severance tax on the value or quantity of coal actually mined. The difficulty with any local tax is that it may place the community at a competitive disadvantage compared to other localities in attracting coal investment.

The Federal Government has a much wider choice of sources for funds, including general Federal revenues based primarily on the income tax and a variety of levies specifically on coal production and use— including fees, rents, and royalties for leases on Federal land, and a national coal severance tax. Federal net transfers can be made available to coal communities in the form of direct payments (e. g., revenue sharing, grants, trust funds) according to some established formula (e. g., amount of Btu equivalents mined) or through a development bank that would provide assistance on a project-by- project basis.

LABOR-MANAGEMENT RELATIONS

The history of labor-management relations in the coal industry has been a tumultuous one. Any analysis of the contribution of coal to U.S. energy requirements must take into account the possibility of supply disruptions due to work stoppages. This was dramatically demonstrated in 1977-78 when the United Mine Workers of America (UMWA) and the Bituminous Coal Operators of America (BCOA) locked horns in a prolonged 109-day strike that effectively shut down about half of U.S. coal output. The reasons for this troubled history are multiple and complex. They include characteristics of the coal market, the ownership structure of the industry, the nature of the workplace and work process, the social and political environment of the coalfields, and the accumulated ill-will and mistrust built up over decades of conflict between the operators and miners.

Policy makers face two basic tasks: first, how to ameliorate the sources of destructive labor-management relations and lay the groundwork for a more constructive long-term relationship; and second, how to deal with another lengthy strike should it occur.

Under the present legislation, the Federal Government can do little to directly alter the terms or context of labor-management relations. The principal exceptions are measures designed to ensure a growing or stable market for coal by mandating or inducing the use of coal instead of gas or oil. The recently passed National Energy Act contains a number of such provisions, including a prohibition against the use of oil and gas in new utility or industrial boilers, DOE authority to require capable facilities to use coal, and restrictions on the use of gas in existing utility powerplants. A stable market should ease the historic insecurity of both operators and miners that has been such a large factor in the industry's labor problems. Other measures are more indirect and relate to the basic social, environmental, and other ills of the coalfields that contribute to the miners' discontent. These options are outlined in earlier portions of this chapter.

In the event of another major coal strike the Federal Government will have an interest in achieving a settlement that is prompt, noninflationary, and that establishes the basis for long-term labor-management stability. If the latter condition is to be met, the settlement must be supported by a substantial majority of rank-and-file miners and must address some of the underlying problems noted previously.

In pursuit of these objectives, five major strategies or approaches will be available, as they were during the 1978 strike:

1. reliance on collective bargaining with limited Government intervention,
2. collective bargaining with strong Government involvement,

3. use of Taft-Hartley with limited efforts at enforcement,
4. Taft-Hartley with vigorous enforcement, and
5. Government seizure of the mines.

Each has its own set of opportunities and liabilities. Of the five, only the last will require legislation. It should be emphasized that these options are purely instrumental; they are independent of any judgment on the substantive merit of the labor/management issues in dispute.

Collective Bargaining With Limited Government Intervention

Under this approach resolution of the strike would be essentially left to bargaining between negotiators for UMWA and BCOA. The Federal Government would limit itself to encouraging the negotiators by "jawboning," meditation, and public appeals to the industry rank-and-file miners.

The major argument in favor of this policy is that it enables the Government to avoid a direct confrontation with either the operators or the miners. If strike-related damage to the economy can be kept to manageable levels (due perhaps to mild weather and increasing production from nonunion mines), this strategy promises to leave BCOA and UMWA increasingly isolated as their mutual leverage over the rest of society declines. Under these conditions the strike may be seen by both labor and management as increasingly self-defeating, thereby hastening a negotiated settlement.

The principal arguments against this approach are that it offers no assurance of a quick end to the strike or that a settlement, when achieved, will be anything more than a temporary truce borne of mutual exhaustion that leaves the underlying causes of labor unrest in the coalfields intact. Moreover, if a prompt settlement is not achieved, the credibility of the Government's energy policy may be seriously undermined with consequent long-term damage to the economy and the effort to reduce reliance on imported fuels. Finally, a hands-off policy may contribute to an image of Government ineffectiveness in dealing with the problems of an industry that has been identified as the key to America's energy future.

Collective Bargaining With Strong Government Intervention

This approach would involve preserving the framework of collective bargaining while bringing substantial Government pressure to bear on one or both parties to modify their negotiating positions. The instrumentalities of pressure will differ depending on whether the operators or the union is the target. Means of influencing the operators could include:

1, manipulation of Government contracts,
2. threat of Government seizure of the mines,
3. vigorous implementation of antitrust laws regarding horizontal and vertical divestiture,
4. proposed changes in the tax laws (e.g., the coal depletion allowance, the write off for black lung benefits, rapidity of amortization, investment credits),
5. modifications in leasing regulations,
6. a tightening or loosening of regulations concerning coal imports and exports,
7. changes in the frequency of Federal health and safety inspections of mines, and
8. a general increasing or lessening of the Government regulatory and permitting burden on the industry.

Pressure on the union could take the form of:

1. withholding food stamps from strikers,
2. threats to investigate union finances,
3. modifications in National Labor Relations Board regulations to make it either easier or harder to organize new mines,
4. threats of preferential Government purchasing from nonunion mines,
5. greater or lesser Government willingness to make coal miners exceptions to national wage guidelines, and
6 an offer to explore means of using public money to strengthen union health care programs.

In addition, statements by Government spokesmen can be used in an effort to pressure or persuade both miners and operators.

Taft-Hartley With Limited Enforcement

This strategy is similar to that apparently adopted by the administration following the second rejection of a tentative contract by the rank and file in early 1978. It involves the use of Taft-Hartley to obtain police protection for those miners who want to return to work. The principal focus would be nonunion mines shut down due to threats of violence by strikers at nearby union mines. No effort would be made to coerce unwilling miners back into the mines. As an inducement, miners who went back to work under a Taft-Hartley injunction could be paid at a new higher wage scale (within Government wage-price guidelines) pending a final settlement. The basic advantage of this approach is that it permits the Government to facilitate a return to production of nonunion mines without a major confrontation with striking miners. To the extent that production is increased, the pressure on UMWA and BCOA will mount. Warmer weather, the growing economic strain on miners and coalfield communities, and an increase in coal prices caused by supply shortages can all contribute to that pressure.

There are several arguments against this strategy. First, it does not assure a quick end to the strike and thus leaves open the possibility of all the negative economic effects identified in the limited intervention option. Second, by tacitly accepting defiance of Taft-Hartley by UMWA miners this policy tolerates disregard for the law and may contribute to a general impression of Government ineffectiveness in energy matters. Third, this approach will probably be widely perceived as favoring the operators at the expense of the miners. Fourth, the underlying assumption is that there is significant nonunion coal production that is not forthcoming because of a union strike. This may be a false premise. Finally, as with the first policy option, there is little reason to think that a settlement reached under this strategy will successfully address the root causes of labor unrest.

Taft-Hartley With Vigorous Enforcement

With this strategy, every effort would be made to use Taft-Hartley to persuade and, if necessary, force miners to return to work. Tools available to the Government include all those listed under the second option plus fines levied on recalcitrant union locals and arrests of pickets. If necessary, separate agreements between UMWA locals and individual coal companies would be encouraged. Other aspects of the strategy might include the offer of a provisional wage increase to miners returning under Taft-Hartley and creation of a White House Commission to recommend terms of a new contract. The basic effect of this policy is to increase pressure on the union by making a strike illegal for 80 days. Any efforts toward encouraging local settlements and thereby fragmenting the industry are a threat to both the union and the operators. The result may induce renewed and productive BCOA-UMWA negotiations under threat of such fragmentation.

The principal argument in favor of this option is that it is designed to achieve an immediate restoration of coal production. At present both UMWA and BCOA are seriously divided internally and consequently vulnerable to the threat of fragmentation. Given that vulnerability, a **possible** outcome of this strategy would be to induce the miners and operators to resume serious negotiation in order to forestall the mutual danger posed by Government intervention. Also, an activist posture by the administration should have some political benefit in terms of providing an image of decisive national leadership. There may even be an important benefit if it becomes necessary to resort to individual agreements between specific union locals and coal companies because fragmentation may create the possibility of breaking the historic pattern of labor relations in the industry. It could create the opportunity for new leadership, new ideas, and a new structure for union-industry bargaining. This in turn may make it possible to address some of the root causes of labor unrest in the Eastern coal fields.

Arguments against the invocation and vigorous enforcement of Taft-Hartley center on the danger that the whole effort could be counterproductive. Previous attempts by the Government to use Taft-Hartley to force coal miners back to work have been uniformly unsuccessful. Even a successful attempt could be politically damaging by antagonizing other unions and blue-collar workers generally. On close examination, some of the tools available to Government are of dubious utility. Because many union locals may already be bankrupt, fines could be ineffective, A cutoff of welfare benefits and food stamps may be successfully challenged in the courts with the result that new legislation will be required. Reliance on Taft-Hartley will clearly antagonize UMWA, and to the extent fragmentation is threatened, BCOA as well. Fragmentation might well result in anarchy rather than a new industry structure, with competitive inflationary wage increases and labor instability the result. Localized settlements or an industrywide settlement reached under the threat of fragmentation are unlikely to systematically address the underlying causes of labor instability. Also, a strong and cohesive union will be required if the pervasive community and environmental problems of Appalachia are ever to be solved. It will not be easy to reconstitute an industrywide union; dismemberment of UMWA might prove to be effectively permanent. Moreover, a basic tenet of national labor policy is to facilitate, not undermine, collective bargaining.

Government Seizure of the Mines

If invocation of the Taft-Hartley Act fails to bring settlement of a strike, the remaining option of last resort is seizure of the mines by the Federal Government. Such action would require the passage of enabling legislation by Congress. The case for legislation would presumably be made in terms of the strike's short-term impact on the economy and the long-term injury done to the Government's effort to meet the Nation's energy requirements through increased use of coal. It should be noted, however, that retrospective analysis of the 1978 strike indicates that the economic impacts, with localized exceptions, were quite manageable. Because of a projected increase in nonunion western production, a future strike would have even less damaging consequences for the national economy.

History suggests that if seizure is to be effective, the authorizing legislation must provide the President with the power to control the conditions under which seizure is carried out. This means authority to change the terms and conditions of employment, to decide when the property should be returned to private ownership, and to seek injunctions in Federal court if there is resistance to this control. The President also has at his command a number of sanctions — moral, economic, military, judicial, and legislative —the use of which Congress must be prepared to support if they are to be effective.

On taking control of the mines, the Government might try to resolve the impasse that led to the strike by mediating between the parties. More severe Government actions would include removal of the existing management personnel, alteration of the conditions and terms of employment, and wage increases (or decreases). Strikes would be forbidden. A decision concerning the conditions of takeover might follow an inquiry by a White House Commission and consultations with miners and operators. The Government could choose to negotiate a new contract with the union and make its acceptance by management a condition for returning the mines to their former ownership. By directly negotiating a new labor contract the Government might be in a position to break the historic cycle of mistrust and hostility in coal labor relations. For example, a Government-negotiated contract might go far to meet the miners' demands concerning such key noneconomic issues as medical care and safety. At the same time a systematic effort to improve the quality of life in the coalfield communities could alter the environment that nourished the miners' discontent. To the extent these objectives are achieved, the climate for a successful implementation of a national energy policy will be markedly improved.

Arguments for this approach center on the contention that it is a way of acheiving both a

quick and durable settlement. It is seen as an extreme remedy necessitated by the severity and intractability of the problem, This strategy is also attractive on the grounds that it will probably be **welcomed by UMWA and organized labor generally and should convey an image of governmental decisiveness and** vigor to the public as a whole.

Arguments against this option begin with the observation that the historical record of the use of seizure in labor disputes has not been altogether happy. Of the 71 instances in which it has been used since the Civil War, only 40 resulted in agreements between labor and management before the property was returned to its owners. In the *31* remaining instances negotiations took place after the seizure was terminated and in *20* cases strikes occurred. Moreover, in 38 of the seizure cases either labor or management obstructed production in some way while the Government was running the business. President Truman's seizure of the steel mills in 1952 was welcomed by the unions but eventually resulted in a 53 day strike. The fact that the seizure of the coal mines would require congressional legislation raises the possibility of congressional delay or veto. Significant congressional reservations. seem likely given the predictable opposition of the coal companies and a generalized uneasiness with seizure as socialistic. To the extent that seizure undermines business confidence in the administration, the political costs could be high. Finally, the seizure or an attempted seizure of the mines will preoccupy congressional and executive energies and attention at the expense of other high priority concerns.

WORKPLACE HEALTH AND SAFETY

Underground mining is a hazardous occupation as measured by the incidence of work-related accidents and disease. Health and safety issues have been a major factor behind labor unrest in the coal industry— including the 109-day UMWA strike of 1977-78. Any substantial increase **in coal production will inevitably be** purchased at the price of thousands of ill and injured miners.

Health

A number of measures designed to upgrade the existing dust control system can be identified. They include:

- Assignment of higher priority to efforts to control nonrespirable dust.
- Development of new methods of mitigating the health impacts of dust from longwall mining, including improved respirator designs, fans, and special ventilation systems.
- Development of area sampler technologies (with appropriate standards) that would supplement personal samplers. Unlike the latter, these area devices should be capable of providing an immediate, on the spot reading of dust levels.
- Reorganization of the respirable dust-sampling program around the new sampler technology and around the concept of miner control or joint control of the program. Shared management should minimize the opportunities for falsification of results that exist in the present program.
- Monitoring of the incidence of trace elements in coal dust.
- Support for research to resolve some of the present uncertainty concerning the adequacy of the 2-mg standard.

The Mine Safety and Health Administration (MSHA) is now considering alternative sampling systems to improve measuring and reporting reliability. Two promising approaches are in-mine dust measurement (allowing immediate correction of excessive dust) and continuous, machine-mounted monitoring that would automatically cut power to operating machinery when dust levels are too high. Both of these approaches would require new capital investment and could impede production dur-

ing the year or two they were installed. These costs would probably be offset over time by a lower prevalence of coal workers' pneumoconiosis (CWP) among workers and lower operator-financed compensation expenses. The present public costs of black lung compensation are substantial.

Other hazards – "nonrespirable " dust, trace elements, emissions from machinery fires and diesel engines, and the like– contribute to respiratory illness to one degree or another. These pollutants may work synergistically with coal dust, thereby increasing the hazard to the worker. Since the individual miner experiences these hazards cumulatively, research and prevention programs should be structured in holistic, multifactor fashion rather than in terms of single-factor hazards. Federal regulation may be necessary to cover the respiratory hazards the 1969 Act did not address specifically (e. g., trace elements). Improved monitoring and control technologies for these pollutants may be needed.

Noise and stress are other significant mine-health concerns. The National Institute of Occupational Safety and Health (NIOSH) has recommended a tightening of the current noise standards, but neither MSHA nor the Occupational Safety and Health Administration IOSHA) has proposed implementing regulations. Miners experience significantly more hearing loss than nonminers, and some studies have linked noise to accidents. A more stringent noise standard would undoubtedly require additional investment by mine operators. After this initial expense, however, production costs should not be increased and productivity may be enhanced by lowering workplace noise levels. Medical costs and compensation are likely to be reduced if a tougher standard is adopted.

Job stress to which noise contributes, has been implicated as an important causal agent in coronary heart disease, gastrointestinal malfunctions, severe nervous conditions, and other disorders.

Recent studies have found more anxiety, depression, irritation, and somatic complaints among miners than other blue-collar workers. Underground coal miners reported a high level of emotional strain in a recent survey. Stress and strain are probably associated with absenteeism, workplace hostility, and lower productivity. Shift rotation may be an important source of job stress and disruption of family life. It may also be related to adverse health and safety effects. **A** Federal policy response to this situation could include banning or modifying certain work practices that research identifies as key sources of job-stress, and establishing a program for monitoring workers for signs of stress.

Safety

As coal production increases, more workers are likely to be hired. If accident rates do not improve, the number of fatalities and disabling injuries will double and triple as production and employment doubles and triples. It is unlikely that any major labor-saving technology will be commercialized over the next 15 to 20 years that would sharply raise productivity and reduce the number of workers exposed to safety hazards. Therefore, it is necessary to assess accident prevention strategies in the context of existing mining systems.

The 1969 Coal Act sought to prevent coal mine disasters. [t has succeeded. The number and severity of disasters have been cut substantially in the last *8* years. Other legislated safety measures — involving roof support, electrical hazards, blasting— have probably reduced fatalities and injuries, but the effects are often difficult to separate and measure.

The principal need in the area of safety is to develop a program to reduce the frequency of disabling injuries (there were 15,000 such injuries last year, each of which cost more than 2 months of lost time).

Several measures designed to mitigate the problem can be identified:

- Comprehensive, mandatory safety standards and design features for machinery.
- More safety conscious work procedures in the mine such as preventing the accumulation of debris along haulage ways. A related measure would be to package supplies (e. g., cement) in small enough units

to be handled easily in confined quarters thereby avoiding back and other muscle injuries.

- Specially designed prevention programs for high-accident mines devised jointly by labor, management, and Federal officials.
- Improved safety education and job training of workers and supervisors. This should have measurable safety benefits since so much of the work force is young and inexperienced.
- Greater frequency of visits by Federal safety inspectors. Studies have shown an inverse correlation between the incidence of inspections and accidents.
- Research into the relationship among the pace of work, production quotas, and accidents.
- A greater voice for miners in safety decisions.

Safety does not come easily or cheaply, Management and workers must practice it continually. Prevention-consciousness must be incorporated into the work attitudes of both management and labor. The costs of inadequate attention to safety are measured in lower productivity, compensation payments, lost production time, lower morale, absenteeism, and medical bills. Upgrading safety often involves capital investment, and may lower productivity and output. On the other hand, a conscientious approach to safety can help production and productivity, and often brings dollar benefits in terms of lower insurance premiums and medical bills,

LEASING

The most basic policy question concerns whether additional leasing of Federal coal lands will be required to meet projected increases in coal demand. Western coal comprises roughly half of the Nation's coal reserves and the Federal Government owns 60 percent and indirectly controls another 20 percent of Western coal. The extent to which Western coal will be used to meet national energy demand is presently unclear due to the 1977 amendments to the Clean Air Act, which may have reduced the attractiveness of Western coal to utilities. Even if it turns out that substantial quantities of Western coal are required, it is not clear how much (if any) new Federal coal reserves would have to be leased. There are already 18 billion tons of Federal coal under lease and another 9 billion tons on land for which preference right lease applications (PRLAs) are pending. However, the status of PRLAs is very much uncertain as a consequence of the "commercialization quantities" test to be applied to all applications. Coal from PRLAs could meet national demand for a decade or, alternatively, many PRLAs could be found illegal or unable to pass the commercial quantities test. Given the uncertainties it is impossible to predict when any new Federal lands will have to be made available for leasing. In any case, available sources of Western coal will be adequate for the next several years, regardless of the disposition of PRLAs. Moreover, recent court cases mean that no new leasing will be possible until the early 1980's at the earliest.

By that time it is possible that a tight coal market could create the conditions for a coal land rush in the West. The clearest way for the Federal Government to defuse such an event is to prepare contingency plans for the orderly resumption of coal leasing at that time, This will require the Government to select among various options for an overall long-term approach. Recently a high-level review committee within the Department of the Interior addressed this problem and produced an option paper.

The stated goal of the paper is to suggest alternative approaches for managing coal resources that emphasize environmental and land use planning and enable the Department of the Interior to adjust the amount of coal leased to production goals set by DOE.

For each suggested option, land use planning and environmental standards are employed to assess which "coal resource areas"

are suitable for mining. Within those areas specific tracts would be identified for leasing. Production goals set by DOE would determine how many mines would be opened. The options differ as to whether industry or Government identifies the areas and tracts for leasing and designates the areas to be subject to environmental and land use assessment.

Option 1: Industry Nominates Areas and Tracts for Leasing

Under the first option proposed by the Review Committee, industry would nominate those areas it desired to mine. The Department of the Interior would then perform various land use and environmental studies to determine which of the nominated resource areas was suitable for mining. Interior would estimate the production potential of the suitable areas relation to the production goals set by DOE. A decision *on* which areas actually to lease would be made taking into account "by trading off the projected resource needs and environmental consequences of development. " If the areas nominated by industry and found suitable for development failed to provide sufficient coal to meet production needs, then the Department of the Interior would designate additional areas on its own initiative. Finally, industry would nominate specific tracts that it desired to lease within each selected leasing area. The frequency and size of leases would be adjusted to meet DOE production goals.

Option II: Government Identifies Areas for Leasing and Industry Nominates Specific Tracts

Under the proposed second option the selection of potential coal leasing areas would first be made by the Department of the Interior. Coal areas appearing to have "significant national potential" would be identified and subjected to environmental and land use analysis. Those areas found suitable for leasing would be "selected and prioritized by comparing resource, socioeconomic, and environmental values. " Using DOE production targets as a goal, leasing targets would be set for those areas found to have the highest priority. Industry would then be asked to nominate tracts within the selected areas that it wished to lease. The frequency and size of leases would be timed to meet the leasing targets for each area.

Option III: Government Selects Areas and Tracts for Leasing

Under the third option suggested by the Review Committee, the Government would follow the procedure specified under Option II for selecting areas for mining and setting leasing targets for each area. In addition, however, the Government would select those specific tracts to be offered for lease without requesting nominations from industry. As with Option II the frequency and size of leases would be keyed to the area leasing targets.

Comparison of the Options

Table 63 summarizes the Department of the Interior's comparison of these three options. As can be seen, in the Department's opinion, the *more* involved the Government becomes in the planning process the higher the cost to the Government and the greater the chance of production shortages produced by reason of Government errors in selecting areas that are not economically suitable for mining. On the other hand, the greater the Government role the more assurance there will be that adverse social, economic, and environmental impacts can be minimized.

Whichever approach is ultimately selected, a number of specific issues will have to be clarified. They include logical mining units, preference right lease applications, the requirements of diligent development and continued operation, estimated recoverable reserves, advance royalty payments, and the exchange of environmentally sensitive leased lands for other unleased Federal land. These topics are examined in chapter V1. There are also some important institutional issues con-

cerning the division of responsibility between the Department of the Interior and DOE regarding leasing. Given the inherent complexity of the leasing process, considerable effort will be required to prevent it from becoming hopelessly lengthy and cumbersome.

Table 63.—Comparison of Policy Options Under Consideration by the Department of the Interior

	Option I	Option II	Option III
1. Determination of production goals.	**Government**	**Government**	**Government**
2. Identifies areas for leasing.	**Industry**	**Government**	**Government**
3. Identifies tracts for leasing	**Industry**	**Industry**	**Government**
4. Defines areas for environmental planning	**Industry**	**Government**	**Government**
5. Cost of planning and administration.	—	**Increasing**	——*
6. Chances for environmental mistakes.	—	**Decreasing**	——
7. Chances for production shortages	—	Increasing	——
8. Likelihood of litigation	—	Decreasing	——*
9. Consideration of socioeconomic concerns.	—	Increasing	——→

SOURCE: US Department of the Interior

CONCLUSION

With the possible exception of carbon dioxide pollution, all the significant problems associated with substantially increased coal use appear to be solvable. That is, policy remedies exist to make coal a viable fuel option for the United States through 2000. But the fact that effective policies can be identified does not mean they will be adopted and implemented. If coal use is to be facilitated and the potential adverse impacts of such use controlled, a complex network of law and regulation will be required to deal with environmental, community, health, safety, and other impacts and to a lesser extent, coal supply and demand. Most of that framework already exists but some does not. Under the best of circumstances there will be difficult problems of coordination, administration, enforcement, technological improvement, and cost. In short, the ingredients for an effective national coal policy exist, but that achievement will not come easily or inexpensively.