DOE/PE-0040 (Vol. 1)
Volume 1 of 3

REPORT TO THE CONGRESS
Department of Energy Organization Act

Title X

SUNSET REVIEW

SUMMARY REPORT

U.S. Department of Energy
Office of Policy, Planning and Analysis

February 1982

DOE/PE-0040 (Vol. 1)
Volume 1 of 3

REPORT TO THE CONGRESS
Department of Energy Organization Act

Title X

SUNSET REVIEW

SUMMARY REPORT

U.S. Department of Energy
Office of Policy, Planning and Analysis
Washington DC 20585

February 1982

Preface

This report is submitted to Congress as required by Title X ("Sunset Provisions") of the Department of Energy Organization Act of 1977 (P.L. 95-91). It provides a description of the background and conduct of the review, sets the policy context of the period being reviewed, and summarizes the findings in each of the program areas. A detailed analysis of each of the program areas is provided in a companion analytical report, the Sunset Review Program-by-Program Analysis, which is being released concurrently by the Secretary of Energy.

TABLE OF CONTENTS

INTRODUCTION

Title X of the Department of Energy Organization Act of 1977 (P.L. 95-91) requires the President to prepare and submit to Congress a comprehensive review of each program of the Department. This report satisfies the provisions of Title X.

Background

The turbulent decade of the 1970's was a period of social experiment in energy, with the Nation's economy and social institutions as the laboratory. The primary conclusion drawn from these experiments was to relearn the lessons of the marketplace.

We have learned that regulatory intervention in energy markets is more likely to disrupt them further than to correct perceived market imperfections. This lesson was taught through our subsidizing rapid oil import growth while trying to control and equalize oil prices through price controls and the entitlements system. We learned--through our experiences in 1973 and 1979 with allocation controls on gasoline and the ensuing gasoline lines--that Federal officials cannot predict shifting energy demand patterns.

Another market lesson we learned in the 1970's was that, with price controls holding down the price of conventional oil and gas supplies, higher cost new technologies could not be economically competitive. Through price controls, the Federal Government had removed the market incentives necessary for industry to invest in energy research and development. This encouraged federally funded development and demonstration projects to accelerate private sector technology development. The problem was compounded when Federal forays into commercialization did not use market tests to select technologies for advanced development, and the Government found itself pumping billions of dollars into technologies for which there would be no market without continued Federal support.

Current Policy

The market orientation of this Administration is the logical conclusion to the series of steps taken in the 1970's. This Administration's approach to energy recognizes the central role of the private sector in energy production and consumption decisions and imposes appropriate limitations on the Government's role. The Administration's energy policy, outlined in the National Energy Policy Plan of July 1981, is part of an overall economic policy that calls for less Federal intervention across the board, including less spending, less regulation, and less taxation. Key elements of this policy are the following:

- Reliance on the marketplace to obtain the most efficient and effective combination of energy production and consumption
- An intensive program of regulatory reform to allow markets to respond freely and effectively
- Emergency preparedness, with emphasis on market allocations even during a supply disruption, while reducing our economic vulnerability through a large Strategic Petroleum Reserve
- Federal research and development focused on the traditional areas of long-term, high-risk but potentially high-payoff programs, leaving commercialization to the marketplace, which is much better equipped to handle it

Results of the Review

The Sunset Review of the Department of Energy was designed to examine both the past and current objectives of the Department's programs and the effectiveness of the programs designed to achieve those objectives. Conducting this review has been valuable in what it has revealed about the Department's programs--how they fit into past and present energy policies, and how well the programs performed in meeting their objectives. In most cases, the program activities reflected the intent of enabling legislation; and some programs showed progress toward achieving objectives.

Whether the objectives and activities of many departmental programs were appropriate, then or now, is another question. As described in the preceding sections, many of the Department's programs are no longer valid within the context of the Federal role in the energy sector of the economy. The program summaries in the main body of this report will identify the areas and general elements being terminated. Specific details about terminations and funding can be obtained in the appropriate sections of the President's Budget for fiscal year 1983.

Dismantlement

In view of the demonstrated success of energy markets in those cases where they have been allowed to function freely, and given the limited role and responsibilities of the Federal Government in this sector of the economy, it is no longer necessary or appropriate to maintain a Cabinet-level Department of Energy. The Department was established to address a set

of problems that were peculiar to their time and that were largely the result of a philosophy that stressed excessive Government intervention in energy markets in the first place.

The Federal budget for energy activities has been revised to reflect this Administration's policies, including phasing out programs that have inhibited or distorted energy producer and user behavior in the marketplace. The remaining valid Government functions can be managed more effectively within other established elements of the executive branch having similar responsibilities, principally the Departments of Commerce and the Interior. Legislative proposals to effect the dismantlement of the Department of Energy are being submitted to Congress with the budget for fiscal year 1983.

A. THE SUNSET REVIEW PROCESS

Title X, the "Sunset Provisions," of the Department of Energy Organization Act requires the President to prepare and submit to Congress a comprehensive review of each program of the Department.[1] The act specifies the type of information to be included in each review and provides that, upon completion, all the individual reviews be made available to the relevant congressional authorizing committees. This volume, along with the Sunset Review Program-by-Program Analysis,[2] satisfies the provisions of Title X.

1. Background: Energy Organization and the Sunset Requirement

Many citizens felt that the United States was in many ways unprepared for the rapid changes in the world energy situation in the 1970's, so "crisis" was a term popularly used to characterize the unexpected turn of events. Of the numerous energy organizations created to deal with these crises, several were designed to have limited lives. For example, the Federal Energy Administration (FEA), created in 1974 in the wake of the 1973 oil embargo, was designed to have a 2-year life.[3] Thus, when FEA was created, it had a real "sunset" provision. However, FEA was extended for 18 months[4] in order "for the Congress to develop a permanent agency responsible for energy matters as a replacement."[5]

---

[1]P.L. 95-91, section 1001. (See Appendix A.)

[2]The Sunset Review Program-by-Program Analysis is a separate report submitted to Congress by the Secretary of Energy.

[3]Federal Energy Administration Act of 1974 (P.L. 93-275), May 7, 1974.

[4]Energy Conservation and Production Act of 1976 (P.L. 94-385), August 14, 1976.

[5]U.S. Congress, Conference Report to Accompany H.R. 12169, Energy Conservation and Production Act, Senate Report 94-1119, August 5, 1976, p. 53.

When the Department of Energy was created in 1977, its sponsors were concerned primarily with coordinating a series of separate Federal efforts to deal with these crises. The Senate Committee on Governmental Affairs reported on a long series of efforts to come to grips with Federal activities in energy:

> The course of development which has led to the current proposed Department of Energy has . . . moved from the very broad concept of [a] Department of Energy and Natural Resources which encompassed all major resource systems as well as energy, through a series of much more specific stop-gap measures that focused on immediate functional needs . . . to the present recognition that the Nation's energy needs and energy problems must receive centralized, comprehensive treatment in a Cabinet-level Department--and that they must receive the high priority that a Department focused on energy concerns exclusively can give them.[6]

The purposes of the act and the responsibilities of the Department were quite specific. For example, one of the principal purposes of the act was the following:

> to provide for a mechanism through which a coordinated national energy policy can be formulated and implemented to deal with the short-, mid- and long-term energy problems of the Nation; and to develop plans and programs for dealing with domestic energy production and import shortages.[7] (Emphasis added.)

Many of these purposes and activities reflected a sense of urgency, of crises to be dealt with, of problems to be solved, of a job to be done. From a policy standpoint, they reflected a sense that Government had to intervene in energy markets. But even then, there was uncertainty as to how to intervene effectively. From an organizational standpoint, they reflected the congressional finding that "formulation and implementation of a national energy program require the integration of major Federal energy functions into a single department in the executive branch."[8]

Little was said about what was to happen once these processes were well under way; however, the assumption was that there were a number of market failures to be addressed, and that Federal intervention was required. Experience has shown many of those interventions to have been ill-advised.

---

[6]Committee on Governmental Affairs, United States Senate, Report to Accompany S. 826 (Department of Energy Organization Act), Senate Report 95-165, May 14, 1977.
[7]P.L. 95-91, section 102(3).
[8]P.L., 95-91, section 101(5).

But even at that time, while the Department was being formulated, there was in other quarters growing concern about the proliferation of Federal activities and about the untrammeled growth of the Federal enterprise. A few years earlier, Congress had imposed discipline on its own consideration of the Federal budget.[9] The "sunset" concept was discussed extensively. Thus, when the legislation to create a Department of Energy reached the floor of the House, an amendment was added that "the provisions of this Act shall expire on December 31, 1982."[10]

In introducing the amendment, Representative Broyhill said:

> This is a sunset amendment. We have been hearing a lot about proposals to have the life of agencies come to an end at some point in time. A number of Members are offering bills that would accomplish this purpose, so I am offering a sunset amendment to this bill which would say that the authorities and provisions in this Act would expire in about 5 years. . . . [I]t would force the Congress to review the activities of the agency. It would not necessarily mean that the new Department would come to an end. I am sure that in the 97th Congress the Congress will be conducting full-scale hearings and will be coming in here with legislation either to continue the agency, to revise it, to amend it, or whatever.[11]

The House adopted the amendment and instructed its conferees to insist on the "sunset provisions."[12] The Senate bill had no comparable provision.

Confronted with these polar approaches, the conference committee replaced the House termination clause with a requirement for a detailed sunset review.[13] Explaining to the House the conference committee's action, Representative Horton said:

> Because of the obvious sentiment of the House on this [sunset] matter, we endeavored to work within the limits which these two votes placed on us. However, the original sunset provision appended to the Department of Energy legislation was faulty in the manner in which it was drafted. Because it could have conceivably terminated the Department, legal experts informed the conferees that this would place extremely heavy burdens on the ability of the new Department to contract for any long-term research and development work. . . . As a consequence of a recommendation from the American Law Division of the Library of Congress, the conference sought to reach agreement on a sunset provision which would provide the

---

[9]Congressional Budget and Impoundment Control Act of 1974 (P.L. 93-344).

[10]Congressional Record, House of Representatives, June 3, 1977, H 5396.

[11]Congressional Record, p. H 5392.

[12]Ibid., June 21, 1977, pp. H 6235-H 6237.

[13]Conference Report, "Department of Energy Organization Act," House Report 95-539, to Accompany S. 826, July 26, 1977.

> necessary congressional oversight of its operations, but at the same time not so restrict the agency that it could not perform its very vital mission. . . . The provision which the conference recommends would provide the type of congressional review which the supporters of sunset are seeking. . . . When that report is submitted it will provide the basis for the most comprehensive review of a Department's operations that has ever been undertaken.[14]

This is that report.

2. Scope of the Review

The actual provisions of Title X are both general and comprehensive in nature. Although the legislative history contains no direct attribution to the source of the 14 analysis points in the law, several of the statements may be found almost verbatim in the standard text on zero-base budgeting,[15] and the thrust of the review follows closely the zero-base budgeting philosophy which was very popular at the time the legislation was drafted.

Of the 14 analysis points required by Title X (see Appendix A), 5 were critical to the design of the review and have shaped the products. Three of these are retrospective in nature; they require the identification of the historical goals and objectives of each of the Department's "programs," an assessment of the degree to which these objectives were achieved, and a statement of program accomplishments for each of the 4 years of DOE's existence. The other two key points are prospective; they require identification of the current needs and objectives for the programs and an assessment of the resources needed to achieve those objectives.

The key analytical point missing from the law was the requirement to evaluate the appropriateness of program goals and objectives in relation to overall policy goals. The most critical ambiguity in the legislation was the lack of an operational definition for the term "program," leaving the level of detail of the review open to broad interpretation.

The activities of the Department are not limited to energy. They fall naturally into five areas: energy technology, application, regulation, and support programs designed to deal with the fundamentals of the Nation's short-term, midterm, and long-term energy situation; energy emergency preparedness programs intended to cope with the effects of a disruption, should one occur; programs for the national defense; general science programs that may support both energy and defense work but are of value for their own sake; and administrative and support programs that exist because the Department and its programs exist. Within these broad categories are many diverse programs.

---

[14] Congressional Record, August 2, 1977, p. H 8256.

[15] Peter A. Pyhrr, Zero-Base Budgeting (New York: John Wiley & Sons, 1973), pp. 62-77.

Therefore, the first step in the sunset review was to define a reasonable set of "programs." To provide some reasonable order for congressional review, the activities of the Department were divided into a series of entities called "program analysis units," or PAU's. A PAU was defined as the maximum aggregation of smaller programs that could reasonably be considered to have a common character and purpose, while retaining structural identification with the congressional budget in order to facilitate congressional review. The result of this process was the definition of 59 PAU's, which together cover all the resources and activities of the Department. The PAU's are listed in Appendix B.

Since the principal criterion for a unit of review was one of program coherence, the PAU's are not the same size: their annual budgets range from a few million dollars to more than $3 billion.

Once a workable definition of "program" had been attained, the next step was to develop an analysis framework that would facilitate the effectiveness measurements required by the act. The key to this was an ability to apply quantitative measures to the program objectives. A quick survey of traditional objective statements that had been used in earlier budget justifications, technical reports, and other departmental publications showed most such statements to be very general and rhetorical in nature and not geared to specific deliverable products on a fixed time schedule.

At that point, a decision was made to break the review process into three distinct phases. Phase I was the identification of a set of clear, concise, and measurable objectives for each of the PAU's and a set of effectiveness measures for each objective. Phase II, the analysis phase, consisted of developing the 14-point analysis for each PAU. Phase III concluded with the review and compilation of the Phase II analyses into a final study product and the development of a summary volume.

Because both the Nation's energy situation and its energy policies have changed since the Department was formed, care has been taken to avoid any misleading or unfair evaluation of yesterday's performance by measuring it against today's objectives. Historical performance should be measured against historical objectives. Accordingly, early in the review it was decided that both historical and current goals would be presented for each program in which they are different. Thus, the review evaluated historical performance against program objectives that were current in the period being reviewed. Future performance is projected against current and future objectives.

During the period under review, the Department of Energy has had three quite different organizational structures. In this report, care was taken to ensure that programs were evaluated according to their success in meeting larger Federal and national needs and were not colored by the framework of any particular organizational structure.

This report covers the past, present, and future. It seeks to fully describe past accomplishments, to show the transition from historical programs to current directions, and to address anticipated future needs.

In reviewing the accomplishments described in this report, the Administration has assessed these accomplishments with several questions in mind:

- Did the American taxpayer receive sound value for the money spent on the programs?
- Did the resulting outputs contribute to the well-being of American consumers and the efficient use of the Nation's resources?
- How effective were these programs compared to related activities conducted by the private sector?
- Is carrying out these programs an appropriate role for the Federal Government?

The Administration's answers to these questions are expressed in the budget proposals for fiscal year 1983 it is sending to Congress.

To provide a background and context for the program reviews, the next section briefly outlines developments in domestic and international energy markets and the evolving national energy policies. The balance of this volume consists of broad descriptions of the programs and program reviews, followed by a discussion of dismantlement of the Department of Energy.

B. THE EVOLVING ENERGY AND POLICY CONTEXT

Most Federal policies and programs evolve over time. Changes often are gradual and incremental, rather than revolutionary. The realities change, and our understanding of those realities changes. We learn, both from research and exploration and from observing the economy and the effects of past policies. The attitudes and perceptions of the people vary. These variations offer a framework for policy debates and for the policies that result.

Energy policy proceeded on such a path until the 1970's. With a few exceptions (such as natural gas regulation and oil import controls) the free market was allowed to work; and this free-market concept was applied to most facets of economic policy, including energy policy. The changed situation in the 1970's, however, forced this evaluation of understanding and policy changes to take place in a very compressed period; and mistakes were made. With the benefit of this experience, energy policy now has matured.

1. Growth and Stability, 1950-1972

The policies of the 1950's and 1960's were consistent with their times. Energy supplies were ample, at prices that for years had been declining in real terms. Until the late 1960's, the domestic oil industry had excess production capacity.

Federal energy policy, limited in scope, strove to maintain stability in energy markets. Gas prices were regulated as a result of a 1954 Supreme Court decision; oil prices, though not controlled directly, were stabilized indirectly after 1959 by import controls under the Mandatory Oil Import Program. Federal budgets for energy focused largely on the support of research and development--a traditional Federal role; and leasing of Federal lands for energy resource development offered major sources of supply and generated substantial revenues.

But the underlying trends were less favorable, and their effects began to be felt late in the 1960's. First, excess domestic oil production capacity disappeared, and oil production peaked in 1970. Demand for natural gas increased rapidly as this clean-burning and price-controlled fuel became popular for both residential and industrial use, and production peaked in 1971. However, the peaking of domestic oil and natural gas production had no visible effect on the rapid growth of energy demand, because shortfalls in domestic supplies were being offset by even cheaper supplies of foreign oil.

U.S. dependence on oil and natural gas was further ensured by a series of actions from another sector. Late in the 1960's, a growing environmental concern led to a variety of legislative measures to protect air and water quality. One result was to focus the rapidly increasing energy demand on cleaner burning natural gas and oil.

As a result of all these trends, oil imports rose very rapidly in the early 1970's. The market power and cohesion of the Organization of Petroleum Exporting Countries (OPEC) were increasing. World oil prices had begun to rise sharply, but not enough yet to create increases that would distress most final consumers. The Mandatory Oil Import Program, which limited imports to a small percentage of domestic production, had to be abandoned in the face of rising imports and rising import prices; and controls on oil prices eventually took its place.

2. 1973 (the Embargo) and Its Aftermath

The country was in a troublesome position in 1973. Economic policy was still trying to get a grip on an economy that had been overheated since the mid-1960's; and the Federal Government had responded by imposing price controls, including controls on oil prices. Spare oil production capacity had declined worldwide. When key oil-producing countries suddenly cut production and crude oil prices increased fourfold, the country was ill equipped to deal with the situation.

There was widespread agreement that something had to be done about the Nation's energy situation but reluctance to leave it for the market to solve. The immediate problems were the sharp increase in world oil prices (with effects on the individual and on the economy as a whole) and a general perception of scarcity of preferred fuels. There was also an increasing recognition of longer term problems: continued vulnerability to events in unstable countries as evidenced by high import levels; and, to some, a perception that we were "running out" of traditional sources of oil and gas. The policy-makers' perceptions of these problems led rapidly to a broad range of policy changes.

Controls on oil prices became binding. The Nation was both amazed and angered by the predicament in which it found itself--the effrontery of the oil "embargo"--so the severe controls on oil prices were maintained in an attempt to shield consumers and the economy from the reality of soaring world oil prices. Because price controls could be imposed only on domestic production, a complex system of "entitlements" was developed to equalize the crude oil prices that different refiners, and thereby their customers,

faced. These price controls on both crude oil and petroleum products, while intended to shelter consumers from sharp OPEC price increases, had the added effect of causing artificial shortages as consumers demanded more oil at the lower, controlled prices than was available. As long as the controls remained binding, the resulting supply shortages generated a need for priorities on distribution, and the Government had to step in to decide which consumers would get priority on the limited supplies of oil and gas. This initiated a continuing, but never successful, process in which complex allocation systems were developed, found inadequate, and continually modified.

Concern for the longer term led to intensified efforts to develop new energy forms and technologies, but price controls removed most private sector incentives to start such programs. Federal budgets for energy research therefore were doubled, and doubled again. Research and development programs were expanded to encompass demonstration and commercialization activities in an effort to prove to industry that new technologies would work; but, in many cases, commercialization decisions were reached with little or no attention to the economics of the investment, and Government subsidies were required to create markets for the products.

Many of these measures dealt with symptoms and with short-term problems. They did not produce long-term solutions. Domestic oil price controls and allocation systems, which were in place when global oil prices increased sharply in 1973, led to gasoline lines and supply uncertainties. Controls on energy prices discouraged conservation by keeping prices artificially low and similarly discouraged new production. The entitlements program, while motivated by a Government-determined sense of fairness, in fact provided multibillion dollar subsidies for imports by shielding consumers from realistic price signals. As a result, after a brief drop, oil imports--and import costs--continued to grow. As imports increased, so did the country's vulnerability to damage from future disruptions in energy supply. Research on long-term solutions, though important, could not help in the short run. Throughout this period, energy continued to be viewed as a special case, separate from national and international economic policy.

3. Consolidation and the Department of Energy, 1977-1980

Since energy was considered a special problem area and the Federal Government was viewed as the source for a solution, energy was thought to require a special Government organization. The Federal Energy Administration (FEA) was created in 1974 to carry out greatly expanded oil regulation, energy information, and other programs. The Energy Research and Development Administration (ERDA) was created in 1975 to bring energy research and development activities formerly under the Department of the Interior and the National Science Foundation together with the nonregulatory activities of the Atomic Energy Commission.

These activities were further consolidated in 1977. The creation of the Department of Energy brought together FEA, ERDA, the Federal Power Commission, and a number of programs and responsibilities from other agencies.

During this period, there was increasing recognition that price controls caused serious distortions in energy markets. Conservation and production both were disadvantaged, and the Government tried to compensate (in the National Energy Act of 1978,[16] the Energy Security Act of 1980,[17] and other legislation), by intervening further, with subsidies for conservation and for production of several different energy forms and with additional nonprice regulations.

Gradually, too, consensus began to form on the idea that price controls and other interventions ultimately ought to be phased out. Decontrol schedules--however hesitant and unrealistic--were established for both oil and natural gas.

Many of the energy policy actions of the 1970's may be viewed as economic and social experiments. America's economy and its people were the laboratory. Some of the experiments worked; many did not.

4. New Directions

This Administration seeks a stable and effective energy policy. In the National Energy Policy Plan released in July 1981,[18] energy no longer is viewed as an isolated entity, but rather as an integral part of the Nation's economy. Therefore, the solution to energy problems should be an integral part of the solution to the Nation's economic problems.

The President's Program for Economic Recovery has four principal elements:

- o A budget reform plan to cut the rate of growth in Federal spending
- o A series of proposals to reduce personal income taxes and other taxes in order to stimulate saving and investment
- o A program of regulatory relief
- o A new commitment, in cooperation with the Federal Reserve Board, to a monetary policy that will restore a stable currency and healthy financial markets[19]

---

[16]Five bills were passed on October 15, 1978: the National Energy Conservation Policy Act of 1978 (P.L. 95-619); the Powerplant and Industrial Fuel Use Act of 1978 (P.L. 95-620); the Public Utility Regulatory Policies Act of 1978 (P.L. 95-617); the Natural Gas Policy Act of 1978 (P.L. 95-621); and the Energy Tax Act of 1978 (P.L. 95-618).

[17]P.L. 96-1104.

[18]U.S. Department of Energy, Securing America's Energy Future: The National Energy Policy Plan (Washington, D.C.: Government Printing Office, 1981).

[19]America's New Beginning: A Program for Economic Recovery, the White House, February 18, 1981.

As part of this Economic Recovery Program, the Administration's energy policy recognizes the central role of the private sector--millions of consumers, producers, inventors, and investors throughout the country--in making efficient energy production and consumption decisions.

Several dimensions of this policy have important implications for Department of Energy programs:

- First, the Government's overriding responsibility with respect to energy is to allow energy markets to function. This is the commonsense and practical way to obtain the most efficient, effective, and generally acceptable combination of energy production and consumption. Some steps already had been taken in that direction: the legislated requirement for oil price controls became discretionary in 1979, and the previous Administration had scheduled a 24-month phaseout of controls with the expiration of the legislation late in 1981. But, just a few days after he took office, President Reagan accelerated this process by using his authority under existing law to remove the remaining price controls on crude oil and petroleum products. The results have been impressive. In response to market forces, the American people are running a larger economy with 14 percent less oil than 2 years ago. October 1981 was the fifth consecutive month in which domestic oil production from the lower-48 states increased from the corresponding month last year. In May 1981, the monthly average for imports of crude oil (net of oil for the Strategic Petroleum Reserve) fell below 4 million barrels per day for the first time since 1975. Contrary to some expectations, oil prices have remained relatively stable and have begun to fall in real terms.

- Second, to allow markets to respond freely and effectively, the Administration is pursuing an intensive program of regulatory reform. Since January 20, 1981, more than 200 Department of Energy regulations have been modified or eliminated, and the process is continuing.

- Third, net imports of crude oil and petroleum products have been reduced from an annual average of 8 million barrels per day in 1979 to as low as 5 million barrels per day in some months of 1981 in response to market forces. But achieving a low level of oil imports at any cost is not a major criterion for the Nation's security and economic health. The Nation would be remiss if it did not press the search for less expensive alternatives to foreign oil; but the economic costs of forcing uneconomic alternative fuels into the marketplace through Government intervention are prohibitive. Even if we were to import no oil, we would remain vulnerable to the economic shock of an oil supply disruption. The market for oil is a world market, and many of our friends and trading partners are more dependent on imports than we. The key for dealing with possible disruptions is clear. Allow energy markets to work to reduce imports efficiently. Avoid controls on oil markets during a disruption--since they have a record of freezing and amplifying supply dislocations--and the market needs maximum flexibility to

reallocate during a disruption. Proceed expeditiously to create a large Strategic Petroleum Reserve, as our ability to replace interrupted supplies quickly provides the best protection from the economic shocks that otherwise would result. Such a strategy is more effective and less expensive than a Government-directed effort to plan the level of U.S. imports.

- Fourth, quite apart from energy matters, this Administration recognizes that oil prices may rise, perhaps sharply at certain times. A legitimate Government concern is the special problems higher prices would impose on the poorest of our citizens. Since this is a problem of social policy rather than of energy policy, the Administration proposes that programs to provide direct assistance to the poor be handled by those agencies with experience in social programs: the Department of Health and Human Services and the Department of Housing and Urban Development.

- Fifth, this Administration is limiting Government research and development spending to long-term, high-risk but potentially high-payoff technologies. Federal support of later stages of demonstration and commercialization distorts energy markets and substitutes the judgment of the Federal Government for those investment decisions that private citizens and entrepreneurs are in a better position to make. With decontrol, prices give appropriate signals and incentives to both producers and consumers, and thus decontrol removes the strongest original justification for the subsidies. Getting the Government out of activities that the private sector has incentive to undertake will significantly reduce the Department's demands on the Federal budget.

- Sixth, these changes will permit Federal support to be focused where it belongs: on research and development of new technologies whose payoff may be large but is diffuse and further off. In many cases, private firms could not expect to recoup, through profits, enough of the benefits of new technologies to stimulate the necessary expenditures. The Federal Government will continue its traditional role of strong support for long-range research in these areas. Thus, there has been a major shift from an emphasis on demonstration and commercialization to one of developing the technology base that will permit investors and consumers, by their actions in the marketplace, to select technologies that are economically and environmentally acceptable.

- Finally, given the limited role of the Federal Government in this area of economic policy, there is no justification for maintaining a separate Cabinet-level Department of Energy. The President will send legislation to Congress to transfer essential programs to other agencies.

C. ENERGY TECHNOLOGY AND APPLICATION PROGRAMS

The Department of Energy has many programs that attempt to deal with the Nation's short-, mid-, and long-term energy problems. In one way or another, all are designed to develop energy technologies, to help understand, or to help shape energy markets.

Five groups of programs may be distinguished: those focused on energy sources (fossil, nuclear, and renewable); those concerned primarily with the use and conservation of energy; supporting programs of energy research, environment, and safety, which serve these and broader purposes; regulation and information programs; and certain business-related activities that the Federal Government conducts in energy production and power marketing.[20]

1. Energy Source Programs

The Department has or has had programs that address every current and potential energy source: fossil energy, nuclear energy, and renewable energy.

a. Fossil Energy

Fossil fuels--coal, oil, and natural gas--accounted for 90 percent of the energy consumed in the United States during 1980. While market forces may make other energy forms increasingly important, fossil fuels could still be supplying 80 percent of all U.S. energy in the year 2000.[21]

---

[20]Energy emergency preparedness programs are addressed in a separate section.

[21]U.S. Department of Energy, Energy Projections to the Year 2000, A Supplement to the National Energy Policy Plan (Washington, D.C.: Government Printing Office, 1981).

The United States has large, well-financed industries which generally have done a good job of providing the fossil fuels we need. Last year, for example, these industries produced some 3 billion barrels of oil, 20,000 billion cubic feet of natural gas, and 800 million tons of coal domestically. If markets are not distorted by Government policy, there is every reason to expect that these industries will continue to develop and adopt new technologies where it is economic to do so, even as conventional domestic supplies decrease.

The private sector has risked billions of dollars for exploration, and declines in proved reserves appear to have been halted, at least temporarily, by record levels of exploration for and development of oil as a result of high prices and decontrol. Much of the undiscovered conventional oil and gas is located in hostile environments and will be difficult and expensive to recover. Therefore, significant increases in production appear unlikely on a sustained basis unless appropriate market incentives exist. Drilling for natural gas has been held back by price controls, so the potential in this area is yet to be determined. Unconventional oil and gas resources offer some potential, and the resources of coal and oil shale are vast. But much of the supplemental production of liquid and gaseous fuels will have to come from technologies that are being introduced or are still under development. Similarly, the future production of electricity and process heat from coal is expected to require combustion technology that is more efficient, more economical, and more environmentally benign than the technology in general use today. The removal of burdensome regulations and controls offers promising opportunities for economical energy production. The private sector has a proven track record of making the most of these opportunities, introducing appropriate technological change when it is economical to do so.

The Federal Government has a long history of involvement in fossil energy research. Small-scale investigations had been carried out since early in this century by the Department of the Interior's Bureau of Mines and, after 1962, by the Office of Coal Research as well.

The program grew rapidly in the early 1970's. By the time the Department of Energy was formed, the fossil energy program had placed increasing emphasis on funding large-scale tests in order to demonstrate by example the technical and economic viability and environmental acceptability of specific new energy technologies, particularly in coal gasification and coal liquefaction. As a result of this emphasis on financing large-scale testing, the annual fossil energy budget reached more than $1 billion by 1981.

Accomplishments. There were a number of technical accomplishments. In the Department's primary programs dealing with liquid fuels,[22] two large direct liquefaction pilot plants (using the proprietary Exxon Donor Solvent

---

[22]Program analysis units: Coal Liquefaction; Oil Shale; and Unconventional Petroleum Technologies. Several other program analysis units, discussed elsewhere, also contribute to liquids development. This situation occurs with respect to other energy forms and activities; the footnoted references are to the PAU's specifically discussed in the text.

and H-Coal processes) were designed, built, and operated by industrial contractors. Conceptual design work has been completed on two demonstration plants (SRC-I and SRC-II). Both a preliminary design baseline for SRC-I and a preliminary planning design for an indirect liquefaction process commercial plant (Grace) will be completed in the current fiscal year. Industry will review the data from these projects in the process of deciding whether to construct commercial plants.

Horizontal and vertical modified in-situ oil shale processes were demonstrated in large-scale retorts. The Unconventional Petroleum Technology Program, which focuses on the currently unrecoverable portions of known crude oil and tar sand resources, shared with industry the costs of field tests of 27 different combinations of technology and reservoir characteristics for enhanced oil recovery.

In the Department's primary program dealing with gaseous fuels,[23] three surface coal gasification projects, (the Conoco, ICGG, and Memphis projects) were funded through the detailed design phase except for the Memphis project, for which detailed design is still in progress. Through Government-funded pilot plant testing, several high-, medium-, and low-Btu gasifiers were developed to commercial readiness, and three industrial gasifiers were built and operated.

The Department's programs to permit more efficient, safer, and more environmentally acceptable direct use of coal[24] also funded major hardware demonstrations. Three industrial atmospheric fluidized-bed demonstration plants and two coal-oil mixture projects were completed, and a 4.8-megawatt phosphoric acid fuel cell powerplant is expected to be completed in the current fiscal year. Environmental standards were achieved in tests of industry-developed improved fuel-gas cleanup technologies, and particulate removal goals were achieved in bench-scale tests for hot gas steam cleanup supporting combined-cycle technologies.

In parallel with these efforts, environmental impact data bases were developed, and environmental control efforts were undertaken. The resulting data from both process and environmental studies were shared with industry.

In its 4 years of existence, the Department has invested more than $3.76 billion in fossil-related programs. In a number of cases, particularly those involving large demonstration plants, actual and forecasted costs have far exceeded the anticipated benefits. Government research and development designed to advance technologies for private sector use generally have been more successful, particularly when conducted on a smaller scale.

---

[23]Program analysis unit: Surface Coal Gasification.

[24]Program analysis units: Advanced Research and Technology Development; Combustion Systems; Fuel Cells; Advanced Environmental Control Technology; Heat Engines; Coal Mining Research and Development; and Magnetohydrodynamics.

While there have been some successes, many projects have had to be abandoned. Although the reasons have varied with the individual projects, they fall into the following general categories: changing economic conditions; projects did not meet technical expectations; assumptions upon which projects were started proved to be erroneous; project costs exceeded benefits to private firms who became unwilling to contribute financially; or ultimate consumers of the product were unwilling to pay the higher market price. In some cases, Government assistance has encouraged the development of a technology sooner than private industry would have developed it.

One of the biggest problems of Government-directed research in any technology area is the removal of incentives to private firms to undertake research in areas where their competitors are receiving Federal funding. With Government support also comes Government management of research. But, because Government is not intimately familiar with markets and has no profit incentive, the critical discipline of the marketplace often is not factored into decisions, and the increased likelihood of failure or the wasting of Government resources is the result, particularly when such activity is on a large scale and close to the commercialization stage, as in demonstration plants.

New Directions. Since the economic and tax policies of the current Administration, along with the considerable financial resources of the Synthetic Fuels Corporation, are expected to provide the incentives necessary for the private sector to support demonstration activities, future fossil energy work will concentrate on the earlier stages of research and development (that is, basic and applied research and proof-of-concept for innovative technology).

The earlier stages are likely to continue to be unable to attract sufficient industry funding because of the high-risk and long-term nature of the payoff. An additional reason why industry is reluctant to undertake basic research and development is that it cannot exclude competitors from using the results. Therefore, a further justification for Federal involvement in basic research and development is that the information generated is a public good.

The overall fossil energy program goal now is to develop the scientific and engineering knowledge base to assist industry in bringing economically competitive and environmentally acceptable new fossil energy resources and technologies into the marketplace.

Research will emphasize those activities critical to improving understanding of fundamental scientific and engineering mechanisms and to predicting performance of new energy resources and advanced technologies. In addition to process-related research and development, fossil energy will continue to support programs of basic and applied science for coal, oil shale, oil, and gas, as well as generic or crosscutting investigations, such as environmental characterization.

Eight of the sixteen fossil energy programs require more drastic changes.[25]

The Administration has proposed terminating the Magnetohydrodynamics (MHD) Program in fiscal year 1982. MHD is a technology for the direct conversion of heat into electricity. The historical goal of the Department's MHD Program was to facilitate the commercialization of coal-fired MHD electric plants by the 1990's. Although the program did produce some important accomplishments, potential costs of developing MHD technology are extremely high. The potential benefits of this costly program are not sufficiently greater than those of other electric-generating technologies that are advancing rapidly.

The Enhanced Gas Recovery Program sought to increase the recovery of the vast amount of gas present in western tight gas sands, Devonian shales, and coalbeds. A number of tests of enhanced recovery methods were conducted, and resource assessments were made to gain a better understanding of the potential contribution of these resources. Given the progress to date, the incentives resulting from expected future prices of gas, the technical and financial resources of the gas-producing industry, and the current need for fiscal restraint, there is not adequate justification for a continued Federal program.

The In Situ Coal Gasification Program sponsored technology development to produce low- and medium-Btu gas from the vast domestic, unmineable coal resource. While this program has completed several successful field tests, there is not adequate justification for a Federal role given the status of the technology, the ability of the private sector to continue developing this technology once financial incentives are sufficient, and the current need for fiscal restraint. Some postburn monitoring will continue.

The Heat Engines Program has focused on the development of high-temperature turbines that could be used to increase the efficiency of coal gasification, combined-cycle powerplants, and the development of engines capable of using minimally processed synthetic fuels. While there have been a number of accomplishments, including successful bench-scale demonstration of high-temperature turbine blade cooling components, there are not sufficient benefits to continue financial assistance to manufacturers except through low-cost technology base activities.

The Domestic Energy Supply Program included a variety of commercialization activities. The program sought to expand readily useable domestic energy sources through the development of economic subsidy programs and through studies of potential socioeconomic and environmental impacts resulting from specific energy projects. The goal of the Administration is to encourage a vigorous expansion of research, development, and demonstration in the private sector. Energy price decontrol, research and development, and tax incentives are all intended to create a climate for increased

---

[25]Program analysis units: Magnetohydrodynamics; Enhanced Gas Recovery; Heat Engines; In Situ (Underground) Coal Gasification; Domestic Energy Supply; Coal Mining Research and Development; Alternative Fuels Production; and Federal Leasing.

investment by many private companies seeking to solve fossil-related energy problems. Implementation of this approach, together with the financial assistance available from the Synthetic Fuels Corporation for synthetic fuels development, eliminates the need for this program. Accordingly, the program was terminated in fiscal year 1981, except for elements of the Coal Loan Guarantee Program, which retains previously appropriated funds until existing negotiations can be concluded.

Pending activation of the Synthetic Fuels Corporation, the Alternative Fuels Production Program has provided funds for feasibility studies, cooperative agreements, and price and loan guarantees for very mature projects. Feasibility studies and cooperative agreements supported 22 coal-based synthetic fuels projects and 3 oil shale projects. Three projects were selected for major support under the Federal Nonnuclear Energy Research and Development Act of 1974 (P.L. 93-577) and the Defense Production Act of 1950 (P.L. 81-774). The Alternative Fuels Production Program was funded in fiscal years 1980 and 1981. Awards of financial incentives for the loan guarantees and purchase commitments for two shale oil projects are expected to be transferred to the Synthetic Fuels Corporation. The program will be carried out without a requirement for additional funding.

Two fossil energy programs--coal mining research and development and DOE leasing responsibilities--are scheduled to be returned to the Department of the Interior. These programs were originally transferred to DOE during a period when all energy-related programs became candidates for consolidation within DOE without regard for their relationships to other Federal responsibilities. These two programs are much more consistent with ongoing Interior Department responsibilities.

The Department's Coal Mining Research and Development Program, like the other fossil energy programs, has been refocused. Funding for research on surface mining has ceased, and research and development now is limited to support of long-term research directed at reducing the cost of underground coal mining. This activity parallels and complements the health, safety, and environmental research program carried out by the Bureau of Mines in the Department of the Interior, which aims at reducing the uncertainties and problems of mine regulation by developing improved technology. It is often difficult to draw the very fine line between a technology developed for health and safety reasons and one developed for production reasons. To be adopted, a technology must be both productive and safe. Accordingly, it is appropriate, subject to congressional approval, to restore the mining research conducted by DOE to its traditional (pre-DOE) close relationship with the mining health and safety research conducted by the Bureau of Mines.

The Department of Energy Organization Act transferred from the Department of the Interior to the Department of Energy certain specific responsibilities to develop and promulgate regulations pertaining to alternative bidding systems, diligent development, royalty oil, production rates, and the promotion of competition in Federal leasing. Under an interagency agreement, DOE has been responsible as well for establishing biennial production forecasts which have been used by the Department of the Interior to help establish leasing rates. Transfer of certain leasing functions to the Department of Energy has not produced major changes in the thrust of the

overall Federal Leasing Program, nor has it produced benefits to offset the resulting increased coordination costs. The legislative basis for DOE's Federal Leasing Program recently has been deleted by Congress and the program returned to the Department of the Interior, where the bulk of Federal leasing responsibilities reside.

b. Nuclear Energy[26]

In the years since the Department of Energy was created, commercial nuclear powerplants have generated an almost constant share of the Nation's electricity--varying between one-eighth and one-ninth of annual U.S. output. However, because of the interruption in operational licensing following the Three Mile Island accident in 1979, there are many unlicensed units on which construction and the installation of equipment are virtually complete. More than 25 new power reactor systems--all of which should be ready for service within the next 2 years--will increase nuclear-generating capacity by nearly 50 percent as soon as all are licensed. Before 1985 nearly one-fifth of all electricity generated in the United States is expected to come from nuclear powerplants.

Experience has shown that nuclear power can provide electricity both safely and at a cost lower than that of competing fuels (frequently including coal). By displacing more costly oil in the generation of electricity, nuclear power contributes to the national security and improves the Nation's economy. By displacing oil, coal, and natural gas, nuclear power makes more of these fuels available for other, higher valued uses. Nevertheless, impediments to the free market have caused the use of nuclear power to grow at a rate much slower than was envisioned at the time DOE was established; and plans for a large number of future plants have been canceled or postponed in the past few years.

Institutional and economic factors have discouraged utilities from making the higher initial capital investment that a nuclear plant requires. These include the way most state ratemaking bodies calculate the return on investment permitted to utilities; the recent high cost of borrowed capital (represented by interest rates); the sharp decrease in electricity demand growth projections from a high in the early 1970's when plants currently under construction were planned; and delays and uncertainties in licensing and regulatory processes at both Federal and state levels.

Changing Federal Policies. Federal policy toward nuclear power has shifted over the years, particularly in response to concerns over proliferation of nuclear weapons capability and the disposal of nuclear wastes. The Department's programs have changed as well.

---

[26]National defense activities of DOE relating to nuclear energy, including development of naval reactors as well as work connected with nuclear weapons, are treated separately under "Defense Programs." Uranium enrichment activities, which support both military and civilian efforts in nuclear energy on a cost-reimbursable basis, are addressed under "Energy Production and Power Marketing."

The most significant shift in nuclear policy concerned spent fuel reprocessing and breeder reactor development. In October 1976, President Ford decided that U.S. reprocessing and recycling of nuclear fuel should be held in abeyance until the adequacy of proliferation safeguards could be demonstrated. In April 1977, President Carter took this policy one step further, deferring indefinitely commercial reprocessing, recycling of spent fuels, and commercialization of the fast breeder reactor. He proposed that the Clinch River Breeder Reactor (CRBR) Project (a joint Federal Government, utility, and industry effort) be terminated. However, congressional action required work on CRBR to continue.

This Administration considers nuclear power to be an important potential source of new electrical energy supplies. Unfortunately, the Federal Government has created a regulatory environment that is forcing many utilities to rule out nuclear power as a source of new generating capacity, even when their consumers may face unnecessarily high electric rates as a result.

In October 1981, President Reagan addressed this issue when he announced a five-part program to correct present government deficiencies and to enable nuclear power to make its essential contribution to our future energy needs. The program includes the following elements:

- The President directed the Secretary of Energy to give immediate priority attention to recommending improvements in the nuclear regulatory and licensing process.

- The President directed that Government agencies proceed with the demonstration of breeder reactor technology, including completion of the Clinch River Breeder Reactor.

- The President lifted the indefinite ban that previous Administrations placed on commercial reprocessing activities in the United States.

- The President instructed the Secretary of Energy, working closely with industry and with state governments, to proceed swiftly toward deployment of a means of storing and disposing commercial high-level radioactive waste.

- The President directed the Secretary of Energy and the Director of the Office of Science and Technology Policy to meet with representatives from universities, private industry, and utilities and requested them to report on the obstacles to increased use of nuclear energy and the steps needed to overcome these obstacles.[27]

---

[27]The President's Nuclear Policy Statement, October 8, 1981.

The Department's nuclear energy activities have their origin in the technology programs of the Atomic Energy Commission, under mandates of the Atomic Energy Act of 1954 (P.L. 83-703), passed on through the Energy Research and Development Administration. The Department's civilian nuclear programs focus on the development of technologies that will permit nuclear power to compete in the marketplace.[28]

Nuclear Programs.[29] During DOE's existence, progress in some fields (such as the assessment of uranium resources and the provision of specialized nuclear power systems to the national space program) has been steady. However, until this year some other programs (for example, the breeder reactor program) moved ahead more slowly because of the effect on DOE programs of changing and uncertain national policies toward nuclear power.

The Department's nuclear programs now reflect the new spirit contained in President Reagan's Nuclear Policy Statement.

Consistent with the basic principles of the National Energy Policy Plan, the Department's civilian nuclear energy effort is not intended to subsidize available technology or private-sector application of such technology. Rather, it focuses primarily on generic, long-range research and development that commercial enterprises (or even the industry as a whole) might not pursue on a pure investment basis, but that nevertheless are important to this country's midterm to long-term energy future.

Realizing the full potential of nuclear power ultimately will require several developments to which DOE programs will contribute. In the followup at Three Mile Island, DOE's objective is to acquire data and information from the cleanup of the affected unit that will help the nuclear manufacturing industry, utilities, and the Nuclear Regulatory Commission to continue to enhance the safety of commercial reactors in general and to mitigate any possible effects on either the operating staff or the public in the vicinity of a plant if a significant accident of any type should occur.

The usefulness of available uranium resources can be extended significantly by employing a breeder reactor, which in principle can produce more useable fissile fuel than it consumes. After several years of uncertainty, DOE's breeder reactor program now is proceeding rapidly. With design of the Clinch River Breeder Reactor nearly 90-percent complete and the fabrication of long lead-time components well under way, site preparation is scheduled to begin during 1982, once authorization has been obtained from the Nuclear Regulatory Commission. Actual fueling should take place before the end of this decade.

---

[28]DOE does not issue construction permits or operating licenses, nor does it regulate plant operations. All of those functions are handled by the independent Nuclear Regulatory Commission.

[29]Program analysis units: Conventional Reactor Systems; Breeder Reactor Systems; Advanced Nuclear Systems; Uranium Resource Assessment; Commercial Waste Management; and Remedial Actions.

Uncertainty about the final disposition of high-level nuclear waste has been one impediment to the broader and more rapid adoption of light water power reactors in this country. This is a problem that the Federal Government, under a succession of Administrations, has promised to solve in the national interest. The sinking of exploratory shafts to characterize the three candidate repository sites is scheduled to begin in 1983. Pending legislation contains fixed milestones for selecting and licensing the first repository and establishing a mechanism for obtaining up-front funding from the utilities to support the program. These actions will allow swift deployment of means to store and dispose of commercial high-level radioactive waste to demonstrate to the public that problems associated with management of nuclear waste can be resolved.

The problem of storing spent nuclear fuel on an interim basis (that is, until commercial reprocessing facilities and high-level waste repositories are available) is somewhat less pressing than it was thought to be a few years ago. New techniques have been developed for storing spent fuel safely in the space available at reactor sites. Through cooperative programs with the Tennessee Valley Authority and other electric utility operators, methods will be demonstrated shortly for maintaining spent fuel in considerably less volume than it now occupies in conventional storage-pool arrangements. The Administration considers it to be the responsibility of the utilities to provide interim storage of spent fuel until reprocessing facilities and waste management repositories are available.

Scientific missions in space often last for years, and they require compact and assured sources of power. To meet this need, DOE is developing for other Federal agencies, nuclear thermal and electric power devices for use in the navigation, communication, and sensing systems of a number of space programs.

c. Fusion Energy[30]

The Magnetic Fusion Energy Program is one of the major research efforts that the Department is conducting to develop a new source of energy, especially for central station power. It is envisioned that once the process is developed and shown to be economically feasible, fusion energy could become a major source of electricity for the United States in the 21st century. However, this goal is far too long range for private investment to provide resources for the expensive, complex, high-technology experiments that are

---

[30]There are two PAU's which deal with fusion energy within the Department. These are Magnetic Fusion and Inertial Confinement Fusion (ICF). The ICF Program, as established in 1978, had a dual purpose of further developing nuclear weapons technology and exploring applications for use in commercial power generation. As activities in the ICF Program have progressed, there has been increasing emphasis on the nuclear weapons technology aspect. While there may be, at some future time, a possibility of some application to power generation, the program is basically geared toward defense-related activities and therefore is included in the Defense Programs section of the Sunset Report.

needed to make fusion a reality. Consequently, as stated in the National Energy Policy Plan, "the Federal Government recognizes a direct responsibility to demonstrate the scientific and engineering feasibility of nuclear fusion."[31]

Two primary configurations for confinement and heating of plasmas are being pursued within this program: toroidal confinement and mirror confinement. There has been progress in both areas, leading to improved performance and a growing convergence of these traditionally separate concepts. The toroidal confinement effort has resulted in such advances as the development of neutral beam injectors for plasma heating at Lawrence Berkeley Laboratory. Using injectors developed at Oak Ridge National Laboratory (ORNL), temperatures in excess of 70 million degrees have been achieved at the Princeton Large Torus. Similar temperatures, at greater plasma densities, recently have been reached in the Poloidal Divertor Experiment, also at Princeton; and the increased efficiency of the magnetic fields has been shown in experiments at ORNL. These specific accomplishments greatly enhance the likelihood that the next major device, the Tokamak Fusion Test Reactor, will demonstrate the scientific feasibility of magnetic fusion by the mid-1980's.

Progress with mirror systems includes development of a new thermal barrier concept that offers significant theoretical improvements for reducing heat loss and successful operation of the Tandem Mirror Experiment at Lawrence Livermore National Laboratory, providing evidence for electrostatic reduction of end losses; and development leading to an expanded tandem mirror experiment presently under construction.

In addition to these two principal concepts, the program's scientific breadth is maintained through smaller efforts that combine attractive features of the two main lines. For example, the Elmo Bumpy Torus project provides supporting data for previous routine predictions on scale and radio frequency heating.

d. Renewable Energy[32]

Renewable energy resources--the Sun, wind, water, Earth's heat, and biomass (including both direct combustion fuels, such as wood, and those such as alcohol based on biomass)--offer many advantages. Yet, until early

---

[31] National Energy Policy Plan, op. cit., p. 9.

[32] "Renewable energy" has various interpretations. The seven program analysis units addressed in this section deal with the nonnuclear and nonmineral energy sources of greatest interest. The PAU's follow the Department's organizational lines for ease in compiling and comparing budget allocations. They are Solar Applications for Buildings; Solar Applications for Industry; Wind and Ocean Solar Power Technologies; Solar Information, International, and SERI; Alcohol Fuels; Hydropower; and Geothermal Resources. Because many renewable energy sources tend to have intermittent outputs, the development of efficient, effective, and reasonably priced storage systems is often a critical factor in their individual economic prospects. Those systems, however, are treated in another segment of this report under the heading "Conservation and Energy Systems."

in the last decade, applications were extemely rare. The reasons were primarily economic: renewable resources generally could not compete in cost with traditional forms of energy, which were readily available in quantity. Even after the availability of traditional sources had become demonstrably uncertain, price controls continued to discourage development of renewables.

The 1973-74 oil embargo and the rising prices that followed in its aftermath, however, focused greater attention on the advantages of renewables; and many efforts were undertaken to encourage development of these resources. In fiscal year 1973, the Federal Government's only efforts in renewables were $4 million in solar research funding by the National Science Foundation. Seven years later, DOE's budget for renewables had grown to $859 million--more than two hundred times. Moreover, additional incentives had been provided by a variety of tax advantages and by the programs of other agencies (such as the Departments of Agriculture and Defense and the Agency for International Development). An analysis of tax incentives is available in the special analysis section of the President's budget.

The Department's early renewables strategy was founded on the assumption that there were several market weaknesses and failures in the energy area (such as price controls on conventional fuels) which had to be offset by Federal intervention to support renewable energy, including the acceleration of new technology development. This strategy was translated into programs for:

- o Characterizing market needs
- o Performing research and development to define the cost of renewable technologies in early development stages and to reduce costs of selected renewable technologies in advanced development stages
- o Identifying and selecting cost-competitive applications for renewable technologies and appropriate Federal roles in development
- o Supporting commercialization

Recent Progress. There has been significant progress in most renewable applications. Technologies have advanced, suppliers have multiplied and improved, public acceptance generally has been good, and the users' market has expanded--with sales of all renewable technologies growing about threefold within 4 years. Some of the sales growth was spurred by the rising costs of conventional fuels, especially the 1979-80 surge in world oil prices.

Many of the original objectives of the various subprograms have been met. Technology has been improved and feasibility has been demonstrated in a variety of cases.

Active solar energy systems are now being used in between 300,000 and 400,000 U.S. buildings. A solar-supply industry that barely existed in 1975 ($17 million in sales, with about 50 manufacturers of solar collectors) has grown to more than 300 firms, projecting sales this year in excess of $300 million. Earlier, the DOE demonstration program was practically the only source of sales for many of these suppliers. This clearly is no longer the case.

The number of identified passive solar homes has grown steadily since 1977. Passive solar features are being incorporated into an increasing number of commercial buildings as well. In addition, several major building trade organizations have instituted projects relating to passive solar energy. In the event that several innovative projects currently under development prove feasible, further growth in the use of passive solar energy can be expected as a function of revitalizing the construction industries.

Photovoltaic solar energy systems have realized cost reductions through research and development. Improvements have been gained through material, process, and technology developments to the point where system efficiency has doubled. The effect has been to make photovoltaic systems cost effective for remote/stand-alone applications. The interest of the private sector is evidenced by the existence of some 15 firms now supplying commercial modules/systems, which use a variety of materials and design approaches, as compared to a few specialty firms in 1973. Photovoltaic sales for 1981 are estimated to be about $75 million, for some 5 megawatts of capacity, with nearly two-thirds being exported for use in stand-alone applications. Federal and some state tax credits exist as further incentives.

During the past several years, 13 large wind turbines with a combined capacity of nearly 15 megawatts have been installed, and 3 of the largest wind turbines in the world were placed at one site in Washington state and tied to the Bonneville Power Administration grid. Because the markets for both large and small wind machines are site-specific, National Wind Resources Atlases have been published for all 50 states and U.S. territories. Although annual sales of small machines are still in the range of a few thousand, the maturity of the industry is indicated by the fact that more than 20 firms are engaged in manufacturing and marketing them. As is the case with all renewable energy sources, the adoption of wind turbines as a large-scale means of generating electricity depends on relative costs in a given geographic area, but the establishment of commercial "wind farms" on both coasts is a sign of genuine interest by private enterprise.

Hydropower is a mature technology. Activity at small sites (so-called "low-head hydro") was dormant by the mid-1970's. Since 1977, however, DOE has supported 20 key demonstration projects and provided grants to 40 states for hydro resource assessments and studies. The number of regulatory applications for low-head hydro projects jumped from 130 during the 4 years before 1980 to 600 in 1980, and in 1981 they more than tripled again. Both changes in relative energy prices and DOE activity in this area have contributed to this increase. Since the industry is moving ahead on its own, further direct intervention by the Federal Government should be unnecessary.

Geothermal energy represents another success story. Promising geothermal resources have been identified in 37 states, including some areas of low- to moderate-temperature in the eastern United States that could be of practical value if application techniques now under development prove successful. By 1983, advanced technology should be available to meet the objective of cutting drilling costs by 25 percent; and the reservoirs

already confirmed are adequate to allow private industry to move forward if favorable economic trends continue. Finally, the technology for using geothermal heat directly for space heating and process heat is well developed and (in certain areas) economical.

The Office of Alcohol Fuels at DOE has been in existence a relatively short time. However, it is now clear that the goal assigned to it by the Energy Security Act of 1980--to reach 920 million gallons per year of alcohol fuel production and use by 1982--will not be met. It is estimated that alcohol fuel production capacity by the end of 1982 will be no more than 400 million gallons per year, with active production and use lagging behind capacity.

The current grain-based conversion process is not economical without current subsidies. Recognizing this, industry is pursuing the development of alternative processes and feedstocks, as well as improvements that still must be made in the engine efficiency of alcohol fuels. In the long run, the widespread adoption of "gasohol" mixtures must depend on the competitiveness of that fuel in the marketplace rather than continuing subsidies embodied in excessive tax concessions and financial assistance programs. These artificial subsidies have the effect of reducing the overall economic efficiency of the marketplace by diverting resources from more competitive activities.

Theoretically it is possible to tap large supplies of renewable energy available in the world's oceans. Nevertheless, its area of possible application for the United States as a whole is limited and the prospects for commercialization restricted. In areas where the technology is promising, the private sector has market incentives to develop commercial systems consistent with this technology's market potential.

Despite technological progress and impressive percentage growth, however, renewable energy forms currently remain a small factor in the overall national picture (except for hydropower and the wood wastes that have long been used in the pulp and paper industry). Active solar, geothermal, and wind systems together produced considerably less than 1 percent of the energy consumed in the United States last year. Their potential for the midterm to distant future is great, but the critical factors governing their rates of growth are primarily economic. This recognition underlies a change in focus and objectives for most of the renewable energy programs.

Now that the price of oil has been decontrolled and the regulation of wellhead prices for some natural gas is being phased out under the Natural Gas Policy Act of 1978, incentives for private investment in renewables have increased. Moreover, the Administration's Economic Recovery Program gives the private sector greater ability to raise capital and increase investments.

Under these conditions, it is appropriate to redefine the Federal role in renewable technologies. Market forces now will cause consumers to demand, and producers to supply, cost-effective renewable energy systems without the need for Federal commercialization activities. Moreover, these market signals will encourage private industry to develop advanced renewable

systems at rates consistent with their economic potential. Hence, it is no longer necessary for the Federal Government to pursue technology development for purposes of accelerating the introduction of new technologies.

Future Directions. The goal of all renewable energy programs within DOE now is to support private sector efforts to improve the technical performance and economic competitiveness of the more promising technologies through a program of basic and generic research that provides a technology base for industry.

2. Conservation and Energy Systems Programs

a. Energy Conservation[33]

Rapid price increases and the growing recognition of our vulnerability to supply disruptions during the 1970's spurred interest in more efficient use of energy, especially oil. Largely as a result of these factors, energy conservation in the United States since 1972 has been substantial. Despite population increases and a rising gross national product (GNP), total annual energy consumption increased from about 76 quads in 1973 to barely 78 quads in 1980 (down from a peak of about 80 quads in 1978 and 1979).[34]

The economy has become considerably more energy efficient: the ratio of energy consumption to GNP was about 12 percent lower in 1980 than it was in 1973. Perhaps of equal importance is the fact that the major reduction in energy consumption has come in imported oil, because this is the specific component of our national fuel mix that leaves us most vulnerable to future shocks. Net crude oil and petroleum product imports, excluding imports for the strategic petroleum reserve, fell from an annual average of more than 8 million barrels per day in the late 1970's to about 6.3 million barrels per day by the end of 1980. In some months of 1981, net crude and product imports fell as low as 5 million barrels per day; and in May 1981, net crude imports fell below 4 million barrels per day for the first time since 1975.

Most of these savings resulted from consumers' responses to rapidly rising prices for energy. With decontrol of oil prices accomplished and price deregulation for segments of the natural gas market under way, still more progress can be expected in future years.

---

[33]Program analysis units: Buildings and Community Systems (including research and development on energy use in buildings, the Federal Energy Management Program, and technology for using municipal waste as an energy source); Industrial Conservation; Transportation Conservation; Multi-Sector Conservation (including Energy Conversion and Utilization Technologies, Energy-Related Inventions, and Appropriate Technology); and State and Local Programs.

[34]These statistics, like others in this report, include the use of biomass--predominately wood. Thus, they vary slightly from figures published by the Energy Information Administration.

Despite the large increases in energy efficiency occurring through independent individual and organizational initiative in the price-controlled environment of the mid-1970's, there was a perception by the Federal Government that levels of conservation were less than optimum. Consequently, a number of tax credits and DOE programs were established in an attempt to balance partially the negative impact of price controls on the economics of conservation.

Based on an assessment of accomplishments and experience in energy conservation spanning nearly a decade, a new ordering of priorities is justified. As a result of the Administration's commitment to encouraging the Nation to use energy efficiently, the economic environment in which energy consumers will make consumption and investment decisions has changed markedly. The price controls that discouraged conservation are being phased out, thus clearly negating the original justification for many conservation subsidies. Moreover, the Economic Recovery Program will improve substantially the climate in which energy-efficiency investments are made.

Reliance therefore can be placed on businesses and industries to be responsible for developing more efficient processes, equipment, and products. Such development will occur rapidly and efficiently as energy prices increasingly reflect true costs.

Consequently, no further funding is being requested for the Buildings and Community Systems, Transportation Conservation, Industrial Conservation, and Appropriate Technology Programs, which were established to accelerate the introduction of new energy technologies, since the pace of technical development is now properly determined by market forces.

Similarly, there is no need to subsidize state and local government efforts to promote energy conservation. Therefore, no funding is being requested for the State and Local Programs.

Direct Federal spending for energy conservation programs should stress long-term basic research that will not be undertaken by the private sector. This policy will provide a generic technology base in support of private research and development efforts. Research will be continued on such topics as thermal transfer, materials, combustion phenomena, and electrochemistry.

The Administration also will continue to provide a high level of assistance to the truly needy to help them adjust to higher energy prices through two Federal block grant programs. The programs will give state and local governments, which are more aware of their citizens' needs than is the Federal Government, the administrative discretion necessary to determine the most effective and efficient ways to provide such aid.

- The Administration is requesting $1.3 billion in fiscal year 1983 for the Low Income Home Energy Assistance Program of the Department of Health and Human Services. This block grant program, which helps pay for low-income families' fuel, permits states to allocate up to 15 percent of their funds for low-cost residential weatherization.

- The Administration is requesting $3.5 billion in fiscal year 1983 for the Community Development Block Grant Program administered by the Department of Housing and Urban Development. This program is principally for the benefit of low-income persons, and recipient communities traditionally allocate about 30 percent of their funds to some form of rehabilitation.

b. Electric and Storage Systems

Energy--particularly electricity--is not always available at the time and in the locations required. For some years, the Department and its predecessor agencies have had a program[35] of research and development on electric energy systems. Initially, that program focused on improved efficiency, reliability, economy, and safety of long-distance transmission of electricity. Later, studies were expanded to include ways in which dispersed and intermittent electric power sources might be integrated into the present utility system. Now, however, this Administration believes research and engineering in these areas can be conducted over time by private industrial corporations, by trade associations, and by the electric utility industry's research arm in response to normal market forces. Accordingly, DOE proposes an orderly phaseout of the Federal presence.

Electricity demands fluctuate with time of day and season of the year. Large-scale powerplants work most efficiently at constant levels of output; some renewable resources generate power only when the Sun shines or the wind blows. But energy can be stored for release when needed. For several years DOE has had a program of research, development, and demonstration of energy storage systems.[36] However, the private sector, over time, can be relied on to further develop the technologies and products required in response to market signals.

3. Supporting Programs

a. Energy Supporting Research

This Administration continues the Federal Government's traditional role in support of basic research in disciplinary areas that will provide the knowledge base for future energy technology development. The Department's energy supporting research programs[37] include four activities that are crosscutting in nature and support the Department's energy research and development mission. The specific goals of these activities are: (1) to produce fundamental scientific and technological knowledge and insight in nuclear science; materials science; chemical sciences; engineering, mathematics, and geoscience; biological energy research; and advanced energy projects (an activity aimed at exploring the scientific feasiblity of novel energy-related concepts); (2) to enhance the preparation and training of future energy professionals; (3) to provide the Department with independent,

---

[35] Program analysis unit: Electric Energy Systems.
[36] Program analysis unit: Energy Storage Systems.
[37] Program analysis unit: Energy Supporting Research.

objective analyses and assessments of research and technical activities and needs; and (4) to rehabilitate and replace deteriorated, unreliable, or otherwise inadequate general support facilities which are required to continue the operation of DOE's multiprogram laboratories.

Of the four subprograms, basic energy sciences (BES) has the most significant long-range potential effect on U.S. energy needs. Designed to provide the fundamental scientific and engineering base on which the Nation's future energy options depend, BES pursues knowledge and insight leading to new and improved processes and techniques by sponsoring basic research in the physical and biological sciences, geosciences, engineering, and mathematics. The products of research in these disciplines are the data and the new concepts on which developments in the applied energy technologies are based.

The basic energy sciences program supports more than 1,000 research projects in nearly every field of modern science. Approximately 70 percent of this research is carried out at national laboratories, 26 percent at universities, and 4 percent at other institutions.

Research in nuclear science advances knowledge about the behavior and properties of nuclei that can be applied to the development of fission and fusion energy systems, as well as biomedical and environmental applications. It also provides for the production and domestic and international distribution of isotopes for research, medical, and industrial purposes. Research in the material sciences is aimed at developing an improved understanding of materials-related phenomena and properties that can limit the development of new energy systems as well as the performance of existing ones. Chemical sciences research covers chemical properties of solids such as coal; energy-related phenomena involving liquids, gases, and plasmas; and the behavior of submicroscopic particles such as molecules, atoms, ions, and electrons.

Engineering research seeks to advance generic engineering science needed for a variety of applications in energy production and use. The applied mathematical effort focuses on the equations, computer algorithms, information analysis methods, and advanced computer concepts undergirding every aspect of energy technology development. The basic research in geosciences addresses fundamental science questions associated with locating, defining, and extracting energy resources and disposing of wastes from energy production processes.

Biological energy research provides fundamental data and understanding related to biological energy conversion for ultimate energy use in biomass or other systems. The advanced energy projects activity complements other BES activities in exploring the feasibility of novel, often interdisciplinary energy-related concepts still at an early stage of scientific definition and, therefore, unlikely to be developed by industry. Because such concepts entail a high degree of risk, they must have the potential for high payoff.

In addition to supporting energy-related disciplinary research activities, the BES program also supports several unique national user

facilities such as the National Synchrotron Light Source at Brookhaven National Laboratory. These facilities are important to many of the energy-related research activities, and to high-priority basic research efforts in other areas, such as biochemistry and biophysics. The BES program has been given the responsibility for managing these facilities as a national trust because of the technical expertise and unique capability that exists at the national laboratories owned by the Department.

Among other benefits, BES-supported research recently contributed to marked improvements in the ability to predict the consequences of nuclear reactor accidents and to the possible easing of nuclear plant siting restrictions as a result of research on the fate of fission-product iodine. Research supported by the program advanced the fundamental understanding of alloy structure, thereby contributing towards development of high-strength steel alloys for potential use in automobiles. Research supported by BES also advanced the understanding of factors involved in extending the life-times of catalysts used in coal gasification. This Administration continues to give high priority to the support of basic research in the energy-related disciplines.

b. Environment, Safety, and Health[38]

The extraction, conversion, transportation, and use of energy can have deleterious effects on the environment and on public health and safety. The Department has conducted an extensive program of research designed to identify, analyze, and reduce those health and environmental uncertainties that could unnecessarily impede the safe and economical implementation of U.S. energy policy. In addition, the Department supports the world's only focused research and development program on the application of nuclear technology to the diagnosis and treatment of human disease.

During the period covered by the review, the program successfully defined the primary health and environmental issues and research needs for the major fossil, nuclear, and renewable energy resource options, developed an integrated multidisciplinary program of research, and produced and published extensive scientific information characterizing energy-related emissions, their fate and behavior in the environment, and their potential impact on humans. Significant new applications were achieved for use of radioactive and stable isotopes, radiation therapy, the synthesis of radiopharmaceuticals, and the development of diagnosis instrumentation for clinical medicine.

The Environment and Safety Program has three principal purposes: to assist departmental compliance with environment, safety, and health (ES&H) statutes and requirements; to ensure ES&H protection in all departmental operating facilities; and to secure quality assurance throughout the Department.

---

[38]Program analysis units: Environment and Safety; and Health and Environmental Research.

Cutting across departmental lines, the program is made up of two major parts: the safety subprogram and the environment subprogram. The safety subprogram encompasses nuclear safety, operational safety, and quality assurance for a range of DOE activities involving more than 130,000 Federal and contractor employees at 200 sites. The environment subprogram is the Department's focal point for assessing environmental issues and complying with environmental legislation.

The Department's safety record, as measured by fatality and illness rates and lost workdays, was substantially better during 1978 to 1981 than that of private industry. The percentage of workers in Department nuclear facilities exposed to greater than 2.0 rem has decreased steadily over the years. In 1979 only a fraction of 1 percent received greater doses.

The Administration continues its commitment to these programs and their goals, while paying particular attention to efficient and effective use of public funds for this purpose. In addition, the Administration's environmental policy aims for a reasonable balance between "energy values" and "environmental values." By streamlining administrative processes, reducing decision-making delays, and clearly weighing economic costs against effectiveness, the Administration seeks to minimize uncertainties and to resolve conflicts according to an informed public consensus.

4. Regulation and Information Programs[39]

The roots of the Department of Energy's regulatory activities can be traced at least as far back as the amendments to the Interstate Commerce Act of 1906, which established the regulation of interstate oil pipelines. Numerous statutes since then have proliferated Federal energy regulations (controlling, to differing degrees, the production, distribution, pricing, and use of most energy supplies) to achieve various, though not always compatible, policy objectives. Energy regulations, at one time or another, have been implemented in an attempt to restrain consumer price increases, conserve the Nation's energy resources, stimulate development of these resources, mandate which fuels should not be used, and reduce energy imports. These activities have not been conducted without difficulties.

Energy information activities go back at least to 1879 when mineral resources began to be surveyed. The Bureau of Mines Organic Act of 1910 (P.L. 61-179) authorized significant data collections in the areas of coal, petroleum, petroleum products, and other such resources. The Federal Government has provided a basic source of energy information since long before the earliest regulatory activity began.

a. Regulation

While some Government regulation is needed to protect the health, safety, and security of the public, regulation must be tempered with realism.

---

[39]Program analysis units: Economic Regulatory Administration; Hearings and Appeals; Federal Energy Regulatory Commission; and Energy Information.

Government attempts to intervene in the marketplace have produced consequences worse than the problems that the regulatory activities were designed to overcome. This experience strongly suggests that, no matter how laudable the policy objective being pursued, the rigidity of counterproductive, burdensome regulations is generally an inadequate substitute for the flexibility and resilience of market forces in allocating resources efficiently. Accordingly, the Department's regulatory programs are being focused on market realities, while continuing to meet statutory obligations.

The Department of Energy Organization Act transferred Federal energy regulation authorities into two agencies of the Department of Energy. The Federal Energy Regulatory Commission (FERC) was created as an independent agency within the Department to regulate the interstate operations of public utilities. The Economic Regulatory Administration (ERA) was established to administer programs affecting the pricing, allocation, and importation of oil. To provide relief from undue regulatory burdens resulting from departmental actions, the Office of Hearings and Appeals (OHA) subsequently was set up to adjudicate appeals to most rules, regulations, and orders issued by the Department.

FERC. Public utilities have been subject to Government regulation because of their supposed status as natural monopolies; Federal jurisdiction over the interstate operations of utilities was established at the beginning of this century. This Federal responsibility is now carried out by the Federal Energy Regulatory Commission. More than 90 percent of the commission's activities are explicitly required by statute. Following its congressional mandates, the commission's primary goal is to regulate the national operations of electric utilities, hydroelectric powerplants, and interstate natural gas and petroleum pipelines--to ensure that industry, business, and consumers have adequate supplies of energy at "just and reasonable" prices, while allowing energy producers rates of return that provide sufficient incentive for increased production and efficiency.

The commission has concentrated on building a carefully managed and streamlined agency that is able to balance competing concerns among consumers and suppliers in all areas under its jurisdiction and to fulfill its responsibilities in a timely manner. To recover the actual costs of regulation, the commission is studying methods that will allow it to recover all costs associated with filings and applications. At the same time, it is working to decrease case-processing time, to reduce industry reporting burdens, and to analyze additional possibilities for regulatory reform.

ERA. While most of the authorities of the Federal Energy Regulatory Commission are long standing, many of the programs of the Economic Regulatory Administration were designed to fulfill legislative mandates enacted during the 1970's under the pressures of energy price shocks and supply uncertainties. Some of these statutes aimed at limiting domestic oil price increases, equalizing prices of oil sold to refiners regardless of whether lower priced domestic oil or higher priced imported oil was purchased, and encouraging conservation of oil since its price was artificially controlled below the marginal cost level of oil imports. Regulations were promulgated and programs were administered that provided for allocation and price limitation of crude oil and petroleum products,

monitoring of imported crude oil, greater use of abundant fuels, control of imported natural gas, greater fuel efficiency, and utility rate structure revisions. In addition, ERA created an enforcement program to ensure company compliance with existing Federal laws.

Although these were all well-intentioned programs designed to promote the health and safety of the Nation and were implemented with good faith and considerable enterprise, many failed. The petroleum allocation and price controls, for example, actually hampered the ability of the marketplace to respond to supply deficiencies. Adherence to rigidly enforced but outdated allocation schemes caused regional gasoline shortages to be worse than they otherwise might have been; crude oil production was artificially constrained; energy efficiency was discouraged because proper price signals were not sent.

The imposition of controls on domestic crude oil prices prohibited U.S. producers from receiving world market prices for their oil. As might be expected, U.S. oil exploration and production were curtailed during the period of price controls to a level lower than expected under free-market conditions. In addition, under the entitlements program, refiners with access to more than their proportionate share of controlled domestic oil were required to make payments to refiners with access to less than their proportionate share, including those refiners primarily dependent on uncontrolled imported oil. The purpose of the entitlements program was to ensure that all refiners shared equitably in the benefits associated with price-controlled oil, passing a uniformly lower set of product prices through to the consumer. Although the entitlements program was effective in equalizing refiners' crude costs, the program also encouraged increased imports as it simultaneously reduced the higher crude acquisition costs of those refiners primarily reliant on foreign oil and lowered the average price of oil products, thereby encouraging demand. Mechanically the program worked, but it did not work to the Nation's advantage.

The following statistics indicate the broad extent of the Economic Regulatory Administration's activity: from fiscal year 1978 through fiscal year 1981, ERA issued more than 9,000 oil import licenses; more than 50 procedural orders for oil imports; in excess of 100,000 gasoline decisions and orders; and approximately 1,200 propane, butane, and natural gasoline decisions and orders. ERA also completed audits of 21 of the 35 major refiners and issued almost 300 resulting enforcement documents. For smaller entities, ERA completed more than 2,000 audits, issued approximately 2,100 legal documents, and referred 85 potential willful violators to the Department of Justice.

The allocation and price controls were lifted by Executive order on January 28, 1981. In addition, many of the other ERA programs have been discontinued in the fiscal year 1982 budget process, since their need ended following decontrol of oil. With decontrol, some of the dollars that formerly left the country for OPEC and other oil-producing nations now remain in the U.S. economy.

The results of decontrol of domestic crude oil have been quite dramatic. Oil prices had been controlled since August 1971. From mid-1972 to mid-1979, lower-48 production followed a steady downward trend, dropping

by about 300,000 barrels per day each year. From mid-1979 to mid-1980, during which period a 2-year phased decontrol program was introduced, production declined by less than 200,000 barrels per day. Following the President's immediate decontrol order in January 1981, average production during the first 6 months of 1981 was just 75,000 barrels per day below year-earlier levels. In June 1981, lower-48 crude oil production rose by 55,000 barrels per day, compared with June 1980. Except for 1 month in 1977, this is the first month since early 1973 that lower-48 production has increased on a year-to-year basis--that is, production in June 1981 exceeded that of June 1980. This trend has been maintained for July and August, and thus--for the first time since 1970--lower-48 production may not decrease from the previous year. The figures for exploration activity are equally encouraging. In the first 11 months of 1981, 28.8 percent more oil wells were completed than were completed in the same period of 1980.

The decontrol-inspired leveling of domestic crude oil production described above, combined with reductions in demand that are also in part a result of decontrol, have resulted in reduced oil imports and improved the U.S. balance of payments and value of the dollar. Following decontrol, crude oil and petroleum product prices experienced a brief upward movement that was due largely a result of an earlier OPEC price hike. Prices now have begun to decline in real terms, and competition has maintained downward pressure on both foreign and domestic prices.

The Economic Regulatory Administration is continuing to administer some programs that are accomplishing their congressional objectives. These include the oil import program, the natural gas program, the fuels conversion program, and a vigorous compliance program. The compliance program is completing audits of refiners and others in the oil industry to determine potential violations of pricing and allocation regulations and seeks negotiated or, if necessary, judicial settlements. Although the price control program ended in January 1981, the Department is committed to pursuing meritorious cases of alleged violation that arose as a result of activities prior to that date.

OHA. Much of the workload of the Department's Office of Hearings and Appeals testifies to the problems inherent in hastily conceived regulatory systems that place too many artificial constraints on the intricate workings of free-market forces. Hearings and Appeals functions as an administrative safety valve and has effectively eased regulatory burdens resulting from departmental actions. Even though oil allocation and price controls, together with the related crude oil entitlements program, were ended nearly a year ago, a substantial portion of anticipated Hearings and Appeals cases over the next few years will be an outgrowth of those programs.

b. Information

An independent agency within DOE, the Energy Information Administration (EIA), was created to consolidate dispersed energy information authorities into one program. EIA collects, validates, analyzes, and disseminates energy information needed for statistical, congressional, regulatory, and other purposes.

Credible, timely information is useful in facilitating the effective working of both regulated and unregulated markets. The Energy Information Administration has developed and maintains a credible energy information base which can be used by the executive branch, Congress, state governments, industry, and the general public in making informed decisions.

Information programs should not be overly expensive to the taxpayer or burdensome to those from whom information is gathered. Accordingly, careful attention is being given to the design of EIA's information programs to ensure that they are efficient and to eliminate burdensome, detailed data collection and overrefined analyses.

5. Energy Production and Power Marketing Programs

The Department conducts three kinds of activities that--while they have their roots in legitimate public activities--are, in effect, businesses.[40]

a. Naval Petroleum and Oil Shale Reserves

The Naval Petroleum and Oil Shale Reserves (NPOSR) were established early in this century, primarily as an emergency source of petroleum for the military. Except for a short period during World War II, the reserves remained untapped until after the Arab oil embargo of 1973-74. The Naval Petroleum Reserves Production Act of 1976 (P.L. 94-258) expanded production to provide for "essential defense, industrial and military emergency energy requirements relative to the national safety, welfare and economy, resulting from foreign, military or economic actions." This act placed the Naval Petroleum Reserves in full production for 6 years with provisions for 3-year extensions. The President has determined that it is in the national interest to continue production of the Naval Petroleum Reserves at their maximum efficient rates for 3 years after April 4, 1982.

The Naval Petroleum and Oil Shale Reserves continue to serve a national security function through the sale of petroleum to the Stragetic Petroleum Reserve, the Department of Defense, and the private sector. In fiscal year 1981, those sales generated $1.6 billion in revenues for the Federal Treasury from the Government's share of production of 64 million barrels of crude oil, 105 billion cubic feet of natural gas, and 191 million gallons of liquid product.

The Pre-Development Plan for Naval Oil Shale Reserve No. 1 (NOSR-1) is scheduled to be completed in 1982. This will place NOSR-1 in a state of readiness for rapid development by private industry or the Government when the need arises. NOSR-2, which has proven to be marginal for shale development, is currently being evaluated for its oil and gas potential. If this proves promising, and Congress concurs, this reserve will be offered for lease to private industry.

---

[40]Program analysis units: Naval Petroleum and Oil Shale Reserves; Uranium Enrichment Activities; and Power Marketing.

b. Uranium Enrichment

DOE presently enriches uranium to the desired assay of the isotope uranium-235 (U_{235}) in its gaseous diffusion plants located at Oak Ridge, Tennessee; Portsmouth, Ohio; and Paducah, Kentucky. These plants were built in the 1940's and 1950's and were operated initially to satisfy defense requirements for U_{235}. They are now operated primarily to provide enrichment services to fuel domestic and foreign nuclear powerplants.

Although the bulk of production is for commercial sale, the enrichment services also are essential to several Government programs, including naval reactors, nuclear weapons, and research reactors. The demand for enrichment services is increasing and requires the continued design and construction of the Gas Centrifuge Enrichment Plant (GCEP) at Portsmouth, Ohio. In order to improve efficiency, reduce costs, and maintain the U.S. position as the dominant enrichment services supplier in the world, DOE also conducts a research and development program on advanced methods for enriching uranium.

DOE charges for uranium enrichment services are based on recovery of the Government's costs over a reasonable period of time. These costs include electric power supplied to the enrichment plants, direct and indirect labor needed to operate the plants, process development, DOE administration, depreciation of plant and equipment, and imputed interest on the Government's investment in uranium enrichment. The cost of major construction projects, such as GCEP, would similarly be recovered over time through user fees.

The goal of this program is to meet domestic, foreign, and U.S. Government requirements for uranium enrichment services in the most economical, reliable, safe, and environmentally acceptable manner. The objectives are directed to production operations and to improved production capability.

Because of the production-oriented, businesslike nature of this program, an alternative to Government ownership would be to sell the enterprise to private industry, or otherwise stimulate the creation of private enrichers. Offering this option to industry is currently being given serious consideration by the Administration.

c. Power Marketing

Five power marketing administrations--Alaska, Bonneville, Southeastern, Southwestern, and Western Area--market the hydroelectric power produced at all Federal multipurpose water projects (except those in the Tennessee Valley).

Federal hydroelectric power is required by law to be priced to recover all costs of producing and marketing the power, including recovering the capital invested, with interest, over a period not to exceed 50 years. Revenues are required to recover annually the electricity-related operation and maintenance costs of the Corps of Engineers and Bureau of Reclamation as well as those of each power administration, the costs of any power purchased

to make the available hydropower marketable, the costs of wheeling service provided by other utilities, interest on the unamortized capital debt, and a portion of the capital invested in power and in irrigation features beyond the ability of the water users to repay.

Bonneville, which is self-financed through use of a revolving fund and which has authority to borrow from the Federal Treasury, uses its revenues directly to pay annual costs and to return capital invested (with interest) to the Treasury. The other power administrations deposit their revenues in the Treasury and obtain appropriations from Congress to operate and maintain their systems, purchase power and wheeling, and undertake needed capital investments for transmission construction and rehabilitation.

D. ENERGY EMERGENCY PREPAREDNESS PROGRAMS[41]

The oil embargo of 1973-74, fluctuations in supplies during 1979 resulting from the Iranian upheaval, continuing concerns about the stability in the Middle East, and the 1,100-percent price increase in oil since 1970 have resulted in fundamental changes in the production and use of oil throughout the world. During the 1980's, considerable reliance on Middle East oil is expected to continue. Therefore, any substantial disruption in oil supply will have dramatic and major adverse impacts on importing nations, including the United States.

The economic losses inflicted by a major disruption in oil supplies are a result of three main factors: the reduction in oil supplies and concomitant increases in oil prices raise production costs and reduce productive capacity in oil-using economic activities; the United States must pay more to foreign producers for oil imports, which reduces national income; and aggregate demand for goods and services declines because of the economic uncertainty created by the disruption and because of the rapid wealth transfer from consuming nations to foreign producers. These economic losses also may be exacerbated by institutional rigidities in wages and prices and by inappropriate Government policies such as controls on oil markets.

Historical program goals were to reduce U.S. vulnerability to energy supply disruptions and mitigate their impact on the national economy; ensure adequate supplies of energy for priority users; formulate and coordinate Federal emergency response measures; and plan for continuity of Government, civil emergency management, and mobilization. In past years, these goals were pursued through a mix of federally mandated petroleum allocation and price controls, mandatory demand restraint, and ad hoc assistance to private industry and state and local governments.

---

[41]Program analysis units: Energy Emergency Preparedness; and Strategic Petroleum Reserve.

Before January 1981, the Energy Emergency Preparedness Program focused on regulatory price and allocation controls as tools to afford protection to certain classes of consumers, including small refineries, local and state governments, and certain high-priority users. The regulations employed to achieve program objectives had serious adverse consequences. They constrained production, created disincentives for private stockpiles, and did little to encourage conservation except through inconvenience. This reliance on allocation schemes, rather than on the market, led to inefficient distribution of those resources, with large spot shortages that occurred particularly in urban areas. Imports were in effect subsidized, adding to upward pressure on world oil prices. These regulations were rescinded in January 1981 when President Reagan ordered immediate decontrol of crude oil and petroleum product prices.

Since the basic problem associated with a major disruption in oil supplies is the inability of the economy to adjust rapidly without substantial losses, the development of adequate levels of petroleum stocks that can be drawn down in an emergency is one of the most direct and cost-effective solutions to the problem, because it reduces the size of the adjustment required. Both private and Government-owned stocks are effective in dealing with disruptions in petroleum supplies and the associated economic losses and national security threats.

Although the Strategic Petroleum Reserve (SPR) was authorized in 1975, initial progress was slow. First, there were engineering and programmatic difficulties; then, acquisition of oil for the SPR was suspended because of concern with potential responses by oil-exporting countries and possible repercussions in energy markets.

This Administration has markedly accelerated the filling rate, and the SPR oil inventory reached 200 million barrels on October 2, 1981. With more than 230 million barrels in the SPR and a large volume of private stocks, the United States has a good start toward achieving very substantial protection against major supply disruptions.

Government policy also can help by reducing disincentives to private oil stockpiling and other forms of self-insurance. Reducing institutional barriers to fuel-switching, power-wheeling, and other adjustment mechanisms can increase the flexibility and resiliency of U.S. productive capacity. Petroleum price and allocation controls, whether actually in place or held in standby status, are the largest and most pervasive disincentive to self-insurance by the private sector. Oil companies, distributors, and end-users will not develop adequate stocks or adequately diversify sources of supply if they expect the Government to preempt inventory profits on those stocks by price controls or to ensure the prepared and the unprepared alike a "fair share" of petroleum supplies at a price substantially lower than can be obtained on the open market.

In addition to ensuring that private and SPR stocks are adequate and that barriers to economic adjustment are minimized, an effective strategy must also include adequate preparedness capabilities to reduce the effects of major supply interruptions. Although current program goals remain substantially unchanged, a different approach has been adopted to achieve

these goals. The emphasis of the current program is to rely primarily on the market, with the Government acting only to facilitate market operations in response to severe supply disruptions where vital public services may be disrupted because of limitations in responding to sharply higher prices.

The goals of the current program are accomplished through developing an energy situation reporting system employing current and projected energy price and supply information; assessing the vulnerability of the Nation's energy systems; developing systems and facilities to coordinate communications and operations during energy emergencies; implementing public education and emergency information procedures; developing and testing the readiness of the emergency manpower reserves; supporting international energy planning; and developing response mechanisms to facilitate the operation of the market during emergencies.

In addition, this program evaluates the national security and defense implications of energy emergencies, develops plans for defense energy requirements, and coordinates energy emergency planning with other Federal agencies including the Department of Defense, the National Security Council, the Federal Emergency Management Agency, and the Emergency Mobilization Preparedness Board, as well as international energy agencies and programs.

E. DEFENSE ACTIVITIES

The Department's defense activities,[42] which received about 60 percent of the Department's funds in fiscal year 1982, support the nuclear-related national defense objectives of the United States.

The principal products of the Department's defense activities are the Nation's nuclear weapons; the nuclear materials contained in these weapons; the management of the resulting radioactive waste; research, design, development, health and safety matters pertaining to naval nuclear propulsion plants, and the fuel cycle support for the Navy's nuclear propulsion systems. There are other products, but all of the defense activities contribute directly or indirectly to at least one of these four principal products.

Because so much of the defense activities work involves sensitive national security information, only the general outlines of the program can be given here. Where details are lacking in these volumes, they are classified and will be provided under separate cover to the cognizant congressional committees.

When the Atomic Energy Commission was abolished, a comprehensive study led to a Presidential recommendation to Congress that the nuclear defense programs should be placed in the Energy Research and Development Administration rather than be transferred to the Department of Defense (DOD). When the Department of Energy was established, that decision was reaffirmed and the defense programs facilities and responsibilities remained under civilian control in DOE to maintain an independent review of the nuclear weapons programs. These programs are highly integrated and interdependent.

---

[42]Program analysis units: Naval Reactors Development; Materials Production; Nuclear Materials Security and Safeguards; Nuclear Weapons Activities; Inertial Confinement Fusion; Verification and Control Technology; and Defense Waste Management.

The Nuclear Materials Production Program produces and supplies plutonium and tritium in the quantities and on the schedule required by the weapons program, which in turn delivers weapons to meet DOD requirements. The Naval Reactors Development Program is responsible for the development of naval nuclear propulsion systems, again in support of DOD requirements.

Materials Production also receives and processes the Navy's spent reactor fuel, recycles the recovered materials as fuel for its plutonium and tritium production reactors, and produces other radioactive products for use in medicine, industry, and research. Inertial Confinement Fusion complements the weapons research and development effort. Verification and Control Technology relies on weapons technical expertise in discharging its responsibilities for arms control and for verification of compliance with the Limited Test Ban and the Threshold Test Ban Treaty. The Defense Waste Management program is responsible for the safe and environmentally acceptable storage and by-products utilization or disposal of defense radioactive wastes.

The Nuclear Materials Security and Safeguards Program supports the other activities by developing policy, providing oversight, and performing research and development in improved nuclear material control and accountability techniques and physical security systems to safeguard nuclear weapons and special nuclear materials and to protect DOE facilities against sabotage. In addition, this program manages an international material safeguards research and development effort in support of the International Atomic Energy Agency. The Uranium Enrichment Activities Program, not formally a part of defense programs, provides enriched uranium for these programs.

The objectives---and indeed the design and conduct--of these programs have been much the same since long before the creation of DOE. All are essential to national defense as it has evolved in the nuclear era. The size and timing of these programs is dictated, to a large extent, by requirements developed by DOD and approved by the President.

Basic and applied research into fundamental technologies and new weapon concepts is conducted continuously by DOE's national laboratories. From the fruits of this research and the military requirements of DOD, plans for the nuclear weapons program are prepared and documented in the Nuclear Weapons Stockpile Memorandum. Each year, this memorandum, prepared jointly by the DOE and DOD and approved by the President, authorizes current and future requirements for nuclear weapons. The Stockpile Memorandum provides program direction to both Departments and constitutes DOE's authority for production, maintenance, and retirement of nuclear weapons.

The weapons program (details of which are classified) accomplishes the development, testing, production, retirement, and life-cycle quality assurance surveillance of all nuclear weapons to ensure that the weapons produced for the Nation's defense are safe, reliable, and meet the needs of DOD in consonance with the desires of the President and Congress.

The Inertial Confinement Fusion Program supports the weapons program through development of pulsed high-energy laser and particle accelerator technology, through experiments in the fundamental processes of fusion

ignition and fuel burn, and through studies of materials and properties at very high pressures and temperatures.

An effective nuclear arms limitation policy requires that the Nation have the capability to understand and verify nuclear weapons developments elsewhere. The Verification and Control Technology Program conducts research, design, development, implementation, and monitoring of satellite, seismic, and nonseismic systems for detection of aboveground and underground explosions. The program also reviews foreign nuclear weapons practices and fuel cycle technology and reviews applications for licenses to export nuclear materials, equipment, and technology.

Radioactive waste is generated as a by-product of the production of nuclear weapons and nuclear materials for defense and other purposes--and has been since the inception of U.S. nuclear activities. These wastes, most of which are in liquid form, differ from those of the civilian reactors, most of which are contained in spent fuel rods. Currently, solid low-level defense radioactive waste is disposed of by shallow land burial; high-level waste is placed in interim storage (predominantly in steel tanks) in ways compatible with potential long-term disposal methods; and transuranic waste is stored in a manner which allows for its retrieval, pending a disposal capability. The long-term objective is to provide the necessary confinement of radioactive wastes in a manner which requires minimum reliance on future maintenance and surveillance by man, and which ensures a high degree of isolation from man's environment during the time the waste poses a potential radiation hazard. Efforts leading to the terminal storage of defense waste include the Waste Isolation Pilot Plant, which will be a research and development facility to demonstrate the safe disposal of defense radioactive waste, and the Defense Waste Processing Facility, which will process high-level waste material into a form suitable for long-term storage.

The Naval Nuclear Propulsion Program is an integrated program of the Departments of Energy and the Navy. Within this integrated program, the Navy is responsible for the military applications of nuclear propulsion including constructing, operating, and maintaining nuclear-powered ships and for developing the nonreactor portions of the nuclear propulsion plants. The Department of Energy is responsible for the research, development, and safety of nuclear reactors for warships. It also is responsible for constructing and operating land-based prototype nuclear propulsion plants and for conducting long-term performance tests. The DOE Naval Reactors Development Program provides for the design, development, testing, and evaluation of improved naval nuclear propulsion plants and reactor cores having long fuel life, high reliability, improved performance, and simplified operating and maintenance requirements. The nuclear propulsion plants and cores cover a wide range of configurations varying in size from small submarines to large surface ships. These program responsibilities have remained substantially unchanged during the past three decades.

Supporting all these defense programs as well as other departmental activities is the Nuclear Materials Security and Safeguards Program. Its goals are to prevent unauthorized disclosure, theft, destruction, or loss of classified material; to provide a base of safeguards and security technology; to strengthen domestic and international safeguards and physical security to

deter diversion of nuclear materials; and to support non-proliferation and national security. Another important supporting activity is the Classification Program. Its goals are to develop and implement effective classification and declassification policies; to update and maintain adequate guidance and regulations; to provide timely and consistent document reviews; and to oversee the classification activities at all DOE and DOE-contractor facilities.

F. GENERAL SCIENCE PROGRAMS

The High Energy and Nuclear Physics Program[43] is devoted to basic research, and its mission is the acquisition of new knowledge. Specifically, the program seeks a deeper understanding of the constituents and behavior of matter and energy at the most fundamental levels. Long seen as a natural part of energy research, the program explores the kind of fundamental issues that, when understood, could restructure our thinking about the physical world, as did the discoveries of Maxwell in electricity and Einstein in modern physics.

High energy and nuclear physics experiments center on particle accelerator and colliding beam facilities designed to permit examination of the interactions of subnuclear particles and atomic nuclei. The High Energy Physics Program focuses on the basic structure of the particles and on the forces that determine the behavior of matter and energy at the most fundamental level--their creation, their annihilation, their detailed properties, and their transformations. The particles include the familiar protons, neutrons, electrons, and photons, in addition to less familiar neutrinos and muons. Also included are particles called quarks, which are the constituents of protons, neutrons, and other particles. This research program endeavors to uncover the fundamental physical laws that are revealed at extremely high energies.

Nuclear physics concentrates on the interactions, structure, and other fundamental characteristics of atomic nuclei. The probes may be other nuclei, nucleons, electrons, or subnuclear particles. The nuclear physics research also includes nuclear theory, heavy ion physics, and medium energy physics. (Experimental nuclear research at lower energies retains strong ties with current applications of nuclear energy and is conducted as part of the separate program in basic energy sciences.)

---

[43]Program analysis unit: High Energy and Nuclear Physics.

The Department administers the high energy and nuclear physics research program as a national trust because of the technical expertise and unique capability that exist at the national laboratories supported by the Department. About 90 percent of the Federal support for high energy physics and 85 percent of the support for nuclear physics is provided by DOE; the National Science Foundation is the other major source of Federal support for this type of research. The program is not duplicated in the private or public sectors.

The intellectual content of high energy and nuclear physics research has attracted some of the Nation's finest scientists. Recently, they have developed a theory providing a unified description of the electromagnetic force and the weak nuclear force, a feat comparable to Maxwell's unification of electricity and magnetism in 1865. In addition, they have advanced understanding of the observed predominance of matter over antimatter in the universe and have established and experimentally verified a fundamental quark-structure theory that has made order out of the "zoo" of subnuclear particles.

This Administration is committed to maintaining a strong national effort in high energy and nuclear physics because of the exceptional research opportunities and the excellence of the U.S. program. An important element in maintaining the strength of these programs has been the quality of the long-range planning.

G. THE ADMINISTRATION OF THE DEPARTMENT

To formulate and carry out energy policies and programs requires the smooth operation and support of large headquarters and field operations.

Administrative functions[44] may be divided into three groups: management and support; Department-wide (corporate) staff functions; and program management and project support.

1. Management and Support

Management and support functions represent those personnel, procurement, financial, housekeeping, data processing, and other administrative tasks essential to the effective management of any large enterprise, public or private. These functions should exist roughly in proportion to the programs they serve.

2. Department-Wide Staff Functions

Staff functions--including Congressional, Intergovernmental, and Public Affairs; Inspector General; General Counsel; Policy, Planning, and Analysis; and international activities--are performed as required for the whole Department.

Policy, Planning, and Analysis has provided analytical support for the development of the Department's programs and of energy policies in general. Under the previous Administration, when there was a continuous flow of policy initiatives in energy markets, this staff reached a peak of more than 200 personnel. The market orientation of current energy and economic

---

[44]Program analysis units: Departmental Administration; and International Programs.

policies removes the need for an analytical staff of this magnitude, and the Administration is proposing significant reductions in both functions and personnel.

The International Affairs organization has served as a link between domestic and foreign energy programs and administers the Department's international agreements and informal commitments. The areas that have been administered by International Affairs include civil nuclear cooperation and non-proliferation, energy emergency measures, energy market policies, and near- and long-term cooperative technology development. Responsibilities in this area will be transferred to the Department of Commerce.

The roles of Congressional, Intergovernmental, and Public Affairs staffs have been to carry out the Department's mandates to promote the interests of consumers; to provide for cooperation and coordination of Federal, state, and local governments in the development of national energy policies and programs; to foster and ensure competition within the energy industry; and to maintain close liaison with Congress and the public. As the Federal Government's role in energy matters shifts toward reliance on private sector initiatives, the need for many of these support activities diminishes. Significant reductions in staff and funding are proposed.

The Office of the General Counsel has provided legal support to administrative and program offices, conducted administrative and judicial litigation, and provided legal advice and support for enforcement, regulatory, oversight, and related activities. The General Counsel also has been responsible for ensuring consistency and legal sufficiency of departmental regulations and proposed legislation affecting the Department of Energy; for administering and monitoring standards of conduct requirements; for conducting the Department's patents program; and for providing legal advice on Department intelligence activities.

The Office of the Inspector General has investigated fraud, waste, and abuse in the conduct of the Department's activities and maintained programs of prevention. The Inspector General has been an independent office of the Department which reports to Congress on a variety of matters.

The Inspector General reports directly to the Secretary and is responsible for supervising, coordinating, and providing policy direction for audits and investigations of the programs and operations administered by the Department of Energy. As required by the Department of Energy Organization Act, the Inspector General submits an annual report to Congress.

Recommended resource levels for these activities are included in the President's budget for fiscal year 1983.

3. Organization and the Field

When the Department was established in October 1977 it faced two significant organizational problems. First, it had to incorporate diverse organizational entities into a single management unit; and, second, it had to digest a fairly large and dissimilar group of field sites. The initial

structure organized the various programmatic components that make up the Department along process lines--basic research, energy technology (applied research), resource applications, solar applications and conservation, environment, and defense programs. It was believed that this headquarters alignment would best expedite the development and commercialization of new technology as well as carry out the Department's other responsibilities. At that time the majority of field organizations came under the direct control of the respective assistant secretaries within headquarters. Thus program managers had not only headquarters components but also field sites directly under their control. Examples would include Grand Junction, Colorado, under the control of the Uranium Resource Assessment Program and the Shippingport and Pittsburgh offices under the Naval Reactors Development Program.

Under Secretary Schlesinger, the Department moved towards placing the remaining field elements under the cognizant Assistant Secretaries--the Energy Technology Centers under fossil, the Clinch River Breeder Reactor and Fast Flux Test Facility project offices under nuclear, and so on.

Under Secretary Duncan, a reevaluation took place and a determination was made that the initial structure was not optimum for accomplishing the goals of the Department. The Department then was reorganized according to fuel types. Energy Technology was disaggregated and new Assistant Secretaryships for Nuclear Energy and Fossil Energy were created; the solar programs were joined with the Conservation and Solar Applications Assistant Secretaryship; and Fusion Energy was transferred to Energy Research. Resource Applications was left as it was.

With the election of President Reagan and the appointment of Secretary Edwards, the organization was adjusted to reflect a transition away from market intervention and commercialization and toward higher priorities in emergency preparedness, basic research, and streamlined departmental management. Resource Applications and Environment were dismantled and their components placed under the appropriate Assistant Secretaries. A new Assistant Secretaryship was created for Environmental Protection, Safety, and Emergency Preparedness, and the remaining functions of the Assistant Secretary for Resource Applications were assigned to other elements of the Department. In addition, an Assistant Secretaryship for Management and Administration was created to consolidate and streamline the Department's administrative, procurement, and financial activities. At this time another reexamination of the field structure was conducted, and it was determined that the Department would function more smoothly and make better use of its resources if the majority of field sites were managed by the operations offices. Therefore, all operations offices were assigned to the Under Secretary (previously only the five non-defense operations offices were so assigned); the majority of field sites then were assigned to the operations offices.[45] Additionally, the regional representative offices were consolidated within the operations offices.

---

[45]The exceptions were the Energy Technology Centers under the Assistant Secretary for Fossil Energy; the Naval Reactor Project Offices under the Assistant Secretary for Nuclear Energy; and the Strategic Petroleum Reserve and Naval Petroleum Project Offices under the Assistant Secretary for Environmental Protection, Safety, and Emergency Preparedness.

With consolidation, the overhead staff was reduced and the field structure was better adapted to deal with the responsibilities of the Department.

H. DISMANTLEMENT OF THE DEPARTMENT

The creation of the Department of Energy in 1977 was intended to strengthen the role of the Federal Government in the management of energy policy and markets. The previous Administration held that helping the Nation adjust to the rising cost of imported oil required a Government-designed solution imposed by a separate and single-focused Department of Energy with direct access to the President. There were substantial efforts by the Federal Government to manage the supply and allocation of petroleum products. A series of bills to effect a U.S. energy policy was developed and aggressively supported by the previous Administration and the Department during the 1976-80 period.

As described in Section B of this report, the results of many of these efforts simply retaught the lessons of the marketplace. The record is particularly poor in the area of market interventions. Price and allocation controls on crude oil and petroleum products subsidized more expensive imports while eliminating market incentives to develop new technologies and alternative energy sources. Conservation was discouraged by artificially low prices for preferred fuels, distribution patterns were distorted, and subsidy programs were required. These programs placed a very heavy drain on Federal resources and, in turn, further preempted private initiative in new technologies.

When the Reagan Administration took office, it shifted the Government's perception of energy as a unique area of public policy to a view that placed it in the context of overall economic policy. Under the President's Economic Recovery Program, several major initiatives are being taken to revitalize the Nation's economy; and these initiatives apply to the energy sector as well as all others. The new economic policy calls for less Federal intervention across the board, including less spending, less taxation and less regulation. Reliance on the marketplace is paramount in this policy.

On January 28, 1981, the President, acting on his legal authority, removed all price and allocation controls on crude oil and petroleum

products. This effectively terminated all Federal regulatory activities in the oil and oil product marketplace. Additionally, the Secretary of Energy streamlined a number of regulatory impediments to the conversion of oil and gas boilers to coal. Further, the President recommended to Congress that expensive, federally financed energy commercialization efforts be terminated--a recommendation that was largely adopted by Congress.

Consistent with this and the President's commitment to making government more effective, it was logical and necessary for the President to review the rationale for continuing the Department of Energy. Given that no further role for the Department was contemplated in petroleum marketplace management and that Federal efforts to finance the commercialization of energy technologies would be greatly reduced, the President decided that:

- a Cabinet-level Department was no longer necessary strictly for the management of energy matters
- management of other highly critical energy functions (including its nuclear weapons and basic research activities) could be more effectively carried out in other Cabinet-level Departments

The dismantling of DOE will be the culmination of Administration efforts to limit Federal involvement in energy markets and to streamline and reduce the management structure of the executive branch.

The President's Proposal

On December 17, 1981, President Reagan announced his intention to propose to Congress a reorganization of Federal energy programs. The President's proposal would:

- Establish an Energy Research and Technology Administration (ERTA) within the Department of Commerce. ERTA's responsibilities would include the Department's defense activities and all current energy-related nuclear, nonnuclear, environmental, safety, and health research and development activities.
- Manage the proposed ERTA as a separate operational entity within the Department of Commerce, reporting to the President through the Secretary of Commerce. Structured in this manner, ERTA would continue to maintain the integrity and integration of ongoing nuclear weapon research and production and closely allied energy research activities. The national laboratory structure would be retained.
- Transfer intact nuclear weapons research, testing, and production programs and operate them as a part of ERTA with no disruption.
- Assign the Department of Commerce responsibility for energy policy, including planning and analysis, emergency preparedness, and energy information collection and publication. In a division of functions comparable to those now in place for other strategic stockpiles, the Commerce Department also would assume responsibility for developing basic policy with respect to the Strategic Petroleum Reserve.

- Transfer responsibility for international energy activities to the Department of Commerce .

- Assign energy resource management functions to the Department of the Interior, including responsibility for the Power Marketing Adminstrations, the Naval Petroleum and Oil Shale Reserves, and the operations of the Strategic Petroleum Reserve.

- Establish the Federal Energy Regulatory Commission as an independent agency.

- Transfer remaining enforcement litigation responsibilities relating to the Emergency Petroleum Allocation Act of 1973 to the Department of Justice.

- Transfer to the Department of Agriculture the financial assistance programs under the Energy Security Act.

- Terminate the residual structure of the Department of Energy.

A detailed legislative proposal for dismantlement of the Department of Energy will be transmitted separately to Congress.

Conclusion

This Summary Report has framed the Department of Energy Sunset Review project and process. It has presented an overview of the Department's programs, a general evaluation of those programs in relation to Reagan Administration goals and policies, and a summary of the proposed disposition of the programs.

Volume II, the Sunset Review Program-by-Program Analysis, will supply more detailed program information and assessments of the Department's activities.

APPENDIX A

TITLE X - SUNSET PROVISIONS

SUBMISSION OF COMPREHENSIVE REVIEW

SEC. 1001. Not later than January 15, 1982, the President shall prepare and submit to the Congress a comprehensive review of each program of the Department. Each such review shall be made available to the committee or committees of the Senate and House of Representatives having jurisdiction with respect to the annual authorization of funds, pursuant to section 660, for programs for the fiscal year beginning October 1, 1982.

CONTENTS OF REVIEW

SEC. 1002. Each comprehensive review prepared for submission under section 1001 shall include:

(1) the name of the component of the Department responsible for administering the program;

(2) an identification of the objectives intended for the program and the problem or need which the program was intended to address;

(3) an identification of any other programs having similar or potentially conflicting or duplicative objectives;

(4) an assessment of alternative methods of achieving the purposes of the program;

(5) a justification for the authorization of new budget authority, and an explanation of the manner in which it conforms to and integrates with other efforts;

(6) an assessment of the degree to which the original objectives of the program have been achieved, expressed in terms of the performance, impact, or accomplishments of the program and of the problem or need which it was intended to address, and employing the procedures or methods of analysis appropriate to the type or character of the program;

(7) a statement of the performance and accomplishments of the program in each of the previous four completed fiscal years and of the budgetary costs incurred in the operation of the program;

(8) a statement of the number and types of beneficiaries or persons served by the program;

(9) an assessment of the effect of the program on the national economy, including, but not limited to, the effects on competition, economic stability, employment, unemployment, productivity, and price inflation, including costs to consumers and to businesses;

(10) an assessment of the impact of the program on the Nation's health and safety;

(11) an assessment of the degree to which the overall administration of the program, as expressed in the rules, regulations, orders, standards, criteria, and decisions of the officers executing the program, are believed to meet the objectives of the Congress in establishing the program;

(12) a projection of the anticipated needs for accomplishing the objectives of the program, including an estimate if applicable of the date on which, and the conditions under which, the program may fulfill such objectives;

(13) an analysis of the services which could be provided and performance which could be achieved if the program were continued at a level less than, equal to, or greater than the existing level; and

(14) recommendations for necessary transitional requirements in the event that funding for such program is discontinued, including proposals for such executive or legislative action as may be necessary to prevent such discontinuation from being unduly disruptive.

--Public Law 95-91.

APPENDIX B

PROGRAM ANALYSIS UNITS

Category	Program Analysis Unit
Energy Programs	
Energy Supply	
Fossil Energy	(1) Coal Mining Research and Development
	(2) Coal Liquefaction
	(3) Surface Coal Gasification
	(4) In Situ (Underground) Coal Gasification
	(5) Fuel Cells
	(6) Magnetohydrodynamics
	(7) Heat Engines
	(8) Combustion Systems
	(9) Advanced Research and Technology Development
	(10) Advanced Environmental Control Technology
	(11) Oil Shale
	(12) Unconventional Petroleum Technologies
	(13) Domestic Energy Supply
	(14) Enhanced Gas Recovery
	(15) Alternative Fuels Production
	(16) Federal Leasing
Nuclear Energy	
Fission	(17) Uranium Resource Assessment
	(18) Conventional Reactor Systems
	(19) Remedial Actions
	(20) Breeder Reactor Systems
	(21) Advanced Nuclear Systems
	(22) Commercial Waste Management
Fusion	(23) Magnetic Fusion
Renewable Energy	(24) Solar Applications for Buildings
	(25) Solar Applications for Industry
	(26) Wind and Ocean Solar Power Technologies
	(27) Solar Information, International, and SERI
	(28) Alcohol Fuels
	(29) Hydropower
	(30) Geothermal Resources

Conservation and Energy Systems	
Energy Conservation	(31) Buildings and Community Systems (32) Industrial Conservation (33) Transportation Conservation (34) Multi-Sector Conservation (35) State and Local Programs
Electric and Storage Systems	(36) Electric Energy Systems (37) Energy Storage Systems
Supporting Programs	
Energy Supporting Research	(38) Energy Supporting Research
Environment, Safety, and Health	(39) Environment and Safety (40) Health and Environmental Research
Regulation and Information	(41) Economic Regulatory Administration (42) Hearings and Appeals (43) Federal Energy Regulatory Commission (44) Energy Information
Energy Production and Power Marketing	(45) Naval Petroleum and Oil Shale Reserves (46) Uranium Enrichment Activities (47) Power Marketing
Energy Emergency Preparedness Programs	(48) Strategic Petroleum Reserve (49) Energy Emergency Preparedness
Defense Programs	(50) Naval Reactors Development (51) Materials Production (52) Nuclear Materials Security and Safeguards (53) Nuclear Weapons Activities (54) Inertial Confinement Fusion (55) Verification and Control Technology (56) Defense Waste Management
General Science Programs	(57) High Energy and Nuclear Physics
Management Programs	(58) Departmental Administration (59) International Programs