

BOOK REVIEW FEATURE

SOCIOLOGICAL WORK ON ENERGY: THE OPPORTUNITY AND SOME PRESCRIPTIONS

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The opportunity for sociological work on energy is demonstrated by a critical review of several bodies of non-sociological work on energy. Included in this review is the crisis genre, the energy primer, the political economy of energy, the work of "renegade" scientists, and research by traditional economists. By criticizing these bodies of work, the potential contribution of sociology to the intellectual debate over energy is shown. Besides these critical comments, there are also several positive prescriptions suggesting that sociological work on energy be critical, historical, and theoretical.

Societal extinction threatens the United States in particular and the world in general unless abundant sources of environmentally safe energy are developed. While apocalypse has always been on the horizon of human existence, the new twist is that it is imaginable, possible, even probable within timespan that can be immediately grasped¹. The problem has now become thematic and personal. Thinking sociologically about energy offers the possibility of thinking our way out of a radical crisis. A social theory, capable of accurate prediction and pointing to appropriate social technologies, would not necessarily rescue us. Neither, however, are the problems of energy purely technical, solvable by physical science or by a social science such as econometrics. Some sociological understanding of energy use and production is necessary. Physical scientific information and factual economic data are essential, but an adequate sociological framework can go beyond to contribute something new, namely, an understanding of how technical "imperatives" interact with those of social and political life.

The deluge of energy-related publications continues to accumulate at an increasing rate. This literature cannot be neatly divided along the usual disciplinary boundaries, so that one

might point to the sociologist's response to the crisis, the biologist's, and the physicist's. Clearly, some writings oriented to the crisis can be pigeonholed in those simple categories. Works by geologists, for example, estimate the availability of various mineral fuel resources, articles by engineers describe new technologies to produce energy, and studies by physicists apply thermodynamics to energy conservation.²

With these works that deal in a delimited natural scientific realm, the sociologist need have no quarrel. Even some work of economists, if we winnow out what is untainted by the assumption of a free-market capitalism, is useful and does not penetrate the sociological realm. These purely natural scientific writings do not purport to address the relation of social-political process to energy.

CRISIS LITERATURE

One place, however, where the sociological shortcomings of the energy literature can be seen is in the plethora of books that essay a general, interdisciplinary approach to energy. Such *crisis* literature is extremely common: it offers a mixture of physics, geology, geography, sociology, engineering, ecology, and economics in response to the energy crisis. A typical (and informative) example³ is S. David Freeman's (1974) *Energy: The New Era*. After a brief discussion of the contemporary crisis and its background in cheap energy, consumption habits, and the allocation of energy in a market economy, Freeman gives a history of fuels in the U.S.; discusses the current patterns of energy consumption, and predicts future consumption. The deleterious effects of high energy use on the environment are the subject of another chapter. A discussion of the declining availability of energy follows; this problem is connected to supply, market forces, and underlying social values. Several chapters describe the involvement of government in energy, including descriptive material on national energy policy, the importance of energy in foreign policy, and the power of energy lobbies in the United States. Freeman closes with chapters on the possibilities of energy conservation through the more effective uses of existing resources.

At the more popular end of the spectrum of the *crisis* genre is Rocks and Runyon's (1972) *The Energy Crisis*, a softer presentation of the scientific and technical aspects of the crisis. They discuss the current situation of oil, gas, and coal, proceeding to a pessimistic treatment of alternative energy sources. Nuclear energy causes them some concern, not because of safety problems, but because they do not think it will be able to supply all electric needs soon enough. They also attend to other problems associated with energy shortages, such as population growth, alternative food sources, and a water shortage. Another chapter reviews the energy position of other nation-states and world regions, including the Soviet Union, China, Western Europe, Latin America, and Africa. They close with an extremely brief discussion of international and domestic energy politics.

Both of these works deserve summaries not because they are unique, but because they typify a number of similar books and articles (see also Holdren and Herrera, 1971; Fisher, 1974; Energy Policy Project, 1974a, 1974b). The homogeneity of the *crisis* genre is such that different representatives have almost the same chapter subjects, often in the same order. For a general orientation to the energy crisis, these materials are quite satisfactory. Their failure is one of omission. They are relatively ahistorical descriptions, with no theoretical point of view, other than an attention to the immediate problem. Various ad hoc social theories are invoked, as in Freeman's references to social values as an element underlying the crisis, but there is no systematic social theoretical framework. The arguments aimed at social explanation are not sufficiently sustained or elaborated to surpass the level of common-sense sociology. For example, Freeman (1974:37) briefly refers to the fact that high energy consumption, while historically a concomitant of a higher standard of living, may actually have contributed little to "increased enjoyment of life," as in Americans' (energy-intensive) tendency to live at a distance from work and commute in large, private automobiles. If this issue were elaborated sociologically, it could lead to a serious analysis of how human needs interact with the structurally available means for their satisfaction.

Generally, the *crisis* authors give limited consideration to social factors and leave the impression that material technology, independent from social change, could solve the crisis. They do not give a sense of how intimately energy use, technology, and the possibilities of surmounting the crisis are linked with social life.

THE ENERGY PRIMER

There is a continuum between the *crisis* books and the next type, the *energy primer*, which is less a direct response to the energy crisis. The energy primer is often written from an interdisciplinary perspective by a physical scientist, but pays more attention to social questions, although usually in an ad hoc way. In the extreme (see, e.g., Odum and Odum, 1976), they understand themselves as the practitioners of a new, unified science of energy. Many *energy primers* seem designed as texts for interdisciplinary courses on energy, capitalizing on current interest in the topic.

The *energy primer* also covers a standard set of topics. Virtually all of them briefly introduce energy as a physical phenomenon, with detail on the basic sources, measurements, forms, and conversion devices. Usually, as in the *crisis* works, some attention is given to the current situation of depleting resources. One advance of the *energy primer* over the *crisis* genre is to provide information about the historical emergence and development of energy use and conversion devices. Steinhart and Steinhart (1974a), for example, describe energy use in pre-industrial Europe and estimate the power available from the various energy-converting devices. They also discuss the beginnings of agricultural civilizations and the energy lifestyle of hunters and gatherers. Another typical topic considered (see Cook, 1976; Steinhart and Steinhart, 1974a, 1974b) is the history of energy converters (e.g., the windmill, watermill, steam engine, electric generator), along with estimates of their physical efficiencies. A noteworthy element of the *energy primer* is the consideration of how energy underlies culture and society, as in Cook's (1976:6) *Man, Energy, Society*, in which he states

that "man's cultural evolution is the history of his increasing control of power technology and energy resources." Cook (1976:164-187) even includes an historical chapter titled "Social Evolution and Energy," correlating social facts (e.g., population densities, serfdom and slavery, the Protestant Ethic) with energy use and technology. He (1976:189-198) also discusses the dependence of social life on the presence of an "energy surplus" (i.e., the accumulation of energy beyond that necessary for bare survival).

Though the energy primers (with the possible exception of Cook's) lack any systematic incorporation of the topic, one does get some feeling for the range of energy lifestyles in societies, and for the social, as opposed to technical, aspect of energy. In addition to covering many of the same topics as the *crisis* genre (e.g., current resource situation, future energy policy, the problems of various energy sources and converters), the *energy primers* give more attention to the costs and benefits of energy use, occasionally with reference to some notion of "externalities"⁴ (see, e.g., Garvey, 1972).

Though the *energy primer* is an improvement from the sociological point of view, its failings are essentially the same as those of the literature focusing more directly on the crisis. The *energy primers* offer perspective on the crisis by their inclusion of physical, economic, sociological, and historical material, but they lack any theoretical unity, which, given their interdisciplinary standpoint, is not surprising. An exception is the work of Howard and Elisabeth Odum (1971, 1976), which subsumes all energy processes into an energy flow model taken from (biological) ecology. The organismic analogy, in their discussion of energy flows in societies, is frank and overwhelming. Money, for example, is an adaptive mechanism to reward units in an ecological system, part of an adaptive feedback loop like those of animal or plant ecological communities (Odum, 1971). Although the Odums' work has theoretical unity, it is certainly no advance toward a sociological perspective on the contemporary situation. They achieve theoretical integration by constructing a physical science of the social, not a social science of the physical.

POLITICAL ECONOMY OF ENERGY

Another response to energy problems is much closer to the social sciences in viewpoint, and consequently deserving of more detailed consideration. The *political economy of energy*, oil in particular, is the subject of a well-researched, muckraking literature.⁵ Robert Engler, whose *Politics of Oil* (1961) was one of the first public exposés of the international petroleum trust, produced a second volume, *The Brotherhood of Oil* (1977), in the aftermath of the 1973-74 "oil crisis." He argues that the root of that crisis lay in the machinations of oil companies. Unlike some *political economists of energy*, however, he does not adopt the view that all energy problems (particularly those projected for the future) are smokescreens promulgated by "big oil." Rather, he attributes the recent crunch to the power and misdeeds of petroleum firms in concert with government. His policy suggestions emphasize the need to defuse this coalition. Michael Tanzer (1974) advances a similar position, though he seems to believe all energy crises can be solved by dismantling monopoly power, substituting world socialism, and advancing technologically. Tanzer and other political economists in this area concern themselves little with the desirability of high energy consumption. Their problem is how to extend high use patterns and distribute them equitably, not to worry about environmental or other ill effects of high use. Except for an occasional offhand comment about big capitalists encouraging high consumption, explaining how patterns of high energy use came about does not interest the political economists of energy. Ridgeway and Conner's (1975) *New Energy*, another representative of this school, differs by treating coal, natural gas, and electricity, as well as oil. Although the book is oriented to the problem of monopoly power, it focuses even more on describing, rather than analyzing, the history of the energy industry. Like others of this school, Ridgeway and Conner recommend curbing corporate power over energy as a future policy objective. Recently, Ray Reece (1979) has extended the political economy of energy to cover solar research and development. He tells an unhappy story of corporate dominance and federal government

collusion in this area. Reece argues that the attempt to monopolize the solar industry and to emphasize centralized solar technologies is a major thrust of the plans of multinational capital, a claim he documents with material drawn from the deliberation of the Trilateral Commission.

The political economy of energy is an improvement over the two schools mentioned above. The political economists have no naiveté about the control of energy by the economically powerful. In this way, they destroy the fiction that energy questions are merely technical, and encourage skepticism toward the supposition that the energy history of the U.S. has harmonized with the interests of the citizen-consumer. Some version of this outlook ought to infuse sociological work on energy processes.

On the other hand, an implicit faith in technological development as savior from the crisis diverts them from a thorough political economy of energy, which would cover consumption as well as production. Though there is an occasional mention of, for example, oil companies encouraging automobile travel, the chief question is the political economy of production. This is how the political economists' implicit (sometimes admitted) faith in science is revealed: If only the corporate control of production could be broken, purely rational considerations could rule and the high-energy lifestyle of the U.S. (the ultimate desideratum) could be maintained.

In fairness to Tanzer and others, it should be observed that they do mention the possibilities of conservation and solar power, but much less often than the problems of ensuring an adequate supply of oil, coal, and natural gas. Another failing of this literature is its specificity. Critiques of the monopolistic practices of the energy industries tell something about particular organizations, about the phenomenal form of the American energy lifestyle, but do not provide a general basis for understanding and criticizing energy use as a whole. The political economy of energy is also theoretically thin. What it offers is the principle that profit maximization, rather than attention to substantively rational⁶ production goals, motivates the organization and ends of the energy industry. While that axiom

is quite correct and useful in explaining the political and economic machinations of energy firms, more elaborate notions are needed for sociological work on energy. Tanzer, Engler, and the others do not provide them.

COMMONER AND LOVINS:
TWO RENEGADE SCIENTISTS

Biologist and environmentalist Barry Commoner is closely related to the political economists in viewpoint, but is sufficiently prominent and differs enough from recent writing on the energy crisis to deserve separate treatment. His *Poverty of Power* (1977) stands apart from all other energy crisis writings in sophistication, subtlety, and depth as a consistent critique of the irrationality of profit-maximization as the principle of economic organization and allocation for so important a good as energy. His thesis is that the current crises of energy depletion, environmental despoilment, and economic stagflation are intimately connected. He documents the physical inefficiencies of contemporary energy technologies, the inadequacies of oil corporations as suppliers and developers of energy resources, and the dangers and diseconomies of coal and nuclear power.

Commoner argues that high energy technology prevalent in the United States is not only environmentally damaging and a liability in the face of declining availability of energy, but is also responsible for the current economic crisis, two aspects of which are a capital shortage and high unemployment. American economic rationality has long stressed labor productivity, rather than capital productivity or energy productivity. Both of these, Commoner claims, have recently been declining, in contrast to the long-run trend toward greater labor productivity. The postwar move toward high-energy technology has been characterized by energy intensity and capital intensity, while increasing labor productivity. Those trends contribute directly to the capital shortage, energy gap, and high unemployment. The energy industry is particularly capital intensive, which, given a systematic capital shortage, makes it a peculiar vehicle upon which to pin one's hopes for developing the technology

and resources to circumvent the current and future energy crisis. However, Commoner argues that certain alternative energy technologies, such as decentralized solar energy systems, not only could be solutions to environmental and energy crises, but are also less capital intensive and would provide more employment for a given investment than current high-energy technologies. In this work and in his earlier *Closing Circle* (1971), Commoner has become known as a chief proponent of the "bad technology" argument, which maintains that the environmental crisis is a result of poor technologies rather than higher consumption. He does not, though have blind faith in improved technology itself. Realizing that technology is always located within a peculiar political-economic system, he repeatedly emphasizes that the failure to develop appropriate technology was due not to inadequate scientific knowledge, but to the disconnection of capitalist production rationality from any motive other than profit-maximization for firms.

Although far the most incisive of recent works on energy, Commoner's work nevertheless has flaws and omissions. His analysis is historical in its emphasis on, for example, trends in productivity, capital usage, and technology, but he does not provide a social history of energy usage and technology. Even his economic history has gaps. He confines most of his comments on the economic history of energy to discussions of quantitative data on the trends mentioned above and neglects discussions of the particular decisions that led to technological and economic trends—this despite the fact that Commoner himself (1977:218) states that deleterious technological changes "were brought about not by some abstract, mindless force called 'growth,' but by deliberate human actions" motivated by profitmaximization strategies. Another problem in Commoner is his relative inattention to consumption under capitalism as a feature of the high-energy economy that also contributes to the energy crisis.⁷ If, as Strout's (1967) analysis shows, changing levels of consumption have been at least partially responsible for energy intensification, consumption deserves more emphasis than Commoner has given it.

Besides Commoner, another renegade scientist deserves separate consideration. Physicist Amory Lovins (1977) advocates non-nuclear "soft-path" technologies as the proper energy conversion strategy.⁸ Two arguments from Lovins' work are relevant here. First, he maintains that soft-path technologies (e.g., solar and wind power) are, have been, or will be economically and technically feasible. Second, he believes that soft-path technologies are more desirable than hard-path (e.g., nuclear, coal gasification) strategies for obtaining energy, not just because the soft-paths will permit societal survival, but moreover because they will promote a better society.

Lovins' point of view, contrasting the social desirability of hard- and soft-path technologies, is unique. He (1977:14) styles himself a Jeffersonian democrat, emphasizing the value of grass-roots control and local self-sufficiency. Thus, in comparing the effects on social life of the two different technological strategies, he stresses local control. He does not suppose that soft-path technologies can take hold without social change; instead, he argues that the social changes associated with nuclear and other hard-path technologies will be unpleasant, requiring increased social and political control, less personal involvement, more dependency, and cession of control to a "bureaucratized, technical elite" (Lovins, 1977:54-55). Hard-path technologies would therefore be unsavory even if they were safe and economical, which Lovins (and others, such as Commoner) argue they are not. Soft-path technologies imply a different texture to social life. They would demand personal involvement, would be impossible to organize through a "centralized management approach" (Lovins, 1977:149), would consequently be less coercive, and would allow more freedom for alternative consumption lifestyles. A major principle of the soft-path is to adapt technology to lifestyles, rather than adapting social life to technology (Lovins, 1977:153).

The overwhelming sociological question indicated by Lovins' arguments is: Why, given all the virtues of soft-path technologies, have not they been adopted? Lovins does not treat this question exhaustively but does list the "institutional barriers" to soft-path technologies: "obsolete building codes,"

resistance to change in the building industry, trade union opposition to possible unemployment, the absence of a system for facilitating transition of workers to different jobs, the fee structure for building engineers, and "fragmentation of government responsibility" (Lovins, 1977:35). However, Lovins makes no attempt to analyze what the character of a social and economic system must be to have such barriers.

Here, he leaves an obvious opening for a sociological and political-economic analysis. Having noted the connection of hard-path technology to centralized social, political, and economic control, Lovins does *not* suggest, for example, that certain powerholders' desires to maintain a centralized system could bar the adoption of soft-path technology. In this and other omissions, Lovins (1977:66) contradicts his own avowed conviction that the most neglected questions of energy strategy are "social and ethical," not technical and economic. His emphasis on the *choice* of an energy strategy implies an utopian omission of political-economic power, and relapses into a view in which that which is technologically feasible can be accomplished without social, political, and economic change. This and similar shortcomings of Lovins' call for a sociological treatment of his material.

ORTHODOX ECONOMISTS AND ENERGY

Orthodox economists are among the most prolific writers on energy. A large part of the economic work on energy has been prepared under the auspices of or published by "Resources for the Future," a Washington-based think tank populated and administered by economists. An early economic work in the energy field, *Energy in the American Economy, 1850-1975* (Schurr et al., 1960), is an RFF staff publication. It provides a detailed quantitative history, with extensive compilations of statistical data. Its review of American energy history from 1850 to 1955 is the source of information for forecasts for 1975. Its explanations of energy events (e.g., the apparent increase in energy efficiency of the economy from 1920 to

1955) in terms of changes in technologies and costs are accurate as far as they go, but do not penetrate the logic of the economic system. This and other RFF publications are not stridently ideological. The very fact that they think it worthwhile to make forecasts and discuss policy distinguishes them from the variety of economist who feels that all energy problems could be effaced by "truly" free-market capitalism. Neither, however, are RFF (or other) economists likely to analyze, for example, what social factors contributed to the acceptance of a high-energy technology, or what interests a particular cost structure favored.

Nevertheless, economic writings on energy provide an essential body of information for sociological work on energy. Among other services, economists often develop interesting sets of facts that the sociologist could alternatively or more deeply explain. For example, another Resources for the Future publication (Darmstadter et al., 1977) compares contemporary energy usage in the United States to several other advanced industrial nations. This book offers answers to many questions (e.g., how do the Swedes produce a standard of living equivalent to that in the U.S. with considerably less energy consumption?) that could serve as items to be further explained by the sociologist. For example, if one element of the American economy that causes higher relative energy usage than that of the Swedes is American consumption of automobile travel, what social and political forces contributed to that consumption? Economic facts about relative costs are insufficient; one would need to know who and what created the cost structure that enabled or forced Americans to drive their autos so frequently. Much economic literature on energy treats the problems without reference to their social-political components. This tendency is of course worse in the more technical economic literature (see, e.g., Mackrakis, 1974).

One aspect of the economic literature useful for sociological consideration is the theory of externalities. An externality is a cost that the market mechanism does not capture, such as pollution associated with automobile traffic or the lowered availability of energy to future consumers brought about by

current consumption. It is a cost imposed on someone "external" (in space or time) to the immediate participants in an economic transaction. Often, economists who treat energy (see, e.g., Page, 1977) suggest redirecting externalities so that everyone pays the "real" cost of his/her economic activity, with the idea that this would restore the optimizing feature of the market. The typical policy implication of the theory of externalities is some sort of taxing system. The notion of externalities also points to sociological questions: For example, what power constellations and ideologies, what form of economic rationality, must prevail in an economic system that allows the substantive irrationalities indicated by the presence of externalities? In general, economic writings on energy can be useful for sociological work, but cannot substitute for it.

CONCLUSIONS ABOUT PREVIOUS WORK

The preceding has not comprehensively covered the energy literature, but has attempted to touch on certain major types of work and on outstanding monographs that bound the frontiers of possible sociological work on energy.⁹ In surveying the socially-relevant energy literature, I have focused on general works, in an attempt to clarify the nature of the available approaches, rather than comprehensively describe the energy literature.

None of the several varieties of writing oriented to the energy crisis have exhausted the possibilities for sociological work. The *crisis* genre anticipates the importance of social study of energy when it invokes quasi-sociological explanations, but its progress in this direction is quite limited. The *energy primers* make some advances; insofar as they attempt an interdisciplinary approach to the problems of energy, they do include a smattering of sociological material. However, their eclecticism generally means that they also lack theoretical unity. The *political economy of energy*, though empirically careful, is excessively descriptive, and often displays an implicit and excessive belief in material technology as savior. Commoner and Lovins, who are themselves physical scientists, give what are actually the most

satisfactory offerings on energy as a social issue, but both are detrimentally ahistorical, and Lovins tends to leave hanging all the interesting sociological questions he raises. Orthodox economists' writings on energy, though often factually useful, rarely accomplish what the sociologist would think of as adequate explanations of the facts they have mined. All of the genres point toward the potential usefulness of sociological work on energy, either by their shortcomings in areas where sociology might be strong, or by raising issues to which sociologists might eagerly want to give their own answers.

DIRECTIONS FOR SOCIOLOGICAL WORK ON ENERGY

Previous work on energy does not offer a satisfactory approach for sociological study of energy processes. The failings pointed out in the literature communicate a sense of problems and suggest some directions sociological effort ought to take.

First, *we must escape from viewing energy problems as technological questions, unregulated by social process.* Though the literature reviewed does not take a self-consciously technocratic view, neither do most authors explicitly attack that position. Viewing energy processes as socially regulated does not mean that the crisis can be solved without technical innovations. However, many alternative energy sources depend on technical knowledge that has been known for centuries, but not pursued for social and economic reasons. The availability of new devices, processes, and energy sources does not automatically produce increased energy production or consumption. There is ample historical evidence (see, e.g., Mumford, 1963:4) that past transitions to more energy-intensive technologies were not the simple result of availability. Coal was known centuries before it became a significant component of Western European production systems. Primitive hunter-gatherer societies do not necessarily adopt agriculture, the original energy innovation, once they are aware of it (Sahlins, 1972:27). Energy devices await social, political, economic, and cultural support.

Another demonstration of the nontechnical component of energy usage comes from looking at a main factor influencing it, namely, consumption of goods and services, particularly those that are energy-intensive. Technical advance does not by itself command rising consumption, and the desire for increased consumption is not even an inevitable characteristic of human beings, as Weber's (1958:59-60) example of the reaction of traditional peoples to the possibility of acquisition shows, as well as the work of Marshall Sahlins (1972) on economy in primitive society. Another argument militating against the treatment of changes in energy lifestyle as a technical process can be based on the work of scholars such as Cottrell (1955) who argue for energy's importance as a parameter underlying and even determining social life. If this is so, styles of energy use may have such impact on social life that they generate interests in maintaining patterns that work against changes in energy use. Thus, the departure point for a sociological treatment of energy is to refuse to treat energy innovations as automatic and anonymous technical developments, a tack implicitly taken in the *crisis* literature and in the *political economy of energy*. Social forces and physical factors, such as energy, mutually regulated one another.

Second, sociology should *avoid the ahistoricity* of most of the literature on energy. This fault is present in all the types of literature examined, except for the political economy of energy. In the *crisis* genre, the focus is almost exclusively contemporary. In the *energy primers*, history appears only in the form of brief descriptions of previous energy lifestyles and devices. Commoner (1977) and Lovins (1977), both of whose works would imply the importance of past decisions to adopt particular technologies, do not pay more than cursory attention to history. Finally, orthodox economists (with the exception of the quantitative but excessively descriptive history of Schurr et al., 1960) use models where historical time is not usually a parameter, and have thus not conducted historical investigations. When one slights history, the contemporary energy lifestyle can easily appear as technically necessary and anonymously produced. An historical look at the development

of the high-energy lifestyle of the United States, particularly one richer in detail and theory than the tracing of purely quantitative trends in fuel consumption, affords the possibility of exposing the implicit decision-making processes that are responsible for the contemporary situation.

Third, *sociological work on energy should be theoretical*. The absence of social theory overwhelmingly confronts the reader of contemporary literature oriented to the energy crisis. Though it often has mounds of interesting facts, it rarely has the coherence of a theoretical framework. A mass of detail without theory is of little use for practical action, let alone for advancing sociological work. The sociologist's theoretical contribution might range in scope from a general theory of the relations of energy and society, to a more focused one that connects with general themes in social theory. As an example of the latter, one fruitful direction for sociology would be a theory of societal energy consumption. Obviously, such a theory (unlike that of Schwartz, 1975) must include as key elements a treatment of the structure of power and the form of economic rationality characteristic of the society. This is why Commoner and the political economists of energy have made an advance in the proper direction, since they all emphasize capitalist rationality as a motive force in energy politics and economics. A good sociological theory could go beyond them, however, by considering consumption as well as production.

CONCLUSIONS

None of the several genres of literature oriented to energy problems have exhausted the possibilities for sociological work. All of the writings immanently point toward the potential usefulness of a sociological perspective on energy, either by their shortcomings in areas where sociology might be strong, or by raising issues to which sociologists might want to give their own answers. To the sociologist who wishes to take up the challenge, it is important to adopt a critical, historical, and theoretical approach in doing sociological work on energy.

FOOTNOTES

1. Jermy Rifkin's *Entropy*, as well as the Meadows et al. (1972) *Limits to Growth* are convincing forecasts of this apocalyptic possibility.
2. See respectively Hubbert (1978), Glaser (1978), and Ford et al. (1975) for examples of these.
3. The categorization of the energy literature into the *crisis* genre, and several other types to appear below, should not be taken as a hard and fast division. These are meant as rough and ready categories, to serve heuristic purposes. Since most of the energy literature treated in this chapter is not part of a scholarly tradition, is not informed by theoretical perspectives, and is interdisciplinary in nature, precise categorization is impossible.
4. See below in the text for an explanation of the concept of "externality."
5. Beyond the literature cited, see also Anthony Sampson's (1975) *Seven Sisters*, another well-known example of the political economy of oil, and Ridgeway's (1973) *The Last Play*.
6. The distinction between *substantive rationality* and *formal rationality* (of economic action) comes from Max Weber. *Substantive rationality* refers to "the degree to which the provisioning of given groups of persons...with goods is shaped by economically oriented social action under some criterion (past, present, or potential) of ultimate values..." in contrast to *formal rationality*, which denotes only the presence of "quantitative calculation and accounting" in economic action (Weber, 1978:85-86).
7. Paul Ehrlich and John Holdren (1972) bitterly (but, I think, incorrectly) criticized an earlier analysis of Commoner's (1971) that exonerates rising consumption for rising pollution levels.
8. "Soft technologies" depend on "renewable energy flows," are "diverse," "flexible and relatively low technology," and are matched in scale, location, and "energy quality to end use needs" (Lovins, 1977: 38-39). Examples, as given in the text, would be solar heating, wind-powered generators, and the conversion of organic waste to fuel alcohol. Nuclear power plants and coal gasification are two prime examples of hard-path technologies.
9. For comprehensive bibliographies of the energy literature, see, e.g., Morrison et al., 1975, 1977.

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NOTES AND COMMENTS

PERSONAL CRIME AND DELINQUENCY RATES IN LOS ANGELES: A SOCIAL AREA ANALYSIS¹

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This paper compares the effects of different measures of the social and physical composition of census tracts on their crime rates for Los Angeles, 1970. The analysis uses three measures of tract composition based on the Shevky-Bell social area typology. In addition to the social rank, familism, and ethnicity measures, several measures of the physical composition of census tracts are included in a multiple regression analysis. As expected, social rank and the ethnicity measures have strong effects on the number of personal crimes reported to the police and on the number of juvenile arrests. Contrary to much previous research, familism does not have a significant effect on either crime measure.

Widespread fear of crime is symptomatic of modern urban life. Research indicates that the majority of urban residents feel it is unsafe to venture outside their homes after dark (Fischer, 1976). These fears are not unfounded since the threat of becoming a victim of a violent crime is nearly ten times greater in large cities than in rural areas (Fischer, 1976:98). Much of the previous research on the location of various crimes within the city has tended to focus on the residential location of the criminal. From the perspective of the city resident, however, it is the actual location of the criminal offense that is important because the potential for becoming a victim is greatest in those areas of the city where the frequency of crime is the highest (Wolfgang, 1968). Several urban sociologists have attempted to explain the distribution and location of crime and delinquency on the basis of the social and physical characteristics of urban sub-areas (see, for example, Schmid, 1960; Boggs, 1966; Pyle et al., 1974; Roncek, 1981).