# The Future of the Law for Energy and the Environment

EARL FINBAR MURPHY*

## I. WHY WE WORRY ABOUT THE ENERGY AND ENVIRONMENTAL FUTURE NOW

Every enterprise ought to be known for its purposes. Anyone, therefore, writing about the future of environmental and energy law needs to start with definitions. Otherwise, any expression on the subject will lack precision and be incapable of sustaining critical scrutiny.

First, what is the future? Is it our own tomorrow or is it Buck Rogers' twenty-fifth century? For some time now, writing about the future has been affected with millenarian bias. The year 2000 has acquired a terminal character. It has become the goal to be reached, as if it represented a safe harbor to time travellers. The year 2000 has such a reality only in the social consequences of believing it to possess finality. Far more significant, of course, is that it will be only one more in the flux of years.

It is hard to conceive of the future in any specific way in terms of more than decades. Even when speculative philosophers such as Saint Thomas More have sought a further view, they have carried into that intended distance the attributes of their own time. Utopia remains firmly a part of Tudor England and will forever be an idealist's impression of what the sixteenth century might have been in northwestern Europe.[1]

Every generation sees the future in its own present terms. Insofar as the energy future is concerned for currently high-energy demandant practices, there is likely to be a glut of energy sources until the mid-1980s. This abundance will encourage even heavier reliance upon those energy sources and an increased growth in gross energy usage. Such conditions will provide a situation ill-suited to the sharp contraction in energy sources that now seems probable for the quarter-century following 1985.

The post-1985 period of energy shortage, either absolute or in terms relative to demand, may then be followed after 2025 by a steady increase in energy supply throughout the remainder of the twenty-first century. This increase could result from developments in solar, hydro, and other as yet unperceived power sources. As for the time beyond the twenty-first century, the supply of energy may be merely a matter of a minor technical fix or there may be a social collapse precipitated by some unreasonable energy or environmental problem.[2]

---

*Professor of Law, The Ohio State University College of Law.

1. Father Copleston called More's *Utopia* "a conservative book . . . [that] anticipated some ideas which reappear in . . . modern socialism." F. COPLESTON, 3 A HISTORY OF PHILOSOPHY PT. 2, at 134 (1963).

2. As Alvin M. Weinberg has said on this last point: "Should we be successful in developing

As has always been the case, the future for energy and the environment lacks an ease of exact prediction. What does seem predictable is the continuing demand for high levels of energy supply, the continuing reliance of the current social structure upon the maintenance of a high supply of energy, and the continuing series of crises in finding or sustaining the sources of that supply.[3] Many predictions will be made about the outcome of each of these that go far beyond the capacity of a lawyer to judge. What a lawyer *can* predict with accuracy is that the legal system will be intimately involved in all of this, at every stage, from tomorrow, to the twenty-first century, and beyond.

But for even the furthest seeing and most concerned of today's active lawyers, the future can scarcely extend more than a half-century, that is, until the middle part of the twenty-first century. It is to this time frame that most predictions about law will be tied. The further past 2030 that predictions are attempted, the more any lawyer's value in making predictions must diminish. And past some undefined point, today's forward-looking lawyer must hope future generations will find sufficient resources and the will to manage them, in order that affluence may remain a continuous possibility. It is hard enough to provide for this generation's legal needs, as well as for those pressing on the social horizon, without taking on the burdens of far-away centuries.[4] Indeed, there are those who urge eschewing any thought of the future. Either necessity will mother invention or it will not. In either case only strangers will be involved.

Yet if there is to be interest in the future, it will recognize the intertwining of energy and the environment, for each is interleaved with the other. For how could there be much urgency in considering the distant future, if the world has a certainty for both an unending energy supply and an environment inexhaustible regardless of the demands laid upon it? There would then be a justified indifference to the future. If such conditions prevailed, one would have to argue that the future should be put out of the contemporary mind.[5]

If one could be certain that terrible events involving energy and the environment would not occur for centuries, it would be improbable that anyone could build a public opinion to prevent those terrible events from

---

inexhaustible energy sources, our underlying rationale for conserving energy would shift from the present first-order concern over dwindling fuel resources to less tangible issues: subtle environmental effects, capital expenditures, or even social risks, such as proliferation, that some inexhaustible energy sources may entail." Weinberg, *Reflections on the Energy Wars*, 66 AMERICAN SCIENTIST 153, 154 (1978).

3. Yet Eric Hirst persuasively argues that growth in energy use could be reduced nearly to zero through the year 2000. Hirst, *Residential Energy Use Alternatives: 1976 to 2000*, 194 SCIENCE 1247 (1976).

4. For a book casting boldly ahead in this regard, see S. BROWN, N. CORNELL, L. FABIAN & E. WEISS, REGIMES FOR THE OCEAN, OUTER SPACE, AND THE WEATHER (1977).

5. *See* W. BAXTER, PEOPLE OR PENGUINS: THE CASE FOR OPTIMAL POLLUTION (1974), *reviewed in* Junger, Book Review, 37 OHIO ST. L.J. 965 (1976). *See also* Beckerman, *The Myth of "Finite" Resources*, BUS. & SOC'Y REV., No. 12, at 21 (1975).

happening. The public might even believe future troubles to be a certainty, failing some preventive measures, and still be immobilizable in taking those measures. They would ask: Why struggle to prevent a harm from happening hundreds of years hence?

This is the likeliest explanation for humanity's historic indifference to environmental harm. The indifference has been particularly strong when coupled, as so often has been the case, with a sense of technologic incapacity and popular fatalism.[6] For this proposition, there are two examples, among many, to be taken from history.

First, Plato's *Criteas* clearly delineated the importance of forests for the maintenance of soil values, ground water, stream flow and clarity, rainfall, moisture retention, and avoidance of erosion. But the loss of all those good consequences did not befall those who first cut the trees. The ultimate losses they imposed upon later generations by the act of deforestation were their current profits. Why, therefore, should the tree cutters deny themselves the immediate benefit of either the past's stored wealth or the ultimate losses to be suffered by others?[7]

Second, long before the great thirteenth century Mongol invasions of the Middle East, it was evident that soil productivity was declining. Irrigation continued for as much as 5,000 years had leached out minerals and deposited salts. Yet wealth still flowed, as immemorially it had flowed. If the amount was less, why worry? It was still enough. Then came the desert Mongols, smashing the ailing irrigation system, interdicting the flow of both water and wealth. The regional population dropped ninety percent in a generation.[8] Even with the petrochemical wealth of the twentieth century, one could scarcely say there had been a comparable recovery in that area despite the passage of more than seven hundred years.

The purpose of mentioning these events in ecologic history is twofold. First, they illustrate the present indifference of any generation to the probability of the future suffering of much later generations. Second, they are indicative of the fixed belief in the perpetual future existence of what each generation has experienced historically.

But history is not compelled to justify either human indifference or expectations. There is always the chance that disaster is not in the far future but looms in immediate prospect. Disaster may be, ultimately, the consequence of past and present actions.

---

6. J. HUGHES, ECOLOGY IN ANCIENT CIVILIZATION 147-56 (1975).

7. The CRITEAS is quoted and discussed in H. PEREIRA, LAND USE AND WATER RESOURCES 26 (1973).

8. It is hard to be precise about this. When Hulagu ordered all inhabitants of Baghdad slain in 1258, he killed 800,000 people. When Timur ordered all the inhabitants of Baghdad slain in 1398, he was only able to kill 90,000 people. *See* P. BRENT, GENGHIS KHAN: THE RISE, AUTHORITY AND DECLINE OF MONGOL POWER 139, 235 (1976). Furthermore, during this period there had been a flight to the towns and rural depopulation. *Id.* at 190.

What a culture has been historically conditioned to consider permanent may become a transient historic event. It is the assertion of this transiency of the apparently permanent that has produced our current concern for the "future." It is not that the environment may fail two centuries forward in time or that the energy supply may run out in 2200 A.D. that evokes concern. It is, instead, the chance either or both could happen before the talismanic year 2000 that exercises the imaginations of contemporaries.[9]

Sentencing a man to be hanged tends powerfully to focus his mind, whatever general views on his mortality he otherwise might hold. Something not too dissimilar seems to have happened to this generation. And just as lawyers know that a capital sentence can be overturned, so also do they know that capital sentences have been executed. In the light of such knowledge, a counsel of "don't fret" to those on death row would have an air of frivolity not suited to the circumstances.

## II. LIMITLESS DEMAND AND THE PROSPECT OF LIMITATIONS FOR ENERGY AND THE ENVIRONMENT

Aristotle believed that resources within nature were limited and that the totality of wealth was not to be increased. There could be a redistribution—between peoples or among individuals—but there could not be a surging increase in what was available in nature for distribution. Such ideas were not of his invention but were commonly held long before his time.[10]

Events in the ancient world subsequent to the death of Aristotle seemed only to confirm the rightness of these views. The natural resources of the Mediterranean Basin, the homeland of classic European thought, shrank. The fiscal wealth of the region declined with the fall of Rome and the breakup of the classic ecumene that had stretched from the Irish Sea to the Indus Valley.[11] Only in the eighteenth century did events occur in northwestern Europe that laid the bases for a long-term challenge to such an ancient tradition.

The Industrial Revolution arrived in the eighteenth century, introducing the flow of the energy cascades that have constantly

---

9. Daniel H. Herring says:

> Under natural resource limitations and environmental pressures, this attitudinal circumstance may undergo a reorientation toward quality and survival, e.g., energy crises. This is particularly true with the scarcity concept in operation, where several economic institutions are in competition for the allocation of environmental *segments*. Ecological interdependencies and the environmental cost of negative influences may then complicate the economic-environmental system.

D. HERRING, ENVIRONMENTAL POLICY AND ADMINISTRATION 7 (1974).

10. Sibly, *The Relevance of Classical Political Theory for Economy, Technology, and Ecology*, 2 ALTERNATIVES, PERSPECTIVES FOR SOCIETY AND THE ENVIRONMENT, No. 2, at 14 (1973).

11. SHEPARD, MAN IN THE LANDSCAPE: A HISTORIC VIEW OF THE ESTHETICS OF NATURE 73-74 (1967). Others insist the ecologic factor in forming patterns of civilization is negligible. P. SCHRECKER, WORK AND HISTORY: AN ESSAY ON THE SSTRUCTURE OF CIVILIZATION 307 (1948).

accelerated from that time forward. Within fewer than one hundred years from the application of steam to industrial production, Adam Smith felt himself justified to talk about the creation of wealth. The provision of energy for turning the wheels first of factories and then of steam trains seemed to sweep away all the limitations that previously had appeared immovable.

By the middle of the nineteenth century, Karl Marx could write about the wonders of capitalism, its creation of riches, its releases of energy, its development of problem-solving technology.[12] The only difficulties remaining lay in how to better share this new wealth, how to prevent the capitalist system creating this wealth from binding up because of alleged compaction in the holding of wealth, and how to step up the rate of this wealth's creation. The ancient philosophers who had described their limited world could step aside and leave the future to engineers and capital managers. On this much, Adam Smith and Karl Marx could agree.

Not that agreement with them was unanimous. The Physiocrats insisted all wealth, coming from land, suffered the limitations of its source. Malthus argued that population, if not controlled in its growth, must inevitably exceed the ability of natural resources to sustain the human pressure.[13] Others, impressed with the loss of energy promised by the discovery of the Second Law of Thermodynamics—a marriage of the ideas of Malthus with those of Sadi Carnot—argued that the rise in the energy curve had to produce the energy death.[14] Even at the peak of optimism that marked the arrival of the twentieth century, there came pessimists claiming that the ancient philosophers had been right: nature was limited; human capacity was not creative, but transformative only; and all growth must eventually reach the inflexible limits of an unexpandable nature.

But the pessimists could find few to listen prior to 1970. Why, indeed, should anyone have been impressed by the cogency of what the pessimists had to say? Stirring events held greater persuasion. What proved to be most impressive of all were the numerous general wars of the twentieth century. They seemed to show that the only limits to sources of energy, or to resources for materials, or to the environment as a receptor, could be found in human willingness to invest in what was needed to remove forever what formerly had been the old immutable barriers.[15]

12. William McNeill calls this "an intellectual error common to Marxian dogmatists, nineteenth-century liberals, and twentieth-century conservatives." MCNEILL, THE RISE OF THE WEST: A HISTORY OF THE HUMAN COMMUNITY 734 (1963).

13. An interesting study by Nicholas Georgescu-Roegen, prepared for a project directed by Giacomo Becattini, interconnects Adam Smith, Francois Quesnay, Karl Marx (and, by implication, Thomas Malthus) as "physiological" economists as opposed to later "mechanistic" economists. N. GEORGESCU-ROEGEN, ENERGY AND ECONOMIC MYTHS: INSTITUTIONAL AND ANALYTICAL ECONOMIC ESSAYS 237-42 (1976).

14. *See* Bruce Hannon's delightful "Energy Use and Moral Restraint, wherein are contrasted the views of the Economist and the Engineer on the use of the finite resources," to be published in the J. OF SOC. & BIOLOGICAL STRUCTURES.

15. These ideas are set forth in ALBRECHT-CARRIE, THE MEANING OF THE FIRST WORLD WAR vi-vii (1965).

In 1914, armies went to war primarily on mule power. Aircraft were toys. Nitrates still came only from Chile. By 1918, the automotive power of the gasoline and diesel engines predicted transportation for succeeding decades. The first regularly scheduled international carriage of commercial passengers (from Vienna to Kiev in 1918) having been established, it was evident the airplane had ceased to be a toy. As for nitrates, they came from the air as well as from Chile. People, therefore, could simultaneously lament the horrors of war and praise the blessings brought forth by that convulsion.

World War II simply carried on this convention. Yes, the rocket attacks had been terrible; but the knowledge they required made space travel a later possibility. Of course, those atom bombs caused dreadful suffering; but then they had made possible access to the energy of the atom for peaceful uses. It was "swords into plowshares," as ever it had been. War had once again revealed opportunities humanity had been too timid, or unimaginative, or cheap to seek.

Particularly too cheap. One of the facts the wars seemed to reveal was the plentiful supply of capital for any purpose man set his will to accomplish. All the cheese-paring old fogies from before the war, or later from between the wars, who had prated about "can't afford" or "too expensive," seemed to have been effectively silenced. For any important wartime purpose, there proved to be plenty of capital to spend, to waste, and to leave as an unexpended surplus. The only limitation lay in the forcefulness of the human will. A boundary turned out to be only one more frontier.[16]

By the middle of the twentieth century, the common wisdom asserted the limitless capacity of nature to satisfy human demand, claimed that it was quite right for human demand to be conceptually limitless, and felt assured that energy and capital would alike always be available limitlessly to respond to any demand made upon them throughout eternity. Upon these premises, population, energy conversion, materials usages, and capital investment surged forward at a pace not even the free-spending great wars of the century had matched.[17] The great secret of universal affluence reputedly had been found. It was only a matter of time before the lapping waves of rising wealth would gently inundate the lands of all people and float their rising numbers into a happy future.

The first modern voices to doubt such cheerful prophecy were those who insisted the world could not support a rate of population increase such as marked the twentieth century. For puzzling reasons, world population growth rates had taken off on a sharply rising curve in the seventeenth

16. A book in this mold is W. HOTCHKISS, MINERALS OF MIGHT (1945), much of which is his "winning" argument against Messieurs Manager, Superintendent, Lawyer, Banker, and President.

17. One example of many optimistic appraisals is in Seaborg, *Science, Technology, and the Citizen*, in IT'S NOT TOO LATE 153 (F. Carvell & M. Tadlock eds. 1971).

century, just prior to a similar steep rise in the rates of applied energy usage. By the mid-twentieth century, however, the number of years required for doubling total world population had shrunk to frightening brevity. Whatever numbers the world might support—even as many as fifty billion on the minimum subsistence that number would seem to impose—the time for getting there had a contracted prospect to it that alarmed those expressing their dismay over population growth. They claimed any course less than zero population growth would be inadequate to avoid the impending catastrophe.[18]

The next voices of alarm were concerned about the pollution of the environment. They noted the declining quality of air and water, the drop in certain bird and fish populations, and the concentration through soil and the food chain of contaminants that imperiled all living organisms in the chain. New chemicals were now released with which previous evolution had conferred no genetic experience. The least effect would be cancer, the most extensive change the alteration of the characteristics of future generations. Alarmed by these visions, these persons were impelled to warn about human activity that threatened slow or rapid biocide on the planet.[19]

And then came the alarmed voices to talk about shortages—of materials, of energy supplies, of capital. They insisted that the lack of materials could not be met by shifting usage from one complementary substance to another, or by taking lower and lower grades of some particular mineral from nature, or by recycling the used stuff back into the process. In the presence of open-ended demand, these would prove palliatives only. More pressing would be the shortage of oil, with an exhaustion of fossil fuels. And most pressing of all would be the lack of capital to cover the costs of shifting from mineral to mineral, of going from fossil fuel to nuclear power, of conserving in order to extract greater use from everything, and of minimizing the deleterious effect of every human action upon everything living or renewable within nature.[20]

Finally in this chorus of alarm came those who put together all these varying sources of fear. Thereby were inaugurated discussions of a crisis of crises. Most closely associated in the popular mind with the Club of Rome, these are the people who applied a systems analysis to the alarms of

---

18. One of the first modern writers to express concern with population was William Vogt, especially his PEOPLE! CHALLENGE TO SURVIVAL (1960), but the most influential book was P. EHRLICH, THE POPULATION BOMB (1968).

19. Many could be cited. The most significant for broad-scale criticism is B. COMMONER, THE CLOSING CIRCLE: NATURE, MAN AND TECHNOLOGY (1971); *but see also* such representative works as B. BRODUER, ASBESTOS AND ENZYMES (1972); K. MONTAGUE & P. MONTAGUE, MERCURY (1971); J. TURNER, THE CHEMICAL FEAST (1970).

20. Again one of the early contemporary writers expressing these fears was W. VOGT, ROAD TO SURVIVAL (1948). Another was F. OSBORN, OUR PLUNDERED PLANET (1948). Other important early works in this genre were P. SEARS, DESERTS ON THE MARCH (1935), which had an impact far beyond its immediate subject, and C. FURNAS, THE NEXT HUNDRED YEARS: THE UNFINISHED BUSINESS OF SCIENCE (1936).

others. They sought to integrate what had before seemed separate facts into a comprehensive picture of likely future events, should present practices in greater or lesser degree be extrapolated forward. In none of the scenarios that they cast was there an optimistic glow. Instead, there were predictions ranging from a future of dour frugality to one of outright disaster, should present practices be continued.[21]

The philosophical position of Aristotle had been rediscovered. The idea, so prevalent in economic circles from before Ricardo, that free goods existed in nature, was rejected by many, if not by most. The phrase, "There is no such thing as a free lunch," was repeated to the point of nausea among many hearing it, although not to the extent that there appeared any loss of appetite. Many, who had in the 1950s been certain that technology and the fine tuning of the economists had amply provided for their personal futures, now began to doubt if they had much of a profitable future left to enjoy, much less to pass on.[22]

What seems to have been rediscovered is the prospect of varying boundaries to expansion—of population, of capital, of energy, of materials. All rising curves, with possibly one exception, ultimately are expected to become sigmoid. Growth cannot be sustained forever in a near-vertical trajectory. The one implicitly asserted exception, so strongly asserted over the past two hundred years, has been that of human demand.[23]

Demand has now been freed for some decades from need. When high-energy or high-capital intensive societies today invoke "need," they refer to whatever must be mobilized to sustain some growth curve's rise. Necessity now seems to mean maintaining rising curves of growth. Often, for many, necessity even means increasing them.[24]

Aristotle believed that there were limits to human need which humanity would recognize. Karl Marx still believed it. But that was before a society appeared based upon growth.[25]

When growth became a necessity, how could need thereafter be defined? Even if it were called "subsistence," it would be for the

---

21. D. H. MEADOWS, D. L. MEADOWS, J. RANDERS, & W. BEHRENS, THE LIMITS TO GROWTH THE FIRST REPORT TO THE CLUB OF ROME (1972); M. MESAROVIC & E. PESTEL, MANKIND AT THE TURNING POINT: THE SECOND REPORT TO THE CLUB OF ROME (1974); J. TINBERGEN, A. DOLMAN, & J. VAN ETTINGER, RIO: RESHAPING THE INTERNATIONAL ORDER: THE THIRD REPORT TO THE CLUB OF ROME (1976). An important work for all this is J. FORRESTER, WORLD DYNAMICS (1971).

22. Who popularized the "free lunch" parable? In my opinion, it was the biologist Barry Commoner and the economist Milton Friedman—for very different purposes, one must add. As to why nature is not a free good, see E. MURPHY, GOVERNING NATURE 138-70 (1967).

23. On this role of the sigmoid—in this case an S-curve, see S. CHASE, THE MOST PROBABLE WORLD 18-19 (1968).

24. Paul Henshaw calls this relationship the "demand for and the price of Utopia." P. HENSHAW, THIS SIDE OF YESTERDAY: EXTINCTION OR UTOPIA 148 (1971).

25. One view of why Marx did not account for growth can be found in N. GEORGESCU-ROEGEN, THE ENTROPY LAW AND THE ECONOMIC PROCESS 262-75 (1971). Marx, of course, recognized that "the means of want satisfaction can change with time and place: the human species would have long since vanished had our wants been rigid like a number." *Id.* at 63.

subsistence of growth. Under such a social condition, any ophelimity limit must have been swept away. Planned obsolescence would become more of a social value than planned protracted utility.[26] A world certainly had been created that denied the validity of Aristotle's recognition of demand limits to be found in human need.

Yet was Aristotle more mistaken here than in his belief in nature's limited wealth? Is the rise in human demand to be the only curve that can fly upward forever? Can nothing external to it flatten or depress it?

One must conclude that there is a likelihood that external forces exist to limit demand. The human will that is instigative of soaring demand is strong. It does not, however, function in a universe capable of forever yielding to its pressuring force. For that reason, sigmoid curves for rising growth will prove inclusive for the curve of human demand.

Of course the alarums may be a bit premature. What humanity can do to nature still has a miniature quality compared to the energy of the sun, or the exhalations of the world's vegetation, or the life-force of microbiota. But the world's population continues to contract the doubling time of its numbers. The dependence on fossil fuels grows more, not less, intense. The use of resources grows multiply. The impacts on renewing systems in the environment increase in severity. The worrisome character of all this can only become evident when open-ended demand is seen as occurring in a world of inexpandible limitations.

It has been upward of two centuries now since many would confidently insist that nature offered limits to human demand. Certainly few have seen limitations that technology could not overcome. The common belief in the creation of new wealth seemingly guarantees sufficient capital to invest for eliminating any barriers the world could ever pose.[27]

Fairly abruptly there have now appeared persons quite confident in their assertions of limitation. They are convinced that Aristotle was more right than he was wrong. They insist that the vast change in conditions since his time has only produced conditions of ineluctable proof.[28]

They understand that the scope of nature was not as contracted as Aristotle believed, but they insist limitations do exist. Ironically, the evidence for the limitation has been made, in their view, both by the intensity of human demand and by the human ingenuity in meeting it. Yet somewhere down the way the limits are certain to be there, they insist.[29]

And it is out of this firm belief that a goodly portion of today's action

---

26. J. GALBRAITH, THE AFFLUENT SOCIETY 116-19 (3d rev. ed. 1976).

27. An influential and serious writer who has expressed this view is Peter Drucker. In P. DRUCKER, THE NEW SOCIETY: THE ANATOMY OF INDUSTRIAL ORDER (1950), energy and environmental constraints are simply absent.

28. W. OPHULS, ECOLOGY AND THE POLITICS OF SCARCITY: PROLOGUE TO A POLITICAL THEORY OF THE STEADY STATE (1977).

29. D. MEADOWS, ALTERNATIVES TO GROWTH—I: A SEARCH FOR SUSTAINABLE FUTURES (1977).

arises on behalf of the energy and environmental future. There is simply a declining faith in the boundlessness of nature. In its stead is more of the old Aristotelian conviction in the finiteness of all things.

## III. The Legal Response to Environmental and Energy Concerns

To insist that nothing happened prior to 1970 concerning environmental protection and energy conservation would disserve many people and several significant events. The decade of the 1960s was one of increasing awareness of the impact of human activity on the renewing environment. Rachel Carson's *Silent Spring* could be received with contempt and obliquity on its appearance in 1962, yet within a handful of years much of its content was accepted wisdom.[30] People and events changed rapidly during the years of the '60s and established a progression of differences about the way the environment and energy would be regarded. It is a progression that has been subsequently accelerated.

Perhaps fortuitously, the significant legislation and legal activity began emerging with the advent of the 1970s. When the National Environmental Policy Act was signed on New Year's Day, 1970, a symbolic event had occurred for both the United States and the world.[31] Modern man puts a stress upon the passage of years and assigns his highest social value to whatever can be called new. Hence the utility of identifying the legal activity protective of the environment with a fresh decade, the Decade of the Environment.

One could not claim the same in 1970 insofar as legislation for energy conservation was concerned. King Hubbert, it is true, had already issued his restricted predictions of the fossil fuel resources.[32] Others had ascertained that the Organization of Petroleum Exporting Countries (OPEC) had been moved by events into the position of a natural producers' cartel whose prices might never again be tumbled down as they had been in the past. But these persons attracted little attention among the drafters and passers of new laws.[33]

It was this absence of new laws, of a change of attitude reflected on the statute books, that is the point. There existed a legally established energy policy in countries like the United States that was decades old by 1970. At the very time that environmentally protective legislation had started to

---

30. For the importance of this work, see P. Brooks, The House of Life: Rachel Carson at Work (1972).

31. 42 U.S.C. §§ 4321-4347 (1970). *See* Anderson, *The National Environmental Policy Act*, in Federal Environmental Law 238 (E. Dolgin & T. Guilbert eds. 1974).

32. M. King Hubbert's first examination of fossil fuels in a time perspective was his article Hubbert, *Energy From Fossil Fuels*, 109 Science 103 (1949). *See* his later article, Hubbert, *U.S. Energy Resources, A Review as of 1972*, in U.S. Energy Resources: A Review as of 1972 (1974).

33. R. Mancke, Squeaking By: U.S. Energy Policy Since the Embargo (1976) deals with OPEC's development, effect, and likely future.

emerge in this country, the policy for energy use remained at open throttle.[34]

Some environmentalists even thought it possible to solve many environmental problems easily with the applications of still greater energy cascades. Many others—perhaps most—had a blissful unawareness of how high an energy demand environmental protection would impose. Environmental protection and energy conservation were not walking hand-in-hand through the legislative process at the start of the 1970s.[35]

Not until 1973, with the occurrence of the Arab oil embargo and the soaring rise in the price of a barrel of oil, was it made plain that energy, too, was in a present crisis.[36] What also became cruelly clear at that moment was the extent to which several conditions had become commonplace after 1945: (1) the rise throughout the world in energy demand, but most particularly the rise in countries that already had a tradition of high levels of energy rise; (2) the shift from reliance on coal and wood (or other current sources for energy) to dependence upon oil and natural gas; (3) the increased use of oil and gas, as compared to coal or hydropower, for the manufacture of electricity, along with the increased employment of electricity to heat or to cool space; (4) the diminishing importance of railways for the carriage of passengers and freight, accompanied by enormously expanded reliance upon gasoline or diesel-powered motor traffic to do the job; (5) the expectancies that fossil-fueled energy would be forthcoming, cheap, plentiful, and hence a kind of release for whatever made either labor or capital intensive; (6) a relatively greater dependency upon more highly centralized or localized organizations of energy supplies; and (7) the near total reliance for continued social tranquility, or even survival, upon the maintenance of open-ended growth in energy supplies.[37]

An expectation had also been encouraged during the same period of time that mankind could expect an easy transition of the energy supply from fossil fuels to nuclear power. Somewhere ahead in a not very specified future, fissioned uranium, the breeder reactor, and the fusion process would successively replace previous energy sources and simultaneously step up the flow of the energy cascades.[38] The wise energy planner

---

34. This is exemplified by the varying energy forecasts applying between 1960 and 1975. *See* SUBCOMM. ON ENERGY AND POWER, HOUSE INTERSTATE AND FOREIGN COMMERCE COMM., H. R. DOC. No. 77, 94th Cong., 2d Sess., pt. 7, Appendix, Table 1, 7 (1976).

35. Sophisticated persons *did* see the relationship. A. KNEESE, R. AYRES & R. D'ARGE, ECONOMICS AND THE ENVIRONMENT: A MATERIALS BALANCE APPROACH 17-28 (1970).

36. OPEC's earlier actions, however, had indicated what was coming. *See* remarks of Akins, Energy, the Environment and Our Society, Symposium held at The Ohio State University sponsored by the Battelle Endowment Program (Feb. 28, 1977).

37. Fred Cottrell was one of the first to make many of these points. F. COTTRELL, ENERGY AND SOCIETY: THE RELATION BETWEEN ENERGY, SOCIAL CHANGE, AND ECONOMIC DEVELOPMENT (1955).

38. Many still see the problems of nuclear power to arise externally to the ability of the nuclear process to safely provide commercial uses. The Study Group on Nuclear Fuel Cycles and Waste Management, *The Nuclear Fuel Cycle: An Appraisal*, PHYSICS TODAY, October 1977, at 32.

had become one who saw the future in terms of energy demand doubling in a generation. This wise planner insisted on demand being necessarily met or surpassed by supply. A smooth technical transfer to different sources for booming energy conversions was the only possible alternative should traditional fossil fuels decline in availability.

The 1970s have not proven a kindly time for either such traditions or such expectations. The first result of the 1973 OPEC oil action was to show energy to be no longer cheap nor a substitute for labor or capital. Nations learned that their future plans had to be redrawn because, whatever its cost, they were dependent upon the maintenance of high energy flow. A world structure had been created throughout the twentieth century that was meant to be sustained by energy cascades. Neither a shortage of foreign exchange nor a competition for the use of capital could stand in the way of satisfying such demands. Wise planning had become very hard to define.[39]

The world, therefore, was thrust abruptly into an energy consciousness, as compared to the gradual development of an environmental consciousness.[40] When the twentieth century began, the renewing environment of air, water, and the biomass was not only regarded as a storehouse of goods freely supplied by Mother Nature. The renewing environment was also regarded as endlessly able to renew itself and as being ultimately beyond the reach of human activity to irreversibly effect adversity. The image posited was man remaining small at the fecund side of Nature.

Even so, there already existed in 1900 a small but vibrant movement concerned with the conservation of nature. Out of this movement had come the efforts to restock streams with fish, to replant deforested woods, to limit the numbers of grazing animals on the range, and to restore eroded soil values. Already, people asserted that there were circumstances in which human activity could impose sufficient pressure that, if left unrelieved, could result in permanent harm. Steadily throughout the twentieth century, based upon this knowledge of at least the locally destructive capacity of human activity, the environmental movement expanded its dual conviction of a human ability to impose destruction upon nature's renewing powers and a human capacity to help nature sustain those same powers for renewal.[41]

---

39. An interesting report on this is International Economic Policy Ass'n, Perspectives on the National Energy Plan: A Mid-Course Appraisal (Sept. 1977).

40. As Kenneth Boulding puts it:

> While it seems highly probable that at the present low price of energy, both supply and demand over the next generation or so will be highly elastic, we may then easily move into a price range where inelasticity sets in; if this is short of what would be required for continued world expansion of per capita real income, we could be in for a very rough time.

Boulding, *Determinants of Energy Strategies*, in FUTURE STRATEGIES FOR ENERGY DEVELOPMENT: A QUESTION OF SCALE 14, 29 (1977).

41. For the course of the American development in the conservation of nature, see THE AMERICAN ENVIRONMENT: READINGS IN A HISTORY OF CONSERVATION (R. Nash ed. 1968).

It was out of such conviction that the Air Quality Act (1970)[42] and the Water Quality Act (1972)[43] emerged in the United States. They were based upon the same belief in man's responsibilities for his actions and confidence in his ability to avoid the evil consequences of those same actions. These beliefs had supported the earlier legislation for desert reclamation (1902),[44] forestry (1911),[45] soil conservation (1935),[46] and the coordination of fish and wildlife preservation (1958).[47]

Whether the belief in such a salvaging capacity is ultimately supportable, it has long existed; and it has co-existed with the recognition that the impact of human demand on the renewing environment creates a need for such conservation. Out of this awareness has developed both the popular consciousness for environmental protection and the political bases for the environmentally protective legislation not only of the 1970s but of previous decades.

This popular concern has not encompassed matters relative to energy, at least until very recently. Indeed the opposite view has prevailed, although there have been flurries of energy concern by government in the past. Sometimes this interest has been based upon a fear that a particular energy source was failing. More often it has rested upon a desire to increase the energy supply.

Government's fears of energy shortages were previously allayed by such events as the conclusions of the 1913 international coal conference that rejected predictions of imminent coal exhaustion and by the oil discoveries on the Great Plains in the 1920s. The Great Plains discoveries put a prompt stop to the progress of oil conservation legislation in the United States Senate.[48] As for the federal responsibility for increases in energy supply, they made possible such values as "cheap" interstate gas, low domestic gasoline prices after 1973 relative to world costs, nuclear

---

42. Pub. L. No. 91-604, 84 Stat. 1676 (1970). The 1970 act amended the Clean Air Act of 1963, 42 U.S.C. §§ 1857-1858a (1970), *as amended by* Air Quality Act of 1967, Pub. L. No. 90-148, 81 Stat. 485 (1967).

43. Federal Water Pollution Control Act Amendments of 1972, Pub. L. No. 92-500, 86 Stat. 816 (codified at 33 U.S.C. §§ 1251-1376 (1975)).

44. Act of June 17, 1902, ch. 1093, 32 Stat. 388 (codified at 43 U.S.C. §§ 371-616yyyy (1970)).

45. Popularly known as the Weeks Act, Act of Mar. 1, 1911, ch. 186, 36 Stat. 963 (amending Act of June 4, 1897, ch. 2, 30 Stat. 36 (codified in scattered sections of 16 U.S.C. chs. 2 & 3 (1970))).

46. Act of April 27, 1935, ch. 85, 49 Stat. 163 (codified at 16 U.S.C. 590a-590q (1970). *See* H. BENNETT, SOIL CONSERVATION (1939). The author therein was important in furthering this legislation and its administration.

47. Pub. L. No. 85-624, 72 Stat. 563 (1958) (codified at 16 U.S.C. §§ 661-664 (1970)). For a general discussion of the evolution of wildlife law, see ENVIRONMENTAL LAW INSTITUTE, COUNCIL ON ENVIRONMENTAL QUALITY, THE EVOLUTION OF NATIONAL WILDLIFE LAW (1977).

48. On coal supplies, see the excerpts from the 1916 address of Frank Short refuting the predictions of Gifford Pinchot that the world's supply of coal was being rapidly exhausted. Short, *Conservation: Its Purpose, Its Effect*, in 2 CONSERVATION IN THE UNITED STATES: MINERALS 675 (F. Smith gen. ed. & W. Doherty ed. 1971). On the 1920s abundance of oil supplies, see Marland, *Future Oil Supply More Certain Than That of Staple Food Crops*, in 2 CONSERVATION IN THE UNITED STATES: MINERALS 146 (F. Smith gen. ed. & W. Doherty ed. 1971).

generating stations resting comfortably on sunk costs, and similar efforts to keep the energy cascades flowing boundlessly.

Prior to 1970, the common problem for energy throughout the world seemed to lie more in how to dispose of a glut than how to act in the presence of a shortage. Due to wartime demand and transportation difficulties, there were brief periods of energy shortage in 1918 and in 1942-1945. But these were like impediments in swiftly moving streams: once the blockage was released, the flow of the energy cascades surged forward with reinforced strength.

In the United States during much of the time between 1925 and 1970, the legal mind was focused upon the support of price stability, the reduction of foreign competition, and the encouragement of domestic demand. What was the result? Aside from the state conservation laws designed to prevent destruction of the oil and gas resources in the extracting process, the legal system was more indifferent than otherwise to either the efficient use of energy or to any lessened use of energy sources.[49]

The absence of a long-established, widely based energy conservation movement has been the consequence. Compare energy conservation with movements for limiting population or protecting the environment. At the beginning of the twentieth century, the idea of birth control was popularly associated with anarchists like Emma Goldman, while the protection of nature was equated with the motto "Save the Fish." Not the best of beginnings, perhaps, for movements meant to change the world, but far more than the goal of energy conservation has had behind it. Population control and environmental protection today possess a tradition spanning several generations. Alongside their history, energy conservation has barely started.[50]

It is odd, therefore, that anyone should be much surprised at the slowness and the timidity with which energy conservation has been tackled since 1973. Marxist countries, which have maintained a concerted opposition to extensive private ownership of automobiles, may have had the easiest reactive role to play. This is a function less of a command economy than of low economic dependence upon automobiles.

In the United States, this economic dependence on cars and trucks may be as much as thirty percent—or it may be far more, when the economic function of the mobility sustained by the gasoline engine is

---

49. An interesting survey of historic American experience is M. MERRILL, THE PUBLIC'S CONCERN WITH THE FUEL MINERALS (1960). On the temporary character of wartime controls, see *id.* at 91, 102; on price support, see *id.*, at 97-98; on maintaining high domestic production levels, see *id.*, at 88-89.

50. Admittedly population control measures—especially sterilization and abortion—were slow to win popular acceptance; but without the work in favor of contraception, these two controversial methods never would have had a chance. *See* TOWARD THE END OF GROWTH: POPULATION IN AMERICA (C. Westoff ed. 1973). The same is true in environmental protection. *See* National Wildlife Fed'n, The Foundation of Conservation Education (Pamphlet No. 3 1941).

included.[51] In Western Europe and Japan, the percentages of dependence on gasoline and diesel are also quite high. Obviously there will be far greater difficulty instituting energy conservation measures—or environmentally protective actions—vis-a-vis the car and the truck in automobile-dependent societies than in societies where a private car is a rarity and goods are sent by rail.[52]

Yet all existing economies need to adopt environmentally protective measures and initiate programs of energy conservation. The need to redress the balances in nature against the impact of human demand upon natural systems would alone assure such changes independently of any difficulty of energy supply. The American air and water quality legislation of the 1970s is illustrative.

When this legislation was enacted, it was meant to force development of appropriate technology. Congress knew that the techniques for dealing with pollution were largely unavailable and, equally significantly, would never become available in the absence of legal compulsions. The reaction of many to the new laws was that Congress had made a mistake and, by overreacting to fads and hysteria, had enacted laws that Congress would have to repeal.[53]

In 1977, Congress reviewed what it had done. Some deadlines were moved back and a very few requirements were modified in the direction of lowering environmentally protective requirements. But, overwhelmingly, Congress stood fast and strengthened the environmentally protective aspects of the federal law.[54]

At about the same time in 1977, Congress enacted a coal mine reclamation act that could only be regarded as a further serious federal commitment to redressing the balance between natural systems and human demand upon those systems.[55] The mine reclamation act stands beside such earlier efforts as the previous year's public lands act[56] and the environmental legislation of the Lyndon Johnson years.[57] Even an

51. The importance of the automobile to the American economy was explored by Leventhal, J., in International Harvester Co. v. Ruckelshaus, 478 F.2d 615 (D.C. Cir. 1973).

52. This is why Amory Lovins, a prominent critic of continued reliance on fossil fuels, urges the rapid development of fluid fuels from current energy sources. Lovins, *Soft Energy Technologies*, 3 ANN. REV. OF ENERGY 477, 494-95 (1978). I am grateful to Mr. Lovins for allowing me to read his article in galleys.

53. Then Secretary of Commerce Maurice Stans expressed his very negative reaction in a speech to the Petroleum Council excerpted in the Wall St. J., Aug. 6, 1971, at 6, col. 4.

54. Davis, Kurtock, Leape & Magill, *The Clean Air Act Amendments of 1977: Away from Technology-Forcing?*, 2 HARV. ENVT'L L. REV. 1 (1977); Lazarus, *Nonpoint Source Pollution*, 2 HARV. ENVT'L L. REV. 176 (1977); Voytko, *The Clean Water Act and Related Developments in the Federal Water Pollution Control Program During 1977*, 2 HARV. ENVT'L L. REV. 103 (1977).

55. McDaniel, *The Surface Mining Control and Reclamation Act of 1977: An Analysis*, 2 HARV. ENVT'L L. REV. 288 (1977), discussing Pub. L. No. 95-87, 91 Stat. 445 (to be codified at 30 U.S.C. §§ 1201-1328 (1977)).

56. Federal Land Policy and Management Act of 1976, Pub. L. No. 94-579, 90 Stat. 2787 (codified at 43 U.S.C.A. §§ 687a-687c-1 (1976)).

57. For President Johnson's own appraisal of his environmental legislation, see L. JOHNSON, THE VANTAGE POINT: PERSPECTIVES OF THE PRESIDENCY, 1963-1969, at 336-39 (1971).

environmental advocate who believed that the effort was inadequate would have to admit that far more had happened in the American legal system than most observers in 1960 would have predicted could take place so soon.

On the energy side, the results have been far more modest. American efforts have been directed toward imposing energy conservation requirements on building heating, cooling, and insulation, as well as upon the fuel demands of vehicles to be produced through the mid-1980s.[58] The latter would have been required by the amended Clean Air Act standing by itself.[59] Beyond this, legislation has been modest, although growth of the burgeoning federal energy bureaucracy has been downright immodest relative to its assigned legal duties.[60]

The United States, like the rest of the world, has maintained the demand for incessant growth. Neither the problems of the environment nor of energy resources have been permitted to alter the will for unlimited growth, whether one is talking about advanced industrial economies or the industrially developing economies of the Third World. The world in the late 1970s may be enduring a recession, imposed by the OPEC-induced energy crisis, and reducing its rates of growth. But there are very few, indeed, who would see any silver lining in *that* cloud. The purpose everywhere is to raise the rates of growth to previous levels or to exceed those levels. Compared to this desire, difficulties in the environment or in energy are seen as subordinate.[61]

Those who are dismayed about progress in the United States relative to environmental protection and energy conservation may be right. The American economic system has the highest demand for energy and the greatest impact upon the environment of any in the world. It is toward American levels that other economies aspire, either generally or with respect to specific aspects.[62] What the United States, therefore, does not do—or, worse, cannot do—becomes paradigmatic for economies that operate, or aspire to operate, under similar conditions. The success of environmental protection and energy conservation in the United States, in

---

58. Energy Policy and Conservation Act, Pub. L. No. 94-163, 89 Stat. 874 (codified at 42 U.S.C. §§ 6201-6422 (1975)); Solar Heating and Cooling Demonstration Act of 1974, Pub. L. No. 93-409, 88 Stat. 1069 (codified at 42 U.S.C. §§ 5501-5566 (1974)); National Energy Extension Service Act, Pub. L. No. 95-39, 91 Stat. 191 (codified at 42 U.S.C.A. §§ 7001-7011 (1977)).

59. Air Pollution Control Act, ch. 360, 69 Stat. 322 (1955), *as amended by* Act of June 22, 1974, Pub. L. No. 93-319, § 10, 88 Stat. 261 (codified at 42 U.S.C.A. § 7547 (1974)).

60. On the growth of the bureaucracy of the U.S. Department of Energy long before it had commensurate duties, see Bachman, *DOE—Vast New Bureaucracy for Energy Job*, THE OIL AND GAS J., Nov. 14, 1977, at 119-25.

61. For a view insistent on the value of growth, see P. PASSELL & L. ROSS, THE RETREAT FROM RICHES: AFFLUENCE AND ITS ENEMIES (1973). Many of the critics of current society are viewed as "an anti-technology wave" that society cannot "countenance." Simon Ramo, Address to the White House Conference on the Industrial World Ahead, excerpted in the Wall St. J., Feb. 16, 1972, at 10, col. 4.

62. There is, in some circles, a rising demand for such greater equality. Mazrui, *The Barrell of the Gun and the Barrell of Oil in North-South Equation*, 3 ALTERNATIVES: A J. OF WORLD POL'Y 455-79 (1978).

consequence, has a global importance that many other American actions cannot possess.[63]

Given the special significance of American efforts, it is discouraging to note that other individual countries have certainly done more than the United States to clean their rivers and their air or to establish energy efficiencies. But one must recognize that most of their efforts to date have been smaller in range than the American efforts, either territorially or with respect to program purpose.[64]

Britain has cleaner air than in 1960, for example, but Scandinavia has increased acid rain. Germany has a clean Ruhr river, but the Rhine is woefully polluted. China has an excellent reforestation, erosion prevention, and silt control program, but ignores the problems of industrial air pollution. Russia strenuously focuses on cleaning up Lake Baikal, but has done little to alleviate the severe pollution of the lower Volga as it debouches into the Caspian. None of these nations has undertaken commitments on a par with the continentally inclusive, multi-purpose programs that the United States has legally imposed for purposes of protecting the environment and, albeit to a far lesser extent, enhancing energy conservation.[65]

For historic reasons, many high energy using economies have a per capita demand only half as high as that of the United States. But the disaggregated character of energy discourages useful comparisons of energy consumption. For other historic reasons, the intensity of American energy employment appears comparatively conservative. Should fossil fuels be approaching exhaustion and should nuclear power not prove a viable alternative, there is not a single industrially expansive, energy demanding economy in the world that will be in a position to lecture the United States for the inadequacies of her performance on either energy or environmental matters.[66]

Is all well, then, in the United States? No. The results can only be called disheartening for conservationists, because environmental protection and energy conservation have enjoyed very modest success. Motive and goal are important, but only accomplishment has essential value. Nature has no awareness of man's intent toward her. What counts is the actual ability of natural systems to maintain themselves, not humanity's good wishes on their behalf.

Present energy demands are exhausting the currently exploited

---

63. Amory Lovins strongly emphasizes the importance of American action for the world. Lovins, *Energy Strategy: The Road Not Taken?*, 55 FOREIGN AFFAIRS 65, 90 (1976).

64. An "ecological imperative" has been recognized, however, on an international scale that was unknown earlier. R. FALK, THIS ENDANGERED PLANET 21-36 (1971).

65. On experience in environmental protection outside the United States, see ECOLOGY AND ECONOMICS: CONTROLLING POLLUTION IN THE 70S, (M. Goldman ed. 1972); ENVIRONMENTAL LAW: INTERNATIONAL AND COMPARATIVE ASPECTS: A SYMPOSIUM (J. Nowak ed. 1976).

66. For extensive international energy comparison, see J. DARMSTADTER, J. DUNKERLLY, & J. ALTERMAN, HOW INDUSTRIAL SOCIETIES USE ENERGY: A COMPARATIVE ANALYSIS (1977).

resources in nature. Benign—and unsuccessful—efforts to moderate those demands mean very little. The United States' statute books, administrative manuals, and judicial decisions bulk large at both the state and federal level. The good intent, at least, is clearly spread out in American law, however meagre the result.

International conventions for the control of air and water pollution are becoming common. Europe, under far greater jurisdictional constraints than North America, has initiated programs to protect the environment and to conserve energy that may produce more favorable outcomes than any yet brought forth in the United States. Certainly segments of Europe can point to individually impressive successes in environmental protection and energy conservation.[67]

But, then, so can the United States. And the law's individual successes in these matters everywhere have not been sufficient. In the future, isolated actions will prove even less meaningful as the size and integration of the comprehensive problems concerning energy and the environment continue what appears at this point to be their inexorable growth.

Legal systems in the 1970s, both nationally and internationally, have been moved massively to protect the environment. They have been altered to conserve energy to an extent that compares favorably with what had previously been done or might have been thought possible in the prior decades of the twentieth century. If in these relative terms of our historic past, one were to enumerate the laws of the 1970s, or the funding, or the projects undertaken, or the commitments made for actions in the near future, one might be optimistic. One might believe that a high-energy demandant society could easily exist in a continuously renewing environment.[68]

But in the 1970s nothing else has stood still—not the degradation of the atmosphere, not the exploitation of materials, not the increase in world population, not the rising use of water, not the growth in energy demand.[69] The law may have run; but it has not even been able to keep pace with the effects of growth.

Law has been even less restorative of previous deteriorations. It is not serving as a bar to future crises concerning energy and the environment that lie on the immediate horizon of the decade of the 1980s. The law, it seems, has not succeeded in its purposes, although the law of energy conservation and environmental protection has surely grown.

---

67. The magazine ENVT'L POL'Y & LAW, sponsored by the International Council on Environmental Law, has covered international aspects of environmental law since 1975.

68. This belief would partake of what E. J. Mishan calls the "Panglossian effect." He probably would argue that the law is still too "spillover-permissive" and insufficiently "spillover-repressive." Mishan, *Ills, Bads, and Disamenities: The Wages of Growth*, in THE NO-GROWTH SOCIETY 83 (M. Olson & H. Landsberg eds. 1973).

69. As Tibor Scitovsky says, "Nature, not economics, stands in the way of man's getting his fill of everything." T. SCITOVSKY, THE JOYLESS ECONOMY: AN INQUIRY INTO HUMAN SATISFACTION AND CONSUMER DISSATISFACTION viii (1976).

Perhaps this legal swelling is only symptomatic of an age when growth is expected. Perhaps it is a preliminary activity necessary to the progression of legal actions that must be initiated and continued forevermore. But the resulting changes have been insufficient.

No one can look back upon all the legal activity of the 1970s concerning energy and the environment, and shout, "Stay! Hold! Enough!" This concerted activity is, at its very best, the end of the beginning.

## IV. THE LEGAL FUTURE CONCERNING ENERGY AND THE ENVIRONMENT

H.L. Mencken, the professional American critic, once said, "The prophesying business is like writing fugues: it is fatal to everyone save the man of absolute genius. The lesser fellow . . . is bound to come to grief at it."[70] What is especially daunting about this judgment is that one of the "lesser fellows," whose prophesying he dismissed, was H.G. Wells. And the twentieth century has come to regard Wells' predictions for it, made in 1900 in his *Anticipations*, as accurate to a startling degree.[71] If such a dismissal of H.G. Wells by one of his sharper contemporaries is typical, all others trying to peer ahead will prove to be very much "lesser fellows."

One might recall, of course, that Mencken himself—after dismissing Robert Frost, Ezra Pound, E.A. Robinson, Vachel Lindsay, Amy Lowell, and Edgar Lee Masters as "negligible," "burlesque," "polite," and so forth—called one Lizette Woodworth Reese the greatest of America's twentieth century poets. But, then, what comfort is there in knowing that Mencken, too, was just another prophesying fool?[72]

When one writes about the future in law concerning energy and environmental matters, one must keep firmly in mind the extent of the effect politics will have upon that future.[73] To concentrate attention only upon extensions of existing human demand or upon calculations about how long that demand can be met out of natural resources is to perpetrate an important error.[74] There is always, for one example, the political chance of nuclear war, with arsenals whose use must either eliminate life on the planet or grossly alter it. Viewing nuclear arms as a deterrent one must

---

70. H. L. MENCKEN, PREJUDICES FIRST SERIES 31 (1919).

71. H. G. WELLS, ANTICIPATIONS OF THE REACTION OF MECHANICAL AND SCIENTIFIC PROGRESS UPON HUMAN LIFE AND THOUGHT (1902), *reprinted from* 75 FORTNIGHTLY REV. 747, 925, 1104 (1901), 76 FORTNIGHTLY REV. 170, 355, 538, 725, 911, 1067 (1901), and 172 N. AM. REV. 801 (1901), 173 N. AM. REV. 56, 263, 401, 554, 694 (1901).

72. *H. L. Mencken, Critic*, in F. HARRIS, CONTEMPORARY PORTRAITS 143, 146-49 (4th Ser. 1923).

73. A book that describes this in historic terms within the American experience is F. SMITH, THE POLITICS OF CONSERVATION (1966).

74. As Amory Lovins has said, speaking about energy decisions: "[M]ost such decisions seemed to be based on political expedience and later justified by adjusting subsidies." Lovins, *supra* note 52, at 481.

always recall what was said in 1914 of the old Balance of Power: meant to deter, it did deter ninety-nine times; but on its hundredth use, it failed.

Nuclear war would be the ultimate political employment of, and impact upon, energy and the environment. But politics has other dramatic possibilities. For instance, there is no instant prospect of a physical absence of oil and natural gas in the world within the decade of the 1980s. At the closing of the 1970s, there is a glut that has created problems of high price maintenance for OPEC. While a contraction of world oil supply could occur in the mid-1980s, the physical resource will continue to be present in large quantities. But will it be sufficiently and continuously available for use through that period?

That will depend upon politics. Politics will be especially important because the location of oil is concentrated in a few countries, while use and dependency tends to be concentrated in a few others. A religious upheaval in Iran, a coup in Saudi Arabia, a renewed Arab war with Israel—these are the sort of political events that can abruptly interdict the bulk of the world's oil supply.

In 1973, the Arab oil embargo was relatively brief and incomplete. At that time the oil purchasers could meet the difficulty with reallocations of uses and price increases. But reliance upon oil from Arab and Iranian sources has grown since 1973 despite the North Sea and Alaskan North Slope fields.[75]

If, on another occasion, the Islamic countries where oil is principally located should mount a protracted embargo, price rises and reallocations would not be enough. Rationing would become necessary simply to assure oil products to parts of the economy that otherwise would be unable to obtain them. The preservation of the existing social order would require no less.

Undoubtedly, rationing eventually would indirectly cause prices to rise and would divert a large volume of money into illegitimate channels. But rationing has the appearance of providing equal treatment. It masks many of the real rises in the costs of commodities since, under law, goods are supposedly available in fixed amounts and for fixed prices. Instituting rationing removes pressure from the domestic political leadership for a long period of time by encouraging political distractions over the operations of the rationing system itself.[76]

Experience with the fixing of energy prices at levels that are low relative to other commodity charges, such as the legal setting of natural gas prices in the interstate United States' market since 1954, shows the difficulty of raising energy prices. Given the importance of energy, who

---

75. For predictions on oil supply and continued substantial Mideast dependence, see *Patterns of World Oil Supply*, in WORLD ENERGY OUTLOOK 32 (Exxon Background Series Pamphlet) (April 1978).

76. Tobin, *On Limiting the Domain of Inequality*, in THE ECONOMIC APPROACH TO PUBLIC POLICY: SELECTED READINGS 276, 281-82 (1976). Some are enthusiastic about the benefits of rationing. J. GALBRAITH, *supra* note 26, at xv.

would not want any part of it that they could get at prices lower than others were paying for it or at prices that kept energy costs low when compared with all other costs in the market? The ultimate issue is whether cheap energy exists. The desire for cheap energy will never be in doubt.[77]

A long-sustained embargo of oil would probably trigger oil rationing, undoubtedly at fixed prices. At the very least, large oil-purchasing countries would seek to buffer parts of their economic and social systems by two-tier energy allocation and price-fixing schemes.[78] The political ease of rationing, whatever its economic shortcomings, makes it the more likely recourse. It would be among the first legal responses to the ripple effect of, say, a long-term Arab-Iranian oil embargo.

This would not be the only effect, of course. Such a legal device as rationing would be important to the legal, political, social, and economic systems of countries dependent in whole or in part on Arab-Iranian oil. But it would likely be of far less consequence than some of the ecologic effects of an abruptly imposed energy shortage.

Many of the environmentally protective requirements enacted into law in the 1970s themselves use energy. Catalytic converters for automobile exhausts, stack controls, and waste cleaners are all energy users. Should energy sources for sustaining general economic activity be in short supply, the temptation would be great to return to the earlier practice of passing costs off onto the environment as a free good. The number of catalytic converters detached in the United States in the 1973 gasoline shortage offered evidence of this sort of reaction. It is probable that the overall decline in the use of energy imposed by an Arab-Iranian oil embargo would not counteract the environmentally deleterious effect of the economically "practical" man disconnecting the pollution control devices or resuming the use of previously forbidden fuels.[79]

The world, as can be perceived by any casual television viewer, has a high dependence upon Arab-Iranian oil. Potential political events in the near future, and the probable exhaustion of that resource by the year 2025,

---

77. Hitch, *Energy in Our Future*, 43 PHI BETA KAPPA KEY REP., Summer 1978, at 2-4, 8.

78. In that situation a country like Norway, with its North Sea fields, would be in a relatively better position compared to other Western countries. But as Bjartmar Gjerde, Norwegian Minister of Oil and Energy expresses it:

> Our experience since 1974 has shown us that the [expected moderate] ceiling will never be reached from [Norwegian] fields already discovered and declared commercial. . . . [After 1987] the production profile will start declining and fall rapidly unless further discoveries are made. . . . The international recession, which all Western countries are experiencing at the moment, makes one doubt the validity of assumptions made in 1974. . . . We are now living in a totally different economic situation and there is widespread unemployment for important groups in our community. . . . Petroleum activities therefore are not very suitable for balancing a difficult economic situation.

ORGANIZATION OF ARAB PETROLEUM EXPORTING COUNTRIES NEWS BULLETIN, April 1978, at 33.

79. "[T]he energy scene is probably the segment of the economy most heavily affected by environmental policies and considerations. Safeguards, risk-reducers, delays, and stop-gap solutions lead to cost. . . . [W]hat to do about them is a political decision." Landsberg, *Low-cost Abundant Energy: Paradise Lost?*, in ENERGY: USE, CONSERVATION, AND SUPPLY 3, 9 (A. Abelson ed. 1974).

underscore the significance of this dependence.[80] Despite its importance, the localized Arab-Iranian oil resource is simply one more example, among many that could be set forth, of the concentrations of energy reliance.

Steadily over the twentieth century, the organization of energy supply has become more complex, more centralized, more vulnerable to disruption, and more important to the survival of the economy and even of human life. A protracted Arab-Iranian oil embargo is only one of the scenarios that could be written about the interdiction of the energy cascades, or the serious consequences that would thereby ensue, or what the law would have to do to deal with those consequences. As Americans know, severe weather alone—from hurricanes to blizzards—is enough to cause a breakdown in the fragile structure of the present highly centralized and complicated energy system.[81]

No individual, no community, no national economy has security apart from the maintenance of this brittle, fragile energy system. It is a vulnerability greatly intensified by a nearly complete reliance upon fossil fuels as the source of energy supply. One of the paradoxes of the present situation is that a society with an accelerating, open-ended demand for energy has come to depend on an energy source that is nonrenewable, limited to paleolithic products stored within the earth's crust.[82]

For over a century, demands for energy have continued to rise in an unprecedented curve. During that time, predictions have been made, beginning with the economist Stanley Jevons in 1865, that the paleolithic storehouse of one fossil fuel or another was about to be drawn down to exhaustion.[83] Each time new discoveries and new technologies for reworking energy sources have denied the accuracy of those prophecies.

Nevertheless, given the present (1) rate of rise in energy demand, (2) difficulty in the discovery of new fossil fuel sources, (3) increase in exploitation of known resources of fossil fuels, and (4) impact upon the living and renewing environment of the burning of those fossil fuels, it is evident some sort of energy crisis threshold is being reached because of this massive reliance upon fossil fuels for energy. Whether the interdiction eventually comes from politics, or physical exhaustion of the fuel source, or inadequacy of the source to meet soaring demand, or inability of the atmosphere and the biomass to handle the by-products of fossil-fueled energy conversion, an interdiction seems to be unavoidable.[84]

80. Some say it is the foundation for a revival of Islam. Mazrui, *supra* note 62.

81. *Energy Research: Alternative Strategies for Development of New Energy Technologies and their Implications for the Federal Budget*, CONG. BUDGET OFFICE 1-2, 9. (Background Paper No. 10) (July 15, 1976).

82. Kneese, *Natural Resources Policy, 1976-86*, in 4 U.S. ECONOMIC GROWTH FROM 1976 TO 1986: PROSPECTS, PROBLEMS, AND PATTERNS—RESOURCES AND ENERGY 122, 136-46 (1976).

83. *See* E. MURPHY, *supra* note 22, at 46-48.

84. Despite what seems to be a world-wide consensus on an existence of an energy crisis and the need for energy conservation, a single, uniform, world energy conservation system remains elusive. INTERNATIONAL COMPARISONS OF ENERGY CONSUMPTION, at x (J. Dunkerley ed. 1978).

Since 1870, people have talked of energy sources that could be used instead of fossil fuels. Of course, some of the proposed sources were what the fossil fuels were replacing—wood, dung, windmills, and the waterwheel. It could be anticipated that these would not be embraced contemporaneously with their very replacement. Hydropower was the exception, but it soon ran into apparently interlocked limitations. It was believed that hydropower would necessarily withdraw large amounts of land and water from other uses, natural and human. Simultaneously, energy demand was rising at a rate that seemed insatiable by hydropower. But apart from hydropower, and later nuclear power—neither of which has yet provided more than a small percentage of the total energy supply—energy sources to replace or supplement fossil fuels have not progressed beyond the realm of discussion and experiment.[85]

Solar power, wind, the tides, geothermal steam, and ocean thermal energy conversion fall in this category. Reams have been written about their potential; successful experiments have repeatedly taken place; occasional applications of some of these processes have occured—yet the portion they contribute to the humanly managed energy supply system is trifling. So trifling, that it is easy to overlook the major contributions of sun, wind, tides, and thermal conversion to the sea of energy in which all human activity floats. It is dispersed energy, but it is life supporting. Until now, however, little of it has been channeled into practical provision of electricity, space heating, or direct steam power.[86]

The same is true of another widely discussed energy alternative, hydrogen. For years, the prospects of a hydrogen economy have been held up as a tempting goal. Hydrogen is ostensibly endlessly available in nature. It is now capable of being carried in nonexplosive form, usable for mobile as well as stationary sources, yet the hydrogen economy remains distant.

Large-scale use of the biomass seems equally remote. Some would use it to make methane, in a partial, sophisticated harking back to the use of dung for fuel. Others would make alcohol from vegetable matter. Brazil, to save foreign exchange, is in fact using alcohol made from sugar cane and cassava to mix with gasoline. The United States has experimented with corn and could distill alcohol from locust, a crop suitable for otherwise nonagricultural land.[87] Nevertheless the biomass, like the hydrogen economy, has had a negligible impact in reducing dependency on fossil fuels.

---

85. Amory Lovins offers evidence that locally, changes have proceeded beyond this level. Lovins, *supra* note 52, at 489-93. The Solar Energy Industries Association in 1977 claimed President Carter's solar goals could easily be met by 1985 in terms of technology. R. LIVINGSTON, SOLAR ENERGY: FEDERAL GOVERNMENT INVOLVEMENT 48-49 (Report to the Solar Energy Research Institute, Feb. 17, 1978).

86. N. GEORGESCU-ROEGEN, *supra* note 13, at 10-12.

87. A survey of such technologies can be found in ENERGY: USE, CONSERVATION, AND SUPPLY 107 (A. Abelson ed. 1974), and in Lovins, *supra* note 52, at 477, 511-17.

Far more effort has gone into attempts to expand the traditional fossil fuel resource.[88] First, drilling has been undertaken at sites where predictions for success have been poor, on the chance that the geologists could be wrong. Second, drilling has been undertaken in areas of high cost and high risk; with expansion into the seabed of the North Atlantic, it can be expected to continue.[89] Third, repeated efforts have been made to extract oil from shale and tar sands, for which costs seem perpetually to establish a retreating target: when oil was $2.50 per barrel, advocates of shale oil said shale would be an economic oil source should oil reach $8 per barrel; yet, with oil at a world price of $13 per barrel people now say shale could be economical with oil at perhaps twice that price.[90] Fourth, there have been the schemes to gasify and liquefy coal in order to turn a more plentiful fossil fuel into one of the scarcer kinds; again, the effort demands energy and capital in amounts that make the attempt more economic only as OPEC increases the price of oil.[91]

Certainly efforts to increase the fossil fuel resources, like those to conserve its use and increase its efficiency, will continue. No one could deny their value. Many *would* question some of them in terms of the capital, energy, and environmental investments required relative to the volume of energy to be obtained for profitable employment.[92]

More significantly, many are now claiming that it is urgent that we actively develop alternative energy sources to the fossil fuels. They argue that the current high-energy demandant society is well into what must be a period of transition to some nonfossil fuel energy source, if this society is to avoid eventual disaster. Advocates of nuclear power, "soft-energy paths," and the hydrogen economy seem to be in solid agreement on this point.[93]

Amory Lovins, who coined the term "soft-energy paths," advocates the use of solar, wind, and biomass power for several reasons. He believes them ecologically the least harmful energy sources and, in the long run, truly inexhaustible springs for the energy cascades. He also believes that, by creating an energy dependence upon current as opposed to stored

---

88. Some of these are described in ENERGY: USE, CONSERVATION, AND SUPPLY, *supra* note 87, at 70-88.

89. *See The Offshore World of Oil and Gas*, 2 PANHANDLERS MAGAZINE 2-6 (1978); *Geopressured Aquifers—A New Source of Natural Gas*, 2 PANHANDLERS MAGAZINE 14-20 (1978).

90. *See* the prices in Metz, *Oil Shale: A Huge Resource of Low-Grade Fuel*, in ENERGY: USE, CONSERVATION, AND SUPPLY 70 (A. Abelson ed. 1974).

91. Even if capitally possible, if coal became the sole energy source at projected rates of increase, there would only be enough for 140 years of use according to one estimate. Cloud, *Mineral Raw Materials and the National Welfare*, 4 U.S. ECONOMIC GROWTH FROM 1976 TO 1986: PROSPECTS, PROBLEMS, AND PATTERNS—RESOURCES AND ENERGY 56 (1976).

92. Pirages, *U.S. Growth and the International Economy*, in 12 U.S. ECONOMIC GROWTH FROM 1976 TO 1986: PROSPECTS, PROBLEMS, AND PATTERNS—ECONOMIC GROWTH IN THE INTERNATIONAL CONTEXT 16, 32-34 (1977).

93. *Id. See also* Lovins, *supra* note 63, among others on solar power; Hammond, *Unconventional Energy Sources: Brazil Looks for Applications*, 195 SCIENCE 862 (1977), discussing alcohol and hydrogen; Rose, *Nuclear Eclectic Power*, in ENERGY: USE, CONSERVATION, AND SUPPLY, 88, 95-96 (A. Abelson ed. 1974), discussing nuclear versus fossil fuel power.

resources, upon renewable as opposed to exhaustible resources, upon dispersed as opposed to centralized resources, and upon locally manageable as opposed to complex centralities of resources, the world will be freed from the present fragile, highly vulnerable energy system.[94]

Such decentralization and noncomplexity of management need not mark all energy systems that are alternatives to fossil fuels. One doubts if this could be the case for a hydrogen economy or some types of biomass energy sources. But in the present state of the art, the employment of individual, neighborhood, or very localized community efforts would probably have to become standard for energy coming from sun, wind, and most geothermal sources.[95]

At the moment, technology also does not confer upon alternative energy systems of the "soft path" all of the "at command" conveniences of fossil fuel and nuclear energy, the "hard path." But technology is improving, and the costs of fossil fuels are rising. "At command" amenity may become accessible in a way unknown to persons who remember heating a little hot water on the roof or lighting the home with a windmill on the eaves. The price may also become "right." Present full convenience or not, currently competitive price or not, the argument is being put forth very strongly that what the world needs is self-reliance, in the form of an energy system that could not be fatally interdicted nor used to hold mankind for ransom by politicians, terrorists, strikers, speculators, or resource exhaustion.[96]

Some believe such a shift must be accomplished very soon. Others think there is as much as a half century for a change from fossil fuel and nuclear power to such current energy sources as the sun, wind, and biomass. During that half century, there would continue to be heavy, although constantly diminishing, reliance upon fossil fuel. But increasing numbers of critics of the current energy system believe that the time to begin the shift away from the fossil fuels is overdue by a decade. They insist that the transition must be started soon and carried through vigorously.[97]

Although they may be right, there is little existing evidence of a

---

94. A. LOVINS, SOFT ENERGY PATHS: TOWARD A DURABLE PEACE (1977).

95. Asbury & Mueller, *Solar Energy and Electric Utilities: Should They Be Interfaced?*, 195 SCIENCE 445 (1978). Geothermal power can be tied into an electricity grid. Stone & McNamara, Geothermal Energy and the Law, at xi (University of Southern California Law Center with the support of the National Science Foundation (RANN)) (Sept. 30, 1975).

96. Amory Lovins summarizes it thusly:

> Energy supply by a centralized entity . . . may increase convenience to users who do not care to become involved except by paying the bill, but may cause others to feel a humiliating and even alienating dependence on remote technical bureaucrats who tell them how much energy they can have at what price, and can disconnect them if they argue.

Lovins, *supra* note 52, at 488.

97. William Ophuls is particularly of the opinion that the situation requires immediate redress to far lower levels of population, energy, materials use, and environmental demand. W. OPHULS, *supra* note 28.

political will to institute energy changes. There is political reluctance even to take the steps toward maximizing the recovery of fossil fuels. Politically, there has been a willingness to adopt laws mandating energy conservation and efficient energy use—spaced over much of the decade of the 1980s. This deferral is not dissimilar to the postponing of the attainment of statutory goals for air and water quality. There has, however, been great reluctance to require any greater changes or impose greater costs for the better discovery, recovery, and use of fossil fuels.

The multi-tier pricing system for oil and natural gas in the United States is evidence of this. The political pressure to keep prices low has proved to be so strong that measures that might have facilitated a greater domestic supply have resisted enactment and vigorous enforcement. The producers, pursuing ends familiar to Adam Smith, have drifted to the areas in which regulation allows the higher return.[98]

For oil, the economic inducements have been found in importation of foreign oil and secondary and tertiary recovery from previously exploited domestic fields. In the case of natural gas, the inducements have been so strong in the previously noncontrolled intrastate market that by late 1978 intrastate prices were dropping, even as gas for the interstate market, kept by federal regulation at consistently lower prices, remained hard to find. In regard to coal, the resistance remains strong among users of high-sulphur coal to avoid meeting the federally imposed requirements to clean up emissions and reduce the ambient levels of aerosols of sulphur. Across the board, no one wants the onus of raising the price of fossil fuels, whatever the energy and environmental justifications.

One fact that has become evident through all this energy and environmental action over the decades of the 1960s and 1970s has been the increasing importance of legal intervention. In the 1960s the political scientist Lynton K. Caldwell insisted that nothing would happen on behalf of the environment if Congress did not adopt "action-forcing" legislation.[99] The earlier Taft-Barkley Water Pollution Control Act (1948),[100] and the Clean Air Act (1963)[101] which had been modeled on it, had been ineffective. Caldwell—of course along with others—was persuasive among key senators.

Suddenly, the National Environmental Policy Act (1969-1970),[102] the Air Quality Act (1970), and the Water Quality Act (1972)—all clearly "action-forcing" upon both the federal and state governments and private industry—came forth as federal statutes. So, too, for recent federal energy legislation, although its "action-forcing" character has been far

98. Anyone regularly reading *CCH Energy Management's* reports on current activity, in my opinion, would be hard-pressed to reach a different conclusion.

99. L. CALDWELL, ENVIRONMENT: A CHALLENGE FOR MODERN SOCIETY xiii (1970).

100. Pub. L. No. 80-845, 62 Stat. 1155 (codified at 33 U.S.C. §§ 466g-1, 1151-60, 1171-75 (1948)).

101. Pub. L. No. 88-206, 77 Stat. 392 (codified at 42 U.S.C. §§ 1857-1857l (1963)).

102. Pub. L. No. 91-190, 83 Stat. 852 (codified at 42 U.S.C. §§ 4321-4347 (1970)).

more passive.[103] Indeed, but for the "action-forcing" price rises of the OPEC cartel, the subject of energy conservation would have made even less than its present progress beyond the talk stage.

Still, the crises in energy, like those in the environment, have long been present. All that recent events have accomplished over the years since 1960 has been to make those crises more evident in the public mind. Nothing is more "action-forcing" than a perceived need for social salvation.

There is no reason to believe that such legal intervention will not continue. If there should occur a movement from highly centralized, complexly managed energy source and distribution systems to simple and local systems, there would be a necessary relocation of capital and economic activity.[104] Much law concerning the regulated utilities would become obsolete. A new focus for law—perhaps even a reduced quantity of legal regulation—would have to be considered.

Nevertheless, this present world society continues to demand high quantities of energy. It will likely continue to do so, although energy demand must eventually be reduced. High energy uses necessarily impact upon the limited capacities of natural systems. For these, if for no other reasons, laws concerning energy use and environmental protection will continue in active force. They will be further extended under almost every conceivable likelihood.[105]

But "conceivable likelihood" is the limitation upon all prediction. The law is not an end in itself. It is a process, mostly a reactive one, for attaining ends externally assigned to law by some social means.[106]

The exact future for energy and environmental uses cannot be drawn up in a grand design today. As a consequence, the precise future patterns of law relative to those subjects are equally impossible to draft. Demand and the organization of supply and its delivery are variables that will determine both social and political choices. The reaction and the application of law will reflect the use and the likely interdictions of fossil fuels. The only choice for the present lies in degrees of probability, with

---

103. The recently passed National Energy Plan seems to fit such a pattern. Public Utilities Regulatory Policies Act of 1978, Pub. L. No. 95-617 (Nov. 9, 1978); Energy Production and Conservation Tax Incentive Act, Pub. L. No. 95-618 (Nov. 9, 1978); National Energy Conservation Policy Act, Pub. L. No. 95-619 (Nov. 9, 1978); Powerplant and Industrial Fuel Use Act of 1978, Pub. L. No. 95-620 (Nov. 9, 1978); Natural Gas Policy Act of 1978, Pub. L. No. 95-621 (Nov. 9, 1978). For a summary of the National Energy Plan, see [1978] ENERGY MANAGEMENT (CCH) ¶ 9420.

104. It might not be an aggregated capital crisis but if the specific industry suffering a capital shortage is all or part of the energy industry, the ripple effect could be profound. *See* Bosworth, *The Issue of Capital Shortage*, 3 U.S. ECONOMIC GROWTH FROM 1976 TO 1986; PROSPECTS, PROBLEMS, AND PATTERNS—CAPITAL 1-15 (1976).

105. *See* VanVactor, *Energy Conservation in the OECD: Progress and Results*, in INTERNATIONAL COMPARISONS OF ENERGY CONSUMPTION 165-75 (J. Dunkerley ed. 1978), for general remarks on energy conservation.

106. *See* the remarks of Friedman, *The Future as an Element of Present Action*, in RETRACKING AMERICA: A THEORY OF TRANSACTIVE PLANNING 137-41 (1973).

the assurance that far more is possible in the way of legal innovation.[107]

In the time frame of the years until 2030, it is probable that energy demand will reluctantly slacken. A heavy dependence upon fossil fuels will continue to be maintained. The impact of converting fossil fuels to energy will impose growing problems upon the environment. At the same time, it is probable that there will be some increase in the use of fissioned nuclear power and, around the turn of the century, the introduction of the fusion process for the conversion of energy.

It is probable that a major shift will occur toward other energy sources, such as hydrogen, methane, the biomass, and the sun. Unless, however, the present attention to these sources dramatically rises, it will be the end of the century before they will substitute for fossil fuels in significant amounts. The fixities, commitments, resistances, and prejudices of the contemporary energy system are the bases for this prediction of probabilities.[108]

It seems likely, therefore, that the law must be prepared for certain consequences. The environment is not going to enjoy automatic improvements. Any human responsibility will require an increased number of artificial regimes in order to assist natural systems to sustain viable balances. The energy system will long remain centralized and complex, with concomitant fragility. Interdictions—from nature, politics, resource insufficiency, or technical inadequacy under the burden of soaring demand—will likely increase, imposing greater social, economic, and political difficulties. Serendipity, in short, will not bless those who create open-ended demands for energy.

What can be expected of the law, under such circumstances? If those drafting it do not hold themselves in readiness for change, legal systems could add their collapse, or lesser difficulties, to the overall crises.[109] One must remember, after all, that the conditions of energy and the environment are not the only subjects of crises with which societies and their legal systems must deal between now and 2030.

Fixity, resistance, and prejudice in the legal system are least tolerable when their presence elsewhere in the social apparatus is creating conditions

---

107. The relevant sort of recommendations are among those made by Willis Harman and Thomas C. Thomas of Stanford Research Institute:

> (2) Institute strong incentives for conservation of energy and materials, and for development of "appropriate technology" that is no more demanding of resources and the environment than necessary. . . . Promote decentralization of technology, institutions, and government. . . . (3) Keep energy and growth policies somewhat flexible. . . . Encourage legitimating alternative perceptions of social and economic reality.

Harman & Thomas, *The Challenges of Non-economic Factors to Economic Growth*, in 2 U.S. ECONOMIC GROWTH FROM 1976 TO 1986: PROSPECTS, PROBLEMS, AND PATTERNS—THE FACTORS AND PROCESSES SHAPING LONG-RUN ECONOMIC GROWTH 41, 58 (1976).

108. On the continued role of lag time, see Long & Schipper, *Resources and Energy Substitution*, in 4 U.S. ECONOMIC GROWTH FROM 1976 TO 1986: PROSPECTS, PROBLEMS, AND PATTERNS—RESOURCES AND ENERGY 94, 98-100 (1976).

109. *See* America's Energy Crisis: Summary Report (A.B.A. Special Comm. on Energy Law) (August 1978).

of crisis. The legal system alone probably can save no society from its perils, but inadequacies at law may increase those perils to a socially insoluble degree.

There need not be more regulation or control by bureaucrats of everyday life;[110] law has other options than the bureaucratic command. The law may redefine property, establish new terms of resource specificity, set the conditions for the transfer of or the taking of security in property, and create or modify causes of action, defenses, or the conduct of adversary proceedings. The last are not so simple in appearance as a prosecutable prohibition or so tangible as a bureaucrat with rubber stamps somewhere in an office. Still, they are equally available options.[111]

Probably every resource of the law—criminal prosecution, administrative command, and changes in the rules of property—should be drawn upon in the future. To neglect any resource will likely have results more consequentially malign than benign. This particularly shall ensue when the situation is socially perilous.

Who can today deny the perils from open-ended economic demand, high energy dependence on the fossil fuels, and the many limitations these find in the environment? "Business as usual" on these terms cannot continue. The changes forced by the present intervention of the law, with its costs and restraints, are not enough to turn future practice to a better course.

Furthermore, for the next fifty years and beyond, the needs relative to energy and the environment will have massive, preempting requirements for capital. Those who are deprived of capital for other, competing uses will be reluctant to accept this preemption. Nevertheless, it will be essential that cultural and political conditions not be allowed to make this direction of capital toward energy and environmental concerns an impossibility. The effective operation of law will be one of the means to that end.

Already the perception of these difficulties has been popularly evident for at least a decade. The law has responded with important and helpful changes. Yet nothing has been solved, and only a little has been saved by these legal measures. Important as they are to the point of indispensability, these legal enactments will be only a part of a continuum of legal action.

Demand remains both undifferentiated and open-ended. Energy use continues to soar and retains its dependence on fossil fuels. It remains something that cannot be aggregated into a unified energy budget, to

110. H. KAHN, W. BROWN & L. MARTEL, THE NEXT 200 YEARS: A SCENARIO FOR AMERICA AND THE WORLD 196-97 (1976). Maybe Herman Kahn is right. He claims government jobs will be only a kind of public welfare. Bureaucrats will be even less relevant to assigned duties if he should be right than they are presently.

111. *See* E. MURPHY, NATURE, BUREAUCRACY, AND THE RULES OF PROPERTY: REGULATING THE RENEWING ENVIRONMENT (1977), for an effort to explore these various possibilities.

predictably offset energy investment with the energy product from the conversion.[112] The environment continues to deteriorate under these impacts, despite efforts made and successes attained. These and other conditions being so, the work of the law is not finished. It has scarcely begun.

If more is to be done that to phenomenologically describe conditions, and if efforts other than the complete dismantling of the present technology and economy can be productively undertaken, then a future role remains for the law. It will be sweeping in its scope. To predict less would be to prophesy the improbable. To predict more precisely is to know the future in a detail that transcends a primary concern with law and requires the more mystic attributes of prophesy. And to predict anything at all is to know the limits of human mortality.[113]

---

112. Huettner, *Net Energy Analysis: An Economic Assessment*, 192 SCIENCE 101 (1976).

113. Herman Kahn calls it writing scenarios. Kenneth E. F. Watt calls it "games for decision-makers." K. WATT, THE TITANIC EFFECT: PLANNING FOR THE UNTHINKABLE 237 (1974). Dennis Gabor calls it "inventing the future." D. GABOR, INVENTING THE Future (1963). C. A. Doxiadis calls it "legislating against great urban crimes." C. A. DOXIADIS, THE GREAT URBAN CRIMES WE PERMIT BY LAW (1973). Buckminster Fuller talks of discovering "the synergetic rules that evolution is . . . trying to make clear to us." R. FULLER, OPERATING MANUAL FOR SPACESHIP EARTH 133 (1969).