# VI. Societal Impacts

# Societal Impacts

## Societal Impacts Overview and Findings

In addition to influencing energy supply and demand, the National Energy Plan will affect, directly or indirectly, immediately or eventually, most aspects of life in the United States. Although some of the individual impacts are clear, the net effect of the Plan on particular regions or income groups or sectors of the economy cannot be predicted with certainty. Moreover, all the elements of the impact equation are not present: some measures for mitigating adverse impacts are not discussed in the Plan, e.g., in the case of regional impacts. As in any major policy shift, risk and uncertainty exist and this must be recognized, although alternative policies to deal with these risks could be formulated.

**The indicated effects of the Plan on the overall economy and employment are likely to be minor but adverse, but these costs appear small compared to the cost of increasing reliance on foreign energy sources.—** The basic energy choice to be made is between a series of immediate actions that may result in an economic slowdown which the Nation can endure, and a failure to act at all, which would lead to a major economic disruption in the future.

Even though the effects of the Plan on the overall economy are likely to be small, certain regions, sectors of the economy, and income groups could be more seriously affected, either by the provisions of the Plan itself, or by the failure of the Plan to redress adverse impacts resulting from the general energy situation as has developed since 1973. The Plan may not fully cushion lower-income persons from the effects of rising energy prices, although the general effect on income distribution should be progressive. Although no plan should be expected to foresee and offset all inequities, the National Energy Plan could usefully include a program to monitor its equity effects and those of the general energy situation, and a mechanism for proposing programs to redress inequities.

A number of participants in the analysis felt that a discussion of energy-related market structure, in particular horizontal divestiture, would be useful. However, OTA, in review, concluded that it did not have the materials in hand to do an analysis in enough detail to be a useful contribution to the debate in Congress.

**it is unlikely that the strong measures necessary to meet the environmental goals of the Plan are compatible with a substantial increase in the use of coal on the schedule proposed in the Plan.—** A deliberate choice between increased use of coal and air-quality goals will probably have to be made in the short run, at least in some regions. Moreover, emphasis on immediate, accelerated use of coal may foreclose some more acceptable, longer-range coal uses and other energy technologies. Even if air quality could be protected during the coal-conversion program, there are a number of other adverse environmental and social impacts of increased coal production and use that are not addressed in the Plan. These range from water pollution, to mining safety, to transportation impacts.

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**The Plan does not provide enough emphasis on health research.—** Health impacts are especially uncertain for coal and other fossil-fuel technologies because health research in these areas has been more limited than the research on the effects of ionizing radiation. Questions of thresholds and synergisms are of especial importance to a thorough understanding of health effects from all energy technologies. Possible long-term health effects from coal gasification and liquefaction are of particular concern. There is an urgent need for a comprehensive and comparative assessment of the health effects of energy supply systems and for an environmental monitoring system to provide an early warning of unanticipated environmental problems. Research also is needed on the possible adverse effects of tight insulation on the indoor environment, and on outdoor emissions from diesel automobile engines.

**For a variety of reasons, the role of nuclear electricity generation is subject to controversy.— There is no public consensus on the questions of safety, standardization, waste disposal, the environmental effects of normal operating conditions, and the probability of sabotage. It may be especially important to undertake a systematic comparison of nuclear power with other energy alternatives, with full public participation, so that a broader consensus** about the relative desirability of nuclear power can be developed.

**More encouragement should be given to less polluting technologies, especially solar energy systems.—** The solar tax credit is limited to solar cooling and heating in principal residences, and fails to encourage a wide variety of applications solar could have now or in the near future. The encouragement a tax credit would give to solar photovoltaic devices, for example, might have a very small immediate effect on energy use, but it could serve to accelerate the eventual economic competitiveness of a wider range of solar photovoltaic applications.

**The roles of State and local governments in implementing the National Energy Plan are not clear.—** There is a **serious** question, not addressed in the Plan, **of how** to identify and respond to regional differences in economies, environment, resources, and social conditions. National energy policy will have to not only take such differences into account, but reconcile them through continuous interaction with and participation by the governments affected.

By emphasizing the leadership role of the Federal Government to the neglect of State and local roles, the Plan appears to downgrade the importance of these levels of government in energy decision making. It is not clear from the proposal what information from the Plan's proposed three-part energy information program would be available to the States, although their need for accurate, up-to-date information is as great as that of the Federal Government.

**The chances for success of a national energy policy will be enhanced by a deliberate effort to involve large numbers of citizens in the technicalities of shaping that policy.—** participation in shaping energy policy by the large numbers of organized and unorganized parties with a vital interest in that policy requires involvement from the earliest planning stages

through every phase of the process. To be effective, such participants should be well informed. Since much energy information is highly technical, citizens' groups will need access to expertise which, in turn, requires sustained financial support. The Plan also should include a program to provide financial and technical support to help link citizens' groups to energy policy development.

**Implementation of the National Energy Plan will have serious and inequitable impacts on some regions of the country, but the Plan contains no provisions for giving regions that will be particularly hard hit either time or money to adjust.—** Some regions of the United States will be able to adjust to the Plan's goals for conserving gasoline more easily than others. Some areas have particularly great energy needs for heating and cooling. It is not possible, given existing technologies, to burn coal in some regions without risking severe health problems. Some rural areas, particularly in the West, are likely to experience severe community impacts as a result of accelerated fossil-fuel development. There are also regional differences in the potential for conservation in the industrial sector. Many of these differential impacts would occur with or without the Plan. All of them are increased by the Plan, which aside from a statement that recognizes regional diversity takes no general account of it.

**The acceleration of domestic energy development mandated by the Plan will depend significantly on increased production from resources on Federal lands.—** If the Plan's production goals are to be met, problems and controversies associated with managing the development of federally owned energy resources will have to be addressed more directly, particularly those problems relating to the role of States in determining which resources are to be developed, which laws and regulations are to be applied, and whether accelerated development can occur without compromising important economic, environmental, and social values.

**The Plan does not adequately link its short-term proposals to a long-range energy picture and examine the consequences of its strategies and tactics from the perspective of post-1985 energy development.—** The Plan proposes fundamental changes during a relatively short period of time in the patterns of energy supply and demand. It does not address the question of whether those changes will provide a stronger or weaker base for planning and development after 1985. For example, the Plan assumes business-as-usual production of automobiles and trucks between now and 1985, but does not relate that assumption to the fact that domestic supplies of oil will almost certainly continue to decline after 1985. This raises the question of whether more emphasis should be placed on developing new sources of fluid energy immediately in the hope that supplies will be available in the future to power the stock of motor vehicles.

The Plan also does not propose specific programs that could make a start toward achieving new land-use patterns that are inherently more energy efficient than existing patterns. Nor does the Plan recognize that

continued population growth, including immigration, could jeopardize the goals of *any* energy plan. Finally, the Plan does not examine the basic philosophical questions of continued economic growth and what environmental amenities are to be absolutely protected, no matter how severe the energy situation may become.

# Issue 1

# Macroeconomic Impacts

**What are the likely effects of the National Energy Plan on the growth rate of real GNP, the rate of unemployment, and the rate of inflation?**

## Summary

The indicated effects of the Plan on the economy and employment are likely to be minor but adverse. Moreover, the macroeconomic costs of the Plan appear small in comparison to costs of increasing reliance on foreign energy sources.

Prices of energy products as well as other products which use energy in their manufacture or distribution will rise as a result of the Plan. It should be noted that present law would increase domestic oil prices to the world market level in 1979 in any case, because current price controls are scheduled to expire at that time. These price increases will add to existing inflationary pressure and may reduce consumer purchasing power (aggregate demand), thereby slowing economic growth and increasing unemployment. The extent of such effects, however, will depend on the effectiveness of proposed rebates of energy tax revenues in offsetting reduced purchasing power and the ability of the economy to respond to changes in relative prices as energy costs rise. The latter issue relates to the ability of the economy to institute more labor-intensive processes as the relative

prices of energy, capital, and labor diverge from their historic relationship, and to the degree to which public policy can be designed to encourage labor-intensive processes.

The near-term (1 977-79) macroeconomic effects of the Plan appear to be relatively small. However, the mid-term (1 980-85) effects will probably be larger and of greater concern. The Plan does not address the changing influence on the economy it will have over time, nor does it recognize or plan for the use of monetary and fiscal tools in addition to rebates to reduce the adverse effects of increased prices and taxes.

Forecasts of future macroeconomic impacts are far from reliable. Economic forecasting models are an important source of information for policy makers. Because of the fundamental limitations of models as simplified representations of the world, even the best model cannot ensure that the future will match its projection. Efforts to ascertain and bound the risks that are implicit in forecasts of macroeconomic impacts would appear productive, as would the design of alternative policies to deal with such risk.

## Questions

1. What is the estimated cost to the consumer of higher prices and taxes for each year of the Plan, compared with those that would result without the Plan? How are these costs divided among the several tax and price proposals?
2. Are there measures that can mitigate the inflationary impact of the proposed price and tax increases?
3. To what extent will the various proposed rebates offset the loss in consumer purchasing power caused by higher prices, taxes, and inflation?
4. How will the income redistribution features of the tax-rebate system affect consumption, savings, and wage demands ?
5, What impacts will a net loss of real consumer purchasing power have on the rates of economic growth and unemployment ?

## Background

For the past two decades, the consumption of energy and the production of real GNP have grown together, both at somewhat over 3 percent per year. The energy plan proposes the growth of energy consumption be reduced to an average of 2 percent per year by 1985, This proposal raises the possibility that GNP growth will be slowed correspondingly and that the rate of unemployment will increase during the period covered by the Plan.

Virtually all forecasts agree that the effect of the Plan on GNP growth and employment opportunities will probably be quite moderate. Industrial use of energy, the source of most of the GNP output and job opportunities, is expected to grow at a slightly higher rate than heretofore, with energy savings coming largely from reductions in transportation and residential-commercial energy use. As a result, a GNP that might amount to $2 trillion in 1985 (in 1972 prices) would be reduced as a consequence of the Plan by perhaps $1s billion, or less than 1 percent. Clearly, such estimates make no pretense of precision; they merely indicate the general degree of impact. In

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this instance, the estimated effect can be interpreted as almost negligible from the standpoint of the overall economy, but it is more likely to be adverse than favorable.

The likely impact on overall unemployment also is very small. A fairly reliable historical relationship is that a l-percent decline in real output corresponds to a 0.3-percent increase in the unemployment rate. The anticipated reduction in 1985 output therefore translates into an overall unemployment rate that is higher by 0.2 to 0.3 percentage points. Again, this is a very tentative estimate, but indicative of the small macroeconomic impact of the Plan. Public policy initiatives which would encourage a transition from energy-intensive to labor-intensive processes would assist in mitigating any impacts on employment.

An important feature of the Plan is to induce energy conservation and a shift to more abundant fuels by encouraging the prices of oil and natural gas to rise. The direct impact of these price increases are more likely to be felt by industry than by the consumer because petroleum products are already being priced on a marginal cost basis. New taxes will be imposed on oil and natural gas used by industries in 1979 and utilities in 1983 to encourage the use of coal and the adoption of energy-conserving technologies. These taxes are likely to be passed on to the consumer indirectly through the prices of purchased goods. The crude oil equalization tax would be reflected in higher gasoline prices. The only direct increase in consumer prices for energy products would result from a proposed standby gasoline tax.

As indicated, however, increases in the price of energy to the industrial sector will lead to greater or lesser increases in the prices of all commodities, and indirectly to increases in wages, with further inflationary consequences. This is a slow process, and the magnitudes of the effects are hard to foresee. Econometric estimates suggest that during the first 5 years of the Plan the cumulative inflationary impetus will be of the order of 2 percent (i.e., 0.4 percent per year).

Although the inflationary impact discussed above is not negligible and could be regarded as a necessary cost of reducing dependence on imported oil, its full impact may be avoidable. Coordinated monetary and fiscal policy could be used to moderate the Plan's adverse effects on inflation, just as the Plan's rebate system is aimed at reducing the impacts on real purchasing power and the associated growth-employment impacts.

# Issue 2

# Distributional Impacts

**The National Energy Plan will impinge on many explicit and implicit social goals. The economic impact will vary by income class, region, and sector, posing equity questions that may require mitigating policies.**

## Summary

It appears that the Plan will affect various groups in American society in different ways, Some groups could be economically advantaged by the Plan while others will most certainly be harmed. If the Plan is to be successful, all Americans will need to change consumption patterns with respect to energy and possibly, to some extent, lifestyles. Income classes, regions and economic sectors all will feel these impacts, often in conflicting and inconsistent ways.

The question is whether any one group is disadvantaged so adversely as to require Federal assistance. The Plan deals with this problem on only one level—that of income equity. Socially and politically, other distributional classifications will also be important. Moreover, it is even unclear whether the measures designed to mitigate the Plan's impact on the poor will be adequate.

Since distributional impacts of substantial policy changes are often widespread, diffuse, and uneven, there is probably no way to foresee the total ramifications, much less design mechanisms at the start to offset all inequities. What the Plan could include, however, and what is lacking, is a program to monitor its own equity impacts and those of the general energy situation plus a mechanism for effectively proposing programs of redress.

## Questions

1. The Plan attempts to minimize adverse impacts on lower-income persons. How likely are these attempts to succeed ?
2. What mechanisms should be designed to identify important adverse distributional impacts which might result from Plan implementation?
3 Can industries and regions be identified which will be directly affected by the Plan in a substantial way—either advantageously or disadvantageousl y?
4. Have potential secondary equity impacts of the Plan been identified?
5. Can differential equity impacts with and without the Plan or with alternative policies be ascertained?

## Background

U.S. equity goals have never been stated as clearly as many other goals but general agreement might be reached on the following principles: (1) No industry, area, or individual, should be importantly affected by a public policy unless these impacts have been weighed carefully; and (2) The adverse impacts of policy should be borne progressively, i.e., the greater impact should be borne more than proportionately by those better able to bear it.

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There is no national consensus on whether the mitigation of inequitable situations should occur as an organic part of the programs or policies that create them or be left to the operation of more general ameliorative measures. In the present instance, the former choice has been made since the Plan contains mitigating or ameliorative measures along with its direct energy proposals. As a result, it can be evaluated as an equity-preserving or enhancing plan.

There is, however, a complication. The energy situation of the United States will be creating its own impacts on social goals. The Plan can therefore be evaluated in two ways, First, it can be judged to see if its provisions minimize its own adverse impacts on equity goals. Secondly, it can be judged to see if its provisions effectively offset the adverse impacts on equity goals stemming from the Nation's overall energy situation as it would exist without the Plan, Both standards of judgment are relevant.

**Industrial Sector Effects—it** is reasonable to expect that uneven effects of the overall energy situation will be felt in industry, with the largest effects on those whose direct energy consumption is greatest. The two largest energy-consuming industries are chemicals and allied products, and primary metals. Another obvious target for large impacts is the automobile industry.

Areas and individuals dependent on these industries are likely to bear a relatively heavier burden of adjustment to the general energy situation as the industry product prices rise at an above-average rate, as demand for their product changes, and as they alter their techniques and rates of production to adjust to changes in input prices and output demands. These impacts of the overall energy situation are likely to be exacerbated by the Plan, which makes no proposals to mitigate these general effects or the extra adversity the plan may impose.

Moreover, the Plan creates price differentials which are likely to create additional differential impacts. If all tax and rebate proposals are implemented, oil will cost consumers quite different prices for different uses. By 1988, a barrel of oil at today's prices will cost a utility $14, an industrial user and commercial aviation $17, and a user of gasoline $36.68. The Plan contains no explicit recognition of these newly created differentials nor of the effects they may have on different industrial sectors.

The Plan clearly contains no estimation of the relative ability of industries to bear the differentials created either by the general energy situation or by the Plan. It seems unlikely, therefore, that impacts will be equitably borne. No mitigating proposals are made.

**Regions—Since regions are not uniform with respect to industrial** mix (see above) or relative income distribution, differential impacts on areas are to be expected from these two sources. There are other reasons for expecting differential area impacts as well. Some areas are more rural and will be most affected by the particular emphasis the Plan places on curbing gasoline consumption. Some areas have extraordinary energy needs for heating and cooling because of climate extremes. Some areas are likely to experience greater environmental impact from fuel production and conversion than others. Community facilities and services in some areas will be strained by expanded energy production projects.

The most prominent example is coal mining. The Plan calls for a 100-percent increase in U.S. coal production by 1985—more than 600 million tons per year of new production, and possibly as much as 700 million tons when replacement of depleted mines is considered. The primary areas for increased production will be Appalachian States and States in the northern Great Plains and the Southwest. Areas where production takes place will experience an expansion in regional employment, total income, and demand for community services and housing. (See Issue #14.)

Additional examples include families in rural areas that spend more of their income for gasoline than urban families, and families in the South and West that spend more on this energy product than those in the North and East. Similarly, an increase in the cost of home heating and cooling will more strongly affect areas with more extreme winter or summer climates, depending on the regional mix of fuel oil, natural gas, and electricity as sources of energy for home space conditioning. There are also regional differences in the potential for conservation. Because South-Central States use more fuel per manufacturing employee than Western or New England States, they may be more heavily affected by the Plan.

Many of these differential impacts would occur without the Plan. All of them are increased by the Plan, which in general takes no account of them.

**Individuals—The Plan was drawn up with particular awareness of differential effects on individuals** in different income classes and consequently cannot be faulted for overlooking these impacts. Though there are differences of opinion (to be discussed below), some commentators (the Congressional Budget Office, for example) conclude that the overall effect of the Plan's taxes and rebates would be modestly progressive. (It should be noted that this conclusion was based upon the Plan as a whole. Modifications to the Plan could change that conclusion.) That analysis, however, relates only to changes that would result from implementing the Plan and does not cover differential effects by income class of the overall energy situation.

The data confirm what would be expected—the share of income devoted to energy-related expenditures falls sharply as income rises. One estimate is that the lowest-income quartile spends more than 30 percent of its income directly or indirectly on energy, while the highest quartile spends about 10 percent. The Plan does not address this issue in a substantive way. It promises "a reformed welfare system" and a "redesigned emergency assistance program" to help (p. 90), but these proposals may not go far enough to protect low-income families, Even the Plan's proposed per capita rebate of wellhead taxes will not necessarily assure equity because not all of the tax will be rebated to individuals (some will go to offset revenue losses from investment tax credits) and the tax will not be rebated progressively (Sec. 1403). The proposed welfare and emergency assistance programs may aid the poorest groups but those just above that level are likely to have the largest burden imposed upon them by the overall energy situation.

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If there should be an added increment to inflation, as seems likely, or if the Plan should prove to adversely affect economic growth, lower-income groups will bear the brunt of this. The young may be affected by a further slackening in job opportunities, coupled with added inflation. The situation of the young, as affected by the Plan, is not addressed.

The poor, and particularly the rural poor who probably comprise most of the half of the lower-income group who own cars, will be hit most heavily by the increases in gasoline prices the Plan proposes. Not only do they spend a relatively larger proportion of their income on gasoline, they suffer from two other handicaps that would make it difficult to adjust to higher transportation costs. First, mass transit is not available for all essential travel, such as to work. Secondly, the poor generally cannot afford new, gas-economizing cars. They will be the purchasers in the second-hand market of "gas guzzlers" whose relative prices will fall as gas prices rise, bringing them within reach of lower-income groups. Thus, those who can afford new, fuel-efficient cars will be saving money on gasoline while the poor will be spending more on gasoline. No element in the Plan recognizes or offsets these possible inequities.

A comparable lack of capital will preclude lower-income homeowners from taking advantage of the tax-credit programs for residential insulation or solar energy units. They may not be able to meet "front end" costs and they may not be paying enough taxes to get the full tax credits proposed by the Plan.

One group of Americans who will not be able to benefit from residential energy conservation programs are tenants who pay for their fuel but who cannot be reimbursed for insulation expenses. Tenants who do not pay for the added cost of heating oil directly will do so indirectly through higher rents, but they are not likely to benefit from rebates on home-heating oil. The Plan's proposed increase in the federally financed weatherization program will help in sheltering the poor against higher fuel costs. However, the current program does not extend such help to renters. In addition, the level of funds available for insulation assistance may be too small. At present, there are approximately 9 million substandard homes in the United States, homes which for the most part are inhabited by the poor. The weatherization programs will handle only a small fraction of these structures.

Probably no plan could foresee and offset all inequities. What the Plan could include, however, and what is lacking, is a program to monitor its equity effects and those of the general energy situation and a mechanism for effectively proposing programs to redress inequities.

# Issue 3

# Air Quality Impacts of Increased Combustion of Coal

**Strict enforcement of strong environmental regulations will be necessary to protect air quality while coal production and use increase under the National Energy Plan; such environmental policies may, in turn, slow the pace of growth in coal utilization.**

## Summary

A major shift from petroleum fuels to coal is a central element of the National Energy Plan. Under the Plan, coal would provide 29 percent of U.S. energy requirements in 1985, compared with 18 percent in 1976, reducing demand for oil by the equivalent of 2.4 million barrels a day. As the Plan's coal proposals are implemented, strict environmental protection policies will be required to avoid adverse impacts on air quality. The Plan requires installation of best available pollution control technology on all new coal-burning facilities. Pending amendments to the Clean Air Act also would cancel credits for tall stacks, require control equipment to be installed on all facilities that do not meet emission standards, and set penalties for noncompliance with standards and failure to maintain control equipment in good working order. It is not likely that such strong environmental measures are compatible with a substantial increase in the use of coal on the schedule proposed in the Plan. A deliberate choice between increased use of coal and air quality goals may have to be made at some point in the future.

## Questions

1. Under what, if any, circumstances would a coal-burning facility be issued a variance from Clean Air Act emission standards ?
2. Under what conditions would a powerplant or industrial facility be allowed to continue to use oil or natural gas rather than coal ?
3. If all new coal-burning facilities are required to install flue-gas desulfurizers (FGD), currently considered the best available technology, would development of other technologies such as fluidized-bed combustors be delayed?
4. What level of funding is contemplated in fiscal year 1978 for developing more effective control and combustion technologies ?
5. To meet the goals of the National Energy Plan, how many new FGDs or scrubbers must be manufactured and installed between now and 1985 ? Can suppliers meet that production schedule?
6. Will efforts to make coal combustion environmentally acceptable delay development of alternative technologies such as solar which are environmentally cleaner?

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## Background

The National Energy Plan states that energy goals are to be achieved "without endangering the public health or degrading the environment" and "without sacrifice of air quality standards . . ." A Presidential review panel would evaluate the health effects of expanded coal use (pp. 67-68). These are commendable goals, but it is possible that they cannot be achieved without sacrificing the Plan's goals for coal utilization.

For coal combustion, the Plan proposes that the best available control technology (BACT) be required on all new coal-burning facilities. If the Plan's proposals and the strongest features of pending amendments to the Clean Air Act are implemented on schedule and without exceptions, the sulfur dioxide, particulate, and nitrogen oxide levels in the air will 'not change significantly as a result of the Plan, assuming the conservation goals of the Plan are also met.

However, combustion of coal releases more carbon dioxide into the atmosphere than either oil or natural gas and there are other inherent conflicts between the Nation's air quality goals and the Plan's coal utilization goals. For example:

1. In certain regions of the United States that do not yet meet ambient air quality standards, no new coal combustion can occur unless pollution from other sources is reduced at a faster rate than is now scheduled. This cannot be accomplished either easily or immediately.
2. Compliance with Federal air quality regulations depends on State implementation plans and State monitoring and enforcement mechanisms, which would delay the effect of new Federal programs. Some States have adopted more stringent standards than the Federal Government, in some cases restricting or forbidding coal utilization even where Federal regulations would allow it.
3. Rapid implementation of air pollution abatement policies using stack-gas cleaning is opposed by most public utilities on the grounds that it is not reliable, that scrubbers that use lime or limestone produce unacceptable amounts of sludge, and that better pollution control technology will be available by the 1980's.
4. It may not be possible to manufacture scrubbers or other pollution control equipment fast enough to meet the 1985 goals of the Plan. Delays of compliance may result.
5. The Plan's emphasis on rapid conversion to coal, coupled with its requirement that the best available control technology be installed, may divert capital from research and commercialization of alternative technologies, such as solar energy units, and conservation technologies.
6. Delays in expanding coal production at the pace proposed by the Plan may be necessary or desirable because of environmental, social, and institutional problems associated with increased coal production. (See Issue #1 4.)

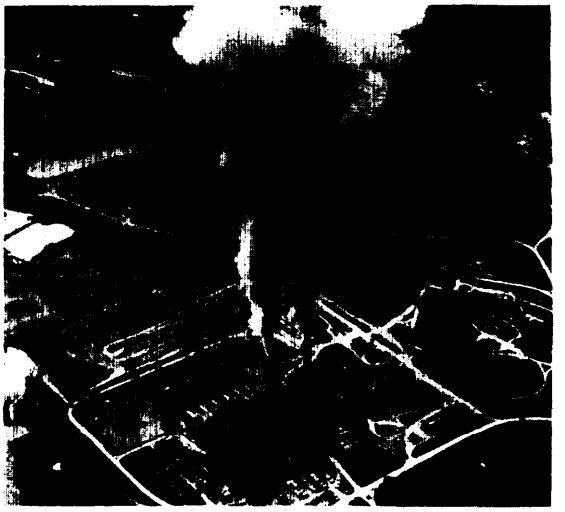
7. Uncertainties exist as to which pollutants need to be regulated and what levels are tolerable. To the extent that these uncertainties reflect inadequate correlations between environmental causes and health effects, the uncertainties eventually can be solved by expanded health research and monitoring. (See Issue #5.)

For these reasons, it is likely that Federal and State regulatory agencies will be asked to issue variances from air quality standards for new powerplants and industrial facilities and for existing industries to enable a shift from oil or gas to coal. Arguments for variances may be compelling: Some coal-burning facilities could not be operated without violating air standards. Better control technology may be available within a few years. A firm's economic analysis may indicate that it makes more sense to shut down operations than to convert to coal and comply with air quality regulations. Past experience indicates that some regions will prefer deterioration of environmental quality to losing a major employer. If decisions in such cases are to stress conversion to coal, granting of variances that delay air quality compliance schedules probably will become so common that air quality will decline in some regions. To a limited extent, the pressure for variances can be eased by siting facilities outside metropolitan areas.

One consequence of limited conversion of oil- and gas-burning facilities to coal combustion will be continued reliance on oil as a fuel source. In that case, it would be important for refineries to retrofit to produce low sulfur oil. An increased supply of low sulfur oil will result in decreased sulfur dioxide pollution from oil-burning sources and hence permit more coal conversions without degrading a region's ambient air quality.

Emphasis on immediate, accelerated utilization of coal may foreclose some more acceptable, longer-range coal uses. Additional research is warranted on post- and pre-combustion cleaning techniques. New combustion techniques using nonconventional boilers show promise of reducing emissions, especially nitrogen oxides. For example, fluidized-bed combustion offers higher combustion efficiency and cleaner burning than traditional boilers. Investment credits or other market incentives could advance these and other cleaner technologies.

Achievement of air quality standards is also dependent on meeting NEP conservation targets. However, conservation savings tend to reduce national emission levels (as in the case of more fuel-efficient autos) and these savings will normally have far less significance in particular local situations where coal conversion is at issue.



Environmental Protection Agency Photo

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## Issue 4

## Other Environmental Impacts of Coal Utilization

**Even if air quality could be protected, meeting the coal production and utilization goals of the National Energy Plan may result in other adverse environmental and social impacts.**

### Summary

Although the Plan "intends to achieve its energy goals without endangering the public health or degrading the environment" (page **67),** its only specific environmental protection proposals concern air quality and strip mining reclamation. However, both combustion of coal and conversion of coal to synthetic gaseous and liquid fuels may result in a much wider range of environmental and social impacts, some of which are not presently regulated. The magnitude of those effects could jeopardize the realization of the coal utilization goals of the Plan, even if air quality standards were met.

### Questions

1. The Plan supports amendments that would strengthen the Clean Air Act. What policies and procedures presently addressed by the Federal Water Pollution Control Act will protect water from pollutants such as acid and water runoff from coal mines, disposal of water used in precombustion washing of coal, and in coal transportation?
2. What are the environmental impacts associated with disposal of waste products (e.g., sludge) from scrubbers in the quantity envisioned by the Plan?
3. What assumptions underlie the Plan's conclusion " that "it appears that railroads could transport the additional coal" (p. 65) ?

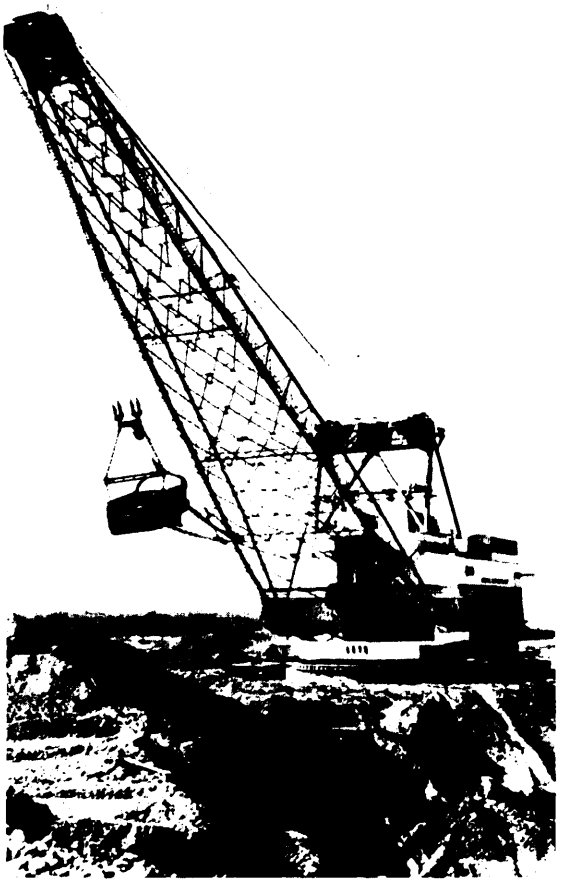
### Background

The National Energy Plan, in outlining its environmental policy regarding coal (pages 67-68), emphasizes the protection of air quality and the need for national strip mine legislation. Mitigation of other specific environmental impacts is omitted from the Plan except for impacts on public services in local communities (p. 89). (See Issue #14.)

The potential impacts of a major expansion of coal production and utilization are extensive. Impacts other than those mentioned in the Plan include the following:

1. Environmental and social impacts of coal mining. In the West, potential problems include water consumption for surface reclamation, contamination or loss of ground water aquifers, drainage of highly alkaline waters from Western mines, and rapid population increases and boomtown development in rural areas. In the East, potential problems include acid-water runoff from mines (especially after mine abandonment, or reactivation of old mines, and in mines above valley floors), and land surface subsidence.

2. Safety in underground mines, Coal extraction and processing pose health and safety hazards to miners, other coal workers, and local populations. The health and safety record in coal mining has been among the worst in the United States, with fatal and disabling injuries most prevalent among newly employed miners.



Federal Energy Administration Photo

3. Currently uncontrolled air emissions from coal combustion. Although subject to some regulation, emissions of nitrogen oxides are not adequately controlled by best available control technology. Radioactive materials, hydrocarbons, carbon monoxide, and heavy metals in gaseous, liquid, or solid states are not regulated at all.

4. Climatic and weather effects. Coal, like other fossil fuels, releases carbon dioxide and particulate into the air during combustion, both of which may contribute to global climatic changes. Conversion to coal would increase carbon dioxide emissions because-per unit of energy delivered-coal yields 11 percent more carbon dioxide than oil and 67 percent more than natural gas. An accelerated use of coal would therefore aggravate any long-term adverse effects on climate that result from carbon dioxide.

5. Waste products from pollution control devices. The harmful emissions from coal combustion do not disappear when control technologies are introduced. Rather, the technologies convert them from one form to another-gaseous to dissolved solid, for example. Consequently stack-gas cleaning produces waste as sludge. Some scrubbers produce about 3,000 tons of solid suspended in several thousand tons of water per day for each Gigawatt of power generated. Because of the large quantities of sludge produced, disposal may cause land-use problems. The moisture content of the sludge, for example, must be contained to avoid contamination of ground and surface water.

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6. Emissions from coal gasification and liquefaction plants. Even if air pollutants from these facilities are controlled under provisions of the Clean Air Act as amended, waste water and solid wastes could present problems. For instance, gasification waste water may have a concentration of inorganic materials that is as high as that in sea water, plus organic substances including cyanide, thiocyanate, ammonia sulfide, phenols, and oils. Waste-water treatment in the Lurgi gasification system requires tar-oil-water separation (three stages), filtration, phenol recovery, ammonia recovery (in an ammonia still), and activated carbon treatment. Several components in the system are new techniques, and an integrated system has never been operated at commercial scale. Total quantities of solid wastes will depend on the ash content of the coal, generally ranging from 2,000 to 3,300 tons per day from a 250 million cubic feet per day gasification plant; these solid wastes will contain most of the heavy metals from the coal.

7 Transportation system requirements, Although the Plan asserts that the Nation's railroad network is adequate to deliver anticipated amounts of coal (p. 65), the railroad industry's capacity to handle this increased traffic will depend on investment in rolling stock, and in some areas, improved track and signal systems. Even where the present rail network is adequate, increased coal transportation could result in longer trains and more frequent trips. This, in turn, could lead to more accidents, railroad congestion, more frequent delays at automobile crossings, greater sustained noise levels, and more dust and air pollution along railroad rights-of-way. These effects will be especially noticeable in small rural towns.

   Other transportation and conversion alternatives, including slurry pipelines, minemouth power generation, and liquefaction or gasification of coal prior to transportation should be considered, especially in the West.

8. Other long-term impacts. Some scientists believe that coal burning releases not only relatively well-known and harmful emissions, but other compounds whose health impacts are presently unknown. These compounds may have long-term carcinogenic or mutagenic effects or they may contribute low-level radiation to the environment.

The inescapable conclusion is that coal is a "dirty" energy source. The sulfur, ash, heavy metals, radioactive substances, and carbon usually found in coal are all present, in altered states, after combustion. Additionally, coal must be extracted and transported, which requires extensive use of land, people, and equipment and creates a range of environmental and health hazards. Managing these processes so as to avoid the adverse effects is a challenge which the National Energy Plan does not fully address.

# Issue 5

# Health Impacts

**The long-term health effects of the energy priorities established by the National Energy Plan are uncertain.**

## Summary

Even where standards have been defined for emission levels and environmental quality, the following energy-related administrative or information gaps exist: (a) scientific evidence to document the health impact of different levels of pollutants; (b) an effective system to monitor pollutant levels and maintain health impact statistics; and (c) a consistently applied approach to correlating pollution levels and human health. The uncertainties are especially great for coal and other fossil fuels, because health impact research has been sparse compared to research on ionizing radiation. Consequently, there is an urgent need for a more comprehensive and comparative assessment of health effects of energy supply systems and for an environmental monitoring system to provide an early warning of unanticipated environmental problems.

## Questions

1. Have the human health impacts of the National Energy Plan been estimated (e.g., morbidities and mortalities in 1985 with and without the Plan) ?
2. Is the threshold concept of pollution regulation compatible with the protection of human health? Do present pollution regulations include the synergistic effect of some pollutants? How frequently should environmental standards be reevaluated?
3. As a result of the energy plan, how will the level of radiation in the environment (nationally and regionally) be affected by (a) coal utilization, (b) nuclear power generation, and (c) geothermal energy development? Are radiation effects of coal and geothermal facilities monitored?
4. How will human health be protected from carcinogenic substances in the process stream of coal gasification or liquefaction facilities?
5. What is the present status of research on the long-term genetic effects of compounds produced by the conversion of coal to a liquid or gas?

## Background

Although environmental protection and human health and safety are prominent concerns of the National Energy Plan, too little is known about the health effects of the energy technologies, processes, and resources included in the Plan to be certain of their impact on human health.

Health effects are relatively well understood in at least two areas: (a) physiological impacts of relatively high radiation levels and certain radioactive isotopes, and (b) physiological impacts of relatively high levels of other possible energy byproducts (such as heavy metals, cyanide, and some air pollutants) which have been identified by searching for the major causes of specific

human deaths and illnesses. But even in those well-studied areas, there is disagreement on the level below which there is no hazard to human health-or even whether such a threshold exists.

The energy plan embraces present environmental legislation which regulates sulfur dioxide, particulate, and nitrogen oxide emissions from fossil fuel combustion, but the Plan fails to address other possible environmental contaminants, some of which may pose greater long-term threats to human health. Current regulations fail to provide for synergistic or long-term health effects. Regulation or precursors, such as sulfur dioxide, may be insufficient when reaction products, such as sulfuric acid, cause the significant health effects. The Plan supports present protections against contamination from highly radioactive materials, but it does not consider the possibility that a general rise in low-level radiation may be a health hazard. Other kinds of possible effects that are overlooked include long-term global climate modification as a result of carbon dioxide build-up and long-term genertic damage from chemical byproducts of coal gasification or liquefaction.

In addition to the general lack of information on environmental health, it is still uncertain whether current environmental protection standards are appropriate. Monitoring of air quality and correlation of air quality changes and human health effects are needed. Interagency and interoffice coordination of research on pollutants, overall air quality, and human health statistics would help ensure that emission standards are neither too lenient, allowing too many adverse impacts on health, nor too strict.

Scientific and environmental health research is necessary in areas beyond "best available control technologies, " including those health effects and pollutants which have not yet been identified. A process for reviewing and assessing the adequacy of national systems for protecting human health may help accumulate environmental health data. The mechanism and process need to have at least three elements:

1. A continuing assessment of the health impacts of energy supply technologies, including (a) an accelerated assessment of the long-term impacts of solid fossil fuels (coal and oil shale); (b) special attention to the human health significance of any chemical compounds and radioactive materials that are produced by energy supply processes; (c) identification and analysis of key morbidity and mortality indicators in the U.S. population, as they relate to pollution levels; and (d) an increased emphasis on environmental health in the training of personnel in health professions, together with special support for training in understaffed fields such as environmental toxicology.

2. Improvements in monitoring the quantities and characteristics of byproducts of energy supply facilities, with a special emphasis on improving the instrumentation for identifying byproducts of facilities burning or converting coal (a recent joint study by the National Academy of Sciences and the Nuclear Regulatory Commission found the Environmental Protection Agency's current monitoring programs seriously deficient).
3. A review of the requirements for measuring byproducts of energy supply facilities other than light-water reactors, to see if additional monitoring requirements are needed.

# Issue 6

# Impacts of Nuclear Power

**The National Energy Plan's proposal to increase nuclear electricity generation raises environmental and social questions.**

## Summary

Although the National Energy Plan emphasizes the increased use of coal to generate electricity in the United States, it also calls for light-water nuclear reactors to play a major role in reducing the Nation's domestic energy deficit. "By 1985 . . . nuclear power could provide as much as 20 percent of electricity supply" (p. 71), twice its current share. "There is no practicable alternative" (p. 70). But questions remain about the safety of nuclear reactors, the impacts of fuel cycle activities necessary to meet the needs of expanded nuclear power generation, the potential for sabotage, and the social desirability of concentrating electricity generation in the kinds of large central-station plants implied by nuclear energy options.

# Societal Impacts

## Questions

1. In what ways might the protection of nuclear reactors from sabotage abridge the civil liberties of the American people?
2. What is the potential for nuclear power generation on a small scale (e.g., the "nonproliferating reactor" design concept recently investigated by the Energy Research and Development Administration) ?
3. Are there plans to undertake a systematic comparison of nuclear power generation with other supply alternates? To what extent and how closely would representatives of the public participate in this comparative assessment ?

## Background (See also Supply Issues #9, #10 and #11 )

According to the National Energy Plan, as many as 75 additional light-water nuclear reactors could be in operation by 1985, joining the 63 presently operating plants (p. 71). The Plan calls for increased attention to reactor safety, waste management, proliferation, and other impact issues; but disagreement continues to exist about whether the risk of serious environmental and social impacts is acceptable.

In addition to concerns about the reliability of light-water reactors, the impact issues include:

1. The safety of nuclear reactors. The Plan notes that "the safety record of light-water reactors has been good, " but many people and groups in the United States believe that even a small risk of a serious accident is unacceptable, especially as the number of operating reactors increases. Although considerable attention has been given to the prevention of major accidents such as a core melt-down, much less is known about design alternatives that improve containment of radioactive materials in case of an accident. Evacuation plans for population in the vicinity of nuclear plants may be inadequate. If a major accident were to occur despite the low probability, not only could the immediate consequences be devastating, but the public outcry could force the shutdown of all other reactors. If a major commitment to nuclear power had been made, the disruption to the energy economy would be severe,

2. Other impacts of fuel cycle activities. A doubling of the number of nuclear plants will require additional mining, milling, enrichment, and transportation of nuclear fuel; and it adds to the economic and* energy-efficiency arguments for fuel reprocessing and recycling, especially if uranium resources turn out to be no higher than the more pessimistic assumptions. Each of these kinds of activities has environmental, economic, and social impacts; for example, mining, milling, and enrichment facilities produce tailings that add to radiation background. In addition, the nuclear reactors themselves may affect the local ecology by discharges from cooling towers to receiving waters or the atmosphere (dispersing heat, moisture, salts, other chemicals, and low-level radioactive products).

**3.** The potential for sabotage. There is no agreement on how difficult it would be to sabotage a reactor so as to cause serious damage in an area near a plant. It should also be noted that seizure and occupation of a reactor with a threat of sabotage could cause widespread disruption, even if sabotage efforts were unsuccessful or the threat was not carried out. Although NRC has recently upgraded security at nuclear reactors, questions about reactor safeguards remain.

4 Social impacts of centralized energy supply. An element in the social protests against nuclear plants is the opinion that nuclear power furthers the centralization of the U.S. energy supply system, favoring capital-intensive infrastructure and requiring technocratic elites. There are also civil liberty concerns about security and safeguards requirements at nuclear facilities.

For these principal reasons, even a supplementary role for nuclear electricity generation is open to controversy, and the issues need to be addressed more clearly and specifically than in the Plan. It may be especially important in the next few years to undertake a systematic comparison of nuclear power with coal and other energy supply alternatives. This comparison should involve extensive public participation, so that a broader consensus about the relative desirability of nuclear power can be developed.

# Societal Impacts

## Issue 7

## Alternative Technology-Solar

**The National Energy Plan underestimates the variety of contributions to energy production, conservation and environmental quality that can be made by solar technology.**

### Summary

Solar technologies can play an increasingly significant role in meeting the Nation's energy needs in the near future. These technologies protect the environment, create jobs, employ an inexhaustible renewable energy source, and provide an alternative to dependence on large-scale central electrification. To fully realize its potential for meeting a variety of the Nation's energy needs, solar technology requires incentives beyond the measures of the Plan.

### Questions

1. Why does the solar tax credit apply to only the taxpayer's principal residence, (National Energy Act, Sec. 1101 (a)) and not to vacation homes, rental property, light industry, or commercial buildings ?
2. Why does the solar tax credit apply only to equipment used to heat and cool buildings and heat water and not to other applications, which may be as economical and practical (e.g. photovoltaic power generation for certain remote-sensing applications) ?
3. What incentives, other than funding for research and development, are applicable to alternate energy technologies such as biomass technology, wind energy, and solid waste?
4. Some of the most useful applications of solar technologies may be in developing countries, especially in rural and remote areas. What are the plans for international cooperation in developing solar systems compatible with the energy and social needs of developing countries?

Federal Energy Administration Photo

## Background

The National Energy Plan provides a tax credit for installation of qualifying solar equipment, funding for installation of solar equipment in Federal buildings, and increased funding of various aspects of solar research and development (pp. 75-76). Also, the industrial tax credit for conversion from oil and gas may encourage use of solar energy as well as coal. Solar technology is the only available energy technology which can claim a neutral environmental impact in operation, which becomes a positive impact when one factors in the environmental degradation avoided by the replacement of fossil-fuel sources, as well as beneficial social impacts including job creation and reduction of total dependence on external, centralized electric power. The tax incentives specified by the Plan may be ineffective in realizing the variety of contributions solar energy can make.

Solar energy is a renewable energy source which has undeniable long-term applications. Additionally, solar technologies have some immediate applications. On a life-cycle costing basis, solar space and water heating is competitive with electric space and water heating in many parts of the country. Use of solar equipment to produce air-conditioning, mechanical power (for pumps and other applications), and electricity is technically feasible now but too expensive to compete with conventional energy sources in any but a few specialized applications. The market for all solar equipment may grow rapidly even without Federal support as the price of non-solar energy sources increases. The policy which keeps the cost of residential energy low is a great disincentive to solar energy.

# Societal Impacts

Additional incentives for solar technology may be needed to achieve even the limited solar goals of the Plan. Specifically, solar incentives, along with energy conservation measures, are needed for new-start housing. Some States have mandated installation of extremely inexpensive equipment which will permit the installation of, or retrofit to, solar water heating. Because of the overriding public policy considerations, mandating solar installation, where appropriate, or at least evaluating solar water and space heating has been considered. increased loans for small businesses would help develop the solar market in the small industry-commercial sectors. Making nonprofit organizations eligible for guarantees under the amendments to the Energy Policy and Conservation Act would also increase marketability. Mandating consideration of solar technologies where appropriate for Federal and State building programs would encourage public acceptance. Further, public acceptance can be heightened by rewarding States and localities for plans which emphasize renewable energy sources, through matching grants, revenue sharing systems, or various other Federal programs.

Additionally, the Plan mentions three specific legal and regulatory impacts of implementation of solar technology-+ quipment certification and installation, legal protection of incident sunlight, and utility rate regulation which affects solar users when backup power is required, The Plan omits specific recommendations in these areas, but encourages State and local action, The imprecision of these recommendations further diminishes the likelihood of expeditious implementation of solar technologies. (See Issue #1 O, on State-Federal relations. )

Finally, in the general area of alternative technologies, the Plan fails to address the issues of economies of scale, respective capital and labor requirements of the various energy sources, and social, demographic, and environmental impacts. For example, biomass conversion for portable fuels, and medium- and small-scale energy production systems, except for district heating, are not discussed. A growing number of energy specialists believe that the long-range implications of the social, environmental, and demographic impacts favor the careful matching of energy quality to end-use requirements and the use of decentralized, renewable energy sources. Because of the variety of solar technologies, its applicability to a variety of applications must be considered.

The Plan limits institutional attention of small-scale alternative technologies to creation of an Office of Small-Scale Technology (p. 80). The Energy Research and Development Administration's Office of Small-Scale Technology is currently authorized at $5 million for 1977-78. To have a sufficient impact on policy-program design, the administrative structure for alternative technologies should be prominent and well funded. Compared to the funding level of conventional energy sources, the current funding of the Office of Small-Scale Technology may be insufficient,

# Issue 8
# Indoor Environments

**Energy conservation in buildings may aggravate some existing health problems and create new ones.**

## Summary

Tight insulation in buildings and increased recirculation of indoor air in air-conditioning systems are effective tactics of energy conservation. However, these tactics may substantially increase concentration of pollution indoors. Further, recommended indoor temperatures need to take into account in a systematic manner factors of health, behavior, and efficiency.

## Questions

1. How much is known about the effects of tight insulation and recirculating air-ventilation systems in concentrating pollutants indoors?
2. How much work has been done on ways to ensure that energy-conserving building designs and energy-conserving modifications to existing buildings are compatible with clean indoor air?
3. What are the projected increases in indoor environmental contamination from the increased use of potentially or demonstrably hazardous insulation materials (e. g., asbestos, rockwool, fiberglas) ?
4. Does the range of indoor temperatures recommended for summer and winter take into account the temperature sensitivity of special population groups (e.g., the elderly, the chronically ill), the possible effects on susceptibility to infectious diseases, and the effects on performance efficiency?

## Background

Although Americans spend about 75 percent of their time indoors, it was not until recently that studies of indoor pollution were commissioned; present information on the health aspects of indoor environments is very limited. In promoting conservation measures in buildings, such as insulation (including weatherstripping, caulking, and other measures for thermal isolation), use of recirculated air, and restraint in heating and cooling, energy policy should fully take into account the possible effects of such measures on health.

Indoor air quality can be worse than that outdoors especially for particulate, including toxic substances like asbestos. Asbestos reaches air in rooms mostly from indoor sources, such as use of asbestos-containing talcum powders and the blowing of asbestos fibers into rooms from asbestos-lined ventilation ducts and wall interiors. In addition, gases such as carbon monoxide and nitrogen oxides can build up indoors from the burning of natural gas or oil for home heating and cooking. Lead is sometimes present in higher concentrations in nonindustrial buildings than outdoors. Toxic organic vapors arise indoors from cleaning fluids and aerosol sprays. Tobacco smoking further deteriorates indoor air quality.

Improved insulation of buildings proposed by the Plan will tend to seal in air pollutants and toxic substances in the course of achieving its primary purpose, which is to retain heated and cooled air. Increased recirculation in forced ventilation systems also will concentrate pollutants.

Although improved insulation is strongly encouraged only for residential buildings, rising fuel costs and tax incentives for fuel conservation could result in increased insulation for all types of buildings, and a decrease in fresh air in forced ventilation systems, This could, for example, affect the transmission of bacteria and viruses in hospitals, and schools, and other public buildings.

A preliminary study at Lawrence Berkeley Laboratory under contract to ERDA (LBL-5918) suggests that some indoor pollutants in the home may rise to levels several times those in peak polluted outdoor urban areas when the air-change rate approaches that being considered for energy conservation purposes. A more imaginative approach to energy conservation could take advantage of building design features which promote both energy conservation and good indoor air quality.

The effects of temperature on performance, health, and disease transmission have not received the attention they deserve, except for the extremes of heat and cold. Persons with heart disease, for example, are very sensitive to heat' and their chances of surviving a heat wave are smaller without air-conditioning. Because daily mortality rates in cities change significantly with slight changes of temperature and humidity, there is reason to suspect that there are more subtle effects as well.

## Issue 9

# Health Effects of Diesel-Powered Automobiles

**The National Energy Plan indirectly encourages the use of diesel-powered automobiles but little consideration has been given to the unregulated harmful emissions of diesel engines.**

### Summary

The automobile gasoline efficiency standards of both present Federal legislation and of the energy plan indirectly encourage the use of fuel-efficient, diesel-powered automobiles. Although diesels produce less carbon monoxide and hydrocarbons than do gasoline engines, they may also produce greater amounts of harmful sulfates and fine particulate.

### Questions

1. What diesel market penetration has the Administration assumed for passenger cars and light and intermediate trucks for its projections of automotive energy demand to 1985? To 1990? To 2000?
2. Have studies been undertaken of the unregulated emissions from diesel technology? What are the potential health effects of diesel automobiles, especially in dense urban areas?

3. What studies have been undertaken to assess the real fuel savings related to a large-scale adoption of diesel technology for passenger car service? What are the results?

## Background

Federally mandated fuel economy standards in effect for 1978-85 model year cars (27.5 MPG fleet average for 1985) have produced considerable interest on the part of legislators, automakers, and agencies such as the Transportation Department in diesel technology for passenger cars. General Motors Corp. will introduce a diesel engine in one of its lines in 1978. Others may follow its lead; foreign diesel-powered automobiles are already available. Some sources have assumed a 25-percent diesel market penetration, especially in large cars, by the 1985 model year.

Diesels are inherently fuel efficient and produce relatively low carbon monoxide and hydrocarbon emissions, although emissions of nitrogen oxides with present technology exceed current statutory standard of 0.4 grams per mile. However, diesels also produce a number of unregulated emissions that could, under heavily congested conditions, become a serious public health hazard.

Like conventional spark-ignition internal combustion engines, diesels emit a variety of air pollutants, odors, and noises, but of different degrees and kinds. The important emissions from diesel engines include visible smoke and fine carbon particles, sulfates and sulfur dioxide, aldehydes, and selected nonreactive hydrocarbons, as well as the conventional gasoline engine emissions. What little is known about diesel emissions suggests the need for considerable caution. This is particularly true for a group of compounds known as polycyclic organic matter (POM).

The partial combustion of organic matter produces POM, which contains two classes of carcinogens: 1 ) polycyclic aromatic hydrocarbons, and 2) aza-arene heterocyclic compounds. Numerous types of POM have been measured in soot: pyrene, anthacene, benz(a)anthracene, benzofluoranthenes, chrysene, coronene, fluoranthene and benzo(a)pyrene. A number of these have been found to be carcinogenic in animal-exposure studies.

The internal combustion engine also is a source of POM, but current efforts to reduce other emissions from such engines have also reduced POM emissions. Anticipated future measures point toward continued reductions as a result of catalytic controls. However, careful attention should be paid to the misuse of diesel-powered vehicles such as overloaded operation or poor maintenance. Idle operation typical of congested urban centers results in high POM emissions from diesels.

The bulk of POM from diesels is thought to be associated with fine particulate aerosols. As a result, POM longevity depends on both the rate of its chemical alteration and the lifetime of its carrier aerosol. Estimates of the lifetimes of fine aerosols exceed 100 hours and range up to 40 days. POM may undergo chemical reaction within a few hours or up to a few days, depending on

degree of exposure to sunlight. in addition, some of the products of **POM reaction with oxygen may also be carcinogenic.**

**Recent studies have shown that 90 percent of the particles** in diesel exhaust are less than 1 micrometer and that 50 percent are about 0.3 micrometers or smaller. These sizes are precisely within the range which is respirable and which is deposited within pulmonary air spaces. There is significant retention within the lung of aerosols of this size. In addition, retention is increased by hydroscopic sulfate which is present in diesel emissions.

There presently are several active projects under EPA sponsorship to determine whether diesel engines emit nitrosamines or any of their potential precursors (in addition to nitrogen oxides). However, it is not known if any studies are underway that address the retention of fine diesel particles in animal lung tissue. Such experiments should be carried out before any large changeover to diesel-powered autos or light-duty trucks occurs.

## Issue 10

## The Role of State and Local Governments

**Unless State and local governments have substantial responsibility for national and regional energy policy, the goals of the National Energy Plan may be jeopardized.**

### Summary

The Plan calls for a "foundation of partnership and understanding" in the implementation of a variety of energy programs, built upon "active roles" and "major responsibilities" for State and local governments. With few exceptions, however, it is not clear what these roles and responsibilities are to be. In fact, by emphasizing the leadership role of the Federal Government and largely ignoring problems of intergovernmental cooperation, the plan appears to downgrade the importance of other levels of government in energy decisionmaking. This is partly an issue of the nature of federalism in the United States, but it is also a question of how to identify and respond to regional differences in economies, environment, resources, and social conditions. National energy policy will not only have to take such differences into account, but reconcile them in a cooperative manner with continuous interaction and participation of the governments and peoples affected. Failure to do so could jeopardize success of the Plan.

## Questions

1. To what extent does the Plan set the stage for a major change in planning and regulatory functions now exercised by the States?
2. To what extent has national energy planning anticipated the great degree of cooperation that will be required by the States to implement the strategies of the Plan?
3. What will be the role of State and local governments in: (a) returning rebates from energy price increases and taxes to the consumer? (b) developing and enforcing energy efficiency standards? (c) facilitating the development of alternative energy sources?
4. Could State governments be given a role in the classification of oil and gas production as "new" or "old?"

## Background

The Plan emphasizes the importance of State and local government participation in the process for making energy resource development decisions. And, in some areas, the Plan defines future State and local implementation roles. For example, attention is given to State enforcement of the 55 miles per hour speed limit, State responsibilities in public utility reforms and conservation services, and State review of proposals to expedite the movement of Alaskan oil from the West Coast. In most cases, however, the Plan only mentions a possible State or local responsibility or implies some future intergovernmental requirement.

The only specific reference to an active positive role for State or local governments involves State utility commissions, which are directed to reform rate structures in accordance with Federal guidelines. There is a general reference to an unspecified role for States in the development of geothermal resources (p. 78) and in the proposed energy information system (p. 89). Otherwise, States are essentially treated by the Plan as enforcers of Federal laws and standards (pp. 40, 63, etc. ) or allocators of Federal funds (pp. 42, 77, etc.). In some cases they lose powers that they now have (e.g., over the pricing of new gas for intrastate markets and over cogenerated electricity). The discussion of nuclear facility siting and licensing (p. 72) does not mention State governments at all, even though the Nuclear Regulatory Commission has recognized that the positive involvement of States is essential to effective nuclear facility regulation.

This appears to represent a reduction of the present role of State governments in energy policymaking. State governments now play a central role in the regulation of resource extraction, surface mining, reclamation, energy facility siting, electricity pricing and transmission, and in enforcing mineral rights laws on other than Federal lands. In addition, many States are active in energy conservation efforts, energy demand estimation, and comprehensive energy planning. Local governments engage in land-use planning, enforcement of building codes, and a variety of other activities that influence energy supply and demand. It has even been suggested that a "new federalism" has been formed in recent years, in which the States have been restored to a full policymaking partnership with the Federal Government.

# Societal Impacts

Without significant roles and responsibilities for State and local governments, and a reconciliation of Federal policies with State policies, a National Energy Plan runs the risk of failing to reach its goals. Although the Plan does not exclude a strong State role, it does not assure it. Examples of cases where State and local responsibilities need to be clarified or conflicts resolved include:

1. The implementation of the policy of conversion to coal;
2. The role of the States and localities in residential/commercial weatherization programs;
3. The requirement that State energy offices "encourage" fuel suppliers to undertake conservation services similar to those offered by State utilities;
4. State responsibilities in the siting of nuclear energy facilities;
5. The exemption from State utility regulations for cogeneration facilities;
6. The role of the States in alternative energy resource development—specifically the need to encourage waste heat utilization, to overcome the barriers to using solid waste as a fuel, to facilitate the leasing of geothermal resources, to modify property taxes to encourage the use of solar energy, and to develop criteria and standards for solar equipment.

In addition to these areas requiring further explanation, almost nothing is said in the Plan about the roles of State and local government in channeling tax rebates to the consumer. Nor is there an adequate examination of the role of the States and localities in determining and enforcing mandatory energy-efficiency standards for new buildings and certain home appliances.

Finally, the Plan does not adequately identify and explain the role of State and local governments in its proposed energy information program, (See Issue #1 2.)

In part, this raises serious questions about the implementation of the Plan as a truly national plan-not just a Federal Government plan. In a broader sense, the Plan's proposals are insensitive to regional differences in the economic, environmental, and social impacts of energy programs, For example, new coal production will be limited to a few regions, which makes the Plan an instrument of economic growth and a regional allocator of undesirable effects. Although the Plan shows a clear concern with equity, it overlooks the likelihood that some inequities in benefits and costs will be regional. The process for dealing with these effects (and the regional concerns that anticipate them) will need to incorporate State and local governments as full partners. In particular, they might help on "fine-tuning" energy programs to adjust to local circumstances,

The details of Federal-State relationships are as important as the policy conflicts themselves. For example, Outer Continental Shelf oil development, strategic and tactical planning for Alaskan North Slope oil, and Western Federal coal and geothermal leasing could be facilitated by new planning arrangements, New policy proposals such as that of conversion to coal will also have to take into account a series of complex factors including local preferences for diversity and risk aversion, air quality constraints, logistics, and potential land- and water-use conflicts. For example, if conversion to coal

becomes national policy, the States should share in setting federally supervised exemption provisions and/or alternative technical compliance schedules.

Finally, in many cases the States are best able to determine the most appropriate internal agency or agencies to administer delegated Federal programs. State-to-State variations in institutions and infrastructure may require delegation of responsibility to the States for efficient administration of such programs.

# Issue 11

# The Impact of Utility Rate Reform on Federal-State Relations

**The National Energy Plan does not fully address the consequences of some of its proposals for the traditional relationship between State and Federal utility regulatory agencies.**

## Summary

The traditional relationship between State and Federal regulatory agencies has been formulated over a long period and provides a forum for the development of diverse and innovative approaches. Several aspects of the National Energy Plan would significantly increase the authority of Federal regulatory agencies (particularly that of the proposed Department of Energy) by providing mandatory requirements in several areas where State commissions now have exclusive jurisdiction. Thus, the Plan could lead to changes or modifications in the historical roles of Government or administrative agencies in energy-related areas. The long-range consequences of these changes should be fully explored and debated.

## Questions

1, To what extent could the Plan's proposals disrupt well-established relationships between Federal and State regulatory bodies ?

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2. Are there alternative approaches that might be less disruptive and equally effective ?

## Background

Several aspects of the Plan would substantially increase the authority of Federal regulatory agencies in matters now the province of State commissions. Federal authority in mandatory weather-proofing programs, conversion strategies, and national utility rate standards are examples of fundamental changes proposed by the Plan. The proposals for national rate design standards are a good case in point.

The Plan's approach is similar to those of the Clean Air Act and the Federal Water Pollution Control Act. States are given a period within which to demonstrate that they can enforce national standards; if they fail to meet nationally determined deadlines, responsibility shifts to the Federal level. One major difference is that at the time the clean air and water pollution acts were adopted, States did not have the experience and competence in environmental law that they have in utility regulation.

While there is general agreement that peak-load pricing for electric utilities can lead to energy savings, for example, there are situations in which the problems of offering such rates might outweigh the advantages. Mandatory national standards might override such atypical situations and create conflicts with State regulatory policies. A national standard should be used only where national interests cannot otherwise be protected. One possible alternative approach would be to offer Federal funds to support State regulatory activities on the condition that a State undertake research leading toward programs to implement the Plan's broad goals. In rate design, for example, a State might be obligated to implement rates that would advance the conservation of oil and natural gas in order to qualify for Federal funds. This would preserve the concept that the Nation's energy situation is serious enough to warrant national policies which State regulators must follow.

# Issue 12

# Information Systems

**The National Energy Plan may not meet the needs of State and local governments for reliable and credible information to use in their energy planning and programs.**

## Summary

The Plan proposes a three-part energy information program designed to inform the Federal Government on petroleum production and reserves, possible anticompetitive behavior of major oil companies, and local energy supplies and consumption patterns for use in supply emergencies. Except for collecting and maintaining data on local supplies and consumption patterns, the role of State and local governments is not specified in the Plan. For example, it is not clear what information on petroleum production and reserves and petroleum company finances will be made available to the States, although data of this type is important in State energy planning and policy development. In general, detailed and reliable information is needed by all levels of government if the overall objectives of the Plan are to be met.

## Questions

1. What specific Information will States be charged with collecting and will the Federal Government provide funding and technical assistance to the States for this endeavor?
2. Will oil and gas reserve data and the information about company finances be available to State and local governments or will the data be treated as proprietary and withheld?
3. State and local governments need information in connection with energy facility siting and licensing proposals. How will this need be met?
4. Will data be made available to the States in a quickly accessible manner, for example, through computer terminal links?

## Background

The National Energy Plan proposes a three-part energy information program:

1. A petroleum production and reserve information system.
2. A petroleum company financial data system.
3. An emergency management information system.

These three systems meet a number of high-priority information needs of the Federal Government. However, except for collecting and maintaining data on local supplies and consumption patterns, the roles of State and local governments in the energy information program are not discussed. This seems to overlook the substantial requirements for reliable information of governments outside of Washington, D. C., on which to base energy planning and policies, including allocation and contingency programs. For example, it is not clear whether State governments would have access to the petroleum production and reserve information system or the petroleum company financial data system.

# Societal Impacts

Information shortages are a general problem in energy policymaking, and have made it difficult for all levels of government to deal effectively with energy problems. A major consequence has been that many public officials and private citizens are not convinced that a serious energy problem exists.

Information shortages are particularly acute at the State and local levels. What appears to be reasonably adequate data on a national scale often turns out to be inadequate when put to the test of providing support for State or local programs. The problems include: (1) the aggregation of data on a national or large regional scale, when State/local concerns are more detailed; (2) the selection of factors to be measured, which may omit items of local concern; (3) a lack of timely access, either because Federal data are not made available or because States and localities find it difficult to determine what is available; and (4) a question of credibility, when Federal data have not been subject to verification by State or local representatives.

Involving State and local governments in an extended energy information program would improve the information base and enhance its credibility. In addition, it would assist State and local governments to do their part in implementing the energy plan more quickly and effectively. One alternative, for example, would be to expand the proposed emergency management information system to a more comprehensive energy management information system, exchanging information about demand projections and baseline environmental characteristics (collected locally) for information about technology characteristics and siting projections (collected nationally).

## Issue 13

## Public Participation in Energy Decisionmaking

**Failure to develop mechanisms for continuing participation by the public in energy decisions will make successful implementation of the National Energy Plan more difficult.**

### Summary

As presently formulated, the Plan does not provide any formal mechanism for public participation in the formulation and implementation of energy policy. Such participation is a prerequisite for successful implementation of the Plan. Public involvement provides a way for citizens to communicate their concerns to decisionmakers at all levels and a framework for communicating governmental proposals and technical information to the public. Without a well-defined role, citizens may be cautious about-or even oppose-Government policy. Because effective participation requires technical expertise and full-time attention, financial support could be extended to groups with limited resources that desire a role in the shaping and implementation of the Plan.

### Questions

1. Is there a Federal commitment to establishing programs for public participation in policy decisions that would broaden public understanding and open channels for citizen response to policy proposals?

2. Will procedures be established to provide citizen groups with reliable and credible energy information ?

3. Because effective public participation requires technical expertise and, at times, legal representation, can public funds be provided to ensure that groups with limited resources can help set policy proposals?

4. Can administrative details of the National Energy Plan be effectively coordinated through existing agencies to avoid proliferation of bureaucracies with which citizens must deal ?

## Background

During the past decade, public insistence on participating in policy decisions has increased. Requirements for public participation programs have been written into many Federal laws, in recognition of the fact that individuals and groups who are not part of decisionmaking institutions are affected by Government decisions and frequently can contribute information and judgments that improve public policy. There also is recognition that in a republic, public policy requires public support if it is to succeed. An informed and supportive public consensus is crucial to policies as basic as energy policies which will require some sacrifice, or at least some change of habits, by all Americans.

Public consensus on energy policy is particularly difficult, because awareness that an energy problem actually exists still is growing and there is no majority opinion about its causes or its consequences. The willingness of people to support new energy policies will depend entirely on their understanding of the problem in detail.

The National Energy Plan acknowledges a need for comment on energy-related legislative proposals as they are considered by Congress and on administrative procedures as they are implemented. The Plan also indicates that the Administration will encourage broad national discussion of its proposals. However, the Plan does not describe a program for achieving structured public involvement.

Several steps must be taken to involve the public in energy policy. Access to the decisionmaking process must be available. A national energy data center should be established to provide reliable and credible information about energy resources and reserves, the characteristics of energy technologies, and proposed energy facility siting schedules, Information will best meet the tests of reliability and credibility if it is: (1) responsive to the concerns of interested parties, (2) produced by people or institutions who are perceived as being professionally competent, and (3) produced by people or institutions without a vested interest in the decisions to be based on the information. Information also must flow in both directions. Public involvement, for example, could facilitate the identification of important secondary design goals i n research and development programs and the evaluation of prototype demonstrations of technologies prior to a commercialization decision.

The linkage of citizens with energy policymaking may require that Federal funds support broad participation. Participants with limited financial or technical resources

often find it difficult to enter into discussions of energy technologies with industry or Federal agents because technical details are not available to them. Financial support for these parties would ensure that they can develop professional staff representation.

The particular aims of a program for public participation must be: (1) to involve the public early in the policymaking process; and (2) to make public participation a standard part of policymaking. Many citizens (and some local and State governments as well) do not have a clear picture of how energy policy decisions are made. When avenues for public participation are blocked, citizens often use legal and political means to delay proposed actions. Early and regular involvement is one way to increase public understanding of energy problems and policies and to permit public sharing of responsibility for the consequences of policy.

## Issue 14

## Regional Impacts

**Implementation of the National Energy Plan will have serious and inequitable impacts on some regions of the country.**

### Summary

Energy-use patterns, the presence and extent of energy resources, and environmental, economic, and social conditions vary considerably among the regions of the country. As an overall approach, the Plan does not give these problems sufficient weight or recognition. As a consequence, social, economic, health, and environmental impacts that will occur when the Plan is implemented will be distributed inequitably among various regions of the country. For example, regions that produce and export energy will absorb most of the impacts of energy resource development; regions that already have air quality problems will suffer from the Plan's emphasis on coal conversion; regions whose industries will be affected by conservation and higher energy prices will disproportionately bear the economic costs of the Plan.

While the Plan notes that regional differences exist, it does not indicate how they are to be identified, what equalizing or mitigating actions will be taken, or what the role of State governments and other interested regional parties are to be. It may not be possible in setting national policy to

meet the needs of all regions of the country, particularly when some regional needs conflict with national needs. However, it is possible to seek equitable regional distribution of impacts. Failure to do so, and failure to involve States and regional organizations in the process, may mobilize opposition to the Plan.

There is a need for review and evaluation of existing regional intergovernmental organizations and agreements to determine their adequacy. Organizations and regional compacts may have to be restructured and rewritten in order to deal coherently with energy problems.

## Questions

1. How are significant regional differences that will affect the equitable distribution of impacts to be identified ?
2. What mitigating actions are to be taken with regard to the regional distribution of impacts?
3. Can policies be developed to accommodate regional diversity through flexibility in the application of regulations, rules, timetables, and tax rates?
4. Could the regional impacts of the Plan be addressed by establishing regional groups of States to work out ways of dealing with environmental and economic impacts?
5. What can be done to protect air quality and human health in areas such as Southern California, where coal burning would aggravate already serious air quality problems?

## Background

The National Energy Plan will cause a wide range of impacts, some of which will be peculiar to, or more serious in, some regions of the country. Impacts on communities in coal-producing regions, particularly in the West, could be particularly severe, as could impacts of increased use of coal in areas which already have serious air quality problems.

**Increased Coal Production.—To** achieve the objectives of the Plan, coal production in the East, Midwest, and West must increase significantly. Increased mining in the East and Midwest will take some pressure off of the environment and established communities in the West. All three regions, however, may be asked to bear burdens in the national interest. In many cases, development can result in significant changes in land- and water-use patterns, air and water quality, and lifestyle.

In the West, for example, energy development will occur for the most part in sparsely populated, predominantly agricultural areas. Farmers will be displaced and some of their water supplies will be diverted to coal producers.

Some of the most severe impacts in the West will result from energy-related population increases. In small localities, existing schools, medical services, and water and sewer facilities could not cope with a sudden influx of population, and in many cases could not be expanded fast enough to meet the needs of growing communities. Capital to expand needed public services and facilities will not be available to most local governments in the short term. Over the long term, revenues from energy production usually will go to counties, while the greatest demand for services and

facilities will occur in towns. Lending institutions often hesitate to make loans for homes or other private facilities in communities which are in a boom and bust cycle.

The mismatch between the demand for services and the capacity of local governments to deal with boomtown situations can result in a wholesale degradation of the quality of life in some communities, State help would be available in such situations, but the Federal Government also has a role to play, since national policies often will trigger projects that cause boomtown problems. The Plan should specifically address creating a system for evaluating such impacts and for providing Federal assistance.

Few Federal housing, water and sewer, and transportation programs were designed to respond to the needs of communities which are disrupted by major new energy production projects, Some Federal programs are being modified but assistance programs tailored to the needs of such communities are needed,

**Conversion to Coal.—The National Energy Plan proposals** to increase the use of coal will have considerably different regional impacts than the coal production goals discussed above. By shifting industry and utilities from oil and gas to coal, air quality problems almost certainly will be exacerbated in regions that already have air quality problems, even when the best available control technology is required,

Some areas such as Southern California will not be able to burn coal without creating serious health hazards. Oil-fired powerplants were not originally designed to burn both oil and coal and must be replaced. There is no transportation system to deliver coal. In addition, most Southern California powerplants are in densely populated air basins where air quality is already bad. Conventional coal plants, even with the best available control technology, are likely to emit more particulate and sulfur than State law allows. Clean burning systems such as low-Btu gasifiers or fluidized-bed coal combustion may resolve these problems, but these technologies are not likely to be commercially available until the late 1980's.

If coal is to be used in California, more effective air quality control than that proposed by the Plan will be required. The Federal Government already has a substantial coal conversion R&D program, but its focus has been primarily on basic process technology and economics. Reorienting the program to accelerate development of clean coal technologies could help. In addition, the coal conversion schedule in the Plan could be adjusted to select a more realistic clean-coal commercialization timetable. For example, combined cycle powerplants could be exempted from taxes on oil use until 1990, especially where coal conversion and new coal-burning capacity are limited by special regional economic and environmental characteristics. Oil and gas taxes could be deferred in cases where States produced a long-range coal conversion schedule consistent with national goals. in such cases, States could administer conversion programs with occasional Federal monitoring.

# Issue 15

# Energy Resource Development on Federal Lands

**The National Energy Plan does not identify and define the role that State and local governments are to play in energy resource development on Federal lands.**

## Summary

The acceleration of domestic energy development mandated by the Plan will depend significantly on increased production from resources on Federal lands. The production goals of the Plan are not likely to be met unless controversies and problems concerning the management of Federal lands are resolved.

Much of the accelerated development called for by the Plan will probably occur on Federal lands in the West. State governments in the West have expressed concern that the current Federal land-management system does not adequately provide for State participation in decisions about which resources are to be developed and which rules and regulations are to apply to development. Specifically, some State officials object to current procedures which allow developers to nominate areas for development, allow States and other regional interests to object to the nominations, but leave the final judgment to Federal officials. States also are concerned about long delays between nominations and development which characterize the present system. In addition, they are concerned about whether effective controls can be applied when producers activate hundreds of dormant coal leases that were signed years ago.

The Administration has acknowledged that problems exist in current Federal land management programs. However, if the Plan's production goals are to be met, problems and controversies associated with managing the development of federally owned energy resources will have to be addressed more directly, particularly those problems relating to the role of the States in determining which resources are to be developed, which laws and regulations are to be applied, and whether accelerated development can occur without compromising important economic, environmental, and social values.

## Questions

1. What role will State governments play in managing and controlling the development of federally owned energy resources ?
2. Can a land management system be established which will protect environmental, social, and economic values and still allow for acceleration of public resource development? Specifically, can the present mineral leasing system for federally owned resources be streamlined without compromising environmental standards?
3. What can be done to control production of coal on land that was leased years ago?

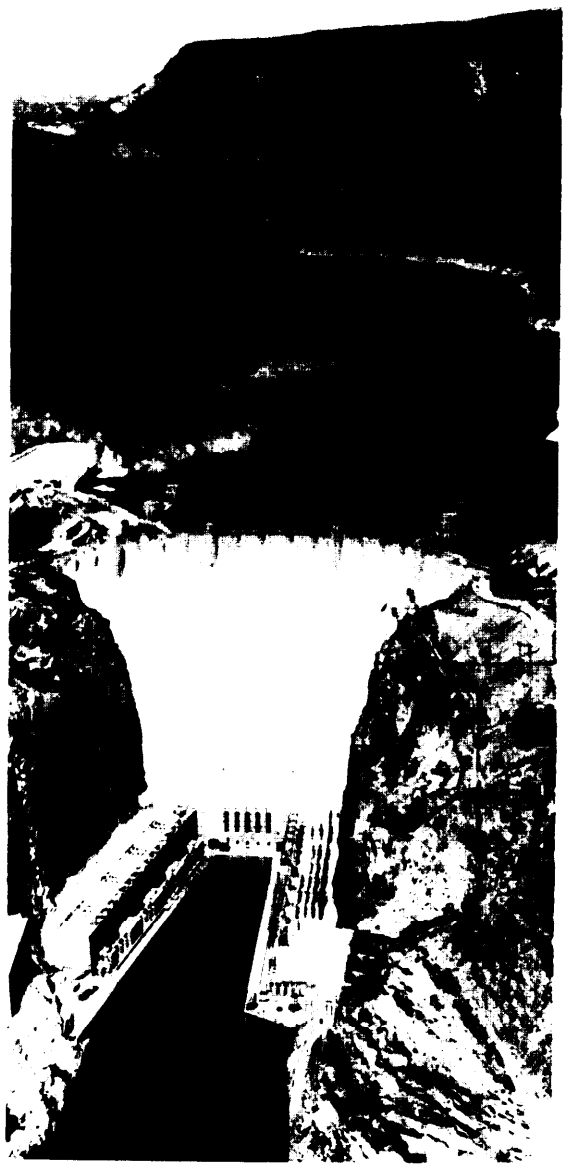
# Societal Impacts

## Background

Historically, public lands have been prime candidates for development because they are under direct Federal control. The Federal Government owns or controls vast holdings of coal, oil, natural gas, oil shale, and uranium, particularly in the West. Any attempt to greatly accelerate the development of domestic energy supplies will depend upon the expeditious development of the resources located on these public lands.

In the Rocky Mountain-Great Plains region, the Federal Government owns about 43 percent of the land and controls more than **60 percent** of recoverable coal reserves, 80 percent of the estimated oil shale potential, and more than 90 percent of recoverable uranium.

At the present time the West is producing approximately 11 percent of the Nation's crude oil. It is estimated that 10 percent of the Nation's natural gas reserve is located in the region, as well as 42 percent of the coal, and 94 percent of the uranium. All of the Nation's high-quality oil shale is in the West. It is estimated that 80 percent of future coal development in the West will occur on Federal land or will involve federally owned resources.



Energy Research and Development Administration Photo

The production potential implicit in the above data is obvious. However, there are a number of significant problems that must be resolved if this production potential is to be realized. For example, several Western States are concerned that they will not be able to influence development on Federal lands. Some States have more stringent laws and regulations governing development than does the Federal Government. This has led officials in these States to argue that their responsibility to protect the health, welfare, and safety of their citizens will be compromised if State laws and regulations are not applied, first, in designating areas as unsuitable for development, and second, to control resource developments on Federal lands. These issues are beginning to be resolved. Recently, the Secretary of the Interior negotiated agreements with Wyoming which permit more stringent State controls to apply to development. The Department is also reviewing State reclamation statutes. When State requirements are as stringent or more stringent than Federal requirements, States will be given as much control on Federal lands as is constitutionally possible. Federal strip mine legislation pending before Congress contains a provision for the application of State reclamation laws. An issue which is still unresolved is whether States should be able to apply broad energy facility-siting laws to development on Federal land, Because many Federal projects are planned for location on public lands, the States' roles with respect to siting criteria must be resolved in the near future.

A second issue which has significantly delayed the development of Federal coal reserves is the present mineral leasing system, The leasing system is a complicated set of procedures that allow for the nomination of lease sites by potential developers followed by "disnomination" suggestions by State governments and other interested parties. A particular lease could be disnomi - nated on the grounds of its general unsuitability, the unusual nature of an area, or the expected acute adverse effects of the development, Under the present system, the Federal Government asserts a right to make preemptive decisions, a position that the States are challenging. Unless this challenge is dealt with, development on Federal land will be likely to proceed even more slowly than it does now.

The leasing system itself is only one of a number of steps that must be taken to develop Federal resources. The environmental impact statement process must be completed and numerous State and Federal environmental requirements, such as air- and water- quality standards, must be met. Therefore, while the decision to issue a lease is usually based upon very few criteria, a potential developer, after he has obtained the lease, must go to a number of State and Federal agencies seeking various permits. Since these processes (i.e., leasing, environmental impact statement, and acquiring various permits) are generally independent, it can take us as long as 10 years to open a coal mine after a developer expresses interest in a given site. A new leasing system that would allow for the early consideration of a variety of important environmental, social, and economic values put forth by Federal, State and local governments could

greatly speed up the process. If these values were established as criteria for a lease, not only would there be more competition for lease sites, but the lease would be immediately consistent with the requirements of State and Federal environmental standards. In all, the processes of environmental impact statements, the review and issuance of the lease, and the application of environmental standards through various permits could be compressed into a unified process.

The final major problem which exists concerning the development of Federal resources is the fact that more than 400 inactive or undeveloped lease sites now exist throughout the West. For years, developers bid on, and received, coal leases that they did not intend to develop immediately. Instead they held these in an inactive status awaiting a rise in the price of coal. These leases were made at a time when little attention was given to environmental values. Consequently, public interest groups and Government officials alike are now greatly concerned that if these sites are developed, a high degree of environmental degradation will result. As improvements are made in the leasing system generally, these nonproducing sites must be examined for their potential as well as their social and environmental impacts.

## Issue 16

## Coordination of Energy-Related Programs

**Some Federal policies and programs may be incompatible with the goals of the National Energy Plan.**

### Summary

Many Federal programs were established long before it was clear that the United States faced a major energy problem. Some programs, for example in transportation, may not be compatible with the goals of the Plan and may, in fact, require actions that would work at cross-purposes with energy policies. In some cases, the conflicts can be resolved by Executive Order. In others, Congress may have to choose between energy goals and goals in other programs and amend laws to reflect that choice, Although adoption of the Plan need not await an identification and resolution of Federal program inconsistencies, effective management of the Plan will require such a review.

### Questions

1. What process should be used to identify Federal programs that are not compatible with the goals of the Plan?
2. When a program supporting an Energy Plan goal and a program in support of some other national goal are found to be incompatible, how should the conflict be resolved?
3. **To what extent can (and should) Ex**ecutive Orders be used to establish priorities among national goals?

4 Is there a mechanism for ensuring that national energy goals are compatible with State and local plans in energy and in other program areas?

## Background

The Energy Plan represents a major step in the direction of improved planning for energy conservation and use. Questions will arise, however, as to how the goals of the Plan are to be made compatible with other goals such as those for transportation, environmental protection, water conservation, land use, and housing.

The coordination of Federal programs with respect to particular policy goals is a well-known problem. The Plan—for understandable reasons-does not identify and assess the dozens of Federal programs that affect energy supply, conservation, and conversion. Although the significance of any single case cannot be evaluated without extensive review, examples of possible inconsistencies include: home mortgage programs that give preference to single-family housing; antitrust policies that may jeopardize the proposed petroleum company financial data system if the information sharing is interpreted as affecting competition; and the extensive investment of Federal agencies in energy-consumptive, intercity employee travel.

Two problems arise: (1) how to identify inconsistencies, and (2) how to resolve any inconsistencies that are identified. Neither is easily settled, and the Plan should not be delayed as a result. However, effective management of the Plan will require an early start on the process.

In addition to close interagency coordination, possible alternatives for identifying incompatible programs include requiring an energy-impact section in all environmental impact assessments and requiring, on a one-time basis, a broad-brush energy impact assessment of each program for which Federal funding is sought.

Possible options for resolving inconsistencies ' include (1) Presidential Executive Order, (2) interagency coordination, and (3) congressional action. Because many of these decisions will amount to establishing priorities among national goals, it is important that resolution strategies be considered as soon as possible, so that future action is not unduly delayed.

# Societal Impacts

## Issue 17

## Adequacy of the Plan's Oil Import Goals

**Will the Plan's oil import goals significantly reduce the danger of an oil shortage in the mid-1980's and the vulnerability of the United States to another oil embargo?**

### Summary

One major concern that motivated the plan was a fear that world oil exporting countries would not be willing or able to produce as much oil as the importing countries would want to import (at the present real price) by the mid-1980's. The Plan also is designed to respond to the danger of another politically motivated embargo.

The Plan proposes to hold oil imports in 1985 **to between 6 million and 7 million barrels a day, about 4.5 million below the estimated amount that would be imported without changes** in U.S. energy policy. If that import goal is met and if the strategic oil reserve is developed on schedule, the ability of OPEC to impose another embargo or further steep price increases should be sharply limited.

### Questions

1. Is a reduction of 4.5 million barrels a day sufficient to avoid a strain on production capacity and a consequent sharp rise in oil prices?
2. Could the United States adjust to any likely oil embargo without unacceptable economic strain?

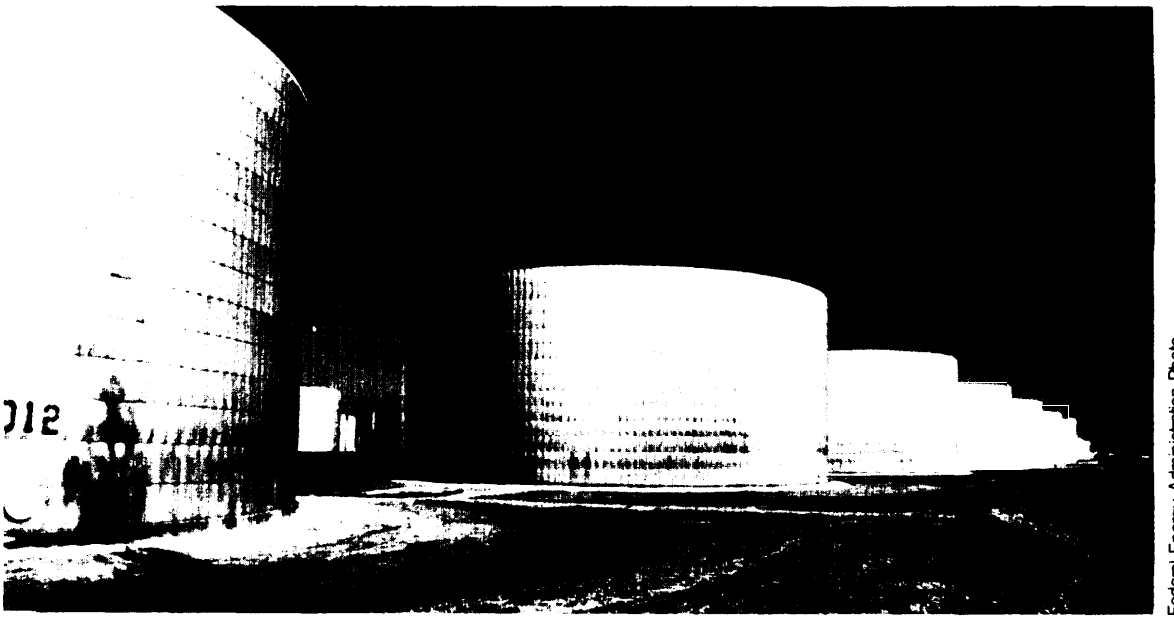
### Background

The most pessimistic published forecast of future world energy demand estimates that by 1985 the members of OPEC will have to export between 43 million and 47 million barrels of oil daily to meet demand in the oil-importing countries. World demand, under that circumstance, could only be met if Saudi Arabia produced between 19 million and 23 million barrels a day.

Saudi Arabia may not be either able or willing to expand its capacity to that level, more than twice its 1976 production. There are a number of reasons for adopting a more optimistic view of world oil supply and demand. For example, the Organization for Economic Cooperation and Development (OECD) projects world oil import requirements in 1985 (OECD reference case) at about 35 million barrels a day, some 8 million to 12 million barrels below the most pessimistic case. Under the OECD assumption, Saudi Arabian production could be as low as 7 million barrels a day with a maximum of 15 million barrels.

The embargo problem is somewhat different. The key questions involve the depth and duration of any curtailment of foreign oil supplies. The Arab embargo and supply restrictions of 1973-74 did not, in fact, cut very deep; at its worst point, only about 3.4 million barrels a day were removed from the world market. Also, the embargo lasted only about 5 months.

For purposes of this analysis, it will be assumed that any future embargo would cut Arab oil exports by half. It will further be assumed that by 1985, those countries will



Federal Energy Administration Photo

be supplying two-thirds of the total oil import market. Cutting their exports in half would therefore reduce oil report availabilities by one-third. Imports, however, will represent only about two-thirds of total oil requirements of the industrialized countries in 1985, so the cut in total oil supplies would be roughly 20 percent. If the International Energy Agency (IEA) emergency plan were to spread this cut evenly among industrial countries, the United States would lose about 4 million barrels a day in total oil supplies, and could adjust to that loss even over a prolonged period,

A somewhat more difficult problem would arise if the IEA plan were not put into effect and if Arab producers simply cut off all oil exports to the United States. In 1976, nearly half of U.S. oil imports came from Arab countries, By 1985, dependence on Arab imports could exceed 60 percent. Without the Plan, this would mean a reduction of U.S. oil supplies of about 7 million barrels a day, or nearly one-third of total consumption. If the Plan's import goals were achieved, the United States would lose about 4 million barrels a day, or about 22 percent of supply.

It appears unlikely, even without the IEA plan, that the Arabs could prevent any of their oil from reaching the United States. Even if they did, the United States could adjust for some time to a loss of 4 million barrels a day. The emergency oil reserve of a billion barrels called for in the Plan would provide half of that amount for a year and a half. The other half could be made up by additional conservation measures. The situation would be much more serious if the loss were 7 million barrels a day. In that event, either the emergency oil reserve would be drawn down much more rapidly, or relatively drastic measures would be taken to cut oil consumption.

# Societal Impacts

## Issue 18

## The Question of Growth

**The National Energy Plan assumes that economic growth can and should continue indefinitely and does not discuss the desirability or even the possibility of achieving such growth in a world with finite resources.**

### Summary

The National Energy Plan presents a long-run objective of sustained economic growth without questioning the appropriateness of this objective. It is widely recognized that growth of the gross national product (GNP) is not an adequate measure of social well-being, particularly when GNP would measure wasted and valuable energy resources but would not reflect savings in energy. Furthermore, continued growth of GNP may not be necessary to achieve basic social objectives; for example, it may be possible to maintain high levels of employment while reducing the rates of growth of GNP and of energy consumption by substituting labor for energy. Such a shift in the structure of the economy, and the long-term changes in capital stock that would be required, are not addressed in the Plan.

In any case, resource availability and ultimate environmental constraints may make sustained economic growth unattainable.

### Questions

1. Is per capita GNP a satisfactory measure of national economic well being? is a more than 4-percent annual growth in GNP necessary to achieve social goals?
2. What changes in capital, technology, and population distribution will be necessary to sustain agriculture as oil and gas become more scarce?
3. Will future energy sources and delivery systems require decentralization of the structural and spatial patterns of our society?
4. Will extensive additional sources of future energy like nuclear fusion be wisely used to increase human well-being? Can **and** should these sources be applied to indefinite growth?

### Background

The National Energy Plan encourages conservation and solar energy development, and plans to replace energy-wasteful capital stocks, both of which actions are needed over the long term. While the plan is significantly more farsighted than existing energy policies, it still does not fully reflect the long-term problem.

The president's Plan is based on the premise that economic growth, measured by the gross national product, can and should continue. It is generally accepted (even among economists) that human benefit does not derive from annual-average rates of flow (GNP) but from the stock, quality, and distribution of the goods available to the population and from other intangible but important values such as access to cultural amenities or to wilderness. Furthermore, there is wide agreement now

that recent growth in GNP to a large extent has in fact been growth in resource-wasting activities. If waste is to be reduced and human well-being increased, it will be necessary to abandon the practice of equating "progress" with "economic growth" or "growth in GNP, " and to develop more adequate indicators.

The extent to which a 4.2-percent annual growth figure for GNP, which the Plan contemplates, is designed to provide "full" employment does underscore the need for society to alleviate unemployment. But it assumes that there are no other ways to achieve employment goals. Substitution of labor for capital and energy, shortening the workweek, and lowering artificial barriers to entry in the labor market are among available approaches.

In the long run, the United States can adapt to an economy which uses less energy with greater employment and higher income levels. Some European countries such as Sweden and West Germany have living standards equivalent to or higher than the United States but use less energy. Capital and energy have displaced labor in U.S. manufacturing in the past, and energy-intensive goals have been substituted for labor-intensive goals and services. Labor intensity in the future will differ from labor intensity in the past. However, future growth is likely in activities which employ more labor and have fewer requirements for oil and natural gas. In the long run there will be growth in rail transportation, urban housing, solar power, and energy-saving technologies and appliances. There will also be growth in agricultural and forestry fibers and materials, coal production, and towns and cities i n regions with these natural resources. Each of these activities would employ more persons and use less energy than the activities they would displace.

A long-term deficiency in the Plan is associated with the need it acknowledges for replacing energy-wasteful capital stocks. The Plan suggests ways to begin changing some of the capital stocks, but focuses on ones that can be changed relatively quickly (e.g., boilers, engines, buildings, etc.) while ignoring several that can be changed only over much longer periods and that waste even more energy.

Agricultural capital is a case in point. The national energy policy of the last several decades has been to replace human labor as rapidly as possible with petroleum energy, and no sector has applied this policy with more vigor than has agriculture. Machines and chemicals used in agriculture now consume 5 or more calories of oil and gas for every calorie of grain produced. Additional human labor will be required to reduce the energy intensiveness of American agriculture.

Even if continued economic growth were desirable it might not be possible. Prolonged growth will require increased combustion of fossil fuels in the next few decades and new sources of energy from thermonuclear fusion or solar power in the next century. Expansion of the processes we

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generally associate with growth may be limited by the availability of other resources and may not be perceived as desirable from a social or environmental point of view. Two specific problems involve the uncertain impacts of introducing additional volumes of carbon dioxide into the atmosphere through increased combustion of fossil fuels, and the consequences of waste heat generation. While the Plan proposes a study of the carbon dioxide problem, the question of waste heat is not addressed at all.

## Issue 19

## The Population Factor and Energy Planning

**Continued population growth, including natural increase and immigration, makes the goals of the National Energy Plan harder to attain. In the long run, no plan to curb the growth in energy demand can succeed without a parallel policy to curb population growth.**

### Summary

U.S. energy demand is the product of population size and per capita consumption. Thus population growth, of which immigration is an important component, is a factor that must be considered in the development of an energy plan.

The slowdown in the U.S. fertility rate has already had a marked effect on projected energy demand. This trend, however, is being partly offset by an increasing growth in the rate of immigration, including illegal immigrants, which affects both energy demand and unemployment.

### Questions

1. What is the optimum population level for the United States, both as to the number of people who can be supported, given available energy resources, and maintenance of an acceptable quality of life? If it is desirable to stabilize population growth at such a level, what policies and programs would best achieve this?

2. What effect will an influx of illegal aliens have upon the achievement of energy plan goals?

## Background

There is a widespread, but erroneous, belief that the United States has solved its population problem. The source of this incorrect impression is as follows: the present (momentary) birth rate in the United States is at replacement level, which in about 50 years would produce zero population growth (ZPC), leveling off at about 270 million (compared with today's 217 million).

population growth, however, proceeds at a faster pace than these statistics imply. In fact, the U.S. population is now growing at about 1.2 percent per year, and if this rate continues, the population will double in 58 years. There are two reasons for this.

First, there is a bulge in the composition of the population in the younger, more fertile years. Even at the replacement rate—one child born for each adult—an increase in population results because parents remain alive for many years after children are born.

The second factor is immigration. Estimates indicate that immigration produces a yearly population increase at least equal to the rate of natural increase of U.S. citizens, and the rate of immigration seems to be increasing.

Of particular concern is illegal immigration. By present estimates there are 6 million to 8 million illegal aliens in the United States, with as many as 1.2 million new illegal aliens arriving yearly. If current rates continue, immigration will add 38 million persons to the U.S. population by the year 2000, of whom at least 25 million will be illegal aliens.

It has been estimated that illegal aliens already living in the United States consume more than 1 million barrels of oil equivalent per day, between 2 and 3 percent of total U.S. energy demand. This and other aspects of the immutable relationship between population and energy demands suggest that U.S. population policies merit careful study and debate as an integral part of any future U.S. energy planning.

# Societal Impacts

## Issue 20

## Impact of a Petroleum-Scarce Future on the Automobile Industry

**The National Energy Plan does not address itself to the need for an accelerated search for a substitute for oil, the energy resource that is likely to be exhausted first.**

### Summary

By the end of the century, the fleet of automobiles and trucks in the United States could total 200 million. Unless adequate liquid fuels are in good supply by that time, the alternatives might well be limited to simply abandoning large parts of that fleet or trying to convert cars to electricity. The loss of mobility that would occur with prolonged sharp reductions in liquid fuel supplies and an enforced shutdown of the U.S. automobile industry and its related businesses would have unprecedented impacts on the U.S. economy.

### Questions

1, Should alternative fluid-fuel sources such as alcohols and hydrogen be given higher research and development priorities?

2. How can a full range of transportation services be maintained without fluid fuels?

3. Has the possibility that U.S. transportation could be immobilized by high costs or scarcity of petroleum within 20 years been squarely addressed by industry or the executive branch?

4. What Federal agency has been charged with looking at the long-range implications of and alternatives to our present large petroleum-based transportation fleet? Will this become a function of the Department of Energy?

### Background

Oil and gas are now burned in applications where coal is available as a substitute. in other applications, particularly in transportation, fluid fuels cannot be replaced on a large scale either by coal or by electricity. There is no evidence to suggest that coal liquefaction can provide enough liquid fuel to provide power for more than a fraction of the Nation's automobile and truck fleet within the next 20 years.

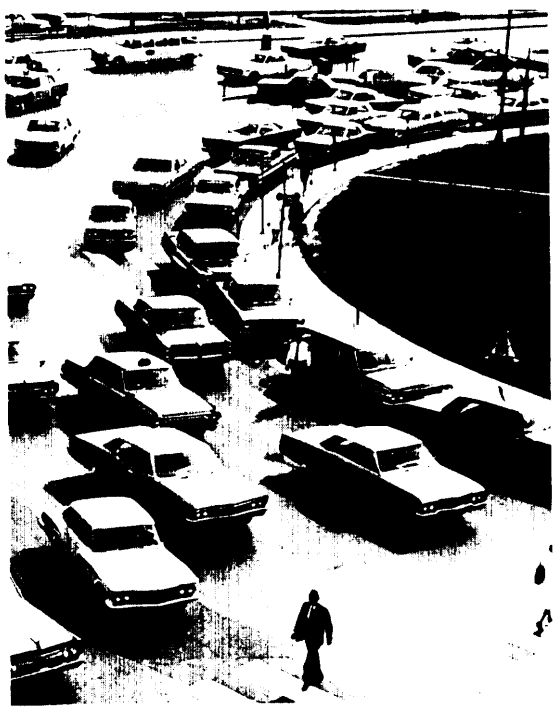
The Plan states that "Government policy has subsidized and protected energy-inefficient . . . transportation. The interstate highway system has encouraged automobile use. Local highways have drawn people, businesses and industry out of central cities into suburbia" (NEP, p. 4). In this process, the United States has become almost totally dependent on the automobile for work, recreation, and the daily tasks of life. Consumers presently pay approximately one-third of their disposable income for mobility, divided roughly 50-50 between personal mobility and the freight costs of consumer products.

As energy becomes more expensive, the United States will have an increasing incentive to shift to public transit and efficient land-use arrangements (Issue #21), This,

however, is a slow process. In the meantime, U.S. society and economy would suffer severe disruptions if prolonged and sharp reductions in liquid fuel supplies occurred.

The U.S. dependence on transportation with the vulnerability it conveys underscores the necessity for additional emphasis on development of other liquid fuel technologies, including alcohol. Alcohol can be obtained by fermentation from dispersed biomass and can be used in modern internal-combustion engines.

At a minimum, the National Energy Plan should make provision for a full-scale analysis of the potential for disruption of U.S. transportation as a result of rising oil costs and dwindling oil supplies.



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# Issue 21

# Land-Use Patterns

**The National Energy Plan acknowledges the opportunities for long-range energy conservation that are inherent in new land-use patterns but offers no proposals to start achieving them.**

## Summary

Existing patterns of land development, particularly in suburban areas, often **put too much distance between homes and offices or factories, between homes and shops, and between homes and** schools. The development pattern in most areas of the United States makes suburban Americans almost totally dependent on the automobile. It also inhibits installation of the kinds of district heating systems that are common in Europe. Changes in land-use patterns could promote the use of district heating and eventually make it possible to make many trips that now require an automobile by public transportation or by foot. But these changes are long range and fundamental and will take more than one generation to complete. They also will require national guidelines, leadership, and incentives. An example of the kind of first step that could be taken at once is to require a long-range "energy impact statement" for all proposed new transportation programs and for all new urban and suburban construction that involves the use of Federal funds.

# Societal Impacts

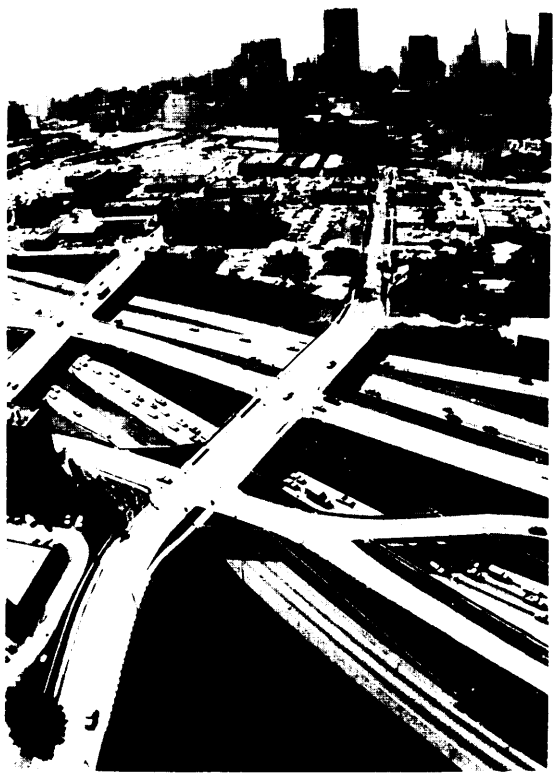
## Questions

1, What steps are being taken to plan for a more energy-efficient distribution of population and industry in the next few decades?

2. What kinds of incentives could encourage people to accept more energy-efficient living and working spatial arrangements ? How can the disincentives which frequently exist at present (e.g., lack of privacy, noise) be eliminated ?

3. What consideration has been given to incorporating a policy-level, land-use office within the Department of Energy?

4. What consideration has been given to coordinating the land-use and transportation functions of the Departments of Housing and Urban Development and Transportation with those of the Department of Energy?



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## Background

During the post-World War II decades of cheap energy, industrial production was centralized and products were shipped to stores throughout large regions and, in some cases, throughout the Nation. Cheap energy permitted a scattering of jobs, homes, schools, and shops, linked in large part by the automobile. Ninety percent of personal transportation in this country is by passenger car and truck. Nearly 75 percent of all automobile trips cover distances of less than 10 miles. public transportation can provide a substitute for automobile trips only in cases where population densities and geographical relationships are such that relatively large numbers of people are bound for the same destination at about the

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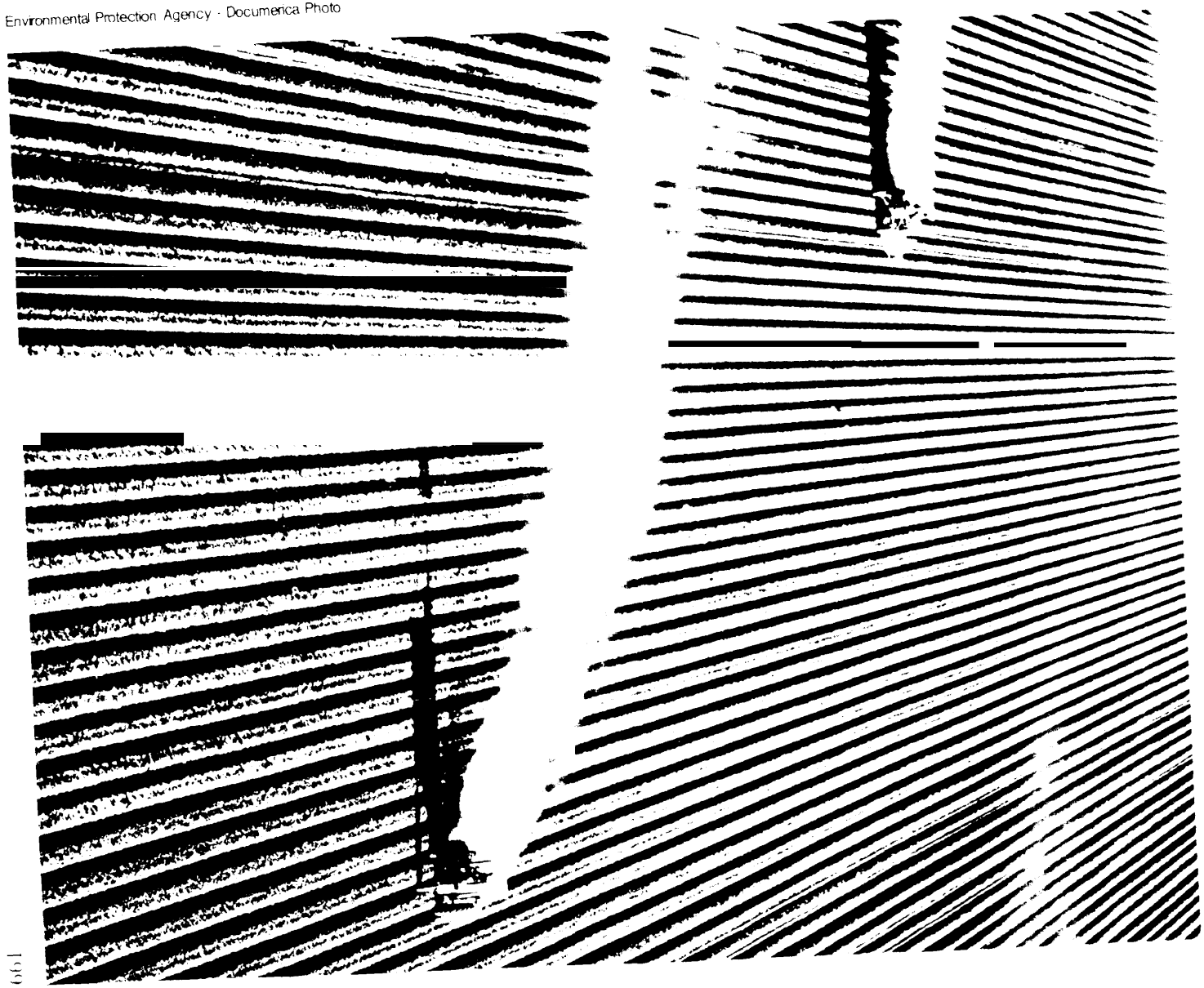

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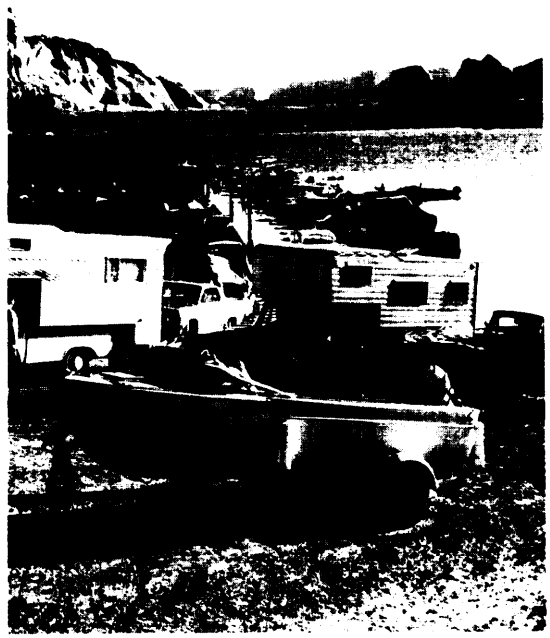
same time. These time and space relationships do not exist in most suburbs today. But as fuels for automobiles become scarce and costly, shoppers and workers will need other means of travel than the car.

One way to reduce dependence on the car is to rearrange urban and suburban development so that work and home or home and shop are more easily linked by public transportation or are close enough together that walking or bicycle riding can substitute for the car. Rearranging land-use patterns is not a short-term solution. it will take over a generation to provide clusters of homes, workplaces, and parks that will reduce the need for transportation as such and still put many amenities within reach of the home. But the new land-use patterns must begin somewhere. Any long-range plan for energy policy should include proposals for beginning such a rearrangement of living and working patterns in the United States.



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# Issue 22

# In Defense of Amenities

**Can cost-benefit analysis justify the sacrifice of irreplaceable national treasures to meet the need for more energy?**

## Summary

If the American people believe that there are some national treasures that must be regarded as exempt from sacrifice to meet energy or economic goals, then the principle should be explicitly recognized. In addition, such national treasures should be identified so that, if a crisis should occur, panic will not lead the Nation to actions it will later regret.

Although the National Park system was a start in this direction, it is highly selective, focusing on the most popular and obvious types of landscape for preservation. There is a danger that anything not already protected, and perhaps a few things which are, will be destroyed as demands for energy increase.

## Questions

1. Can Americans collectively agree that there are national treasures (other than historical shrines) that should be saved for posterity despite energy demands in this generation?
2. Can explicit criteria be worked out, and agreed upon, for identifying national treasures?
3 Can education in the broadest sense, including movies and television, convey a vicarious experience of these treasures to the majority of the people who cannot have the actual experience? Can such vicarious experience be sufficiently keen to elicit support for the preservation of treasures from people who will never enjoy the direct experience ?

## Background

In most hard-nosed energy analyses, there is an implied threat that what are called amenities may have to be sacrificed to meet national energy demands. It is implied that the benefits of amenities are soft and cannot be quantified at a high-enough level to justify retaining them in the face of large and easily quantifiable energy needs. This issue should be met head on.

Mount Vernon is generally accepted as a national treasure. The buildings are made largely of wood; their value as fuel, in barrels of oil equivalent, could easily be calculated. As other fuels increase in price will there not finally arrive the time when the increasing value of Mount Vernon as an energy source (which is objectively determinable) must exceed its constant value as an esthetic and historic monument (which cannot be objectively determined)? When this time arrives, do not the principles of cost-benefit analysis dictate that Mount Vernon be converted into firewood?

If the answer to this question is yes, there is no further problem: the pursuit of energy becomes clear sailing—the United States must simply determine the Btu value of all artifacts, treasures or not, and then burn as needed.

But if the answer to this question is no, then the Nation should say so explicitly, because the answer can be, and should be, generalized. If the American people believe that there are some treasures that must be regarded as standing above energy considerations, then these should be explicitly identified in advance of either a crisis or actions taken in panic.

The question of sacrificing a national treasure will not, of course, first be raised with a historic amenity like Mount Vernon: burning this would be unthinkable. But the possibility of sacrifice has already been raised for natural amenities—redwood forests, pristine valleys, and vulnerable species of plants and animals in danger of extinction. Can the Nation—should the Nation-protect these treasures against demands for more energy? Should workmen tear up a beautiful valley to get coal? Should a forest be demolished to get building materials?

The issue of replaceability is relevant. In the case of a landscape which is merely pretty, it is possible to restore its limited beauty after strip mining, if the extractive procedure is properly planned from the outset. The cost of restoration added to the other costs will increase the price of fuel to consumers, but it is generally conceded that justice towards succeeding generations demands that we bear these costs of energy extraction.

There are, however, many works of nature that once lost cannot be restored. The minority who have ever had close contact with a climax hardwood forest or a virgin prairie can speak for the almost indescribable beauty of these complex superorganisms. Once destroyed, neither will be regenerated in a human lifetime: the forest is replaced by a temperate jungle called second growth, and the prairie is followed by an ugly miscellany of weeds. If no further disturbance occurs, ecological succession may eventually restore the original mixture of species, together with the beauty; but in no case will the succession be complete in less than 500 years-a period longer than the lifetime of most nations. For all practical purposes, as far as national policy is concerned, destruction of a beautiful ecological community and the vital information it contains is irreversible.

Can people defend aesthetic goods against utilitarian demands? Those who have experienced the aesthetic delight of them are more likely to rise to their defense, but fortunately it is possible for those who have not had the experience to join in the defense. What percentage of the U.S. population has ever seen, or ever contemplates seeing, Mount Vernon? It surely is less than 10 percent (25 million); yet any proposal to cut up Mount Vernon for firewood would undoubtedly be rejected by the great majority of the electorate. The mere knowledge that this historic shrine is there is an amenity for most Americans-an amenity they will defend against the quantitative onslaught of cost-benefit analysis of the conventional kind.