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AN ANALYSIS OF PUBLIC POLICY FORMULATION, IMPLEMENTATION, AND ALTERNATIVES

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AN ANALYSIS OF PUBLIC POLICY FORMULATION, IMPLEMENTATION, AND ALTERNATIVES

APPROVED BY

DISSERTATION COMMITTEE

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INTRODUCTION AND CONCEPTUAL FRAMEWORK

Part one outlines the scope and purpose of the research and describes the conceptual framework for conducting the analysis. It begins by noting in Chapter I that the consumption side of this country's energy supply and demand system received little attention until the 1973 Organization of Petroleum Exporting Countries (OPEC) oil embargo. Fuel shortages and higher energy prices coming in the wake of the embargo resulted in conservation legislation, programs, and national goals aimed at reducing the rate of energy use in the U.S. The formulation and implementation of these policies reflects a convergence of technical, economic, and environmental and political perspectives. However, little research has been devoted to the political aspects of energy policymaking. Indeed, political scientists have not as yet brought their particular insights or skills to bear on the conservation policy area. This is partly because energy has only recently been recognized as an organizational concept for research. It is also because the analysis of substantive policy problems and issues requires a "subject matter" expertise that few political scientists have traditionally been interested in developing. These conditions, which are further highlighted by a review of relevant conservation literature, make the conservation problem a prime candidate for applied policy analysis.

In this light, Chapter II begins with a discussion of the theoretical background for applied policy analysis and suggests that no core theory exists in political science for doing policy analysis. This is followed with a definition and description of the conceptual approach used in this study--the "issue systems" framework. The framework draws from both incremental decision-making and systems analysis theory, seeking to combine the context of substantive policy problems and decision processes. Research questions and assumptions are delineated to guide the analysis toward meeting the objectives outlined in Chapter I.

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ENERGY CONSERVATION:

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IMPLEMENTATION, AND ALTERNATIVES

CHAPTER I

Scope of the Study

Energy in its various end use forms--electricity and liquid, gaseous, and solid fuels--serves a wide range of purposes, including heating, cooling and lighting of homes and commercial buildings, fueling private automobiles and public transportation systems, and automation of industrial processes among others. Stated differently, energy is consumed to meet the needs of the residential and commercial, industrial, and transportation sectors of the U.S. economy.[1] Until the 1973 energy shortages and subsequent price increases brought about by the Organization of Petroleum Exporting Countries (OPEC) oil embargo, the consumption side of this country's energy supply and demand system received little

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[1]For a discussion of energy use by fuel and by sector, see The University of Oklahoma, Science and Public Policy Program, Energy Alternatives: A Comparative Analysis (Washington, D.C.: Government Printing Office, 1975), pp. 13-1 to 13-45.

public attention. However, as domestic supplies and demands have become increasingly imbalanced and the nation has become more dependent on foreign oil, energy consumption has assumed a new significance as a public policy issue.

Indeed, recent federal activities to reduce demand in the major consuming sectors--residential and commercial, industrial, and transportation--have clearly placed "energy conservation"[2] on the agenda of government. Initiatives for energy efficiency improvements, such as mileage standards for new cars, and public education programs to change individual consumption habits in homes, have been adopted by Congress. In addition, conservation is the central thrust of President Carter's national energy goals.[3]

But the perceived need for conserving energy and the actual results of national efforts to conserve remains a

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[2]As used in this study, energy conservation denotes slowing down the rate of energy consumption through technical fixes and by changing behavior; for example, by improving efficiency, reducing wasteful practices in utilization, and shifting to less energy-intensive activities.

[3]President Carter appears committed to the notion that the country's energy future is closely tied to slowing the annual growth in energy use. A goal of the Administration's National Energy Plan is to reduce the average growth rate of total energy demand from the present rate of three to four percent per year to below two percent. See U.S., Executive Office of the President, The National Energy Plan (Washington, D.C.: Government Printing Office, 1977), p. XIII. Although many of the plan's 113 separate initiatives went through Congress intact, debate surrounding approximately six provisions, especially those concerning natural gas pricing, have stalled Congressional efforts to formulate national energy legislation. See Steven Rattner, "Energy: Where Did The Crisis Go?" New York Times, April 16, 1978.

matter of concern. To some extent this is because conservation policies have been introduced into a policymaking environment oriented to a time when energy was both abundant and cheap.[4] It is also because insufficient attention has been given to the linkage between policy alternatives and the social, political and institutional factors that constrain efforts to implement conservation policies and programs. The issues stemming from these conditions make the conservation problem a prime candidate for policy research, research which falls within the domain of political scientists as policy analysts.

This study identifies and defines the substantive dimensions of the energy conservation problem in the residential and commercial, industrial and transportation sectors; describes the key elements in the historical development of conservation as a public policy issue area; identifies the relevant, current public and private, formal and informal institutional arrangements for dealing with conservation "problems," and "issues;"[5] and identifies evaluates, and

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[4]As aptly characterized by Norman Metzger, conservation is "The Intruding Samaritan" in traditionally production-oriented energy arenas. Metzger, Energy: The Continuing Crisis (New York: Thomas Y. Crowell Co., 1977), p. 181.

[5]The primary distinction between the terms problems and issues is that issues involve conflict among competing interests and values. As a result, only one or the other term will ordinarily be used in this study, "issue" when conflict is not involved or is not being stressed. See Irvin L. White et al., Work Plan for Completing a Technology Assessment of Western Energy Resource Development (Washington, D.C.: U.S., Environmental Protection Agency, 1978), p. 32.

compares alternatives and implementation strategies to improve the policy results. As such, the study is designed to follow in the applied research tradition termed "policy analysis."[6] More specifically, an "issue systems" framework is used to emphasize how problems of policy substance, in this case energy conservation problems, are related to those of the political process (procedures for dealing with political issues or problem areas).[7] Thus, the analysis is intended to enhance the information base needed for political decision-making in this issue area and to inform the search for new energy conservation alternatives as well.

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[6]Edward S. Quade defines policy analysis in a broad sense as "any type of analysis that generates and presents information in such a way as to improve the basis for policy-makers to exercise their judgment." Quade, Analysis for Public Decisions (New York: American Elsevier, 1975), p. 4. For an overview of the development of the policy analysis movement, see Jacob B. Ukeles, "Policy Analysis: Myth or Reality?" Public Administration Review 37 (May/June 1977): 223-228.

[7]An issue system may be defined in terms of a single issue or for a category of problems and issues. The issue systems framework was first developed as a model for organizing knowledge about how political problems of an international scope are dealt with in the international political system. Its theoretical bases are in systems analysis and decision-making approaches; however, instead of focusing on decision processes, the focus is on substantive international political issues and the procedures for dealing with them. In sum, the focus is on "policy and policymaking and is intended to provide for the systematic analysis of both substance and procedure." See Irvin L. White, "Policy Analysis and International Law: Interdisciplinary Research in Law of the Sea," paper presented at the Annual Meeting of the International Studies Association, New York City, N.Y., March 14-17, 1973. See chapter 2 in this study for elaboration of how this framework has evolved as a useful heuristic tool for analyzing domestic energy problems and issues.

Recognizing the broad implications of the research topic, there are important questions of procedure and judgment as to what can and cannot be included. More and more government agencies and legislative bodies are making decisions and attempting to implement policies for energy conservation. As a result, the study is limited according to the following parameters:

1. In terms of organizational and implementation responses to achieve energy conservation goals, the Energy Research and Development Administration (ERDA), the Federal Energy Administration (FEA)--both now in the Department of Energy (DOE)--and the Departments of Transportation, Housing and Urban Development, and Commerce deserve primary attention within the federal government.

2. Two pieces of legislation, the Energy Policy and Conservation Act (EPCA) of 1975[8] and the Energy Conservation and Production Act (EPCA) of 1976,[9] and President Carter's National Energy Plan codify most of what has taken place in government to spur energy conservation; therefore, the research looks primarily at the formulation and implementation of policies and programs stemming from these sources.

3. Finally, policy alternatives and implementation strategies will be developed and evaluated for those problems and issues which are judged to be the most significant within the conservation issue system. Significant problems and issues and alternatives are to be selected according to the description of overall goals of the energy conservation policy system and the interests and values of relevant participants.[10]

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[8]Pub. L. 94-163, 89 Stat. 871.

[9]Pub. L. 94-385, Stat. 1125, as amended Pub. L. 95-70, 91 Stat. 275.

[10]For justification and elaboration, see chapter II.

Purpose of the Research

As with almost every other aspect of currently evolving energy policy, political scientists have yet to bring their particular skills and insights to bear on the emerging government role in energy conservation. This lack of research focusing on conservation, specifically, and energy policymaking, in general, is due largely to three existing (but in some cases changing) conditions in political science: (1) political scientists have only recently recognized energy as an organizational concept, (2) applied policy research depends on methods and concepts that are different than those employed in discipline-oriented research, and (3) policy analysis requires a "subject matter" expertise that very few behavioral political scientists have been interested in developing. Each of these factors is discussed briefly below.

First, there are technical, economic, environmental, and political perspectives of energy policy, and all of these need to be appropriately related if one is to understand energy policymaking. But political scientists have only recently recognized energy as an organizational concept for research.[11] Consequently, most of the prevailing energy literature is concentrated in the technical, economic, and environmental areas. Although investigation of the political

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[11]For elaboration of this point, see Robert M. Lawrence, "Energy Policy," Policy Studies Journal 2 (Winter 1973): 141-146.

components of energy decision-making has been limited to date, there is a small, but growing number of political scientists currently involved in energy-related research.[12]

In the second place, difficulties arise when researchers of the micro- and behavioralist perspectives--the dominant approach to knowledge in political science up until at least the late 1960s--try to translate their concern about the nature, composition, and functioning of the political system into an interest in public policy problems and solutions.[13] In other words, systematic analysis of public policy requires methods and concepts that are different from those employed in micropolitical approaches. This difference stems largely from the purposes served by the two kinds of research. Basic research, or discipline-oriented research in the social sciences is usually defined in terms of

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[12]Although by no means intended to be a complete list, names which immediately come to mind are Don Kash, Irvin White, Robert Lawrence, David Davis, Gerald Garvey, Helen Ingram, Steven Ballard, Norman Wengert, Robert Rycroft, Alfred Light, and Andrew McFarland. Because of the recognized need for familiarity with the substance of a policy problem area, it should also be noted that this author has kept abreast of developments in energy conservation since 1973, and has written several papers on the topic.

[13]Theodore J. Lowi, "What Political Scientists Don't Need to Ask about Policy Analysis," Policy Studies Journal 2 (Autumn 1973): 66. This difficulty leads Lowi to argue that primary concern should be placed on internal political science development instead of on development of interdisciplinary means for policy research. Further methodological problems with regard to the state of public policymaking study and analysis are discussed by Yehezkel Dror, Public Policymaking Reexamined (Scranton, Penn.: Chandler Publishing Co., 1968), pp. 73-84.

"knowledge in the abstract" where utilization of the knowledge is not a principal concern.[14] In contrast, applied policy studies are generally addressed to an audience outside, as well as inside, the bounds of the discipline--i.e., the researcher seeks to inform political discussion and public decisionmaking.

Thirdly, policy analysis, whatever the policy area, requires a familiarity with and a sense of relevance for the substantive dimensions of a public problem; a "subject matter" expertise that very few political scientists have traditionally been interested in developing.[15] As explained by Phillip Foss:

> Stated differently, very few political scientists would qualify as "expert witnesses" in any of the substantive policy areas. Economics, on the other hand, has for years had experts in most of the major policy areas. An economics department of any size will ordinarily have specialists in public finance policy, transportation, public utilities, agriculture, labor, and natural resources policy. There is nothing comparable in Political Science. The economists are now, and have been for years, _the_ policy scientists. They have become the policy scientists

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[14] Richard Rose, "Disciplined Research and Undisciplined Problems," in _Using Social Research in Public Policy Making_, ed. Carol H. Weiss (Lexington, Mass.: Lexington Books, 1977), p. 25.

[15] See Phillip O. Foss, "Policy Analysis and the Political Science Profession," _Policy Studies Journal_ 2 (Autumn 1973): 67-71. As noted by Foss, there are, of course, exceptions. A number of researchers have distinguished themselves in specific policy areas, such as education, minority rights, and natural resources.

> not only because they have actively involved themselves in policy studies but because Political Science has abdicated.[16]

Although these circumstances are changing, the above three points generally characterize the existing state-of-affairs in applied policy research with the exception of a few substantive policy areas. And, as noted earlier, almost all of the energy policy research being undertaken is concentrated on the supply side of the energy supply and demand system rather than on energy consumption and relevant government policies and programs to reduce demand. Thus, conservation as a distinct, substantive policy area is in an early stage of development. This explains in part why it has just begun to attract the attention of policy analysts.

But why study a specific policy problem like energy conservation? In general, given the complexity of most of society's urgent social problems, serious policy study requires studying policy in the particular. There are, however, other answers to this question and in almost every case an answer fits into one of the three categories of resarch goals identified by Austin Ranney: scientific, professional, and political.[17] Scientific goals stress improved understanding of policy processes and results; professional goals

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[16] Foss, "Policy Analysis and the Political Science Profession," p. 69.

[17] Austin Ranney, "The Study of Policy Content: A Framework for Choice," in Political Science and Public Policy, ed. Ranney (Chicago: Markham Publishing Co., 1968), pp. 13-18.

emphasize the policy analyst's role of evaluation and advice-giving to policymakers; and political goals point to the need for political scientists to get involved in urging "right policies to achieve right goals."

With regard to this study, the scientific and professional goals are inseparable. That is, this policy analysis seeks to understand public decision-making processes and policies for conservation in the residential and commercial, industrial, and transportation sectors in so far as the knowledge can be applied as a basis for identifying and evaluating policy alternatives. The effort, then, is to link problems of policy substance to political process problems. As expressed succinctly by Arnold Heidenheimer, Hugh Heclo, and Carolyn Adams: "Discussions of policy process tend to be skeletal without an understanding of how issues are related to policy substance."[18]

In terms of specific, professional political science goals, studies of the existing state of policy in a given issue area help one to acquire the necessary knowledge base for providing policy advice.[19] The researcher who aspires

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[18] Arnold J. Heidenheimer, Hugh Heclo, and Carolyn Teich Adams, Comparative Public Policy: The Politics of Social Choice in Europe and America (New York: St. Martin's Press, 1975), p. 1.

[19] It should be noted here that findings associated with this research were shared in two national energy conservation conferences attended by scientists, academics, and bureaucrats. Some of these individuals had conservation responsibilities in government. In addition, the research

to gain credibility in a specific policy area needs first to undertake exploratory research to define the goals, priorities, relevant constraints on action, and values and interests of the major participants in a policy area. The concepts, identifiable patterns and sensitivities that result from such analyses fulfill a pragmatic learning function that must occur prior to actual efforts to modify or refine social policies.

Of course, the long-run, and political goal of the applied policy analyst, is to move "toward meeting the demand for relevant research, available before policy decisions are framed."[20] Political scientists usually react to such statements by contending they cannot possibly compete with professionals in the various substantive policy areas; that the dangers and costs are too great in terms of the scientific development of the discipline; and that, ultimately, researchers in the cause of government policymaking become "handmaidens" of the state. These pleas are worthy of attention, the risks are to some extent real, and much thought has been devoted to each claim.[21] Conventional arguments aside,

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design was reviewed by individuals in the U.S. Department of Energy. Finally, involvement in the topic resulted in two separate consulting activities for the U.S. Congress, Office of Technology Assessment.

[20]Howard E. Freeman and Illene N. Bernstein, "Evaluation Research and Public Policies," in Policy Studies and the Social Sciences, ed. Stuart S. Nagel (Lexington, Mass.: Lexington Books, 1975), p. 23.

[21]Carol H. Weiss, "Introduction," in Using Social Research in Public Policy, provides an excellent summary of

however, political scientists (for example, those mentioned above) have begun to argue straightforwardly that they do have resources useful in the service of policymakers and that their research can contribute more rationality to public policymaking. The most fundamental assumption in this regard is, as stated by Charles Jones, that political scientists can bring their "more or less well ordered impressions about what one might expect to find in politics" to bear on important public problems.[22]

The two research purposes of this study are derived directly from the needs and goals cited above. First, an analysis of how the problem of energy conservation is being dealt with by the political system has as a research purpose building a descriptive base in terms of:

- an investigation of why and how the problem became a major political issue;
- delineation of the existing policy system for conservation decision-making (i.e., a description of the roles and interactions of various participants and institutions); and
- a description of the policies and implementation strategies that have been developed to deal with the issue.

On the one hand, a detailed examination of this sort is expected to provide information about the particular policy

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arguments for and against the use of social science research to inform political discussion and public decision-making. See especially, pp. 1-10.

[22]Charles O. Jones, Clean Air: The Policies and Politics of Pollution Control (Pittsburgh: University of Pittsburgh Press, 1975), p. 13.

event and efforts to define national conservation goals, providing knowledge useful in its own right. In turn, the above information sets the context for an evaluation of conservation policy alternatives. Thus, a second purpose of the research is to delineate unresolved problems and issues of energy conservation in the three major consuming sectors, with the focus on evaluation of substantive and procedural alternatives to improve and/or change policy results.

From this description, the research purposes of this study can be summarized as follows:

- To define the substantive political issue and the policymaking system which led to the formulation and implementation of public policy with regard to energy conservation.

- To identify, evaluate, and compare policy alternatives to improve and/or change energy conservation policymaking and policy results in the three major consuming sectors.

In the review of the literature which follows, developments in the energy conservation policy area are summarized to set the context for applying policy analysis categories to the substantive problem. The intent is to place the above research purposes within the mainstream of inquiry in the conservation issue area. Then, the next chapter outlines the theoretical background against which the current applied policy analysis emphasis developed and describes the actual approach used in this study--the "issue systems" framework.

Review of the Energy Policy Literature

Although social scientists are currently analyzing a lot of policy-related matters, only a few noteworthy studies have appeared in the energy field. As noted by Daniel Dreyfus in a study prepared for the Senate Committee on Interior and Insular Affairs:

> Until recently, surprisingly little attention has been given to the organization of the Federal government to formulate and implement energy policy. The great size of the energy industries in economic and financial terms and their obvious critical significance to the well-being of society, however, have attracted the interest of all levels of government. A complex body of policy has evolved which constitutes a pervasive, if uncoordinated, Federal involvement in many aspects of the energy system. The policy is presently (1973) administered by a diffuse and ill-defined assembly of agenices throughout the Executive Branch.
>
> A survey made by the Congressional Research Service of the major Federal reorganization proposals of the past 40 years reveals no specific consideration for fuel and energy matters until the relatively modest energy recommendations of the Ash Council. Similarly, a review of over 100 studies of fuel and energy matters found that they include very few remarks on organization and even those few were in general and vague terms. These studies are evidence of the fact that energy has not been viewed as an organizing concept for government.[23]

Thus, energy politics and policies were largely unnoticed by political scientists and the public. Indeed, David Davis observes energy politics has typically been "closed against the intrusion of outsiders."[24]

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[23] Daniel A. Dreyfus, Federal Energy Organization (Washington, D.C.: Government Printing Office, 1973), p. 3. Emphasis added.

[24] David Howard Davis, Energy Politics (New York: St. Martin's Press, 1974), p. 3.

Early Analyses in the Energy Area

As a result of this state of affairs, early analyses in the energy area focused primarily on the "private government" or "elitist nature" of energy decision-making.[25] Another common approach for studies with a decided political orientation has been the focus on a variety of energy "mini-policies" according to resource type, with policy analysis used as a means to make comparisons between resources. For example, in Energy Politics, David Davis analyzes five political arenas--coal, oil, natural gas, electricity, and nuclear energy--and compares them according to the "market forces," "physical characteristics," and "general political environment" that shape the policy process and politics of each arena.[26] Other studies have similarly reserved for energy policy analysis a comparative or descriptive rather than integrative role.[27] And some studies with a policy focus have tended to be resource specific, such as Gerald

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[25]For an analysis of the oil industry from the elitist paradigm, see Robert Engler, The Politics of Oil (New York: Macmillan, 1961). Aaron B. Wildavsky contributed a pioneering study on the public power-private power conflict in the Dixon-Yates case. See Dixon-Yates: A Study in Power Politics (New Haven, Conn.: Yale University Press, 1962).

[26]Davis, Energy Politics, pp. 13-16.

[27]Examples of these contributions are Dennis L. Thompson, ed., Politics, Policy, and Natural Resources (New York: Free Press, 1972); and Robert H. Connery and Robert S. Gilmour, eds., The National Energy Problem (Lexington, Mass.: Lexington Books, 1974).

Nash's review of U.S. oil policy from 1890 to 1964,[28] Dorothy Nelkin's study of nuclear power policy,[29] and, more recently, The University of Oklahoma, Science and Public Policy Program's policy-oriented assessment of offshore oil and gas development in the U.S.[30]

As shown above, policy studies, at least until 1973, were driven almost totally by the concern for energy supply and the discovery of new energy resources and the development of technologies which could produce them. In 1972, Rogers C. B. Morton said a Secretary of Interior should "try to shape in his time an energy ethic," so that the U.S. would use its natural resources wisely, postponing the possible day "when you boil them off and you haven't got them anymore." He noted that President Nixon had instituted wage and price controls, an action that would have seemed beyond feasibility several years prior to 1972. Morton then observed: "Maybe some future President somewhere down the line is going to have to do the same thing with energy," by imposing restrictions on consumption.[31] Although Secretary Morton added that

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[28]Gerald D. Nash, United States Oil Policy 1890-1964 (Pittsburgh: University of Pittsburgh Press, 1968).

[29]Dorothy Nelkin, Nuclear Power and Its Critics (Ithaca: Cornell University Press, 1971).

[30]Don E. Kash and Irvin L. White et al., Energy Under the Oceans: A Technology Assessment of Outer Continental Shelf Oil and Gas Operations (Norman, Okla.: University of Oklahoma Press, 1973).

[31]Richard Corrigan, "Administration Readies 1973 Program to Encourage More Oil, Gas Production," National Journal Reports 4 (October 21, 1972): 1632.

he hoped this would not be the case, his words were somewhat prophetic because the ensuing energy crisis demonstrated to policymakers and to the general public the serious social, economic, and national security implications of the growing gap between domestic energy production and consumption.[32]

Critiques of U.S. Energy Policy

The immediate response was to declare a national policy goal of achieving "energy self-suffiency." By early 1974, the federal government had unveiled "Project Independence," which promised energy self-sufficiency in the short-term future.[33] The early (1973-1974) energy policy literature reflects the optimism of this period. By 1975, however, the drive toward energy independence had dramatically slowed. Public response to the program had been apathetic at best, and the dual policy objectives of reducing U.S. petroleum imports and increasing the domestic production of all forms of energy had proven more difficult to achieve than had been assumed immediately after the OPEC oil embargo.[34] Thus,

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[32] See John C. Fisher, The Energy Crisis in Perspective (New York: John Wiley & Sons, 1974).

[33] Peter L. Auer, "Energy Self-Sufficiency," in Annual Review of Energy, Vol. 1, ed. Jack M. Hollander (Palo Also, Calif.: Annual Reviews, Inc., 1976), p. 692. See also, U.S. Federal Energy Administration, Project Independence, A Summary (Washington, D.C.: Government Printing Office, 1974).

[34] For a discussion of production problems, see Herman T. Franssen, Towards Project Independence: Energy in the Coming Decade (Washington, D.C.: Government Printing Office, 1975).

studies began to appear which featured critiques of U.S. energy policy and Project Independence as being too short-sighted and unresponsive to the changed economic and political circumstances in energy.

Richard Mancke fixed the blame for national energy "policy failure" on poorly informed policymakers and an historical "hit and miss" approach to policy formulation in the area:

> These policy failures are chiefly due to an inability or unwillingness to coordinate existing policies and a failure to adopt flexible policies responsive to the inevitable changes in the fundamental "facts" upon which they are based. In sum, the crux of the United States' energy crisis lies in the contradiction between economic, political and technologic realities and our policymakers' inappropriate responses. If the United States is to escape the enervating costs of a perpetual energy crisis, fundamental policy changes must now be made.[35]

Of course, others were just as quick to place the blame on the energy industry, or "special interests" in general, or on the "environmentalists" who were seemingly blocking the expansion of energy production with their concern for environmental protection.[36] Regardless of the different perceptions about who was at fault, the search for policy reform was broadening.

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[35] Richard B. Mancke, The Failure of U.S. Energy Policy (New York: Columbia University Press, 1974), p. 162. Mancke contributed another work representative of the post-oil embargo criticism of U.S. energy decisions. See Squeaking By: U.S. Energy Policy Since the Embargo (New York: Columbia University Press, 1976).

[36] See chapter IV for a discussion of these points.

Conservation Research

Energy consumption began to receive attention, especially as both the executive and the legislature became increasingly aware that a good part of the nation's annual energy budget was being "wasted" in some manner. Perhaps the most comprehensive documentation of this is found in the numerous congressional committee hearings and background studies which appeared during 1971-1974. In one of a group of early documents published by Senator Henry Jackson's Committee on Interior and Insular Affairs, Senator Jackson made the following remarks:

> The unprecedented demand for energy in this country is the root cause of our energy crisis today. Clearly we cannot tolerate these spiraling rates of energy consumption. We are only now beginning to pay the price for our failure to recognize the impact of exponential growth in energy demand and move to control it.
>
> Most experts would agree that we cannot hope to achieve any real degree of self-sufficiency in the next generation merely by working to satisfy energy demand. That is quite clearly a losing battle. Until we start questioning the legitimacy of demand, until we start challenging the widespread waste of energy resources, we cannot expect to satisfy our basic energy requirements in economically and environmentally acceptable ways.[37]

However, as noted earlier, the prevailing bias in energy policy institutions was towards increased development of energy supply alternatives to meet demands. And so-called "system inertia" made it difficult for conservation to be viewed initially as a legitimate concern.

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[37] U.S., Senate, Committee on Interior and Insular Affairs, <u>Energy Conservation and S.2176, Hearings</u>, Part 2 (Washington, D.C.: Government Printing Office, 1973), pp. 479-480.

Just as the search for themes to augment Project Independence began to take shape, the Ford Foundation's Energy Policy Project completed a major study which not only covered many of the topics outlined above, but also served as an introduction to policies aimed at the demand side of the energy system.[38] It extolled the need for energy conservation as an important policy goal due to the increasingly uncertain nature of energy supplies. In addition, the Ford study highlighted a particularly troublesome question regarding the tradeoffs between exponential energy growth and the environment: Could the U.S. continue to pay the economic and environmental costs associated with the development of new energy resources at a rate sufficient to keep up with the average annual energy demand growth rate?

This question led to a tremendous number of analyses of future U.S. supply/demand strategies. By far the most influential evaluation came from Amory Lovins in a Foreign

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[38]Energy Policy Project of the Ford Foundation, A Time to Choose (Cambridge, Mass.: Ballinger Publishing Co., 1974). The Energy Policy Project commissioned two conservation studies which focused on both the information and policy needs regarding the growing concern over per capita energy consumption. See Dorothy K. Newman and Dawn Day, The American Energy Consumer (Cambridge, Mass.: Ballinger Publishing Co., 1975); and Robert H. Williams, ed., The Energy Conservation Papers (Cambridge, Mass.: Ballinger Publishing Co., 1975). In The American Energy Consumer, which was the first systematic effort to determine how different socioeconomic groups actually use energy in their households, Newman and Day note that better theoretical frameworks are needed to assess the potential impacts of various conservation alternatives.

Affairs article which appeared in 1976.[39] Lovins outlined and compared two courses that the U.S. could choose to follow over the next 50 years: the "hard" and "soft" paths. The hard path follows closely historical growth rates and patterns of energy development. It calls for the rapid deployment of large, centralized technologies to increase all forms of domestic energy supplies, especially supplies of electricity. Energy conservation receives very little attention in Lovins' hard path. On the other hand, the soft path relies on the combination of "technical fixes" and the development and commercialization of "appropriate" technologies (technologies which are diverse, flexible, matched in scale and quality to end uses, and generally based on renewable energy sources). According to Lovins, the soft path would eventually lead to minimal, equilibrium, or possibly negative annual energy demand growth rates.

But the basis for energy supply/demand questions and analyses had been developing since 1971 when the data collection needs for energy use first began receiving attention. Two works by Stanford Research Institute (SRI), which actually pre-date the energy crisis, investigated energy use primarily to develop a more systematic data base.[40] SRI's studies

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[39] Amory B. Lovins, "Energy Strategy: The Road Not Taken?" Foreign Affairs 55 (October 1976): 65-69.

[40] Stanford Research Institute, End Uses of Energy (Menlo Park, Calif.: Stanford Research Institute, 1971); and Patterns of Energy Consumption in the U.S. (Washington, D.C.: Government Printing Office, 1972).

classified energy consumption into the meaningful end use categories used today: residential and commercial, industrial, and transportation.

Activities then increased to identify energy use targets within the major consuming sectors where opportunities for energy conservation exist. Besides the Ford Foundation's report, the now defunct Office of Emergency Preparedness (OEP) issued a staff study that attempted to identify conservation goals that the federal government could help meet through various executive or legislative actions.[41]

Based on the early work of OEP, SRI, and the Ford Foundation, among others, several conclusions concerning conservation were advanced: (1) energy conservation is as important as energy supply, (2) measures to reduce energy use should be evaluated by government as a way of achieving a better balance between energy production and consumption and reducing dependence on oil imports, (3) conservation might decrease or eliminate some of the requirements that might otherwise have to be satisfied by new or alternate energy sources, (4) slowing the average annual growth rate of energy demand could improve the longevity of domestic supplies and reduce environmental damage and pollution, and

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[41] U.S., Office of Emergency Preparedness, The Potential for Energy Conservation (Washington, D.C.: Government Printing Office, 1972).

(5) conservation could buy time to develop and implement long-term energy solutions.[42]

Besides these general works, studies concentrating on each consuming sector have served to clarify the substance of energy use problems and suggest conservation options. Most of the sectorial studies approach their topics from a technical, economic, or environmental frame of reference. Nevertheless, they provide valuable background information for the policy analyst. For the residential and commercial sector, research has focused primarily on the need to reduce energy waste in buildings. As early as 1972, the American Institute of Architects began to explore the relationships between energy and the "built environment."[43] Up until the early 1970s very little work had been undertaken to characterize the way energy was being used in residences and commercial structures, and hardly any attention had been given to finding ways to improve the efficiency of energy use or to the means to implement improvements. The potential role of government in this area has now been generally defined in terms of providing various incentives to encourage better building

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[42] On several of these points, see U.S., Council on Environmental Quality, Energy and the Environment: Electric Power (Washington, D.C.: Government Printing Office, 1973), p. 27.

[43] American Institute of Architects, A Nation of Energy Efficient Buildings by 1990 (Washington, D.C.: American Institute of Architects, 1974).

insulation standards,[44] more energy-efficient architectural practices,[45] more energy-efficient appliances, and the use of alternative energy sources such as solar for heating, cooling, and lighting buildings.[46]

Early analyses of energy use in the industrial sector dealt primarily with "housekeeping" measures that could be implemented to tighten up energy "leaks." These were usually aimed at specific industrial processes and activities.[47] In addition, they were often coupled with basically technical discussions of capital projects which, if undertaken, could improve the fuel efficiencies of devices such as heat furnaces (used in the manufacture of steel and other products); and discussions of the energy saving potential of equipment still in the research and development stage.[48] Policy research in this area has been confined mostly to exploring

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[44] John C. Moyers, The Value of Thermal Insulation in Residential Construction: Economics and the Conservation of Energy (Oak Ridge, Tenn.: Oak Ridge National Laboratory, 1971).

[45] Richard G. Stein, "Architecture and Energy," paper presented at the Annual Meeting of the American Association for the Advancement of Science, Philadelphia, Penn., December 29, 1971.

[46] Richard A. Tybout and George O. G. Lof, "Solar House Heating," Natural Resources 10 (April 1970): 268-326.

[47] The Energy Policy Project of the Ford Foundation included a study to determine where and how energy is used in a number of selected manufacturing industries. See The Conference Board, Energy Consumption in Manufacturing (Cambridge, Mass.: Ballinger Publishing Co., 1974).

[48] For example, see Charles A. Berg, "Conservation in Industry," Science 184 (April 19, 1974): 264-270.

voluntary inducements to spur conservation programs and technological innovation in the most energy-intensive industries (e.g., plastics, aluminum, steel, and cement). A large part of the conservation research has been by economists who have emphasized the effect of price on the amount of energy used by industry. But, like the other sectors, the current literature stresses the need for further public-private sharing of responsibilities if conservation opportunities are to be further identified and realized.[49]

In the transportation sector, primary concern is with ways to reduce gasoline consumption. Two reports released in 1974 observed that gasoline use was the critical factor in the transportation supply/demand equation.[50] Research describing transportation problems and possible solutions has, in essence, centered on technological means, such as more efficient vehicle engines, to get at energy waste.[51] However, numerous "software" alternatives such as the application of available government policy tools (incentives,

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[49] J. Dicken Kirschten, "Conservation--The Cornerstone of Carter's Plans for Energy," National Journal 9 (February 26, 1977): 316-317.

[50] U.S., Federal Energy Administration, Project Independence Report, Appendix AIII (Washington, D.C.: Federal Energy Administration, 1974), p. 118; and National Academy of Engineering, U.S. Energy Prospects (Washington, D.C.: National Academy of Engineering, 1974), pp. 24-31.

[51] For example, see Hittman Associates, Inc., The Automobile--Energy and the Environment (Columbia, Md.: Hittman Associates, Inc., 1974).

subsidies, etc.) to stimulate urban mass transit and a shift to less energy-intensive ways of hauling freight, have also received much attention.[52] The more difficult attitudinal and behavioral questions and issues concerning individual transportation habits deserve greater consideration than they have received to date.

A number of studies have taken a more integrative approach to the problems and issues surrounding energy consumption. That is, in a vein much like that of A Time to Choose, these studies have viewed conservation in a more holistic framework by discussing the relationships among all sectors. In general, such discussions have sought to identify appropriate policy initiatives and potential implementation barriers, both public and private.[53] Reports like those of David Large and Lee Schipper have contributed substantially to definitions of energy conservation problems and issues, particularly in identifying the "non-technical" constraints to efficient energy utilization and the need for government action.[54] Lee Schipper states:

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[52]Eric Hirst, "Transportation Energy Conservation: Opportunities and Policy Issues," Transportation Journal 13 (Spring 1974): 42-52.

[53]See David B. Large, ed., Hidden Waste: Potentials for Energy Conservation (Washington, D.C.: The Conservation Foundation, 1973); and Lee Schipper, Energy Conservation: Its Nature, Hidden Benefits, and Hidden Barriers (Berkeley, Calif.: Lawrence Berkeley Laboratory, University of California, 1975).

[54]Similarly, Denis Hayes' Energy: The Case for Conservation (Washington, D.C.: Worldwatch Institute, 1976) popularized the need for conservation as an element in overall national energy policy.

> [R]emoving these barriers entails political action as well as straightening out the economic system in nearly every phase of social activity, because all activity today uses energy. Government, industry, and the people must decide how much regulation, how many kinds of efficiency and performance standards, what pricing policies, what kinds of taxation on energy use or subsidies for more efficient energy utilization will be necessary.[55]

Needless to say, the purposes of this study have been defined to assess and improve the public response to this challenge.

The state-of-the-art in energy conservation research can be summarized, then, as having focused on: (1) the identification of conservation as an element in the overall national response to the energy crisis; (2) the substantive dimensions, usually defined in economic, environmental, and technical terms, of the problems within the various consuming sectors; and (3) delineation of potential conservation opportunities, initiatives, and implementation barriers.

Legislative and governmental reorganization efforts within the last few years to develop and implement conservation policies and programs have made it increasingly apparent that conservation problems and issues are inextricably meshed with social and political phenomena--i.e., public goals, needs, interests, values, social behavior and institutions. Analyses are now needed that give serious attention to the role these phenomena play in constraining or enhancing the effectiveness of conservation policymaking. And this underscores the place of this study in the field of conservation research.

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[55] Schipper, Energy Conservation, p. 60.

Outline of the Study

This chapter has set the stage for a policy analysis of energy conservation by reviewing relevant conservation literature and by suggesting the place of this study in the field of conservation research. In chapter II, the theoretical background for applied policy analysis will be addressed more fully including a discussion of the conceptual framework used in this study. Part Two describes the social and political context within which conservation problems and issues are being addressed. It includes a description of the substantive dimensions of the energy conservation problem (chapter III), a review of key elements in the rationale for energy conservation as an integral part of overall national energy policy (chapter IV), a definition of the existing conservation policy system, and an identification of unresolved problems and issues in the major energy consuming sectors (chapter V). Part Three identifies, evaluates, and compares both substantive and procedural alternatives and implementing strategies for dealing with conservation problems and issues (chapter VI), and, finally, offers some overall conclusions regarding energy conservation research and the conduct of policy analysis (chapter VII).

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CHAPTER II

CONCEPTUAL FRAMEWORK AND ASSUMPTIONS

Introduction

To accomplish the research objectives outlined in chapter I, a conceptual framework is needed that facilitates the general understanding of the policymaking process and its relationship to a substantive problem area. That is, a framework is needed that provides for both describing the development of energy conservation as a public policy problem and analyzing policy alternatives which might mitigate existing unresolved problems and issues. To this end, the following discussion is organized in two parts. The first part summarizes relevant developments in public policymaking, policy sciences, and policy analysis literature. It pays particular attention to recent efforts to strengthen policy analysis concepts and approaches in the service of policymakers and policymaking institutions. It is intended, therefore, to provide the theoretical beginning point for the study of a specific policy area from an applied focus.

This is followed, in the second part, by a definition and description of the conceptual approach used in this study--the "issue systems" framework--which offers an approach to policy analysis that seeks to combine the context of substantive policy problems and decision processes.

Public Policymaking, Policy Sciences, and Policy Analysis

In general, policymaking can be characterized as "the process of deciding upon what the goals of government should be and what specific behavioral and environmental characteristics should be maintained or achieved in order to satisfy those goals."[1] According to this definition, policymaking involves "value selection" and the translation of values into facts through the choice of appropriate and feasible courses of action. One result of the policymaking process, then, is the selection of specific means to meet desired ends. Choices are constrained, of course, by the social context of a policy problem, by the legal-regulatory system, and also by the amount of available resources that can be expended to meet an identified goal. The most critical constraint is information and analysis concerning the likelihood of a policy decision producing the intended results. Estimates or projections of answers to this question is what policy analysis is all about.

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[1]Robert J. Mowitz, instructional materials taken from memoranda prepared in recommending organizational arrangements for various program budgeting and analysis functions in a number of states. The Pennsylvania State University, Institute of Public Administration, University Park, Penn., June 10, 1975, p. 1. (Mimeographed.)

However, analysts approach contemporary policy research from a variety of perspectives. Some are discipline-bound viewing policy problems from the perspective of their professional group identity, whereas others (of an interdisciplinary persuasion) view social problems and issues as beyond the paradigm of any one discipline and profession.[2] Some are concerned primarily with decision processes by which policies are made, and thus make recommendations for improving those processes; others hold to the assumption that policy analysis, by definition, includes the suggestion of reasoned alternatives to change the "impacts" of past policies and programs or predict the impacts of future policies.[3] In addition, each analyst works with a conception of policy decision-making that falls somewhere on a continuum which at one end extolls the role of political bargaining (or "muddling through"[4]), and at the other end praises rational

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[2]Duncan McRae, Jr., "Policy Analysis as an Applied Social Science Discipline," Administration & Society 6 (February 1975): 365.

[3]"Impacts," as the term is used here, denotes the broad intended and unintended consequences or effects of public policy both on the specific policy issues and on society more generally. Thus, a distinction is made between political "outputs" (public policies) and "outcomes," or impacts. For elaboration of the difference, see David Easton, A Systems Analysis of Political Life (New York: John Wiley & Sons, 1965), pp. 351-352; and Larry L. Wade, The Elements of Public Policy (Columbus, Ohio: Charles E. Merrill Publishing Co., 1972), pp. 4-5.

[4]Charles E. Lindblom, "The Science of 'Muddling Through,'" Public Administration Review 19 (Spring 1959): 79-88.

analysis and systematic planning. But as a general enterprise, almost everyone doing policy analysis is concerned to a greater or lesser degree with improving public policy.

The discussion below begins with an overview of policy study during the 1950s and early 1960s. Parallel and later developments are considered in the "policy sciences" literature, which called explicitly for the application of informed knowledge (research and analysis) to problems in the political arena. Given this background, the central thrust in contemporary policy analysis is examined from two competing but complimentary decision-making approaches: incrementalism and systems analysis. It is suggested that policy analysis can be strengthened by "marrying" elements and assumptions drawn from the two approaches.

Historically, public policy has not been the primary focus of political science. Rather political scientists have been more interested in the institutions and structures of government, in political behavior, governmental processes, and intergovernmental relations.[5] Similarly, more modern "behavioral" political science has focused principally on the study of sociological and psychological dimensions of group behavior; determinants of voting and other overt political acts; the roles and functions of interest groups and

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[5] Charles S. Hyneman, The Study of Politics: The Present State of American Political Science (Urbana: University of Illinois Press, 1959), pp. 38-39.

political parties; and the description and explanation of legislative, executive, and judicial political behavior. Thus, behavioral political science was not directly concerned with "finding out what governments do, why they do it, and what difference it makes."[6]

Policy and Process

In fact, from the early 1950s through the mid-1960s, the study of American politics was dominated by the process school of thought and group theorists. Group theory as expounded by Arthur Bentley[7] and David Truman[8] begins with the proposition that interaction among groups, who represent interests, is the central fact of politics. The task of the political system is to manage group conflict by establishing the "rules of the game," arranging compromises and balancing interests, enacting compromises in the form of public policy, and enforcing these compromises. Because of the prevailing confidence in group politics, political science researchers showed little interest in the outcomes (or "who gets what" in Harold Lasswell's formulation) of enacted government policies. As stated by Allen Schick: "The pluralists were deterred from looking into such questions by their own focus

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[6]Thomas R. Dye, Policy Analysis (University: University of Alabama Press, 1976), p. 1.

[7]Arthur F. Bentley, The Process of Government (Evanston, Ill.: The Principia Press, 1908).

[8]David B. Truman, The Governmental Process (New York: Alfred A. Knopf, 1951).

on process."[9] Schick suggests several reasons for this "deus ex machina faith in the goodness of the pluralist process":

1. American political science is habituated to confidence in the formal relations among power holders.

2. The pluralists were impressed by their "discovery" of interest groups.

3. The process approach offered a convenient escape from difficult value questions.

4. The pluralists emphasized the remedial features of incrementalism.

5. The pluralists were impressed by the ability of the budgetary process to limit political and bureaucratic conflict.

6. Finally, the pluralists looked at the American political scene and liked what they saw--abundance, growth, consensus, stability, satisfaction with the American way.[10]

Given these "success indicators," the pluralists naturally assumed the shares of public satisfaction were being equitably divided. Thus, they saw no need to subject public objectives to explicit and systematic evaluation, no reason to question the outcomes of competitive resource allocations. Again, as explained by Schick:

> It was not a time for thinking about purpose or worrying about priorities. Perspectives did not extend much beyond this year and the next. There was great confidence in the capability of the political

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[9] Allen Schick, "Systems Politics and Systems Budgeting," Public Administration Review 29 (March/April 1969): 139.

[10] Ibid., pp. 140-142.

process to produce the right results. Muddling through was cannonized as the American virtue.[11]

As policy studies began to receive more emphasis in the late 1960s, efforts to formulate conceptual frameworks that better accounted for the public decision-making process increased. A number of studies were published, including among others Charles Lindblom, The Policy-Making Process;[12] Raymond A. Bauer and Kenneth J. Gergen, editors, The Study of Policy Formation;[13] and Thomas Dye, Politics, Economics and the Public;[14] and more recently, Understanding Public Policy;[15] Charles O. Jones, An Introduction to the Study of Public Policy;[16] and Ira Sharkansky, editor, Policy Analysis in Political Science.[17] Policy analysis, as the term was used by political scientists during this period, generally referred to investigations which sought to isolate salient behavioral variables in policymaking (actors, roles, institutions, processes and so on). This conceptual approach reflected a professional "predisposition to assert the importance of political science characteristics in determining

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[11]Ibid., p. 142.

[12]Englewood Cliffs, N.J., Prentice-Hall, 1968.

[13]New York, Free Press, 1968.

[14]Chicago, Rand McNally, 1966.

[15]Englewood Cliffs, N.J., Prentice-Hall, 1972.

[16]North Scituate, Mass., Duxbury Press, 2d ed., 1977. First edition published in 1970.

[17]Chicago, Markham Publishing Co., 1970.

causes and consequences of public policy,"[18] often ignoring important social, economic, cultural, historical, and technological factors. In short, there was a substantial increase in systematic research to test propositions about what actually determined public policies, particularly at the state and local levels,[19] and to explain "how" policies are made. Evaluating policy, to the degree that it was considered a functional category, centered mainly on examining evaluation procedures within the various branches of government and governmental institutions. This work can be categorized mostly as being aimed at "disciplinary" development; that is, the policy analysts were guided in their choice of problems by standards that originated within the discipline and not, as suggested by James Coleman, "in the world of action."[20] This led to charges, such as that made by Austin Ranney, that "at least since 1945, most political scientists have focused their professional attention mainly on the

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[18] Dye, Policy Analysis, p. 22.

[19] Richard E. Dawson and James A. Robinson, "Interparty Competition, Economic Variables and Welfare Policies in the American States," Journal of Politics (May 1963): 265-289; Richard Hofferbert, "The Relation Between Public Policy and Some Structural and Environmental Variables in the American States," American Political Science Review 60 (March 1966): 73-82; and Thomas R. Dye, "Malapportionment and Public Policy in the States," Journal of Politics 27 (February 1965): 586-601.

[20] For elaboration of this idea from a broad social science perspective, see James S. Coleman, Policy Research in the Social Sciences (Morristown, N.J.: General Learning Press, 1972).

process by which public policies are made and have shown relatively little concern with their contents."[21]

The Contents of Policy

During this same period, however, a few studies did attempt to deal with the relationship between the policy process and policy results. Particularly relevant in this regard are the works of Yehezkel Dror, Public Policymaking Reexamined;[22] Austin Ranney, Political Science and Public Policy; and Larry L. Wade, The Elements of Public Policy.[23] For the most part these authors mirrored three common themes: (1) a growing discontent with the results of the policy process (thus the need for conceptual models that paid more attention to policy contents); (2) a recognition of the increasing complexity of social problems that cut across narrow definitions of what is "political"; and (3) the increasing need for expert attention by political scientists to policies or policy choices formulated to have impacts in environments external to the governmental system itself (e.g., policies concerned with such matters as science and technology, the use and conservation of natural resources, transportation,

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[21]Austin Ranney, "The Study of Policy Content: A Framework for Choice," in Political Science and Public Policy, ed. Ranney (Chicago: Markham Publishing Co., 1968), p. 3. Ranney equates policy content with Easton's concept of policy outputs and outcomes.

[22]San Francisco, Chandler Publishing Co., 1968.

[23]Columbus, Ohio, Charles E. Merrill, 1972.

the environment, communications, health and welfare, education, money and banking, and law enforcement). Writing in the American Political Science Review in 1969, David Easton highlighted these themes by proclaiming the arrival of a "post-behavioral revolution," reflecting further dissatisfaction with the lack of relevance of social science to pressing societal issues and concerns.[24]

A similar concern had been advanced fifteen years before Easton's article appeared (and likewise before the works on public policy cited above) when Harold Lasswell and Daniel Lerner had introduced the concept of the "policy sciences."[25] Although largely ignored at the time, the authors, in laying out the scope and methods of a policy orientation, argued that a policy focus should be directed in part toward the policy process and in part toward the "intelligence needs of policy":

> We have become more aware of the policy process as a suitable object of study in its own right, primarily in the hope of improving the rationality of the flow of decision.

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[24]David Easton, "The New Revolution in Political Science," American Political Science Review 63 (December 1969): 1951-1061. Although Easton did his early work in "systems politics," for example, see The Political System (New York: Alfred A. Knopf, Inc., 1953, it is only in recent years that the "input" and "output" categories have been operationalized with useful information and data.

[25]Daniel Lerner and Harold D. Lasswell, eds., The Policy Sciences: Recent Developments in Scope and Methods (Stanford: Stanford University Press, 1951).

> A policy orientation has been developing that cuts across the existing specializations. The orientation is twofold. In part it is directed toward the policy process, and in part toward the intelligence needs of policy. The first task, which is the development of a science of policy forming and execution, uses the methods of social and psychological inquiry. The second task, which is the improving of the concrete content of the information and the interpretations available to policy-makers, typically goes outside the boundaries of social science and psychology.[26]

Approximately twenty years later, Yehezkel Dror, in his introductory note to Lasswell's follow-up work, A Pre-View of Policy Sciences, suggests:

> Even though the concept was recognized as a revolutionary one and the book [The Policy Sciences] itself was widely reviewed and discussed, the idea of policy sciences itself was not followed up until quite recently. Apparently, more progress in various policy sciences disciplines (e.g., decision sciences, applied behavioral sciences, systems analysis), more experience with policy research organizations (e.g., the Rand Corporation and the Hudson Institute) and, in particular, some disenchantment with "normal sciences" and their social consequences, were necessary requisites for accelerated efforts to advance policy sciences.[27]

Lasswell's "pre-view" ostensibly led the way for political scientists and other policy sciences professionals interested in applying their specialized knowledge to the manner in which government, business, and other institutions seek to realize their policy goals. The literature that has grown up around this approach to policy research stresses the need for policy analyses that estimate the future impacts of

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[26] Ibid,, pp. 3-4.

[27] Harold D. Lasswell, A Pre-View of Policy Sciences (New York: American Elsevier, 1971), p. xi.

past policy choices and the likely impacts of innovations advanced to deal with substantive policy problems. Jacob Ukeles adds that this does not mean the activities identified with policy analysis of the pragmatic or problem-solving mode are unlike those which traditionally have been associated with public policymaking studies, rather it stresses the <u>formal</u> association of analysis with public decision-making.[28]

Systems Analysis and Incrementalism

Although there is now general agreement that policy analysis is a worthwhile activity, disagreement continues over the methods of analysis, whether policy analysis is normative or positive, and over the role of the analyst in governmental policymaking.[29] As noted in chapter I, part of the debate in all of these categories stems from philosophical arguments about the place of policy research within the discipline of political science. However, much of the debate is reflected in the conflict between those who view the results obtained by political bargaining ("muddling through," or "disjointed incrementalism") as more favorable

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[28] Jacob B. Ukeles, "Policy Analysis: Myth or Reality?" Public Administration Review 37 (May/June 1977): 223.

[29] Ukeles, "Policy Analysis," pp. 224-225. See also Yehezkel Dror, "Policy Analyst: A New Professional Role in Government," Public Administration Review 27 (September 1967): 197-203; K. A. Archibald, "Three Views of the Expert's Role in Policymaking: Systems Analysis, Incrementalism, and the Clinical Approach," Policy Sciences 1 (1970): 73-86; and Dror, Ventures in Policy Sciences (New York: American Elsevier, 1971).

and those who contend that choosing alternative paths to social goals depends on rational or systems analysis of all possible courses of action relevant to achieving identified objectives.

Regarding the latter viewpoint, in the 1950s and early 1960s, Rand Corporation's "systems analysis" school of thought began to extoll the use of rational analysis to help a decision-maker choose a course of action from among competing alternatives by bringing expert judgment and quantitative, economic methods to bear on a problem.[30] The rational model structures analysis in four steps: (1) identify objectives, (2) identify all possible alternatives relevant to achieving objectives, (3) predict the probable consequences of alternative courses of action, and (4) select that alternative which maximizes the attainment of objectives.[31] Systems analysis therefore stresses the effectiveness of decisions, with maximum results usually defined in "economic rationality," or "least unit cost" terms.[32]

At the same time, Lindblom and other academics were arguing that attempts to apply the rational model--borrowed

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[30] For example, see David Novick, ed., Program Budgeting (Cambridge, Mass.: Harvard University Press, 1966); and Edward S. Quade and Wayne I. Boucher, eds., Systems Analysis and Policy Planning: Applications in Defense (New York: American Elsevier, 1968).

[31] Ukeles, "Policy Analysis," p. 226.

[32] Archibald, "Three Views of the Expert's Role in Policymaking," p. 75.

largely from "think tank" successes in defense policy--to public policymaking ignore the way the policy process really works. In seminal works, Robert Dahl and Lindblom[33] and David Braybrooke and Lindblom[34] contend that policy is made by small adjustments ("increments") in existing reality. Lindblom suggests the strategy of disjointed incrementalism, an elaboration of what he earlier referred to as "muddling through." In this approach, policies are the result of sequential decision-making through minor adjustments to past decisions on particular problems. The decision-maker examines only those alternatives which are incrementally different from existing policy and from each other; and he does not attempt to analyze all the consequences of even this limited number of alternatives. But more importantly, as compared to systems analysis, Lindblom's strategy aims at political expedience instead of economic rationality--i.e., emphasis is on the "political feasibility" of an alternative. The incrementalist, then, may arbitrarily exclude some alternative from his analysis because of the assumption that politics will correct adverse decisions.

Further comparisons of systems analysis and disjointed incrementalism have shown that there are important

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[33]Robert A. Dahl and Charles E. Lindblom, Politics, Economics and Welfare (New York: Harper & Row, 1953).

[34]David Braybrooke and Charles E. Lindblom, The Strategy of Decision (New York: Free Press, 1963). The best treatment of incrementalism is found in Lindblom, The Intelligence of Democracy (New York: Free Press, 1965).

similarities as well as differences. For example, both approaches: recognize the need to make choices among conflicting policy objectives, at the margin; attempt to cope with complexity or uncertainty; use "satisficing" (expectations are adjusted to the limitations of time, cost, and information) rather than optimizing or maximizing criteria; continually restructure data, means, and ends; and recognize that constraints always prevent the analysis of all alternatives.[35]

The manner in which incrementalism and systems analysis interact is significant for the applied policy analyst. In fact, most current definitions of policy analysis generally reflect a blending of the advantages of both. Charles Schultze[36] and Dror[37] have tried to define some middle ground between incrementalism and systematic analysis. Both authors criticize incrementalist theory on normative grounds, arguing it does not fit an era of rapid increase in technological and behavioral knowledge and is unable to deal with changing values in an increasingly dynamic society. On the other hand, both realize that the high information requirements of the

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[35]Archibald, "Three Views of the Expert's Role in Policymaking," p. 76. See also James Schlesinger, "Systems Analysis and the Political Process," Journal of Law and Economics 11 (October 1968): 281-298.

[36]Charles L. Schultze, The Politics and Economics of Public Spending (Washington, D.C.: The Brookings Institution, 1968).

[37]Dror, Public Policymaking Reexamined.

rational model can seldom, if ever, be met. More specifically, Dror contends that policy analysis should combine the data-oriented methods of systems analysis with qualitative techniques and total awareness of the unique characteristics of political phenomena.[38] In other words, if policy analysts are to provide an information base for political decision-making, consideration must be given to a wider range of alternatives and to relatively intangible factors such as interests and values within the system.

Both approaches have had a tremendous influence on existing conceptions of policy analysis. Even though the two are significantly different, the most commonly advanced definitions of policy analysis include elements and assumptions from each. For example, one such general model for policy analysis includes the following components:

> Step One: Assess the policy-making environment within which the analyst and the relevant decision maker(s) are operating.
>
> Step Two: Identify the policy question or problem needing resolution.
>
> Step Three: Identify policy alternatives appropriate to the policy-making environment and the decision maker(s).

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[38] Dror, "Policy Analyst: A New Professional Role," pp. 197-203. For further inquiry into the origins, application, uses, and abuses of systems analysis, see Ida R. Hoos, Systems Analysis in Public Policy: A Critique (Berkeley: University of California Press, 1972). On the need to consider intangible factors in policy analysis, see Eileen Siedman, "Why Not Qualitative Analysis?" Public Administration Review 37 (July/August 1977): 415-416.

Step Four: Identify criteria that are relevant to choosing among alternatives.

Step Five: Using assumptions and limited information, assess the pros and cons of each alternative in terms of the relevant criteria.[39]

No attempt is made to maximize the achievement of objectives, instead the analysis may simply "screen out the worst possible alternatives."

The purpose in recounting the above debate is to suggest its close ties with parallel developments in the policy sciences ideas discussed earlier. The literature cited is the theoretical beginning point for the study of a particular substantive policy problem, such as energy conservation, where the aim is to develop information that might improve the public policies that have been made to date. From the discussion and review up to this point, one is able to discern that in a matter of a few years policy analysis evolved from an idea to reality, but not without growth pains. It is generally agreed, however, that policy analysis has the potential for enhancing the way government does business. It is to this end that the discussion now turns to an identification and description of the framework to be used in this study.

The Issue Systems Framework

The issue systems framework, outlined in figure II-1, is responsive to the contemporary trend in policy studies.

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[39] Ukeles, "Policy Analysis," p. 226.

FIGURE II-1

AN ISSUE SYSTEMS FRAMEWORK FOR THE ANALYSIS OF PUBLIC POLICY

STEP 1	<u>Identify and Define the Substantive Policy Problems and Issues</u> o Identify trends and events in society that give impetus to the problems and issues; o Define problems and issues being processed by the system.

STEP 2	<u>Describe the Social and Political Context</u> o Describe the key elements in the historical development of the issue: -When did the issue arise? -Which participants perceived it as an issue? -What interests and values did these participants represent? -When and how did government respond? -What policies were enacted or established? -What agency administered these policies? -How have these policies affected the issue? o Define the existing system for dealing with the issue: -What are the relevant, current public and private, formal and informal institutional arrangements? -What interests and values are at stake? -Who represents these interests and values and what strategies and tactics are they using? -Are there situations or soical, cultural and technical conditions and circumstances that could affect whether and how the issue is processed by the system?

FIGURE II-1, continued

STEP 3	Identify, Evaluate, and Compare Alternative Policies and Implementing Strategies o Identify and describe alternative policies and implementing strategies already being proposed for dealing with existing problems and issues; o Describe alternative policies and implementing strategies formulated in the conduct of the research; o Describe the costs, risks, and benefits of most significant and feasible policies and implementing strategies; o Compare alternatives and strategies on the basis of explicit criteria using a variety of measures.

SOURCE: Adapted from Irvin L. White, Steven C. Ballard and Timothy A. Hall, "Technology Assessment as an Energy Policy Tool," Policy Studies Journal, forthcoming Fall, 1978; and Irvin L. White et al., Work Plan for Completing a Technology Assessment of Western Energy Resource Development (Washington, D.C.: U.S., Environmental Protection Agency, 1978), pp. 29-39.

It offers an approach to policymaking and analysis that is intended to provide for the systematic investigation of both problem and process. Its theoretical roots are largely in systems analysis and decision-making approaches described earlier. As will be shown below, the issue systems approach attempts to "marry," or synthesize the advantages of the two foci. The actual sets of research questions, also to be specified below, are based on an interpretation of this framework as it has been applied to domestic energy policy problems and issues.[40]

Underlying Assumptions

Use of this model implies the acceptance of two underlying assumptions about policymaking and politics.

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[40]This approach to applied policy analysis draws heavily on the cumulative experience of the Science and Public Policy Program (S&PPP) of The University of Oklahoma. S&PPP's interdisciplinary research teams have conducted two "technology assessments" which, as applied policy studies, focus on informing interested publics and decision-makers of the possible ranges of consequences for new actions and associated policy alternatives. See Irvin L. White et al., Energy From the West: Draft Policy Analysis Report (Washington, D.C.: U.S., Environmental Protection Agency, forthcoming); White et al., Energy From the West: A Progress Report of a Technology Assessment of Western Energy Resource Development (Washington, D.C.: U.S., Environmental Protection Agency, 1977); and Don E. Kash et al., Energy Under the Oceans: A Technology Assessment of Outer Continental Shelf Oil and Gas Operations (Norman: University of Oklahoma Press, 1973). Related works by S&PPP are, Kash et al., Our Energy Future: The Role of Research, Development, and Demonstration in Reaching a National Consensus on Energy Supply (Norman: University of Oklahoma Press, 1976); Kash et al., Energy Alternatives: A Comparative Analysis (Washington, D.C.: Government Printing Office, 1975); and White et al., North Sea Oil and Gas: Implications for Future United States Development (Norman: University of Oklahoma Press, 1973).

These need to be made explicit. First, the framework has a substance basis; it emphasizes the observation that the structure of and behavior within issue systems vary according to the substance of the issue being considered. The interests and values at stake, relevant institutional arrangements, applicable laws and regulations, governmental and nongovernmental participants, and intensity of involvement of relevant stakeholders can all vary on the basis of substance.[41] For example, the substance of energy problems leads to a different policy system definition than would the substance of social welfare problems. And at a lower level of generality, the substance of energy conservation problems leads to the definition of a policy system different than the system that would be defined for nuclear energy problems.

Second, it is important to note, in relation to the above observation, that the nature of an issue may therefore influence how various policymaking processes develop and

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[41]The basic notion here is one which suggests instead of a single, integrated policy process, what exists is a number of individual, and largely independent policy "subsystems" defined according to the problem being examined. See J. Leiper Freeman, The Political Process (New York: Random House, 1965). On the concept, see also, A. Lee Fritschler, Smoking and Politics: Policy-making and the Federal Bureaucracy (New York: Appleton-Century-Crofts, 1969); Irvin L. White, "Policy Analysis and International Law of the Sea," paper presented at the Annual Meeting of the International Studies Association, New York City, N.Y., March 14-17, 1973; and Lester M. Salamon and John J. Siegfried, "Economic Power and Political Influence: The Impact of Industry Structure on Public Policy," American Political Science Review 71 (September 1977): 1030-31.

function. But contrary to the position implied in the more traditional policymaking approaches which emphasize procedural aspects for dealing with issues, the expertise of the political scientist acting as policy analysis is not just within the parameters of the political process and how it works, but in the substantive issue as well. In other words, questions of structural design and the day-to-day management of policymaking systems must be complimented with another important question: How can the policy product be improved?

In summary, then, the issue systems framework rests on two assumptions which stress the fact that the policy analyst needs to understand the policymaking process and policymaking environment within which the analyst is operating to be able to inform policymakers about how to get desired results. However, instead of focusing on decision processes, the focus is on political issues and procedures for dealing with them.

Operationalizing the Framework

The framework also serves a useful heuristic purpose by identifying relevant research questions and the structure and interrelationship among these questions. The remainder of this chapter will expand on the issue systems categories and research questions as they will be applied to the conservation policy problem.

Step 1: Identify and Define the Substantive Policy Problems and Issues. The concern for energy conservation obviously did not arise overnight, instead as will be shown in chapter III, it evolved from a closely related set of underlying circumstances and events that collectively captured policymakers' attention. Thus, a first step in the analysis of conservation policy can be stated in terms of a definition of the problem and an identification of issues being processed by the system and issues needing resolution.

Although political scientists are analyzing many policy-related topics, very few seek to clarify the substance of the problems they are addressing except as the problems have already been defined by the policymaking system. Some would even argue that the substance of policy problems is not a proper concern of the discipline. In recent years, however, it has been suggested that the demands that help give rise to public policy and administration are important empirical items for consideration in policy analysis. That is, the policy analyst must begin by "recycling thinking" about problem formulation and problem definition,[42] an activity which is given limited attention in most policymaking models.

Charles Jones contends not only are problems stimuli to government action, but also the nature of a problem may determine the nature of political processes for addressing the problem.[43] This assumption is similarly supported by

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[42]Thomas D. Lynch, Policy Analysis in Public Policymaking (Lexington, Mass.: Lexington Books, 1975), pp. 90-93.

[43]Jones, An Introduction to the Study of Public Policy, chapters 1 and 2.

the policy analysis literature discussed in the preceding section. From this perspective, applied studies of policy require systematic description of the trends and events that lead to a problem being identified as a political issue and lead to the public policy definition (or definitions) of the problem.

The need for policy analysts to identify the conditioning variables or events in society that give impetus to policy problems and issues was espoused earlier (in the late 1940s) by Professor John Merriman Gaus. Gaus, in what he calls an "ecological approach" to public administration, contends that:

> [T]here is an explanation of the functions of government in the changes which coerce us into the use of government as an instrument of public housekeeping and adjustment.[44]

Drawing principally from his own work and from the writings of Felix Frankfurter, A. V. Dicey, Elihu Root, John Dewey, J. W. Bews and Charles Beard, Professor Gaus developed a list of factors which appear useful in explaining the "ebb and flow" of the functions of government: people, place, physical technology, social technology, wishes and ideas, catastrophe, and personality.[45] These, according to Gaus, are the "raw materials of politics." They help describe and

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[44]John Merriman Gaus, Reflections on Public Administration (University: University of Alabama Press, 1947), p. 5. Emphasis added.

[45]Ibid., p. 9.

interpret "why particular activities are undertaken through government and the problems of policy, organization and management generally that result from such origins."[46] Thus, in an ecological approach to government, the prerequisites of public policy are found in the observation of environmental factors--the substance of the problem. More specifically, environmental change and the coercion which changes bring is linked with resulting administrative processes as will be discussed in chapters IV and V. Again, quoting Gaus:

> The exhausting of a resource or some other upsetting of the natural environment, the redistribution of population by age or place, the introduction of new physical or social inventions, the seepage of new ideas, tastes, wishes, and dramatic catastrophe, the expertness and leadership of groups and persons, working in all sorts of combinations, frequently subtly and unnoticed until their consequences force attention, may become so widely coercive as to require collective action. Taken together, these factors are the ecology of government. In them administration as well as politics has its roots.[47]

Despite claims to this effect, most studies are of a more traditional policymaking mode and pick up the action after a particular problem or issue has already been "perceived," "defined," and placed on the agenda of government.[48]

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[46] Ibid., pp. 9-10.

[47] Ibid., pp. 127-28. As will be shown in chapters IV and V, policies are closely related to the diagnosis of such environmental change.

[48] Jones, An Introduction to the Study of Public Policy, pp. 27-28, defines "perception" as the way people receive and register events in society. "Definition" refers

Obviously, not all problems are acted on by government. In other words, some problems are of a restricted or private nature and affect only the person or persons directly involved in a particular activity. For example, when an individual's automobile runs out of gasoline in that person's driveway, the problem is private. But if one should happen to run out of gasoline on an urban freeway, the problem is public--i.e., it affects others and in some cases is prohibited by law. Thus, using a distinction made by John Dewey,[49] a problem becomes public if the consequences of a human act or transaction are broad, and are perceived to affect other persons not directly involved in the transaction. When the consequences of some action are considered significant enough to be controlled or regulated, the problem can be defined as a "policy demand."[50] David Smith suggests that for policymaking purposes, a problem can be defined as "a human need, deprivation, or dissatisfaction, self-identified or identified by others, for which relief is sought."[51] Those demands which decision-makers

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to the problem more than the events: "Something happens; someone receives it in a particular way and defines it as a problem for him."

[49]John Dewey, The Public and Its Problems (New York: Henry Holt and Co., 1927. Reprinted, Chicago: Swallow Press, Inc., 1954), p. 12.

[50]James E. Anderson, Public Policy-Making (New York: Praeger Publishers, 1975), p. 4.

[51]David G. Smith, "Pragmatism and the Group Theory of Politics," American Political Science Review 58 (September 1964): 607-10.

either choose or in some manner feel compelled to act upon make up the government's "policy agenda."[52]

As noted by Roger Cobb and Charles Elder, students of public policy must be concerned with "how issues are created and why some controversies or incipient issues come to command the attention and concern of the formal centers of decision-making, while others fail."[53] For these demands are the "stuff" of the policymaking process and, by this definition, influence not only the process itself but, ultimately, the content of decisions. One way that problems may get on the government's policy agenda and be acted upon is as a result of a "crisis" or some otherwise dramatic circumstance. Crisis was originally a medical term used to describe a decisive or climatic stage in the course of a disease. By implication, when the term is applied to the affairs of government, it suggests that the country is at some critical turning point where immediate action is in order.[54] Therefore, a crisis serves to raise the relevance of problems and issues and attract broad public attention. Consequently,

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[52]For a discussion of "agenda building," see Layne Hoppe, "Agenda Setting Strategies: The Case of Pollution Problems," paper presented at the Annual Meeting of the American Political Science Association, Los Angeles, Calif., September 1970.

[53]Roger W. Cobb and Charles D. Elder, Participation in American Politics: The Dynamics of Agenda-Building (Boston: Allyn and Bacon, 1972), p. 14.

[54]Davis, Energy Politics, p. 3.

decision-makers often feel compelled to respond with measures to relieve perceived problems. In this sense, the "energy crisis" can be viewed as a "triggering event" (to use Cobb and Elder's term)[55] that was needed to push the latent problem of energy resource use and conservation onto the policy agenda.

Step 2: Describe the Social and Political Context. In this second policy analysis step, substantive problems and issues are related to the social and political context within which they are being addressed. This requires the identification and description of the relevant policy system or systems. Implicit in this is the observation, as noted earlier, that political systems vary according to the issue being processed. In other words, participants who are actively involved, institutional arrangements, laws and regulations, interests and values at stake, and the intensity with which participants press their interests in relevant policy arenas vary on the basis of substance.[56] The explicit point is that the structure and behavior of an "energy

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[55] Cobb and Elder, Participation in American Politics, pp. 84-85.

[56] White et al., Work Plan for Completing a Technology Assessment of Western Energy Resource Development, p. 33. For a case study which underscores these points, see Helen M. Ingram, Patterns of Politics in Water Resource Development: A Case Study of New Mexico's Role in the Colorado River Basin Bill (Albuquerque: Institute for Social Research and Development, University of New Mexico, 1969), especially pp. 8-12.

conservation policy system" are unique, although overlap with other energy-related policy areas is inevitable.

The social and political context description begins with an examination of key elements in the historical development of issues in the major consuming sectors. This includes an account of the political and organizational context for policy formulation, implementation, and impacts. Primary empirical questions to be answered are: When did the issue arise? Which participants perceived it as an issue? What interests and values did the participants represent? When and how did government respond? What policies were enacted or established? What agency administered these policies? How have these policies affected the issue?

This step also includes a more detailed identification of the existing system for dealing with problems and issues. Given the scope and purposes of this study, the framework must accommodate both state and national governmental institutions. In addition, inputs from groups outside government, for example, private sector interests, public interest groups, nonprofit research organizations, and individuals play key roles in the issue system. The following questions will be considered: What are the relevant, current public and private, formal and informal institutional arrangements? What interests and values are at stake? Who represents these interests and values and what strategies and tactics are they using? Are there situations or social, cultural and technical conditions and circumstances that either affect or could affect whether and how the issue is processed by the policy system?

These questions are aimed at describing how the problems and issues have been or could be acted on by government. In general, responses by government to the issues can be characterized in terms of: (1) the actual organizational or structural response; (2) the legislation passed and regulations, orders, etc. issued; (3) implementation of policies; and (4) policy impacts. As will be shown in chapter V, more and more government agencies and legislative bodies are making decisions and attempting to implement policies for energy conservation. Incentives for state conservation plans and programs are the result of federal initiatives taken during the period 1975 to 1977. Several pieces of national legislation have codified most of what has taken place in government to encourage energy savings at the state level. In terms of organizational and implementation efforts, the Energy Research and Development Administration (ERDA), the Federal Energy Administration (FEA)--both now in the Department of Energy (DOE) which was established in 1977--and the Departments of Transportation, Housing and Urban Development, and Commerce deserve primary attention within the federal government. The roles and responsibilities of these administrative units will be described as they have attempted to respond to conservation problems and issues.

Thus, delineation of the conservation policy system provides information about how various values and interests, which are almost always in conflict, are being or can be accommodated in the policymaking process. Part of the effort is also intended to initiate the evaluation stage of the analysis by defining costs, risks, and benefits[57] of existing conservation policies, and assessing the advantages and disadvantages of the methods and strategies being used to deal with issues. Such information is necessary if the policy analyst is to begin to develop and evaluate policy alternatives.

Step 3: Identify, Evaluate, and Compare Alternative Policies and Implementing Strategies. The evaluation step in the issue systems model calls for the assessment of alternative policies and implementation strategies. Alternatives and implementation strategies for dealing with issues already being addressed by the conservation policy system will have been identified in the preceding step. However, alternatives will be included both for issues being processed and for those unresolved issues identified during the conduct of the research. The list of possible alternatives and strategies will be reduced to a manageable number, which can then be evaluated and compared. This is accomplished by a preliminary assessment of: (1) what the potential impacts of

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[57]Costs, risks, and benefits in the context of applied policy analysis are discussed in the evaluation step below.

each alternative might be on the relevant individuals, groups, or organizations; (2) the extent to which an alternative would transfer costs and benefits from some individuals, groups, or organizations to others; and (3) existing barriers or constraints (e.g., legal, ethical, moral, difficulty of implementation, economic, and so on) which might impede acceptance and implementation.[58]

For the reduced list of alternatives, the following questions will be pursued: What are the costs, risks, and benefits of the selected alternatives?[59] How will the costs risks, and benefits be distributed? Is the alternative applicable and adaptable? Is it socially and politically feasible?

In considering policy evaluation as characterized by these questions, it is important to recognize the following

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[58]White et al., Work Plan for Completing a Technology Assessment, pp. 35-36.

[59]Developed initially as an analysis technique by economists, cost-benefit analysis is now used extensively in applied policy research. Where cost-benefit is broadly construed, a variety of measures other than dollars are used to assess alternatives. This recognizes the fact that some impacts of a chosen policy alternative cannot be meaningfully expressed in monetary terms. The significant analytical point, which will be further explored below, is that multiple evaluative measures are required. On this point, see White et al., First Year Work Plan for a Technology Assessment of Western Energy Resource Development (Washington, D.C.: U.S., Environmental Protection Agency, 1976), pp. 5-15 and 5-21. For a detailed discussion of the cost-benefit approach to evaluation, see Jerome Rothberg, "Cost-Benefit Analysis: A Methodological Exposition," in Marcia Guttentag and Elmer L. Struening, eds., Handbook of Evaluation Research, Vol. 2 (Beverly Hills, Calif.: Sage Publications, 1975), pp. 55-88.

distinctions. First, as noted earlier, policy outputs are not the same as policy outcomes. Outcomes, or impacts as they have been referred to in this study, denote the broader consequences or effects of public policy both on the specific policy issue and on society more generally.[60] And recall these can be indirect and unintended, as well as direct and intended. In the second place, a distinction is maintained between policy evaluation to understand "causality" (whether or not a specific impact can be linked to a particular policy alternative in a cause-effect relationship) and policy evaluation for the purpose of developing alternatives that can be compared on the basis of their potential for dealing with specific policy issues.[61]

Determining relevant criteria to be used to evaluate energy conservation policy alternatives and implementation strategies is a difficult task. Although there is a fairly extensive base in the policy literature which broadly defines categories of policy inputs, less attention has been given to specifying criteria, other than in traditional economic

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[60] See Wade, Elements of Public Policy, pp. 4-5.

[61] The assessment of alternatives is a critical component of applied policy analysis, as distinguished from policy analysis which attempts to understand the causes and consequences of particular policies. For an elaboration of attempts to understand causes and effects, see Dye, Policy Analysis. Elaboration of the analysis of alternatives in applied policy analysis is discussed in Dror, Design for the Policy Sciences. See also, White, Ballard, and Hall, "Technology Assessment as an Energy Policy Tool."

efficiency and effectiveness terms, to evaluate and compare different courses of action.

According to the issue systems approach as defined above, two kinds of alternatives are to be identified--procedural and substantive. Table II-1 identifies and defines five basic criteria to be used in the evaluation and comparison of conservation policies and implementing strategies: <u>effectiveness</u>, <u>efficiency</u>, <u>equity</u>, <u>flexibility</u>, and <u>implementability</u>. These will be explored in a general manner below; however, greater specification and operationalization is provided in chapter VI.[62]

Procedurally-oriented criteria, <u>flexibility</u> and <u>implementability</u>, are intended to assess an alternative's policy formulation needs and barriers to implementation. As applied to energy conservation, these two criteria encompass centralization versus decentralization of conservation authority and responsibility, recognition of regional differences in policy formulation,[63] the place of energy conservation goals within the scope of the emerging national

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[62]Each criterion is defined more specifically for conservation problems and issues in chapter VI. In addition, quantitative and qualitative measures are specified for the five criteria.

[63]A. Berry Crawford, "Energy Conservation in the Interior Western States," paper presented at the Annual Meeting of the American Association for the Advancement of Science, Denver, Colo., February 21-25, 1977, p. 17.

TABLE II-1

CRITERIA FOR EVALUATING AND COMPARING ALTERNATIVE POLICIES AND IMPLEMENTATION STRATEGIES

Criterion	What Does It Evaluate?
Effectiveness	Achievement of Objective . Avoid or mitigate the problem or issue? . Short- or long-term resolution or solution? . Dependency on state-of-society assumptions?
Efficiency	Costs, Risks, and Benefits . Economic costs, risks, benefits? . Social costs, risks, benefits? . Environmental costs and risks? . Reversible/irreversible, short- or long-term?
Equity	Distribution of Costs, Risks, and Benefits . Who will benefit? experience costs? assume risks? -Geographically? -Sectorially? -Socially?
Flexibility	Applicability/Adaptability . Are local and regional differences accommodated? . Are social and sectorial differences taken into account? . How difficult will it be to administer? . How difficult will it be to change?
Implementability	Adoptability/Acceptability . Can it be implemented within existing laws, regulations, and programs? . Can it be implemented by a single agency or level of government? . Is it compatible with existing societal values? . Is it likely to generate significant opposition?

SOURCE: Irvin L. White et al., Energy from the West: Policy Analysis Report (Washington, D.C.: U.S., Environmental Protection Agency, forthcoming).

energy policy apparatus,[64] and access to decision-making authority by stakeholders in the issue system.[65] Thus, an estimate is made of the fit between an alternative, its flexibility, adaptability, and applicability.

Implementation strategies can also affect the distribution of costs, risks, and benefits. That is, implementation by the "bureaucracy" raises special problems for consideration in policy analysis.[66] For example: What are the existing barriers to the execution of a selected alternative? How much "administrative discretion" should be allowed? What will be the effects of discretion on the policy objectives? Whether or not the generally agreed-upon goals of newly enacted or recommended legislation will be carried out depends on the public administration system and the application of programs. Special attention is therefore given to intergovernmental aspects of implementing strategies, for example, by defining what is expected of the various

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[64] U.S., Congress, Congressional Budget Office, Energy Policy Alternatives (Washington, D.C.: Government Printing Office, 1977).

[65] Kash et al., Our Energy Future, pp. 453-471, discuss the need for a wide range of parties to have access to and to participate in decisions concerning new technologies or the development of energy facilities in new source areas.

[66] For a discussion of problems of implementation and the role of policy analysis, see Jeffrey L. Pressman and Aaron B. Wildavsky, Implementation (Berkeley: University of California Press, 1973); and Eugene C. Bardach, The Implementation Game (Cambridge, Mass.: M.I.T. Press, 1977).

levels of government, barriers faced, and assessing their capabilities to respond to a course of action.[67]

Substantive criteria, on the other hand, attempt to answer the questions of "whose impact" and "impact on what" for each alternative.[68] As shown in the table, effectiveness is generally defined as a measure of the achievement of substantive policy goals--energy conservation goals for these purposes. Of course, effectiveness as a criterion in the more traditional sense raises issues regarding causality, but as noted already, understanding cause and effect is not the primary goal of this policy study. Even though it may be impossible (for many well-recited reasons) to isolate empirical cause-effect relationships, some estimate of the aggregate effectiveness of an alternative can be made. For example, this can be derived from measures of the potential reduction in energy use by sector or device compared to historical consumption patterns, and by estimates of attitudinal

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[67] Policy analysts have increasingly recognized that implementation is an important research unit between inputs and performance. Besides Pressman and Wildavsky, and Bardach, see Walter Williams and Richard F. Elmore, eds., Social Program Implementation (New York: Academic Press, 1976). On the specific point that implementation is a constraint in translating policy into performance, see Donald S. Van Meter and Carl E. Van Horn, "The Policy Implementation Process: A Conceptual Framework," Administration & Society 6 (February 1975): 458-462.

[68] For a discussion of these two kinds of impact perspectives, see Hugh Heclo, "Social Politics and Policy Impacts," in What Government Does, ed. Matthew Holden, Jr., and Dennis L. Dresang (Beverly Hills, Calif.: Sage Publications, 1975), pp. 153-157.

and/or behavioral changes on the part of target populations.[69]

As discussed throughout this chapter, numerous social, economic, and political values are at stake with regard to energy decisions. The efficiency of a policy alternative or implementation strategy emphasizes its costs, risks, and benefits. In an economic sense, the efficiency criterion deals with the actual dollar costs of the alternative as compared to its energy-saving returns. In some cases, there may be hidden costs or externalities which need to be accounted for. Thus, an evaluation of a policy's efficiency must also include some assessment of technical and political risks and related social costs and benefits.

The costs and benefits of alternative policies may not be shared equally by all stakeholders since policies always have the potential to affect economic sectors and political jurisdictions in different ways. Consequently, the equity criterion attempts to measure the dislocational and distributional impacts of an action for conservation. Dorothy Newman and Dawn Day's study of energy consumption by American households suggests the value of applying this

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[69]Besides attitudinal and behavioral changes associated with an alternative, information utilization (improvements of public knowledge of energy saving techniques) is also closely tied to effectiveness considerations.

criterion--i.e., the need to consider who benefits, experiences the costs, and assumes risks.[70]

The essential point about evaluative criteria is that while many policymakers desire a "bottom line," no single evaluative criterion can provide an adequate summary of the potential impacts of alternative public policies. The combination of criteria to be used is determined both by what is being evaluated and the interests and values at stake. Although effectiveness and efficiency criteria are used most frequently, they are not always applicable and do not always provide an adequate basis for evaluation.[71] For example, dollars are not always an adequate indicator of how equitably a policy might distribute costs, risks, and benefits. And while it is possible to determine the dollar cost of some "technical fix" policy, the associated social costs often cannot be determined in a precise way. Of course, the same circumstance holds for evaluating benefits.

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[70]Dorothy K. Newman and Dawn Day, The American Energy Consumer (Cambridge, Mass.: Ballinger Publishing Co., 1975), p. 189. Recent work by the Congressional Budget Office has attempted to forecast equity impacts of proposed conservation measures, thereby providing an additional basis for using this criterion. See U.S., Congress, Congressional Budget Office, President Carter's Energy Proposals: A Perspective (Washington, D.C.: Government Printing Office, 1977), pp. 115-127.

[71]Irvin L. White et al., Energy from the West: Draft Policy Analysis Report (Washington, D.C.: U.S., Environmental Protection Agency, 1978), pp. 3-19 to 3-20.

Summary

Although the sequence of research tasks outlined in the preceding discussion guides the policy analysis, reporting of the results will be more integrative. That is, because the research questions for each step are by no means as neatly differentiated as the model and description suggest, results will synthesize information and be responsive to areas of duplication and overlap among issues. At any rate, since the framework is intended as a heuristic policy analysis device, and the focus is on the substantive problems and issues, modifications in light of the issue system in question are to be expected.

To recapitulate briefly, this chapter has shown that applied policy analysis challenges the process emphasis in public decision-making research by calling for the appraisal of policy objectives and evaluation of alternative policies for meeting specified objectives. The issue systems framework has been identified as a model to investigate decision-making and policy performance. Consequently, the framework should provide a useful means for analyzing energy conservation policymaking and policy results. As described above, the evaluation of conservation policy alternatives and implementing strategies is viewed as an attempt to summarize the costs, risks, and benefits of a range of options in order to better inform policymakers about the potential impacts of choosing one alternative over another. It is hoped that the results obtained can make a contribution both to our understanding of the issues associated with the need to reduce national energy demand and to the concepts and techniques of applied policy analysis.

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PART TWO

THE SOCIAL AND POLITICAL CONTEXT OF CONSERVATION PROBLEMS AND ISSUES

Part Two defines the social and political context within which conservation problems and issues are being addressed. Chapter III examines the substantive dimensions of energy conservation problems and issues by tracing the trends and events in society and factors in each of the major consuming sectors that have contributed, and continue to contribute, to the need for conservation. The context description continues in chapter IV with a review of the rationale for energy conservation as an integral part of national energy objectives. It delineates both public and elite perceptions of the energy use problem and formulates the "case" for conservation and conservation strategies as defined by key individuals and in a number of early energy research reports. Chapter V extends this phase of the research by describing the background and status of existing policies and programs. Chapters III, IV, and V therefore provide the basis for the identification of unresolved problems and issues and for the categorization of policy alternatives to be evaluated in Part Three.

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CHAPTER III

THE ENERGY CONSERVATION PROBLEM

Introduction

Interest in problems related to the consumption and conservation of natural resources is underpinned by rich tradition, from political, economic, and ecological perspectives.[1] Frank Smith, in The Politics of Conservation, noted that the emphasis in conservation problems and issues "shifts with the changing economy and the changing environment, but though there may be fluctuations, the importance of these problems will be even greater in the future than it has been in the past."[2] Smith's prediction in the mid-1960s was firmly based given the growing awareness of social and environmental costs associated with rapid industrial expansion and resource use in this country. Indeed, just a few years later the traditional conservation emphases --land, water, forests, and wildlife--had to expand to

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[1] For example, see John Rodman, "Four Forms of Ecological Consciousness, Part One: Resource Conservation--Economics and After," paper presented at the Annual Meeting of the American Political Science Association, Chicago, Illinois, September 2-5, 1976.

[2] New York, Pantheon Books, 1966, p. x.

include concern over the consumption and depletion of finite energy resources, especially petroleum and natural gas. In essence, this concern resulted from one central fact: demands for energy in the U.S. outstripped domestic supplies, which are heavily based on nonrenewable or depletable resources.

This chapter examines the substantive dimensions of energy conservation problems and issues by tracing the trends and events in society that were instrumental in causing energy demand to surpass supply, thereby giving impetus to the need for conservation. First, the historical components of the current U.S. energy supply/demand imbalance are described. This is followed by an identification and description of factors that have contributed to increasing energy use within each of the major consuming sectors. Although social changes and trends discussed for the residential and commercial, industrial, and transportation sectors help to explain why energy consumption became a problem, public attention focused more readily on the issues of energy use as a result of, first, regional and spot energy shortages, and second, the 1973 OPEC oil embargo. Thus, the final section of this chapter describes these events.

The underlying premise of this chapter is the contention that any subsequent attempt to analyze energy conservation policymaking and policy alternatives depends on this investigation into the substance of the problems and issues. In other words, the goal, as explained in chapter II, is to further understand the "environmental changes," trends and events, that influenced or determined the definition of energy conservation as a public policy issue.

Energy Supply and Demand

Energy supplies can be characterized as "inputs" into the U.S. economy in the form of primary fuels (petroleum, natural gas, and coal, including imports from other nations) or derivatives of these fuels (e.g., gasoline, butane, and propane), plus electricity from domestic hydro and nuclear power generation. Total energy consumption, on the other hand, consists of two components: "final demand," or the fuels and purchased electricity consumed directly by the residential and commercial, industrial, and transportation sectors; and energy that is "lost" in converting a primary energy source into electricity and transmitting this source from the power plant to the point of use.[3]

Since 1950 there has been a growing gap between U.S. energy production and consumption levels. An important reason for the energy market disparity has been the rapid growth of demand during a period when domestic production was declining. As shown in Figure III-1, energy consumption has consistently outpaced population growth since the industrial revolution. This fact, coupled with technical

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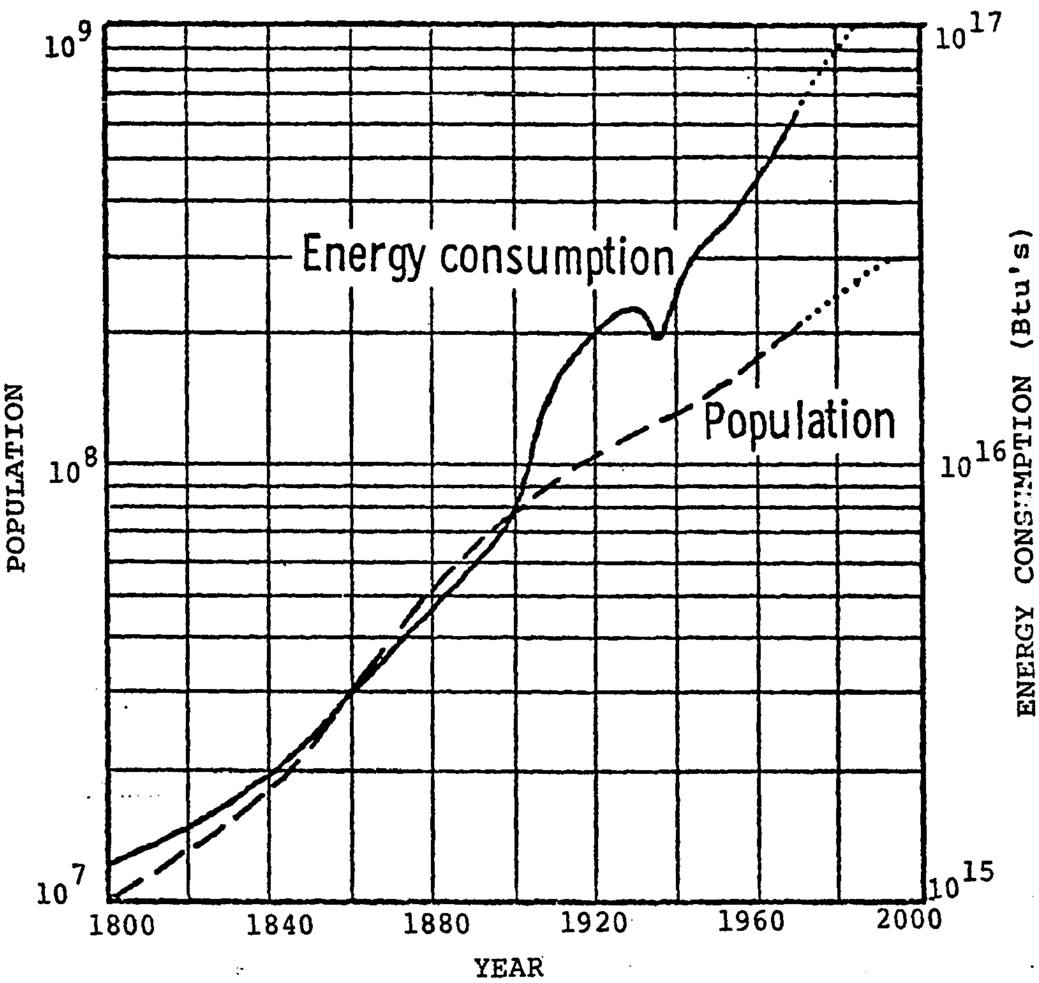
[3]Definitions adapted from Walter G. Dupree, Jr., and John S. Corsentino, United States Energy Through the Year 2000 (Revised) (Washington, D.C.: Government Printing Office, 1975), p. 3.

FIGURE III-1

ENERGY CONSUMPTION AND POPULATION GROWTH IN THE U.S.



SOURCE: Scientific American Editors, Energy and Power: A Scientific American Book (San Francisco: W. H. Freeman, 1971).

inefficiencies and rising energy use per capita during a period when energy was relatively inexpensive, has resulted in unprecedented levels of energy consumption. Today although the U.S. represents only six percent of the world's population, it consumes one-third of the energy used in the world.[4]

The Historical Record

The historical record for energy consumption in this country is shown in Table III-1. In all but five years since 1947, demand for energy has risen progressively each year. And four of the five years in which a decline was recorded were years of "lessened economic activity" as measured by gross national product (GNP).[5] More precisely, during the 1947-1973 period, total energy consumption more than doubled, from 33.0 to 74.7 quadrillion (10^{15}) Btu's. The combined effects of the 1973 OPEC embargo (and concurrent price increases for energy), a declining economy, and consecutively mild winters, resulted in total consumption dropping to 72.9 quadrillion Btu's in 1974 and declining again to 71.1 quadrillion Btu's in 1975. Prior to this, the last decline had come in 1954. Data for 1976 and 1977 indicate, however,

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[4]Earl Cook, "The Flow of Energy in an Industrial Society," Scientific American 224 (September 1971): 135.

[5]Dupree, Jr. and Corsentino, United States Energy Through the Year 200, p. 15.

TABLE III-1

U.S. ENERGY CONSUMPTION, QUADRILLION (10^{15})
BTU'S, 1947-1975

Year	Final Energy Demand	Losses	Total Energy Consumption
1947	29.2	3.8	33.0
1948	29.1	4.8	33.9
1949	27.3	4.2	31.5
1950	29.7	4.3	34.0
1951	32.1	4.7	36.8
1952	31.6	4.9	36.5
1953	32.6	5.0	37.6
1954	31.2	5.1	36.3
1955	34.3	5.4	39.7
1956	35.8	5.9	41.7
1957	35.6	6.1	41.7
1958	35.5	6.2	41.7
1959	36.4	6.7	43.1
1960	38.2	6.4	44.6
1961	38.7	6.6	45.3
1962	40.5	6.9	47.4
1963	42.0	7.3	49.3
1964	43.6	7.6	51.2
1965	45.3	8.0	53.3
1966	47.6	8.8	56.4
1967	49.4	8.9	58.3
1968	52.2	9.5	61.7
1969	54.4	10.6	6.50
1970	56.0	11.1	67.1
1971	57.0	11.7	68.7
1972	59.5	12.6	72.1
1973	61.3	13.4	74.7
1974	59.3	13.6	72.9
1975	57.5	13.6	71.1

SOURCE: U.S., Department of the Interior, Energy Perspectives 2 (Washington, D.C.: Government Printing Office, 1976), p. 206.

that substantial increases in domestic energy consumption are occurring once again.[6]

A better perspective of energy consumption in this country is gained by examining the magnitude of modern demand growth rates. Demand for energy grew at an average rate of 3.0 percent per year from 1950-1965, meaning that consumption would double every 23 years. Then, as shown in Table III-2, over the next eight years, 1965-1973, the average growth rate of total consumption increased considerably to 4.5 percent, a doubling time of just 16 years.

At the same time, domestic energy production grew at roughly 3.0 percent annually from 1950 to 1970, but has been at a virtual standstill since 1970.[7] Thus, as illustrated in Figure III-2, the progressive rise in consumption could not be equalled by production solely from U.S. sources.

Moreover, recent projections for the present through the year 2000 indicate an even greater disparity between domestic supply and demand growth rates unless measures are taken to adjust these trends.[8]

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[6] U.S., Federal Administration, Monthly Energy Review, September 1977, p. 1; and U.S., Department of Energy, Monthly Energy Review, December 1977, p. 1. Total consumption in 1976 was 74.0 quadrillion Btu's, almost equal to the highest year on record. Estimates for 1977 indicate consumption will surpass the 1973 peak, reaching 77.6 quadrillion Btu's.

[7] Energy Policy Project of the Ford Foundation, A Time to Choose, p. 5.

[8] Edison Electric Institute, Economic Growth in the Future (New York: McGraw-Hill, Inc., 1976); Energy Policy Project of the Ford Foundation, A Time to Choose; National

TABLE III-2

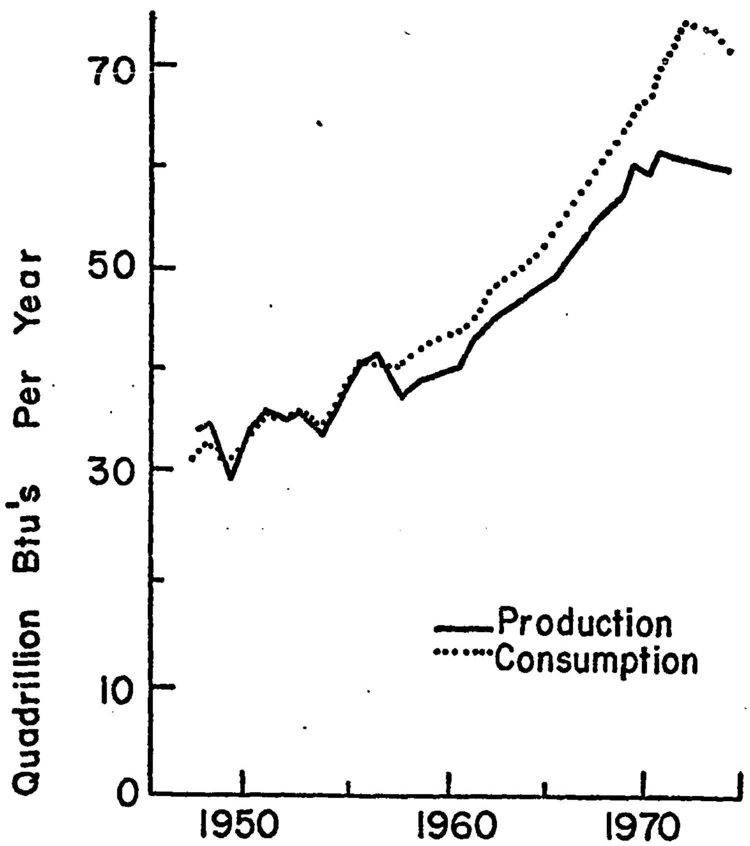
AVERAGE ANNUAL ENERGY GROWTH RATES, SELECTED PERIODS, 1950-1975 (Percent)

Period	Total Consumption	Final Demand
1950 - 1960	2.7	2.5
1960 - 1965	3.7	3.5
1965 - 1970	4.7	4.5
1970 - 1973	3.7	3.0
1950 - 1965	3.0	2.9
1950 - 1976	3.0	2.7
1965 - 1973	4.5	3.9
1965 - 1975	2.9	2.4

SOURCE: Calculated from data in U.S., Department of the Interior, Energy Perspectives 2 (Washington, D.C.: Government Printing Office, 1976), p. 207.

FIGURE III-2

TOTAL U.S. ENERGY PRODUCTION
AND CONSUMPTION, 1947-1975



SOURCE: Data from U.S., Department of the Interior, Energy Perspectives 2 (Washington, D.C.: Government Printing Office, 1976), p. 206.

Another indicator of our increasingly energy-intensive society is energy use per capita over the last 25 years. Total energy use per capita grew from 229.0 million (10^6) Btu's in 1947 to 246.8 million Btu's in 1960, depicting a rather slow average annual growth rate of 1.0 percent. But growth rates for energy use per person dramatically increased after 1960. For example, in sharp contrast to the above figures, the 1960-1965 average annual growth for energy use per person was 2.1 percent, and the 1965-1970 rate was 3.7 percent. These five-year trends are shown in Table III-3.

As in the case of total energy consumption, although per capita demand declined for two years in a row following the 1973 energy shortages and price increases, it is once again climbing at a substantial rate.

Thus, the magnitude of overall energy growth in the U.S. reflects the fact that the average consumer was using more energy each year. This rapid increase in energy consumption by individuals was induced by two related factors: declining relative prices of energy and rising real incomes for consumers. Looking at the 10-year period 1960-1970, while the wholesale price index for all commodities increased at an average rate of 1.5 percent per year, the wholesale

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Petroleum Council, U.S. Energy Outlook (Washington, D.C.: National Petroleum Council, 1972); and U.S., Federal Energy Administration, 1976 National Energy Outlook (Washington, D.C.: Government Printing Office, 1976). These forecasts and their policy implications are discussed in chapter IV.

TABLE III-3

PER CAPITA ENERGY USE AND GROWTH RATES,
FIVE-YEAR PERIODS, 1950-1975

Year	Population (millions)	Total Energy Consumption Per Capita (million Btu's)	Average Annual Growth Rate (percent)
1950	152.3	223.2	-
1955	165.9	239.3	1.4
1960	180.7	246.8	0.6
1965	194.3	274.3	2.1
1970	204.9	327.5	3.6
1975	213.4	338.0	0.6

SOURCE: Calculated from data in U.S., Department of the Interior, Energy Perspectives 2 (Washington, D.C.: Government Printing Office, 1976), p. 206.

price index for fuels and electricity rose an average of 1.0 percent per year.[9] In addition, energy prices increased at a slower rate than the per unit costs of labor during this same 10-year period.[10] In sum, while the real price of energy was growing, the price relative to all commodities and labor was declining. This trend continued for two more years. In 1973 the wholesale price index for energy grew at an average rate of 13.2 percent, whereas the index for all commodities grew at a slightly lower average rate of 13.1 percent. The effect of the oil embargo on energy prices was reflected in 1974 growth rates (an increase of 55.1 percent in the energy wholesale price index compared to 18.9 percent for all commodities.[11]

The period 1960-1970 was also one of rising incomes as U.S. economic activity rose every year except for 1970. For example, real per capita income (in constant 1958 dollars) increased as an average rate of 3.5 percent per year.[12] In combination, rising incomes and declining relative prices of energy had three "mutually reinforcing" effects on energy

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[9]U.S., Department of Commerce, The U.S. Fact Book, The American Almanac, the Statistical Abstract of the U.S. (New York: Grossett & Dunlap, 1976), p. 418.

[10]Bruce Hannon, "Energy Conservation and the Consumer," Science 189 (July 11, 1975): 96.

[11]The U.S. Fact Book, p. 416.

[12]Ibid., p. 383.

consumption.[13] First, declining relative prices of energy led to changes in production processes and techniques. Energy from fossil fuels was increasingly substituted for human labor.[14] Secondly, this substitution kept the costs of production from rising as high as they would have otherwise, thereby creating a favorable economic climate for energy-intensive, as compared to labor-intensive, products. Thirdly, because of lower relative prices of energy-intensive goods and services and rising per capita incomes, consumers began to spend more on energy-using commodities. Increasingly, the population became dependent on lifestyles based on the acquisition of such energy consuming products as automobiles, televisions, clothes dryers, dishwashers, air conditioners, disposable goods, and similar energy-intensive articles. And, as will be discussed below, in terms of energy requirements, many of the products currently available to consumers are less energy efficient than earlier counterparts, or have added luxury features that increase their energy use. This trend toward goods that use more energy holds equally for some types of services.

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[13] Thomas H. Tietenberg, Energy Planning and Policy (Lexington, Mass.: Lexington Books, 1976), pp. 14-15.

[14] This was especially true for agriculture and food production where between 1920 and 1950 the proportion of the U.S. population involved in agriculture decreased by one-half. It did so again by 1962, and again has declined by almost half since then. See Carol E. Steinhart and John S. Steinhart, Energy: Sources, Use and Role in Human Affairs (North Scituate, Mass.: Duxbury Press, 1974).

Up to this point, energy supplies and demands have been described in aggregate terms. Although this approach has merit for the purpose of introducing historical production-consumption trends and effects, it is less than complete. Energy technologies and utilization efficiencies differ among the residential and commercial, industrial, and transportation sectors. Likewise, the types and amounts of fuel in demand vary according to end uses. As with population, changing lifestyles, and energy prices, factors unique to each sector have influenced the course of supply and demand. The discussion below: (1) takes a detailed look at consumption trends and uses in each of the major energy consuming sectors, and (2) describes problems associated with supplying energy to meet these sectorial needs.

Energy Consumption by Sector[15]

Table III-4 shows that all sectors of the economy have substnatially increased their use of energy over the past 25 years. However, the rate of increase has varied

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[15]This discussion of energy use by sector is based in part on research undertaken by the author in conjunction with the Science and Public Policy Program, conducted under Contract Number EQAC034 with the Council on Environmental Quality, funded by the Atomic Energy Commission (now part of the Department of Energy (DOE)), Council on Environmental Quality, Department of the Interior, Bureau of Land Management, Environmental Protection Agency, Federal Energy Administration (now in DOE), and the Federal Power Commission (also now a part of DOE). See The University of Oklahoma, Science and Public Policy Program, Energy Alternatives: A Comparative Analysis (Washington, D.C.: Government Print-Office, 1975), pp. 13-1 to 13-45.

TABLE III-4

U.S. ENERGY CONSUMPTION BY ECONOMIC SECTORS
QUADRILLION (10^{15}) Btu's[a]

Year	Residential and Commercial	Industrial	Nonfuel Uses	Transportation	Final Demand[b]	Losses	Total Energy	Percent Lost
1950	8.1	11.9	1.0	8.6	29.7	4.3	34.0	13
1960	11.4	14.4	1.5	10.8	38.2	6.4	44.6	14
1970	17.0	19.8	2.9	16.4	56.0	11.1	67.1	17
1971	17.4	19.6	2.8	16.9	57.0	11.7	68.7	17
1972	18.1	20.0	3.1	17.9	59.5	12.4	71.9	17
1973	18.0	20.0	3.2	18.8	61.3	13.4	74.7	18
1974	17.6	20.2	3.2	18.3	59.3	13.6	72.9	19
1975	17.3	19.0	3.1	18.4	57.5	13.6	71.1	19
1976	18.8	21.2	(NA)	19.3	59.6	14.4	74.0	19

(NA) = Not available

SOURCE: U.S., Congress, House, Committee on Interstate and Foreign Commerce, and Senate, Committee on Energy and Natural Resources and the National Ocean Policy Study of the Committee on Commerce, Project Interdependence: U.S. and World Energy Outlook Through 1990, Committee Print (Washington, D.C.: Government Printing Office, 1977), p. 114.

[a]Data for residential and commercial, industrial, and transportation sectors are for direct energy use only. Losses due to the conversion, transmission, and distribution of electricity are not allocated to each sector.

[b]Lines may not add due to rounding.

among sectors such that shifts have occurred in their relative importance to the national total. Historically, the industrial sector has been the largest consuming sector, but recent increases have been going into the other sectors. Using final demand as the measure, in 1950 American industries used 40 percent of the nation's energy requirement for that year. By 1976 this share declined to approximately one-third of the total. On the other hand, transportation and residential and commercial use climbed from about one-fourth each to one-third during the same period.

A relatively few end uses within these sectors comprise a significant proportion of all energy used. For example, as indicated in Table III-5, residential and commercial space heating and cooling, industrial heat processes for manufacturing, and transportation fuel usage equal approximately three-fourths of all energy used. In recent times, changes within these end use categories have boosted the rate of sectorial consumption, contributing to the shifts noted above. By far two of the most important patterns have been the rising use of electricity for residential and commercial purposes, particularly space conditioning, and the large-scale commitment of national energy resources to a massive transportation system accompanied by a shift of people and goods to less energy-efficient ways of transport. Industrial use is refractory to such a generalizable pattern --i.e., the way energy is used obviously differs greatly

TABLE III-5

SIGNIFICANT ENERGY END USES, 1975[a]

Sector	Percent of Total
Transportation fuel	26.2
Space heating (residential, commercial)	17.6
Process steam (industrial)	16.0
Direct heat (industrial)	10.4
Electric drives (industrial)	8.2
Feedstocks, raw materisls (commercial, industrial, transportation)	5.1
Water heating (residential, commercial)	3.8
Air conditioning (residential, commercial)	3.3
Commercial lighting	2.6
Refrigeration (residential, commercial)	2.4
Cooking (residential, commercial)	1.1
Electrolytic processes (industrial)	1.1
Other	2.2
Total	100.0

SOURCE: Electric Power Research Institute, "R&D Status Report," EPRI Journal 2 (December 1977): 40.

[a]Total energy consumption in 1975 was approximately 71 quadrillion Btu's.

among industries. Even so, two facts about industrial energy consumption since 1950 are important: one, industry has used more energy each year (except 1975); and two, the amount of energy invested in a product has progressively declined. These features and others will be explored below.

Residential and Commercial

The residential and commercial sector consists of single- and multi-family dwelling units, and diverse commercial establishments such as office buildings, hotels, wholesale and retail stores, hospitals, schools, service stations, restaurants, and so forth. Energy use in residences is primarily a function of the number of households, size and technological characteristics of the home, number of persons, and number of appliances in the household.[16] During the recent past, the average annual growth rate of residential energy consumption has exceeded that for energy consumption in general.[17] This is due in part to population growth and energy-intensive lifestyles. These factors have contributed to a more widespread use of electricity consuming devices, particualrly for heating, air conditioning, clothes drying, refrigeration, lighting and assorted small

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[16]Dorothy K. Newman and Dawn Day, The American Energy Consumer (Cambridge, Mass.: Ballinger Publishing Co., 1975), p. xxv.

[17]Stanford Research Institute, Patterns of Energy Consumption in the United States (Washington, D.C.: Government Printing Office, 1972), p. 6.

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appliances. Table III-6 illustrates the role of these devices in energy consumption, and indicates the growth of appliance ownership over the 1960-1973 period.

In addition to these appliances, the growth in electric resistance heating is noteworthy. In 1974, 49 percent of the homes built were heated electrically, and 48 percent were centrally air conditioned.[18] This trend is compounded by the fact that houses are also increasing in size. For example, in 1960 only 16 percent of the houses built had seven or more rooms; this had risen to 22 percent by 1974.[19] All of these variables, more appliances, larger homes, and the widespread use of electric space conditioning, are bound to increase the future intensity of energy consumption in the American household.

Commercial energy uses are very similar to those within the home: space heating and cooling, appliances, cooking, and so on. About one-half of the energy demand is for space conditioning. Rising consumption in this sector reflects the expansion of commercial and service activities generally in the economy, which have outpaced industrial growth consistently over the last decade.[20] Significant

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[18]U.S., Department of Commerce, Statistical Abstract of the United States, 1975 (Washington, D.C.: Government Printing Office, 1975), p. 713.

[19]Ibid., p. 721.

[20]Energy Policy Project of the Ford Foundation, Exploring Energy Choices: A Preliminary Report (Washington, D.C.: Ford Foundation, 1974), p. 3.

TABLE III-6

HOUSEHOLD APPLIANCE OWNERSHIP AND AVERAGE ENERGY CONSUMPTION, 1960-1973

Appliances	Percent of Households 1960	1973	Annual Average Kilowatt-Hours Consumed[a]
Air conditioner (room or central	13	49	1,389[b]
Television			
Black and white	87	69	362
Color		56	502
Clothes dryer	17	48	993
Dishwasher	5	22	363
Freezer	(NA)	32	1,761
Refrigerator	86	80	1,217
Washing machine	75	69	103

SOURCE: Appliance ownership data are from U.S., Department of Commerce, Bureau of the Census, *The U.S. Fact Book, The American Almanac, The Statistical Abstract of the U.S.* (New York: Grosset & Dunlap, 1976), p. 406. Energy consumption figures for appliances are from Alvin Kaufman, Warren Farb and Barbara Daly, "U.S. Energy Demand Forecast, 1976-90," in *Project Interdependence: U.S. and World Energy Outlook through 1990*, Committee Print, ed. U.S., Congress, House, Committee on Interstate and Foreign Commerce, Subcommittee on Energy and Power; and Senate, Committee on Energy and Natural Resources and the National Ocean Policy Study of the Committee on Commerce (Washington, D.C.: Government Printing Office, 1977), p. 116.

[a]One Kilowatt-hour of electricity equals 3,413 Btu's.

[b]Room type.

increases in commercial energy consumption have been in air conditioning for buildings and other electricity uses (e.g., lighting, computers, elevators, office machines, and some electric heat).

Thus, one of the primary reasons for rising energy consumption in the residential and commercial sector is the growing use of electrictiy. In the 25-year period, 1950-1975, electricity demand in this sector increased close to sixfold. The effect of this on total U.S. energy consumption has been compounded by the leveling off of the efficiency with which power plants convert primary fuels to electricity. Between 1950 and 1975 the heat input required to produce one Kilowatt-hour (Kwh) of electrictiy declined at an average annual rate of 1.5 percent, but during the latter part of this time period, 1964-1975, it increased at a rate of 0.1 percent per year.[21]

While all energy conversions are more or less limited in theoretical efficiency by the "laws of thermodynamics," in the case of electrical power generation there are losses at the power plant and in transmission to the point of use. For example, in 1970 almost 10 percent of the country's useful "work" was done by electricity; however, producing that electricity accounted for 26 percent of the nation's total energy consumption.[22] The losses ended up as "wasted" energy--i.e.,

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[21]Kaufman, Farb, and Daly, "U.S. Energy Demand Forecast, 1976-90," in Project Interdependence, p. 115.

[22]Cook, "The Flow of Energy," p. 136.

waste heat released into the environment. Of course losses also occur when fuels such as natural gas and heating oil are directly burned. But the efficiency with which, for example, natural gas home furnaces use energy ranges from 60 to 80 percent, compared to 32 percent for the electric power plant.[23]

The implications of these efficiency considerations can best be summarized by the following three illustrations. First, as noted above, electric air conditioning is one of the fastest growing areas of energy use. Because of the typical inefficiency of many cooling units, air conditioning accounted for almost 16 percent of the total increase in electric power from 1960 to 1970.[24] Secondly, if present electricity growth rates continue unabated, demand could almost double by 1990, from 2 trillion Kwh to 3.8 trillion. Finally, a distinguishing characteristic of an affluent, energy-intensive society is the total amount of energy consumed by the residential and commercial sector compared to that used by the industrial sector. As shown in Figure III-3, increasing electricity use reveals an interesting convergence of residential and commercial use and industrial consumption. In fact, if conversion losses are allocated to the two sectors, in 1975 for the first time in our history, industrial energy use actually fell slightly below that of the other

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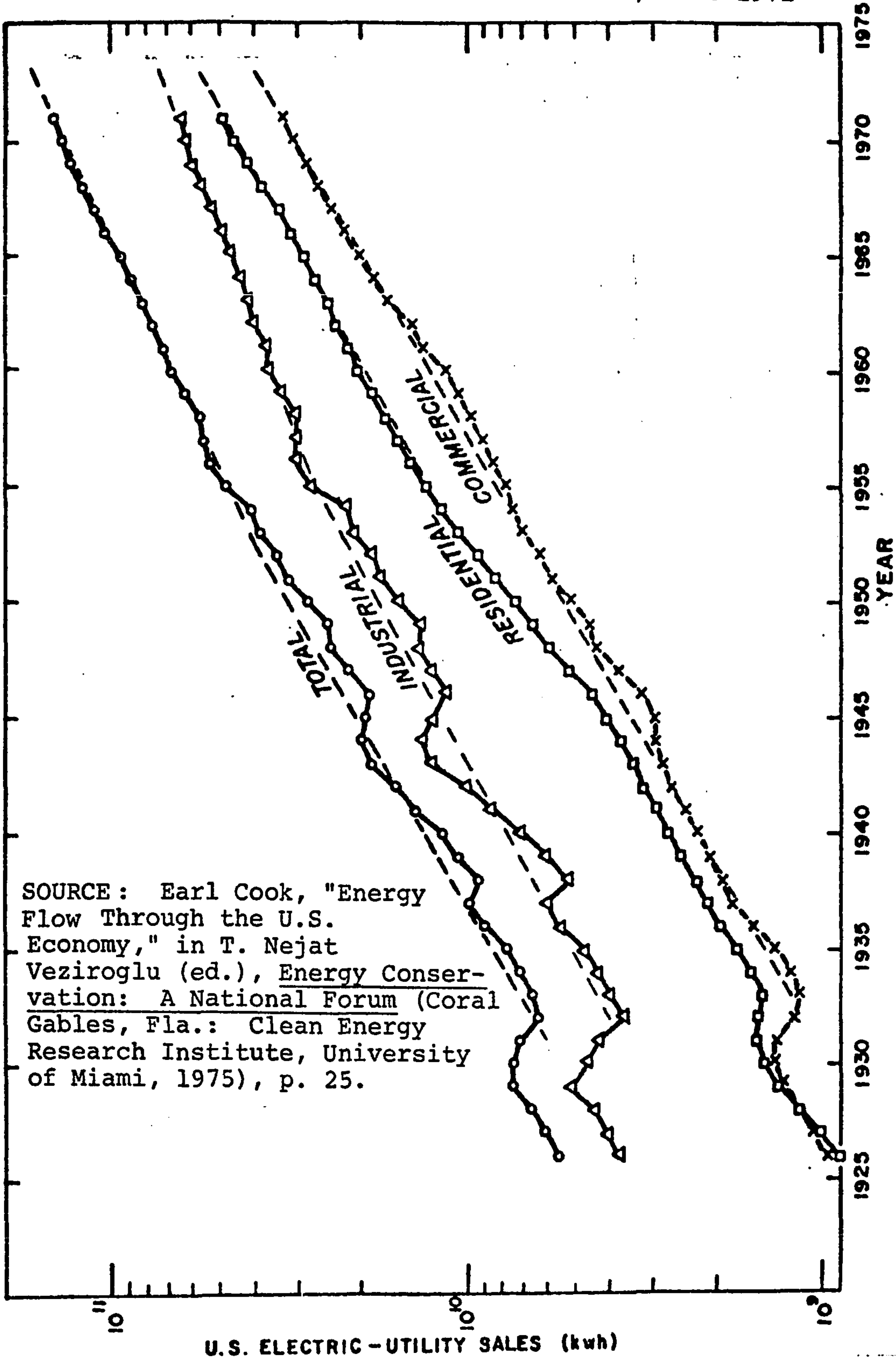
[23]Stanford Research Institute, Patterns of Energy Consumption in the United States, p. 153.

[24]Cook, "The Flow of Energy," pp. 137-138.

FIGURE III-3: ELECTRICITY USE BY SECTOR, 1926-1971



SOURCE: Earl Cook, "Energy Flow Through the U.S. Economy," in T. Nejat Veziroglu (ed.), Energy Conservation: A National Forum (Coral Gables, Fla.: Clean Energy Research Institute, University of Miami, 1975), p. 25.

sector (26.08 quadrillion Btu's compared to 26.11 quadrillion Btu's).[25]

Industrial

Historically, the industrial sector has been the largest consuming sector in the U.S. About one-half of the energy is used in industrial thermal (heat) processes alone (e.g., in the direct burning of fuels or the manufacture of steam), or about the same amount as that required to supply all residential energy needs. Manufacturing consumes approximately 85 percent of industrial energy and the remainder is equally shared by agriculture and mining.

Industry uses energy in extremely diverse ways, but the top six manufacturing industries--chemicals and allied products; primary metal products (particularly steel and aluminum); petroleum and coal refined products; paper and allied products; stone, clay, and glass products; and food processing--account for about 80 percent of the total demand.[26] Although the specific fuels and amounts used by these six groups varies considerably, natural gas has been the largest (about 40 percent) and most rapidly growing

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[25]U.S., Department of Energy, Monthly Energy Review, December 1977, p. 47.

[26]Braddock, Dunn, and McDonald, Inc., First Interim Technical Status Report, Study of Alternative Strategies and Methods of Conserving Energy (Vienna, Va.: Braddock, Dunn, and McDonald, Inc., 1974), p. III-10. See also, The Conference Board, Energy Consumption in Manufacturing (Cambridge, Mass.: Ballinger Publishing Co., 1974).

energy source consumed directly in industrial plants, followed by coal and coke (27 percent), electricity (22 percent), and petroleum (11 percent). Electricity and coal are both expected to replace natural gas as the growth source of some industrial fuels in the future.

As depicted in Table III-7, the top six industrial groups (on the basis of annual energy consumption) also include the top five energy-intensive groups, identified by the ratio of input energy for each dollar of production goods shipped out. Among the largest industrial energy users, only food processing is not energy intensive.[27]

Industrial energy demands also include small amounts of energy for space heating, air conditioning, water heating, lighting, and so on. As noted, half the energy used in this sector is for heating processes. In 1975, process steam accounted for 16 percent of total U.S. energy consumption. Direct heat--heat obtained when fuel is burned directly in an industrial process, for example, in the production of steel or cement--comprised almost 11 percent of the nation's energy requirement. Much of the remaining demand in this sector is for mechanical energy in the form of electric drives, or motors, electrolysis to manufacture primary metals, and for "non-energy" purposes (e.g., raw materials or feedstocks for manufacturing processes).

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[27]Energy Policy Project of the Ford Foundation, Exploring Energy Choices, p. 5.

TABLE III-7

ENERGY INTENSIVENESS OF FIVE MANUFACTURING GROUPS, 1973

Industrial Group	Energy Intensiveness[a]
Stone, Clay and Glass Products	.090
Petroleum and Coal Products	.072
Chemicals and Allied Products	.060
Paper and Allied Products	.063
Primary Metals	.052

SOURCE: Braddock, Dunn, and McDonald, Inc., First Interim Technical Status Report: Study of Alternative Strategies and Methods of Conserving Energy (Vienna, Va.: Braddock, Dunn, and McDonald, Inc., 1974), p. III-12. Based on data from U.S., Department of Commerce, Annual Survey of Manufactures (Washington, D.C.: Government Printing Office, 1973).

[a]Total energy consumed for each dollar of production goods shipped out.

Recent increases in industrial energy use are, as alluded to in the discussion of aggregate production-consumption trends, the result of automation and the rising ratio of worker's wages to the cost of electricity and electrical machinery. Bruce Hannon suggests that the replacement of labor by tools and energy gave the industrialist a means to better control and predict production costs and profits. However, he further points out that the transition from labor-intensive production processes to energy-intensive processes has its disadvantages as well--i.e., "capital can be recycled, but, of course, energy cannot. Labor cannot only be recycled, it can be multiplied."[28]

However, in this regard, it should be recognized that the amount of energy invested in a manufactured product has consistently declined. That is, savings in energy use have been realized by the manufacturing industries in the past. Energy use per unit of manufactured product has dropped an average of 1.6 percent from 1954 to 1967, and approximately 2.0 percent since then.[29] As a result, total manufacturing output rose 87 percent during this same period, while total energy use rose only 53 percent. A recent report to the Energy Policy Project of the Ford Foundation identified several reasons that contributed to the decline in the energy-output ratio for manufacturing, among them:

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[28]Hannon, "Energy Conservation and the Consumer," p. 96.

[29]Norman Metzger, Energy: The Continuing Crisis (New York: Thomas Y. Crowell Co., 1977), p. 194.

1. The long-term historical trend away from energy-intensive industries such as basic materials production to less energy-intensive ones such as fabrication.

2. Capital investment in new technologies and management that resulted in more efficient production processes and/or "housekeeping" changes to reduce energy waste.

3. Increasing use of Btu "accounting" in manufacturing--i.e., more careful tracking of all energy-bearing materials that enter a plant in order to determine where energy is used.[30]

A last point about industry and energy is that what now appears efficient in an economic sense, may not have appeared so in the past. Past industrial decisons that led to more energy use per unit of output, or to the use of fossil fuels that are now in short supply, such as natural gas, were efficient as designed on the basis of conditions that prevailed during the 1950s to the late 1960s. As stated in The Conference Board's report:

> When energy prices were constant or falling relative to the general price level, and that pattern was expected to continue into the future, machinery was purchased and plants built in order to utilize processes that now may be inappropriate.[31]

Events of the 1970s sharply revised industry expectations about future energy prices and the relation of energy price to other prices. Whether intentional or unintentional, manufacturing companies seem to have been more responsive to this

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[30] Conference Board, Energy Consumption in Manufacturing, pp. 2-3.

[31] Ibid., p. 10.

changing reality in energy than have the other two sectors. This is highlighted especially when recent actions to reduce waste are compared to activities in the transportation sec-sector.

Transportion

The transportation sector accounts for a significant percentage of total U.S. energy consumption,[32] averaging 24-25 percent since 1950. Like total energy consumption in this country, transportation energy requirements have been growing exponentially. Figure III-4 shows that requirements almost doubled from 1950 to 1970 (from 8.7 quadrillion Btu's to 15.8 quadrillion Btu's). It is instructive to note that 1974 transportation energy use, partly in reaction to the 1973 oil embargo, was below that of 1973. In 1975 demand was up by a relatively small amount, but 1976 saw energy use in this sector increase by 5.0 percent (up to 19.3 quadrillion Btu's), indicating an upward trend that continued throughout 1977.

Most of the 1950-1970 increase was due to the explosion of the number of automobiles, which grew twice as fast as the human population in the 10 years spanning 1960-1970, and the rapid expansion of the country's jet aircraft services. Thus, primary fuel demands in this sector have

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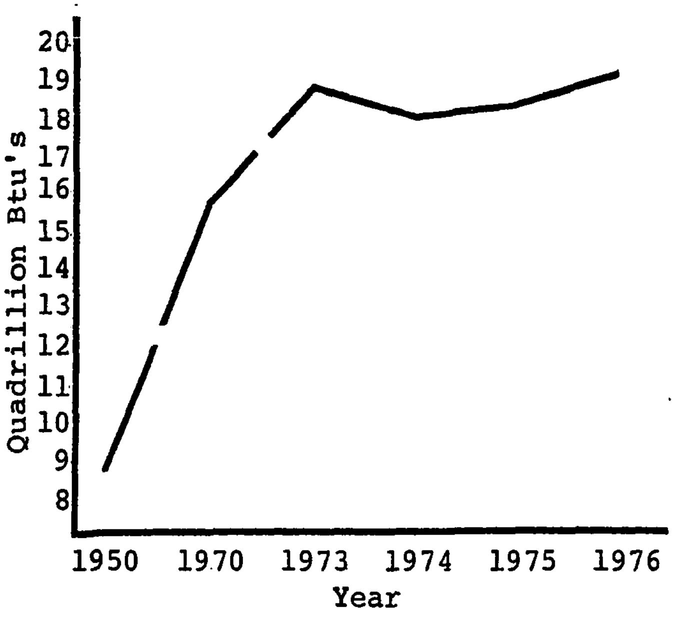
[32]This description does not deal with the energy required to build transportation systems, only with the energy used to operate them.

FIGURE III-4

ENERGY CONSUMPTION BY THE TRANSPORTATION SECTOR, 1950-1976



SOURCE: Data from U.S., Department of the Interior, Energy Perspectives 2 (Washington, D.C.: Government Printing Office, 1976), p. 75.

been in the form of petroleum products used in cars, trucks, and aircraft. In fact, transportation accounts for more than half of the total U.S. petroleum use, contributing significantly to our dependence on petroleum imports.[33] Table III-8 gives a breakdown by fuel types of the total consumption of energy for transportation. Approximately 50 percent of this fuel went for urban and intercity automobile transportation, trucks were second, and domestic/international air travel third. Growth projections suggest that pressure on petroleum reserves will continue from these three uses.[34]

While due primarily to growth in traffic levels and miles travelled, there are other reasons for rising energy demand in the transportation sector. For example, two of the most significant factors are recent shifts to less energy-efficient ways of moving freight (shifting freight from rail to truck and air), and declining energy efficiency for individual modes of travel.[35] Since a basic challenge in this respect is what to do about the automobile and

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[33] Stanford Research Institute, Patterns of Energy Consumption in the United States, p. B-8; and Hittman Associates, Inc., Environmental Impacts, Efficiency, and Cost of Energy Supply and End Use, Vol. I (Columbia, Md.: Hittman Associates, Inc., 1974), Table 30.

[34] U.S., Office of Emergency Preparedness, The Potential for Energy Conservation (Washington, D.C.: Government Printing Office, 1972), p. 14.

[35] Eric Hirst and John C. Moyers, "Efficiency of Energy Use in the United States," Science 179 (March 30, 1973): 1299.

TABLE III-8

END USE OF TRANSPORTATION ENERGY, 1970

Use	Percent of Total Transportation Energy
Automobile	52.3
Trucks	21.8
Aircraft	9.9
Military/Government	4.5
Ships and Barges	4.1
Rail	3.7
Feedstocks	1.0
Buses	0.9
Other	1.8
Total	100.0

SOURCE: Calculated from data in Hittman Associates, Inc., Environmental Impacts, Efficiency, and Cost of Energy Supply and End Use, Final Report, Vol. 1 (Columbia, Md.: Hittman Associated, Inc., 1974), Table 30.

gasoline consumption, the remainder of this discussion will focus largely on this end use.

The largest single energy consumer in this sector is by far the passenger car. Eight out of 10 American households presently own at least one car, and three in 10 have two or more cars.[36] Increasing auto use is related to rising affluence, suburb development, and shifting employment patterns. In many cases, access to a private car is considered a basic necessity. In essence, the automobile is very much a part of the American lifestyle, reflecting mobility and independence. It offers distinct advantages over competing ways of travel, such as privacy, speed, personal comfort, and freedom to choose one's own route of travel. As a consequence, consumers have tended to ignore many of the energy tradeoffs involved in their transportation decisions.

Trends in ownership and use are exacerbated by the fact that most autos are presently heavy, high-powered, and inefficient. Calculations for overall vehicle efficiency show a decline from 12.4 miles per gallon (mpg) in 1960 to 11.9 mpg in 1973. During this same period, passenger car efficiency alone fell eight percent, from 14.5 mpg to 13.3. And while efficiency was declining, vehicle miles driven

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[36] Newman and Day, The American Energy Consumer, p. 69.

rose from 719 billion in 1960 to 1.3 trillion in 1973, an increase of 82 percent.[37]

Until recently, the primary reasons for declining passenger car efficiency were steady increases in engine displacement (from six-cylinder engines to larger V-8's), weight, and average operating speed, in conjunction with the widespread introduction of energy consuming options such as air conditioners, power steering, and automatic transmissions (see Table III-9).[38] The recent imposition of the national 55-miles per hour (mph) limit has somewhat reduced the average speed and Environmental Protection Agency emission standards have caused some reduction in engine size. However, the installation of pollution abatement equipment and the saturation of power accessories on larger cars continues to affect average fuel economy.

All of the above factors--joined with low average car occupancy (one passenger for urban use, two passenger for average use),[39] the growing use of cars for short distance trips, and projections for total travel over the next

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[37] Statistical Abstract of the U.S., p. 575.

[38] Eric Hirst and Robert Herendeen, Total Energy Demand for Automobiles (New York: Society of Automotive Engineers, 1973). Reprinted in U.S., Senate, Committee on Interior and Insular Affairs, Energy Conservation and S. 2176, Hearings (Washington, D.C.: Government Printing Office, 1974), pp. 970-976.

[39] See Richard A. Rice, "Systems Energy and Future Transportation," Technology Review 74 (January 1972): 31-37.

TABLE III-9

PERCENT OF CARS EQUIPPED WITH SELECTED ACCESSORIES, 1960-1974

Accessories	Percent of Cars Produced 1960	1974
Air conditioning	7	67
Automatic transmission	72	90
Power steering	39	83
V-8 engine	57	68

SOURCE: U.S., Department of Commerce, Statistical Abstract of the U.S. (Washington, D.C.: Government Printing Office, 1975), p. 576.

decade--have not only increased petroleum consumption, but also contributed significantly to local air pollution and traffic management problems. Some of these conditions may be relieved by a shift to smaller, lighter, and more efficient autos, but it seems reasonable to assume that: (1) travel by car will increase, and (2) pressures on petroleum supplies will cause the per gallon price of gasoline to continue rising.

Problems of Supply

Interaction of the elements already identified with a number of domestic energy supply problems is so great that which is cause and which is effect is not always obvious. Yet rapidly expanding demand explains only one side of the U.S. energy gap. The 1973 "energy crisis" was as much a collision of trends and events on both sides of the energy supply and demand system as it was a direct result of the decisions made by the Organization of Petroleum Exporting Countries (OPEC). To obtain a more complete perspective of the energy conservation problem, some of the problems related to producing the energy to meet the nation's growing needs must be examined.

Growing Dependence on Foreign Energy Resources

Each energy resource has its own characteristics and consumption history. America's expanding economy has gone through what has been characterized as three eras in terms of its use of energy resources: wood era (1850s), coal era (1900s), oil and natural gas era (1950s to present). Table III-10 shows that wood fuel was predominant until 1900 when it was replaced by coal. Coal remained the primary fuel until around 1950 when consumers began to use petroleum fuels in substantial amounts. The switch from coal was not caused by a shortage since coal was and still is our most abundant fossil fuel, but by the economic and technological attractions of oil and natural gas. Emergence of these two fuels as the primary forms of energy resulted from the fact that the two are frequently found together in the same geologic formation; they are easier to extraact, transport, and burn; both are cleaner, more versatile; and initially they were cheaper. In addition, the 1960s prices of coal reinforced this substitution process.

By 1973, coal's share of the energy supply picture had fallen to about 18 percent, while oil and natural gas together had soared to 77 percent. This displacement was further spurred by the growth of the automobile industry, increasing demand for gasoline, and technological advances in industrial processes.[40]

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[40]See Charles A. Berg, "Process Innovation and Changes in Industrial Energy Use," Science 199 (February 10, 1978): 608-614, for a discussion of how important technological advances in basic industrial process, such as glass-making, cementmaking, and steelmaking, may have been more important in fuel switching from wood to coal and similarly from coal to oil than the relative prices of the resources.

TABLE III-10

CHANGING PATTERNS OF ENERGY RESOURCE USE IN THE U.S. FOR SELECTED YEARS, 1850-1973

Resource Era	Year	Fuel and Composition			
Wood	1850	Wood	91%		= 100%
		Coal	9		
Coal	1900	Coal	73		= 100%
		Wood	18		
		Other[a]	9		
Oil and Natural Gas	1950	Oil	40	= 58	= 100%
		Gas	18		
		Coal	38		
		Hydro-power	5		
Oil and Natural Gas	1973	Oil	46	= 77	= 100%
		Gas	31		
		Coal	18		
		Hydro-power	4		
		Nuclear	1		

SOURCE: Compiled from data in G. Tyler Miller, Jr., Energy and Environment: Four Energy Crises (Belmont, Calif.: Wadsworth Publishing Co., Inc., 1975).

[a]Primarily hydropower.

More importantly, by 1970 the combination of increasing demand, as described in the preceding sectorial descriptions, and the growing role of oil in the energy market outstripped domestic production capabilities. In fact, the early 1950s signaled the end of the U.S. role as an exporter of oil. Almost all of the increase in energy consumption after 1970 was met by crude oil and refined petroleum products imports. For example, in 1960 oil imports supplied 19 percent of our consumption of petroleum products. This figure had reached 38 percent by September of 1974.[41] Briefly then, energy consumption was rising, the nation's limited fuel reserves were being depleted, and as a result, the U.S. was becoming more dependent on foreign oil supplies.[42]

The prospect of reliance on foreign markets for fuels was seen as a threat to national security. Opponents of the trend feared the U.S. was opening itself to political blackmail since the oil nations of the Middle East could choose

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[41] Energy Policy Project of the Ford Foundation, A Time to Choose, p. 5.

[42] Increasing dependence on foreign imports can be explained partly by government policy. Following World War I, the U.S., fearing the exhaustion of domestic reserves, adopted: (1) a program to exploit oil reserves in other parts of the world, and (2) policies to artificially hold down domestic production rates. See further, Edward H. Shaffer, The Oil Import Program of the United States: An Evaluation (New York: Praeger, 1968); and Stephen L. McDonald, Petroleum Conservation in the United States: An Economic Analysis (Baltimore: Johns Hopkins Press for the Resources for the Future, 1971).

to "close the valve" at any time, thereby threatening the U.S. economy.[43] Equally threatening was the prospect of a mushrooming balance-of-payments deficit due to foreign oil purchases.[44] Petroleum imports which cost $3.7 billion in 1971, cost $42 billion in 1977. And even though published estimates vary widely, one source projected that the U.S. could be importing about 17 million barrels of oil a day by 1985 compared to only six million barrels per day in 1973.[45]

Early Warnings of Impending Supply Problems

Many energy supply problems are closely related to the larger energy and environment issues that emerged during the 1960s. Long before the advent of the "energy crisis," per se, public attention had settled on a crisis of another sort--the "environmental crisis."[46] Declining supplies of

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[43]Joseph A. Yager et al., Energy and U.S. Foreign Policy (Cambridge: Ballinger Publishing Co., 1974), p. 5.

[44]The 1977 trade deficit in fact rose to a record $26.7 billion, four times larger than the previous record deficit set in 1972. Imports of foreign oil were a major cause, costing $42.1 billion, an increase of $10 billion over 1976. The growing import-export imbalance is considered by some to be a chief reason for the U.S. dollar's decline on world money markets. See "Deficit Hits $26 Billion," The Daily Oklahoman, January 31, 1978.

[45]U.S., Congress, Office of Technology Assessment, "Background Paper for OTA Energy Policy Analysis," paper prepared for the OTA review of President Carter's National Energy Plan, Washington, D.C., May 1977. (Mimeographed.)

[46]For an excellent summary of how and why the environment and ecology became a major concern of public policy, see Lynton Keith Caldwell, Environment: A Challenge to

energy can be linked to components of this prior concern. One investigator of energy policy issues aptly summarized this link as follows:

> As a society we appear schzoid. While on the one hand we consume and demand more and more energy, on the other we manifest great public anxiety concerning the environmental aspects of our consumption.[47]

Peak years for public attention on the environment were 1969 and 1970. In December 1969, Congress passed the National Environmental Policy Act (NEPA)[48] and in 1970, the Clean Air Act Amendments.[49] NEPA required federal agencies to issue an "environmental impact statement" (EIS) on "major federal actions significantly affecting the quality of the human environment." Consequently, the Act established the general substance of environmental policy for the nation. Its provisions for interagency and public review and comment have had an impact on power plant siting, outer continental shelf oil and gas development, and on the Alaska pipeline, to cite only a few examples.

The "highpoint of harmony" on the issue of environmental protection was marked by the celebration of "Earth

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Modern Society (New York: Anchor Books, 1971); and Barry Commoner, The Closing Circle: Nature, Man, and Technology (New York: Alfred A. Knopf, 1971).

[47]Irvin L. White, "Energy Policy-Making: Limitations of a Conceptual Model," in The Energy Crisis, eds. Richard S. Lewis and Bernard I. Spinrad (Chicago: Educational Foundation for Nuclear Science, 1972), p. 81.

[48]Pub. L. 91-190.

[49]Pub. L. 91-604.

Day"--originally suggested by Senator Gaylord Nelson (D Wis.) --on April 22, 1970. This day was observed by millions of Americans through such activities as environmental teach-ins, anti-pollution protests, and a variety of clean-up projects. Congress adjourned for the day as members addressed "Earth Day" rallies across the country.[50]

In terms of its interrelationship with energy supplies, increased environmental consciousness and regulation forced cutbacks in the use of certain polluting fuels and blocked short-term efforts to relieve the widening energy gap by bringing new energy facilities on line. For example, stringent air quality regulations limited the use of high-sulfur eastern coal and oil. Efforts to reduce sulfur oxide emissions caused many industries to switch to burning clean natural gas, rather than internalize the cost of cleaning up "dirty" fuels.[51] This substitution was especially significant for many electric generating plants. As gas supplies became tighter, many industries and power plants changed over to oil (low-sulfur heating oil) to meet the imposed air quality regulations. These last shifts, as will be shown below, probably contributed substantially to the heating oil shortages experienced by residential and commercial customers

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[50] Congressional Quarterly, Inc., Energy Crisis in America (Washington, D.C.: Congressional Quarterly, Inc., 1973), p. 1. See also, Environmental Action, Earth Day: The Beginning (New York: Bantam Books, 1970).

[51] This also contributed to the declining role of coal as a power plant fuel in the early 1970s.

in the late fall of 1972. As pointed out by John Fisher, this "switch by northeast utilities increased the demand for petroleum and for refining capacity beyond that which had been anticipated by the petroleum industry who--along with most others in industry--were taken unaware by the environmental movement."[52]

Another indicator of potential supply problems comes to light if one examines oil and gas exploration activity and drilling trends over the recent past. After a sharply rising trend that began in 1948 and continued through 1956, by 1972 drilling activity measured in well completions had declined to about the 1945 level.[53] Although gas drilling activities dramatically increased in 1973, the turn-around was not matched in oil drilling.

In addition to the above circumstances, potential supplies from outer continental shelf (OCS) lands received a setback from a series of tanker accidents and oil spills from Santa Barbara, California, and Louisiana oil wells. These accidents served as a catalyst for environmentalists

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[52]John C. Fisher, Energy Crisis in Perspective (New York: Wiley-Interscience, 1974), p. 34.

[53]In 1945, according to industry figures, 24,666 oil and gas wells were completed in the U.S. See American Petroleum Institute, Petroleum Facts and Figures (Washington, D.C.: American Petroleum Institute, 1971), p. 24. In 1972, API estimates show 27,291 wells completed. See Quarterly Review of Drilling Statistics for the United States 6 (February 1973): 15.

who opposed further offshore exploration and development.[54] Similarly, the development of the Northern Alaska oil field was temporarily halted due to environmentalist opposition regarding construction of the trans-Alaska pipeline system (TAPS). Blocking or at least impeding the development of offshore and North slope oil and gas had a substantial impact on prospective supplies. While not intended as an evaluation of environmental objections, one study points out that those two sources could have contributed substantially more than 10 percent of demand, or more than a third of 1973 U.S. oil imports had they come into production as first expected.[55]

There are other energy supply problems which, for our purposes, will be only briefly considered. As shown in Table III-11, U.S. crude oil capacity at refineries had not kept pace with demand. The reasons for this are numerous and complex--i.e., import limitations, suspension of the investment tax credit, tax advantages for location offshore, and rising difficulties in obtaining low-sulfur oil which most U.S. refineries are built to process. It is sufficient to note here that the limited expansion in refinery capacity has since the 1960s contributed to the rising dependence on product imports, a topic already discussed.

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[54]Don E. Kash and Irvin L. White et al., Energy Under the Oceans: A Technology Assessment of Outer Continental Shelf Oil and Gas Operations (Norman: University of Oklahoma Press, 1973), pp. 10-12.

[55]Hans H. Landsberg et al., Energy and the Social Sciences: An Examination of Research Needs (Washington, D.C.: Resources for the Future, Inc., 1974), p. 45.

TABLE III-11

U.S. CRUDE OIL CAPACITY AT REFINERIES FOR SELECTED YEARS, 1950-1973

Year	Capacity (thousand barrels per day)	Annual Percentage Change
1950	6,696	--
1955	8,421	4.7
1960	9,901	3.3
1965	10,775	1.7
1966	10,493	-2.6
1967	10,760	2.5
1968	11,533	7.2
1969	11,740	1.8
1970	12,074	2.8
1971	13,020	7.8
1972	13,437	3.2
1973	13,775	2.5

SOURCE: Hans H. Landsberg et al., Energy and the Social Sciences (Washington, D.C.: Resources for the Future, Inc., 1974), p. 49. Based on data from U.S., Department of the Interior, Bureau of Mines, Minerals Yearbook (Washington, D.C.: U.S., Department of the Interior, successive editions); and U.S., Department of the Interior, Bureau of Mines, "Mineral Industry Surveys," newsletter.

Also, hydroelectric power (water power) which had been used so successfully in regions of the U.S., such as the the Tennessee Valley, was declining in terms of its share of overall national supply. By 1960, most of the hydropower sources that were economically feasible had already been harnessed. In 1940, these sources supplied about 30 percent of the total electrical energy supply used in the U.S.[56] Although the nation's hydroelectric generating capacity has expanded since 1940, its role in relation to other energy sources fell to only 15 percent of the installed capacity in 1971.[57] Part of this was due to heightened levels of opposition to the building of new dams and generating facilities expressed by groups concerned with fish and wildlife conservation and outdoor recreation. This opposition in the 1960s and 1970s, in conjunction with the limited availability of feasible dam sites, contributed to the declining relative importance of hydropower in the overall energy picture.

Finally, nuclear plants did not measure up to early expectations. With the creation of the Atomic Energy Commission following World War II, plans were made to construct numerous nuclear-fueled power plants in the U.S., but trouble appeared in several forms. Environmentalists were

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[56] James J. Doland, Hydro Power Engineering (New York: The Ronald Press, 1954), p. 5.

[57] U.S., Atomic Energy Commission, Draft Environmental Impact Statement: Liquid Metal Fast Breeder Reactor Program, Vol. 4 (Washington, D.C.: Government Printing Office, 1974), p. A.3-3.

vocal in their concern over: (1) routine as well as accidental radiation emission levels, (2) the management of disposed plutonium waste materials, (3) the thermal pollution of lakes and rivers, and (4) potential large-scale disasters (e.g., plant explosions). But the environmentalists were only a part of a much more complex problem. The nuclear industry was from the outset plagued with unsuspected technical problems, cost overruns, inflation, and other problems endemic to a new industrial venture, such as worker strikes, delays in delivery of critical components, and other similar time-consuming delays. These problems were compounded by bureaucratic-organizational issues such as the government-industry relationship, AEC's licensing process, and the multiplicity of agencies involved in regulating the nuclear industry.[58] Although nuclear power seemed ideally to have the capacity for an almost limitless energy production capability, constraints like the above significantly clouded its future. As noted by Metzger: "Whatever the reason, by 1971 the utilities were short twenty-one plants representing 16,000 megawatts of unavailable power."[59]

While the above conditions can be generally categorized as "environmental changes" that forced recognition of a problem, public attention focused more readily on the

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[58] Arthur D. Little, Inc., Energy Policy Issues for the United States during the Seventies (New York: Engineers Joint Council, 1971), p. 20.

[59] Metzger, Energy, p. 30.

energy problem through a series of events that hinted of impending trouble. The early warning signs were essentially regional and seasonal. For example, as early as 1965, Northeasterners faced the prospects of periodic voltage reductions and load shedding in the form of brownouts or blackouts (though none as drastic as the New York power failure of November, 1965). Fearing they could not meet increased demands, a number of gas companies began refusing to connect new residential customers. In 1964, the Oregon Public Utility Commission warned electric and natural gas utilities in the state against "imprudent statements" for their products.[60] An Oregon utilities commissioner stated: "There appears to be no reason for gas utilities to promote sales that will increase peak loads in the face of such a bleak supply situation." However, some companies in other parts of the U.S. where shortages were either nonexistent or not so acute indicated they were still seeking new residential and commercial customers.

The next consumers affected were oil customers. During the winter of 1970, a number of areas across the Northeast and Middle West prepared for the possibility of heating fuel shortages due to a potentially inadequate supply of petroleum derivatives.[61] Then in an unprecedented crisis

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[60]"Power Shortage Leads to Ad Cut," New York Times, December 27, 1970.

[61]Wayne King, "Worse Shortage of Heating Fuels Feared, Some Urge Federal Action to Provide Relief," New York Times, September 28, 1970.

of wintertime electric power supplies, the northern U.S. was hit by 19 voltage reductions in a span of just 21 days during January and February of 1971.[62] According to Federal Power Commission (FPC) data, the crisis began in New England on January 14 and grew until it reached as far south as Virginia and as far west as Chicago. By February 4, power cutbacks had affected an estimated 50 million persons. FPC Commissioner John A. Carver, Jr., claimed: The way our demand for energy is growing faster than our ability to supply that energy, any year we don't have a problem will be a lucky year."[63]

The Nation's Energy Crisis

In the late Fall of 1972, shortages of heating oil prompted schools and other public buildings to close, adding to the growing number of direct effects from energy supply/ demand problems. Farmers in the Midwest began to worry about their ability to secure enough fuel to power their tractors, other farm equipment, and to dry wet crops. Soaring prices of fuel, fertilizer, and food were experienced all over the country.[64] Petroleum product shortages, once regional and seasonal, became chronic.

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[62] "Winter-Caused Power Cutbacks Affect 50 Million Persons," Tulsa Daily World, February 4, 1971.

[63] Ibid.

[64] Landsberg, "Low-Cost, Abundant Energy," p. 247.

Prospects for short-term relief dimmed considerably when the OPEC imposed oil embargo and production cutback was invoked during the October 1973 war between the Arab nations and Israel. The oil importing countries of the western industrial world were caught offguard for they all in some degree had become dependent on imports from the Arab states to take up the slack in domestic production. A total embargo was announced for exports to the U.S., Canada, the Bahamas, Trinidad, the Netherlands, Antilles, Puerto Rico, and Guam. The OPEC nations also made it clear for other states that their stance on the Arab-Israeli dispute would affect the amount of oil they would be supplied. Furthermore, posted prices for oil were immediately raised by 70 percent, and increased again in mid-December by 130 percent.[65] This sequence of events reduced consumption levels, resulted in the transfer of large amounts of money from this country to the OPEC nations, and created an environment of uncertainty with regard to future energy supplies.[66]

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[65]Member of OPEC are Iran, Iraq, Kuwait, Saudi Arabia, Venezuela, Algeria, Ecuador, Indonesia, Libya, Nigeria, Qatar, the United Arab Emirates, and Gabon. A parallel group, the Organization of Arab Petroleum Exporting Countries (OAPEC), includes all Arab members of OPEC, plus Egypt, Syria, and Bahrein. Congressional Quarterly, Inc., Continuing Energy Crisis in America (Washington, D.C.: Congressional Quarterly, Inc., 1975), p. 37. For a detailed discussion of the embargo and its effects, see U.S., Federal Energy Administration, U.S. Oil Companies and the Arab Oil Embargo: The International Allocation of Constricted Supplies (Washington, D.C.: Government Printing Office, 1975).

[66]Titenberg, Energy Planning and Policy, p. 26.

Assigning a particular date to the time the energy crisis appeared full blown is at best speculative. However, in terms of public perception and actual effects, the Arab embargo signaled, in the words of David Davis, that the "day of reckoning was at hand":

> If this judgment were to be assigned a literal date it would be October 17, 1973, for on that day, inscrutable kings, emirs, and sheiks met in the windswept Arab capital of Kuwait to proclaim the end of an era. The old era was one of cheap and dependable energy, epitomized by the easy exploitation of the crude oil lying just beneath the Middle Eastern sands. The new era was to be one of more costly and more uncertain energy.[67]

By the winter of 1973, distillate fuel oil, gasoline, and crude oil as well were all in short supply. Reduction in supplies reached a high point of over 3 million barrels a day during February and March of 1974. This represented a shortfall of about 17 percent of the expected domestic consumption during that period.[68] More dramatic were the accompanying price increases which affected all oil: the price of crude rose from about $3.50 a barrel in September 1973 to over $13.00 per barrel by the following May.[69] Although prices received by oil companies were controlled and programs to allocate the shortages were established, the

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[67] Davis, Energy Politics, p. 1. Emphasis added.

[68] U.S., Federal Energy Administration, Project Independence Report, Appendix AIII (Washington, D.C.: Government Printing Office, 1974), p. 284.

[69] U.S., Federal Energy Administration, Monthly Energy Review, December 1974, p. 41.

increases in costs due to rising import prices were allowed to be passed through to consumers. Although lengthy, Davis's comments regarding the effects of the crisis are worth quoting:

> Within the United States the boycott (oil embargo) sparked violence on the turnpikes (trucking industry reaction), fostered the birth of a new federal agency, and further undercut support of a President trying to stage off impeachment (Nixon and "Watergate"). In Washington, senators investigating American relations with the Arabs discovered a secret decision of Harry Truman's National Security Council that had quietly guided foreign policy for a quarter of a century. Other probers revealed the machinations of giant petroleum corporations aimed at enriching Texas producers of oil and gas in return for millions of dollars of campaign contribuitons. In the state capitols, governors proclaimed schemes to ration gasoline, and state legislators negotiated deals to buy from secret supplies.[70]

Long gas lines and about a 50 percent increase in the price of gasoline acted as involuntary consumption-reducing measures, just as the brownouts and blackouts had in 1964 and 1965. Early weekday and Sunday closings of service stations, or "sold out" signs on gasoline pumps became a familiar sight that had to be dealt with by American motorists. Restrictions on driving habits, like those noted above, were made mandatory in most states by early 1974 and remained in effect until the OPEC nations lifted the oil embargo in March of that year. But the effects on prices remained as a reminder that the era of cheap energy was over.

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[70] David Howard Davis, <u>Energy Politics</u> (New York: St. Martin's Press, 1974), p. 2.

Summary

To recapitulate briefly, this chapter has shown that interest and concern with energy supplies and demands in this country did not arise full blown overnight. Instead, public attention focused on energy problems as a result of many interrelated trends and events that converged in the energy crisis. Environmental concern over the earth's finite resources served as the forerunner of the argument that energy resources, especially fossil fuels, were also limited. And by the early 1970s, there was a growing realization that the primary cost in coping with environmental problems is to place considerable limits on both the supply and use of various energy resources. Because of these constraints and a variety of social, economic, and technical factors, nationwide energy consumption outraced the combined domestic production of conventional fuels and nuclear energy. Oil imports grew to fill the gap, and as a result, raised critical issues of national security. These events were brought to a climax by the OPEC oil embargo of 1973, which caused national attention to focus on energy problems, particularly increasing energy prices. The most important point here is that for the first time in this country's history plentiful and secure supplies of energy could no longer be taken for granted.

The chapter has also shown that three areas comprise the bulk of energy demands in the U.S.: heating and cooling of buildings; industrial processes; and transportation, especially automobiles. More importantly, much of the energy consumed for these purposes is wasted as a result of technical inefficiencies and social-economic circumstances. The events of 1973 and 1974 were important in precipitating both the awareness of energy waste and the search for actions to ease the imbalance between energy supplies and demands through effective energy conservation.

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CHAPTER IV

THE CASE FOR ENERGY CONSERVATION

Introduction

The energy use trends and events described in the previous chapter were perceived differently by individuals and groups who held different values and interests. For example, some saw the imbalance of supplies and demands as a production problem that could be solved, as it always had been in the past, by an intensive effort to increase domestic production of all forms of energy. At the same time, information documenting the exponential growth of demands in this country caused attention to turn to opportunities to conserve energy. A number of individuals, public interest groups, and policy research organizations pushed for a national debate that would examine the historical supply-oriented approach to energy needs.

But an energy future that did not focus on accelerated supply required to a large degree changing the "rules of the game," as well as allowing new participants into the traditionally closed arenas of energy policymaking.

Energy-related policies had been designed to deal only with the management of supply and growth, and as a consequence, no "plans" were available to address problems of resource scarcity. Advocates of energy conservation pointed out fundamental conflicts between public and private sector policies and programs that promoted energy use and the need to reduce oil imports. As energy problems wore on and domestic production remained more problematical than had been estimated at the time of the OPEC embargo, strategies to reduce consumption increasingly gained support as legitimate alternatives. That is, energy conservation goals and strategies were identified.

This chapter continues the description of the social and political context within which conservation problems and issues are being addressed. Its purpose is to review key elements in the rationale for energy conservation as an integral part of overall national energy objectives. First, public perceptions of the energy crisis and attitudes concerning who was to blame and what should be done are examined. As will be shown, the public demonstrated a general awareness of the need to use energy more efficiently immediately following the OPEC embargo. Furthermore, policymakers were even more sensitive to energy problems and issues during 1973-1974 than the public-at-large. Next, the chapter delineates the "case" for conservation as formulated by several key individuals and in a number of early energy research reports.

Of course, the activities discussed below did not occur apart from executive and legislative attempts to define the conservation response to energy problems. They are considered separately only for heuristic purposes. Chapter V extends this discussion by describing the background and status of energy conservation policies and programs.

Aftermath of the OPEC Embargo: Who Perceived What?

A large percentage of the population was affected by energy shortages and price increases that came in the aftermath of the embargo, and this focused their attention on energy problems. Three features of this attention are significant to understanding the development of the case for conservation: the extent to which energy problems were perceived to be a policy problem, public perceptions of the reasons for the energy shortages, and attitudes concerning who was to blame for the state of affairs in energy. Whereas the first consideration provides insight into the salience of energy consumption as a public problem, the other two extend beyond public awareness of the problem by introducing relevant parties-at-interest and identifying who was held as most responsible for doing something about energy needs. These factors will be addressed below by reviewing reported results of national surveys of public attitudes.

Did the Public Perceive Energy as a Problem?

First, to what extent was the energy problem viewed as a public policy problem? The answer to this question is more complex than it first appears, for "it involves not only whether the salience accorded this issue is essentially the same for both leaders and the public, but it also deals with the salience relative to other issues at the moment."[1] An open-ended question used in Gallup surveys conducted during the period 1973-1975 provides some meaningful answers: respondents were asked to identify what they considered to be the "most important problems facing the nation today."[2] In a March 1973 survey, energy was not listed among 15 substantive categories of identified national problems; however, by June, 83 percent of all respondents said they had heard or read about the "energy crisis." By October 1973, eight percent of all respondents identified the energy crisis as an "important problem."[3] Then, during the OPEC embargo, fuel shortages momentarily replaced traditional economic concerns (the high cost of living and inflation) as the number one problem worrying the public (see Table IV-1). This appeared to be the high point of concern because other surveys

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[1]James F. Sheffield, Jr., "Public Opinion and Energy Policymaking," paper presented at the American Society for Public Administration, Region VII Annual Meetings, Omaha, Neb., October 7-8, 1977.

[2]American Institute of Public Opinion, The Gallup Opinion Index. Issues cited in this section include March and September, 1973 (Nos. 93 and 99); January, March, September, and October, 1974 (Nos. 103, 105, 111, and 112); and April, July, and October, 1975 (Nos. 118, 121, and 125).

[3]With this percentage, the energy issue ranked eighth in 15 substantive categories of problems. In an earlier May survey, energy was 13th in 16 categories.

TABLE IV-1

COMPARATIVE PUBLIC PROBLEM IDENTIFICATION
BY U.S. REGIONS, JANUARY 1974
(percent)

Question: "What do you think is the most important problem facing this country today?"

Problem	East	Midwest	South	West
Energy crisis/fuel shortage	46	47	49	38
High cost of living	25	23	28	24
Dissatisfaction with/ lack of trust in government	16	17	11	19
Corruption in government/Watergate	7	8	5	8
Moral decline/lack of religion	-	5	-	-
Unemployment	4	-	5	10
All others	24	23	27	30
No opinion	3	2	5	3
Total[a]	125	125	130	132

SOURCE: American Institute of Public Opinion, The Gallup Opinion Index, March 1974 (No. 105).

[a]Totals add to more than 100 percent since some persons named more than one problem.

conducted in late 1974 and through 1975 show responses ranging from three to seven percent, ranking energy and fuel shortages about third or fourth in comparison to all other problems.

Public Versus Elite Perceptions

As documented by James Sheffield, citing data derived from an elite-mass study sponsored in 1974 by the Chicago Council on Foreign Relations (hereafter referred to as the CFR survey), there was a substantial difference between the perceptions of opinion leaders and the public-at-large with regard to energy problems and issues.[4] Although the primary focus of the CFR survey was in terms of representation of those elites having influence and knowledge about foreign affairs, the results are still instructive. Sheffield found in his analysis of the data that an elite sample, made up of members of the Foreign Relations and Foreign Affairs Congressional Committees and officials of the Department of State, was "substantially more sensitive to the (energy) problem than the public."[5] Whereas the Gallup surveys reported above and the CFR survey show that by 1974 the public was more likely to cite two or three problems as "most important" ahead of energy, this apparently did not hold for opinion

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[4]See Sheffield, "Public Opinion and Energy Policy-Making," pp. 6-7, and Tables 1 and 2.

[5]Ibid., p. 6.

leaders. Indeed, energy problems ranked second for them out of five categories.[6]

Perceptions of Responsibility

The second significant feature within the public's perception of energy as a public policy problem centers on who was perceived to be responsible for the existing state of affairs. The open-ended nature of the typical opinion poll leaves unanswered evaluative questions of intensity and responsibility: for example, how seriously did the public, and policymakers, view energy problems; and who was seen as most responsible for the fuel shortages? As will be shown below, answers to these questions are related to perception of the need for energy conservation.

Since 1974, the Opinion Research Corporation has surveyed public attitudes and behavior toward energy problems and issues for the Federal Energy Administration (FEA)--now part of the newly created Department of Energy (DOE). Results of the March 1974 survey indicate that slightly more than 20 percent of the public believed energy shortages to be either "very serious" or "somewhat serious" and of "long

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[6]In contrast, in the same survey the public-at-large ranked energy problems last among the categories.

[7]Opinion Research Corporation, General Public Attitudes and Behavior Toward Energy Saving, prepared for the U.S., Federal Energy Administration (now Department of Energy) (Springfield, Va.: National Technical Information Service, monthly beginning in September 1974). (Title varies.)

duration."[8] Table IV-2 shows that the percentage of people taking this position increased to 31 percent by September of that year, and that persons with "some college or more" or who are "environmental activists" were more likely than the public-at-large to view the energy problems as severe, likely to become more severe, and likely to last a long time. The difference between the two groups and the general public corresponds to the results reported for the elite sample in the CFR survey. In both cases the greater sensitivity to energy problems appears to be explained by a difference in the knowledge of and interest in the problem on the part of leaders or "activists."

The early FEA surveys also found that the degree to which people thought the energy situation was serious correlated strongly with perceptions of who they held most responsible. As shown in the first part of Table IV-3, answers to an open-ended question on responsibility ranged over a spectrum that included the energy industries or business (one or more oil companies, the oil industry, big business or business leaders), the government (the President or Congress), and the public (consumers or everyone). Furthermore, as the second part of the table shows, although the public was almost evenly divided on the question of whether the shortages were "real" or "contrived," there was a very

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[8] Ibid.

TABLE IV-2

PERCEPTIONS OF THE SERIOUSNESS AND DURATION OF ENERGY SHORTAGES, SEPTEMBER 1974
(percent)

	Very Serious	Of Long Duration	Will Become More Severe In the Next Few Months
Total Public	31	51	31
Some College Education or More	31	63	30
Environmental Activists[a]	41	63	37

SOURCE: Opinion Research Corporation, General Public Attitudes and Behavior Toward Energy Saving, Vol. I, prepared for the U.S., Federal Energy Administration (now Department of Energy) (Springfield, Va.: National Technical Information Service, September 1974), p. 2.

[a]Includes people who either belong to an environmental organization or have written a letter on an environmental subject to a newspaper, legislator, or other government body, or have done both.

TABLE IV-3

PUBLIC ATTITUDES CONCERNING WHO CAUSED AND IS RESPONSIBLE FOR ENERGY SHORTAGES (Percent)

Seriousness of the Shortage	Most Responsible for the Shortage			Nature of the Shortage		
	Oil Business	Public/ Everyone	Government	Real	Contrived	Both
Very Serious	22	32	17	51	26	16
Somewhat Serious	33	25	19	38	30	27
Not at all Serious	57	5	35	7	78	9
Total	34	23	27	35	38	20

SOURCE: Opinion Research Corporation, General Public Attitudes and Behavior Toward Energy Saving, Vol. I, prepared for the U.S., Federal Energy Administration (Springfield, Va.: National Technical Information Service, September, 1974), p. 5.

high relationship between those who believed that fuel problems were "contrived" and "not very serious." And according to the FEA survey report, skepticism about the severity of the energy problems and issues occurred "among all age, education, and income groups, and in all sections of the country."[9]

What Happened and What Should Be Done?

As with any event of unexpected, or crisis proportions, efforts to define what happened correlated closely with attempts to search out the guilty party or parties. Since the public generally lacked information necessary to evaluate long existing supply-demand trends, or could not assess available competing information about the events leading to the energy crisis, few were willing to believe that consumers faced shortages simply because demand had confronted real problems of supply.[10] When presented with a list of possible reasons for energy shortages, a majority of the public, in almost every case, saw seven reasons as "very important." As Table IV-4 illustrates, environmental activists most often blamed the public for wasteful habits and industry for not being concerned with the energy efficiency of its products. On the other hand, as might be

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[9] Opinion Research Corporation, General Public Attitudes Toward Energy, Vol. I, p. 6.

[10] Hans H. Landsberg, "Low-Cost, Abundant Energy: Paradise Lost?" Science 184 (April 19, 1974): 248.

TABLE IV-4

PUBLIC PERCEPTIONS OF POSSIBLE REASONS FOR THE ENERGY SHORTAGE (Percent saying reason is "very important")

Reason for Energy Shortage	Total Public	See Energy Shortage As: Very Serious	Not at All Serious	Environmental Activists[a]
Public increasingly wasteful	64	70	49	64
Too many inefficient consumer goods	59	62	44	70
Expansion of industry	55	57	54	56
No national energy policy by government	53	61	42	57
Oil companies didn't prepare	50	54	36	45
Various pollution controls	50	55	49	35
Population growth	48	55	49	53

SOURCE: Opinion Research Corporation, General Public Attitudes and Behavior Toward Energy Saving, Vol. 1, prepared for the U.S., Federal Energy Administration (now Department of Energy) (Springfield, Va.: National Technical Information Service, September 1974), p. 6.

[a]Includes people who either belong to an environmental organization or have written a letter on an environmental subject to a newspaper, legislator, or other government body, or have done both.

expected, environmentalists were less willing to accept the argument that environmental, or pollution, controls were to blame. Similarly, a Gallup poll reported in February 1974, parallels these results, showing 25 percent of the public-at-large blamed oil companies for energy problems; 23 percent blamed the federal government (including three percent who said "Congress"); 19 percent specifically blamed the Nixon Administration or Nixon himself; 16 percent blamed U.S. consumers; seven percent, the Arab nations; and six percent identified big business to be at fault.[11] As summarized succinctly by Hans Landsberg, when assessed by their adversaries industry "conspired," government "bungled," and the environmentalists "obstructed."[12] Each of these perceptual categories served as a catalyst for both defining energy problems and identifying where responsibility lay for dealing with the problems.

Environmentalists, as well as some segments of the general public, argued that the managers of the major energy industries constituted an interlocking power elite which was literally controlling all facets of the U.S. energy economy. Due to the operation of this elite, the American public allegedly had been giving up billions of dollars each year through special privileges (e.g., through various tax

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[11] American Institute of Public Opinion, The Gallup Opinion Index, February 1974 (No. 104).

[12] Landsberg, "Low-Cost, Abundant Energy," p. 248.

privileges) granted to these industries. Robert Engler's The Politics of Oil was written from such elitist assumptions.[13] Echoes of Engler's theme, essentially referred to as the "conspiracy theory," were heard at the height of the debate over who was to blame for and what should be done about fuel shortages.[14] The charges can be summed to the effect that energy problems were, if not planned, being used by oil companies to drive up their own prices, to force government out of the regulatory business (e.g., regulation of wellhead natural gas prices), and to crowd the independent dealers who often undersold major oil companies out of the market.[15] Whether or not these charges have merit, it is crucial to recognize that they contributed to citizen suspicions as to whether or not an energy shortage actually existed.

This skepticism resulted in part from public disclosures of information which documented the holdings of energy companies in competitive fuel forms--i.e., the fact

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[13] New York, Macmillan and Co., 1961.

[14] See Raleigh Warner, Jr., "That Alleged Oil Conspiracy," Conference Board Report 10 (October 1973): 10-15; Richard B. Mancke, "Petroleum Conspiracy: A Costly Myth," Public Policy 12 (Winter 1974): 1-13; and Mira Wilkins, "The Oil Crisis in Perspective: The Oil Companies," Daedalus 104 (Fall 1975): 159-178.

[15] Gerald Garvey, "Research on Energy Policy: Processes and Institutions," in Energy and the Social Sciences: An Examination of Research Needs, ed. Hans H. Landsberg et al. (Washington, D.C.: Resources for the Future, 1974), p. 566.

the conglomerate oil companies owned coal and uranium resources. Such patterns of ownership were perceived by some as potentially beneficial to these industries should oil and gas remain in short supply.[16] However, the major issue which did much to create the "villain" image of the oil industry was the question of excess profits. The 1973 profits of the top 10 oil companies rose 51.2 percent over 1972 profits for a total of $7.8 billion.[17] It was this circumstance that led to a large part of the criticism of the industry and subsequent congressional committee investigations into the federal regulations and tax laws which operate to their benefit. Some individuals, among them congressional representatives, believed the companies were making excess profits and contributing to problems of economic inflation at the expense of the public during a time of national stress. The industry, however, argued that its profits were "windfall" profits coming about when world and domestic prices were increased more than the costs of producing oil.[18]

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[16] S. David Freeman, Energy: The New Era (New York: Vintage Books, 1974), pp. 154-155. Freeman states: "[W]hen the oil companies enter the coal business by taking over existing large coal companies, as has occurred, or when the integrated energy company represents a significant share of the market in both fuels, there is a real danger that interfuel competition will disappear."

[17] "The New Shape of the U.S. Oil Industry," Business Week, February 2, 1974, p. 50.

[18] For elaboration, see U.S., Senate, Committee on the Judiciary, Competition in the Energy Industry (Washington, D.C.: Government Printing Office, 1973).

As noted earlier, environmental activists were quick to blame industry, the public (especially for its wasteful habits), and government for the nation's energy dilemma. In contrast, there were those who held the environmentalists in part responsible--i.e., environmental activists were viewed as obstructing progress, and often portrayed as "hopeless idealists."[19] Public interest lobbies such as the Sierra Club and Common Cause had made issues of offshore leasing and coal leasing by taking them out of the private arena of energy policy and placing them on the public sector's agenda.[20] In addition, environmental concern had caused local resistance to the construction of nuclear plants, refineries, oil and gas terminals, and expanded port facilities for supertankers bringing foreign oil to the U.S.[21] And, as discussed in chapter III, almost every source of energy was faced with some environmental constraint that affected all phases of resource development from mining/extraction to consumption. While the environmental movement was clearly not single-handedly to blame for energy problems, it did at least

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[19] Congressional Quarterly, Inc., Continuing Energy Crisis (Washington, D.C.: Congressional Quarterly, Inc., 1975), p. 21.

[20] Andrew S. McFarland, Public Interest Lobbies: Decision Making on Energy (Washington, D.C.: American Enterprise Institute for Public Policy Research, 1976), pp. 86, 119-120.

[21] Arthur D. Little, Jr., Energy Policy Issues for the United States During the Seventies, report prepared for the National Energy Forum, United States National Committee, World Energy Conference (New York: Engineers Joint Council, 1971), p. 20.

exacerbate supply problems and accelerate the timetable for shortages. On the other hand, Ralph Nader's Public Citizen, Inc., Common Cause, Friends of the Earth, the Sierra Club, League of Women Voters, and other smaller groups were politically active in support of alternate means, especially conservation and appropriate technologies, to overcome some of the projected supply-demand imbalance.[22]

Perceptions of responsibility also aggregated around criticism and dissatisfaction with the government's role in energy markets. The pressures of the energy crisis highlighted the awareness that the federal government's historical approach to resource management--rate-making and the promotion of market competition--did not respond with the "speed, flexibility, clarity and decisiveness appropriate to our country's energy-related needs."[23] But even in this case, views of what was wrong depended largely on personal and group goals and beliefs. Industry charged government with holding down prices, reducing production incentives, cutting subsidies, and involving industry in a multiplicity of agencies, standards, and regulations that in effect destroyed efficiency and initiative. Consumers charged government with not holding down prices and failing to regulate

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[22] See McFarland, Public Interest Lobbies.

[23] William O. Doub, Federal Energy Regulation: An Organizational Study (Washington, D.C.: Government Printing Office, 1974), p. 2.

properly the industry. In both cases, however, government was seen as falling short in areas of energy regulation.

In 1973, a federal energy regulation study team found that more than 40 agencies, bureaus, and commissions had some role in energy regulation. This multiplicity of actors created acute problems of flexibility to deal with immediate energy shortages. Industry claimed the existing regulatory structure favored environmentalists and environmentalists asserted just the opposite. At any rate, the different groups seemed to agree that the federal regulatory system, to the extent it could be called a system, was "biased, confused, and indecisive" even if they could not agree on the direction of the bias.[24]

The issues surrounding government responsibility actually go much deeper than simply regulation. It was evident during 1973-1974 more than ever before that the U.S. lacked an overall energy policy. Instead, what had developed was a range of fragmented, uncoordinated, and conflicting energy-related policies. In spite of the perceptual environment described above--skepticism, confusion, uncertainty--within a few weeks of the embargo, national leaders recognized that short-term crisis measures were necessary, as well as a broader policy review to begin sorting out prescriptions for the long-term.

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[24]Ibid., p. 13.

Early Efforts to Define a Conservation Response

General George A. Lincoln, former head of the now defunct Office of Emergency Preparedness (OEP) which for years maintained high-level administrative responsibilities for energy policy, suggests:

> [I]t can be argued that the American way of dealing with a large unexpected problem is, first, to be skeptical of its existence, then to search for scapegoats, and finally to settle down to dealing with the problem.[25]

Prior to the OPEC embargo, studies were already underway examining how the estimated demand for foreign oil could be reduced through increasing existing domestic supplies. On the surface there was little reason to expect that the U.S. could not supply the resources to meet its energy needs and protect the economy and foreign policy from insecure foreign sources. For example, a 1972 report of the National Petroleum Council stated: "No major source of U.S. fuel supply is limited by the availability of resources to sustain higher production."[26]

Indeed, in terms of the availability of fuels for the major consuming sectors, the few decades preceding the energy crisis have been referred to as a "promotional era" in energy

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[25]George A. Lincoln, "Background to the U.S. Energy Revolution," in The Energy Crisis and U.S. Foreign Policy, eds. Joseph S. Szyliowicz and Bard E. O'Neill (New York: Praeger Publishers, 1975), p. 26.

[26]National Petroleum Council. U.S. Energy Outlook (Washington, D.C.: National Petroleum Council, 1972), p. 4.

growth. A variety of government policies and programs supported the promotional practices of various resource industries to make abundant supplies of energy available to consumers.[27] This relative abundance (compared to most other nations) led to few policies to restrain energy use. In fact, the historical ability of the U.S. to respond to its rapidly expanding demands by promoting increased fuel supplies had a substantial influence in molding the direction of government energy concerns away from conservation. Although this state of affairs with regard to government policy will be further explored in the next chapter, the important point here is that the only assumption for the demand side of the nation's energy system was the seemingly unquestioned concept of rapid growth.[28] Restrictive programs that were adopted, for example, state regulation of petroleum production, oil import quotas, and Federal Power Commission pricing policies for natural gas, were not implemented specifically to conserve energy or reduce demand. Rather, they were adopted to protect energy suppliers and consumers by

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[27] S. David Freeman, "Toward a Policy of Energy Conservation," in The Energy Crisis, eds. Richard S. Lewis and Bernard I. Spinrad (Chicago: Educational Foundation for Nuclear Science, 1972), p. 67.

[28] Don E. Kash, "Energy in the 1970's--The Problem of Abundance to Scarcity," in Energy Impacts on Public Policy and Administration, ed. Walter F. Scheffer (Norman: University of Oklahoma Press, 1976), p. 24.

maintaining what were thought to be appropriate prices in the face of downward price pressures.[29]

Definitions of Conservation

But a portion of the ultimate objective achieved by increasing supply can be reached by the adoption of measures to reduce demand. In the early 1970s a number of individuals, such as Paul Ehrlich, E. F. Schumacher, Barry Commoner, General Lincoln, James Schlesinger, S. David Freeman, and Earl Cook, had begun to sound a call for more efficient use of resources and the reduction of "waste." Much of their writing was aimed at the generally prevailing American philosophy that "more is always better," pointing out the consequences of overconsumption, rapid population growth, and the direct and higher order impacts of technology. Commoner[30] and Freeman[31] paid special attention to the way in which energy use is related to the broader questions of environmental degradation and the future. Cook was concerned with the exponential nature of U.S. energy consumption. For example, in 1971 he wrote:

> Democratic societies are not noted for their ability to take the long view in making decisions. Yet

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[29] U.S., Federal Energy Administration, Project Independence Blueprint: An Historical Perspective (Washington, D.C.: Government Printing Office, 1974), p. 8.

[30] Barry Commoner, The Closing Circle: Nature, Man & Technology (New York: Alfred A. Knopf, Inc., 1971).

[31] Freeman, Energy: The New Era, especially chapter 4.

> indefinite growth in energy consumption, as in human population is simply not possible.[32]

Cook suggested further that major changes in power technology were required to reduce pollution and manage wastes --the by-products of consumption. Moreoever, these changes called for "hard political decisions."

The most significant results of Cook's research were his estimates that five-sixths of the energy used in transportation, two-thirds of the fuel consumed to generate electricity, and nearly one-third of the remaining energy--that is, more than 50 percent of the energy consumed in the U.S.--was discarded as waste heat.[33] These data were widely accepted and cited as the basis for the assumption that conservation of energy was "a worthy and increasingly important goal."[34]

Then, in October 1972 the Office of Emergency Preparedness (OEP) released a staff study which recommended conservation as a competing strategy for countering expected energy shortages in this country. OEP reviewed existing projections of energy demand to beyond the year 1985, and suggested measures to reduce future energy consumption. The authors of the report concluded that although the conservation measures they recommended "will not, taken alone,

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[32]Earl Cook, "The Flow of Energy in an Industrial Society," Scientific American 224 (September 1971): 135-144.

[33]Ibid., pp. 138-139.

[34]Allen L. Hammond, "Conservation of Energy: The Potential for More Efficient Use," Science 178 (December 8, 1972): 1079.

eliminate the need for increased oil imports, they can substantially reduce this need."[35] Also appearing in 1972 was a study conducted by the Stanford Research Institute (SRI) of Menlo Park, California, for the U.S. Office of Science and Technology.[36] SRI's report detailed the end use of energy in the U.S., underscoring the trends discussed in the previous chapter: rapidly and haphazardly increasing energy consumption over the recent past.

Most of these early conservation studies recognized that even extreme conservation measures would not halt the need for more energy; however, the authors rejected the idea that from this it followed that wasteful and inefficient uses of energy should be perpetuated. Instead, they argued that energy conservation should be viewed as a "source" of energy within the scope of supply and demand strategies. Conclusions drawn from the two major studies noted above, along with the specific sectorial analyses (discussed in chapter I) of where and how more efficient uses of energy might be achieved were widely disseminated among relevant energy agencies, published in scholarly and scientific journals, and reviewed by the media, newspapers and television.

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[35] U.S., Office of Energy Preparedness, The Potential for Energy Conservation (Washington, D.C.: Government Printing Office, 1972), p. vi.

[36] Stanford Research Institute, Patterns for Energy Consumption in the United States (Washington, D.C.: Government Printing Office, 1972).

Although, as will be discussed in chapter V President Nixon's national policy goal of achieving "energy self-sufficiency" included energy conservation measures, the Energy Policy Project of the Ford Foundation, under the direction of S. David Freeman, made what is considered to be the first comprehensive "case" for energy conservation. A Time to Choose, published in 1974, took the supply-oriented energy picture to task by positing three alternative energy futures: "historical growth," "technical fix," and "zero energy growth."[37] In the historical growth scenario, energy demand would continue to rise at the average annual growth rate of the 1950-1970 period (about 3.5 percent) while energy supply policy would attempt to match the rapid increases in consumption. This alternative would essentially emphasize "business as usual," but with an expanded energy research and development effort, more vigorous domestic resource development, and continued reliance on foreign oil imports. The technical fix scenario would reduce energy demands (consumption would increase at an average rate of below 2.0 percent per year) by improving the efficiency with which energy is used in the major consuming sectors. In other words, scientific and engineering expertise would be used to develop more energy efficient technologies to improve such end

[37] Energy Policy Project of the Ford Foundation, A Time to Choose (Cambridge, Mass.: Ballinger Publishing Co., 1974), pp. 19-112.

uses as automobile fuel economy, industrial processes, and power plant conversion efficiency. This energy future, by reducing demand, would allow greater flexibility in determining energy supply policy and would delay the deployment of environmentally controversial, or other high risk, supply options.

By far the most controversial scenario outlined by the Energy Policy Project was zero energy growth. This alternative would include all the technical fix efficiency measures, but would also attempt to redirect economic growth away from energy-intensive activities such as manufacturing, and toward less energy-intensive purposes such as public services. Thus, annual energy demand growth would ultimately be reduced to zero. This would allow large energy technologies to be deemphasized and in their place, smaller scale, renewable energy resources could be implemented.

Essentially, the Ford Foundation study was the first attempt to specify an energy future based largely on using energy more efficiently, and in some cases, using less. Its impact was far-reaching, substantially altering the energy debate. As noted in a recent article:

> A Time to Choose was published in October 1974 with all the expensive ceremony that the [Ford] foundation attaches to announcements of grave social significance. It was presented at press conferences convened simultaneously in New York and Washington. At least 6,000 copies of the report were given to members of Congress, the federal bureaucracy, and the press; during the autumn of 1974 another 30,000 copies were sold in bookstores, and the foundation

> arranged for the Book-of-the-Month Club to offer an additional 300,000 copies of an abridged text to its civic-minded subscribers.
>
> In the minds of many people on Capitol Hill at the time, the report was thought to provide the first coherent explanation of energy matters not submitted by the oil and gas lobby. Politicians spoke of the report's "filling a vacuum," of the way in which it "exploded the myth of a connection between energy growth and economic growth as a whole."[38]

A number of conservation-focused analyses followed closely after the Ford Foundation report. For present purposes, it is sufficient to suggest only that these studies significantly advanced the definition of energy conservation and potential energy saving strategies, and that they reflected certain common themes regarding the advantages of reducing energy demands (see Table IV-5). Although conservation was increasingly defined as denoting efficiency in energy use and avoidance of waste, problems of identifying what was waste in the U.S. energy system, and how it should be measured, occupied most of the debate over conservation strategies during this early period. That is, waste means different things to different people. To compound this philosophical difference, the concept is always tied to some professional or technical meaning of "efficiency." This perceptual difficulty over the definition of waste and

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[38]Lewis H. Lapham, "The Energy Debacle," Harpers 225 (August 1977): 59. Lapham goes on to suggest that the report was not so enthusiastically received by some "knowledgeable people." In fact, his contention is that the report was inadequate, reflecting the narrow interests of a few of the work's authors, especially Freeman.

TABLE IV-5

ADVANTAGES OF ENERGY CONSERVATION

- A barrel of oil saved is as useful (and often better) than a barrel produced; it typically costs less to save a barrel of oil than to produce one through new technology.
- In contrast to increased production, conservation reduces environmental damage and pollution.
- Can result in more efficient utilization of finite resources, thereby reducing waste.
- Reduces dependence on oil imports and improves balance of trade.
- Some conservation technologies and measures can be applied faster than new energy supply systems.
- Reduced demand buys time to develop and implement long-term energy solutions.
- Creates new job opportunities through such activities as retrofitting older buildings (must be weighed against possible job displacement).

conservation is important, since as will be shown, decision-makers had to settle on some meaning for prescriptive policy purposes.

Physicists and engineers contend that "wasted energy results from fundamental physical constraints upon the efficiency with which energy can be converted from one form to another."[39] Waste can also result from inappropriate mechanical design. On the other hand, an economic perspective of waste often ignores physical or technical considerations, arguing that pricing mechanisms in idealized markets "have assigned appropriate dollar values to all possible purchases."[40] In other words, externalities (residuals in the form of waste heat) are ignored. In this light, current levels of energy use could not be considered wasteful since consumers behave rationally and always act in their own economic self-interest, and because overall the economy appeared to be operating in a reasonably efficient manner.[41] However,

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[39] Statements of Dr. David A. Large in U.S., Senate, Committee on Interior and Insular Affairs, Energy Conservation, Hearings, Part 1 (Washington, D.C.: Government Printing Office, 1973), pp. 143-144.

[40] Denis Hayes, Energy: The Case for Conservation (Washington, D.C.: Worldwatch Institute, 1976), p. 10. This discussion of waste definitions draws heavily on Hayes' interpretation and explanation, as well as Barry Commoner's discussion of thermodynamics in, Commoner, The Poverty of Power: Energy and the Economic Crisis (New York: Alfred A. Knopf, Inc., 1976), pp. 6-29.

[41] For an elaboration of this perspective, see Morris A. Adelman et al., No Time to Confuse (San Francisco: Institute for Contemporary Studies, 1975).

not only does this ignore externalities, but it also ignores institutional factors that determine the mix of energy and other economic inputs in fuel purchase decisions (e.g., government policies which artifically keep energy prices low and/or subsidize inefficiency in terms of technical standards).

A different perspective on waste and efficiency is offered by thermodynamic analysis. Energy is consumed to perform "work," and after it is used, the energy remains but it is no longer as useful. The Laws of Thermodynamics state that all energy moves from a highly organized state to a more disorganized state--i.e., it degenerates to low-grade heat. Denis Hayes illustrates this in the following manner:

> Television sets get hot; light bulbs get hot; automobile tires get hot. This heat flows relentlessly from warmer to cooler objects, becoming even more dilute. In the terminology of physics, it demonstrates an increase in entropy.[42]

Thus, energy has a qualitative dimension. The Second Law of Thermodynamics states that the quality of energy declines as it is used. An analysis of energy use, then, needs to distinguish between the relative entrophy levels of the flow of Btu's in a given process. This represents a valuable concept in defining waste and how efficiently the U.S. uses its energy resources. For example, a high-grade energy source should not be used to perform work which actually requires low-grade energy such as using electricity to provide

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[42] Hayes, Case for Conservation, p. 69.

electrical resistance space heating. Such a practice, according to the Second Law, is wasteful.

Physicists of the American Physical Society introduced this "second law efficiency" concept and applied it to a number of significant end uses in this country. They concluded that the overall efficiency of energy use is 10 to 15 percent. According to this criterion, autos were determined to be 10 percent efficient, space heating in homes six percent, air conditioning five percent, and hot water heating only three percent efficient.[43] Although a perfect second law efficiency is impossible, research by Marc Ross and Robert Williams in 1975 indicated that had second law efficiency been applied to total energy use in 1973, the "same living standard could have been provided with nearly 45 percent less energy."[44] This suggested that energy sources were not being as appropriately matched to various

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[43]The American Physical Society, "Efficent Use of Energy: A Physics Perspective," reprinted in U.S., House, Committee on Science and Technology, ERDA Authorization--Part I, 1976 and Transition Period, Conservation (Washington, D.C.: Government Printing Office, 1975), pp. 397-659.

[44]Marc H. Ross and Robert H. Williams, "Assessing the Potential for Fuel Conservation: A New Definition and Analysis of Energy Efficiency Helps to Clarify Policy ALternatives," unpublished manuscript, July 1, 1975, p. 18. (Mimeographed.) See also, Ross and Williams, "The Potential for Fuel Conservation," Technology Review 79 (February 1977); 49-57.

tasks as they could have been,[45] lending more support to conservation ideas and strategies.

Conservation Strategies

Based on the various kinds of energy uses described in chapter III, and flowing from the attempts to define energy waste and efficiency discussed above, important kinds of conservation strategies have come generally to include:

1. Improving the efficiency of end use. Preventing energy losses in life-support systems and in production systems, ensuring that energy systems are operating at their designed efficiency, and eliminating inefficiently utilized energy by retrofitting in all energy systems. For example, using more efficient air conditioning devices or improving maintainence of furnaces, insulating buildings, or adopting new technologies to increase the efficiency of transportation and industrial processes.

2. Reducing unnecessarily wasteful practices. Involves changing thermostat settings, turning off lights in a room when not in use, using better driving habits to reduce gasoline consumption, and similar minor alterations in lifestyles and habits.

3. Shifting to less energy-intensive activities. Examples are shifting freight from truck or air to rail, shifting passengers from autos to car pools and mass transit, shifting from manufacturing to services in the economy. Can mean major changes in lifestyles, consumer preferences, or behavior.

4. Fuel and resource substitutions to better match energy and end use. Using energy in alternate forms to conserve those resources in scarce supply.

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[45] It should be noted that this omits consideration of the economic fact that the costs of some technical opportunities for conservation may simply be too prohibitive to be implemented.

5. Curtailment. Conservation by doing away with a particular process, or banning some activity. For example, driving bans or prohibiting a productive activity by rationing or allocation of fuels.

The extent to which energy savings are being or can be captured through the application of specific measures that fall within the above categories depends on public acceptance and efforts by the public and private sector to implement the various strategies. The next chapter describes the background and status of the national response to these conservation strategies.

Summary

This chapter has shown that beginning in the early 1970s, the idea that conservation could help close the gap between supplies and demands received explicit attention from the general public, prominent individuals, research organizations, environmentalists, and government agencies. Moreover, the public held government largely responsible for the energy dilemma. Thus, the basic attitudinal structure existed which could be built upon to foster support for government action to encourage conservation. In addition, analyses during the two years following the OPEC embargo demonstrated that besides reducing demands for energy, conservation had other advantages over increasing energy supplies such as less pollution, decreasing dependence on foreign imports, more time and investment capital to develop renewable resources. Specific strategies were advanced to capture energy savings in the major consuming sectors. These factors formed the underlying assumptions which paralleled and influenced the growth of government involvement/intervention in the conservation issue area.

* * *

CHAPTER V

THE POLICY SYSTEM

Introduction

Essentially, because of the 1970s crisis, the U.S. confronted a number of complex choices regarding the availability of energy resources and resource use in the major consuming sectors. These choices become issues as they influence relevant parties-at-interest, the values they hold, and existing political and social institutions. In many ways, the conservation policy system parallels the overall political context within which energy policy, in general, is developing. That is, it exhibits piecemeal, ad hoc policy formulation and implementation, reflects conflicts in intergovernmental relations, and is characterized by confrontation among public and private sectors. For example, prior to 1977, federal authority and responsibility in energy conservation was shared by some 25 institutions. More importantly, most of the policies and programs within these agencies were not the result of any coordinated effort to formulate a national "conservation policy." In addition, the executive branch and Congress were more often than not deadlocked over the choice of policy tools to promote conservation in the economy. Then, in 1977, President Carter substantially reorganized the existing policy structure, placing many of the diffuse conservation programs under the aegis of the newly established Department of Energy (DOE). How much centralizing conservation authority in a single department-level organization will reduce conflict and uncertainty remains an open question.

This chapter begins with an overview of the organizational and legislative response to conservation as a strategy within the scope of national energy policy. It therefore continues the context description and analysis by focusing on the way in which conservation policies were formulated and decisions made. The last three sections of the chapter extend this discussion of the policy system by looking further at existing policies and programs for implementing energy conservation as well as assessing the impacts of these actions within the three major consuming sectors.

With regard to the purposes of this chapter, two observations should be noted. First, the policy system for dealing with energy conservation problems and issues has developed only within the last four or five years. Thus, roles and responsibilities among parties-at-interest are still evolving. As will be shown, the early approach taken was to rely on federal exhortation and pleas for voluntary actions to curb energy use in the consuming sectors. More recent congressional legislation has aimed largely at decentralizing responsibility for conservation to the states, establishing goals and guidelines, and providing technical and financial assistance for meeting federal objectives. These actions have already resulted in significant policy clashes, and, with the lingering energy situation, more debate is expected.

Secondly, the chapter attempts to describe the impacts of substantive policies as well as the strengths and weaknesses of the policymaking system. This provides the basis for the identification and categorization of alternatives to be evaluated in chapter VI. In this light, however, the chapter should not be viewed as an attempt to contribute directly to knowledge of the processes and functions of government in general. Instead it seeks to delineate the policy system in which policy decisions are made, and to portray the various participants and actions that are a part of this system.

Historical Development of Conservation Policy

As noted above, the historical development of the policy system for dealing with conservation problems and issues parallels the record of government involvement in energy matters generally.[1] Conservation policies and the

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[1]For an excellent review of the history of U.S. energy policy and organization, see U.S., Senate, Committee on Interior and Insular Affairs, Federal Energy Reorganization:

roles of relevant parties-at-interest have developed in a piecemeal, incremental way over the past few years. Individual decisions were made in response to specific needs, at a specific time, and with little thought until recently about their interrelationships. This development has taken place through administrative actions, such as Presidential Executive Orders and Reorganization Plans, legislative decisions, agency programs to implement legal mandates, state responses to federal initiatives, and other private and public sector activities such as the dissemination of research results described in the previous chapter. Three patterns encapsulate this evolutionary development. These are: (1) efforts to reorganize the federal bureaucracy to include energy conservation, (2) executive-congressional debate over appropriate policy tools to promote conservation, and (3) conflicts in intergovernmental relations with regard to conservation policies.

Reorganizing the Bureaucracy to Include Conservation

Historically, the association of government agencies and energy industries arose out of the industries' interests in resources beneath publicly-owned lands, and in hydroelectric sites. Another early concern was the significance of energy resources to the federal responsibility for national defense. Then, in response to the monopolistic growth of gas

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Historical Perspective (Washington, D.C.: Government Printing Office, 1976).

and electric utilities during the 1930s, government interests broadened into the areas of economic regulation and development. Finally, in the 1950s and 1960s, the federal government assumed a stronger role in matters related to health, safety, and the environment, culminating in the enactment of national legislation to control water and air pollution and the impacts of major federal decisions. To support its growing role in all of these areas, government funded more and more energy-related research and development.[2]

Based on this expansion of interests and responsibilities, one can speculate that the essential role of energy in the above policy areas would have eventually forced the development of a national energy policy, with or without the 1973 OPEC embargo. Similarly, the depletion of finite energy resources would have ultimately forced the nation to consider its exponential rate of energy consumption, but not necessarily during the 1970s. However, in the wake of summertime "brownouts" in the northeastern U.S. in 1970, and facing prospects of potentially serious fuel shortages as winter approached, the Nixon Administration took several actions to ease the energy situation. Paul W. McCracken, chairman of the President's Council of Economic Advisers, and General George Lincoln announced these actions, which ranged from

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[2]Daniel Dreyfus, Federal Energy Organization (Washington, D.C.: Government Printing Office, 1973), pp. 29-40.

relatively minor relaxations in oil import quotas[3] to the creation of a joint board of top government officials to deal with emergency fuel shortages and coordinate remedial action. In addition, the Administration urged the public to conserve the "use of energy," and noted that federal agencies would set an example in this respect. Although both McCracken and Lincoln said it was the President's basic policy to rely on private industry to deal with present and future demands of energy:

> [I]t was decided that, in the present situation, "certain actions by the Federal government can help both to assure the adequacy of supplies and thereby moderate the increase in prices."
>
> But they conceded, "in view of numerous uncertainties, no one can now be sure that these steps will be adequate."[4]

Whether or not the relaxation of oil import restrictions could do much to relieve the fuel shortage was not as important as the fact that the actions taken by the Administration publicly acknowledged the potential fuel oil crisis, and for our purposes, cited the need to conserve energy. But the President placed the responsibility for long-term solutions squarely on the energy industries.

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[3]E. W. Kenworthy, "U.S. Eases Quotas on Importing of Oil as Shortage Looms," New York Times, September 30, 1970. Because the increasing flow of petroleum imports from different parts of the world since the early 1950s was seen as a potential threat to the economy, quotas were adopted by the federal government to restrict the average number of barrels per day of fuel oil, natural gas liquids, liquefied petroleum gas, crude, and other petroleum products that could be imported.

[4]Ibid.

Then, on June 4, 1971, President Nixon forwarded a message to Congress on the subject of energy.[5] Nixon warned that the U.S. was facing increasing shortages of electrical energy, and supplies could no longer be taken for granted:

> For most of our history, a plentiful supply of energy is something the American people have taken very much for granted. In the past twenty years alone, we have been able to double our consumption of energy without exhausting the supply. But the assumption that sufficient energy will always be readily available has been brought sharply into question within the last year.[6]

Not only did the President again acknowledge that the U.S. faced significant energy problems, he also suggested a program to help alleviate them. The initial program contained the following goals:

- -To facilitate research and development for clean energy;
- -To make available the energy resources on federal lands;
- -To assure a timely supply of nuclear fuels;
- -To use our energy more wisely (calling for a new Federal Housing Administration standard requiring additional insulation in new federally-insured homes, dissemination of information on how consumers can use energy more efficiently, and other efforts to encourage energy conservation);
- -To balance environmental and energy needs, including a system of long-range open planning of electric

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[5]This had not happened since 1939 when Franklin D. Roosevelt called the Congress' attention to the need to preserve our country's energy resources. Lester A. Sobel, ed., Energy Crisis: 1969-1973, Vol. 1 (New York: Facts on File, Inc., 1974), p. 2.

[6]U.S., Senate, Committee on Interior and Insular Affairs, Presidential Energy Statements (Washington, D.C.: Government Printing Office, 1973), p. 1.

power plant sites and transmission line routes with approval by a state or regional agency before construction;
-To organize federal efforts more effectively, referencing the need to create a single structure within a Department of Natural Resources to unite all important energy resource development programs.[7]

These concepts and objectives remain basically unchanged. That is, much of the energy legislation, proposed or passed since 1971, and a good part of recent activity to resolve institutional disorganization (at both the federal and state levels) has been responsive to the basic goals outlined by the Nixon Administration. However, as discussed earlier, no agency existed or was established to address specifically the problem of energy consumption and conservation.

In his second energy message to the Congress, Nixon announced in April, 1973, he was establishing by executive action a Special Committee on Energy made up of his Assistants for Economic Affairs (George Schultz), Domestic Affairs (John Erlichman), and National Security (Henry Kissinger). At the same time, Charles DiBona was appointed Special Consultant to the President for energy matters and assigned responsibility for establishing a separate policy analysis staff in the White House.[8] This staff was given the name of

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[7]U.S., Senate, Presidential Energy Statements, pp. 1-2.

[8]Richard Corrigan, "Nixon Message Follows Months of White House Wrangling," National Journal Reports 5 (April 21, 1973): 574-575.

National Energy Office (NEO) and was charged with advising the President through the Special Committee on Energy on all federal energy problems, policies, and related matters.

With regard to conservation, in the same message the President stated:

> Common sense clearly dictates that as we expand the types and sources of energy available to us for the future, we must direct equal attention to conserving the energy available to us today, and we must explore means to limit future growth in energy demand.[9]

Since his 1971 speech first calling for wise energy use, the President had directed the Department of Commerce (DOC) in cooperation with the Council on Environmental Quality (CEQ) and the Environmental Protection Agency (EPA), to develop a voluntary "labeling" program which would apply to major energy-using home appliances and automobile accessories. Manufacturers had been asked to voluntarily display labels that provided information on an item's energy use, as well as a rating of the product's energy efficiency compared to other similar products. Standards for testing appliances were to be developed by the National Bureau of Standards (NBS) and for autos by EPA. Also, as noted earlier, FHA within the Department of Housing and Urban Development (HUD) had been directed to strengthen FHA insulation requirements for single and multifamily housing and to evaluate the extension of insulation standards to mobile homes. Furthermore,

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[9] U.S., Senate, Presidential Energy Statements, p. 24.

as cited in the 1971 message, all federal agencies had been ordered to develop programs to conserve energy, including programs in building design and construction[10] and in the procurement of energy consuming products, and to thoroughly account for the energy impacts of major agency actions.

But by 1973 it was recognized that the diffusion of these fledgling conservation programs in several federal departments and agencies was proving to be an impediment to the formulation of an effective conservation response. And since Congress had not acted on the President's proposal to create a single department level agency for energy matters, Nixon announced the establishment of the first major organizational mechanism to deal explicitly with conservation.

The Secretary of Interior was directed to create an Office of Energy Conservation within the Department of the Interior (DOI). The Office was given the authority to coordinate federal energy conservation programs, to conduct research on issues related to the need to reduce energy demand, and to work to educate the public on energy efficiency and costs. However, these organizational initiatives

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[10]Federal efforts to develop analytical techniques for predicting energy use in new buildings were already underway in a demonstration project being conducted by the General Services Administration (GSA) in Manchester, New Hampshire. Similarly, NBS was evaluating energy use in full size houses in its laboratories in Gaithersburg, Maryland. See U.S., Department of Commerce, Energy Conservation Programs at the National Bureau of Standards (Washington, D.C.: National Bureau of Standards, 1975), pp. 4 and 7.

at the executive level failed to eliminate the institutional chaos that had for so long characterized energy policymaking and conservation policymaking more recently. By mid-1973, confronting additional fuel shortages, the President decided to modify his earlier organizational arrangements by forming an Energy Policy Office (EPO) in the Executive Office. John A. Love, the Governor of Colorado, was appointed "energy czar" to direct the new energy office. EPO was to be responsible for identifying major energy problems, reviewing alternatives, making policy recommendations, assuring that agencies developed short- and long-range plans, and monitoring the implementation of approved energy policies.[11] Two additional actions were taken. First, the President reintroduced legislation to establish a Cabinet-level Department of Energy and Natural Resources (DENR)[12] which was to assume functions transferred from the Department of the Interior and several other federal agencies. Secondly, he proposed the establishment of a new independent agency, the Energy Research and Development Administration (ERDA),

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[11]"President Overhauls Energy Machinery," Oil & Gas Journal 71 (July 9, 1973): 34-36.

[12]U.S., Senate, Committee on Government Operations, To Establish a Department of Energy and Natural Resources, Energy Research and Development Administration, and a Nuclear Safety and Licensing Commission, Hearings (Washington, D.C.: Government Printing Office, 1974), pp. 401-440.

to focus on all federal energy research and development activities.[13]

Whereas the energy message of April 18, 1973, Nixon's second, had an underlying tone of optimism regarding the potential for voluntary energy conservation measures, the message by June of that year, though still based on voluntary actions, went beyond verbal persuasion. Three broad categories of users were addressed: the government, industry, and the public. Agencies of the federal government were given approximately one month to report on specific steps taken to meet a seven percent reduction in energy consumption anticipated over the next 12 months. Precise measures for conserving energy were left up to the department or agency heads; however, the following general guidelines were to be included:

1. Reduction in the level of air conditioning of all federal office buildings throughout the summer.

2. Reduction in the number of official trips taken by federal employees.

3. Purchasing or leasing of automobiles and other vehicles which provide good gasoline mileage.

OEC was directed to develop and implement a consumer information program on energy conservation.[14]

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[13] U.S., Senate, To Establish a Department of Energy and Natural Resources, pp. 441-468.

[14] U.S., Senate, Presidential Energy Statements, pp. 53-55.

For the private sector, the Secretaries of the Interior and Commerce and the head of the EPO were to meet with representatives of industry to discuss ways of reducing unnecessary energy consumption and to encourage their participation in developing long-term conservation plans. The Secretary of Transportation was directed to work with the Federal Aviation Administration (FAA) to reduce airline flight speeds and better plan the frequency of commercial flights.

Finally, the President appealed to the public to help reduce the level of national consumption by individual consumers by five percent. Among the measures suggested were many of those reported in the Office of Emergency Preparedness staff study discussed in the previous chapter--for example, raising thermostat settings on air conditioning by four degrees, and lowering winter home heating temperatures as much as five degrees, purchasing more energy efficient autos, carpooling to increase vehicle load factors, using mass transportation, and reducing driving speeds. Nixon concluded his remarks on conservation by stating:

> The conservation of existing resources is not a proposal; it is a necessity. . . I believe that the American people must develop an energy conservation ethic.[15]

Although the EPO had theoretically been given the lead in policymaking for energy, the Office was not given

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[15] Ibid.

the resources, authority, or staff to meet its mandated policy responsibilities. Because of these constraints, most of the Office's time was spent "fire fighting," dealing with short-term emergency situations which had developed by the fall of 1973. In fact, by November, a Cabinet-level committee--the Emergency Energy Action Group (EEAG)--was established to address supply-demand imbalances that had developed. Another group, the Energy Emergency Planning Group (EEPG), was given the task of providing policy analysis support to the EEAG.[16]

It was apparent that this country's problems of energy supplies and demands had developed into a full blown crisis. The immediate response was to declare a national policy goal of achieving "energy self-sufficiency." In a speech on November 7, 1973, President Nixon, assuming a strong executive role in the matter of reducing U.S. dependence on foreign imports, advocated a "Project Independence" in energy. Pending legislative approval of a new Federal Energy Administration, Executive Order 11748, of December 4, abolished the EPO and established a Federal Energy Office (FEO) to play an interim role in managing and coordinating energy policy. William Simon was named Director of FEO and nominated as FEA Administrator.[17]

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[16] Juan Cameron, "Reaching for an Energy Policy: Years of Drift, Weeks of Panic," Fortune 89 (January 1974): 76-77 and 158-159.

[17] Frank V. Fowlkes and Joel Havemann, "President Forms Federal Energy Body with Broad Regulation, Price

It is instructive to note that FEO differed substantially from its earlier counterparts (NEO, EPO) which had small staffs and little operational control over other federal energy organizations. FEO Administrator Simon pulled together a staff of over 3,000 people loaned from various other agencies performing specific energy functions.[18] In May, the Federal Energy Administration Act was signed into law[19] creating the FEA which was given responsibility for energy conservation and planning for Project Independence. Concerning its functional responsibilities in conservation, the FEA was charged with developiong and overseeing the implementation of "equitable" voluntary and mandatory conservation programs and promoting efficiency in the use of energy resources.[20]

Project Independence, which was initiated in March of 1974, included energy conservation and demand management among the broad strategic options available to the U.S. Most of the conservation measures considered in the Project Independence energy supply and demand model were derived from

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Control Powers," National Journal Reports 5 (December 8, 1973): 1830-1838.

[18]"Simon Heads New Federal Energy Setup," Oil & Gas Journal 71 (December 10, 1973): 50-51.

[19]Pub. L. 93-275.

[20]For a description of the development of the FEA and an evaluation of its performance, see Robert W. Rycroft, "The Federal Energy Administration: A Case Study of Energy Policy-Making," Ph.D. dissertation, The University of Oklahoma, 1976.

reports described in the last chapter. Major actions identified that could reduce demand growth to about 2.0 percent per year (close to the Ford Foundation's Technical Fix scenario) by 1985 included: standards for more efficient new autos, incentives to reduce miles travelled, incentives for improved thermal efficiency in existing homes and offices and minimal standards for new homes and offices, and switching existing power plants and industrial users from petroleum and natural gas to coal or coal-fired electric power.[21]

In evaluating the implications of these actions, the Project Independence report noted two important policy implications of conservation measures that formed the basis for much of the executive-congressional debate over what conservation programs are needed and how they should be implemented: (1) conservation requires intervention and regulation in previously free market areas, and (2) it results in increased nonmarket costs due to more limited individual choice and changed lifestyles.

However, as established, the FEA was not as powerful an organization as Nixon had proposed. Instead of giving the agency broad authority to deal with the energy shortage, Congress limited FEA's authority only to those powers it specifically granted.[22]

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[21] U.S., Federal Energy Administration, Project Independence, A Summary (Washington, D.C.: Government Printing Office, 1974), p. 9.

[22] Congressional Quarterly, Inc., Congress and the Nation, Vol. IV (Washington, D.C.: Congressional Quarterly, Inc., 1977), p. 218.

After assuming office when Nixon resigned, President Gerald Ford endorsed Nixon's proposal for the establishment of a massive energy research and development organization to lead in the development of new energy resources. In fact, the new President labeled legislation then before the Congress to establish such an agency as his top priority energy measure. Reflecting this commitment, he signed the Energy Reorganization Act of 1974[23] on October 11, the day after Congress passed it. The bill abolished the Atomic Energy Commission (AEC) and created an Energy Research and Development Administration (ERDA) to handle the majority of federal research and development projects. A new Nuclear Regulatory Commission (NRC) was formed to take over AEC's safety and regulatory responsibilities.

As originally reported from the House Government Operations Committee, the bill made no provisions for energy conservation activities. The one amendment (out of 12 suggested) accepted during the House floor debate was one which sought to strengthen the language calling for research and development of measures to conserve energy. Morris K. Udall (D-Ariz.) offered the amendment in an effort to clearly define for the agency a role in encouraging conservation. Benjamin S. Rosenthal (D-N.Y.) wanted to further elevate the position of conservation in ERDA's organizational structure

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[23]Pub. L. 93-577.

by dividing the responsibilities of the assistant administrator for environment, safety, and conservation by adding a new assistant administrator for energy conservation. Rosenthal argued that the problem of conservation was not directly related to environmental and safety policies and warranted an administrator with no other responsibilities. The amendment was rejected.[24]

But that was not the end of the request. The Senate Government Operations Committee reported S 2744--the counterpart of HR 11510--on June 27, 1974. The Committee made an extensive change in the initial proposal, emphasizing conservation by specifying that separate programs for energy conservation and environment and safety be provided. Thus, conservation was established as a distinct program area with its own assistant administrator. In Senate floor action, Howard Metzenbaum (D-Ohio) introduced an amendment which was passed by voice vote to direct the ERDA administrator to "publicize information on new technologies for energy conservation and new energy sources as they become available for general use."[25] This was intended to provide an informational link with the public and other interested parties. Both actions were adopted in the conference report that was finally approved.

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[24]Congressional Quarterly, Inc., Continuing Energy Crisis in America (Washington, D.C.: Congressional Quarterly, Inc., 1975), p. 101.

[25]Ibid., pp. 102-105.

ERDA and FEA were viewed as related agencies both essentially reporting to the President, both in theory under the control of the Energy Resources Council (ERC), also established on October 11. ERC was formed to ensure communication and coordination among federal agencies involved in energy-related activities and to develop and implement national energy policy. The Council consisted of the Secretary of the Interior, the director of the FEA, the ERDA Administrator, the Secretary of State, the Director of the Office of Management and Budget (OMB), and other federal officials. According to the legislation, ERC would terminate upon creation of a permanent department for energy or natural resources or within two years, whichever occurred sooner.

When compared to President Nixon's early proposals for an energy research organization, the 1974 Reorganization Act created an agency more oriented toward environmental protection, nuclear safety, and energy conservation than had initially been intended.[26] In addition, attempts by the Senate and House conferees to broaden the language of the bill beyond nuclear power concerns eventually resulted in confusion over the agency's relationship with several other energy organizations, principally in the areas of the environment and conservation.

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[26] Congressional Quarterly, Inc., Congress and the Nation, p. 219.

As established, both FEA and ERDA had been assigned major responsibility and authority for energy conservation programs. However, as late as 1976 no overall management philosophy for conservation policy was forthcoming. ERDA had been given the "lead agency" role in this respect, but no one in either the FEA or ERDA was quite sure how the responsibility for conservation should be divided.[27] In two major assessments of ERDA's programs and plan, the Office of Technology Assessment identified the need for clarification of ERDA's mandate in conservation.[28] The agency eventually responded by contending its role in conservation was to be that of research, development, and demonstration of potential energy efficiency improvements in the major consuming sectors.[29] FEA was to deal more with policy analysis--i.e, with social, economic, and institutional policy problems and issues, program implementation, and data needs for conservation.

Even so, ERDA's budgetary position as revealed in the fiscal 1976 statements reflected an unambitious position

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[27] Personal communication with representatives from ERDA and FEA, July 1975.

[28] U.S., Congress, Office of Technology Assessment, An Analysis of the ERDA Plan and Program (Washington, D.C.: Government Printing Office, 1975); and Office of Technology Assessment, Comparative Analysis of the 1976 ERDA Plan and Program (Washington, D.C.: Government Printing Office, 1976).

[29] Austin N. Heller, address delivered at the National Energy Conservation Forum, Fort Lauderdale, Fla., December 2, 1975. (Mimeographed).

with regard to functional programs in the conservation area. Out of a projected $4 billion budget, conservation research and development accounted for only $32 million, or less than one percent of the total. Of the $32 million, only $3 million (less than one-tenth of one percent of the total) was identified for end-use energy conservation R&D--i.e., for the development of new technologies which could reduce energy consumption in commercial and residential buildings and provide for more efficient home appliances.[30] The important point here is that these specific applications had been spelled out as a part of the assumptions in Project Independence's conservation strategy. Although successive ERDA budgets since 1975 incrementally increased conservation funds and the agency raised conservation R,D&D to top priority, the budget requests for conservation were generally criticized as not reflecting "a sense of urgency to achieve results (saved energy)."[31]

To some extent, ERDA's budgetary problems with regard to conservation were a reflection of the agency's overlapping responsibility with a number of other federal agencies. In addition to ERDA and FEA, approximately 25

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[30] Jerold W. Jones, "End-Use Energy Conservation Research and Development Program," in U.S. Energy Research and Development Administration Budget Estimates, Fiscal Year 1976 and Transition Period: A Brief Analysis, ed. Center for Energy Studies (Austin: Center for Energy Studies, The University of Texas at Austin, 1975).

[31] Office of Technology Assessment, Comparative Analysis of the 1976 ERDA Plan, p. 145.

other government organizations were involved in energy conservation activities as a result of congressional legislation or executive pronouncements during the period 1973 to 1975. Several of these agencies (e.g., HUD, DOC, and DOT) were identified in passing in the preceding discussion. Some of the conservation responsibilities initially assigned to these agencies have been transferred to the newly established Department of Energy and will therefore be discussed more fully in later sections. However, it should be noted that prior to the Carter Administration's reorganization, programs both in existence and in the developmental stages within the line agencies played a dominant role in the formulation and implementation of energy policy, generally, and conservation policy, specifically.

In extending the FEA expiration date under provisions of the Energy Conservation and Production Act of 1976,[32] Congress specifically mandated an executive branch review, and development of recommendations for reorganizing the federal government's energy agencies and programs. On March 1, 1977, the new Administration, under President Carter, sent to Congress legislation to create a permanent, Cabinet-level Department of Energy (DOE). The Department of Energy Organization Act (S 826) passed in 1977 consolidated three entire agencies (FEA, ERDA, and the Federal

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[32] Pub. L. 94-385. Provisions of this law are discussed below.

Power Commission) and fragments of several others, all dealing with energy-related matters.[33]

With regard to conservation, the post of Under Secretary for Energy Conservation was established, programs split between FEA and ERDA combined, authorities for building thermal efficiency standards in HUD and the voluntary industrial energy conservation programs in DOC were transferred to the Department, and an Office of Conservation and Solar Applications (CS) was formed (headed by an Assistant Secretary). In addition, the Secretary of Energy was given an advisory role in recommending goals in the auto fuel efficiency program in DOT. Thus, at least in statutory terms, energy conservation policies and programs were finally given an institutional home.

Then, in April the President unveiled his National Energy Plan (NEP)[34] in which he outlined a comprehensive strategy intended to achieve a significant reduction of oil imports by 1985. As announced earlier, conservation and fuel efficiency were the "cornerstone" of his Plan.[35] The

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[33] "New Energy Department Shaping Up in Congress," Oil & Gas Journal 75 (June 13, 1977): 19-22; and "Energy Reorganization," Energy Today 4 (March 1, 1977): 89-91.

[34] U.S., Executive Office of the President, The National Energy Plan (Washington, D.C.: Government Print-Office, 1977).

[35] J. Dicken Kirschten, "Conservation--The Cornerstone of Carter's Plans for Energy," National Journal 9 (February 26, 1977): 313-318.

NEP contained 10 "principles" which the Administration deemed necessary for the formation of a "sound context for energy policy" and to "provide its main guidelines."[36] As reviewed by one observer:

> There is very little within the detailed proposals or even the goals which can qualify as "new"--with the exception of two of the ten principles which are set forth to "provide a framework not only for present policies, but also for the development of future policies."
>
> Eight of the ten principles represent general findings already embodied in legislation currently in force . . .
>
> Two of the principles however represent fundamental changes as compared with national energy policies and assumptions of the past--the assertion that (1) the Federal Government should take the leading role in dealing with the nation's energy policy comprehensively and that (2) energy prices should generally reflect the true replacement cost of energy.[37]

As noted previously, energy policies traditionally had depended on the private sector and historically had been based on ensuring that supplies be made available at the lowest possible costs and prices. To begin to change this basis and to meet the goals outlined in the NEP, the Administration introduced, on the same day that it released the

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[36] Executive Office of the President, National Energy Plan, pp. ix-xiii.

[37] Frances A. Gulick, "U.S. National Energy Policy: The Federal Role," in Project Interdependence: U.S. and World Energy Outlook Through 1990, eds. U.S., House, Subcommittee on Energy and Power and Committee on Interstate and Foreign Commerce; and Senate, Committee on Energy and Natural Resources, and The National Ocean Policy Study of the Committee on Commerce, Science, and Transportation (Washington, D.C.: Government Printing Office, 1977), p. 104.

Plan, a draft of proposed legislation to the Congress. The National Energy Act[38] set forth numerous incentives and disincentives to promote conservation in the major consuming sectors and to address the issue of energy prices. For example, the legislation included: phased increases in gasoline taxes and a penalty tax on inefficient autos; rebates of gasoline taxes to consumers who purchased more efficient vehicles; economic inducements (taxes, investment credits) to encourage installation of insulation and other energy-saving devices in homes and buildings; systematic escalation of energy prices to more directly reflect the cost of producing new energy; and a well-financed public education campaign to encourage voluntary conservation. Many of these proposals had been formulated to deal explicitly with problems and issues in the residential and commercial, transportation, and industrial sectors which had proved intractable to conservation efforts in previous administrations. Although many of the Act's 113 initiatives went through Congress intact, including several of the conservation provisions, debate concerning natural gas price deregulation has stalled efforts to reach a consensus on the Carter energy legislation.[39] Since much

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[38]U.S., House, National Energy Act, Communication the President of the United States, House Document 95-138, 95th Cong., 1st sess., 1977.

[39]Steven Rattner, "Energy: Where Did the Crisis Go?" New York Times, April 16, 1978.

uncertainty still exists regarding what shape the final legislation will take, its conservation provisions and status will be discussed later in the sections which summarize the impacts of energy conservation policy to date and identify unresolved problems and issues in the consuming sectors.

The Role of Congress

Along side these organizational and administrative steps to reshape U.S. energy institutions and policy, the 93d and 94th Congresses were also active in energy matters. In the 93d Congress alone, more than 2,000 energy-related bills were introduced, including several hundred conservation measures.[40] However, few conservation bills proposed during 1973-1974 actually passed. Even so, two major energy-related activities were initiated in Congress, one in the House and one in the Senate, that were to eventually have far-reaching effects on national efforts to define conservation programs. First, Senate Resolution 45 adopted in May 1971 authorized the Senate Interior and Insular Affairs Committee and ex-officio members of the Committes on Commerce and Public Works and the Joint Committee on Atomic Energy to conduct an investigation and study of national fuels and energy policies. Pursuant to the resolution, the "national Fuels and Energy Policy Study" included

[40] U.S., Senate, Committee on Interior and Insular Affairs, Highlights of Energy Related Legislation in the 93d Congress (Washington, D.C.: Government Printing Office, 1975), p. 1.

the first congressional hearings ever devoted to the role of energy conservation. These hearings examined the nature of energy demand; explored the potential for reducing demand through conservation measures; and considered the economic, political, and social consequences of conservation alternatives. Summaries of reports identified in the previous chapter, the SRI document on consumption, and the OEP report on the potential for conservation, were included as background for the first day's hearings.[41] Testimony emphasized the "untapped potential" for energy conservation in transportation, housing, and the industrial sectors. Furthermore, the hearings underscored the climate of opinion regarding conflict between the executive and Congress. Claims were made by several congressmen to the effect that there was "little evidence (in 1973) of a serious commitment to energy conservation in the executive branch."[42]

In response, the Senate introduced The National Fuels and Energy Conservation Act in the belief that Congress needed "to assure that conservation plays a central role in national energy policy."[43] The bill, which outlined a sustained

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[41] U.S., Senate, Committee on Interior and Insular Affairs, Energy Conservation, Hearings, Part 1 (Washington, D.C.: Government Printing Office, 1973).

[42] U.S., Senate, Committee on Interior and Insular Affairs, Energy Conservation and S. 2176, Hearings, Part 2 (Washington, D.C.: Government Printing Office, 1973), p. 479.

[43] Ibid., p. 480.

energy savings strategy by government, passed the Senate but was subsequently killed in the House.

Similarly, in the House of Representatives, joint hearings before Subcommittees of the Committees on Government Operations and Science and Astronautics were held from May to July in 1973. These were also on the subject of conservation and the efficient use of energy.[44] The hearings resulted in over 2,000 pages of testimony and focused especially on the need to reduce energy waste by the public and in the consuming sectors. Mike McCormack, chairman of the Energy Subcommittee of the Committee on Science and Astronautics stated in the last day of testimony that the hearings had been very important. He went on to suggest:

> I believe they will serve as a solid base for drafting worthwhile legislation in the energy conservation area.
>
> I want to tell you (the committee witnesses) that the staff is already at work on the material that has been presented . . .
>
> We are preparing legislation in this area based on the information elicited at these hearings.[45]

But as of October 1975, aside from the reorganization acts introduced by the President, the 55-mph speed limit, and a few other relatively minor pieces of legislation on the demand side of the energy system, conservation remained the object of much rhetoric and a stepchild of

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[44]U.S., House, Committees on Government Operations and Science and Astronautics, Conservation and Efficient Use of Energy, Hearings, Parts 1-4 (Washington, D.C.: Government Printing Office, 1973).

[45]Ibid., Part 4, pp. 1505-1506.

supply-oriented proposals in Congress. Likewise, national energy policy legislation remained elusive. Recognition of this state of affairs is less important than an examination of its reasons. In assessing the lack of responsiveness to the accepted need for a comprehensive, coherent energy policy framework, two factors appear paramount: (1) fragmented jurisdiction over energy issues within the Congress, and (2) the ongoing debate between the Congress and the President regarding price increases to spur conservation behavior. Both of these factors will be summarized below as they significantly affected legislation passed by the 94th Congress.

Fragmented Jurisdiction. Energy issues, because they are inherently multifaceted, fall within the purview of several powerful committees in Congress. For example, a total of 10 Senate committees and 11 House committees are notably involved with energy conservation or related energy problems.[46] It is well known that disputes over jurisdiction among these committees, particularly on timely topics, is no small matter often resulting in lengthy debates and delays. Then, once jurisdictional disputes are resolved, the typical procedure is to break a single bill up into its

[46] Currently, Senate committees are Foreign Relations; Interior and Insular Affairs; Armed Services; Commerce; Public Works; Budget; Finance; Government Operations; Labor and Public Welfare; and Banking, Housing and Urban Affairs. On the House side of Congress, important energy committees are Interstate and Foreign Commerce; Science and Technology; Interior and Insular Affairs; Appropriations; Budget; Government Operations; Small Business; Public Works; Ways and Means; Banking and Currency; and Foreign Affairs.

component parts with each part considered by a different committee.[47] After being reported out of committee, coordination requirements between the House and Senate for joint conferences on similar bills are equally complex and time-consuming.

This fragmented committee system in the Congress proved especially problematical for dealing with energy issues partly because committee jurisdiction had been established before energy became an important public policy issue, and because many of the initiatives from Presidents Nixon and Ford demanded that Congress consider a variety of objectives and policy tools as a package.[48] For example, the Ford Administration's Energy Program was spelled out in a single omnibus act, The Energy Independence Act of 1975, which included some 13 interrelated titles. Congress responded by sending the separate titles of the bill to four House committees and nine Senate committees.[49] This sort of ad hoc consideration of energy bills resulted in several attempts to centralize responsibility for energy legislation, particularly in the House, but the existing

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[47] For elaboration on the congressional committee process, see Lewis A. Froman, The Congressional Process: Strategies, Rules and Procedures (Boston: Little, Brown and Co., 1967).

[48] Thomas H. Tietenberg, Energy Planning and Policy (Lexington, Mass.: Lexington Books, 1976), pp. 100-101.

[49] Elder Witt and Tom Arrandale, "Energy Policy: 'Overestimating the Capability of Congress'?" Congressional Quarterly Weekly Report, June 28, 1975, p. 1343.

committee system proved to be too strongly entrenched to give way to significant reform.[50]

Partisan Conflict over Policy Tools. The second impediment to congressional responsiveness to energy issues in the 94th Congress centered on Democratic opposition to the Ford plan with regard to the use of price increases to encourage conservation. This was not, however, a new concern. The 93d Congress had closed with no agreement as to what to do about high and rising energy prices.[51] Following the lead of the Nixon Administration, President Ford's conservation strategy was based on still higher energy prices: "If energy were more expensive, his reasoning ran, production would be encouraged--and so would conservation."[52]

Arguing that Congress had failed to enact tax measures or incentives sufficient to encourage long-term conservation or reduce import vulnerability, the Administration called for additional tariffs ($3 per barrel) on imported oil and sought to lift federal controls holding down the price of domestic oil. A joint task force of Democrats, headed by Representative James Wright (D-Tex.) and Senator

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[50] Tietenberg, Energy Planning and Policy, pp. 102-104.

[51] U.S., Senate, Highlights of Energy Related Legislation in the 93d Congress, p. 24.

[52] Congressional Quarterly, Inc., Congress and the Nation, p. 233.

John Pastore (D-R.I.), although hard pressed to formulate a viable alternative to the President's plan, eventually responded with a plan that recommended mostly conservation measures. It was intended to be "less damaging to the already weak economy and less painful for the already pressed consumer."[53] While the Democratic energy program did contain measures that would have increased prices (e.g., through a five cents a gallon increase in the federal gasoline excise tax and a graduated tax on inefficient autos), a task force included policy measures to combat inflation and prevent excess profits in the oil industry.[54] Debate over the plan and subsequent variations thereof, as well as opposition from Republicans who opted for the President's plan, resulted in a stalemate that prevailed both within the Congress and between the President and Congress during most of 1975.

In sum, the central factor in the deadlock was the Administration's "conservation-by-price" philosophy compared to the Democrat's reluctance to adopt measures that would result in higher energy prices to consumers. The comments of Representative Henry A. Waxman (D-Calif.) highlight this difference of opinion:

> The President's response to our growing dilemma has been to impose periodic increments on the petroleum import tariff, an approach which only

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[53] Ibid.

[54] Peter Milius, "Democrats Set Energy Plan," Washington Post, February 28, 1975.

> places a higher price on the already unacceptably high price of foreign petroleum. This policy is not only terribly inflationary and socially inequitable, but ineffective in encouraging the conservation which is required. Unless we act decisively, the President's current policy . . . will be allowed to stand, by default, as our country's response to the energy crisis.
>
> The President has stated that his tariff is designed to provoke Congress into action on solving the energy crisis. At the same time he has attacked our alleged inaction. The tragic effect has been to politicize and divide, instead of unifying and progressing together. Although this may be politically advantageous to the President, it is an advantage which has been exacted to the detriment of the American people.[55]

More specifically with regard to conservation, Representative William S. Moorhead (D-Penn.) argued that congressional inactivity stemmed from ineffective national leadership:

> While a great deal of lip service has been given to energy conservation by the administration, the overall Federal energy conservation effort remains fragmented and uncoordinated. Unfortunately, we have no lead agency for energy conservation. There has been very little effort directed at informing the public of the critical importance of conservation to the economy, to our national security, and to the environment. The administration has relied too heavily on the hope that voluntary conservation would result from higher energy cost and not enough on public education as to why conservation is important and how it can be accomplished.[56]

Congressman Moorhead went on to state: "I am optimistic that the proper mix of public education, research and development,

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[55]U.S., House, Representative Henry A. Waxman speaking on the need for energy conservation, Congressional Record, July 14, 1975, p. 6781.

[56]U.S., House, Representative William S. Moorhead speaking on the need for energy conservation, Congressional Record, July 14, 1975, p. 6779.

and government regulation aimed at energy conservation will lead to a wiser allocation of domestic energy resources, decreased dependence on foreign resources, and a cleaner environment."[57]

Although numerous other comments and cases could be brought to bear on the congressional-executive debate which during 1975 had essentially blocked every effort to produce a major energy conservation act, the important fact is the lack of consensus resulted both from internal congressional problems and fundamental conflicts over policy tools. Yet, the debates during the 93d and 94th Congresses were the foundation for a major reassessment of historical assumptions concerning the federal role in influencing domestic energy prices and consumption of energy, a reassessment that is still underway. Moreover, the debates reflected national efforts to achieve a consensus regarding the emerging role of conservation in the U.S. energy future.

The Energy Policy and Conservation Act. A consensus of sorts was finally reached in late 1975 with the passage of the Energy Policy and Conservation Act (EPCA).[58] This act was essentially the first major attempt by Congress to promote conservation. Titles II and III of the legislation combined a number of pieces of conservation bills that had already passed the Senate or House earlier in the year.

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[57] Ibid., p. 6780.

[58] Pub. L. 94-163.

Table V-1 summarizes the federal role and major responsibilities delegated to the states as defined by EPCA. As shown, the act reflected Congress' unwillingness to use higher prices to reduce energy use, relying instead on voluntary and mandatory conservation programs. In addition, the legislation was intended to decentralize and share much of the responsibility for achieving national conservation goals by providing financial incentives to states to voluntarily develop and implement energy saving plans and programs.

The Energy Conservation and Production Act. The second, and most recent, congressional statement of conservation policy came with the passage of the Energy Conservation and Production Act (ECPA) of 1976.[59] Although initially intended as a House bill to extend the life of the FEA, which as noted earlier has been established as a temporaru crisis agency with conservation responsibility, ECPA was transformed by the Senate into full-fledged energy policy legislation. As depicted in Table V-2, it substantially supplemented the 1975 EPCA with additional conservation assistance measures and programs. The most controversial provision was the requirement that HUD develop federal performance standards (to take effect sometime in 1981) for energy efficiency in all new commercial and residential buildings. Although many different bills in both the House and Senate during 1975 had

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[59]Pub. L. 94-385. For an example of the optimism surrounding this bill's passage, see Edward Cowan, "A Start Toward Energy Conservation," New York Times, October 24, 1976.

TABLE V-1

MAJOR CONSERVATION PROVISIONS OF THE ENERGY POLICY AND CONSERVATION ACT OF 1975

Standby Authorities (Title II)	Authorized the President to prescribe national energy conservation and gasoline rationing plans subject to approval by both chambers of Congress in emergency situations.
Automobile Efficiency Standards (Title III)	Required that after 1977 the average fuel economy of passenger cars (manufactured or imported) by any one manufacturer be no less than: 18 miles per gallon in 1978 19 miles per gallon in 1979 20 miles per gallon in 1980 27.5 miles per gallon in 1985 and succeeding years.
	Required labeling of cars manufactured or imported after 1976 to show fuel economy performance.
Implementation/ Monitoring	Department of Transportation
Enforcement	Penalties and credits based on amount in which a manufacturer's average fleet fuel economy exceeds standard for any one year.
Consumer Product Efficiency and Labeling	Provided for an energy testing, labeling, and standards program for major appliances.
	Set efficiency targets designed to achieve an aggregate improvement of at least 20 percent in efficiency by 1980 over 1972 products.
Implementation/ Monitoring	Federal Energy Administration
Enforcement	Required Federal Energy Administration to set enforceable standards for products which failed to meet identified targets.

TABLE V-1--continued

State Conservation Programs	Authorized $150 million over three years (fiscal 76-78) for use by the Federal Energy Administration to help states develop and implement conservation plans and programs to reduce their consumption by five percent below the expected level for 1980. Participation was to be on a voluntary basis; however, the following elements were mandatory in any state plan for the state to receive federal funds: thermal standards for buildings; lighting efficiency standards; energy efficiency standards; energy efficiency procurement standards; transportation measures, which included right-turn-on-red and carpools.
Other Programs	Directed the Federal Energy Administration to set voluntary energy efficiency improvement targets for the 10 most energy-consumptive industries in the U.S. Directed the President to develop and implement a 10-year energy conservation plan for the federal government.

TABLE V-2

KEY CONSERVATION PROVISIONS OF THE ENERGY CONSERVATION AND PRODUCTION ACT OF 1976

Supplement to the Energy Policy and Conservation Act of 1975	Authorized additional appropriations for states participating in EPCA conservation programs. Contingent upon implementation of new mandatory requirements in state plan: public education program on energy saving measures; effective intergovernmental coordination of conservation programs; encouragement and implementation of state energy audits.
Energy Information	Established an Office of Energy Information and Analysis within the Federal Energy Administration to facilitate the analysis of supply and demand as a basis for the agency, Congress, and other policymakers.
Utility Rate Design	Directed the Federal Energy Administration to develop proposals for improving electric utility rate design to be submitted to Congress.
Thermal Efficiency Standards for Buildings	Directed the Department of Housing and Urban Development to develop federal performance standards for energy efficiency in all new commercial and residential buildings.
Weatherization Program	Authorized the Federal Energy Administration to make grants to states and Indian tribes, to local governments, and to community action agencies in a state not participating in the voluntary conservation program, for insulation and other weatherization investments in residences occupied by low-income persons.

TABLE V-2--continued

Conservation Demonstration Program	Directed Housing and Urban Development to undertake a national energy conservation and renewable resources demonstration program for existing buildings.
	Authorized Housing and Urban Development to use grants, loans, subsidies, and loan guarantees to encourage the use of proven conservation measures.
Loan Guarantee Program	Provided authority for the Federal Energy Administration to guarantee loans to corporations, institutions, governments, and other eligible borrowers to finance energy conservation or renewable resource measures for industrial goals or to otherwise improve the efficiency of the large-scale use of energy.

endorsed the development of thermal efficiency standards for new buildings, those Congressmen opposing such standards and lobbyists for the building industry had effectively blocked adoption of the bills. The National Association of Counties and the National League of Cities contended that the standards, which would prescribe minimum amounts of insulation to be used in construction, foreshadowed the imposition of a national building code.[60] These groups also contended that advances already being made by states and localities negated the need for federal intervention. In addition, groups such as the National Association of Home Builders, the Mortgage Bankers Assocation, and the U.S. Chamber of Commerce "looked upon the . . . bill for enforceable standards as one that could entangle builders in more red tape and drive up the already high cost of housing."[61] Yet, many in Congress believed that the measures were needed to ensure the implementation of the nation's emerging conservation policy. They were strongly supported by the American Institute of Architects, the National Conference of State Legislators, and several environmental groups that had for years been pushing for a national conservation policy. The Sierra Club and the Environmental Policy Center urged Senator William

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[60] Luther J. Carter, "Energy Conservation: Congress Acts on Building Standards," Science 193 (August 27, 1976): 749.

[61] Ibid.

Proxmire (D-Wis.) and his colleagues on the Banking, Housing, and Urban Affairs Committee to hold the line on sanctions to enforce building standards.[62]

Congress also demonstrated in 1976 its willingness to increase appropriations for non-nuclear energy programs. The lack of direction in energy conservation programs had been consistently reflected in ERDA's energy budget as noted earlier. The House Science and Technology Committee increased the President's conservation budget proposals for 1976 by almost $83 million, restoring funds cut from ERDA's request by the Office of Management and Budget. The boost in conservation funding was distributed among five of ERDA's conservation programs: energy storage, buildings, industrial, transportation, and improved conversion efficiency for power plants.

The Committee also authorized $10 million for the establishment of an Energy Extension Service Program within ERDA "to provide for technical assistance, instruction, information dissemination and practical demonstrations in energy conservation opportunities."[63] The program was to

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[62]As it turned out, the Senate compromised on the sanctions provision in the legislation to break a deadlock over imposition of the standards--i.e., Congress deferred decision on the sanctions until the time when the standards are promulgated by Housing and Urban Development.

[63]U.S., House, Conference Report, Authorizing Appropriations for the Energy Research and Development Administration (Washington, D.C.: Government Printing Office, 1976), p. 29.

be modeled after the Department of Agriculture's cooperative farm extension service to provide assistance at the local level. Although actual appropriations were delayed, ERDA began developing the program on an experimental basis, involving pilot programs in 10 states.

Federal-State Sharing of Responsibility

Another important factor in the conservation policy system stems directly from efforts to implement both the Energy Policy and Conservation Act and the Energy Conservation and Production Act. The pattern of federal-state sharing of conservation authority and responsibility has resulted in conflicts, especially over the formulation of policy objectives. In general, these conflicts revolve around states' claims that mandatory provisions dictated by the federal government do not adequately account for state-specific and regional differences, and that the lack of cohesiveness among conservation agencies at the federal level impedes state initiatives.

These claims have been summarized by Edward L. Helminski, Director of Energy Programs of the National Governors' Conference in a recent report:

> [T]he states have expressed . . . concerns about the need to revamp various aspects of the Federal energy structure. Of particular significance to the States is that the present structure almost completely disregards the States as a functioning unit of a Federal energy organization and provides almost no

> mechanisms for State policymakers to participate in the energy decision-making forum.[64]

Helminski suggests further that the performance of federal energy conservation programs has been "lackluster," and this can be attributed in part to the omission of institutional arrangements for a coordinated state-federal response.[65]

In this country's federal system, the states historically have been called upon to implement and enforce programs in substantive policy areas. Usually the federal government has intervened by providing funds to encourage state development of programs, typically premised on grounds that the state develop some specific forms of regulation for dealing with identified national problems.[66] Within the context of recent environmental and energy problems and issues, states have begun to press for a more substantial policy formulation role.[67]

When FEA first began developing its program to further conservation goals, the agency cooperated closely with the

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[64] Edward L. Helminski, "State Perspectives on the Organization of the Proposed Department of Energy," in U.S., House, Project Interdependence, p. 563.

[65] Ibid., pp. 563-564.

[66] See, for example, Daniel J. Elazar, ed., The American System (Chicago: Rand McNally, 1966). See also, Charles O. Jones, "Federal-State-Local Sharing in Air Pollution Control," Publius 4 (Winter 1974): 69-85.

[67] For a discussion of this trend, see Irvin L. White et al., Energy from the West: Policy Analysis Report (Washington, D.C.: U.S., Environmental Protection Agency, forthcoming), especially chapters 1 and 2.

National Governors' Conference. In fact, the initial framework for sharing responsibilities was developed by the FEA jointly with representatives of five states. The voluntary federal-state program as conceived by mid-1975 relied heavily on the active participation of states in the early analysis of state energy use to determine what conservation goals were most applicable for each state. FEA was to provide basically technical assistance.[68]

As shown earlier in Table V-1, Title III of the EPCA gave FEA the authority to establish guidelines for the formulation and implementation of state conservation plans. Although the legislation reflected many of the basic concepts outlined earlier in the year by FEA and the Governors' Conference, it was different in two basic ways. First, funds authorized to the states were contingent upon state acceptance of federally-defined conservation objectives. And secondly, these objectives included specific, mandatory conservation actions that states had to include in their plans. These actions were subsequently followed in 1976 by the passage of the Energy Conservation and Production Act which added more mandatory measures that had to be incorporated in state programs if they wished to participate in the federal program and to receive financial assistance.

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[68]Laurence H. Martin, "The Role of Government in Causing Energy End Use Efficiency--An Overview," in Energy Use Management, Vol. II, eds. Rocco A. Fazzolare and Craig B. Smith (New York: Pergamon Press, 1977), p. 484.

Since the adoption of this framework for the states' response, representatives of the National Governors' Conference have contended that not only did Congress fail to consider many state priorities and needs, but also that many of the mandatory requirements would actually do little to save energy in some states (e.g., right-turn-on-red in sparsely populated rural communities).[69] More generally, states suggest that the current program does not allow sufficient flexibility to address unique state climatic, geographic, and economic conditions. Both the Governors' Conference and the National Conference of State Legislatures have called for the strengthening of intergovernmental capacity in the newly established Department of Energy to facilitate state involvement in all stages of the conservation policymaking process, from policy formulation to program development and implementation.[70]

Confronting this political opposition, FEA and the Congress did not insist on immediate compliance by participating states. Of the $150 million in assistance funds available between 1976 and 1978, only $74.5 million had been disbursed by April 1978. Despite its relatively slow

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[69] Quonnie Laughlin, "Federal Energy Conservation Programs: A State Perspective," in U.S., House, Project Interdependence, p. 581.

[70] Helminski, "State Perspectives," in U.S., House, Project Interdependence, pp. 562-563; and National Conference of State Legislatures, Goals for State-Federal Action (Washington, D.C.: National Conference of State Legislatures, 1977), pp. 22-23.

start, it appears that the program is resulting in state energy savings. With a majority of states participating, plans show consumption reductions ranging from four percent in Alaska to almost 10 percent in Wisconsin. The expected energy savings by 1980 is approximately one billion barrels of oil.[71] It is instructive to note, however, that only 15 percent of the projected savings will result from implementation of the controversial mandatory conservation requirements.[72] This suggests that states have gone considerably beyond the federal initiatives in an effort to demonstrate their capability to define state-specific conservation needs and retain decision-making authority in this policy area. It also implicitly suggests that the issue of federal-state sharing in conservation programs is far from being removed.

The Impacts and Current Status of Policies and Programs

Although administrative problems and questions about appropriate organizational techniques and intergovernmental relations are important, an assessment of the social and political context for conservation policy must come to grips with the impacts of conservation innovations among the public. This necessitates examining changes in public and private sector values and behavior towards energy

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[71] Janet Raloff, "States, with Federal Help, Expect to Trim Energy Use 5% in 2 Years," Energy Research Reports 4 (April 17, 1978): 4-5.

[72] Ibid., p. 4.

conservation, bringing us back to questions of appropriate strategies for implementing conservation within the three major energy consuming sectors. The remainder of this chapter focuses on the impacts of existing or pending conservation policies and programs. Emphasis is placed on identifying social, economic, and political barriers to conservation as well as identifying unresolved problems and issues. As in the preceding discussion, the purpose is to further understanding of the policy system--i.e., parties-at-interest and current institutional arrangements for dealing with problems and issues.

Drawing on the discussion up to this point, Table V-3 summarizes conservation programs and strategies implemented or pending as of early 1978. It utilizes the five categories of strategies identified in chapter IV. The purpose of the table is not to specify actual programs by name, rather to depict the general shape and pattern of conservation efforts for the three consuming sectors. A review of the table indicates that efficiency improvements have received the greatest attention within emerging conservation policy. This is especially the case since the distinction between efficiency improvements and reducing wasteful practices is often tenuous. On the other hand, curtailment strategies are not being relied upon as feasible responses to fuel shortages. Given the fact that conservation as a public policy concern is only a few years old, the list appears impressive.

TABLE V-3

SUMMARY OF CONSERVATION STRATEGIES AND PROGRAMS
IMPLEMENTED OR PENDING AS OF EARLY 1978

Conservation Strategy	Energy Consuming Sector: Residential-Commercial	Energy Consuming Sector: Industrial	Energy Consuming Sector: Transportation
Improving the efficiency of end use	.Development of thermal performance standards for new buildings .Lighting efficiency standards .Voluntary appliance efficience standards .R,D&D on total energy systems and energy use for residences and buildings (e.g., integrated utility systems and heat pumps) .Weatherization of residences for low-income persons .Insulation tax credits .Conservation loan guarantees for large-scale energy users .Voluntary state programs	.R,D&D to improve efficiency of industrial processes and electric power plants .Voluntary state programs .Promotion of cogeneration .Conservation loan guarantees	.Mandatory mileage performance standards .R,D&D for all motor vehicles and propulsion systems .Voluntary state programs .Tax penalties for ineffective autos

TABLE V-3--continued

Conservation Strategy	Energy Consuming Sector: Residential-Commercial	Industrial	Transportation
Reducing wasteful practices	.Retrofitting existing buildings .Labeling of appliances to describe energy efficiency .Public awareness and education programs .State/local energy extension pilot program	.Introduction of energy accounting and audits undertaken by private sector .Voluntary efficiency targets for the nation's 10 most energy-consumptive industries .International technology sharing program .Management training and energy awareness programs established by private sector	.55 mph speed limit .Public awareness and education programs .Voluntary state programs for right-turn-on-red, carpooling, vanpooling .Labeling of vehicles to show gasoline efficiency .State/local energy extension pilot program
Shifting to less energy intensive activities	.Recycling initiatives at state/local level .Solid waste resource recovery program	.Recycling initiatives by industry .Initiatives by various manufacturers to monitor energy equivalency of materials used in manufacturing process and where feasible to make substitutions	.Assistance for mass transit systems .Federal assistance to railroads to encourage increased freight and passenger loads .Introduction of smaller autos by private sector

TABLE V-3--continued

Conservation Strategy	Energy Consuming Sector		
	Residential-Commercial	Industry	Transportation
		.Demonstrations of electric utility rate reforms to conserve energy, such as peak load pricing	
Fuel and resource substitution	.Demonstration projects for solar heating and cooling applications and for other renewable resources (e.g., refuse incineration, and wind energy) .District heating	.Mandatory programs to shift certain industries from the use of oil and gas to coal .Programs to encourage waste heat utilization	.R,D&D for electric and hybrid vehicles .Voluntary state/local programs (e.g., bikeways)
Curtailment	.Standby emergency authority for President and Congress to prescribe conservation actions	.Standby emergency authority for President and Congress to prescribe conservation actions	.Emergency gasoline rationing authority vested in President and Congress

However, as will be shown, policy results in many cases have not been as substantial as the measures taken would suggest.

The Residential and Commercial Sector

Since buildings have been shown to require a tremendous amount of energy to operate, it is logical that a large share of policy attention has been given to planning and constructing more energy efficient buildings and retrofitting existing structures. Indeed, anyone familiar with the conservation literature aimed at this sector recognizes there is no paucity of conservation ideas in buildings. Instead, the unresolved problems and issues center on the application of these strategies, on getting the architects, planners, builders, suppliers of materials, money-lending institutions, and policymakers to work together.[73] Although technical and economic innovations have been prescribed, institutional resistance remains.[74] Two cases help to clarify the nature of this resistance--appliance labeling and building standards.

First, as noted earlier, the Energy Policy and Conservation Act (EPCA) of 1975 requires that major household

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[73] Norman Metzger, Energy: The Continuing Crisis (New York: Thomas Y. Crowell Co., 1977), p. 185.

[74] See Alan Hirshberg and Richard Schoen, "Barriers to Widespread Utilization of Residential Solar Energy: The Prospects for Solar Energy in the U.S. Housing Industry," Policy Sciences 5 (December 1974): 453-468.

appliances bear labels describing their energy efficiency.[75] The provisions of EPCA codified voluntary programs which had been formulated within the Department of Commerce during 1973-1974. The purpose of the labeling program is to cause manufacturers to provide energy use information to consumers at the "point-of-sale" and to encourage consumers to purchase more energy efficient products. Extensive testing procedures, labeling requirements, and procedures for promulgation of efficiency standards have been established. Similar steps to educate the public with regard to its purchasing habits for these appliances are critical, but receive less well-defined attention in the act. Strategies to encourage energy saving purchases have been left largely to the discretion of the Department of Energy. If these are to be effective in changing consumer preferences and decisions, they will require close cooperation with industry trade associations and the manufacturers themselves. And since the target date for the standards is 1980, timing is also significant--i.e., since the average life time of most major appliances is 10-20 years, it would be 1990 or 1995 before labeling programs produce noticeable impacts on national consumption, assuming full compliance.

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[75]Consumer products covered by the act include: refrigerators, refrigerator-freezers, freezers, dishwashers, clothes dryers, water heaters, room air conditioners, home heating equipment (not including furnaces), television sets, kitchen ranges and ovens, clothes washers, humidifiers and dehumidifiers, central air conditioners, furnaces, and others as deemed appropriate by the Department of Energy.

Secondly, R,D&D is underway to develop mandatory thermal performance standards for new residential and commercial buildings. The Department of Housing and Urban Development (HUD) was authorized in 1975 to develop the standards within three years. As of February 1977 HUD had not received the necessary funds to do so, but it does appear that standards acceptable to relevant participants may be forthcoming by 1979. As described earlier, Congress compromised with the lending institutions and building trade groups by deferring enforcement sanctions with respect to the standards. Full implementation will undoubtedly depend on whether federal sanctions now in the law in conditional terms will be approved when the efficiency requirements are promulgated.[76]

Strategies to retrofit existing structures also need to be considered. Insulation tax credits for homeowners and businesses have recently passed both the House and Senate and should serve as an incentive for the addition of new insulation, weather-stripping, storm windows and doors, and fuel saving devices such as electric furnace igniters (instead of gas pilot lights) and thermostat timers to automatically regulate space conditioning in buildings. Similar tax credits have been proposed (and in some cases adopted by states) for solar space heating and solar water heating installations. The goal of the Carter energy plan is to retrofit 90 percent of American homes by 1985. At this

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[76] Carter, "Energy Conservation," p. 748.

point the goal falls into the category of voluntarily reducing wasteful practices. The only direct funds that have been appropriated are targeted to weatherizing the homes of low-income persons. Clearly, implementation is based on a strong private sector role in marketing the materials and devices to save energy. But as pointed out by one source:

> [T]he marketplace alone has been unable to convince large numbers of consumers of the advantages of true conservation. Too small a percentage of the population understands that insulation is a worthwhile investment.[77]

The Administration has indicated if the 1985 retrofit goal is not met, then legislation might be asked for that would require a house to be retrofitted with insulation whenever ownership is transferred.[78]

In addition to these incentives, a substantial R,D&D component has been aimed at buildings. Primary responsibility for this effort now lies with DOE. Program elements are focused on maximizing the quantity and rate at which energy efficient (and economically feasible) technologies can be transferred into the market. Part of DOE's responsibility in this area is to support the development of the thermal standards for new buildings. Again the fundamental barriers are public and institutional acceptance of new technologies

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[77] W. R. Goodwin, "Energy Conservation: The Need for a Strong Federal Program," National Journal 8 (April 3, 1976): 456.

[78] U.S., Senate, Committee on Energy and Natural Resources, Impacts of the National Energy Plan: Hearings (Washington, D.C.: Government Printing Office, 1977), p. 28.

or ideas. Even though the average payback period for energy-saving measures, for example, retrofit materials, may be only three or four years, that fact alone may not convince consumers that a higher "first-cost" is warranted.[79]

Besides these consumer and marketplace impediments, existing programs in the buildings area are further constrained by the structure of the housing industry. A report to the Energy Policy Project of the Ford Foundation stated:

> Taken as a whole, the industry can be characterized as an activity which is largely fractionalized, involving many small operators and consumers; undercapitalized and therefore a captive of national economic cycles; operating in a very powerful, somewhat unique and frequently difficult labor environment; carrying on relatively little research and development in comparison to other industries of its size; largely reinventing the specific team of participant actors to carry out each specific construction project; and, due to all these attributes, comprising an extremely risky section of the U.S. economy.[80]

And yet, probably the most striking feature of the construction industry is its fragmented nature. It is broken up into "sub-markets" which specialize in different building-types (e.g., residential, commercial, industrial, recreational, educational, health care, and other specialized buildings).

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[79] Paul P. Craig, Joel Darmstadter, and Stephen Rattien, "Social and Institutional Factors in Energy Conservation," in Annual Review of Energy, Vol. 1, ed. Jack M. Hollander (Palo Alto, Calif.: Annual Reviews, Inc., 1976), p. 537.

[80] Richard Schoen, Alan Hirshberg, and Jerome Weingart, New Energy Technologies for Buildings: Institutional Problems and Solutions (Cambridge, Mass.: Ballinger Publishing Co., 1975), p. 38.

Furthermore, the industry is literally enmeshed in construction codes, building ordinances, and zoning regulations which emanate from every jurisdictional level of government. Any deviation from the technical specifications contained in these building codes must be approved by each authority with any relevant jurisdiction.[81]

Consequently, conservation innovations are being introduced into an environment that requires substantial changes not only in the way things have always been done but in the highly technical specifications as to what materials should be used. In essence, conservation ideas and devices increase the already risky housing ventures. Within this risky environment agents of the construction industry are not easily motivated to change--to implement new techniques or technologies where the client has not demanded them.[82] Because the industry is first-cost oriented, if new products or techniques, such as solar water heating and space conditioning, or integrated total energy systems, are to replace those which have enjoyed widespread acceptance for some time, the new products must be "almost immediately competitive."[83]

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[81]Metzger, Energy, p. 186.

[82]See Richard P. Geyser, "The Need for Organized Building Processes," paper presented at the American Society of Civil Engineering Annual Meeting and National Meeting on Structural Engineering, Pittsburgh, Pa., September 30-October 4, 1968.

[83]Schoen, Hirshberg, and Weingart, New Energy Technologies for Buildings, p. 39.

By and large, government's response to these conditions has been to encourage demonstration projects in the hope that new ideas, when proven, will be accepted and adopted by industry. During 1974-1976, the National Bureau of Standards, supported in part by the FEA, HUD, and ERDA, collaborated with the General Services Administration in the design and evaluation of a demonstration office building in Manchester, New Hampshire, and cooperated with the city of New York's City Board of Education (under a National Science Foundation grant) to develop an energy efficient public school building.[84] Similar projects have been promoted and well-financed for solar applications. The potential for transferring innovations that result from these demonstrations, largely planned and financed by the public sector, has been questioned by a number of authoritative sources.[85] Norman Metzger states: "I can find no examples of any (demonstration houses) that have worked; i.e., convinced the industry to change its ways."[86]

Monsanto's "House of the Future" displayed at Disneyland during the late 1960s, where millions of people viewed the structure, apparently "did not impress the housing

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[84]Department of Commerce, Energy Conservation Programs, pp. 4-5.

[85]For an excellent summary of public-private sector relations generally in this regard, see Mary R. Hamilton, "Energy Policy and Changing Public-Private Sector Relations," Policy Studies Journal (Summer 1978, forthcoming).

[86]Metzger, Energy, p. 186.

industry."[87] As summarized succinctly by Hirshberg and Schoen, the Monsanto House:

> . . . was simply an unreal demonstration in housing industry terms. Its structure and enclosure of reinforced fiberglass components did not conform to any building code specifications at that time nor were there on-site trades skilled in the use of the material for these purposes . . .[88]

With no promise of a significant, aggregated market, the house was viewed as an unacceptable business risk. Indeed, would a market materialize? Would anyone accept such an exotic, but unorthodox, design?

Thus, the success of conservation strategies in this sector will depend on more effective processes of interaction and integration between the public and private sectors. Given the fragmented nature of the housing industry, the introduction of new technologies and techniques will require long lead times and focused attention on implementation. Finally, existing conservation strategies need to better address the overall buildings problem, including research, development, innovation, implementation, and public acceptance.

The Industrial Sector

The impacts and barriers to conservation policies and programs in the industrial sector are not as susceptible to generalization as those in the residential and commercial

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[87] Ibid.

[88] Hirshberg and Schoen, "Barriers to Widespread Utilization of Residential Solar Energy."

sector. This is due in part to the diverstiy of industrial energy uses as described in Chapter III. It is also because different industries have reacted differently to the changed circumstances in energy--i.e., some have moved to implement energy saving technologies as a result of fuel shortages and higher prices, and others have bolstered their own internal research and development programs to uncover useful energy saving ideas and techniques. Government programs have relied heavily on industry's ability to put its own house in order. With these caveats in mind, the discussion here focuses generally on the results of government strategies to encourage industry's self-interest in conservation. It specifically deals with conservation via two important initiatives--industrial cogeneration and district heating--and offers some conclusions concerning the effectiveness of the current voluntary emphasis/status of industrial programs.

Unlike the housing industry, a majority of manufacturing industries typically control large shares of their respective markets. Likewise, manufacturing processes are generally highly automated and therefore tied closely to large-scale energy use, and, in the face of rising prices, to increased efficiency. But efficiency is in this case quite industry specific, depending on each industry's own economics, processes, and markets.[89]

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[89] Metzger, Energy, p. 193.

Prior to the establishment of the DOE, the National Bureau of Standards had been primarily responsible for supporting Commerce's Voluntary Industrial Energy Conservation Program. The Bureau, working closely with DOC and FEA, was assisting industry by developing and promoting methods to reduce total energy use, to prevent energy losses, and to encourage the use of waste heat generated in industrial processes and systems. Because of the great potential of waste heat utilization, and therefore fuel savings, both President Carter and Energy Secretary James Schlesinger are interested in the concept of cogeneration (the use of waste steam heat from industrial processes to produce byproduct electricity). The National Energy Plan seeks legislation to encourage this conservation strategy.

Obstacles to the widespread acceptance of industrial cogeneration are institutional and economic rather than technical. As stated in the Energy Policy Project report of the Ford Foundation:

> In the past many industries generated their own electricity and steam, but the economies of scale combined with promotional rates (given by electric utilities) have enabled the utilities to capture most of the industrial electricity market.[90]

The report went on to contend: "The time has now come largely to reverse that trend, in order to save both energy and money for industrial consumers at current fuel prices."[91]

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[90]Energy Policy Project, A Time to Choose, p. 69.

[91]Ibid.

But uncertainty over interconnection of cogeneration systems with utility systems has impeded progress towards this goal. An industry that generates electricity by means of cogeneration might wish to hook into the power grid of a local utility in order to keep the load on the cogeneration system constant. However, such joint efforts are quite often difficult under existing utility policies and regulations.[92] Without interchange and backup arrangements and commitments, on site generation is simply not feasible.

To spur cooperation between industrial companies and utilities that service them, the Carter Administration has called for a program to assure that industrial firms generating electricity receive fair rates from utilities for both the backup power they may need to buy and for the surplus electricity they might wish to sell. Industries utilizing cogeneration processes would be exempted from state and federal public utility regulations, and could use public utility transmission facilities to sell surplus power and buy backup power. In addition, an investment tax credit of 10 percent above the existing credit would be provided for money spent on cogeneration equipment.[93]

Other productive uses of waste heat which results from industrial proceses are district heating and integrated

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[92] "Saving Energy the Cogeneration Way," Business Week, June 6, 1977, p. 100.

[93] Executive Office of the President, National Energy Plan, p. 45.

utility systems. Prior to the reorganization in 1977, HUD, with the technical support of NBS, had implemented a major federal program known as Modular Integrated Utility Systems (MIUS) to evaluate the potential for combining various functions of utilities and conventional building services (e.g., operating a small electrical power plant which could serve the heating and cooling needs of a dwelling unit, a school, and a commercial area). Conservation in such a system is achieved by sharing and recycling energy which is normally wasted by the separate facilities.[94] Although a number of agencies have attempted or have on the drawing boards demonstration or feasibility studies, to date little progress has been made in gaining utility and state public utility commission support of integrated systems ideas.

A parallel situation exists with regard to district heating concepts (supplying heat to source via an extensive pipe network utilizing hot water or steam). European countries, for example, Denmark and Sweden, have found that district heating can provide significant amounts of heat. The concept is attractive from a resource substitution standpoint since the central heat source can use the fuel (oil, refuse, coal) that is most economical to consumers in the district. It can also use waste heat from existing industrial plants and utilities. The concept and technology are

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[94]Department of Commerce, Energy Conservation Programs, pp. 8-9.

well-established, but a recent study noted that "experience suggests it takes many years to develop or convert a major part of a city to the process."[95] The same study further pointed out that agencies in the U.S. involved in identifying the use of district heating in other countries were doing little to assess how the foreign experience might improve implementation of the concept in the U.S.[96] It appears that government programs to voluntarily encourage the productive use of waste heat have to be augmented with positive inducements or incentives for the private sector.

Other strategies being pursued in industry stem from the 1975 EPCA which set up voluntary conservation programs, now monitored by DOE, in the nation's 10 most energy-consumptive industries. Mandatory progress reports are required under the provisions of the program. Results of the program indicate that energy prices have been a major factor in encouraging conservation in industry. Most industries possess the analytical capability and the engineering expertise to identify and implement potential energy saving measures. The recent shifts in sectorial demand patterns cited in chapter III suggest that this sector is indeed voluntarily

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[95] U.S., General Accounting Office, U.S. Energy Conservation Could Benefit from Experience of Other Countries (Washington, D.C.: General Accounting Office, 1978), p. 11.

[96] Ibid., p. 16.

responding to the need to use energy more efficiently in manufacturing processes.[97]

As shown above, however, there is no reason to assume that industry will automatically pursue certain important conservation strategies on the basis of increasing energy prices alone. Moreover, government policy affects the price industry pays for energy, and in the past, large industrial users have been given lower electricity rates. Equalizing these promotional rates is currently a primary concern of government. The rationale for rate reform is that it could encourage investments by industry to reduce energy requirements.[98] In this regard DOE has taken over an FEA program to enable state public utility regulatory commissions to conduct demonstrations of various conservation-related reforms, such as peak load pricing, for electric utilities.

Consolidated Edison, one of the nation's largest electric utilities, has been experimenting with time-of-day

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[97]For evidence to support this claim, see U.S., Senate, Committee on Commerce, Industry Efforts in Energy Conservation (Washington, D.C.: Government Printing Office, 1974). This document provides a number of case studies which illustrate the degree to which energy use management has become integral in many major U.S. corporations.

[98]For a discussion of promotional rate practices, examples, and their relation to conservation, see Barry I. Hyman, Initiatives in Energy Conservation (Washington, D.C.: Government Printing Office, 1973), pp. 37-38. See also, Herbert B. Cohn, "Should Utility Rate Structures Be Revised to Discourage Electric Use?" Public Utilities Fortnightly 93 (April 11, 1974): 21-25; and Warren L. Deverel and Jay Gellert, "An Examination of Price Elasticity--Utility Rate Structure and Conservation," Public Utilities Fortnightly 94 (July 18, 1974): 24-27.

pricing (reducing electric rates paid by consumers during typically low use hours) in order to try and redistribute demand on the company's equipment.[99] As demonstrated by reports in the press on congressional hearings with regard to the Carter Administration's initiatives to speed up voluntary utility reform by proposing minimum national standards, federal intervention into state and utility rate-setting practices is being resisted.

In general, then, mandatory conservation strategies for industry have remained in the background. It has been suggested, however, that the easy savings have already been captured, and further improvements will depend on more innovative (and undoubtedly costly) action. Strategies which have received some attention from government are mandatory energy audits of major plants and setting of federal efficiency standards for industrial equipment, such as boilers.[100]

The Transportation Sector

The status with regard to the implementation of transportation conservation strategies parallels that of the residential and commercial sector. That is, policies and programs have been constrained by institutional difficulties and not by lack of ideas or technical research and

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[99] "A Con Ed Rate Experiment," New York Times, September 12, 1976.

[100] J. Dicken Kirschten, "Conservation--The Cornerstone of Carter's Plans," pp. 316-317.

development.[101] Also, as in the case of buildings, state governments have been given a substantial role in implementing national conservation objectives in this sector. Since most transportation problems and issues revolve around what to do about the automobile and gasoline consumption, the discussion below concentrates primarily, but not exclusively, on the impacts of programs aimed at this end use.

After its establishment, ERDA identified motor vehicles as the primary target for conservation R,D&D. Similarly, the Department of Transportation has had an influential role in transportation conservation since the OPEC embargo. As identified earlier, other actions taken thus far by government have been of a regulatory nature as exemplifed by the Emergency Highway Conservation Act, and by the mileage performance standards in the Energy Policy and Conservation Act. President Carter wants to go above the 1985, 27.5 mpg target for autos set in the EPCA. Enforcement is based on civil penalties which can be invoked against auto manufacturers who do not meet the prescibed standards. Yet, a recent analysis conducted by the Congressional Budget Office suggests that the standards and noncompliance

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[101] Monte Canfield, Jr., and Adam E. Sieminski, "'If You're So Smart, Why Ain't You Rich?'--An Analysis of Impediments to Implementing Energy Conservation in the United States," Public Administration Review 35 (July/August 1975): 322.

penalties in the law do not appear to be strong enough to induce compliance in all future years.[102]

The President's energy plan contained two measures to reinforce elements of existing programs--a "gas-guzzler" tax and a standby gasoline consumption tax. The gas-guzzler tax was to be a graduated excise tax on vehicles not meeting applicable fuel economies for the specified year, with provisions to refund monies collected to those who purchase cars more efficient than the federal standards.[103] The standby tax was to become effective if gasoline consumption exceeded federal targets by one percent or more beginning in 1979.[104] The House Ways and Means Committee dropped the standby tax and also weakened Carter's proposals for taxes on low-mileage automobiles. The Committee also killed the proposed rebates to purchasers of fuel-efficient autos, but it did approve tax penalties on the most inefficient vehicles. In the Senate, the gas guzzler tax was unable to survive hearings by the Finance Committee.[105] As of mid-1978, exactly what may be included inthe final conference report remained unclear.

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[102] U.S., Congress, Congressional Budget Office, President Carter's Energy Proposals: A Perspective (Washington, D.C.: Government Printing Office, 1977), p. 57.

[103] Executive Office of the President, National Energy Plan, p. 36.

[104] Ibid., p. 38.

[105] "Resistance Wanes to the Energy Bill," Business Week, June 27, 1977, p. 31.

Thus, it appears that Congress has been generally hesitant to impose further energy use taxes to get at the problem of gasoline use, relying instead on the R,D&D strategy and the timely introduction of fuel-efficient autos into the marketplace. But national experience with standards and enforcement in other areas, for example, air quality, leaves unanswered the question of whether mileage mandates will be met unless government takes further regulatory action to assure compliance, action which might very well be more costly in terms of additional bureaucratic load and strained public-private sector relations. A key concern in this respect is timing--i.e., the 10-year lag in automobile replacement indicates even if the 27.5 mpg figure were to be achieved in 1985, it will still be 1995 before most cars are achieving the standard.

States are participating in energy efficiency through involvement in the EPCA and ECPA conservation programs. EPCA asks states to reach a five percent reduction in all energy use against a projected estimate of the states 1980 consumption. Mandatory transportation options which must be included in a participating states plan were described earlier. A study of responses in the interior western states indicates besides a serious effort to upgrade public transportation and encourage carpooling, most states have gone beyond the act's mandatory provisions (e.g., by including measures such as state bikeway plans, more rigorous enforcement of the 55-mph speed limit, increases in the states' gasoline tax as a disincentive to overconsumption, and encouragement of lower interest rates on loans for high mileage autos).[106] Even so, as recognized by the National Governors' Conference state efforts "have not been uniform and much remains to be done."[107] Most states also feel that the existing DOE-state conservation program provides inadequate funding to meet specific transportation needs, especially in urban areas.

For any state, one of the basic issues in implementing transportation strategies is finding the proper mix of inducements and mandatory measures and this depends to a large degree on the technical, regional, and behavioral difference in areas of the U.S. This fact is best illustrated by considering the energy saving carpool. Actually, the impact of carpooling (in fuel saved) is difficult to estimate because of variations in geographic locations, size of metropolitan areas, business types, and residential densities. Similarly, mass transit systems, though attractive in energy efficiency terms, have very long lead times and high capital costs which may prohibit their expansion in certain locations or cities.

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[106] A. Berry Crawford, "Energy Conservation in the Interior Western States," paper presented at the Annual Meeting of the American Association for the Advancement of Science, Denver, Colorado, February 21-25, 1977, pp. 7-8.

[107] "National Governors' Conference Policy Positions, Energy Conservation," reprinted in U.S., House, Project Interdependence, p. 600.

Aside from these examples, three other barriers appear to be blocking effective implementation of transportation strategies. First, the tendency to rely heavily on rising prices of fuel to bring about conservation is misplaced. Individuals' transportation habits are often very "inelastic" as in the case of the commuter who would rather travel alone in his car instead of joining an energy saving carpool regardless of the economic savings. Price increases may have to be too severe to be acceptable on equity grounds in the short-term to bring about the desired results or behavioral changes.[108] Secondly, a whole range of ongoing governmental programs actually encourage or promote overconsumption, for example, the federal government through the Highway Trust Fund monies has subsidized highway travel by private vehicles, and air regulations have similarly subsidized air travel at the expense of other more efficient modes. Finally, like buildings policies, transportation strategies must be viewed with the context of the broad and influential private sector role in this area. Recent government legislation underscored the fact that government did not believe the automobile industry would voluntarily make binding commitments to smaller autos and increased fuel economy within an acceptable time period. The introduction of new technologies that go beyond what is currently technologically and economically

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[108] Michael Boretsky, "Opportunities and Strategies for Energy Conservation," Technology Review 79 (July/August 1977): 62.

feasible will require close cooperation between government and the automobile manufacturers. And, given the importance of the transportation industry to the economy, changes will have to be carefully planned with the continued support of all parties-at-interest.

Summary

To recapitulate, this chapter has examined the organizational and legislative context for dealing with energy conservation problems and issues. As shown, the conservation policy system is characterized by multiple public and private sector institutions and actors, often with overlapping roles and responsibilities. At the federal level, the development of a base for conservation policy began with the establishment of the Federal Energy Administration, the Energy Research and Development Administration, and in the federal agencies with substantive interests in buildings, industry, and transportation. Congress made substantial strides towards codifying both the federal and state roles in conservation with the enactment of the Energy Policy and Conservation Act of 1975 and the Energy Conservation and Production Act of 1976. President Carter reorganized the structural framework in 1977 by incorporating most of the ongoing conservation programs into the Department of Energy. The President's National Energy Plan and supporting legislative proposals attempted to expand the scope of conservation programs and strategies in each energy consuming sector, but not much beyond what had been proposed by previous administrations.

Thus, from 1973 to mid-1978, conservation progressed from a presidential plea (Nixon's early energy message to Congress) to being formally entrenched within the evolving apparatus for the formulation and implementation of overall national energy policy goals. But not without substantive and procedural problems.

In essence, these problems center on the choice and application of policy tools to implement various conservation strategies that have been identified. Partisan debate over the role of energy prices to reduce consumption characterizes legislative relations with regard to conservation policy. The democratic Congress continues to favor the use of financial incentives, subsidies, and government regulations over a market response which is viewed as possibly resulting in profiteering, windfall profits, and inequities for the lower income groups of society. In addition, conflicts persist between the states and the federal government over the role states should play in formulating policies and programs to reduce energy demands. Finally, public acceptance of the need for conservation and the lack of effective public and private sector cooperation to disseminate information and implement new energy saving technologies were both shown to be substantial constraints cutting across all three major consuming sectors.

The findings in this chapter, as well as the results of chapters III and IV, reflect the central substantive and procedural dimensions of the conservation issue system. Part Three begins by drawing some conclusions and offering some observations based on these results as they relate to the analysis of conservation policy alternatives.

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PART THREE

EVALUATION OF ENERGY CONSERVATION ALTERNATIVES

Part Three analyzes policy alternatives for energy conservation problems and issues, and offers some overall conclusions regarding this research and the conduct of applied policy analysis. Both chapters VI and VII rest on observations and conclusions which can be drawn from the preceding discussion in Part Two. It is therefore useful to highlight these findings prior to undertaking the analysis of conservation alternatives and implementing strategies.

The social and political context for dealing with energy conservation reflects uncertainty over definitions of the problems and issues, confrontation over policy strategies, and conflicts in roles and responsibilities among multiple public and private sector institutions and actors. As described in chapter III, the conservation problem does not exist as a unitary problem. It is in fact a number of separate but overlapping problems and issues, such as increasing population, social and behavioral changes, rising per capita affluence, increasing energy demands in the three major consuming sectors, immediate supply shortages, historically lower prices of energy relative to other commodities, technological inefficiency and waste, government and industry management difficulties, and international events, all of which are part of "the problem." The definition of conservation as a public policy issue has been influenced and determined largely by these substantive dimensions. That is, policies and programs have been formulated in a piecemeal, ad hoc manner to address individual elements of the problem, much in the same manner that energy policies, in general, have developed.

Chapters IV and V discussed how conservation goals and policy strategies were identified and communicated in the wake of the OPEC oil embargo. Given the scope of the problems and issues involved, it follows logically that perceptions of "what should be done" and "by whom" have been equally as diverse as the dimensions of the problem. Indeed, it can be concluded that there is no quantitative shortage of conservation ideas and strategies. The major failing is instead the lack of alternatives which can overcome persistent organizational and political difficulties.

As described in chapter V, conservation interests contend in a policymaking environment oriented to supplying energy rather than managing consumption. And until 1977, policymakers faced a changing institutional base as three different presidents redesigned the energy policy structure. In addition, recent congressional-executive debates over President Carter's National Energy Plan indicate that the search for politically suitable conservation alternatives remains divided along ideological and partisan lines. In general, Democrats propose mandating conservation through government regulations and Republicans favor using energy prices and the market system to adjust consumption behavior.

Aside from these more general contextual findings, which are critical to understanding the way in which conservation policies are formulated and decisions implemented, three additional conclusions can be drawn about the conservation issue system: (1) there appears to be a limited range of technological options available for policymakers to choose from; (2) although conservation is the object of considerable attention, there is very little in the way of substantive programs around which participants in the system can aggregate; and (3) after five years of debate, a consensus has not been achieved concerning where major resource allocations should be made to achieve "best" conservation results. In combination, these characteristics, as will be discussed below, help to explain why conservation policy alternatives have been typically short-term, incremental, and largely reactive rather than innovative.

First, unlike promising energy supply alternatives (e.g., nuclear fusion and synthetic fuels) finding ways to reduce energy use does not seem to offer similar technologically imaginative or captivating options. Historically, the energy supply system has responded to resource demands through successive advances in technology. Transitions from one fuel type to another depended largely on the introduction of new extraction/production techniques which were the result of scientific and engineering breakthroughs. For example, domestic oil and gas supplies were enhanced substantially with the development of offshore drilling techniques. The harnessing of nuclear energy promised limitless electricity supplies. And once again coal has become attractive with the introduction of better surface mining equipment, air quality control devices, and continuous underground mining machinery. In sum, "technical fix" alternatives and the prospects of revolutionary technological breakthroughs have driven energy supply policy responses.

This is not the case for conservation. As shown in the preceding chapters, conservation strategies for the most part entail basically commonplace activities, such as turning off lights, adding more insulation to homes, and turning thermostats up and down, activities that require relatively little technical innovation or R,D&D. Technical fixes have been prescribed for motor vehicles, appliances, and buildings. But beyond these, few options with a substantial R,D&D component have been identified. Solar applications and other approaches to fuel substitution, as well as research to increase the efficiency with which energy is produced and supplied, do depend on solving a number of technological problems, but it can be argued that these activities are surrogates for conservation. Because technological conservation solutions have remained elusive, energy supply problems continue to hold more attraction for energy researchers. Basic research on new supply options is not only more promising professionally, but it is also more financially rewarding since the push to bring new supplies on line is backed by a comparatively better funded effort.

The inability to define conservation alternatives within the mainstream of energy R,D&D is related to the second conservation issue system characteristic noted above: the lack of substantive programs around which groups can aggregate. Conservation programs for the major consuming sectors, especially for residential and commercial and transportation, offer little basis for uniting relevant parties-at-interest to press for particular policy outcomes. The degree of aggregation and organization necessary to link conservation problems to participants and participants to government is weakened by the diverse nature of the problems and issues, the many different end uses of energy, and the large number of relevant actors in each sector. Whereas energy supply systems (e.g., oil, coal, nuclear) are linked by common objectives, interests, values, research needs, and articulated policy demands and strategies, conservation programs are not similarly conceived and supported. For example, the national program to achieve better insulated homes reflects a well organized, centrally-directed effort at the federal level in terms of formulating standards. But beyond federal government representation, and to some extent state organization, it becomes more difficult to identify "rally points," points where individual, group, and institutional interaction to implement insulation programs is evident.

Thirdly, a consensus has not been reached regarding where major allocations should be made for conservation. Participants in the system have not been able to identify where "best" to spend additional research monies for conservation, even if the funds were to be made available. Stated differently, budgetary and political support from Congress depends on identifying what makes conservation research distinct from and as important as other kinds of research to solve national energy problems. Difficulties in this area are related to the way in which conservation becomes a budgetary concern within the major energy agencies. As administrative units with conservation responsibilities came into the picture, staffs were drawn from supply-oriented agencies. However, the introduction of conservation goals required changing the mix of energy-related appropriations. Program budgets had to make room for conservation requests, but more importantly, choices had to be made about how much and where to spend conservation dollars. Since long-term plans for dealing with resource consumption did not exist, the immediate choices were weighted towards straightforward objectives--towards program ideas already "off the shelf." Indeed, a review of conservation appropriations illustrates the fact that most of the funded programs are largely reformulations of options devloped from the 1972 Office of Emergency Preparedness report.

But what of the long-term? No unified front has emerged to help define the direction conservation allocations should take. The Carter Administration contends conservation is its energy policy "cornerstone." Significant increases in funding have been requested so that the total for conservation requests is now more than one billion dollars (although the bulk of the appropriations is for financial assistance programs and not direct energy end uses). Yet one billion dollars may not represent the scale of outlays needed if a long-term conservation effort is to be mounted by the private and public sectors.

To a great extent, these characteristics mirror the stage of development of the conservation issue system--i.e., the system has developed only recently and roles and responsibilities as well as objectives are still evovling. They also underscore the fact that energy conservation problems and issues reflect both procedural and substantive concerns. Policies are now needed to improve the energy conservation policymaking process and the contents of specific policies and strategies. It is within this context of evolving policy, existing uncertainty, and policy needs that chapter VI identifies and evaluates conservation alternatives. This is followed in chapter VII with some overall conclusions concerning this research and the conduct of applied policy analysis.

* * *

CHAPTER VI

ALTERNATIVE POLICIES AND STRATEGIES FOR ENERGY CONSERVATION

Introduction

The preceding chapters have pointed out the strengths and weaknesses of strategies being used to achieve conservation in the major consuming sectors, and have identified problems and issues that have arisen in implementing policies and programs. The discussion led to the conclusion that energy conservation problems and issues reflect two kinds of concerns: procedural and substantive. Procedural concerns center on how policies are made, for example, on whether state governments and other parties-at-interest are given an adequate opportunity to make their interests known when decisions are made about energy conservation. Substantive concerns focus on the contents and anticipated impacts of conservation policies, for example, on the consequences of specific policies and implementing strategies to increase energy use efficiency and reduce consumption.

Based upon this conclusion and the extended discussion in the preceding chapters, it seems that policy alternatives to deal with energy conservation problems and issues must address two closely related (and overlapping) objectives:

1. Insure adequate procedures (institutions and processes) for considering the values and interests of relevant participants and facilitating cooperation among parties-at-interest.

2. Reduce the growth of energy demand and increase the efficiency with which energy is used in the major consuming sectors while maintaining acceptable lifestyles and standards of living.

This chapter identifies, defines, evaluates, and compares alternatives from which policymakers might choose to meet these policy objectives. It begins with a categorization and description of alternatives. This is followed by an evaluation and comparison of the costs and benefits of alternatives according to a specification of the criteria identified in chapter II.

Given the scope and purposes of this study, it is not feasible to conduct a detailed evaluation of specific alternatives for the range of problems and issues identified. Instead, the scope of the analysis has been narrowed by selecting specific alternatives and implementing strategies on the basis of an initial screening of: (1) options already being considered within the conservation issue system; and (2) alternatives formulated during the conduct of this research.[1] The evaluation is further limited by focusing on alternatives aimed primarily at the residential and commercial and transportation sectors. This restriction seems appropriate given the findings and conclusions about conservation strategies being pursued within the industrial sector. It should be noted, however, that the generic conservation alternatives defined below are in many cases broadly applicable across sectors.

What Are the Alternatives?

As shown in Table VI-1, policymakers may choose alternatives from among several categories to meet the two energy conservation objectives defined above. These are: coordinated energy conservation planning and management, education and exhortation, market incentives and disincentives, technical fix, financial incentives and disincentives, and direct regulatory action. The first category, coordinated planning and management, reflects the need to devise more adequate processes and institutions for aggregating and accommodating conservation interests. As such, it actually facilitates meeting both policy objectives. That is, less fragmented policy leadership and direction could help meet the procedural goal to provide a better public administration system and increase cooperation among participants, as well

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[1] For elaboration, see chapter II.

TABLE VI-1

ENERGY CONSERVATION OBJECTIVES AND POLICY ALTERNATIVES

Objective	Category of Alternatives	Specific Alternatives
Insure adequate procedures (institutions and processes) for considering the values and interests of all relevant participants and facilitating cooperation among parties-at-interest	Coordinated energy conservation planning and management	Centrally-directed federal control Improve policy formulation, implementation, and management capacities of state (and local) governments Establish coordinated multistate planning and management
Reduce the growth of energy demand and increase end use efficiency while maintaining acceptable standards of living	Education and exhortation	Collection and dissemination of information to: -change attitudes about energy use; and -increase support for the need to alter consumption patterns
	Market incentives and disincentives	Price energy on the basis of its "replacement" cost: -immediate deregulation of energy prices -phased deregulation of energy prices
	Technical fix	Promote research, development, and demonstration of conservation technologies Expedite commercialization of new or potential energy saving technologies
	Financial incentives and disincentives	Use tax system to change energy use behavior, and mitigate inequities among users Increase loans, credits, and other forms of public financial assistance of discontinue financial aid to encourage conservation Price controls on energy resources
	Direct regulatory action	Mandatory efficiency or performance based standards for selected processes and energy end uses Curtailment and rationing measures

as unite relevant parties-at-interest pressing for particular substantive policy outcomes.

The remaining five categories in the table reflect the need for more effective policies to improve the efficiency with which energy is currently being used in all three consuming sectors. Each alternative identified also includes procedural considerations in terms of its implementing strategies; and, each represents integrative, cumulative options which generally cut across sectorial boundaries and deal with diverse energy demands.

One approach to conservation is to rely on education and exhortation to promote public awareness of the need for saving energy. Government at all levels, industry, and public interest groups are currently actively involved in collecting and disseminating information in an effort to bring about end use energy efficiency and reduce energy waste. In spite of existing education programs, however, substantial evidence indicates a majority of Americans are either uninformed about energy problems, or behave as if there were no problem even when informed.[2] For example, according to the results of a May 1977 Gallup survey, slightly less than half the public is even aware that "the United States must import oil to

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[2]Phillip H. Abelson, "Public Opinion and Energy Use," Science 197 (September 30, 1977): 1325. See also, Jeffrey S. Milstein, "How Consumers Feel About Energy: Attitudes and Behavior During the Winter and Spring of 1976-77," unpublished paper, June 1977. (Mimeographed)

satisfy its energy demands, and only one-tenth of the public has an accurate idea of how much petroleum the United States does import."[3]

In addition, other recent studies indicate that where conservation can be achieved at a relatively modest price, demanding little of one's time, it appears worth the cost. Where it entails a greater degree of inconvenience, economically or socially, conservation is less acceptable.[4] These data suggest that the use of public interest announcements, public seminars and forums, energy saving slogans, "fireside chats" by the President, and so forth, have not proven to be effective ways of fostering major attitudinal changes with regard to the energy situation and the need for conservation.

Education and exhortation are supported to a large degree by market incentives and disincentives. It is an established principle of economics that the price paid for a specified product should mirror what it costs to produce "one additional unit" or "replace" the product if the market is to insure efficient operation and allow maximum expression of consumer choice. This is called the marginal price or replacement cost. In an ideal market system producers

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[3] Milstein, "How Consumers Feel About Energy," p. 5.

[4] William H. Cunningham and Sally Cook Lopreato, Energy Use and Conservation Incentives (New York: Praeger, 1977), p. 67.

would react to changing energy supply and demand conditions and prevent problems, such as fuel shortages, from becoming public policy issues. Stated differently:

> If there were not enough petroleum to meet all demand at current prices, there would be temporary shortages that could lead to higher prices that in turn would (1) discourage some potential buyers and (2) encourage more potential producers.[5]

Price increases would follow until the fuel shortage was eliminated, at which time prices would stabilize. More importantly, if the market were operating ideally, the price system would adjust supply and demand before critical shortages develop. Thus, questions of energy supply and demand would be resolved by the decisions of private energy producers and by consumers confronting higher fuel prices.

But it is clear that price systems in the real world are imperfect. There are numerous ways in which consumers receive and act on "bad" market signals, for example, when prices do not accurately reflect costs and benefits indirectly involved in a decision ("externalities"), when there is a lack of competition in the production of a product, and when the product in question is an exhaustible resource.[6] Each of these possibilities has played an important part in determining the extent to which the United States is willing

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[5]Gerard M. Brannon, Energy Taxes and Subsidies (Cambridge, Mass.: Ballinger Publishing Co., 1974), p. 3.

[6]For a discussion of these market defects, see David N. Hyman, The Economics of Governmental Activity (New York: Holt, Rinehart and Winston, 1973), pp. 43-70.

to rely on alternatives in this category to bring energy supply and demand into balance.

"Technological Fix"--to use Alvin Weinberg's term which refers to the possibility for circumventing social problems by reducing them to technological problems[7]--is a principal category of policy alternatives open to both the public and private sectors. As discussed in chapters IV and V, research, development, and demonstration (R,D&D) for conservation technologies is already well underway in the Departments of Energy, Commerce, Housing, and Urban Development, and Transportation. Likewise, states, universities, and private sector organizations, such as the Electric Power Research Institute, American Gas Association, and the American Society of Heating, Refrigerating and Air Conditioning Engineers, are conducting R,D&D to identify significant areas for improvements in energy efficiency. These activities reflect the potential for applying a variety of technical fixes to the way energy is used in the economy, ranging from industrial research to identify and develop more efficient boilers, power generation, and manufacturing processes; to transportation investigations to develop more efficient automobile engines and designs; to research for improved light bulbs, insulation materials, and heating and air conditioning systems.

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[7]Alvin M. Weinberg, "Can Technology Replace Social Engineering? University of Chicago Magazine 59 (October 1966): 6-10.

It appears that without a major breakthrough in the next few years on the supply side of the energy system, and barring another severe crisis that might force the adoption of rationing or extreme mandatory conservation measures by government, improved and new conservation technologies increasingly will be required to help balance supplies and demands.[8] But as noted in the introduction to this part, research by both the private and public sector has uncovered few potentially long-term technical fix solutions for energy end uses. And among those remedies which have been suggested over the past few years, most are not clearcut technological solutions that can be implemented without first removing related social and institutional bottlenecks.

Financial incentives and disincentives (e.g., using the tax system, subsidies, and various forms of financial assistance) can be and are being used to direct both producers and consumers toward conservation objectives. Typically, alternatives within this category are based on the provision of some form of reward (money) offered to individuals, businesses, and states or other units of government for the purpose of initiating changes that might otherwise be unacceptable. Examples are subsidized fares for mass transit, financial aid for installing insulation in homes,

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[8] This also assumes no major changes in state-of-society assumptions regarding the public's behavior toward energy use and conservation.

guaranteed loans for conservation investments, and grants to states and communities to develop voluntary conservation programs as specified in current legislation.

Stimulation of conservation through financial incentives is favored by the Carter energy plan and legislation. Not surprisingly so, since studies sponsored by government energy agencies have consistently shown that money incentives are more of an immediate motivation for conservation than exhortation and education,[9] and are more politically acceptable than price increases.

The last category of policy alternatives is direct government regulation to require either the utilization of energy conserving technologies or to mandate specific conservation behaviors.[10] Regulation alternatives have a well-established history with regard to energy supplies and environmental impacts related to energy development, and have been used as well to control firms within monopolistic

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[9] Jeffrey S. Milstein, "Attitudes, Knowledge and Behavior of American Consumers Regarding Energy Conservation with Some Implications for Governmental Action," unpublished paper, October 1976. (Mimeographed)

[10] Some kinds of financial incentives or disincentives may be construed as a type of price regulation and can therefore overlap with this category. However, the focus here is on alternatives which more directly regulate behavior. In other words, if one were to draw a continuum, price reulation would fall somewhere between incentives and behavior regulation. See further, Keith E. Hamm, Ronald D. Hedlund, and Robert M. Stein, "Attitudes Toward Energy Conservation: Acceptance of Coercive Government Policies," paper presented at the Annual Meeting of the Southwestern Political Science Association, Houston, Texas, April 12-15, 1978, p. 5.

industries. However, attempts to regulate directly energy end uses (and users) to cause the efficient use of energy are more recent phenomena. The basic assumption underlying this form of policy intervention is recognition of the need to reduce unnecessarily wasteful technologies and practices that might continue given "bad" price signals from the market, or existing social and institutional barriers to innovation. Examples of such intervention are mandatory labeling requirements for appliances, efficiency standards for buildings, and gasoline economy performance standards for automobiles.

Assessment of Alternatives

The five basic evaluation criteria identified and defined in chapter II will be used in this analysis. Definitions and appropriate quantitative and qualitative measures of the criteria as they apply to energy conservation are presented in Table VI-2. As the table illustrates, applying these criteria raises both substantive and procedural questions. Although there is some obvious overlap among criteria, questions about achieving objectives, costs, risks, and benefits and the distribution of costs, risks, and benefits are primarily substantive, whereas questions about an alternative's flexibility and implementability are primarily procedural. This overlap is appropriate, however, since the overall policy objectives for energy conservation are also substantive and procedural.

TABLE VI-2

EVALUATION CRITERIA AND MEASURES FOR ENERGY CONSERVATION ALTERNATIVES

Criteria	As Applied to Energy Conservation	Measures
Effectiveness (achievement of substantive policy objectives)	-How much will demand be reduced or efficiency increased? -Does the alternative avoid or mitigate conservation problems and issues? -Is it a short-term or long-term solution? -Does the alternative foster both attitudinal compliance and diffuse public support?	Quantitative -Estimate of energy savings -Duration of the solution Qualitative -Degree to which the option changes attitudes about conservation -Degree to which problems and issues are avoided -Effect on other national goals
Efficiency (costs, risks, and benefits)	-What are the economic costs and benefits of the alternative? -What are the risks? -What are the social and environmental disadvantages and advantages?	Quantitative -Dollar costs -Impact on federal revenues Qualitative -Social costs (lifestyles, employment, standards of living) -Environmental effects -Degree of risk (potential failure)
Equity (distribution of costs, risks, and benefits)	-What is the geographic distribution of costs, risks, and benefits, particularly among states and regions of the country? -What is the distribution of costs, risks, and benefits across sectors, particularly between the federal government and business/industry, and among income groups?	Quantitative -First costs to consumers -Public investment as compared to private funding Qualitative -States, regions which are benefited or deprived -Degree to which groups and individuals are benefited or deprived
Flexibility (adaptability/applicability)	-Does the alternative allow for different state and regional energy use characteristics? -How well does it accommodate social and sectorial differences? -Can the alternative accommodate changes which might occur in energy consumption demands and patterns over time?	Qualitative -Degree to which the option can be applied to different conditions -Adjustability of the alternative (adjustments to meet changing events and/or conditions)
Implementability (possibility of being approved)	-How difficult will it be to bring about required changes given established interests and existing institutions? -What are the administrative costs? -How strongly will participants respond? -Are processes for making conservation choices pluralistic and open?	Quantitative -Dollar costs of administration Qualitative -Degree of consensus -Ease of administration -Legislative potential -Adequacy of information

Ideally, a policymaker would like to have credible, reliable, and complete information for all of the measures specified in Table VI-2. Public policy choices are seldom so well-informed. And in many instances, rationality must ultimately yield to political bargaining and compromise. However, to the extent possible, the analysis of alternatives seeks to answer the following questions. What are the costs, risks, and benefits of the selected alternatives? How will the costs, risks, and benefits be distributed? Is the alternative applicable and adaptable? Is it socially and politically feasible?

Coordinated Energy Conservation Planning and Management

Conflict over the roles and responsibilities of various participants, both public and private, and over access to policymaking processes is a consistent theme in the conservation issue system. This has been shown to be particularly evident regarding balancing federal and state interests within the Department of Energy's state conservation program. The emerging federal role in causing end use energy efficiency, which now includes mandatory, inflexible measures to which states must adhere if they wish to receive financial assistance, has raised crucial questions about what the next step for energy conservation planning and management should be. For example, will state authority and responsibility be completely pre-empted with states serving only as a means for implementing centrally-directed national goals; or, will states assume the key role they are currently demanding in formulating future responses to conservation problems and issues. An evaluation of potential alternatives to deal with these questions rests essentially on examining the flexibility, implementability, and equity of different responses. This is due in part to the nature of the questions, but it is also because experience in coordinating energy demand management is limited.

As indicated in Table VI-3, better coordinated energy conservation planning and management includes the possibility for centralized federal coordination, regulation, monitoring, and enforcement of national conservation goals. This alternative would be implemented by having the national government (primarily DOE) assume the lead role in conservation implementation. It is presumed that additional legislation would be needed to spell out specific conservation targets for states and economic sectors with appropriate regulatory measures and sanctions and penalties for noncompliance. Thus, this alternative requires a further expansion of federal control and power at the expense of state power, much in the historical development pattern of air and water quality policies and programs in this country.[11]

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[11]Charles O. Jones refers to this pattern in air quality programs as "centrally-directed federalism." By this, Jones means that there has been a sharing of power

TABLE VI-3

IMPLEMENTATION STRATEGIES AND CONSTRAINTS FOR COORDINATED ENERGY CONSERVATION PLANNING AND MANAGEMENT

Specific Alternatives	Implementing Strategies	Constraints
Centrally-directed federal control	National legislation prescribing mandatory conservation targets for states and economic sectors with appropriate regulatory measures and sanctions and penalities for noncompliance	Further expansion of federal control and power at the expense of state power
Improve policy formulation, implementation, and management capabilities of state (and local) governments	Rely on legislative initiative at state-local level, with federal government sharing responsibility for meeting conservation goals through the provision of financial assistance and technical support	Requires strong state role in terms of administrative, technical, and financial initiative Incrementally-improving the existing decentralized, fragmented system may require too long to implement effective conservation objectives
Establish coordinated multistate planning and management	Modify regional development commissions or establish new regional organizations to serve as forums for cooperative, coordinated conservation policy planning and administration	Long time frame for implementation High risk because of innovation and adjustment requirements within the existing issue system

A second alternative would be to build on the potential for initiative at the state-local level, with the federal government sharing responsibility for meeting conservation goals through the provision of financial assistance and technical support. Existing state conservation agencies and program plans being developed under the Energy Policy and Conservation Act would be utilized, or new state coordinating organizations established to pull together parties-at-interest and relevant state-local activities. This procedural alternative parallels closely the policy statements from states and representatives of state legislative and governors' conferences--i.e., it recognizes state arguments that federal initiatives are often ineffective since they fail to account for differences in energy usage patterns among states.[12] It also means changing current federal practices so that state (and local) officials and interest groups can participate _directly_ in making

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which is directed if not dictated by the federal government. See Jones, "Federal-State-Local Sharing in Air Pollution Control," _Publius_ 4 (Winter 1974): 70-73. Harvey Leiber suggests that the federal government has similarly usurped state prerogatives in the water policy area. See Leiber, _Federalism and Clean Waters_ (Lexington, Mass.: D. C. Heath and Co., 1975), p. 196. See also, Irvin L. White et al., _Energy from the West: Policy Analysis Report_ (Washington, D.C.: U.S., Environmental Protection Agency, forthcoming), especially chapters 5 and 6.

[12] See the discussion in chapter V.

federal decisions that affect the values and interests of states and localities.[13]

Because of the already substantial federal involvement in energy conservation and energy policy, more generally, it is unlikely that a state system could deal effectively with the conservation problems and issues discussed earlier unless the federal government cooperates with the states, coordinating federal activities with state planning and program development. In this case, DOE, the Departments of Commerce, Transportation, and Housing and Urban Development could serve as primary sources of research and development information and technical support in substantive problem areas. In addition, the federal government might wish to consider the possibility of making financial support available to organized interests that wish to participate in conservation planning.

Finally, an intermediate alternative for conservation planning and management focuses on the possibility of institutionalizing a multistate approach to energy conservation problems and issues. Regional development commissions could be modified or new regional organizations established to serve as forums for cooperative, coordinated conservation policy planning and administration. For example, "Energy

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[13] For elaboration of this point, see Western Governors' Police Office, Balanced Growth and Economic Development: A Western White Paper (Denver: Western Governors' Policy Office, 1977), pp. 29-30.

Conservation Districts," which take into account common energy use factors and characteristics (similarities in climate, urban and rural development, industrial and economic patterns), could be formed. These districts could also provide the structure for coordinating federal-state-local policymaking, advocating desirable regional conservation targets, and processing information and input from nongovernmental participants.

All three of the above alternatives address problems and issues discussed earlier concerning federal-state sharing of conservation authority, as well as the need to provide forums in which all interested parties can be represented. Each option has its own costs and benefits. On the one hand, more pronounced national control within the issue system will compound already difficult questions of federal preemption of states' rights to protect the health, safety, and welfare of the states' citizens. On the other hand, if policymakers choose to deal with administration and participation problems by relying on incrementally improving the existing decentralized, fragmented system, the time required to implement conservation goals becomes a significant constraint, as does the requirement for states to assume a stronger role in terms of financial, technical, and administrative initiative. And a regional or multistate approach to solving procedural problems will probably require an even longer time frame for implementation, with greater risk, since it represents a tremendous degree of innovation and adjustment within the existing system.

Education and Exhortation

Although administrative problems and issues about appropriate conservation institutions are important, public policy must ultimately come to grips with the adoption of substantive conservation ideas and innovations among the public. Broadly construed, this necessitates either indirectly changing energy use through appeals for voluntary actions, or affecting energy efficiency directly by eliminating certain products from the market or making inefficient devices and systems economically noncompetitive. Education and exhortation focus on the first kind of activity--i.e., alternatives in this category aim at targets of social change, employing what might be called "social fixes." The specific alternative considered below is the collection and dissemination of conservation information.

Social fixes with regard to information dissemination can be measures to change attidues (and behavior) and measures to increase public support for conservation as a national goal. Attitude change rests on the assumption that: "By altering one's attitudes toward the energy shortage . . . individuals will engage in more energy conserving behavior, even though it may affect their lifestyle."[14]

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[14] Hamm, Hedlund, and Stein, "Attitudes Toward Energy Conservation," p. 5.

The complement to attitude change is to increase public support for the need to conserve energy. In this respect, appeals to individual and group "patriotism," "cultural loyalty," or "national security" form the basis for promoting and encouraging conservation behavior. Saving energy is therefore defined as being a "collective good" and conservation behavior is purported to be in the best "public interest."[15] It is assumed, in turn, that the ongoing reservoir of support for the political system can be tapped to build public acceptance for unpopular policies, especially during times of national crisis.[16]

Currently, activities to increase voluntary actions on the part of the public comprise a significant part of the overall conservation effort. For example, President Carter views conservation as an element within the "moral equivalent of war" that needs to be waged to solve energy problems. And, as a result, the Administration's National Energy Plan depicts energy policy as patriotic, important to national security (e.g., it will protect the nation from blackmail by the foreign oil producing countries), and as potentially serving all Americans.[17] Before Carter, Presidents Nixon

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[15] Paul C. Stern and Eileen M. Kirkpatrick, "Energy Behavior," Environment 19 (December 1977): 13.

[16] For elaboration, see David Easton and Jack Dennis, Children in the Political System (New York: McGraw-Hill, 1969).

[17] Amitai Etzioni, "An Uneasy Policy in Energy," New York Times, January 2, 1977.

and Ford urged the public to adopt a "conservation ethic." In all three instances, the thrust of the appeal was to educate and exhort the public to support conservation voluntarily.

As shown in Table VI-4, three possible strategies for implementing the information collection and dissemination alternative are: (1) undertake a revitalized national campaign (with DOE as the lead agency) aimed at specific products and well-defined groups to educate the public about energy economics; (2) require all fuel suppliers to inform customers of available residential and commercial conservation programs, how to obtain assistance and/or financing, materials, and labor to conduct conservation activities; and (3) establish formal energy conservation educational programs as components of secondary and higher education curricula.

The first strategy stems from findings presented in chapter V which suggest that the majority of barriers to voluntary conservation in the residential and commercial sector involve the dollar costs of conservation to the consumer. In general, consumers have insufficient levels of information about the various products (appliances, televisions, homes, autos) they purchase. Although existing labeling programs are increasing the flow of available information, many individuals often still lack the sophistication to deal with economic analyses such as those based on

TABLE VI-4

IMPLEMENTATION STRATEGIES AND CONSTRAINTS
FOR EDUCATION AND EXHORTATION

Specific Alternatives	Implementing Strategies	Constraints
Collection and dissemination of energy conservation information	Undertake a revitalized national conservation campaign aimed at specific products and well-defined groups to educate the public with regard to energy economics	Effectiveness is uncertain Cost-effectiveness has not been demonstrated
	Require all fuel suppliers to inform customers of available residential and commercial conservation programs, how to obtain assitance and/or financing, materials, and labor to conduct conservation activities	Places the burden for conservation education on the private sector Utilities may gain unfair advantage in conservation products market
	Establish formal conservation educational programs as components of secondary and higher education curricula	Shifts the burden for conservation to future generations.

lifecycle cost.[18] An intensive national campaign supported by public revenues could be launched to demonstrate the potential dollar savings (and energy savings) available to individuals who make "off the shelf" technology investments.

The second strategy, like the first, links conservation information more directly to utilization. However, it is different in that it depends primarily on actions by utilities. Relying on fuel suppliers has certain obvious advantages over the strategy identified above. For example, utilities are more likely to be attuned to state/regional energy use characteristics and are more knowledgeable about the clientele they serve.

Finally, the educational curricula strategy is a more incremental, long-term response relying on early individual and group development processes of learning and socialization to increase the legitimacy of both individual and public responses to energy shortages and conservation. In a sense, this strategy parallels the course of action chosen for introducing the metric system in this country. That is, it depends principally on future generations to assimilate new ideas and expects little reaction from the present generation (even though information is made available to everyone).

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[18] U.S., Department of Energy, "Barriers to Energy Conservation," unpublished paper, July 1976. (Mimeographed.) This report does not necessarily reflect the views, opinions, or policy of the Department of Energy.

To assess the effectiveness of this information alternative and related implementing strategies, the policy-maker would like to know the following: What is the probability that better information will be successful in causing individuals to change their consumption attitudes and behavior? How long will it take before the information results in reduced energy demand? By how much will demand be reduced? Are the changes permanent or short-term? In part, answers to these questions may be extrapolated from past experience.

In spite of efforts to raise public awareness about the need to conserve energy, aggregate demand trends as well as trends for the residential and commercial sector suggest that energy consumption is still increasing.[19] Available studies do indicate, however, that consumers have begun to make some adjustments in their energy usage patterns. In fact, the public appears to have a better voluntary record than is often claimed. But analyses are needed which separate out the savings being achieved as a result of current price increases, government legislation and regulation, and other factors, compared to voluntaristic responses.

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[19] If one factors in the energy savings being captured in the industrial sector, and those savings resulting from increasing automobile efficiency, it can be argued that in comparison to its historical relation with the growth of the Gross National Product, energy consumption has slowed. But this measure of consumption ignores the more basic question of potential savings versus what is actually being saved.

In many cases, the conservation behavior which has been adopted represents the easiest steps available which have only minimal impact on overall energy demand. For example, in a study of one state, 90 percent of the families contacted said they were making some effort to save energy. With the exception of retrofit activities, which can save substantial amounts of energy, activities most often identified were minor. Few people had purchased more efficient autos, increased their use of mass transit, or joined an energy saving carpool. Most were using electrical appliances less, turning down thermostats, and turning off lights.[20] A national poll conducted in the same year shows similar results. Only two percent of the individuals contacted said they were using public transportation, five percent were participating in carpools, and seven percent indicated they had insulated their homes.[21] This is especially instructive since much of the effort (primarily by government) over the last few years has been oriented towards educating the public regarding the benefits of carpooling and insulation.

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[20]Ronald D. Hedlund, Keith E. Hamm, and Robert M. Stein, "Public Attitudes Toward Energy and Its Conservation: A Statewide Survey of Public Opinion" (Milwaukee: Urban Research Center, University of Wisconsin--Milwaukee, 1977), pp. 31, 40, and 48.

[21]George Gallup, "Approval of Carter on Energy Wanes," Denver Post, September 9, 1977.

More importantly, in some cases actual behavior has been found to fall far behind reported behavior. Surveys undertaken during the winter natural gas shortage in 1976 revealed that people were not always doing what they said:

> At that time President Carter asked the people to set their daytime temperature at 65°F and nighttime temperature at 55°F. When polled by telephone, people said they were keeping their homes at 66°F during the day and 64°F at night. However, when pollsters went to homes carrying their own thermometers, they found that the average temperatures were 70° (plus or minus) 2°F during the day and 69° (plus or minus) 2°F at night.[22]

This is not to deny the fact that there are some positive features reflected in these data. Instead, the intent is to suggest that any attempt to evaluate the effectiveness of alternatives in this category must take into account the divergence between attitudes and behavior. It does appear that a base exists upon which the effectiveness of conservation information collection and dissemination can be improved. All three strategies defined earlier seek to strengthen communications by identifying more precisely the target audiences and then linking education and exhortation directly to measures to bring about utilization.

Evaluating the efficiency (costs, risks, and benefits) of this alternative is more problematic. It is peculiar that government agencies and private businesses and industries over the past five years have invested in

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[22] Milstein, "How Consumers Feel About Energy," as cited in Abelson, "Public Opinion and Energy Use," p. 1325.

conservation "advertising," but no comprehensive study can be identified which analyzes the results (e.g., in cost-effectiveness terms) of such information campaigns. This may be explained in part by the belief that efficiency, in its typical economic meaning, is not the major concern in designing education programs. In other words, government may be willing to make noneconomical short-term tradeoffs to reduce total energy demand.[23] Of course, this would not necessarily be the case for the strategy which would rely on utilities to pass information on to their customers.

An estimate of the potential public investment required to implement this alternative can be obtained by considering a recent advertising campaign sponsored by ERDA in Denver, Colorado.[24] This 10-week intensive campaign attempted to encourage residents in the area to consider life-cycle costs along with product costs. Television and radio advertising identified the long-range savings to be gained from the use of insulation and storm windows, for example. This was to be followed with tie-in advertising by local area merchants. The campaign cost ERDA $175,000. Thus, if similar projects were simultaneously conducted in the two largest cities in each state, the total expenditure

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[23] Department of Energy, "Barriers to Energy Conservation," p. AI-2.

[24] "Marketing Observer," Business Week, October 17, 1977, p. 152.

would be $17-$18 million. Based on the total requests for energy programs for 1979, this would represent only about two percent of the budget.

If this program were to result in the retrofitting of residences, the national savings in energy (and the per capita dollar savings) could be substantial. For example, six inches of attic insulation, which most homeowners could install themselves, would cost about $200 in an average home (1,600 square feet of floor space). This investment could be paid back in approximately two years in a mild climate area, such as Atlanta, Georgia; three years in a moderate climate area, such as New York City; and five years in a cold climate, such as Minneapolis-St. Paul, Minnesota.[25] And if one-third of the nation's homeowners undertook a complete retrofitting, including not only attic insulation but also storm doors and windows, and caulking and weather-stripping for doors and windows, the energy equivalent of 0.5 quadrillion Btu's per year could be saved.[26]

Several observations can be made concerning the potential distribution of costs and benefits and implementability of this alternative. First, the costs of information collection and dissemination are extremely variable, depending on the target, the media, and techniques used to

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[25] John M. Fowler, "Energy Conservation, Homes and Buildings" (Oak Ridge, Tenn.: Department of Energy-Technical Information Cneter, 1977), p. 2.

[26] Ibid.

reach the target audience. Secondly, because the benefit of of such programs accrue to society-at-large, the public investment required to conduct a national awareness campaign or to implement an education curricula should pose few problems of acceptability. Implementing the requirement that fuel suppliers inform customers of conservation measures, however, places a large share of the education and economic burden on the private sector. It will also require changes in the traditional relationship between utilities and customers, and in utility policies (e.g., promotional pricing policies).[27] In addition, the utility company's conservation activities would have to be a part of the companies' total operations which raises issues concerning who would bear the cost for the added services. These costs would likely be passed on to consumers in the form of higher energy bills. Finally, the impacts of a massive utility program on small businesses (e.g., those businesses that presently sell conservation services) would have to be evaluated to determine the potential for conflicts of interest and unfair competition.

The results of this assessment of the information alternative can be summarized as follows. The evaluation confirms the high level of uncertainty associated with the effectiveness of education and exhortation as an approach

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[27] U.S., Congress, Office of Technology Assessment, Analysis of the Proposed National Energy Plan (Washington, D.C.: Government Printing Office, 1977), p. 124.

to conservation, especially in the short- to mid-term. Furthermore, it has been suggested that the potential success of strategies for this alternative are dependent upon how well target groups are identified and to what degree first-costs of energy conservation technologies can be shown to be recoverable. The alternative requires a minimum of government intervention into consumer decisions and is adaptable to changing energy needs and technologies. Although this assessment is limited in several instances, the limitation itself is a significant finding. A part of the prevailing debate over conservation policies and strategies is stated in terms of voluntary conservation versus mandatory and coercive initiatives. It is no small matter that there is a paucity of information available to clearly evaluate the economic costs and benefits of education alternatives.

Market Incentives and Disincentives

Government has been in the business of regulating energy markets for several decades. As a result, energy prices in this country are controlled for oil, gas, and electricity (by both national policy and private sector action).[28] Price controls have been used to protect suppliers and consumers either by raising or lowering domestic energy prices, depending on the availability of supplies.

[28] In contrast, coal costs are still set by the unrestrained interplay of market supply and demand.

This intervention and the resultant disparity among fuel costs have led to the argument that government policies actually create barriers to economically rational prices that might induce conservation investments and behavior. That is, because full replacement costs are not charged prices are artifically low and therefore encourage overconsumption.[29]

For example, regulated rates for electric utilities are based on "average production costs" rather than on the incremental cost of adding new electricity generating capacity. It is argued by some that average-cost pricing has "created a continuous bias toward over investment in new facilities."[30] In turn, electricity demand has been higher than it might have been because paying the "average" cost of a unit of electricity is more economically attractive than investing in conservation that could eliminate the requirement for that unit of energy. Oil and natural gas policies are said to parallel this situation. Past policies have relied on price ceilings which are construed by some to be below replacement costs, once again discouraging conservation by shielding consumers from the full cost of the fuel.

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[29] Herman Kahn, "A Review of a Time to Choose," in No Time to Confuse, ed. Institute for Contemporary Studies (San Francisco: Institute for Contemporary Studies, 1975), p. 143.

[30] Office of Technology Assessment, Analysis of the Proposed National Energy Plan, p. 85.

These barriers to conservation are further exacerbated by utility rate structures, such as average cost pricing and declining block rates, which reward the most energy consumptive consumers by charging less. In other words, those who use the least amount of fuel or electricity commonly pay the highest per unit price.

Likewise, existing price controls are said to inhibit the profits necessary for energy companies to assume new investment risks and increase domestic exploration for supplies.[31] And it is also argued that policies which maintain the price of fuels below replacement costs inhibit the introduction of alternative energy technologies (e.g., solar and synthetic fuels) which, though not competitive at current prices, might compete with existing fuels if replacement cost pricing were applied.[32]

In general, to resolve these difficulties it is suggested by some industry leaders, oil companies, economists, and policymakers that the U.S. should return to a "free market economy" by deregulating energy prices and relying on evolving market conditions to adjust consumer and producer behavior.[33]

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[31]See Stan Benjamin, "Oil Companies Say Income Too Low," Norman Transcript, January 12, 1978.

[32]Office of Technology Assessment, Analysis of the Proposed National Energy Plan, p. 84.

[33]For a discussion of this alternative, see American Enterprise Institute for Public Policy Research, "U.S. Energy Policy: Which Direction?" (Washington, D.C.: American

Two strategies, shown in Table VI-5, for implementing this alternative are currently under consideration by the Congress. The first would move towards replacement cost pricing by immediate and complete deregulation of domestic oil and natural gas prices with prices to be determined by the interplay of supply and demand (in essence, the world price of oil); and, the second calls for a phased or gradual decontrol of energy prices with intervention in the form of price ceilings and tax measures. The long-term goal of both is basically the same--to correct the artifically low prices of energy--and both require modification of current legislation and regulatory practices for fuels and electricity. Critical outcome differences are related to the timing, or rate of adjustment towards market conditions, and the degree of government intervention to protect consumers confronting higher fuel prices.

Immediate and complete deregulation would allow energy prices to be determined by the OPEC oil price levels. It is expected that this strategy would result in higher revenues to energy producers and higher prices to consumers. The accompanying demand expectation is that consumption would effectively be reduced. However, the results of econometric analyses to predict the demand changes following from higher fuel prices, as well as the lag time involved, are

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Enterprise Institute for Public Policy Research, AEI Forums Roundtable, June 27, 1977), p. 4.

TABLE VI-5

IMPLEMENTATION STRATEGIES AND CONSTRAINTS
FOR MARKET INCENTIVES AND DISINCENTIVES

Specific Alternatives	Implementing Strategies	Constraints
Price energy on the basis of its "replacement" cost	Complete deregulation of domestic oil and natural gas prices with price to be determined by interplay of supply and demand	Uncertain consumer response Potential equity problems of a move to free market
	Phased decontrol of energy prices	Tradeoff between short-term economic considerations and long-term energy policy goals Creates potential for with-holding reserves rather than bringing them to market

mixed.[34] And the impacts of higher prices on industry profits and capital financing requirements to increase production are equally uncertain, raising issues of potential "windfall profit" and related equity questions. As noted by one source:

> [O]ur whole historical experience has been one of low or declining real energy prices. We must therefore depend on rather abstract statistical analyses to tell us what might be energy users' response to rising prices. The tentative message spelled out by a number of such studies (particularly in electric power consumption) is that over the long term prices might indeed constitute a demand-restraining influence, though one about which we cannot at the present time speak with a great deal of certainty or authority.[35]

Thus, immediate price escalation would have to be imposed without a clear understanding of the magnitude of effects.

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[34]For example, the short-term "elasticity" (the ratio of percentage change in consumption to percentage change in price) for petroleum has been estimated at approximately -0.15. This means a 50 percent price increase would be needed to achieve a corresponding reduction of only 7.5 percent in consumption. And the lag time for price responses in electricity demand, for example, has been estimated at 8 years for 90 percent of the response to take place. Paul P. Craig, Joel Darmstadter, and Stephen Rattien, "Social and Institutional Factors in Energy Conservation," in Annual Review of Energy, Vol. 1, ed. Jack M. Hollander (Palo Alto, Calif.: Annual Review, Inc., 1976), p. 547. Another study found that the effects of markedly higher fossil fuel prices, when translated into higher electricity prices, are likely to be small and will not impact demand until after a "substantial period." However, effects would be seen in utility moves to substitute lower priced fuels. See James M. Griffin, "The Effects of Higher Prices on Electricity Consumption," Bell Journal of Economics and Management Science 5 (Autumn 1974): 515-539.

[35]Joel Darmstadter, "Limiting the Demand for Energy: Possible? Probable?" Environmental Affairs 2 (Spring 1973): 728.

This uncertainty, further evidenced in current legislative debate over price controls and taxes, has confused both policymakers and the public. Lacking convincing proof either for or against markedly higher prices, there has been no direct move to end immediately price controls on oil and gas. Although divided, congressional opinion seems to favor gradual transition to replacement cost pricing, using government regulation and the tax system to mitigate adverse distributional impacts.[36]

Implementing phased decontrol allows the use of the economic efficiency criterion for making many energy use decisions, but protects consumers and certain regions of the country from sharp and inequitable price increases. By decontrolling some, but not all, domestic crude oil production, prices could gradually rise to world prices. Taxes, rebates, and price ceilings would be used to protect the economy from potential inflationary and unemployment consequences. For natural gas, price ceilings would also be maintained for a specified period. Tariff adjustments and rate restructuring to cause electric utility pricing practices to reflect more accurately the cost of services would be required. However, due to the unique regional characteristics of electricity demand, implementation of new rate structures would be more adoptable and flexible if accomplished locally

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[36]Steven Rattner, Energy: Where Did the Crisis Go?" New York Times, April 16, 1978.

or regionally through appropriate legislation (with the exception of those utilities under DOE control).[37]

Phased decontrol includes many of the same costs identified for immediate decontrol--i.e., potential windfall profits, equity problems, and uncertainty in information. Moreover, this strategy requires continued government intervention (for better or worse) into market mechanisms for some time. Increasingly, this intervention is being challenged by the private sector.

A final consideration brings the discussion back to the effectiveness of the replacement cost pricing alternative. Some consumer groups, such as Energy Action, argue that energy prices are already too high.[38] Here again the information is mixed, but this type of argument raises the following questions for policymakers: Will further price increases result in additional energy savings if prices are perceived by some as already high? Or, do present consumption levels represent the "best" response price can induce alone? If not, how high must prices go before unchecked market mechanisms are no longer acceptable to the public?

In this same vein, another view holds that if all the externalities associated with energy resource

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[37] Laurence H. Martin, "The Role of Government in Causing Energy End Use Efficiency--An Overview, in Energy Use Management, Vol. II, eds. Rocco A. Fazzolare and Craig B. Smith (New York: Pergamon Press, 1977), p. 488.

[38] Benjamin, "Oil Companies Say Income Too Low."

development and use (e.g., environmental damage and depletion of the store of resources available for future generations) were factored into energy costs, then replacement-cost prices would themselves be too low.[39] Advocates of this position suggest that "permanent replacement costs," which include the impacts of such externalities, should be the long-term goal for pricing policies in this country. If this becomes the criterion, energy prices would be based on the requirements for providing energy obtained from a renewable and environmentally benign source, such as the sun, and would rise to even higher levels.

In sum, this assessment has dealt principally with the effectiveness and equity outcomes of pricing energy on the basis of its replacement costs. Both immediate decontrol and gradual decontrol of energy prices may result in an unacceptable distribution of costs and benefits. Moreover, the magnitude of these impacts are largely unknown because of inexperience in predicting the demand-restraining effects of higher fuel prices and the lack of consensus as to how high prices should be allowed to rise. Based on these findings, it can be concluded that alternatives which rely on price as the <u>primary</u> tool to accomplish energy conservation seem somewhat misdirected. However, it is equally apparent that energy prices are going to increase, moving towards

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[39] Office of Technology Assessment, <u>Analysis of the Proposed National Energy Plan</u>, p. 87.

replacement-cost levels, and for the present, these levels are not going to be the result of either direct private involvement or straightforward public policymaking.

Technical Fix

Compared to social fixes which seek primarily to change attitudes about energy use, or reliance on prices to adjust demands, technical fixes aim at developing and introducing into the market "off the shelf" (existing) and new energy conserving technologies. Alternatives in the category can be further divided into two distinct types: first, those which directly save energy at the point of end use (e.g., in buildings, motor vehicles, and industrial machinery); and second, those which save energy indirectly as aresult of improved energy production and conversion (e.g., more efficient technologies to convert fossil fuels to electricity).

Because technical fix alternatives for conservation cover such a broad spectrum, the evaluation here focuses only on the development and commercialization of technological opportunities for energy end uses. The assessment is further limited in that it broadly delineates the costs, risks, and benefits of choosing technical fix options as a path to achieve conservation results. In part, this last limitation reflects the current state of the art and the available evaluative information concerning existing conservation research, development, and demonstration (R,D&D) activities.[40]

As shown in Table VI-6, two specific alternatives and implementing strategies have been identified. These are: (1) promote R,D&D of conservation end use technologies through increased federal funding; and (2) expedite commercialization of new or potential energy saving technologies by increasing joint public-private sector ventures.

Both alternatives attempt to mitigate the major conservation R,D&D problems and issues identified in the introduction to this part of the research. By increasing public investments for end use conservation research, it may be possible to motivate the scientific research community to engage in the search for longer-term efficiency improvements in energy products and processes. This alternative is further emphasized since conservation expenditures and programs have to date exhibited a marked preoccupation with "off the shelf" and relatively well-known techniques--i.e., technologies which require reapplication or redevelopment rather than invention or theoretical research and development.

The second alternative and related implementing strategy is underpinned by the assumption that substantive

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[40]For example, a recent evaluation of federal conservation activities, conducted by the General Accounting Office, did not include R,D&D for conservation in its review. See U.S., General Accounting Office, Report to the Congress, The Federal Government Should Establish and Meet Energy Conservation Goals (Washington, D.C.: Government Printing Office, 1978).

TABLE VI-6

IMPLEMENTATION STRATEGIES AND CONSTRAINTS FOR TECHNICAL FIX

Specific Alternatives	Implementing Strategies	Constraints
Promote research, development, and demonstration of conservation technologies	Increase federal (DOE) funding of energy end use conservation R,D&D Provide incentives for expanded private sector conservation R,D&D	Uncertainty with regard to the potential for identifying new, significant technical fixes
Expedite commercialization of new or potential energy saving technologies	More effectively link government conservation R,D&D to commercialization Increase subsidies for joint public-private sector ventures	Appropriate federal role in development and commercialization is unclear and undefined

programs for conservation need to be built around technologies as well as social fixes. In other words, once proven, conservation technologies can be used in conjunction with other policy alternatives. For example, efficient items can be required as a part of federal-state-local purchasing and procurement policies, or regulations established to force inefficient items out of the market. For this to occur, however, conservation technologies must reach commercialization and be competitive with their counterparts.

One strategy for removing barriers to marketability is for the public and private sectors to share the initial risk. Actions can range from government removing barriers to private sector development and commercialization to government providing subsidies, or other incentives, for producers until enough product demand is created to achieve necessary economies of scale. The basic point that needs to be made here is that the private sector is best suited to demonstrate and market existing and new technologies, but may not do so unless additional guarantees and supports are provided.

Thus, both technical fix alternatives considered here require increased public and private sector investment in conservation R,D&D and commercialization programs. Although the first option requires no new legislation on the federal side, initiatives could be implemented to encourage expanded private sector research and development. For example, electric utilities could be encouraged to continue (and increase) funding of R,D&D activities in the energy use area. In this case, state regulatory bodies and DOE could stipulate that funding for private research be incorporated into the rate base and/or expenses for determining electricity rate levels.[41] Legislation might also provide that research expenditures be considered as fully tax deductible and not construed as "promotional" expenditures.

Likewise, commercialization needs to be bolstered for both existing and new conservation technologies. Currently DOE expects those products with low risk to be introduced by the private sector based on an evaluation of normal market and profit potential. Public revenues (DOE appropriations) are to be utilized essentially for more risky technologies. More importantly, as presently conceived, commercialization programs within the federal government are overly focused on the need to support new, high risk energy supply techniques such as synthetic fuels and solar. Subsidies, other incentives, and increased joint public-private ventures are needed to tie the two approaches together because new supply technologies cannot be considered apart from their end use applications.

To evaluate these alternatives properly requires impact analyses of existing R,D&D efforts, specification of

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[41]Rate base treatment of R,D&D expenditures is presently on a case-by-case basis.

long-term projects, conservation technologies by sector, research plans, plans for demonstration and commercialization both inside and outside government--including manpower requirements, effects on capital availability, and related kinds of information. Such analyses must be left to subsequent research, especially until that time when DOE more precisely defines the role that government is to assume in conservation development and commercialization. For the purposes of this study, however, several evaluative conclusions about the alternatives can be drawn based upon knowledge of technical fixes more generally.

It is widely accepted that in terms of their effectiveness, new technologies typically lead to a permanent reduction in energy use.[42] Once introduced on a competitive, commercial scale, energy efficient technologies and processes have long-lasting, demand-restraining effects. This contrasts with non-market, behaviorally-oriented alternatives which may have few lasting impacts once the inducement or incentive is removed.[43] In addition, increasing the efficiency with which energy is used by improving products and processes can result in reduced demand with few major inconveniences or lifestyle changes. This does not mean technical conservation solutions do not require social modifications and adaptations; rather

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[42]U.S., Congress, Congressional Budget Office, Energy Policy Alternatives (Washington, D.C.: Government Printing Office, 1977), p. 32.

[43]See the discussion below of financial incentives and disincentives.

the key consideration is the degree of inconvenience. The inconvenience of driving smaller, more efficient autos the same distance with less fuel is not as great as reducing the number of miles travelled by direct intervention in the form of rationing or curtailment.

Some of the savings from technological improvements can be gained from widespread application of existing techniques and products. Table VI-7 identifies the potential savings which might be captured for the residential and commercial sector if seven currently existing technologies or technical concepts were adopted by the public. As illustrated in the table, if beginning in 1975 these improvements had fully penetrated the market, by 1980 energy savings would be approaching four and one-half quadrillion Btu's per year. Similarly, as depicted in Table VI-8, industrial sector savings from six existing technologies and related applications of conservation concepts could approach 12 quadrillion Btu's per year by 1980.

Although a number of the technologies identified in Table VI-8 have been adopted by industry, most of those identified for the residential and commercial sector remain as potential savings. One exception is the use of heat pumps. In 1975, 46 percent of the new homes in the U.S. were electrically heated--of which 50 percent utilized heat pumps. According to a recent General Accounting Office study, this space conditioning technology has increased its

TABLE VI-7

POTENTIAL ENERGY SAVINGS FROM SELECTED CONSERVATION TECHNOLOGIES IN THE RESIDENTIAL/COMMERCIAL SECTOR

Technology or Concept	Target Use	Scope	Savings/Year
Electric ignition systems to replace gas pilot lights	Space heating, air conditioning, water heating, cooking, clothes drying	All residential gas appliances in use in 1980	.07Q
Electric heat pumps in electrically heated homes and businesses	Space heating	All electrically heated residential/commercial buildings built after 1975	.90Q
Improvements in heating, ventilation, and air conditioning (HVAC) in commercial buildings	Space heating and air conditioning	All commercial buildings in 1980	1.84Q
Use of automated controls to provide automatic night-time and independent room temperature control	Space heating and air conditioning	All homes in 1980 built after 1975	.22Q
Employ solar energy for use in residential/commercial buildings	Space heating, air conditioning, hot water heating	5% of residential/commercial buildings in 1980	.65Q

TABLE VI-7, continued

Technology of Concept	Target Use	Scope	Savings/Year
Energy conserving building design and materials concepts	Space heating and air conditioning	All residential buildings build after 1975	.06Q
More efficient air conditioning equipment for room air conditioners and central air conditioning systems	Air conditioning	All air conditioning units in residential/ commercial buildings built after 1975	.70Q

SOURCE: Braddock, Dunn and McDonald, Inc., First Interim Technical Status Report, Study of Alternative Strategies and Methods of Conserving Energy (Vienna, Va.: Braddock, Dunn and McDonald, Inc., 1974), pp. L-9 to L-15.

TABLE VI-8

POTENTIAL ENERGY SAVINGS FROM SELECTED CONSERVATION TECHNOLOGIES IN THE INDUSTRIAL SECTOR

Technology or Concept	Target Use	Scope	Savings/Year (Quadrillion Btu's)
Insulation of skid rails in heat treating furnaces	Direct heat applications	50% of heat treating furnaces in metals fabrication in steel industry in 1980	.07Q
Use of recuperators to preheat incoming combustion air using the heat of flue gases	Direct heat applications and process steam	All direct heat and process steam in industry in 1980	7.5Q
On-line computer control of combustion equipment	Process steam and direct heat	All purpose steam and direct heat applications in 1980	1.3Q
Burn municipal and industrial wastes as fuel for electric power generation	All electric power end uses	All cities of large enough size up to 40 million total population	.46Q
Improvements in process steam systems	Process steam	All process steam uses in industry in 1980	1.55Q
Improve efficiency of systems for direct heat applications	Direct heat applications	All industries in 1980	.9Q

SOURCE: Braddock, Dunn, and McDonald, Inc., First Interim Technical Status Report, Study of Alternative Strategies and Methods of Conserving Energy (Vienna, Va.: Braddock, Dunn, and McDonald, Inc., 1974), pp. L-1 to L-8.

share of total home heating and cooling sales from 6.5 percent in 1974 to about 15 percent in 1976.[44] These data are themselves significant, but the more important consideration is the reason for the growing acceptance of heat pumps. A large part of this acceptance appears due to recent R,D&D and commercialization work to increase both the reliability and economic position of heat pumps. In contrast, where conservation technologies have not been applied, the barriers usually cited are the lack of documentation of energy savings and payback periods, or excessive payback periods.[45]

Technical fixes as a category exhibit certain other advantages, especially with regard to national policy goals. First, reduced consumption typically means less environmental pollution. Table VI-9 shows that a $1 million investment in any of three technologies could result in substantial reduction of pollutant emissions per day. Similar benefits can be gained from engineering improvements, weight reductions, and switching to light-weight diesel and certain stratified charge engines for motor vehicles.[46] The extent of

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[44]General Accounting Office, Federal Government Shou Should Establish and Meet Energy Conservation Goals, p. 60.

[45]For buildings, most managers or homeowners will not make capital investments unless they can be recovered within three years. Ibid., p. 66.

[46]John Davidson et al., "Energy Needs for Pollution Control," in The Energy Conservation Papers, ed. Robert H. Williams (Cambridge, Mass.: Ballinger Publishing Co., 1975), pp. 312-316.

TABLE VI-9

ENVIRONMENTAL BENEFITS OF END USE CONSERVATION
(Pounds of emissions per day)[a]

	Aces[b]	Stirling Cycle Auto[c]	Heat Recuperator[d]
At end use sites:			
Particulates			153
Sulfur dioxide			6
Nitrogen oxide		50	6,000
Carbon monoxide		44	170
Hydrocarbons		48	10
At production sites:			
Particulates	16	8	25
Sulfur dioxide	330	20	610
Nitrogen oxide	230	78	240
Carbon monoxide	13	3	13
Hydrocarbons	4	46	4
Land disruption	1 acre/ day	1 acre/ day	47 acres/ day

SOURCE: U.S., Council on Environmental Quality, Environment and Conservation in Energy Research and Development (Washington, D.C.: Government Printing Office, 1976), p. 47.

[a]Emissions associated with coal-synthetic fuels production and use which could be avoided by an application of $1 million worth of each kind of more efficient end use device specified in table.

[b]The annual cycle energy system (ACES) uses a heat pump to transfer heat from an insulated water tank to a residence in the winter. As the heat if withdrawn, the water freezes. In the summer, the heat pump is reversed and the ice is thawed to provide air conditioning. The system is being developed by DOE and is expected to reduce the amount of energy used in electric heating and air conditioning by approximately 50 percent.

[c]The Stirling cycle automobile engine uses external heat to drive an internal working fluid. Since combustion occurs externally, as opposed to existing internal combustion engines, emissions could be controlled more easily. An advanced Stirling cycle engine may reduce fuel use by about 20 or 30 percent, depending on auto size, design, and use.

[d]Heat recuperators utilize the wasted heat that industrial furnaces release into the atmosphere. Recuperators are expected to reduce fuel use by as much as 80 percent.

environmental benefits gained varies, of course, with each technology, but the advantage holds generally whenever end use consumption is reduced.

Secondly, a more efficient stock of technical goods and services means reduced oil imports, a major objective within the scope of national energy policy alternatives.

The benefits of reduced consumption, less environmental pollution, and enhanced national security accrue to individuals and to society-at-large. At the same time, however, the reapplication of existing technologies or the purchase of new conserving products means increased first-costs to consumers. Some low-income groups could be effectively cut off from enjoying the benefits of these technologies, and some technologies may be more applicable to certain regions of the country than others. For example, the increased public investment in solar heating and cooling may not provide returns for cold climate regions until much more efficient devices are developed. As will be discussed elsewhere, these costs and distributional impacts of new technologies can be "softened" through the use of a range of financial incentives and direct aid.

The efficiency outcomes of increasing public revenues for conservation development and commercialization are not as well understood as the effectiveness and distribution of technical fix effects. Taking a technological view of conservation, or for that matter any other aspect of energy policy, may result in overinvestment in R,D&D at the expense of other national needs. How much of the energy research budget should go for conservation was shown in the preceding chapters to be a controversial issue. Lacking a policy for quickly redeploying research programs in crisis situations, government efforts to commit public revenues to conservation have taken place incrementally.[47] Research programs were initially small scale, diffuse in character, and largely non-developmental. The inertia that built up around early "off the shelf" programs has contineud to inhibit the capability of conservation researchers and agencies to "think big."[48] For example, even though federal allocations for conservation have grown from an estimated $39 million in 1974,[49] to a DOE request for $386 million for 1979,[50] comparison of these figures with the overall energy

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[47]For a discussion of the difficulties in making R,D&D shifts as new priorities arise, see W. Henry Lambright, Governing Science and Technology (New York: Oxford University Press, 1976), pp. 163-181.

[48]As head of the Oak Ridge National Laboratory (ORNL), Alvin Weinberg's criteria for new ORNL projects were that they be "big, expensive, strongly in the national interest . . . and not ready for commercial exploitation." Alvin Weinberg, "Problem of Missions," speech before the Institute for Scientists in Research and Development Laboratories, March 20, 1961. As cited in Lambright, Governing Science and Technology, p. 176.

[49]U.S., Federal Council for Science and Technology, Report on the Federal R&D Program FY 1976 (Washington, D.C.: Government Printing Office, 1976), p. 100.

[50]Willis H. Shapley and Don I. Phillips, Research & Development AAAS Report III, R&D in the Federal Budget: FY 1979, R&D, Industry, & the Economy (Washington, D.C.: American Association for the Advancement of Science, 1978), p. 96.

budget is more instructive. Whereas the 1979 request for conservation represents only eight percent of the almost five billion dollar R,D&D budget within DOE, energy supply research and technology development claims over half, and nuclear energy almost one-fourth of the total request.

As important as the question of how these funds are being distributed is whether or not choosing an alternative and strategy to increase public investment in end use R,D&D could provide sufficient returns to warrant the investment. Experience to date suggests that conservation may be absorbing all of the money it could possibly expend at this time.[51] In part, this is based on the inability to identify substantive proposals for basic research. Thus, a larger program for conservation development and commercialization could pose a high degree of capital risk. On the other hand, the widespread use of new technologies offers the potential for significant energy savings, especially in the long-term.

Finally, one of the most important benefits associated with alternatives in this category is the degree to which increased energy system efficiency preserves options for the future. Conservation technologies buy time for the

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[51] U.S., Senate, Committee on Interior and Insular Affairs, ERDA Long-Range Plan and Program, Hearings (Washington, D.C.: Government Printing Office, 1976), pp. 78-81. It could be argued that although the risks may be high, they are probably no greater than those being taken on the supply side of the energy system (e.g., in the cases of synthetic fuels, nuclear fusion, and solar).

development of new supplies.[52] The long lead times now needed to bring most new supplies on line make technical fixes to reduce consumption more attractive.

To summarize briefly, technical fix alternatives once adopted provide for permanent reductions in energy use and result in fewer major lifestyle changes than other policy actions described thus far. Reduced demand in turn is advantageous with regard to national environmental and energy policy goals. Thus, the benefits stemming from increased R,D&D and commercialization appear to outweigh the costs. The alternatives described here attempt to distribute the costs, risks, and benefits across both the federal government and private sectors. However, the potential cost-effectiveness of increased public investments for conservation has yet to be demonstrated. It could be argued that for this category of alternatives, economic costs are not necessarily the "best" criterion for evaluating choices given the uncertainty on the supply side of the energy system and the need to increase the acceptance of conservation technologies.

Financial Incentives and Disincentives

As discussed in chapter V, actions taken by Congress and government energy agencies have already resulted in wide ranging programs using financial assistance measures to

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[52] U.S., Council on Environmental Quality, Environment and Conservation in Energy Research and Development (Washington, D.C.: Government Printing Office, 1976), p. 21.

encourage conservation. As a result, the focus here will be on other specific alternatives within this category which might be implemented in conjunction with financial aid incentives.

As shown in Table VI-10, alternatives may directly intervene in the market by utilizing taxes to adjust fuel or product prices. In opposition to tax incentives, imposed measures may serve as a disincentive or penalty for specific fuel uses. Or, the disincentive could be of a more general nature, such as a Btu-tax on all nonrenewable resources. Likewise, funds that are made available to states or localities can be withheld to encourage the adoption of specific conservation activities, as in the case of federal legislation which would have denied Highway Trust Fund revenues to states that did not choose to enact the 55 mph speed limit.

In choosing an alternative from this category, a policymaker must be concerned with whether or not the alternative is sufficient to bring about the desired reduction in energy demand, and whether motivation remains to continue the desired conservation activity once the incentive or disincentive is removed.

There are a variety of implementing strategies for the "tax system" alternative, as depicted in Table VI-10. A general federal energy tax that relates to energy content, such as the Btu's in each energy form, could be applied to all nonrenewable resources (coal, oil, gas, and uranium).

TABLE VI-10

IMPLEMENTATION STRATEGIES AND CONSTRAINTS FOR FINANCIAL INCENTIVES AND DISINCENTIVES

Specific Alternatives	Implementing Strategies	Constraints
Use tax system to change energy use behavior and mitigate inequities among users	Adopt a general federal energy (or Btu) tax for all non-renewable resources applied at point of extraction (wellhead or mine-mouth)	Would require significant increases in energy prices to be effective and entail program of rebates to redistribute the collected revenues.
	Establish federal consumption taxes and rebates on basis of energy efficiency	Increased costs fall only on new devices and products Time required to be effective
Increase loans, credits, and other forms of financial assistance or discontinue financial aid to encourage conservation	Require energy conservation planning at the state-local government level as a condition for receiving federal planning assistance monies.	Implementability is uncertain

For this strategy, policymakers would have to select a point in the energy supply and demand process at which the tax would be imposed. It could be levied at the point of extraction (wellhead or minemouth), when the resource is purchased as fuel, or when energy using equipment is purchased. Applied at any of these points, a general tax would be highly implementable and essentially self-regulating. Yet several recent analyses have determined that the general Btu tax approach is an inefficient way to increase energy prices.[53] Not only would the tax have to be high enough to double the price of gasoline and home heating oil, for example, but unless it was coupled with an extensive program of tax rebates to redistribute collected revenues, it could lead to serious economic hardships for low-income families.[54] Thus, the self-regulating advantage normally attributed to a tax alternative would be compromised by probable government intervention to deal with equity problems. It is also suggested by some that a tax-induced reduction of demand would

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[53]For a detailed treatment of this conclusion, see Brannon, Energy Taxes and Subsidies, pp. 133-136; and Brannon, "Tax Policies to Modify Energy Consumption Patterns," in Studies in Energy Tax Policy, ed. Brannon (Cambridge, Mass.: Ballinger Publishing Co., 1975), pp. 323-342. For disagreement with these findings, see Luther J. Carter, "Energy Policy: Independence by 1985 May Be Unreachable Without Btu Tax," Science 191 (February 13, 1976); 546-548; and Don G. Scroggin, "Energy Conservation in the U.S.: A National Policy to Reduce Energy Waste May Be the Only Way to Preserve Economic Well-Being," Yale Scientific 51 (April 1977): 9-13.

[54]Carter, "Energy Policy," p. 546.

be counterproductive for the need to increase supplies--i.e., the tax revenues gained would not create profits and incentives for increased production; instead, they would be redistributed to the public.[55]

These arguments should not be construed as negating an important finding in the studies cited above, that there may be a need for some type of selective fuel taxes to deal with specific fuel uses. As an alternative implementing strategy, differential fuel taxes could be established by imposing a set of rates based on the relative scarcity of fuels. This would allow a more rapid allocation of the relative costs involved in the production of energy from each of the different resources.[56] It would also allow greater flexibility by permitting a more direct focus on selected types of energy consumers. Regressive impacts could be handled through tax exemptions rather than rebates.

For our purposes, however, the implementing strategy which provides more of a direct link to energy consumption problems and issues, is to use the tax system to change the price of an energy-using investment. That is, instead of taxing energy use itself, the tax would be levied at the point of purchase on things like automobiles, furnaces,

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[55]Some sort of "plowback" provision could be adopted to insure that incentive revenues were made available to energy companies.

[56]Marquis R. Seidel, Steven E. Plotkin, and Robert O. Reck, Energy Conservation Strategies (Washington, D.C.: U.S., Environmental Protection Agency, 1973), p. 34.

appliances, hot water heaters, and industrial equipment. Given the earlier assessment of market incentives and disincentives where it was found that some consumers may not be influenced by moderate price increases, this approach seems to approximate "best" the role that energy prices play in energy use decisions. Indeed, one study notes that it is difficult to identify a relationship between price changes and the amount of energy consumed unless the existing stock of equipment (e.g., appliances, automobiles, boilers) calling for a specific fuel or energy input is included in the analysis.[57] This leads to the conclusion that price may be more of an inducement to limit the purchase of inefficient energy-consuming devices than it is a limit on consumption for devices already owned. Essentially, this means the consumer might be willing to "ignore the implications of the continuing energy bill he might incur, but would respond to a higher tax on his appliance at the time of purchase."[58]

A second outcome of this strategy has both positive and negative equity implications. It is most likely that the tax would fall only on new investment choices. On the one hand, it would represent an unfair burden on that

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[57] See Edward W. Erickson, Robert M. Spann, and Robert Ciliano, "Substitution and Usage in Energy Demand, An Econometric Estimate of Long Run and Short Run Effects," in Energy Modeling, ed. Milton F. Searl (Washington, D.C.: Resources for the Future, 1973), pp. 190-208.

[58] Siedel, Plotkin, and Reck, Energy Conservation Strategies, p. 35.

segment of the population (or commercial and industrial groups) contemplating equipment purchases now or in the near future. On the other hand, it reduces the hardship that might be incurred by those owning inefficient items if a general energy tax were the choice.

Lastly, a tax of this sort could be applied as an excise tax based on the energy efficiency of the item in question. The result would be to influence investment choices towards specific energy-efficient devices.

The "gas-guzzler" provisions of President Carter's National Energy Plan provide an example of how the tax system might be used in conjunction with several other alternatives and demonstrates potential outcomes from such alternatives. As discussed in chapter V, the administration recommended the imposition of a set of graduated excise taxes and rebates based on the fuel-economy of new cars. The tax was to be supported by three additional measures: (1) direct government regulation in the form of price controls and an "equalization tax" for crude oil that would effectively bring domestic oil prices up to the world price by 1980 and increase them at the rate of inflation thereafter; (2) a standby gasoline tax of up to 50 cents per gallon, imposed in five cent increments beginning in 1979 if gasoline consumption levels exceeded predetermined targets; and (3) the already existing fuel efficiency standards mandated by the Energy Policy and Conservation Act of 1975.

Of the three new proposals, the gas-guzzler excise taxes were estimated to have the largest potential effect on fuel consumption, reducing automobile gasoline consumption by 10,000 barrels per day in 1978, 15,000 barrels per day in 1980, 215,000 barrels per day in 1985, and reaching 450,000 barrels per day by 1990.[59] Although the 1985 and 1990 figures are impressive, these data point out one of the basic problems in relying on taxes to influence consumer choices--i.e., the number of years required before the tax has an appreciable effect on consumption. Just as in the case of education and exhortation, the acceptability of the time lag involved is a critical factor influencing tax system choices for conservation purposes.

A final consideration within this category of alternatives is the role of government financial assistance as a lever to require specific conservation activities or programs. As noted earlier, the emphasis here is on the possibility of withholding revenues from states and localities as a means of encouraging conservation within the scope of ongoing government energy-environment activiites. Public revenues in the form of grants and revenue sharing funds represent income transfers from the public to government. If it can be argued that conservation is a public policy goal in the

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[59] U.S., Congress, Congressional Budget Office, President Carter's Energy Proposals: A Perspective (Washington, D.C.: Government Printing Office, 1977), p. 65.

public interest, then investments by government should reflect this objective.

An example of how this alternative could be implemented is through the extensive framework of federal planning assistance currently available to states and localities. For example, the government exercises substantial land use control powers over states and localities, largely through Section 701 of the Housing Act of 1954, which provides assistance to local governments for planning purposes. The principal source of federal financial support for this program is the Department of Housing and Urban Development's (HUD) 701 grants program. Section 701 requires grant recipients to carry out an ongoing "comprehensive planning process" that contains mutually consistent housing and land use elements in line with national growth policy objectives. Planning for national conservation goals could be included in this and other community facility or service programs, and the release of funds contingent upon the development of a "conservation plan." The primary outcome of such a strategy would be to <u>require</u> conservation planning whereas existing legislation allows states to choose not to participate in the national State Energy Conservation Program. Procedurally, this might be more implementable and flexible than would the adoption of mandatory state programs through direct government regulation.

As discussed earlier, comprehensive planning can be a primary alternative for developing conservation because it supports coordination of private and public sector decisions. It could also coerce planners and public officials to use land use controls to promote maximum energy savings. The "plan" could show how housing and residential development and transportation systems interact, which in turn can induce growth and development patterns that facilitate the use of public transportation systems and other energy conserving concepts.[60]

The above assessment can be summarized as follows. Any attempt to use the tax system to change consumption behavior requires consideration of numerous potential side-effects or distributional outcomes. For the general energy tax, distributional impacts may be politically unacceptable, counterproductive, and require substantial government intervention to correct inequities. Collecting and redistributing revenues from such taxes will impose high administrative costs on the public. Approaching energy conservation by taxing end uses does not appear to be as efficient as taxing investments for energy-using devices. And both financial incentives and disincentives depend on continued support to be effective.

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[60] Corbin Crews Harwood, "Planning for Energy Conservation," ECP Report (Newsletter of the Energy Conservation Project, Environmental Law Institute), No. 5, March, 1976, p. 2.

Although experience in applying alternatives in this category to conservation is only now beginning to accumulate, there is enough evidence to suggest that the effects of incentives may be "short-lived."[61] Furthermore, incentives may lead to overdependence on external motivation, acting as barriers to the development of long-term behavioral changes which are necessary to produce effective voluntary demand-restraint.[62] These conclusions have led to considerations of the possibility of expanding direct government regulation to change energy consumption patterns and behavior.

Direct Regulatory Action

Historically, direct market intervention which relies on governmental regulation has been used to promote or attempt to initiate a prescribed type of citizen or private sector behavior. As discussed in chapter V, regulatory actions to restrict energy use or energy using products are in an early formative stage, reflecting varied degrees of direct and indirect coercion. Even so, one of the most clearly discernible trends in the conservation issue system is the increasing attention being given to possible regulatory policies to cause more efficient end uses of energy.

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[61]See R. M. Foxx and D. F. Hake, "Gasoline Conservation: A Procedure for Measuring and Reducing the Driving of College Students," Journal of Applied Behavioral Analysis 10 (Spring 1977): 61-74.

[62]Stern and Kirkpatrick, "Energy Behavior," pp. 11-12.

As indicated in Table VI-11, two specific alternatives for direct regulatory action are: (1) mandatory efficiency or performance based standards for selected processes and energy end uses, and (2) curtailment and rationing policies. Both specific alternatives can be implemented at all levels of government in the form of legal requirements or prohibitions. In fact, some actions have already been proposed or enacted.

The discussion below begins with a brief description and assessment of mandatory programs and curtailment and rationing measures, including identification of implementing strategies that either can be or are being pursued. Following this, the remainder of the evaluation focuses on direct regulation by means of efficiency or performance based standards. The rationale for this approach is based on earlier findings which indicate that government activities within this category currently emphasize energy efficiency standards or variations thereof. Examples of specific strategies include the development of building codes that rely on stricter thermal performance standards, regulations requiring vehicles to meet specified fuel economy standards, and efficiency labels (eventually leading to standards) for certain energy-consuming appliances.

Strategies to implement mandatory conservation programs to restrict energy use by consumers overlap to some extent with the imposition of efficiency standards. The

TABLE VI-11

IMPLEMENTATION STRATEGIES AND CONSTRAINTS
FOR DIRECT REGULATORY ACTION

Specific Alternatives	Implementing Strategies	Constraints
Mandatory federal efficiency or performance based standards for selected processes and energy end uses	Federal legislation and regulations to gradually eliminate inefficient products and buildings (efficiency standards already established for automobiles; under consideration for new buildings and certain appliances)	Resistance by private sector to increased government intervention and control May be too inflexible to accommodate regional/state variations, and difficult to administer
	Adopt mandatory state-local government energy demand management programs (federal program already established)	Places initiative at state level, including requirement for conservation planning
Curtailment and rationing policies	Federal and state legislation with stringent regulations to meet emergency situations	Viewed as not needed except as components of contingency plans

important distinction is that mandatory programs, such as the Federal Energy Management Program (FEMP), as a more subtle form of government regulation aimed at specific groups of energy users. The FEMP, applicable to federal employees and facilities of the 16 most energy-consumptive departments and agencies,[63] provides the example for the strategy suggested in Table VI-11 that state-local governments adopt similar mandatory demand management programs. FEMP includes regulations for federal building operations, transportation, and employee activities (e.g., requirements for reducing illumination levels, prescribed temperature settings, requirements for buying and leasing smaller, more efficient cars for employee use, and conducting employee energy awareness programs during working hours.)[64]

States and local governments could adopt and implement these same types of regulations and requirements for all their public facilities and employees. As a measure of the energy conserving potential of such programs, the 16 federal agencies recorded energy savings from six to 25 percent during 1974 (compared to the baseline for 1973).

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[63]The agencies included in the FEMP are: the Departments of Transportation; Defense; Labor; Interior; Agriculture; Commerce; Health, Education and Welfare; Treasury; Housing and Urban Development; State; Justice; and the National Aeronautics and Space Administration; General Services Administration; Veterans Administration; Department of Energy; and the Environmental Protection Agency.

[64]See, U.S., Federal Energy Administration, Environment Federal Energy Management Program, First Annual Report, Fiscal Year 1974 (Washington, D.C.: Government Printing Office, 1974).

Anticipated consumption was reduced by .53 quadrillion Btu's, or the equivalent of 90.5 million barrels of oil.[65] Based on current crude oil prices, an energy reduction of this magnitude would save over one billion dollars, money which could be credited against the national trade deficit. Although savings would vary by state and community, this example indicates the potential effectiveness of mandatory measures. Since most of the measures require little if any outlay of funds, except for administrative purposes to establish, implement, and monitor the program, the new returns to governments in reduced energy bills should be positive.

To be flexible and responsive to different state-local characteristics, the initiative for the programs must come from the state and local level. Furthermore, to coordinate and direct the programs effectively will require the formulation of a conservation or demand management plan for the relevant agencies. If states and communities do not choose this course, it is likely that the legislative provisions of the Energy Conservation and Production Act (ECPA) and the Energy Policy and Conservation Act (EPCA) which require the implementation of mandatory programs relating to energy use (if a state voluntarily chooses to participate) will no longer be optional--i.e., the federal government will direct states to adopt the existing federal guidelines.

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[65]"Agencies Slash Energy Use," The Sunday Oklahoman, February 7, 1975. This equals about one percent of the total national energy requirement in 1974.

The curtailment and rationing alternative has received much attention (most during the height of the OPEC embargo,)[66] but very little deliberate action. Both policies can be used to deal with potentially severe inequities and inefficiencies during emergency situations. However, because fuel shortages are a recent phenomena in this country, curtailment and rationing are acceptable, on social and political grounds, only in periods of visible crisis. That is, under normal conditions the two are not viewed as elements of a long-term rational energy policy. Instead, such emergency measures are generally perceived as representing the failure of past policy (or the lack of a policy).[67]

Thus far the only substantive results of federal government activities in this policy area are the "emergency" or "standby" measures contained in the ECPA. These allow the President to take various actions to reduce demand and allocate available supplies in the event of critical fuel shortages. Most states and some cities have now dormant emergency type laws which contain detailed regulations describing how fuels would be allocated and used if events

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[66]"Rationing Experts Needed," Norman Transcript, November 13, 1973.

[67]David J. Rose, "Energy Policy in the U.S.," Scientific American 230 (January 1974). Reprinted in U.S., Senate, Committee on Interior and Insular Affairs, Energy Policy Papers (Washington, D.C.: Government Printing Office, 1974), p. 71.

so dictate.[68] The Los Angeles City Energy Curtailment Plan provides an instructive example of how directive regulations may be prescribed and implemented. This plan is broadly formulated and has been used by the federal government and other states in connection with the development of their programs.[69]

For the present, it appears that rationing and curtailment will remain as backup regulatory alternatives. Yet, a recent study noted if "other more gradual fuel conservation programs and legislation fail to control the existing energy problems, it is quite likely (state) 'emergency measures' will be activated and used on a long-term if not permanent basis."[70] Thus, at least contingency plans for these alternatives are needed at all levels of government.

Direct regulation by means of federal efficiency standards represents an approach similar to but less coercive than curtailment and rationing. It is similar in the sense that the end results are essentially the same--i.e., the prohibition of certain inefficiencies and waste in the way energy is consumed. As noted above, the remainder of

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[68]Martin, "Role of Government in Causing Energy End Use Efficiency," p. 483.

[69]See, U.S., Senate, Government Operations Committee, Current Energy Shortages Oversight Series, Staff Study of Impact of Energy Shortages on Los Angeles (Washington, D.C.: Government Printing Office, 1974).

[70]Martin, "Role of Government in Causing Energy End Use Efficiency," p. 483.

this discussion is concerned with the costs, risks, and benefits associated with the adoption of federal legislation and regulations to mandate product and process efficiencies. This approach has already been implemented for automobiles; and, in the case of buildings, HUD has been charged with the responsibility to formulate national building standards by 1981. Likewise, what began as voluntary labeling programs for certain residential and commercial appliances are likely to be replaced by mandatory efficiency standards. In all three instances--automobiles, buildings, and appliances--regulations will be (or have been) promulgated to force manufacturers to increase the energy efficiencies of their products. The intended outcomes are a lower level of national energy consumption and the gradual elimination of inefficient products from the market.

The potential or actual effectiveness of efficiency standards in reducing sectorial and national energy demand is generally understood and accepted. In other words, it follows that increasing the energy efficiency of a product will reduce per unit, and ultimately, total consumption.[71] For example, the 1965 Federal Housing Authority (FHA) minimum performance standards, applicable to all federally-insured residences, permitted heat losses of up to 50 Btu's per day for an average-sized (1,600 square-feet) house, or

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[71]Denis Hayes, "Conservation as a Major Energy Source," New York Times, March 21, 1976.

almost two million Btu's per day. Stricter standards were adopted first in 1971 and again in 1976. If all of the 15.4 million residences projected for construction between 1972 and 1982 conformed at least to the 1971 standards, rather than the 1965 standards, the total energy savings would be approximately three quadrillion Btu's per year--about 10 percent of the expected 1982 total residential space heating and cooling requirement.[72] Even greater savings are projected when the 1976 FHA standards and the DOE appliance efficiency targets are implemented for all new buildings.[73]

Because efficiency standards were not to become effective until 1978, changes in transportation energy demand are also based on projections. However, these estimates are supported by other data which indicate the introduction of more efficient automobiles is beginning to have a favorable impact on gasoline consumption.[74] Several aggregate

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[72] These data are from Fowler, "Energy Conservation, Homes and Buildings," p. 2.

[73] The 1976 FHA minimum property standards are believed to represent a good proxy for federal building standards now being developed by HUD as a result of the 1975 EPCA. For estimates of potential savings based on the implementation of these standards and appliance efficiency targets, see James B. Kurish and Eric Hirst, Residential Energy Use Models for the Nine U.S. Census Divisions (Oak Ridge, Tenn.: Oak Ridge National Laboratory, 1977).

[74] At this time it is not possible to separate out interactive effects such as the level of national economic activity, higher fuel prices, spot fuel shortages, and increased consumer awareness of conservation that may affect driving habits.

trends indicate that better vehicle efficiencies are reducing historical consumption levels for automobiles. As illustrated in Table VI-12, while total passenger car gasoline consumption increased by about nine percent from 1972 to 1976, per car consumption declined by about 3.6 percent. Preliminary data for 1977 indicate that a lower rate of increase in automobile fuel usage occurred in 1977, and is believed to be in part a result of increases in the fuel efficiency of the automobile fleet.[75]

The degree to which this alternative will continue to have positive effects on automobile fuel consumption has been estimated as follows. Under present EPCA fuel economy standards for new cars, in spite of an expected 32 percent growth in vehicle-miles travelled between 1977 and 1985, total auto fuel consumption is expected to change only slightly:

> As vehicles with improved fuel efficiency are phased in, the historic pattern of annually increasing automotive fuel use is expected to reverse itself. Auto fuel consumption is expected to peak in 1978 at about 5.4 percent above the 1976 level, then fall to about 0.7 percent above the 1976 level in 1985, and to begin to increase again in the late 1980s.[76]

This slight growth and eventual decrease in fuel usage between 1977 and 1985 is attributable primarily to fuel economy

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[75] General Accounting Office, Federal Government Should Establish and Meet Energy Conservation Goals, p. 19.

[76] Congressional Budget Office, President Carter's Energy Proposals, p. 63. Projections based on the following averages for fleet fuel economy of new cars: 18.3 mpg in 1978, 20.5 mpg in 1980, and 23.3 in 1985.

TABLE VI-12

ANNUAL GASOLINE CONSUMPTION, 1972-1976

	Gasoline Consumption				
	1972	1973	1974	1975	1976[a]
Total automobile gasoline consumed (millions of gallons)	73,121	77,619	73,770	76,010	79,811
Average gasoline consumer per automobile (gallons)	755	763	704	712	728

SOURCE: U.S., General Accounting Office, Report to the Congress, The Federal Government Should Establish and Meet Energy Conservation Goals (Washington, D.C.: Government Printing Office, 1978), p. 13.

[a]General Accounting Office estimates based on Department of Transportation data.

improvements resulting from the mandatory provisions of the EPCA. If higher (higher than those in the EPCA) average fuel economy standards recently established by the Secretary of Transportation are met, the fuel savings will be even greater.[77]

Besides the projected national conservation gains, the increase in new car fuel economy and building and appliance efficiency results in two additional distinct benefits. First, efficiency or performance based standards as a class of alternatives can be formulated to produce relatively immediate effects on manufacturers once technologically and economically feasible targets have been determined. How quickly the more efficient devices saturate the market depends, of course, on the average replacement time associated with different products. For example, it may take as long as 20 years for some home appliances and 10 years for automobiles before the full potential of each is realized in reduced sectorial energy demand. But the length of these time frames is probably less than what it would be based only on normal market reaction to conservation objectives.

Secondly, as the stock of technical equipment is improved, and greater energy efficiencies achieved, the overall cost to use energy-consuming goods is reduced--i.e., the same distance can be travelled, homes heated and

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[77] Federal Register 42 (June 1977): 33549. EPCA standards have been revised to: 20.0 mpg by 1980, and 27.5 mpg by 1985.

cooled, with less fuel. Thus, per capita expenditures will decline (relative to increasing fuel prices) as the same amount of "work" is accomplished more efficiently. The questions which cannot be answered at this time are: Will increased efficiency eventually be offset by future increases in usage? Or, will money saved be spent on more energy-intensive goods and services?[78]

The dollar savings which accrue to individuals as a result of mandatory efficiency improvements are offset to some extent by higher first-costs of improved products. Prescriptive standards will raise the initial price of new residences and appliances, as they have already done in the case of automobiles. This stems from the costs incurred by manufacturers to attain higher efficiencies, costs which are typically passed on to customers. Even though some of these costs are associated with externalities that might appropriately be internalized, it is largely up to the newly-regulated industry to determine how much of the costs associated with government intervention must be borne by con-consumers.[79] These increased costs may be recoverable over the normal operating lifetime of an automobile, building, or appliance, but the higher first-costs may tend initially to

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[78]For a discussion of these questions, see Bruce Hannon, "Energy Conservation and the Consumer," Science 189 (July 11, 1975): 95-102.

[79]Mark V. Nadel, Corporations and Political Accountability (Lexington, Mass.: D. C. Heath and Co., 1976), p. 187.

favor some consumers over others, for example, middle- to high-income groups over low-income groups. The potential unequal distribution of this conservation benefit has been addressed for buildings (as discussed in chapter V) through existing financial assistance programs to help low-income groups. Similar programs may be needed for other energy-efficient products as well. Some banks are already giving lower interest rates to individuals who purchase more efficient automobiles or want home loans to install new insulation or other energy saving devices.[80]

Another more difficult outcome to deal with is the potential adverse effects of government actions to remove inefficient products from the market. Mandatory standards will infringe on both consumer preferences and private sector product choices. Indeed, energy decision-makers, who must decide which methods are most effective and which products and processes are inefficient, might eventually play a significant role in defining the characteristics of consumer goods prohibited or allowed. For example, the implicit assumption behind auto efficiency standards is to coerce consumers into smaller, more efficient autos.

Efficiency standards to achieve conservation also pose some distinct disadvantages in terms of implementation requirements and flexibility. Compared to market approaches

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[80] Jane Cracraft, "Bank Saves Energy, Money," Denver Post, March 8, 1978.

to technical innovation in any of the areas discussed above, mandatory requirements, administered and enforced by government, pose relatively high information and administrative costs. Some of the economic costs for research, development, and demonstration normally borne by the automobile industry, construction industry, and related manufacturers are shifted to government. The Departments of Energy, Transportation, Commerce, and Housing and Urban Development must not only formulate, fund, and enforce mandated programs, but these agencies must also revise and update the standards for the products and services based on ongoing analyses of private sector progress, each year's projected and real energy savings, and changing technologically feasible targets. In other words, as new conservation technologies become available, the appropriate agencies must make and enforce new rules.[81] Thus, mandatory programs lead to increased public investments and bureaucratic intervention into the economy.

In addition, regulatory alternatives are by definition an inflexible approach to dealing with specific problems and issues. Such regulatory standards as those discussed here are perceived by many to be too insensitive to local, state, and regional variations in energy use.[82]

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[81] Scroggins, "Energy Conservation in the U.S.," p. 11.

[82] A. Barry Crawford, "Energy Conservation in the Interior Western States," paper presented at the Annual Meeting of the American Association for the Advancement of Science, Denver, Colo., 1977, p. 10.

The complexity of establishing workable public and private sector arrangements, the highly technical nature of the problems and issues that can arise, the need to assemble together participants from diffuse markets and roles, all combine to make it difficult to prescribe one set of rules that can deal with every product and every manufacturer. Furthermore, with the passage of time, conservation standards once set can become counterproductive--i.e., the standards become the norm. Instead of forcing technological development, standards may arrest it and produce barriers to further innovation and change.[83] This potential outcome is best illustrated by considering the problem of energy conversion processes and air quality control. When Congress passed the Clean Air Act of 1970, it was construed to be a "technology forcing" bill. The air quality standards established by the Environmental Protection Agency were expected to result in the deployment of the "best available control technology" to reduce the emission levels of certain air pollutants. However, because technical risk and cost-effectiveness issues surrounded available clean-up technologies, industry reacted initially by adopting in some cases air quality control measures or techniques that did not reflect the technology forcing "spirit" of the legislation. The resulting impasse

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[83] Richard Schoen, Alan S. Hirshberg, and Jerome M. Weingart, New Energy Technologies for Buildings (Cambridge, Mass.: Ballinger Publishing Co., 1975), p. 57.

over the standards and how they were to be implemented in part led to amendments to the 1970 law to clarify the technical requirements.[84]

The basic point that needs to be made here is actually broader than the above example. Direct regulatory action besides imposing costs on the private sector in terms of increased bureaucratic intervention by government, can result in second-order unanticipated problems and issues. Private sector resistance to interference, even where technological and economic feasibility have been demonstrated, can cause delays in implementing prescribed standards (as has already occurred for the 1978 automobile fuel economy requirements). Similar reactions are expected if and when the federal government promulgates the national building standards being developed by HUD.[85] Finally, there is the perennial problem of the regulatory agency itself becoming the captive of or dominated by the industry it is supposed to regulate.[86] Any one of these factors can reduce the effectiveness of legislation for direct regulation of an energy use.

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[84]For a more detailed discussion of this issue, see Irvin L. White et al., Energy from the West: Policy Analysis Report (Washington, D.C.: U.S., Environmental Protection Agency, forthcoming), chapter 6.

[85]Schoen, Hirshberg, and Weingart, New Energy Technologies for Buildings, p. 51.

[86]See James Q. Wilson, "The Dead Hand of Regulation," The Public Interest 25 (Fall 1971): 39-58.

To summarize briefly, curtailment and rationing appear politically and socially acceptable only in periods of visible crisis or emergency. However, lingering energy policy problems have raised their legitimacy as necessary components of contingency planning at every level of government.

Alternatives that rely on other forms of direct regulatory action, such as mandatory conservation programs and efficiency standards for inefficient energy consuming items, have been shown to exhibit a favorable potential for reducing energy consumption. They also have the distinct advantage that they can be formulated to produce immediate effects on manufacturers, assuming the necessary information base exists upon which standards may be based. Once formulated, the effectiveness of labeling and efficiency standards depends largely on public and private sector cooperation to meet the designated conservation targets.

Implementation requirements are high in both information and administrative costs, particulary since some of the costs and risks normally borne by the private sector are shifted to government and the public. Mandatory regulation of end use is also viewed by some as too inflexible to accommodate local, state, and regional energy use variations. Furthermore, the discernible trend from voluntary government programs to mandatory prescription raises questions about the long-term consequences on individual preferences, particularly concerning the role of energy decision-makers to prohibit or allow certain goods and services over some others.

Findings and Comparison of Alternatives

As noted earlier, the evaluation step in this research provides a framework within which alternative policies and implementing strategies can be compared. More specifically, the five substantive categories of alternatives primarily reflect tradeoffs in formulating and implementing public policies to reduce energy demand and increase energy use efficiency, whereas the procedural category addresses different approaches for improving the existing decentralized, fragmented policymaking process for conservation. Together these six categories underscore the need to find a mix of inducements, technical fixes, regulations, and institutional arrangements to deal with conservation problems and issues.

In general, it was concluded that increased federal planning and management of conservation authority will exacerbate already difficult issues of federal intervention into state energy policies and programs. On the other hand, reliance on incremental improvements to the existing decentralized, fragmented policy system, or the establishment of a regional or multi-state approach to problems and issues, may require an unacceptably long time frame to implement national conservation goals. The requirement that states assume a more pronounced policy formulation role will likewise stress their financial, technical, and administrative institutions. Even so, improving the existing issue system by relying on state-local initiative is more acceptable and implementable than other options. This acceptability must be weighed by policymakers against tradeoffs in effectiveness and the time required to achieve substantive conservation objectives.

The substantive alternatives and strategies considered above were also found to pose different costs, risks, and benefits in terms of the general values at stake--i.e., effectiveness, efficiency, equity, flexibility, and implementability. It should be noted that many tradeoffs are involved, and the comparison undertaken below does not lead to a clear or "best" choice. Instead, this summary is intended to highlight the consequences of a particular choice and help to inform policymakers about what the relative advantages and disadvantages among choices are.

Regarding how well alternatives achieve the goal of reduced demand and increased efficiency, direct regulation by means of mandatory programs can produce more immediate demand-restraining effects than information collection and dissemination or financial assistance in the form of incentives. In part this is because of the uncertainty associated with information and incentive programs unless target groups are clearly identified, information is linked to utilization, and first-costs of conservation activities are shown to be recoverable. It is also because alternatives in the two categories rely heavily on voluntaristic reactions. Rising energy prices resulting from immediate or phased deregulation of oil and gas will also reduce demand and encourage technical efficiency, but there is no consensus as to how high prices must rise or in terms of the potential effects on consumers. That is, although some practices and behavior changes may eventually follow from inducements and higher energy prices, this assessment indicates that the hard comparative questions concerning the effectiveness of alternatives are when and at what price to society. Thus, policymakers need to consider tradeoffs among energy conservation, economic goals, and individual welfare.

The potential of alternatives to avoid or mitigate conservation problems and issues was found to be closely tied to questions of timing and duration. Education campaigns and financial incentives require continued support and exhortation. Since they depend on attitudinal and behavioral changes, the time required for public acceptance and support may ultimately shift the burden for conservation onto future generations. Better immediate and permanent effects can be achieved through direct regulatory action by promulgating efficiency and performance based standards for energy using goods. In addition, increasing end use efficiency will buy time for the development of a longer-term rational energy supply policy. However, alternatives found to be potentially effective in the short- to mid-term can lead to adverse second and higher order effect. For example, direct regulation poses social and political acceptability issues; technical fixes do not attempt to deal with the root causes of overconsumption and waste; and immediate deregulation clearly has equity consequences.

The efficiency of the various alternatives and strategies can be compared in terms of economic costs and cost-effectiveness, risks, and environmental effects. Information collection and dissemination strategies have not been shown to be cost-effective, but as discussed earlier, will require only a small percentage of the overall national energy budget. Similarly, uncertainty exists with regard to increasing public investments to promote R,D&D and expedite commercialization of new energy saving technologies. R,D&D for conservation is generally not as economically-intensive as supply options, however, the potential risks for the public sector are great since the marketability of new or potential conservation technologies has not been proven. It has been suggested that until more promising substantive proposals for basic conservation research are identified, the current level of expenditures ($386 million) may be all that the policy area can absorb.

Less questionable and more comparable are the environmental benefits that may be gained by lowered consumption attributable to any one of the identified conservation alternatives. In sum, conservation reduces environmental damage, for example, by decreasing air pollution resulting from energy use and reducing land disturbance associated with related energy supply development to meet a high rate of demand.

How the costs, risks, and benefits of alternative policies will be shared was determined to be one of the more critical components in this assessment, especially in terms of the relative burden borne by the public and private sectors. For example, technical fix and regulatory options will increase private sector costs with most of the costs passed on to consumers in higher first-costs for energy goods and services. Consequently, efficiency standards and the availability of a more efficient stock of technologies favor middle- to high-income energy consumers over others. Consumption taxes, a general energy tax, or deregulation, if combined with programs of tax rebates, can mitigate to some degree the impacts associated with these alternatives but will raise the costs of conservation for government and lower profits to energy industries.

The critical point to be weighed here is the lack of information concerning the magnitude of impacts (e.g., unemployment, inflationary effects, and standard of living changes) associated with most mandatory alternatives and strategies. This is especially the case for immediate deregulation of prices due to inexperience in predicting the demand consequences of higher fuel prices.

There are also equity risks associated with other options. Forced reduction of energy use through reliance on government induced efficiency standards will affect both private sector and consumer preferences and decision-making because certain goods and practices will be prohibited. Likewise, the social and political costs, as well as effects on other national policy goals, of using the tax system to modify consumption habits need to be carefully considered.

Finally, because all conservation opportunities help to keep supply options open and reduce environmental damage, future generations stand to benefit more than present generations. In a more immediate sense, however, society-at-large is a primary beneficiary from information collection and dissemination, financial incentives, and better coordinated conservation planning and management. And improving conservation technologies appears to be the most equitable means of distributing benefits to everyone. Benefits from immediate or phased deregulation will accrue mostly to the private sector unless government intervenes to prevent windfall profits.

Some alternatives were shown to be more flexible (adaptable and adjustable) to local and regional variation and changes over time than others. Education programs, especially information provided by fuel suppliers, and some technical fix alternatives appear by far to be the most capable of accommodating different energy use needs and consumption patterns. Likewise, financial incentives and disincentives allow discretionary decisions by energy policymakers to deal with a range of problems and issues and time-related adjustments. Of all the options considered, direct regulatory action in the form of performance based standards is the least flexible approach to conservation end uses. Indeed, regulatory alternatives can become counter-productive in that, once defined, standards act as barriers to further innovation. Of course this aspect of regulation to achieve conservation must be weighed against distinct effectiveness advantages.

In terms of their implementability, the most acceptable substantive alternatives are those which improve the economics of conservation, including financial inducements (rewards) and new tehcnologies which can be demonstrated to have a relatively short payback period (three to five years). Also, specific alternatives requiring the least government intervention are generally deemed preferable. Any effort to expand direct regulation of end uses is expected to be resisted by private sector interests. And because policy-makers and the public are unsure about the need for higher energy prices, immediate deregulation appears to be politically unacceptable for the present.

Beyond these general comparative remarks, information on implementation is limited, particularly concerning the ease and costs of administration. This state of affairs is expected to persist until more experience is gained regarding efforts to manage energy demand.

The overall assessment of alternatives and implementing strategies is summarized in Table VI-13, according to the specified evaluative criteria, measures, and findings. Two final points need to be made about the evaluation. First, because efforts to manage energy demand represent a new social and scientific concern in this country, the analysis highlights a number of information needs with regard to the current state-of-the-art (e.g., a major inadequacy is the lack of economic cost and benefit data for several of the specific alternatives). These will be further addressed in the next chapter. Secondly, in some instances the measures in the table apply more directly to some alternatives and not others. Where this occurs, the most relevant finding has been tabulated.

TABLE VI-13

A COMPARISON OF POLICY ALTERNATIVES
FOR ENERGY CONSERVATION

Criteria	Measure	Findings
Effectiveness -How well do alternatives achieve the substantive policy objectives of reduced demand and increased efficiency; avoid or mitigate conservation problems and issues; over what time period?	Potential energy savings	Highest degree of uncertainty associated with voluntary alternatives. For example, information collection and dissemination strategies are ineffective unless target groups are clearly identified, information is linked to utilization, and first-costs of conservation are shown to be recoverable. Higher energy prices as a result of immediate or phased deregulation will reduce demand, but there is no consensus as to how high prices must rise or in terms of projected consequences. Both "off the shelf" and new technologies exhibit the best potential (see discussion for estimates) for reducing sectorial consumption and will entail fewer life-style changes than other alternatives. Approaching energy conservation by means of a general tax on energy resources does not appear to be as effective as taxing investments for energy-using devices. Direct regulation by means of mandatory programs can produce immediate demand-restraining effects and lead to the gradual elimination of inefficient goods and services from the economy.
	Duration of the solution	Education campaigns and financial incentives require continued support and exhortation; time required for public acceptance and diffuse support may ultimately shift the burden for conservation onto future generations. "Permanent replacement cost pricing" as a market incentive may be one of the most effective long-term approaches to energy prices, but means prices will rise drastically from present levels. Increasing efficiency of end use energy devices buys time for development of rational energy supply policy. Use of federal consumption taxes affects current purchases and is therefore aimed at the long-term, but does not consider existing stock of inefficient goods and services. Curtailment and rationing are seen as interim crisis measures. Best permanent effects achieved through direct regulatory action through promulgation of efficiency and performance standards (i.e., once conservation technology is introduced, its demand-restraining effects are permenent).
	Degree to which problems and issues are avoided	Implementation of alternatives with the best efficiency potential could help to aggregate parties-at-interest around substantive conservation goals. However, alternatives found to be potentially effective in short- to mid-term (as well as long-term) can lead to uncertain second

TABLE VI-13, continued

Criteria	Measure	Findings
		and higher order effects. For example, direct regulation raises social and political acceptability issues; technical fixes do not attempt to deal with root causes of overconsumption and waste; and immediate deregulation has adverse equity consequences.
Efficiency -What will be the costs, risks, and benefits associated with the alternatives?	Economic costs and cost-effectiveness	Information collection and dissemination strategies have not been shown to be cost-effective, but will require only a small percentage of the overall federal energy budget (e.g., a 10-week intensive campaign aimed at the two largest cities in each of the 50 states might cost $17-18 million, or an amount equal to about two percent of the total DOE 1979 budget request). R,D&D for conservation is not as economically-intensive as supply options (e.g., investments of $1 million in each of three new energy saving technologies were shown to capture environmental benefits as well as reduce demand). Similarly, "off the shelf" technologies, such as insulation for retrofit purposes, have acceptable payback periods. Current federal R,D&D budget for conservation is $386 million compared to about $5 billion for all energy R,D&D. However, until more promising substantive proposals for basic conservation research are identified, this may be all that the policy area can absorb. At individual level, initial costs of energy consuming products will increase as efficiencies improve. A majority of the alternatives lead to increased public/private sector investments.
	Risks	Expanded programs for conservation development and commercialization pose high degree of risks for the public sector since the marketability of new or potential technologies is uncertain.
	Environmental effects	Lowered consumption attributable to conservation alternatives reduces environmental damage, for example, decreases air pollutants resulting from automobiles and reduces land disturbance associated with energy supply development
Equity -How will these costs, risks, and benefits be distributed?	Costs	Technical fix and regulatory alternatives will increase private sector costs; however, most of these will be passed on to consumer in higher first-costs for energy consuming goods and services. Economic

TABLE VI-13, continued

Criteria	Measure	Findings
		effects of efficiency standards and technical fix options favor middle- to high-income energy consumers over others because of increased out-of-pocket expenses. Consumption taxes on inefficient devices combined with a program of tax rebates can mitigate equity problems, but raises costs to government and lowers profits to energy industries. Requirement that fuel suppliers provide conservation information and assistance to customers places burden of conservation education/exhortation on the private sector.
	Risks	Magnitude of impacts (e.g., unemployment, inflation, standard of living changes) due to immediate deregulation of energy prices is largely unknown due to inexperience in predicting demand-restraining consequences of higher fuel prices. Reliance on government induced efficiency standards affects private sector and consumer preferences and decision-making since certain goods and practices will be prohibited. In this case, social and political costs are uncertain. Any attempt to use the tax system to change consumption behavior will affect national policy goals in other substantive policy areas more than most alternatives.
	Benefits	In the long-term, future generations stand to benefit most since all conservation opportunities preserve range of supply options and reduce environmental pollution and damage. In a more immediate sense, society-at-large is the major beneficiary from information collection and dissemination, financial incentives in the form of loans, grants, and tax credits, and better coordinated energy conservation planning and management. Improved technical devices also means energy savings will eventually accrue to everyone, whereas economic benefits of immediate and phased deregulation will accrue mostly to the private sector. R,D&D options distribute benefits across all major consuming sectors. And better coordination of policies and programs means more open, pluralistic decision-making.

TABLE VI-13, continued

Criteria	Measure	Findings
Flexibility -Is the alternative sufficiently flexible to be applicable under a variety of conditions and over time?	Adaptability	Centrally-directed federal coordination of energy conservation policies and programs appears to be most inflexible route to deal with local-state-regional variations in energy use. In terms of substantive alternatives, education programs (especially information provided by fuel suppliers) and technical fix alternatives are most capable of accommodating different energy use needs and consumption patterns. Taxes on specific fuels offer another highly adaptable path to conservation of nonrenewable resources, but a general Btu tax appears to be too inflexible. Financial incentives and disincentives allow discretionary decisions by energy policymakers to deal with a range of problems and issues. Direct regulatory action in the form of performance based standards is the least flexible approach to conservation end uses.
	Adjustability	Direct regulatory action by government can be counterproductive in that, once defined, standards often become the norm, acting as barriers to further innovation.
Implementability -How difficult will it be to implement the alternative?	Acceptability	Improving the existing decentralized, fragmented conservation policy system by relying on state-local initiative is more acceptable than increased federal planning and management (but this must be weighed against tradeoffs in effectiveness and time required to achieve conservation). Most acceptable substantive alternatives are those which improve the economics of conservation, including financial incentives and technical fixes which have a 3-5 year payback period. Specific alternatives with least government intervention are generally preferred. Policymakers and the public are confused as to the need for higher energy prices and what effects prices will have on existing energy problems and issues. Thus, immediate deregulation is for the present not acceptable. Direct regulatory action for national building standards, for example, can be expected to be resisted by private sector.
	Adequacy of Informaton	Because efforts to manage energy demand are in the early stages of development, information on implementation is limited, especially concerning the ease and costs of administration. For example, there is no previous experience with direct measures to regulate energy use (EPCA mileage standards were to begin with the 1978 model year), nor is there a base for evaluating the application of consumption taxes, or expanded R,D&D programs in the conservation area.

CHAPTER VII

CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

Introduction

This research has identified and defined the substantive political issues and the policymaking system which led to the formulation and implementation of public policies and programs for energy conservation. Furthermore, chapter VI evaluated and compared policy alternatives and implementing strategies to improve and/or change the conservation policymaking system and policy results. Investigation of the diverse ways energy is used in the U.S. economy and the analysis of conservation policies was facilitated by the use of an "issue systems" framework. It has been demonstrated that the substance of energy conservation problems and issues leads to a policy system that can be differentiated from other systems on the basis of specific interests and values at stake, relevant institutional arrangements, applicable laws and regulations, and governmental and nongovernmental participants. It has also been shown that the nature of energy use problems plays a principal role in shaping alternative policies and strategies.

This chapter offers several overall conclusions about policies to reduce national energy demand, recommends future research to refine the analysis undertaken in the preceding chapters, and concludes with a discussion of the role of applied policy analysis within the discipline of political science. Although the potential for political science research to help resolve energy problems and issues is only now beginning to be realized, this chapter suggests that the prospects are greater now that social and institutional factors have become as important as technological characteristics in the national energy debate.

Conservation and Emerging National Energy Policy

Three principal conclusions emerge from this research regarding the concept of conservation and its role in emerging national energy policy: (1) the debate over price-induced conservation versus other approaches remains unresolved; (2) there is no single, "best" category of public policy alternatives to deal with conservation problems and issues; and (3) although generally recognized, the possibility of significant energy savings from technical fixes, or new conservation technologies, has not achieved the kind of policy support warranted.

First, conservation measures which have been adopted to date reflect the tension between market and non-market approaches to the problem. While policymakers have avoided the singular goal of increasing energy prices to encourage reduced demand, this could be changing given the current emphasis on making energy prices more fully reflect the cost of producing new energy. Chapter VI indicated that energy prices will continue to increase either through taxation or deregulation. However, the unresolved debate over government policy in this area exists as a barrier to the development of a long-term, effective conservation program. The debate essentially centers on how long the U.S. can take to make the transition from an era of low-priced energy to the era of expensive energy. Resolution of this issue has significant implications for both energy supplies and demands. On the demand side, energy prices will affect individual decisions with regard to present and future energy purchases and uses, and, ultimately, the average annual rate of consumption in this country.

Secondly, the analysis of alternatives and implementing strategies suggests that there is no single, "best" category of policy tools to deal with conservation and no policy choice for a sector exists in a "pure" form. Alternatives chosen to deal with problems and issues in any one sector are clearly tied to existing or impending government programs and actions in other policy categories. For example, education programs can provide information to encourage consumers to change their energy use habits or make more informed choices based on product efficiency ratings, which in turn are influenced by both regulations and technology development and commercialization decisions. Likewise, market prices of fuels within the consuming sectors are affected by the tax system, price controls, and by federal standards. Thus, a range of specific and selective strategies tailored to meet the needs of energy uses in each consuming sector appears to be the appropriate path to follow.

Furthermore, the diversity of interests, end uses, and fuels indicates that implementation decisions for specific policies and strategies depend on decentralizing responsibility for some problems and policies. For example, the energy efficiency of new and emerging technologies can be more readily directed through federal regulatory and research activities, whereas retrofit programs for the existing stock of inefficient goods, such as housing, need to be addressed by states and localities.

The above considerations raise problems of intergovernmental relations and program coordination which may be only partially resolved by the new Department of Energy organization (to what extent remains to be seen.) More importantly, recognizing the need for other levels of government to assume primary responsibility for improving the efficiency of existing products goes against the prevailing trend toward centrally-directed conservation policies and programs. This is not intended to suggest that strong national leadership is not needed or required, instead it underscores the fact that some conservation alternatives can be more effective and implementable if handled by states.

Thirdly, although generally recognized as offering significant opportunities to save energy, the development of new conservation technologies has lagged behind the development of energy supplies. Immediately, following the OPEC oil embargo, conservation was defined as a short-term crisis measure to reduce U.S. dependence on foreign oil imports. This early focus gave way to the development of conservation as a functional area of government activity when the Federal Energy Administration and the Energy Research and Development Administration were established. It was increasingly recognized that energy waste could be managed through the adoption of technologies and practices which in turn would provide both economic and environmental benefits. Consequently, increased federal emphasis in the form of increased public investments needs to be placed on research, development, demonstration and commercialization for new and potential conservation technologies. As stated in chapter VI, the capital risks may be high, but probably not any greater than those currently being taken on the supply side of the energy system. This is especially the case if one considers the fact that a more efficient stock of energy using products can reduce demands with fewer major lifestyle impacts.

Directions for Future Research

Based on the above conclusions, it is possible to identify both technical and political areas where additional policy-oriented research or where refinements in the information developed in this study are required. The agenda outlined below assumes that the potential for social science research combined with technical analyses to help resolve energy problems and issues is greater than revealed by current efforts.

For the research, development, and demonstration (R,D&D) category of alternatives, technology assessments should be conducted for new conservation technologies throughout the research-to-commercialization sequence. Identification of immediate or future impacts and mitigating strategies might encourage consensus-building for new technologies before high risk demonstrations or commercialization efforts are proposed--i.e., before public investments are irreversibly committed. It would also help provide for social science input throughout each stage of conservation technology development.

In addition, the assessment of alternatives in this study could be refined by undertaking more narrowly-focused evaluations (according to the five specified evaluative criteria) of promising specific alternatives. In a number of cases, generalizations offered in this study need to be further explored and tested. Primary candidates for in-depth investigations are: (1) the requirement that fuel suppliers serve as a link between consumers and conservation information; (2) the establishment of mandatory state energy management programs modeled after the federal program; and (3) specific technical fix options (e.g., external combustion engines for autos, alternative technologies for residential and commercial heating applications, and so on). The purpose of additional research in these areas would be to identify more clearly the specific sectorial problems and options within the categories of alternatives to deal with the problems.

Another particular research concern is the role of energy use taxes and related social costs, risks, and benefits. As evidenced in chapter VI, a majority of the research on taxes to induce conservation is of a general nature and not focused on specific end uses. More detailed comparative analyses of the consequences of consumption (excise) taxes and deregulation on energy end uses and processes across economic groups, or income levels, would be useful to help resolve the political debate over the appropriate role of energy prices in restraining demand. Similarly, the economic costs and benefits associated with most of the specific alternatives discussed earlier merit further attention, especially since economic barriers (first-costs versus lifecycle costs) have been shown to be a major constraint for the implementation and utilization of energy saving technologies.

Research is also needed to more fully document individual and interest group attitudes, perceptions, and behavior with regard to conservation and the willingness of individuals and groups to accept mandatory or coercive policies. In this respect, attention should also be centered on eliciting information to formulate better incentives and techniques to build diffuse support for conservation programs.

Applied institutional decision-making research is required to better identify, define, and evaluate the functions, roles, processes, and performance of relevant conservation agencies. A prime example of investigations in this area would be comparative analyses of what states are doing or have done to implement the conservation elements of the Energy Policy and Conservation Act of 1975 and the Energy Conservation and Production Act of 1976. Such analyses could doucment whether or not new conservation legislation has been enacted, agencies created, appropriations authorized, implementation strategies chosen, and outcomes. Other projects might: (1) evaluate conservation program development within the newly established Department of Energy, looking primarily at problems of inter- and intra-governmental coordination; (2) assess the results of the Department of Transportation's mandatory fuel-economy program after its first full year of operation; and (3) examime the efforts of the Department of Housing and

Urban Development to formulate national building standards, concentrating especially on the politics of industry opposition to and lobbying against performance based conservation standards. Information of this kind would augment the search for better procedural alternatives to manage the emerging national conservation program, as well as improve the understanding of substantive policy outcomes.

Finally, more policy research needs to be aimed at what was earlier referred to as targets of social change, or "social fixes." Explicit in the third conclusion noted above regarding the role of conservation in national energy policy is the requirement for technical research to identify new or potential conservation technologies. More implicit, but just as important, is the necessity for "non-hardware" research. Policy innovations are needed that get at behavior and energy use problems. For example, a fundamental question for all conservation R,D&D is how to couple technologies with inducements to encourage public acceptance and utilization. Useful social science research in this area can be contributed by economists, sociologists, and psychologists, as well as political scientists.

Integrating Applied Policy Analysis and Political Science

As demonstrated by this research and as indicated in the above agenda, political scientists have an important role to play in bringing their insights to bear on energy and other critical policy problems. Despite this potential role, and despite the rapid growth and development of the "Policy Sciences," substantial debate--as discussed in chapters I and II--exists within the political science community regarding the place of applied policy analysis in traditional disciplinary concerns. The debate reflects a genuine concern for professional political scientists since support for the study of energy problems and policies comes largely from government agencies, nonprofits, and private research organizations.

The central question is whether or not applied research, such as this analysis of energy conservation alternatives, can contribute concurrently to society and the discipline. Those who oppose this kind of research activity for political science are concerned that: (1) it diverts the attention of political scientists from the development of disciplinary knowledge (core theories, methodologies, or data bases); (2) applied research is limiting or damaging to the discipline because it results in political scientists giving premature advice on the basis of inadequate explanatory theories, methods, and data; (3) the discipline's research agenda will be established by those who select the problems and provide the funds; and (4) political scientists will become the tools and accomplices of the "powers-that-be"--i.e., the government in office.[1] Each of these arguments is worthy of attention, and as already noted, the risks are to some extent real. Because political scientists who choose to involve themselves in substantive policy areas should be aware of these concerns, the remainder of the chapter addresses the four arguments within the context of the design and conduct of this research.

Regarding the first argument that applied policy analysis will not contribute to the continued development of the discipline, two points stand out. In the first place, this study has attempted to contribute not only to our knowledge of energy conservation policy formation, but also to the development of theory and methods to study public policies and policymaking. The conceptual approach--the issue systems framework--was shown to be a useful model for structuring a complex social problem. Furthermore, the framework is applicable and adaptable to other policy problem areas. Indeed, the use of the framework to study a range of social problems could provide the basis for further developing and testing existing generalizations or empirical hypotheses about policymaking. That is, it offers an

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[1]These four points are a modified statement of Carol Weiss' summary of the arguments made by those opposed to involving social science in policymaking. See Carol H. Weiss, ed., Using Social Science Research in Public Policy Making (Lexington, Mass.: D. C. Heath and Co., 1977), p. 2.

approach for organizing knowledge in different policy areas that can help structure a body of comparative information.

Secondly, this research has used substantive and theoretical knowledge bases from political science. Substantively, political science literature has been shown to be useful in understanding political institutions, public decision-making processes, and problem and issue categories affected by energy conservation policy demands. For example, political science literature was instrumental in developing knowledge of the social and political context of conservation problems and issues, participants in the policy process, and the importance of intergovernmental relations in planning and coordinating energy conservation policymaking. The study has also used and developed more theoretical knowledge. For example, the identification and evaluation of policy alternatives and implementing strategies emphasizes the use of five evaluative criteria rather than focusing only on the more traditional administrative concerns of efficiency and effectiveness. It is in this evaluative stage that political science concepts have much to offer policymakers, especially with regard to efficiency, equity, and implementability issues.

The study also suggests potential revisions to existing theoretical constructs regarding the process of policy development. The prevailing decision-making literature assumes that policy formulation begins with a shared articulation or consensus of a problem and works toward resolution. This analysis of energy conservation problems and issues indicates that policymakers seldom begin with a consensual definition of the problem or issue to be solved. In fact, the variety of policy problems and issues that make up "the conservation problem" leads to just the opposite finding--i.e., the conservation issue system is characterized by a conflictual policy process and problem definition.

The research also collapses the typical distinction between empirical, normative, and technical analysis. The actions, interests, and values of policymakers and other participants in the system are given the same status, at least in the logic of the issue systems approach, as empirical statements as to what caused a policy. In other words, the focus of policy is not just to understand or explain causes, it is also to know what kinds of arguments were brought to bear on the policy (for or against), how and where they were debated, how the adopted policy was assessed, and what groups won or lost or might win or lose in the case of prescriptive alternatives.[2]

As noted in chapter II, most behavioral political scientists argue that political science has a specialized

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[2]For a recent discussion that makes similar points about the role of normative elements in policy analysis, see Charles W. Anderson, "The Logic of Public Problems: Evaluation in Comparative Policy Research," in Comparing Public Policies: New Concepts and Methods, pp. 19-41, ed. Douglas E. Ashford (Beverly Hills, Calif.: Sage Publications, 1978), pp. 19-41.

concern for policy which is the impact of policies on the political system. The above revisions suggest that this must be tempered with concern about the impact of the system on policies and the publics involved.

The second argument against integrating policy analysis and the discipline holds that because political science is an embryonic discipline, premature advice to policymakers may be damaging to the reputation of the discipline. It can be easily concluded from a reading of this study that no effort has been made to overstate or misrepresent the state-of-knowledge with regard to the discipline. As has been demonstrated, policy analyses have high information demands, and the theories and tools of political scientists are viewed as a complement to the work of other policy analysts. More specifically, the interdisciplinary information requirements of the issue systems framework provides insurance against premature advice because it requires the tempering of one's professional judgment with a spectrum of social, economic, technical, and related perspectives.[3]

The last two arguments against integrating applied policy analysis and political science--government determination of research agendas and the potential for political scientists to become handmaidens of government--have not

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[3]As discussed in chapter I, this research has benefitted from the insights and criticism of other social scientists and technical researchers in the field.

been borne out by this research. However, they deserve attention because applied research is generally funded by federal, state, or local government agencies and also because the research agenda outlined above reflects a positive view concerning the place of conservation research in emerging national energy policy. As stated in chapter II, the analytical framework used to structure this analysis is in part the product of eight years of applied policy analysis conducted by the Science and Public Policy Program (S&PPP) at The University of Oklahoma. All of the S&PPP studies, headed by political scientists during 1970-1978, have been funded by federal agencies (the National Science Foundation, President's Council on Environmental Quality, Office of Technology Assessment, and the Environmental Protection Agency). Similarly, this analysis of energy conservation began as a part of one of S&PPP's larger research projects. However, the relationship of both the Program, and this researcher, to the funding agencies has been succinctly summarized by the Assistant Director of S&PPP and primary investigator for several of the Program's recent energy studies:

> We have never felt that our research agenda was being set by the funding agencies, in part because we have only taken on projects which were on our own agenda, but also because of the great degree of freedom the agencies have given us. We certainly have not become the tools and accomplices of the government in office.[4]

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[4]Irvin L. White, "An Interdisciplinary Approach to Applied Policy Analysis," paper presented at the Annual Meeting of the American Political Science Association, New York, N.Y., August 31-September 3, 1978, p. 15.

While this statement alone does not lead one to the conclusion that those who criticize applied policy research on the above grounds should be ignored, it does suggest that the experience of one policy research group indicates the arguments are neither necessarily accurate, nor are the feared results inevitable.

In conclusion, this research has attempted to contribute to our knowledge of energy conservation policy-making and policies--i.e., to both the political science discipline and to society. It has been further suggested that professional political scientists can play a key contributory role in the realm of policy analysis and vice versa, especially through the use of political scientists to define the social and political context of policy problems and issues and to structure the evaluation of alternative policies and implementing strategies. As discussed throughout the preceding chapters, numerous social, economic, and political values are at stake with regard to energy policy decisions, and the costs and benefits may not be shared equally by all stakeholders since policies always have the potential to effect economic sectors and political jurisdictions in different ways. Thus, the basic challenge for applied policy analysis is to define and evaluate the costs, risks, and benefits of options in order to better inform policymakers about the possible impacts of choosing one alternative over another.

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