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THE ENERGY CRISIS: THE ISSUES AND A PROPOSED RESPONSE

By Michael McCloskey[*]

Disagreement exists as to the nature of the "energy crisis." The industries supplying energy would have us believe that the crisis has arisen from a need to expand supplies and to lessen constraints on growth. Environmentalists, however, submit that the crisis lies instead in the need to halt excessive pressures for increased energy consumption. They contend that present rates of energy growth are unrealistic, environmentally damaging, and artificially induced. Because these rates cannot long continue, they that feel our main task ought to be to bring these rates of growth under control, and that there are reasonable ways of doing this.

Unrealistic Growth Rates

Present rates of energy growth are unrealistic for a variety of reasons. These compounding rates of growth cannot be projected very far into the future before they run up against mathematical, physical, biological, and qualitative limits. Let us examine these rates and some of the limits which they confront.

Today we consume 15 times the energy we did 100 years ago, though our population has only tripled in that time. Over the past decade the average growth rate in the consumption of energy in all its forms has been more than four percent annually, climbing to about five percent annually over the last five years. Growth has been particularly phenomenal in the electrical energy sector, at about seven percent annually in recent years. Projections based on that rate of growth call for a doubling of electric power production about every ten years.

With these growth rates we may soon find that we are reaching absolute limits in physical space for power plants. It has been calculated that even with large 1,000 megawatt power plants,

each of which requires an area of only 1,000 feet on a side, in less than 20 doublings (less than 200 years) all the available land space in the United States would be occupied by such plants. In California, where power production is expected to double every eight years, if power were to be supplied by 110 megawatt plants on 80 acre sites, the entire land area would be covered in only 122 years. Similar startling projections could doubtless be made with respect to other forms of energy use, such as the amount of space that will need to be paved over to accommodate our automobile oriented transportation system.

Other physical limits to energy use can be cited. For example, by the end of the century, if growth continues as projected at current rates, one third of our total freshwater run-off might be required for powerplant cooling purposes, If just "once-through" cooling is used. If "once-through" cooling is superseded by cooling ponds and towers, then more land will be needed, and the space crunch will come even sooner.

Ultimate limits to growth in energy use also obviously exist in the finite nature of our fuel resources. The fossil fuels now provide by far the greatest part of our energy sources (e.g., almost 96 percent in 1969). Whatever the true situation as to immediate supplies, it is obvious that ultimately these nonrenewable resources will be depleted. Optimistic estimates predict that our fossil fuels as a group will be exhausted within a few hundred years at best, possibly much sooner. A recent National Academy of Sciences report, for example, predicts that within approximately 50 years, the great bulk of the world's initial supply of recoverable petroleum liquids and natural gas will be exhausted. Recoverable fuel from the oil shales and tar sands might extend the lifetime of the petroleum group another century. With respect to coal, the report estimates that if used as the principle source of energy at projected demands, it will last no more than two or three centuries.

Though nuclear power is expected to play a major role in future electrical energy production, electrical energy is only a part of the total energy consumed—presently, about one quarter—and the supply of uranium 235 from high-grade ores is limited. The NAS report indicates that the production of nuclear power with the present type of reactors and with uranium 235 as the principal energy source can be sustained for only a few decades. Another estimate gives high grade uranium ores a

lifetime of under 50 years. Breeder reactors could extend these fuels, but it is not clear what the costs may be, and many operational and environmental problems remain unsolved. Moreover, a practical method of producing electricity from fusion is still only a possibility.

Hydroelectric power has a finite limit in the availability of suitable sites, and is of small importance in the supply picture. While only one-fourth of the potential hydroelectric sites have now been developed in this country, these are the best sites; most of the rest are economically unfeasible.

Another ultimate limit to energy growth is imposed by the problem of dissipating the heat resulting from the production of energy. With energy consumption increasing at an annual rate of five percent, a climatological heat limit—the point at which global climate would be drastically altered—could be reached in less than a century.

By the year 2000, at projected growth rates, the energy produced by man in major urban areas may approximate 30 percent of solar input. Our population centers will turn into giant heat radiators affecting local climates. Increasing attention has also been given to the possible role of two by-products of energy production—carbon dioxide and water vapor—in long range climatological change. Each year fossil fuel combustion adds to the atmosphere an amount of carbon dioxide equal to about .25 percent of the total carbon dioxide in the atmosphere. If the present growth rate in fuel use continues, there will be an increase of about 170 percent in the carbon dioxide level in the next 150 years. Many scientists fear that the "greenhouse effect" (the trapping of heat energy which leaves the earth by carbon dioxide in the atmosphere) will have serious repercussions on world climate. For differing reasons, concern is also expressed over adding substantial amounts of water vapor to the atmosphere. Though more research is imperative, these considerations may also place ultimate limits on unrestrained energy consumption.

Damaging Environmental Impact

Long before these ultimate limits are reached the environmental impact of unrestrained energy growth may become unbearable. We do not know where the dividing line between environmental deterioration and irreversible catastrophe may lie, but at the least we can foresee that galloping energy consump-

tion will have a continuing and cumulatively destructive impact upon the environment.

At every stage of energy production and use, unacceptable environmental degradation occurs. At the first step of extracting fuels from the earth, defacement and pollution occur in the source area. For example, by 1965, 3.2 million acres of United States land had been surface mined, 41 percent for coal. As we deplete our high grade reserves we increase our destruction of the land. The strip mining method of producing coal has been steadily increasing, from 29 to 36 percent in the last ten years, and today, strip mining benches in nine Appalachian states extend for 20,000 miles.

In addition to the usual effects of mineral extraction, uranium mining and milling have their own special hazards in the form of radioactive wastes. A typical uranium mill must dispose daily of about ten curies of radium in its process wastes. Of 26 such mills operating in 1963, for instance, ten were still discharging the effluent from their tailings directly into streams. In the late 1950's consumers of untreated water along the Animas River in Colorado below the Durango mills were receiving 300 percent of the recommended "permissible" daily intake of radium. The production of uranium has also resulted in the accumulation of mill tailing piles of up to several million tons in the Colorado River basin. In most cases, no containment measures were undertaken for many years, and these piles were left exposed to erosion by wind and rain.

Fuel extraction has polluted our waters as well as defaced our lands. Coal mining has degraded 12,000 miles of Appalachian streams alone, through mine acid drainage. Extraction of oil also seriously pollutes the source area: the Santa Barbara blowout and Platform "Charlie" in the Gulf of Mexico are but two familiar examples of marine pollution from offshore oil wells.

The transporting of fuels from the source area to points of utilization and the handling and processing of these fuels lead to further environmental degradation. Illustrations familiar to everyone are the numerous oil spills from vessels, marine terminals, refineries, storage tanks, and pipelines. About 4,000 oil spills from all sources were reported to the Coast Guard in 1970, and it is certain that many go unreported. Estimates put the actual number of oil spills into United States waters at about 7,500 annually, almost 21 per day.

Oil pollution illustrates not only the hazards of accidental spillage of oil transported as cargo, but also the intentional pollution resulting from current modes of operation within the marine transportation system itself. Current estimates are that approximately ten million tons of oil are spilled each year into the marine environment. Of this amount, two to four million are spilled accidentally while six to eight million are intentionally dumped into the sea, primarily through bilge pumping, tank cleaning, and deballasting practices of the maritime industry. Severe biological damage is reported in main shipping channels as a result. One expert estimates that 40 percent of all sea life has already been destroyed by pollution of all types.

The extracting, processing, and transporting of energy-producing fuels is only the beginning of the total environmental impact of energy. The production and use of energy in all its forms has created severe pollution and space problems which threaten to become overwhelming in the near future. Air pollution is perhaps the most obvious environmental by-product of energy production and use. The fossil fuels presently account for almost all of our energy sources (96.4% in 1969), and the burning of these fuels creates the largest share of many of the common air pollutants. Motor vehicles lead the field, accounting for over 60 percent of total air pollutants. Power plants as well as the industrial, residential, and commercial use of energy all make their characteristic contributions to air pollution. The visible or noxious air pollutants have received the most attention. In 1966, in the United States, 28.6 million tons of sulfur dioxide, 11.5 million tons of particulates and about 13 million tons of nitrogen oxides were emitted. Power plants were responsible for a large share of these pollutants: an estimated 50 percent, 25 percent, and 25 percent, respectively.

Another serious pollution problem generated by growing energy consumption is the thermal loading of our rivers and lakes. Electric power plants are major offenders, accounting for about 80 percent of the industrial waste heat discharged into our waters. Such plants are about one-third efficient in their use of heat to generate electricity, and most of the remaining waste heat is discharged directly into the cooling water source. The amount of waste heat involved is tremendous: a typical 1,000 megawatt fossil fueled plant produces enough waste heat yearly to heat 300,000 Minnesota homes, and waste heat from a nuclear

plant could heat 400,000. At projected rates of growth, by the year 2000 the waste heat from these plants might be sufficient to raise the temperature of our total run-off by 20 to 30 degrees fahrenheit. If controls on thermal pollution of our waters are not immediately imposed, we may expect serious short-term impacts on local environments as well as disastrous long-range effects.

Other types of energy-associated pollution are of increasing concern as well. For example, some scientists estimate that coal fired power plants put 150 tons of mercury into our air every year. Chemicals (such as chlorine), biocides, and various other compounds that are added during the power generation process are not now recovered but are instead released into the nearest body of water. Some of these can cause serious disruption of aquatic environments, as well as render certain shellfish unfit for consumption.

The solid waste problems associated with energy production and use are massive. By burning coal, we produce an estimated 30 million tons of slag and ash every year, of which eight million enter the air; the rest contribute to our mounting disposal problems. The solid waste problems which are created by the soon-obsolescent products of our various industries are staggering.

As nuclear power assumes a greater role in the production of electricity, we may have to come to terms with a new and frightening form of pollution, that of radioactivity. By the year 2000 nuclear power may account for about one half of our power production. The Atomic Energy Commission projects the construction of perhaps 600 large nuclear plants in the next several decades—enough annually to produce radioactivity equal to one half million Hiroshima bombs.

Nuclear plants as a means of power production are still in the experimental stage. Although the chances of a major accident have been minimized by industry and government, such a possibility cannot be completely ruled out. The safety record of plants already built gives us cause for concern. By the end of 1968, 17 civilian plants and one military plant had been completed; five of these have since shut down as uneconomic or unsafe. A sixth (Fermi) never operated properly and was ultimately taken out of service following an accident. A seventh (Humboldt) has been able to operate within allowable radiation limits only by reducing power output.

Routine low-level radioactive discharges from nuclear plants

are another source of concern. While the AEC, in the face of mounting criticism, has just drastically reduced permissible discharges, concern continues about accumulating radioactivity. At the Hanford installation, for example, low level wastes empty into open trenches. If the ducks which drink from this water were to be eaten by human beings, the human beings would receive five times the "permissible" dose of radiation. In New York, radiation levels in a creek were reported to be 30,000 to 100,000 times higher than AEC limits.

Recent testimony before a congressional committee indicated that by the year 2000, nuclear plants and associated fuel processing facilities would be producing 470 million curies of krypton 85 annually, representing an increase in radiation exposure of about two millirems per year, or one to two percent of natural background radiation. This assumes that it is uniformly diluted throughout the atmosphere; however, exposures in the United States might be as much as ten times higher. Though much research still needs to be done, some scientists now predict that in 30 years, if growth projections are reached, radiation levels may be high enough to cause serious effects on living things.

Another problem associated with nuclear energy is the management of the high level radioactive wastes produced. In the face of great danger, men handle, transport, process, and ultimately dispose of these wastes. The storage problem alone is immense. Can we confidently assume that long-lived radioactive wastes will be safely contained by future generations for hundreds and thousands of years to come? Over 100 million gallons of high level wastes are already stored in underground tanks, of which 60,000 gallons have already leaked into the ground. A "failsafe" storage system must be devised if nuclear power is to be acceptable in the future.

Finally, we confront critical space problems, brought on by fast increasing energy production and use. Short of the ultimate limits already noted, the amount of land used for energy-related activities may become environmentally unacceptable in the near future. Such uses include paving land for freeways in order to accommodate our auto based transportation system and its related "needs," such as parking lots and gas stations; taking land for construction of more and more power plants and more and more transmission lines; and covering land with industrial installations of all kinds, each consuming energy and many turn-

ing out frivolous, wasteful or soon-obsolete "conveniences." In the process, open space is diminished, wildlife habitats are preempted, many of our most scenic areas are visually impaired, and wild areas and rivers are destroyed. Difficult questions emerge with respect to optimum siting for those highways and plants which may be absolutely necessary.

A few statistics on power plants and lines will illustrate the problem. In California, where power production is expected to double every eight years, by the year 2000, 92 new plants of 4,000 megawatts, capacity (a capacity *far larger* than any existing now) would be required. This would amount to one plant for every ten miles of coastline (if plants were sited there as many people now urge). If plants of 1,100 megawatt capacity (San Orofre size) were built, 350 additional plants would be required in California by the year 2000. Presently, there are across the nation 300,000 miles of transmission lines, occupying four million acres; by 1990, 200,000 miles more might be required, taking up another 3.1 million acres, twice the size of Delaware. Another projection is that by 1990 plants and lines will actually occupy 11 million acres, and will be visually offensive to many additional acres. This cannot be permitted.

Artificial Inducements to Growth

It is no accident that our energy situation appears ominous. It is largely because the energy industry has contrived crises that we hear cries of fuel and energy shortages. The alarmism has increased with the growth of interlocking ownership in the fuel and energy industry. The so-called "energy crisis" has its basis in demands which have been artificially stimulated by the power industry.

In the last few years, we have experienced all sorts of sudden fuel and power shortages. The price of residual fuel oil doubled in a year, ostensibly because of a cut-off in Middle Eastern supplies, despite the fact that most of that oil comes from places other than the Middle East. A sudden shortage in natural gas developed in 1969 when the gas industry decided to try to pressure the Federal Power Commission to grant it a 60 percent price increase. The gas industry would not reveal how many wells were capped awaiting higher prices. Coal became in short supply because of mysterious difficulties in production and delivery. Despite the fact that the electric utility industry has had a re-

serve capacity of 27 percent nationally, summer power crises have been experienced as plants and interties have malfunctioned.

None of these so-called crises need have arisen. The growing monopoly among energy companies helps explain how a few large corporations can suddenly contrive these crises. The oil industry has always controlled natural gas companies, but it is now on its way to controlling coal and uranium as well. At least 11 large oil companies have significant interests in coal. The two largest owners of coal reserves are oil companies, one of which (Standard Oil Company of New Jersey) is also the largest oil company. The petroleum industry as a whole accounts for one quarter of our coal production. At least 18 oil companies have invested in uranium development. The oil industry now holds 45 percent of all known uranium reserves. A recent investigation by the House Banking Committee showed that 49 of our largest banks have interlocking directorates with 36 of our largest electric companies, 28 gas companies, 15 coal mining companies, 17 oil companies, 58 coal carrying railroads, and 27 companies which supply electrical equipment.

Not only is industry in a position to withhold supplies in order to wring concessions from government, but it has also been enormously successful in persuading government to stimulate demand in every possible way. For over a century, a pro growth bias toward energy use has been woven into the fabric of public policy. The rate structures for electricity are distorted to provide discounts for large industrial consumers. Utilities are allowed to promote consumption through advertising which is charged off to rate payers. Nuclear power is subsidized through AEC activities and the accident insurance afforded by the Price-Anderson Act. Hydroelectric power is subsidized through virtually free licenses to use public water power sites. Public power is subsidized through exemption from income taxes and preferential interest rates. Coal mining is subsidized through failure to enforce strip mining and safety controls, with the result that social and environmental costs are not sufficiently internalized. The domestic oil industry is for all practical purposes subsidized through depletion allowances and import quotas. The auto and oil industries jointly are abetted and encouraged through federally aided highway programs. Bulk fuel transport is encouraged through subsidization of continued barge canal construction. Railroads continue to receive a multitude of forms of federal support.

Controlling Energy Growth

How then do we extricate ourselves from the dilemmas of this contrived pattern of exponential energy growth? While no simple answer exists, an interim strategy can be tried. It consists of making a number of simultaneous changes in public policy in order to reduce rates of growth. Complementing each other, these changes may be sufficient to put the problem into temporarily manageable form. We could then assess whether cutbacks in actual consumption levels in the long run would also be needed.

A short-run strategy would involve the following changes in public policy: ending or reducing the many biases in public policies which provide incentives to energy growth; maintaining and strengthening environmental constraints on energy growth; reducing energy demands by educating the public to understand the importance of conservative use of energy; encouraging intensified research and development in order to achieve greater efficiencies in energy utilization and in order to find new, more environmentally acceptable, energy sources; and discouraging growth in industries that are the most profligate consumers of energy. Coordination of these efforts would be facilitated through the establishment of new government agencies, specifically geared to respond to the energy problem. Each of these changes would involve efforts that would go well beyond the traditional bounds of energy policy, and all could have profound economic and social impacts. Yet changes are already beginning to occur in all these fields, and environmentalists are determined to promote them. Let us look at the central idea of each of these proposed changes.

We will never be able to cope with the crisis of energy growth until we extirpate the many incentives in public policy to such growth. What would happen if the diseconomies of all these subsidies were to be removed or reduced? Quite likely the actual impetus behind energy growth would drop sharply. We would no longer be artificially stimulating a false demand, as if energy growth were a clear public good rather than a clear public problem.

As artificial incentives are removed, positive constraints must be imposed to protect environmental values. These include the following restrictions on the modes of developing, processing, and transporting fuels: establishment of onshore and offshore closures to drilling and mining in order to safeguard areas which should be protected, such as wilderness, parks, wildlife refuges, and marine sanctuaries; strict environmental operating control

on open areas; a ban on strip mining; deferred development of oil shale; stringent controls on marine oil shipping, including controls on the operation and design of super tankers; stricter controls on pipeline specifications and routing; and tighter controls on the handling, processing, and disposal of nuclear waste products. Simultaneously, greater environmental controls need to be placed on the facilities which consume fuels: principally power plants, automobiles, and basic industries. Pollution controls on effluents and emissions need to be further tightened, with greater emphasis on toxic substances and by-product recovery as well as on closed-plant recycling. With the move toward national land-use controls, the siting of plants, transmission lines, and highways will have to become increasingly restricted.

The rising costs associated with all of these constraints can be regarded as an internalizing of social costs. As costs rise and are passed onto consumers, demand should slacken, as should the rate of the drain on energy resources.

As the public faces higher energy and product costs, a strong effort must be made to promote public understanding of the reasons behind these shifts. As consumers, we must understand that we have not been paying the full costs of driving automobiles and using electricity. Instead of looking upon these rising costs as a new consumer burden, we should look upon them as ending a "free ride," one which we have been getting at the expense of those who will inherit our environment. Moreover, we should encourage even greater understanding of the need to end our wasteful habits in using energy. Changing cultural attitudes toward walking, bicycling, and mass transit can help end the automobile's preeminence as a means of transportation. Changing cultural attitudes can also help bring under control the rising use of electricity among middle class households; hopefully there will be a growing trend away from all-electric gadgetry as a status symbol.

Finally it is important that steps be taken to make sure that rising prices do not block the aspirations of the poor. Particularly with respect to electric rates, special steps should be taken to provide low rates for small residential consumers. Improved mass transit should also help low income urban residents. Other steps may need to be taken also to make sure that the poor are not penalized by these changes in public policy.

Not only must we convince consumers to be more conscious of

the need to be conservative in their use of energy, but we also must find better ways to conserve fuel supplies while extending their uses. Through gassification of coal, for instance, we may be able to achieve better efficiencies in the use of coal. Magneto-hydrodynamics could improve efficiencies in energy conversion. There may be a limited but useful way to utilize solar energy for household heating in certain parts of the country. It may also be possible to use the heat from the air conditioners and thermal discharges in order to reduce our energy demands. The energy industry should be taxed in order to fund a new federal program for intensive research and development on possibilities of this sort. The aim should be not to discover a "technological fix" whereby we might continue our profligate ways, but rather to help us find ways to conserve our fuel supplies and to minimize the adverse effects of their use upon the environment.

There are a few basic industries that consume large amounts of energy and cause serious energy-related environmental problems. These include the automobile industry, the aluminum industry, the paper industry, and the fertilizer industry. Because of planned obsolescence, the automobile industry consumes an inordinate share of the world's resources. Moreover, its products constitute one of our main sources of air pollution; by requiring more and more highways the automobile also poses a threat to the viability of cities and the integrity of our countryside. Environmentalists are shaping a variety of assaults upon the patterns of operation of this industry. The aluminum industry is a prime consumer of electricity and is a major contributor of litter in the form of disposable beverage cans. Laws to require returnable containers could profoundly effect this industry, and have already been enacted in some jurisdictions. The paper industry also consumes significant amounts of energy and is a major polluter. Cultural trends away from the disposable way of life, built upon paper goods, could cut into the growth of this industry. Finally, if there is a trend away from inorganic fertilizers and toward the use of animal manures, the energy demands of the fertilizer industry would be significantly reduced. Through these separate programs of environmental reform much of the dynamism could be taken out of energy growth rates.

Administering The Necessary Changes

To assure that all these efforts are orchestrated, environmentalists are advocating new governmental institutions and pro-

grams which will gather basic information about various energy and fuel supplies and evaluate alternative courses of action in order to provide an enlightened public policy. For example, substitutions are possible among the uses of coal, oil, gas, and nuclear energy, and any such substitution should be consonant with sound public policy. The public cannot look to the energy industries to provide objective information about any such tradeoffs. There should be a specific federal agency to gather this information, to analyze it, and to suggest those courses of action which reflect the wisest public policy.

In addition to energy analyses, actual plans must be prepared, particularly with respect to the generation of electrical power, which is historically a publically regulated and franchised function. This planning must be done on an increasingly broader scale in light of the expanding distances between fuel supplies and load centers, the need for bulk facilities and system interconnections, and the ramifications of national energy policy. Power planning cannot be done adequately on a state-by-state basis, and even less on a utility-service-area basis. The patterns of power development, interconnections, and impact extend far beyond state boundaries. Neither the utilities themselves nor the state agencies can integrate factors on a large enough scale.

There are basic problems with looking to utilities for basic energy planning. One is that the utilities' self-interest may cause them to avoid certain planning approaches that may be in the public interest, such as shifting to less profitable but more acceptable types of power. Second, the utilities will not want to embrace any type of planning that will significantly imepde their freedom of action, even though it might better serve the public interest. Third, there are inherent limitations in defining workable planning regions in terms of utility service areas, and it will still be necessary to integrate regional plans on a national basis. To avoid these problems, there must be a federal agency that will engage in integrated utility planning on a comprehensive national basis. This planning should be done in light of policy goals suggested by energy analyses.

Presently, the Federal Power Commission is supposed to do some planning, through projecting power demands and through preparing criteria to determine whether hydroelectric license applications conform to comprehensive basin management plans. It would be undesirable to give the Federal Power Commission greater planning responsibilities, either in the form of administer-

ing standards for planning by utilities or in the form of preparing comprehensive siting plans. There are inherent problems in trying to vest both the licensing function and the planning function in the same agency, particularly if the agency is an independent regulatory commission. Such commissions are so accustomed to responding to the initiatives of applicants that it is doubtful whether they are capable of actively pursuing an independent planning program. If the planning function is to have real vitality, it should be established in an agency separate from the licensing body. In addition, it is desirable to have the planning and licensing functions separated so that the planners can be insulated from the pressures of license applicants and so that the licensors will be more removed from the temptation to implement their own plans regardless of other factors.

The passive nature of regulatory commissions makes it difficult for one to have much confidence that they can aggressively pursue and enforce standards for system reliability. Licenses should contain stipulations with respect to reliability, but there is little likelihood that a license will be revoked for failure to comply. We must have an agency which can constantly revise and extent appropriate standards of reliability and inspect installations to check compliance. Fines should be set for noncompliance. Such an agency might operate on the pattern of the Food and Drug Administration. The quasi-judicial stance of the Federal Power Commission makes it difficult for it to undertake such a separate role.

It is clear that some of the dilemmas we face in power planning can be eased by new technological developments. These new developments may better enable us to conserve our fuel supplies, to obtain greater efficiencies in production, to install lines and plants underground, and to reduce pollution. Also wholly new modes of production may be perfected. Although these discoveries may not solve all of our problems (and indeed can create new ones), we should not be deterred from pursuing research and development programs. For a variety of reasons, private industry is not likely to lead this effort. The utility industry and their equipment suppliers and fuelers have a vested interest in protecting their investments in existing technology. Also, as established monopolies with administered rates, utilities have weak incentives to invest in basic research and historically have invested very little. If major investments are to be made

in solving troublesome problems of broad interest, it is likely that the federal government itself will have to establish a research and development arm.

Another vexing problem is finding ways to assure that the siting of plants, lines, and other facilities is compatible with sound land use planning. Each type of developer tends to hope that his project can escape the constraints of land use plans or be regarded as an exception. Indeed most local land use plans are rendered ineffective by endless variances sought by developers who claim that theirs are exceptional cases. Because of the ineffectualities of local land use planning, legislation is pending in Congress to encourage the states to take a stronger role in land use planning and to establish a federal agency which would have administrative controls over the states' efforts. Such legislation should be supported. If such a federal agency is to be established and succeed and if national land use planning is to have any integrity, then utility siting should be as much subject to planning as the siting of highways, railroads, and industrial developments. The siting of electrical utility installations should be governed by comprehensive land use plans, and the agency that prepares them should be the only agency that can modify them. It would make a mockery of this planning effort if utility-oriented agencies could at their own option decide the extent to which they will choose to be bound by such plans. If land use planning is to have any integrity, utility proposals must be evaluated by a land use planning agency for siting compatibility, not by a utility oriented agency. Additional consideration must be given to problems of environmental impact in utility planning. Just as with land use planning, it should be clear that the only competent agency to evaluate environmental standards is the environmental agency with the expertise and authority to set them. If compliance with environmental standards is to be evaluated by agencies lacking environmental responsibility, then it is inevitable that these standards will not be maintained. How can air and water purity standards have any integrity and strength if every developmental group in the country wishes to have its own allied agencies evaluate their applicability to them? How can park systems, historical districts, natural areas, and wildlife refuges have any integrity if those who pose the primary threats to their survival are to determine whether they are to be invaded? The only acceptable approach is to have environmental agencies

be responsible for certifying that utility projects meet their standards. To propose anything else is a tacit admission of intent to violate environmental standards. While this country needs a certain amount of electricity, it is more in need of breathable air and green places to produce oxygen and provide relief from sweltering cities. A constant tradeoff of these values for a never ending commitment to more power can only lead to our destruction.

Because of the difficult choices that are implicit in resolving these disputes, it is particularly important that the public be afforded a full opportunity to express an opinion about what should be done. Ample advance notice of utility proposals is, of course, a key to eliciting a timely public response. With plant construction time stretching to as long as seven years, it would seem necessary to have 20 years advance notice with respect to the development of large power systems and ten years advance notice with respect to proposed plant sites. If the public is to have an orderly way of participating in the decision-making process, it is important to provide for public hearings in order to assure that public interest groups have standing to participate in licensing proceedings, and in order to provide proper grounds for appeals and judicial review. If the planning process does not truly welcome citizen participation, then other outlets will be found for public opposition to unacceptable projects.

In summary, it is submitted that Congress should enact legislation which would have this broad outline:

1. The basic licensing agency for all bulk power facilities should be the Federal Power Commission. Its authority should extend to all types of plants—hydroelectric, coal, gas, and nuclear—over 100,000 kilowatts. It should also have licensing authority over transmission lines, perhaps those over 69 kilovolts. It should also have continued authority over gas transmission lines.

2. To qualify for a license, utilities should be required to file plans on system extensions twenty years in advance, and on plant construction ten years in advance. At the various steps—advance planning, site filing, and licensing—there should be provisions for public notice, opportunities for comment, hearings, intervention, and appeals and judicial review.

3. Hearings on license applications should be handled by Regional Boards of Examiners. These boards would develop expertise in each region, but would operate in a national framework. Each board member might be appointed by a different agency.

For example, if there were three man boards, one person might be appointed by the FPC, one by the Environmental Protection Agency, and one by the Interior Department. The boards would evaluate applications in terms of conformance with requirements respecting such matters as site plans, environmental standards set by environmental agencies, land use plans established by appropriate authorities, and new plans and policies established with respect to energy policy and system reliability and safety. Decisions by Regional Boards would be subject to review by the FPC and should be appealable to it. The FPC's composition, too, should be broadened to parallel the range of interests represented on the regional boards.

4. As a complement to this licensing system, a number of new agencies should be established in the Interior Department. One agency should be established to conduct energy studies and to propose energy policy. It should also be charged with the responsibility of evaluating national electrical utility planning and suggesting model plans. This agency might logically be housed in the energy branch which the Administration has proposed in connection with plans for a Department of Natural Resources. A separate agency should be established in this branch to administer a program for electrical reliability and safety. A third agency should be established within this branch to direct a Federal Program of Research and Development centered on power and energy problems. These agencies might be partially supported by new taxes on fuel and power production. Finally, through separate legislation, an agency should be established in the Interior Department to administer a national land use planning program. Of course, this agency would not be within the Energy Branch. Each of these new agencies would have Regional Offices which could prepare inputs for the deliberations of the Regional Licensing Boards of the FPC.

5. Under this scheme, a Regional Licensing Board could award a utility permit under the following circumstances:

a. if it were assured that the project conformed to national energy plans;

b. if it were assured that the project conformed to public policy with respect to reliability and safety, which should be set within the context of legislation establishing an agency to administer that program;

c. If the utility could produce a certificate of compliance from whichever agencies (state or federal) have responsibility for land use planning and zoning;

d. if the utility could produce a certificate from the Environmental Protection Agency that all applicable pollution control standards will be met (standards governing air and water pollution, radioactivity, biocides, toxic metals, noise, etc.);

e. if the utility could produce a certificate of compliance from the AEC (or its successor agencies) that all standards for nuclear reactor safety and fuel handling have been met;

f. if the utility could produce a certificate from the Bureau of Sports Fisheries and Wildlife and the National Park Service that the project will not have unacceptably adverse impact upon biological, scenic, historic, scientific, or recreational values; and,

g. if the utility produces a certificate of compliance from the Council on Environmental Quality that the requirements of the National Environmental Policy Act have been met.

6. Finally, in all proceedings before the FPC, there should also be intervenors on behalf of the public interest. To secure this, an office of Environmental Public Defenders should be established in the Council on Environmental Quality. With the FPC acting only as a licensing body, there should always be lawyers before it in its proceedings who represent the public interest, in contrast to the narrower scope of interest represented by the applicant. The Office of Public Defenders might also represent the public before other regulatory bodies too.

Conclusion

There is no way to foresee precisely the ultimate effects of all of these changes in policy and administration. However, at this time, three points may be made. First, many of these changes are already beginning to occur. Second, the strategy of orchestrating these changes allows many factors to be continually adjusted and corrections to be readily effected. Third, the practical alternatives to such changes are not very attractive. As one alternative, we might defer significant reform until a time when inaction could produce pressures for revolutionary changes in our basic institutions. As another alternative, we might simply permit the energy system to expand as far as it could and thereby permit the environment to bear enormous and irreversible degradation. Neither

is a prudent way to deal with a problem which must be resolved without delay.

One of the most distressing aspects of our dilemma is that we do not know the full extent to which our environment has already been damaged by energy programs. Certainly we should lose no time in pursuing our best option. Our choice need not be between blackouts and governmental orders to turn out the lights. We can still impose restraints on those self-interested and overdeveloped industries which, in their fabrication of artificial crises in energy, are creating genuine crises in the environment.

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