REPORT TO THE CONGRESS

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

Energy: Issues Facing The 95th Congress

Multiagency

This report was prepared in response to a request from the Chairman, Subcommittee on Energy and Power, House Committee on Interstate and Foreign Commerce. It discusses the results of GAO's efforts in the energy area during the 94th Congress and the Major energy issues facing the 95th Congress.

The report augments GAO's previous report "National Energy Policy: An Agenda for Analysis" (EMD-77-16, dated Jan. 27, 1977) which discussed eight broad energy issues. This report discusses the major questions and concerns affecting the programs of each major energy agency. The report, used in conjunction with the "Agenda for Analysis," is intended to aid the Congress in its consideration of each agency's programs and in its development of a cohesive energy policy and to contribute to a better understanding of the energy problems facing the Nation.

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COMPTROLLER GENERAL OF THE UNITED STATES
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To the President of the Senate and the
Speaker of the House of Representatives

Pursuant to a request of November 8, 1976, from the Chairman, Subcommittee on Energy and Power, House Committee on Interstate and Foreign Commerce, we have developed a report summarizing our views on the significant issues facing five major energy agencies during the 95th Congress and discussing our past efforts on energy questions during the 94th Congress. Our views on the major issues are based partly on these past efforts and partly on our continuing assessment of critical national issues. This report is intended to aid the Congress and responsible committees in evaluating agency programs and in setting priorities for addressing major energy problems.

The Nation's energy problems are long term. The winter of 1977 and the resultant shortage of natural gas again brought the Nation's energy problems to the forefront. Energy is pervasive. Finding solutions acceptable to all areas of society will require political consensus among competing areas of concern, such as balancing economic and environmental goals and objectives. In such areas, concensus is hard to achieve.

On January 27, 1977, we issued a report entitled "National Energy Policy: An Agenda for Analysis" (EMD-77-16) which discussed major issues in the context of eight broad issue areas. This report augments the previous one by summarizing our contributions to answering energy questions and discussing our views in more detail on questions and concerns that will be facing the five energy agencies during the 95th Congress. It also summarizes our present and planned work aimed at seeking answers to some of these questions.

Over $11 billion will be spent in fiscal year 1977 on energy programs primarily by five Federal agencies: the Federal Energy Administration, Department of the Interior, Federal Power Commission, Nuclear Regulatory Commission, and Energy Research and Development Administration. Within these agencies, the Government's energy progams are diffused among these program areas:

Conservation
Petroleum and natural gas regulatory programs
Energy information and analysis
Strategic Petroleum Reserve
Federal energy organization
Electricity
Pipeline rights-of-way
Outer Continental Shelf
Public lands
Fossil energy development
Nuclear power development
Renewable resources development, and
International concerns.

The report discusses our assessment of major energy questions within the context of these 13 program areas and as they apply to each of the five agencies. It provides a framework and perspective for considering energy issues that will be facing the Congress--on an agency-by-agency basis--and should be useful to congressional committees in reviewing programs and needs of the energy agencies as consideration is given to questions of organizing the energy agencies, setting priorities and goals, and resolving trade-offs and conflicts inherent in these priorities and goals.

We recognize that there will likely be some major changes in the organization and structure of the Federal energy agencies in the coming months. Nevertheless, these agencies' basic purpose and mission more than likely will not change substantially, just as the major problems and questions facing the Nation in solving the energy crisis will be present for some time.

Issues discussed in this report are also addressed to others concerned with energy--the academic community, scientists, industry, and citizens. A public awareness of the critical energy issues needs to be developed that will give those outside Government a basis for providing contributions to the development of a cohesive national energy policy.

Copies of this report are being sent to the Director, Office of Management and Budget; the heads of the responsible energy agencies; and congressional committees which have legislative responsibilities over energy activities.

Comptroller General
of the United States

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ABBREVIATIONS

ERDA	Energy Research and Development Administration
FEA	Federal Energy Administration
FPC	Federal Power Commission
GAO	General Accounting Office
LMFBR	Liquid Metal Fast Breeder Reactor
NRC	Nuclear Regulatory Commission
OPEC	Organization of Petroleum Exporting Countries

CHAPTER 1

INTRODUCTION

During the recent Presidential campaign, President Carter raised a number of issues regarding the Nation's energy policies and promised some new initiatives and legislation during the 95th Congress. Some of the issues raised during the campaign included:

--The priority that should be given to conservation and advanced energy supply technologies, such as solar energy.

--The pace and timing for expanding the use of nuclear fission, including questions about the nonproliferation of nuclear weapons from peaceful uses of atomic energy.

--The need to reorganize the Federal energy agencies.

--The possible need to decontrol domestic crude oil and natural gas prices.

--The possibility of expanding the use of coal consistent with solving any environmental and socioeconomic problems.

--The role the Liquid Metal Fast Breeder Reactor (LMFBR) and synthetic fuels from coal play in meeting energy needs.

Because of possible new initiatives by the Carter Administration, the Chairman, Subcommittee on Energy and Power, House Committee on Interstate and Foreign Commerce, asked us to assess current major energy programs. He said that the Subcommittee needed such an assessment to respond effectively to new initiatives as well as develop alternatives of its own.

This report provides our assessment of the major energy issues and problems facing the 95th Congress and the major energy agencies based on our past efforts during the 94th Congress. It should be used with our report entitled "National Energy Policy: An Agenda for Analysis" (EMD-77-16, 1/27/77) which discusses major concerns and questions in the context of eight broad issue areas which we believe are most in need of attention if this Nation is to develop a sound, cohesive energy policy. Because this report discusses the major issues as they apply to each major energy agency,

it will serve to augment the previous report and hopefully will aid the Congress in setting priorities for reviewing each agency's programs and in formulating energy policy.

Over $11 billion will be spent in fiscal year 1977 on Federal energy programs. Currently, five executive agencies are responsible for carrying out the majority of these programs.

--Federal Energy Administration (FEA)
--Department of the Interior
--Federal Power Commission (FPC)
--Nuclear Regulatory Commission (NRC)
--Energy Research and Development Administration (ERDA)

In addition, other Federal agencies--such as the Departments of Commerce and Housing and Urban Development, General Services Administration, and the Tennessee Valley Authority--either have their own internal energy-related programs or have an interagency agreement with one of the five major agencies to carry out their programs. For example, the National Aeronautics and Space Administration carries out part of ERDA's solar energy research and development program.

Also, there were several programs recently enacted by the 94th Congress and other proposals which would substantially expand the activities and the cost of the Federal energy effort. These include:

--The Energy Conservation and Production Act (Public Law 94-385), which established a number of new programs with authorized funding of about $360 million. Included was a program for obligation guarantees of up to $2 billion to encourage energy conservation measures and renewable resource energy measures in private, State, and local buildings and industrial plants.

--The Energy Policy and Conservation Act (Public Law 94-163), which established a number of new programs, including the Strategic Petroleum Reserve which has an estimated Federal cost of $8 to $20 billion, and a $750 million loan guarantee program to develop new underground coal mines.

--The Federal Coal Leasing Amendments Act (Public Law 94-377), which established new policies for leasing coal on Federal lands.

--The Naval Petroleum Reserves Production Act of 1976 (Public Law 94-258), which opened some of these reserves for production and sale on the open market.

--The recently proposed Surface Mining Control and Reclamation Act of 1977 (H.R. 2 and S. 7) which, if passed, will establish strong environmental controls over surface mining and will provide for reclamation of previously mined land.

--Recently proposed amendments to the Outer Continental Shelf Lands Act (S. 9 and H.R. 1614), which would significantly alter the present system of leasing oil and gas resources on the Outer Continental Shelf.

--The proposed Energy Independence Authority (S. 2532 and H.R. 10267-94th Congress) which would administer Federal loan and loan guarantee programs with a potential total of $100 billion.

--The proposed synthetic fuels program (H.R. 12112-94th Congress), which would involve Federal guarantees of obligations estimated to total about $3.5 billion.

--The proposed uranium enrichment program (S. 2035 and H.R. 8401-94th Congress), which would authorize ERDA to contract with private industry to produce enriched uranium and guarantee up to a commitment of $8 billion that uranium enrichment technology supplied by the Government will work.

Some of the programs proposed in the 94th Congress have been reintroduced in the 95th Congress. For example, several bills have been introduced to provide ERDA with broad loan guarantee authority for non-nuclear technologies, including synthetic fuels (e.g., H.R. 36, H.R. 37, H.R. 38, H.R. 1142, S. 37, and S. 429). On the other hand, bills to establish an Energy Independence Authority and to authorize contracts with private industry to produce enriched uranium have not yet been reintroduced. Whether these bills will be introduced in the same form is uncertain.

Over the past 3 to 4 years, the strength of the Organization of Petroleum Exporting Countries (OPEC) has grown starting with the oil embargo by those countries in 1973. As a result, international oil prices have increased by over 400 percent. In that time the Federal Government

has responded to the energy problem in many and varied ways. New regulations have been formulated, new programs initiated, new legislation passed, and many voluminous reports written.

Unfortunately, the short term effects of Federal actions have not been encouraging. The Nation is more dependent upon foreign energy sources today than it was 3 years ago. A longer term assessment of these effects is even more difficult. Certainly the Federal response has not been disciplined by a clearly enunciated and cohesive national energy policy. The effects of the energy shortage and the Nation's growing dependence on foreign sources have again been brought to the forefront by the unusually cold winter of 1977 and natural gas shortages in the eastern and midwestern parts of the country.

Our past efforts during the 94th Congress in the energy area were aimed at evaluating the efficiency and effectiveness of the various energy agencies' operation's as well as identifying and assessing the alternative courses of action for solving several critical energy issues.

In addition, the Congress mandated us to evaluate and make recommendations on programs being carried out under the Federal Energy Administration Act of 1974 (Public Law 93-275), the Energy Reorganization Act of 1974 (Public Law 93-438), the Energy Policy and Conservation Act, and the Energy Conservation and Production Act.

Among other things, we are required to (1) evaluate and monitor the operations of the Federal Energy Administration, including its reporting activities, (2) audit, review, and evaluate the activities of NRC and report our findings by January 1980, (3) report annually to Congress on programs carried out under Title IV of the Energy Conservation and Production Act for conserving energy in existing dwelling units, nonresidential buildings, and industrial plants, and (4) participate in establishing a Professional Audit Review Team to annually review the activities of FEA's Office of Energy Information and Analysis.

In addition, Title V of the Energy Policy and Conservation Act required us to conduct energy data verification examinations and report annually to the Congress on the results of our work. The act gave the Comptroller General substantial new authority to conduct such examinations of the books and records of:

(1) companies legally required to submit energy information to FEA, FPC, or Interior; (2) companies engaged in the energy business and who furnish information to any Federal agency which uses the information in carrying out its official functions; and (3) vertically integrated petroleum companies with respect to energy related financial information. In carrying out the authorities of Title V, the Comptroller General is authorized to sign and issue subpoenas, require written answers to interrogatories, administer oaths, enter business premises and facilities to inventory and sample energy resources and examine and copy books and records, and assess and collect penalties.

We have developed the following broad program areas which include the five major agencies' energy programs.

Conservation
Petroleum and natural gas regulatory programs
Energy information and analysis
Strategic Petroleum Reserve
Federal energy organization
Electricity
Pipeline rights-of-way
Outer Continental Shelf
Public lands
Fossil energy development
Nuclear power development
Renewable resources development
International concerns

Based partly on past work and partly on our continuing assessment of critical national issues, we identified those key energy issues that, in our view, are most in need of attention. The following chapters of this report discuss our assessment of the major issues facing the 95th Congress as they relate to each of the 5 executive energy agencies and the 13 program areas listed above. Each chapter will also discuss our past efforts within each program area and our currently planned work aimed at helping to answer some of these questions and concerns. This report is designed to serve as a reference document to aid the Subcommittee, the Congress, and the public in gaining a better understanding of our energy problems. It should also serve to highlight those areas where congressional actions may be required.

Appendix I lists, by agency and program area, our energy related reports issued during the 94th and 95th Congresses.

CHAPTER 2

FEDERAL ENERGY ADMINISTRATION

The Federal Energy Administration was created as a temporary agency in 1974 by the Federal Energy Administration Act of 1974, primarily to manage short-term fuel shortages using existing allocation and price control authorities. At that time, several energy responsibilities previously existing in the Department of the Interior and the Cost of Living Council were transferred to FEA. Since that time, the Congress has given FEA new and additional program responsibilities in the areas of energy conservation, Strategic Petroleum Reserve, renewable resources, and energy data. FEA's authority was extended through December 1977.

The issues facing FEA in the immediate future fall within four broad areas of FEA's responsibility: conservation, petroleum regulatory programs, energy information and analysis, and Strategic Petroleum Reserve. Our views on the major questions within each of these areas are discussed below. Our past efforts at FEA are discussed on page 18.

ISSUES FACING THE 95th CONGRESS

Conservation

There are basically three kinds of conservation actions:

--Eliminating energy waste through belt-tightening or leakplugging actions. Simple actions include turning down the thermostat and observing the highway speed limits. Complex actions include demand-management approaches, whereby electric utilities can discourage consumers from wasting energy.

--Developing more efficient energy-use systems such as automobile engines and industrial systems.

--Changing lifestyles and living patterns to reduce energy use, yet still achieving the same social and personal objectives. These include living closer to work and using forms of communication which eliminate the need for travel.

During the 1973-74 oil embargo, the Federal Government realized that new domestic energy sources would take at least a decade to develop and started showing genuine interest in energy conservation. To create an economic, social, and political atmosphere that encourages conservation, the Federal Government (1) sets energy performance standards (e.g., for new automobiles and buildings), (2) requires specific reductions in Government energy uses as an example to the Nation, and (3) provides financial incentives for the private sector. FEA is responsible for developing and monitoring the implementation by the Government and private industry of equitable voluntary and mandatory energy conservation programs.

A number of energy conservation programs were enacted in the 94th Congress. These programs raise several questions about the role and impact of energy conservation in a national energy policy. We believe the following questions are most important in assessing that role.

How effective are the conservation programs that have been enacted?

Various types of conservation programs were enacted in the Energy Policy and Conservation Act and the Energy Conservation and Production Act. The effectiveness of these programs must be assessed to assist the Congress in determining what more needs to be done to achieve an acceptable national energy consumption growth rate.

We have ongoing and future work planned which should assist the Congress in its deliberations on this issue. One ongoing effort--a study of Federal efforts to achieve energy conservation--attempts to determine (1) whether energy conservation programs are working, (2) what further incentives and/or requirements could result in more effective energy conservation, and (3) what the Federal role should be in establishing energy conservation policies and priorities. A second ongoing effort will assess the four specific energy conservation programs authorized under Title IV of the Energy Conservation and Production Act in terms of energy savings, effectiveness, and expenditures of Federal funds. These four programs provide:

--Weatherization assistance to low income and low income handicapped and elderly persons ($200 million total funding authorized).

--Additional financial assistance to States for developing and implementing energy conservation plans ($105 million total funding authorized).

--Various forms of financial assistance to owners of existing dwelling units to encourage the implementation of energy conservation and/or renewable resource measures ($200 million total funding authorized).

--Loan guarantees to those purchasing and implementing energy conservation and/or renewable resource measures in any building or industrial plant ($60 million total funding authorized).

Only two of these programs--weatherization assistance and financial assistance to the States--were funded by the previous Administration's fiscal year 1978 budget. The new Administration's 1978 budget, however, would, if enacted by Congress, fund the entire title IV program.

Another ongoing effort--a review of the Community Services Administration's low-income weatherization program--will assess the effectiveness of this specific program.

A related question concerns whether essentially voluntary programs will be enough to get industry to conserve energy. Industry uses about 40 percent of the Nation's energy. FEA has established targets for energy conservation and requires key industries to report on their successes in meeting the targets. These targets call for industry to improve its energy efficiency by an average of about 15 percent based on 1972 usage. The stringency of the targets and industries' success in meeting them will help determine the need, if any, for mandatory standards.

Questions could be raised about the wisdom of using 1972 as the base year for measuring industries' success in meeting the targets. Industry has already taken a number of steps to conserve energy as a result of the 1973-74 oil embargo and subsequent energy crises. Thus, changing the base to a more recent year may be desirable.

As part of our ongoing study of Federal efforts to achieve energy conservation, we are assessing the effectiveness of voluntary industrial conservation programs and

identifying actions that could be taken to achieve greater industrial energy savings.

Will existing energy performance standards for new automobiles adequately encourage energy conservation in the transportation sector?

Transportation accounts for about 25 percent of total energy use and is a major area where opportunities exist for significant energy savings. Achieving many of these savings requires changing the automobile's basic engine and body design, using alternative transport methods (buses, special lanes, etc.), and using the most energy efficient transport methods for particular purposes. This could mean, for example, that short airline routes might be discouraged in favor of train or bus service.

In one of our ongoing efforts, we are exploring the types of actions beyond performance standards that could be taken to reduce energy use in the transportation sector.

To what extent will institutional barriers inhibit energy conservation?

A major unresolved question is whether reducing our energy growth rate will also result in reducing our economic growth rate. Many studies indicate that in the recent past, energy growth and economic growth have gone and will continue to go hand-in-hand. Other studies argue that energy growth and economic growth can be successfully decoupled. The question has not been satisfactorily resolved, and it must be if this Nation is to lower energy growth rates substantially without sacrificing the major national goals.

In addition, there is a whole range of questions regarding the degree to which changes in building codes, utility rate structures, and other areas will be accepted. Conservation actions may or may not result in substantial changes in lifestyles, greater Government regulation, and a lessening of competition in certain transportation modes (i.e., fewer airline companies with more passengers). All of these factors must be considered in establishing a desirable level of energy conservation.

Our ongoing review of Federal efforts to achieve energy conservation will identify institutional barriers

which are inhibiting greater energy conservation and assess the possible implications of overcoming those barriers.

Can the Federal Government do more to encourage in-house energy conservation?

The Federal Government must demonstrate its commitment to energy conservation and provide leadership by achieving a significant level of energy conservation in its in-house activities. The Federal Government uses from only 2 to 3 percent of the energy consumed in the United States. However, its example-setting implications are clearly important because, if the Government does not set the pace, it can hardly expect the private sector to follow.

We currently have underway two studies of the Federal Government's in-house conservation activities. In these studies, we are assesssing the efforts being made by Federal agencies in assisting Government contractors to establish effective energy management programs and the Department of Defense's management of its Energy Conservation Investment Program. In the future, we plan to begin a review of the efforts being made to retrofit existing Federal office buildings with energy saving equipment and techniques.

Petroleum and natural gas regulatory programs

FEA's responsibilities in this area include (1) assuring lawful and equitable distribution and pricing of crude oil and petroleum products, (2) monitoring the supply and demand of energy resources, (3) directing allocation actions, and (4) assuring compliance with FEA regulations. FEA does not have any regulatory responsibility over the use of natural gas.

Before the implementation of the Energy Policy and Conservation Act, which provides for the gradual phase-out of price controls over petroleum products and crude oil, a great deal of public and congressional interest existed in FEA's compliance and enforcement efforts. As a result, a great deal of our work at FEA was directed toward this program area. Since

passage of the Energy Policy and Conservation Act interest has declined and this area requires less of our effort.

How effective will FEA's energy conservation and gasoline rationing contingency plans be in minimizing the impact of a crude oil supply shortage?

FEA is required to develop a variety of energy conservation contingency plans, including gasoline rationing, which can be placed quickly into use if there are future embargoes or other disruptions to the energy supply. These plans would be put into effect only after congressional approval and if required by a supply interruption. The types of action that can be taken and their potential effectiveness in alleviating possible energy shortages has been the subject of some debate, particularly during and following the oil embargo of 1973-74. They become even more important in view of the Nation's growing dependency on imported crude oil.

During the 95th Congress, we plan to begin a study to evaluate the basis for and potential effectiveness of FEA's contingency plans. We plan to determine (1) how and why FEA selected specific plans for development, (2) the scope and applicability of the plans (i.e., how many energy-consuming sectors are affected), (3) the potential impact and energy savings of each plan, and (4) potential difficulty or ease with which the plans can be implemented. In addition, we intend to assess the relationship of the conservation and gasoline rationing contingency plans to the Strategic Petroleum Reserve plan (see p. 14) since all three programs are designed to deal with future supply interruptions.

Fossil energy development

There has been a great deal of debate over the best way to increase the supplies of or reduce the demand for scarce resources of fossil fuels--particularly petroleum and natural gas. There are several options available for reaching demand reducing or supply increasing objectives including the use of increased taxes, tax incentives, and regulatory controls. The use of these options also have implications on the development and commercialization of new energy technologies, such as renewable resource technologies.

In addition to questions about the use of such options, there is a question about the need for increased domestic petroleum refining capacity in the future.

What are the effects of pricing, tax, and other regulatory actions on the production and price of energy supplies?

The extent to which crude oil price controls should be continued in view of the Nation's growing dependence on imported crude oil and whether decontrol would result in increased domestic production are major questions facing the 95th Congress. Related questions concern the options available for influencing the price of and demand for energy and the impact these options will have on other areas, such as imported crude oil prices and conservation efforts. Some specific options include excise taxes on gasoline, tax credits for weatherizing homes or installing solar heating equipment, and various types of pricing structures such as peak load pricing for electricity.

In addition, recent Federal actions, such as coal mine health and safety regulations, air and water quality regulations, and the repeal of depletion allowances affect national energy supplies and prices.

State and local governments are also using taxes as a means of regulating energy development. For example, New Mexico, Montana, Wyoming, and Alaska have increased taxes on coal, oil, and gas. Just how State actions interface with Federal actions and their likely influence on energy resource development will be important questions in the years to come.

We are currently studying the effects of State taxes on Alaskan oil. In this effort, we are reviewing the development of Alaskan oil resources and the financial implications of existing and proposed State and local taxes on such development and on the supply of oil. We are also examining the interrelationship of Federal, State, and local taxes and their effect on energy development.

In another effort, we plan to examine existing and proposed tax structures as they affect the supply of all energy sources. We hope to give consideration to various tax policies--such as depletion allowance, investment tax credits, and excise taxes--and the extent to which these and other tax policies encourage or discourage the development of energy sources.

In other efforts, we plan to examine the cause and effect relationships between higher domestic crude oil prices and increased production. We plan to examine and evaluate (1) current Federal pricing incentives to encourage increased domestic oil production using primary, secondary, and tertiary recovery techniques, (2) the need for additional Federal pricing incentives, and (3) the impact of total decontrol of domestic crude oil prices.

What levels of domestic refining capacity are desirable?

A critical issue affecting future domestic energy production is the availability of and need for future domestic refining capacity. There are several questions which need to be addressed relative to this issue, including:

--What are the refining capacity projections for the future?

--Does the United States need this projected refining capacity?

--What is the relationship of existing capacity to future capacity?

--Should the United States build more domestic refining capacity or should it rely more on foreign capacity?

During 1977, we plan to look at the domestic refining situation as it relates to these questions in an attempt to identify specific areas for further examination.

Energy information and analysis

Since the 1973 Arab oil embargo, the Congress has been concerned over the availability of accurate and reliable information on which to base energy policy decisions. While the Federal Energy Administration Act of 1974 gave FEA significant energy data collection responsibilities, a number of Federal agencies continue to collect energy information in various forms to meet the needs of their specific programs. This has resulted in fragmented energy data collection and analysis. Over the years, various forms of legislation were proposed to solve this problem. The Energy Conservation and Production Act, passed on August 14, 1976, established a separate energy data component in FEA with the authority to

oversee the Federal Government's energy data collection effort. The act also established a Professioinal Audit Review Team to oversee FEA's data activities, with a GAO representative--appointed by the Comptroller General--serving as chairman of the team.

Is energy data credible?

The key issue in this area is still one of credibility. A related concern is whether the provisions of the Energy Conservation and Production Act will be successful in solving the problem. Because of the enactment of these energy data provisions, it is unlikely that additional energy data legislation will be immediately forthcoming from the 95th Congress.

We will continue monitoring FEA's data collection and analysis activities to determine whether the actions taken are resulting in more accurate, timely, and credible energy information for making policy decisions. Our work in this area, however, will supplement and not duplicate the work of the Professional Audit Review Team.

We are also currently examining the energy accounting practices used by the petroleum industry required under the Energy Policy and Conservation Act. Our objective is to gain an insight into several companies' accounting systems for oil exploration and production. It will enable us to better assist the Securities and Exchange Commission in carrying out its responsibilities under the act to develop industry energy accounting practices which will permit the compilation of an energy data base.

Strategic Petroleum Reserve

The Energy Policy and Conservation Act requires FEA to create a Strategic Petroleum Reserve containing an estimated 500 million barrels of crude oil and/or petroleum products by December 1982 to help diminish U.S. vulnerability to the effects of a severe interruption in energy supplies. As part of the Reserve, the act requires that an Early Storage Reserve be established to contain at least 150 million barrels of oil or products by December 1978. The act also gives FEA authority to establish a Regional Petroleum Reserve and an Industrial Petroleum Reserve. The quantities of oil to be contained in these reserves are to be part of, and not in addition to, the Strategic Petroleum Reserve.

Major issues concerning FEA's plan for a Strategic Petroleum Reserve relate to the nature and type of storage, how oil should be acquired to fill the Reserve. and how it should be financed. Our previous work in this area identified three basic questions which must be analyzed and addressed in developing and approving a Strategic Petroleum Reserve plan.

--Is there a need for the type of Strategic Petroleum Reserve as outlined by FEA? Industry stockpiles could be used at significant savings.

--If so, how will the oil be purchased to fill the reserve? Royalty and Elk Hills Naval Petroleum Reserve oil, rather than oil purchased on the open market, may be viable alternatives.

--What ways other than general tax revenues are available to finance a Strategic Petroleum Reserve? A user fee placing the cost on those who use the product may be a better option.

We discuss each of these questions in more detail starting on page 20.

Our work in this area during the 95th Congress will focus on FEA's efforts to answer these questions. Also, since FEA currently plans to store the oil in salt caverns, primarily located in the Gulf Coast area, we have recently begun a study of the cost and feasibility of such storage.

International concerns

This Nation's growing dependence on imported energy makes it vulnerable to international, political, and economic pressures--such as those exerted by the oil embargo--and reduces its freedom in foreign and domestic policymaking.

The oil embargo demonstrated the Nation's vulnerability to reliance on foreign oil imports. FEA estimated that the embargo caused a $10 to $20 billion drop in the Gross National Product and a rise in unemployment of 500,000. The embargo and accompanying four-fold increase in imported oil prices were the principal causes of the worst U.S. recession since World War II. Worldwide impacts have been similarly severe.

FEA was created in 1974 primarily to manage short term fuel shortages. Thus, international actions have a heavy impact on its policymaking and coordination functions.

Will the Nation be able to import oil and gas in sufficient quantities to meet future demand requirements at reasonable prices?

Although many large-scale and sophisticated studies have been conducted which attempt to project U.S. demand and indigenous supply capacity in the mid-term future, the results vary considerably. An ingredient common to most of the studies is the implicit assumption that international oil supplies will adequately satisfy U.S. import needs, regardless of the size of those needs. Most experts agree that the world's proven oil and gas reserves are adequate to match the world's mid-term demand needs; however, whether key supplier nations will be prepared to exploit their reserves to the level required to meet world demand is uncertain.

On the other hand, if major new discoveries materialize, major investments in alternative new energy supplies may be lost as a result of substantially reduced prices for energy on the world market. This raises a question of whether the United States should maximize domestic petroleum production now or maintain domestic reserves for future contingencies and use imported energy while foreign supplies exist and the prices are relatively stable.

Other important problems are related. As a member of the International Energy Agency, the United States is somewhat protected from oil shortages by a system which would allocate available oil among member nations. In the event the International Energy Agency breaks down, would U.S. contingency plans get the Nation through another oil embargo? What are the implications of growing economic interdependence between the major oil importing and producing nations?

In one major ongoing review, we are studying the relationship between the international oil companies and OPEC governments. Some of the issues we are examining include (1) the nature of the OPEC price maintenance mechanisms, (2) the role of oil company purchasing decisions on OPEC or individual member price setting behavior, (3) the effect of long term

contracts which award access to crude oil on preferential terms, (4) the effects of OPEC ambitions to obtain access to refining and distribution operations and the extent to which these ambitions are facilitated by OPEC's leverage over major oil companies, and (5) the oversight role of the U.S. Government in the international oil market. We are using our authority under Title V of the Energy Policy and Conservation Act in this effort (see p. 4) and expect to issue a report on this review in the next few months. We are also currently studying the potential for expanding oil field potential in free world non-OPEC countries and selected International Energy Agency's programs and activities. In the future, we plan also to examine energy's role in U.S. bilateral relations with selected OPEC nations.

Is the Government doing all it can to coordinate and cooperate with other nations in the areas of energy conservation?

The United States is lagging behind other nations in reducing energy consumption. These nations may therefore be implementing conservation actions which could also be implemented in this country. We are currently reviewing foreign energy related technological development and conservation practices with a view toward identifying ways to reduce U.S. energy consumption.

Is the Government doing all it can to minimize the possibility of foreign energy policies impairing vital U.S. national interests?

Given the significant changes in the international order arising from the new international energy situation, it is important to determine whether vital U.S. interests have been or are in danger of being impaired. These recent changes raise questions about the impact of growing monetary reserves of producer nations and increasing direct investments in the United States by these nations. Such investments may improve relations with key producing countries, but their impact on the United States is not clearly understood. There are also questions about the security implications of exporting vast quantities of sophisticated military weapons and hardware to Middle East oil producer nations and whether such exports are necessary to alleviate balance of payments problems or to provide future bargaining leverage with foreign oil suppliers.

PAST EFFORTS

Conservation

Because most Federal efforts to encourage energy conservation have only recently been initiated in such legislation as the Energy Policy and Conservation Act passed in December 1975, and the Energy Conservation and Production Act passed in August 1976, FEA's conservation programs are in their infancy. Thus, our past efforts in this area have been limited.

Nevertheless, we have issued several major reports on conservation during the 94th Congress. For example, one report dealt with residential energy conservation (RED-75-377, 6/20/75), while another dealt with Federal in-house conservation efforts (LCD-76-229, 8/19/76).

The first report discussed such problems and issues as the emphasis on lowest initial cost in residential construction, obstacles preventing introduction of technological changes to promote energy efficiency, limited use of the Department of Housing and Urban Development's minimum property standards to encourage energy conservation, and limited research to improve the energy efficiency of a housing unit. We recommended that the Congress consider a combination of mandatory and voluntary actions to increase the level of energy conservation in the residential sector and that the Department of Housing and Urban Development emphasize energy conservation and establish thermal standards for federally insured homes. Many of the recommended actions were incorporated in the Energy Policy and Conservation Act and the Energy Conservation and Production Act.

The second report on Federal in-house energy conservation actions concluded that although some conservation actions had been taken by Federal agencies, much more could be done. This report, which was based on a review of conservation actions at 77 Government installations, identified a lack of (1) commitment to energy conservation, (2) leadership, and (3) complete and accurate data to assess progress in meeting energy conservation goals. We made recommendations to FEA, in conjunction with other Federal agencies, in the areas of energy program management, energy consumption data, vehicle operations, facilities energy use, and mission and training operations. FEA generally agreed with our recommendations and the Congress addressed some of the problems in the Energy Policy and Conservation Act. Specifically, the act

directed the President to develop mandatory energy conservation standards for federally owned or leased facilities.

In another report to the 95th Congress (CED-77-27, 2/14/77), we discussed the Department of Transportation's 55 mile-per-hour speed limit program and concluded that, although the program has been somewhat successful in decreasing the average driving speeds, the Department's efforts to increase State enforcement of the speed limit are limited. We made recommendations aimed at improving the program's acceptance and effectiveness.

In addition, we reviewed Federal efforts to improve the fuel economy of new automobiles (EMD-77-13, 1/13/77) and found that, although substantial improvement in new automobiles' fuel economy has occurred over the last 3 model years, continued improvements depend largely on how well Federal emissions and safety standards can be balanced with often conflicting fuel economy standards. We noted that the present Federal approach to regulate automobile design is a piecemeal and conflicting decisionmaking process and recommended several actions for achieving a balanced set of automobile standards.

We also evaluated and submitted comments to the Senate Finance Committee on H.R. 6860--a bill to establish import limitations on foreign oil--as passed by the House of Representatives. We concluded that only two of the bill's provisions--mileage standards for automobiles and housing insulation--were likely to achieve measurable reductions in energy consumption, and that imposition of import quotas without commensurate reductions in petroleum demand could result in severe shortages and have an adverse affect on the economy.

Petroleum and natural gas regulatory programs

As noted earlier, congressional and public interest in FEA's regulatory activities in the pricing, distribution, and allocation of crude oil and petroleum products has declined since passage of the Energy Policy and Conservaton Act providing for a gradual phaseout of controls on crude oil and petroleum products. Thus, we have also placed less emphasis on this area but will be monitoring FEA's efforts on a continuing basis to identify possible areas for improvement.

During the 94th Congress, we issued several major reports concerning FEA's compliance and enforcement efforts and its administration of various compliance and allocation programs. These reports discussed problems in FEA's auditing procedures, regulation development and implementation, efforts to protect the independent sector of the petroleum industry, and administration of the State petroleum set-aside program. We made several recommendations which the agency generally followed.

Energy information and analysis

In a 1976 report (OSP-76-21, 6/15/76), we pointed out that many problems continue to exist in the energy data area and that establishing a Department of Energy and Natural Resources with an independent data component offers the best long-term organizational solution to energy problems, including energy data problems. In the interim, we concluded that FEA could be strengthened to make it a more credible and objective focal point for Federal energy data efforts.

As a result of this report and a similar report issued in 1974, the Energy Conservation and Production Act included a number of measures providing for a credible and objective focal point for collecting energy data. It established within FEA an Office of Energy Information and Analysis and a National Energy Information System. As noted earlier, it also created a Professional Audit Review Team to conduct a thorough annual performance audit review of the procedures and methodology of the office. The Chairman of the team is appointed by the Comptroller General.

In another recently issued report (EMD-77-6, 3/17/77) on domestic resource and reserve estimates of coal, crude oil, natural gas, and uranium, we concluded that these estimates could be greatly improved and that additional information should be obtained concerning oil and gas in the Outer Continental Shelf areas, the availability of economically recoverable uranium, the effect of the cost-price relationship on the recovery of energy resources, the quantities of recoverable coal resources, and the ownership and control over energy sources. We made several recommendations aimed at making improvements in all of these areas.

Strategic Petroleum Reserve

On December 15, 1976, FEA submitted the Strategic Petroleum Reserve plan to the Congress for its approval.

In a February 16, 1977, report entitled "Issues Needing Attention in Developing the Strategic Petroleum Reserve", (EMD 77-20), we discussed questions in three key areas which we believe need further analysis by FEA and warrant the attention of the Congress in its deliberations on approving the plan (also see p. 14).

--Is there a need for the type of Strategic Petroleum Reserve as outlined by FEA? Potential exists for using industry stockpiles of crude oil and product stocks for the reserve at significant dollar savings. According to a Government report to the International Energy Agency, U.S. industries maintain commercially held stocks of crude oil and products equivalent to 120 days of oil imports. For these inventories to be used effectively as part or all of a Strategic Reserve, the Government would have to impose controls so that specified quantities of oil are maintained and appropriately used in the event of an embargo. This system would be similar to the Government controlled and industry-owned oil storage programs of France and Japan. We concluded that further analysis of this possible alternative is needed before a Strategic Reserve plan is approved.

--If there is a need for a reserve, how will the oil be purchased to fill it? FEA intends to fill the reserve through purchase of oil on the open market at a price near the national average composite price. However, other options exist for acquiring the oil in addition to open market purchase. Oil produced from Outer Continental Shelf and onshore Federal leases, and oil from Elk Hills Naval Petroleum Reserve, under certain circumstances, offer substantial cost savings to the Federal Government. If price controls remain in effect, significant savings can be incurred if royalty oil were purchased for the reserve. If oil prices are decontrolled, savings could result from purchasing Elk Hills oil. FEA said it would consider using Elk Hills oil if it were economical, but disagreed that royalty oil should be used.

--What ways other than general tax revenues are available to finance a Strategic Petroleum

Reserve? Although FEA's plan does not specify how the reserve is to be financed, it implies that general tax revenues, largely personal and corporate income taxes, will be the source of financing. FEA is currently studying several options for financing the reserve. The benefits of the reserve accrue directly to those who buy imported crude oil and the products derived therefrom by providing protection against the economic costs they would occur in the event of a supply interruption. Thus, we said that consideration should be given to having those who will benefit directly from the reserve bear its cost. This could be accomplished through imposing a user fee. We did not analyze all available options for imposing a fee; however, we identified two options--a tariff on imported crude oil and an excise tax on gasoline. We expressed the view that fees collected should be placed in the general fund of the U.S. Treasury and remain subject to congressional oversight.

We testified on our report before the Subcommittee on Energy and Power, House Committee on Interstate and Foreign Commerce on February 16, 1977, and will continue to monitor the Strategic Petroleum Reserve program because of its magnitude and importance as a cornerstone of national energy policy.

CHAPTER 3

FEDERAL POWER COMMISSION

The Federal Power Commission is responsible for regulating the interstate aspects of the electric power and natural gas industries. In fulfilling this function, FPC is responsible for assuring an adequate supply of natural gas and electric power at reasonable rates. FPC also licenses the construction and operation of non-Federal hydroelectric projects and investigates the environmental impact of the activities it regulates. FPC's regulatory authority is limited, however, to wholesale rates and services. Jurisdiction over retail natural gas and electric rates and services resides with the individual States. Our views on the major issues facing FPC are discussed below. Our past efforts at FPC are discussed on page 29.

ISSUES FACING THE 95th CONGRESS

Electricity

FPC is responsible for assuring that the interstate sale of electrical power in the wholesale market is offered at rates and conditions that are fair and equitable to both buyers and sellers. FPC's hydroelectric licensing program attempts to insure that the Nation's water resources are used for the maximum public benefit. To effectively carry out its responsibilities, FPC has its own data collection and forecasting program.

The major issues facing FPC in this session of Congress relate to the current structure of the electric utility industry and to FPC's ratemaking policies.

Is there a need to restructure the electric utility industry and to amend the Federal Power Act?

The Federal Power Act, as amended (16 U.S.C. 792-825) which governs the operation of the wholesale portion of the electric utility industry, has not changed substantially since 1935; yet, there have been numerous changes in the factors which affect that industry. In recent years, fuel prices have increased dramatically, inflation has increased operating and construction costs, and the subsequent economic recession has dampened demand for

electric energy and has caused significant changes in the utility industry.

Industry leaders are unsure as to the best course of action to pursue, both in the near and far-term, because of such uncertainties and problems as (1) the lack of Federal and State coordination resulting in conflicting requirements, fragmented policies and procedures, and jurisdictional differences, (2) inadequate and different demand forecasting methodologies, (3) lack of standardized reserve levels or reliability criteria, (4) inadequate financing for operations and expansion, (5) possible imposition of load management and pricing alternatives with concomitant socioeconomic implications, (6) uncertain effects and costs of new technologies, and (7) the potential conflict of environmental and conservation requirements with industry objectives.

As a result, there is concern as to whether the Nation's 3,600 municipal, cooperative, State, Federal, and private utilities can cooperate sufficiently to build the kinds of systems needed for the future, or whether further Federal planning and intervention is needed.

We are currently examining the problems and issues confronting the electric utility industry to identify and assess the various factors affecting the industry's future, their interrelationship, and the pros and cons of alternative courses of action.

Petroleum and natural gas regulatory programs

In regulating natural gas sold in interstate commerce, FPC is responsible for, among other things, authorizing the construction, extension, acquisition, and/or operation of facilities and regulating natural gas rates and services, including curtailments in times of gas shortages. FPC does not have any regulatory responsibility over the use of petroleum.

FPC's problems in the natural gas area are being dramatized by the current energy crisis occurring as a result of an abnormally cold winter. The natural gas shortage and the resulting decline in deliveries and dedications to the interstate market is the most difficult problem facing FPC. As with electricity, FPC is also faced with the responsibility of insuring adequate supplies at a reasonable price while, at

the same time, maintaining the financial viability of natural gas producers and pipelines.

Is there a need to increase the effectiveness of FPC's natural gas policies?

The most immediate and pressing energy problem facing the Nation is the shortage of natural gas. Recently, emergency legislation was passed to provide the President with additional powers to alleviate critical shortages in several states. These shortages have occurred because of a steady decline in the interstate natural gas supply which has caused many interstate pipelines to curtail gas deliveries to their customers. As a result of the gas shortage, there has been extensive debate about whether to deregulate the price of natural gas and/or improve the effectiveness of FPC's curtailment policy.

The continued disagreement about whether to deregulate natural gas has made the gas industry unsure of its actions. Clearly, price regulation affects the entire energy system, not just the regulated component. At present, low regulated prices may contribute to making it uneconomical to develop new energy sources; surely they discourage conservation actions. It may not be so much a question of regulation versus deregulation, however. Most of the consequences of deregulation could occur under continued regulation with higher regulated prices which approximated market prices. Price is the key to the supply and economic implications of deregulation and, in theory at least, prices could rise by comparable amounts in the context of either deregulation or continued regulation. The question of deregulation then, is not so much a question of increasing natural gas supplies as it is a question of the social and economic desirability of government-determined versus market-determined natural gas prices.

FPC's direct curtailment policy applies only to sales by the interstate pipeline companies and does not extend to intrastate pipelines, distributing companies and end users. As a result of this jurisdictional limitation, the effectiveness of FPC's curtailment policy in limiting the adverse effects of shortages is limited.

FPC has recently taken action to increase deliveries to the interstate market including

--establishing a new national rate structure,

--permitting pipeline companies to make interest-free advance payments to producers, and

--permitting curtailed industrial customers to compete in the intrastate market for gas supplies.

The recently enacted emergency gas legislation is also aimed at increasing interstate deliveries.

Our ongoing work includes reviews of FPC's advance payment program, the adequacy and reliability of natural gas reserve information, and the natural gas curtailment program, including an assessment of activities under the recently enacted emergency natural gas legislation. In this latter study, we plan to review the use of emergency purchases by interstate pipelines and the allocation of natural gas between these pipelines with a view towards developing recommendations for dealing with the natural gas shortages.

Are FPC's methods for determining reasonable electric and natural gas rates fair?

FPC is responsible for assuring an adequate supply of electric power and natural gas at the lowest reasonable rates. FPC's reasonable rate determinations depend heavily on the assessment of the utilities' operating costs, investment in the business, and profit. The demand for electric power and the natural gas shortage has justifiably focused attention on methods used by FPC to determine reasonable rates. Maintaining the financial viability of the electric and natural gas utility industries to provide service without excessive costs to the consumers is a difficult task. We plan to begin separate reviews of FPC's electrical and natural gas ratemaking processes during the 95th Congress.

What can be done to alleviate regulatory lag?

This question applies to FPC's electricity and natural gas regulatory functions and concerns the delay in disposing of the massive backlog of natural gas and

electric rate cases in addition to numerous and complex gas curtailment cases.

FPC has been unable to cope with its increasing workload, which arose primarily in the last 3 or 4 years as a result of the energy crisis. At the end of February 1976, there were over 140 natural gas pipeline rate increase cases totaling about $2.2 billion annually under suspension and subject to potential refund and over 100 electric rate cases totaling over $500 million annually under suspension.

Regulatory lag may cause problems, including increased rates, inadequate service, and the possibility that refunds may or may not be returned to consumers. During 1977, we plan to study the effects of regulatory lag and identify actions that can be taken to solve or alleviate the problem.

Are FPC's surveillance and enforcement activities adequate to protect the consumer and the general public?

This question also applies to both electricity and natural gas regulatory programs and concerns FPC's effectiveness in insuring that laws, regulations, Commission orders, and conditions attached to permits, licenses, and certificates are being properly followed. On several occasions, FPC has been criticized for footdragging and failing to enforce compliance with its regulations. If these allegations are true, consumers and the general public are not being protected as intended by the Congress.

We plan to evaluate the effectiveness of FPC's surveillance and enforcement activities during the 95th Congress.

Fossil energy development

What should the role of liquefied natural gas be in meeting U.S. energy needs?

FPC's role in fossil energy development is somewhat limited. Because of the natural gas shortage, however, an increasing reliance will have to be placed on supplemental supplies, such as liquefied natural gas imports. Such imports, if relied on, must be used to the best

advantage because of balance of payments and security of supply concerns. Using liquefied natural gas imports must also be balanced against using imported oil to determine which fuel offers the most advantages. Problems, such as the need for specialized tankers and receiving terminals, must also be considered. In short, large scale liquefied natural gas imports may involve problems similar to those created by large oil imports.

Using liquefied natural gas also has certain major safety problems and concerns. In this respect, we are assessing the potential dangers associated with transporting and storage of this gas as well as other dangerous gases, such as naptha.

In August 1976, the Energy Resources Council recommended a limit on liquefied natural gas imports and a continuation of Federal financial assistance to liquefied natural gas projects. If import controls are placed on liquefied natural gas, a decision must be made on the best way to control these imports. We have recently initiated a study to determine how liquefied natural gas can best be utilized in meeting the Nation's energy needs, actions available to control imports, and the strategy that should govern the use of these controls. In a related effort, we plan to examine, as a case study, problems faced by U.S. liquefied natural gas importers in obtaining approval for developing and shipping liquefied natural gas from Indonesian fields.

Energy Information and Analysis

Is FPC's information system adequate for making good management decisions?

Beginning in 1973, FPC began developing an automated data processing system to provide timely and accurate information for use in carrying out its decisionmaking responsibilities. The use of this system raises several questions, such as (1) is the information necessary for good decisions being collected? (2) is the information accurate? and (3) does the system focus on the most critical problems?

If the new system is not providing FPC with accurate, adequate, and timely information, FPC's decisionmaking process will be hampered thus adversely affecting the regulated industry and the consumer. The need for reliable information on which to base

decisions was highlighted by the recent gas shortage and allegations that major natural gas producers are withholding information on natural gas supplies to obtain a higher price. This allegation has been raised for several years, particularly since the recent shortages, and has yet to be resolved.

During the 95th Congress we plan to assess how well FPC's new information system is being used to meet the needs of FPC, the public, and the Congress. We are also currently reviewing the adequacy and reliability of natural gas reserve information for use by FPC, the Congress, and the Government in making decisions on the natural gas question.

PAST EFFORTS

Electricity

Our past efforts in FPC's electric power regulation program have been aimed primarily at FPC's hydroelectric licensing program and its steadily growing applications backlog. In a September 23, 1975, report (RED-76-13), we noted that most of the licensing time required was outside FPC's control. On the other hand, we found that some of the time required was within FPC's control and was due to processing delays, such as (1) automatic extension of reporting deadlines after allowing applicants 30 to 90 days to comply with requests for needed information, (2) never attempting to prosecute those who have failed to provide needed information, and (3) a lengthy and timeconsuming process for obtaining comments from other Federal agencies. We made several recommendations aimed at reducing the processing delay and at formalizing the role of other Federal agencies in the licensing process. FPC has subsequently taken action to implement our recommendations. However, formal procedures for obtaining other agencies' comments have not yet been established.

Petroleum and natural gas regulatory programs

Our efforts during the 94th Congress regarding natural gas dealt primarily with the possible deregulation and curtailment of this valuable resource. In one report (OSP-76-11, 1/14/76) we analyzed the consequences in terms of increased supplies and increased prices from deregulation of natural gas. Although we did not make any recommendations, our basic conclusion was that natural gas production, even with deregulation,

was likely to decline. We said, however, that deregulation could slow the rate of decline by providing an additional 1.5 trillion cubic feet of new natural gas supply in 1985, but this would have to be weighed against a cumulative additional cost to the consumers of about $75 billion between 1975-85. We also pointed out that continued regulation would result in almost the entire decline in supplies being borne by the interstate market whereas deregulation would tend to distribute this decline between inter- and intrastate markets.

We also reported (RED-76-11, 9/18/75) that the reliability of FPC's projections of the amounts of natural gas currently under contract between producers and pipeline companies which could be released as a result of Federal price deregulation was questionable. In our view, this occurred because FPC did limited verification to determine if the data on which the projections were based was complete and accurate. FPC has taken action to correct this situation which should provide more current and accurate contract information and enhance its decisionmaking process.

Regarding FPC's natural gas curtailment policy, we reported on September 19, 1975 (RED-76-18) that FPC lacks the authority to obtain end-use and economic impact information necessary to evaluate the effectiveness of its curtailment program because its jurisdiction does not extend to intrastate commerce. We noted that FPC, with FEA, was attempting to obtain the needed information, and we recommended that FPC report to the Congress on the results of its efforts and on additional actions, if any, needed to obtain the data.

In another report dealing with the impact of natural gas curtailments during the winter of 1975-76, (RED-76-39, 10/31/75) we said that if the winter were normal and if alternative fuels were available, the natural gas shortage was not expected to result in widespread unemployment and extensive plant closures. The report provided the Congress with information regarding the need for emergency natural gas legislation.

In addition to our reports on deregulation and curtailments, we reported on September 13, 1974, (B-180228) that FPC (1) made improper extensions to its 60-day limits on emergency gas sales, (2) did not have complete and accurate data on

the volume and price of emergency sales used in its decisionmaking process, (3) failed to take timely action on applications under its optional certificate procedure--which allows a producer to charge higher rates until final action is taken on its application--resulting in higher gas prices than may have been just and reasonable, and (4) allowed widespread noncompliance by FPC officials with its standards of conduct regulations intended to prevent conflicts of interest.

We recommended that FPC obtain additional information on the volume and price of emergency sales and improve its internal procedures to adequately evaluate its emergency sales program. We followed up on these recommendations in a May 24, 1976, report (RED-76-108) and found that FPC had, for the most part, implemented our recommendations.

CHAPTER 4

DEPARTMENT OF THE INTERIOR

The Department of the Interior is the Federal custodian of the Nation's natural resources, particularly the public lands which contain about half of this country's remaining energy resources. Thus, the Department's role in this Nation's energy future is immensely important. It has major responsibilities in domestic energy exploration, extraction, and marketing as well as land use, environmental protection, conservation, and safety. The Department has major programs in the areas of pipeline rights of way, including the trans-Alaska pipeline; tract selection and leasing regulation of the Outer Continental Shelf and public lands onshore; and generation and marketing of electricity through such organizations as the Bureau of Reclamation and Bonneville Power Administration. Following is a discussion of the major issues facing the Interior Department. Our past efforts are discussed on page 41.

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Pipeline rights of way

The Department is responsible for issuing transmission rights-of-way permits for pipelines after making environmental impact analyses. It is also responsible for construction and post construction monitoring to determine compliance with the permit. Currently, the major program in this area is the construction and eventual operation of the trans-Alaska pipeline, which will deliver Alaskan oil to the lower 48 States.

Thus, the most significant issue in this program area relates to the trans-Alaska pipeline and how decisions and actions taken on that effort will affect other oil and gas pipeline construction decisions.

What are the environmental and socioeconomic ramifications of pipeline construction?

Since inception, there have been disagreements over the potential socioeconomic and environmental effects of the trans-Alaska pipeline. Problems encountered and possible environmental and socioeconomic effects of the trans-Alaska pipeline will certainly influence decisions

on other major pipeline construction decisions. For example, the opening of Outer Continental Shelf areas to energy development will probably require pipelines to onshore facilities. Problems, such as divided Federal authority, lack of information on the number and location of pipelines to be required, and the environmental and economic impact, could hamper the success of Outer Continental Shelf development if not properly assessed and addressed.

In an ongoing review, we are examining the management of and reasons for cost increases in the trans-Alaska oil pipeline with a view toward identifying shortcomings in the management of that effort which could be avoided in constructing a trans-Alaska natural gas pipeline. When issued, our report should outline lessons learned in constructing the oil pipeline which could be applied to the gas pipeline.

We are also monitoring the progress of the trans-Alaska pipeline construction, including the Department's handling of environmental, system design, and quality control problems and are studying the Outer Continental Shelf pipeline issues.

Outer Continental Shelf

The Outer Continental Shelf contains an estimated 16 to 49 billion barrels of recoverable oil and 146 to 181 trillion cubic feet of natural gas. The Department estimates that 301 million barrels of oil and 3.8 trillion cubic feet of natural gas will be produced from Outer Continental Shelf resources in fiscal year 1977.

In leasing Outer Continental Shelf lands, the Department performs resource appraisals and environmental investigations for tract selection and valuation, awards leases, and monitors the operation of the producer and lessee, including safety, quantity verification, and royalty assessment and collection. Because of the shortages of oil and natural gas, this program is being accelerated.

Since the inception of the program in 1953, for example, 13.2 million acres have been leased on the Outer Continental Shelf for oil and gas development. By comparison, the Department expects to offer 4.4 million acres for lease in fiscal year 1977. Until recently, leasing on the Outer Continental Shelf was confined to the Gulf of Mexico and Southern

California. However, recent and planned leasing off the Atlantic and Alaskan coasts has aroused public concern over the program's management, the fair value return to the Treasury, and the environmental consequences of possible oil spills.

In our view, the primary issues relating to Outer Continental Shelf development concern the program's direction, the need for reliable data on which to base decisions, and the environmental and socioeconomic impacts of the program.

What should our Outer Continental Shelf leasing goals be and how do they relate to national energy needs?

One of the overriding issues facing Outer Continental Shelf development concerns how offshore oil and gas fits into the overall U.S. energy plans and goals. The Nation is committed to an accelerated Outer Continental Shelf leasing program as a major means of increasing energy self-sufficiency. Our past work in this area, however, has shown that the Department's plans are not clearly defined or related to other national objectives and goals, such as those set forth in FEA's Project Independence. Unfortunately, the Department has not responded favorably to our past recommendations in this area. One review now in progress addresses conflicts among various groups--Federal, State, local, and industry--on Outer Continental Shelf development. In this review, we plan to determine the need for additional steps which might spur the Department to action.

Is sufficient geologic and geophysical data available on Outer Continental Shelf resources?

The Outer Continental Shelf leasing program is hindered by the lack of knowledge about the extent of Outer Continental Shelf resources. For example, estimates of recoverable oil range from 16 to 49 billion barrels.

The Department has programs to obtain additional data on Outer Continental Shelf reserves, and legislation was introduced last year that would have required federally financed exploration. The proposed legislation, however, failed to pass. We have reported on this problem in the past. For example, as discussed on page 41, our most recent report on Outer Continental Shelf sale #35 in

California noted a need for more reliable data on Outer Continental Shelf resources and made several recommendations for improvement. We are currently looking at the broader question of overall Outer Continental Shelf needs in our ongoing review of Outer Continental Shelf conflicts discussed above.

Additional related issues to be resolved in this area include questions about Federal versus private exploration, whether to make exploration data available to others, and whether fair market value is being received for leasing public resources. Adequate data is needed to answer these questions.

What are the environmental and socioeconomic impacts of Outer Continental Shelf development?

Outer Continental Shelf development has brought considerable opposition from coastal States and other private interests resulting in some delays in lease sales. There are many environmental and socioeconomic questions yet to be answered, and in our view, these issues have not received adequate consideration in the past. Spills have occurred, and less consideration seems to be given to the long-term impact of lease decisions on marine life and on the socioeconomics of a particular area. The impact on nearby cities can be significant and land use becomes a consideration because of onshore activities that accompany offshore development. One recent sale on the east coast, for example, was canceled by a court primarily for environmental reasons.

A somewhat related issue concerns the possible need for deepwater port facilities. Super tankers cannot enter U.S. ports resulting in the additional expense of transferring the oil to smaller ships. Other nations have constructed deepwater ports with pipelines to carry the oil to shore. This procedure may be less costly, but there are important questions about its socioeconomic and environmental impact.

We are currently reviewing the need for environmental data in our previously cited study of Outer Continental Shelf conflicts. We are also studying the pros and cons of constructing deepwater port facilities. We plan to begin a study of the usefulness of baseline and monitoring programs for protecting the environment and in managing the Outer Continental Shelf leasing program.

Public lands

The Department has numerous responsibilities and programs dealing with public lands. Many of these activities--such as mapping resource appraisals and assuring compliance with mining safety standards--also extend into private lands. According to Department estimates, energy reserves on Federal land amount to 1.8 billion barrels of oil and natural gas liquids and 16.2 trillion cubic feet of natural gas. The Federal Government also owns and administers approximately 70 percent of the oil shale resources and owns 60 percent of the Nation's western coal resources. Federal lands in 1974 accounted for 6 percent of domestic production, and efforts are underway to increase this production. Decisions on leasing public lands will be a major determinant of both the amount and type of energy the country uses.

The major issues in this area relate to the manner in which public lands will be developed, the adequacy of the resource information, and the role of Alaskan fossil fuel resources.

How should development of energy resources on public lands proceed?

In our view, firmer decisions need to be made on development and production requirements for the various energy resources on public lands. Other issues relate to the need for timely lease development, efforts to improve tract valuation, need to evaluate nonproductive leases, the socioeconomic impacts on growing communities, and environmental impacts.

We have several ongoing and planned efforts in this area, including evaluations of (1) the relationship between the major end uses of coal and the Federal coal leasing program and (2) the likely socioeconomic impacts of leasing in the Rocky Mountain area. We are also examining the land use planning and the classification of Federal lands and plan to study the effects of withdrawing public lands for wilderness areas on other land uses, such as energy development.

Is the data base sufficient for adequate program development?

The Department's knowledge of energy resources and reserves on public lands is speculative, making it

difficult to prepare reliable plans and accurately assess the potential for U.S. self-sufficiency. This lack of knowledge can also reduce the number of bids and value of bids on lease offers. Although there are several factors to consider in deciding whether more intensive exploration is needed--such as whether it offers a favorable cost benefit ratio--such exploration would provide for firmer leasing schedules, production estimates, and tract valuation.

The Federal Coal Leasing Amendments Act requires a comprehensive departmental survey of coal resources on Federal lands. We are currently using our authority granted under Title V of the Energy Policy and Conservation Act to verify the accuracy of the Department's coal reserve estimates under Federal lease with private industry.

What is and will be the role of Alaskan energy resources?

Alaska's problems and potential are so unique as to warrant being discussed separately. Alaska has large known oil and natural gas resources and potentially large coal reserves but, besides petroleum, little development is taking place. Its vast areas of undeveloped land and its extremely fragile ecology are greatly threatened by large-scale resource development. Furthermore, since the high cost of constructing transportation systems has made it uneconomical for private interests to build competing systems, the Federal Government will continue to be involved in deciding how to transport Alaskan energy resources to the lower 48 States.

The trans-Alaska pipeline is near completion, but many problems experienced in that effort will more than likely be faced in attempting to move other Alaskan resources to the lower 48 states. For example, a natural gas pipeline may be built from Alaska. Questions and concerns about that pipeline have yet to be resolved and problems experienced in constructing the oil pipeline will also be faced in building a gas pipeline.

Also, the transfer of federally owned lands to native groups and the State of Alaska, as well as the transfer of presently unappropriated public domain lands into the forest, parks, refuge, and wild and scenic rivers system will likely significantly impact on the development of Alaskan energy resources.

The Federal Government may also have to assist in determining the ultimate destination in the lower 48 States for Alaskan oil when production starts in 1977. Current industry plans call for the oil to be delivered to the west coast and may result in a glut of oil there. The Government may have to approve a plan to ship some of the oil east or to export it.

As discussed on page 33, we are currently examining the management of and reasons for cost increases in the trans-Alaska oil pipeline to identify any problems which could be avoided in constructing a gas pipeline. In the future, we plan to study the agency's efforts to identify Alaskan resources and to increase the production and marketability of these resources.

Fossil energy development

Some of the issues relating to expanding the use of coal and to developing other fossil fuel resources do not relate specifically to the Department's responsibilities over public lands, but they are being discussed here because of the large amounts of fossil fuel resources on Federal lands.

How can the socioeconomic and environmental impact of accelerated domestic energy production be minimized?

With the bulk of our energy resources lying on Federal lands, the Department's public lands leasing policies will also have a major impact on society and the environment. For example, there are major questions about the environmental and socioeconomic impacts associated with expanded use of coal which could be especially severe in the western states where coal is being strip mined at an accelerating pace to help boost the Nation's output of electric power. Montana, for example, increased its strip mine production from an estimated 3 million tons in 1970 to 23 million tons in 1975. The influx of labor to support the large strip mine operations and the resultant demand for increased services pose serious problems for many previously stable small western communities. Likewise, the agricultural way-of-life of many western areas will be subject to drastic changes. These socioeconomic consequences are compounded by the damage strip mining does to the land. Major surface mining legislation has been passed in recent years but

has been vetoed twice. Major debate centers on the question of the proper tradeoff between environmental concerns and their impact on production and employment.

There is also growing concern over the long-term effects of burning fossil fuels, even if all pollutants could be removed. Fossil fuels are mainly carbon and, when burned, release carbon dioxide into the atmosphere. Since carbon dioxide acts as a one-way filter, its increased concentration in the atmosphere poses a potential problem by permitting the sun's rays to reach the earth but not allowing heat to escape. Atmospheric heat buildup may well turn out to be the major problem of and argument against increased use of fossil fuels. Analysis of the potential impacts of such a heat buildup is only in its infancy. Much must be learned about this phenomena, and quickly, if a major program to increase the use of fossil fuels is to achieve social acceptance.

As discussed under the following question, a major study underway will provide a broad overview of the issues influencing coal's future in this country. As part of that study, we are addressing the environmental and socioeconomic problems with increased coal production. Another ongoing effort is studying the socioeconomic impact of potential coal and other energy resource development in the Rocky Mountain area.

Also, the Federal Coal Leasing Amendments Act requires the Department to consider the environmental and socioeconomic impacts on an area when leasing land for coal development. It requires the Department to prepare a comprehensive land use plan and requires mining companies, within 3 years after the lease is awarded, to submit a mining and land reclamation plan. In the future, we plan to determine how well the Department's regulations governing reclamation and mining plans have been implemented and whether an adequate review of mining plans is performed to ensure that the environment will be protected.

How can the U.S. make better use of its coal resources?

The coal industry has been financially depressed until just recently, and little effort has gone into technology for improved extraction, transportation, and combustion of coal. A number of promising new techniques to extract a higher percentage of coal from the ground are being used by other countries,

but the United States has not adopted them to any great extent. Locating electric generating plants near the coal mine instead of near the population being served could keep electricity costs down, but this technique is in very limited use in this country. Coal slurry pipelines could transport coal efficiently, but a number of technical, environmental, and legal problems must be resolved before it can become a major, feasible way of delivering coal to users.

In a major study now underway, we are analyzing the promises and uncertainties of future development of U.S. coal. The study is addressing four major questions:

--Where does the United States stand now and who are the key participants in U.S. coal development?

--Based on selected scenarios, where will U.S. coal development be in 1985 or 2000?

--What is required to meet the energy goals in the scenarios?

--What are the issues and constraints and what are the alternatives to solve them?

Electricity

Is the existing structure of the Federal power marketing agencies suitable to meeting the future needs of the Nation?

The Federal power marketing programs are based on the principles that (1) energy shall be marketed to encourage the widest possible use, (2) it shall be made available at the lowest possible rates (consistent with sound business principles), and (3) preference in power sales shall be given to public bodies and cooperatives.

These principles were established at a time when energy was abundant. As a result, electricity sold by the power marketing agencies has generally been cheaper than other energy sources and has encouraged electricity consumption. The power marketing agencies' decisions on prices and whether to construct additional

generating facilities may not be consistent with overall Federal energy policies and goals which encourage conservation and reducing energy use. The programs of those agencies will need reexamination in the light of changing national needs.

We plan during the coming year to examine the operating philosophies of the Federal power marketing agencies in relationship to national energy goals and the potential for increasing the efficiency and production of electricity from these plants.

Currently, we have a similar study underway on the Tennesssee Valley Authority's activities. In this effort, we are assessing how the Tennessee Valley Authority's goals relate to National energy and environmental goals. We are considering actions that may be taken to better define or change the agency's overall goals.

PAST EFFORTS

Outer Continental Shelf

We issued three major reports during the 94th Congress dealing with various aspects of the Department's efforts to develop Outer Continental Shelf resources (RED-75-343, 3/19/75; RED-75-359, 6/30/75; and RED-76-48, 11/21/75). These reports were directed largely at difficulties in achieving the Administration's leasing objectives. We concluded that (1) the acreage leasing goals were unrealistic and did not consider national energy goals and plans, (2) shortages of materials, equipment, manpower and capital can limit the timing of Outer Continental Shelf production, and (3) a Government-financed and -directed exploring program is essential because information on reserves is inadequate and hinders proper tract selection and valuation.

In a recent report to the 95th Congress (EMD-77-19, 3/7/77) on Outer Continental Shelf sale #35 in California, we noted that the Department's policy of leasing Outer Continental Shelf resources as quickly as possible encourages industry to tie up its capital in lands with minimal potential and may lower the value received. We concluded that the Department should have more reliable data on potential Outer Continental Shelf resources and recommended that the Department (1) direct an exploration program to provide a systematic plan for appraising and selecting Outer Continental Shelf

tracts and (2) limit lease offers to those tracts on which sufficient data has been collected.

We also aided the Congress in its consideration of the Coastal Zone Management Act Amendments (Public Law 94-370) which authorized $1.2 billion in Federal aid to help coastal states deal with the effects of offshore gas and oil development. We supported this act in April 9, 1975, testimony before the Senate Committees on Commerce and Interior and Insular Affairs because it would assist coastal states in the orderly development of their coastal zones and would provide grants for planning, training, and research.

We also assisted the Congress--through written comments and testimony before the Subcommittee on Energy Research, Development, and Demonstration, House Committee on Science and Technology, and joint hearings before the Senate Committees on Commerce and Interior and Insular Affairs--in its consideration of the Outer Continental Shelf Lands Act Amendments (S. 521-94th Congress). The bill, which did not pass, would have significantly altered the present system of leasing oil and gas resources on the Outer Continental Shelf. Similar bills (S. 9 and H.R. 1614) with the same essential elements have been introduced in the 95th Congress.

Public lands

Our efforts during the past 2 years in this program area have been directed primarily at the Department's coal leasing program. We reported (RED-76-79, 4/1/76) that the Department had not determined when and how much land should be leased to meet national coal production goals. We recommended that the Department (1) develop a systematic coal drilling program for resource appraisal and provide planned and coordinated drilling through federally financed activities and (2) determine the demands that will be placed on Federal coal resources and establish a leasing schedule.

We also recommended in this report that the Congress amend the Mineral Leasing Act of 1920 to provide for (1) awarding leases only on a competitive basis and (2) issuing prospecting permits under which persons would explore for coal but would have no exclusive rights to leases. Our recommendations

were subsequently incorporated into the Federal Coal Leasing Amendments Act. We recommended also that the act be amended to provide for more frequent adjusting of the lease terms, but this recommendation was not adopted.

We examined Federal geothermal resources (RED-75-330, 3/6/75) and concluded that through 1985, these resources will not be a major energy source and through 2000, projections are uncertain. We also concluded that more reliable information was needed before designating Federal lands as known geothermal resource areas, and that leasing regulations should be changed to promote early exploration and development of leased lands.

Until recently, the general policy of private development of energy resources on public lands did not apply to the Naval Petroleum Reserves. This policy, however, has been reevaluated in view of the limited capacity of the reserves and the desire to use them to reduce foreign imports. We have issued two reports on these reserves (LCD-75-321, 7/29/75; LCD-76-313, 5/14/76) in which we identified a need for reliable resource estimates and for clear statements of how the reserves will be used. In March 17, 1975, testimony before the House Ways and Means Committee, we advocated developing two of the reserves as part of a national emergency energy reserve and recommended that the third reserve be fully explored for eventual commercial leasing. Subsequently, the Naval Petroleum Reserves Production Act of 1976 was enacted providing that oil from Reserves 1, 2, and 3 will be produced and sold on the open market. Responsibility for management of Reserve 4, located in Alaska, will be turned over to the Interior Department on June 1, 1977. The act authorizes the President to study the possible uses for the reserve and, in so doing, requires that he consider the impacts of further development and production.

CHAPTER 5

NUCLEAR REGULATORY COMMISSION

The Nuclear Regulatory Commission was established in January 1975 by the Energy Reorganization Act of 1974 to provide an independent agency to regulate the commercial nuclear industry. This responsibility previously rested with the former Atomic Energy Commission.

NRC is primarily responsible for regulating the construction and operation of commercial nuclear powerplants and most activities associated with the nuclear fuel cycle to assure that they do not pose an undue risk to public health and safety. NRC carries out these responsibilities by developing standards and regulations, issuing licenses, and inspecting and enforcing licensee compliance with regulations. NRC expends almost half of its budget on reactor safety research. The questions facing NRC are discussed below. Our past efforts are discussed on page 51.

ISSUES FACING THE 95th CONGRESS

Nuclear power development

Nuclear powerplants currently provide about 8 percent of the country's total electricity; in some local areas this figure is as high as 42 percent. As of December 1976, there were 62 commercial nuclear powerplants licensed to operate in this country, and another 72 under construction. In addition, public utilities had applied for construction permits for 67 powerplants and had placed orders with manufacturers for 16 more.

However, nuclear fission power continues to be one of the most controversial energy issues in this country. Consequently, its future contribution is not yet decided, and could range from an outright moratorium to, some optimists believe, providing up to 45 percent of the Nation's total electrical needs by the year 2000. Decisions made in the next 5 years may well be pivotal in deciding the future of nuclear fission.

Because NRC is responsible for regulating the commercial nuclear industry to protect public health and safety, it, as well as the Energy Research and Development Administration, are the agencies which

are faced with the critical issues facing nuclear power development.

The arguments against nuclear energy have been taken to the courts and to the voters. Two recent Court of Appeals decisions challenged NRC's licensing process by requiring that applicants give full consideration to (1) the environmental problems of operating reprocessing plants and disposing of wastes and (2) the alternative of energy conservation. Antinuclear groups have garnered enough support to get nuclear "moratorium" and/or control initiatives on ballots in a number of States. In every instance, these initiatives were defeated. The voting showed, however, that a large and vocal minority does not favor increased growth of nuclear power. Nevertheless, it also shows that most voters in these States believe nuclear power should be developed further as an alternative to foreign energy imports.

These recent court decisions underline the fact that NRC can no longer consider license applications solely on a case-by-case basis, and only in terms of reactor health and safety. NRC is being pressured more and more to consider broad programmatic questions, including

--safety and security problems,

--adequate disposal of radioactive wastes,

--the need for new nuclear plants in light of overall trends in the development of alternative energy sources, and

--socioeconomic and environmental impacts.

Is NRC an independent, aggressive, and effective regulator of the nuclear industry?

Intervenors frequently criticize NRC because it allegedly accepts, without question, the information provided by utilities in their license applications and thus appears to be "too soft on" or "in bed with" the industry it is supposed to regulate. Many see little change since the 1974 reorganization of the Atomic Energy Commission into ERDA and NRC.

Although most regulatory agencies are subject to some criticism, it appears that the persistence of this image may adversely affect the future development of nuclear power. In future work, we plan to consider the relationship of NRC to the nuclear industry by (1) identifying and applying qualitative and quantitative methods to evaluate this relationship and (2) comparing the NRC relationship with the nuclear industry to other regulatory agencies and the industries they regulate.

A related question concerns whether NRC's licensing process can be streamlined to reduce the 8 to 10 years lead time it takes to license and build a reactor. This long lead time adds to the already high capital cost of nuclear powerplants and many utilities have deferred or canceled construction of planned reactors due, in part, to increased capital costs. The previous Administration directed NRC to take steps to reduce this lead time, and NRC has adopted administrative measures within its present legal authority and has proposed changes in its legislative authority. These changes, however, have not yet been adopted.

Are nuclear powerplants safe?

Powerplant safety is the single most critical issue facing the nuclear industry. Opponents point out that NRC has not demonstrated that the "worst possible" accident--a fuel core melt which would result in a release of radioactivity to the environment and pose serious threats to public health and safety--will never occur. NRC maintains that the chances of such an accident are so remote that there is no need to consider it when reviewing and approving applications for permits to build and operate nuclear powerplants.

NRC fulfills its nuclear safety responsibilities through its licensing processes and procedures, a quality assurance program, and a program for powerplant security against theft and sabotage.

We are currently identifying and evaluating the processes and procedures used by NRC in considering applications for nuclear powerplant construction and operation, including the degree of independent evaluation and research conducted versus the amount of reliance placed on the applicant's information, the amount of staff participation and input in the process, and the degree to which generic safety questions are being addressed or suppressed.

NRC's quality assurance program is designed to monitor the licensee's activities to determine if it is adhering to previously approved design, construction, fabrication, and operating standards. This is accomplished through a series of inspections, starting very early in the design phase and carried throughout the life of the powerplant. In regulating and inspecting commercial nuclear facilities, NRC's philosophy is that the licensee has the prime responsibility for assuring that its facility is adequately designed, constructed, and operated. Thus, the major quality assurance/quality control activities are carried out by the licensee or his contractors.

We are currently evaluating the type and extent of NRC's quality assurance inspection program to determine whether (1) the present NRC philosophy assures adequate public protection against potential nuclear hazards caused by poor design, construction, or operating practices, (2) the system is adequate for evaluating the effectiveness of the quality assurance program, (3) inspectors are used effectively, and (4) a firm stand is taken with utilities when deficiencies are found.

NRC is also responsible for assuring that adequate safeguards exist against theft of special nuclear material or other highly dangerous nuclear materials from a plant or the sabotage of that plant. Over the past decade terrorism has increased, both here and abroad. As a result, nuclear powerplant security is of utmost importance for the protection of public health and safety, as well as the vast investment in plant and equipment.

We are currently evaluating the adequacy of the protection provided to determine whether (1) plant security requirements are uniform, (2) NRC inspectors are consistent, and (3) NRC regulations should be more stringent.

Related questions concern whether the NRC and ERDA reactor safety research programs are addressing the right safety questions and whether problems associated with decontaminating and decommissioning nuclear facilities in the future are being addressed.

In view of the increasing controversy over nuclear power, it would seem logical that safety research projects be geared toward either confirming or improving the safety of nuclear powerplants and nuclear fuel

cycle activities. We intend to begin a study of NRC's research program during the coming year.

Decommissioning and decontamination is the process by which nuclear facilities, after the end of their useful life, are decontaminated and/or disposed of safely and completely. NRC is responsible for assuring that all users of radioactive materials licensed by them carry out this process. ERDA is responsible for decommissioning and decontaminating its own facilities. We plan to evaluate NRC's and ERDA's decommissioning and decontamination programs with a view towards recommending possible actions that can be taken now to better plan for this eventuality.

Does the nuclear option involve unacceptable damage to the environment?

Under the National Environmental Policy Act of 1969 (42 U.S.C. 4321), Federal agencies must prepare a detailed environmental impact statement for all significant actions affecting the environment. NRC prepares such statements preparatory to issuing licenses for nuclear facilities--including power reactors, testing facilities, fuel reprocessors, and isotopic enrichment plants, as well as when new regulations are promulgated.

We are currently evaluating the adequacy of NRC's assessment of the environmental impacts and associated long-term problems of nuclear powerplants. We are determining among other things whether the agency decisionmakers and the interested public have sufficient information to assess the environmental impacts of a proposed facility. We are also considering whether NRC (1) substantiates environmental data submitted by applicants, (2) evaluates the projected cumulative effects of nuclear power proliferation, (3) considers specific energy conservation methods and their possible impact on power consumption when considering the need for power, and (4) addresses adequately the decommissioning of these facilities after their useful life.

Are there advantages to collocating commercial nuclear fuel cycle facilities?

The Energy Reorganization Act of 1974 directed NRC to consider the feasibility and practicability of nuclear energy centers. Collocating facilities into

nuclear parks could eliminate much of the required nuclear materials transportation and consequent safeguards risks. The energy center thus has some advantages in protecting against terrorists and saboteurs. The larger controlled area would also give more time to implement emergency measures to protect offsite populations and make it more difficult for intruders to penetrate the plants. On the other hand, this concept would pose a new set of problems, including vulnerability to overt attack and siting and transmission problems.

During the 95th Congress we intend to determine the economic and practical potential for this concept.

Do nuclear plants generate electricity cheaper than their fossil fueled competitors?

Nuclear proponents maintain that electricity produced from nuclear power is significantly cheaper than from its chief competitors--coal and oil. They maintain that lower operating costs more than offset higher capital costs. NRC, in preparing environmental impact statements, usually finds the 40 year cost of electricity is cheaper via the nuclear option. Some experts disagree, however.

Many factors in addition to capital investment and operating costs must be considered in comparing nuclear power to other energy alternatives. Perhaps the most important factor is the level of Government support which may be required in future years to sustain a large commercial nuclear fission program. The comparative performance of nuclear versus other alternatives must also be considered. For example, a recently published study maintains that nuclear power is more costly than alternatives--except for oil in the northeast--because the nuclear plants experience higher outage rates.

In the future, we plan to evaluate the direct and indirect costs of commercial nuclear powerplants and compare these costs to available alternatives. We also plan to point out the difficulty in quantifying some of the costs, such as the cost of permanent waste disposal and decommissioning. Currently, the cost of waste disposal, decommissioning, and reprocessing are highly uncertain and are not included in computing the cost of generating electricity with nuclear power. Such omissions clearly enhance nuclear energy's competitive position relative to other sources of electrical energy, such as coal.

International concerns

Regardless of the position this country takes on nuclear power, other countries are developing energy policies heavily dependent on nuclear fission power. This is particularly true for many European countries which have limited energy resources. This international commercialization of nuclear power and the development of new nuclear technologies poses critical problems for this Nation's security, particularly as it relates to questions about nonproliferation of nuclear weapons, safeguards, and export controls.

> Is the Government doing all it can to see that international safeguards are established which are sufficient to prevent nuclear proliferation and the diversion of nuclear materials to terrorist groups?

The Congress continues to prod the executive branch in this area, urging it to undertake greater efforts. Perhaps the greatest danger affecting U.S. security and world peace is the spread of nuclear weapons beyond the six nations which now have nuclear weapons capability. Such proliferation is made possible by, among other things, the sharing of certain peaceful nuclear technology, such as reprocessing and enrichment facilities. Several proliferation control measures were debated during the 94th Congress, although none were passed.

Some of the questions most in need of answers include: Has the Government fully explored the possibilities for cooperation with other nuclear nations to halt the spread of nuclear technologies? If cooperative efforts fail, are alternative courses of action open to the Government? For example, could the United States produce and sell enough enriched uranium to maintain a dominant supplier position? Could or should the Government promote international nuclear reprocessing facilities to meet the enriched uranium needs of present non-nuclear weapons nations? Further examination of U.S. and international safeguards, nuclear suppliers' export policies, and the

arms control implications of new nuclear-related technologies and transfers of this technology is needed. A related question concerns the need for more stringent export controls until stronger nonproliferation measures can be implemented. We are currently identifying and assessing the major issues affecting U.S. efforts to control nuclear proliferation. In addition, we have initiated a review of the nuclear export policies of major supplier nations with a view towards identifying areas where the United States can strengthen its nuclear export policies and procedures.

PAST EFFORTS

Nuclear power development

Our major reports on NRC activities during the 94th Congress dealt primarily with nuclear safety and problems associated with disposing of wastes from nuclear operations.

In two reports (RED-76-68, 5/26/76; EMD-76-4, 8/25/76), we said that two NRC safety research projects--the loss-of-fluid test facility and the Plenum Fill Experiment--experienced management deficiencies and delays, including schedule slippages, program redirection, and escalated costs. We concluded that neither project could reach its anticipated objective.

In another report (RED-76-54, 1/12/76) on waste disposal, we noted that neither ERDA --which has research and development responsibilities for nuclear waste management--nor NRC had established site selection criteria for low level radioactive waste burial grounds and had not defined earth science characteristics even though some sites had been operating for over 30 years. Some sites were releasing radioactivity to the environment. Based on our recommendations, ERDA budgeted funds for fiscal year 1977 to develop site selection criteria for its own burial grounds.

Between 1952 and 1966, uranium mill tailings--a low level sand-like material resulting from the extraction of uranium from uranium ore--were used extensively for construction fill material in Grand Junction, Colorado. In a May 21, 1975, report (RED-75-365), we noted that Federal and State efforts to provide financial assistance for remedial actions were stymied because all property owners could not be notified. Although uranium mills must be

licensed by NRC or State agencies operating under agreement with NRC, there is no Federal enforcement once the license is terminated. Since tailings stabilization methods to date have been ineffective, we felt there was a need for continued regulation and long-term control to insure their integrity.

In a report to the 95th Congress on NRC efforts to reduce the long lead time (8 to 10 years) it takes to license and build a reactor (EMD-77-15, 2/25/77), we concluded that NRC is not going to succeed in reducing lead times through administrative procedures primarily because State and local governments' licensing requirements are not compatible with NRC licensing procedures. We recommended that NRC work with the States to develop common licensing procedures. NRC generally agreed with our recommendations.

In another report to the 95th Congress on the issues related to the closing of the only commercial reprocessing facility that has operated in the United States (EMD-77-27, 3/8/77), we concluded that the technology for solidifying and disposing of waste at the West Valley, New York, facility has not been developed and years of additional research are needed before any decisions on the final disposition of this waste can be made. We also concluded that it is economically infeasible to reopen this facility and that additional research is needed before decisions can be made on what to do with the high-level liquid wastes presently stored at the facility. We recommended that NRC and ERDA develop a policy on Federal assistance to New York for the West Valley site. We testified on our report before the Subcommittee on Conservation, Energy and Natural Resources, House Committee on Government Operations, on March 8, 1977.

In all of these reports, we made recommendations aimed at either increasing or improving management effectiveness of these programs. The agencies agreed to take positive actions on our recommendations and in one case, NRC stopped work on a safety research project pending completion of a conceptual design study.

International concerns

In the past, our efforts on the international development of nuclear energy have concentrated primarily on the nonproliferation and safeguards questions. Four reports were issued to the 94th Congress

on various aspects of these subjects. The most recent report, issued on September 14, 1976 (ID-76-60), summarized several previous reports we had issued on international safeguards and nonproliferation. We said that although the United States has sought improvements in international safeguards and physical security of nuclear materials and equipment, much more could be done. We also discussed shortcomings in the controls over the diversion of nuclear material for weapons purposes. We made several recommendations designed to

--improve the effectiveness of International Atomic Energy Agency safeguards,

--provide the United States and other nations with more information concerning safeguards effectiveness,

--upgrade the capabilities of the International Atomic Energy Agency safeguards staff, and

--urge all Agency member nations to establish adequate sanctions against nations diverting nuclear material for nuclear explosive purposes.

Other reports issued discuss, among other things, various policy options for deterring nuclear proliferation, export controls over nuclear materials and technology, physical security of nuclear materials and equipment transferred abroad, the role of the International Atomic Energy Agency in safeguarding nuclear material, and the effectiveness of international safeguards. We made a number of recommendations in these reports aimed at strengthening U.S. and international controls over the peaceful use of atomic energy and the International Atomic Energy Agency's role in international nuclear safeguards. There was general agreement with many of the issues raised in our reports and the affected agencies have begun to take action to implement our recommendations. For example, the executive branch has initiated specific programs to strengthen international safeguards.

CHAPTER 6

ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION

The Energy Research and Development Administration was created by the Energy Reorganization Act of 1974 to bring together in a single agency the major Federal energy research and development activities. ERDA is responsible for (1) directing and conducting research and development on domestic sources of energy, (2) carrying out nuclear energy functions related to fuel production and national defense, and (3) conducting basic research in the physical, biomedical, and environmental sciences. In fiscal year 1977, ERDA is providing about 80 percent of the total Federal funding for energy research and development. Because of its broad research and development responsibilities, ERDA's programs include efforts in the nuclear power development, fossil energy development, renewable resource, and conservation program areas. Our views on the major issues within each of these areas are discussed below. Our past efforts at ERDA are discussed on page 65.

ISSUES FACING THE 95th CONGRESS

Nuclear power development

ERDA's present top priority research and development project is the Liquid Metal Fast Breeder Reactor, a nuclear fission reactor that will "create" more fuel than it uses. Estimates of U.S. uranium resources are speculative, and foreign sources are uncertain. The LMFBR, with its fuel "breeding" capability, could be the solution to any problem with uranium supplies. However, there are significant problems involved with commercializing the LMFBR. It is many years and billions of dollars away from commercial use. The energy output of nuclear fission, at least over the next 20 years, will continue to be almost exclusively from light water reactors. In addition, if nuclear energy and the LMFBR are to be viable options, the nuclear fuel cycle must be closed by solving the waste disposal and reprocessing problems.

The nuclear fuel cycle involves (1) mining uranium, (2) processing it through several steps--including enrichment--into fuel for the powerplant, (3) reprocessing the used fuel, and (4) ultimately disposing of highly radioactive wastes. Because of the highly radioactive

nature of most nuclear materials, they must be adequately safeguarded against the possibility of terrorism and sabotage at all times.

ERDA's responsibilities in this area include (1) making assessments of the extent of uranium resources and encouraging industry to develop these resources, (2) assisting industry in overcoming technical and institutional uncertainties in the areas of fuel reprocessing, recycling, and waste management, (3) developing and demonstrating efficient and effective safeguards systems for both light water and advanced reactor fuel cycle systems, and (4) developing and demonstrating advanced enrichment technology.

How close are NRC and ERDA to solving the fuel reprocessing and waste disposal problems necessary to close the nuclear fuel cycle?

Commercial reprocessing facilities would separate waste products in spent fuel discharged from nuclear powerplants and convert the remaining spent fuel into useful uranium and plutonium products. No commercial reprocessing plants operate in the United States today, nor has reprocessing been successfully demonstrated on a commercial scale. Similarly, a solution to the problem of long-term storage of highly radioactive nuclear wastes has not been found. Failure to solve the waste management and reprocessing problems mean that large amounts of highly radioactive spent fuel must be stored at the nuclear powerplants. This situation has forced many nuclear powerplants to expand their onsite storage capability for wastes of all types. Other reactors may be faced with possible shutdown because of a lack of adequate storage space.

To compound the problem, Nuclear Fuel Services, Inc.--the only fuel reprocessor close to being ready for operation--recently withdrew from the reprocessing business leaving this country with the problem of disposing of over a half million gallons of radioactive waste. We reported on this problem on March 8, 1977 (see p. 52).

An important question to be addressed by the 95th Congress will be whether commercial fuel

reprocessing should go forward. On April 7, 1977, President Carter announced that because of associated safety and safeguards problems, commercial reprocessing in the United States will be deferred indefinitely. Technical alternatives to nuclear fuel reprocessing, which may reap many of the benefits, but involve less risk, are also being studied.

We are currently studying the reprocessing question as it relates to the Nation's nuclear nonproliferation objectives and plan to assess the status and pros and cons of various reprocessing alternatives during the 95th Congress.

All operations that produce or use nuclear materials generate radioactive waste. Solving the waste management problem is crucial to continued nuclear growth. However, possible solutions have been debated for 20 years, and the problem remains unsolved.

Radioactive wastes are generally classified as either high- or low-level wastes. Because high-level wastes are highly radioactive, the Nation must develop techniques for permanent isolation of these wastes in a way that requires little reliance on human surveillance for very long periods of time--centuries to millenia. An estimated 75 million gallons of high-level wastes are currently stored at temporary locations.

In addition, low-level wastes are generally disposed of in shallow land burial sites. Some of the six existing commercial sites are no longer accepting this material, however, and it is uncertain how long the remaining ones can handle the increased capacity.

NRC is responsible for protecting public health and safety through regulating the possession, use, and disposal of radioactive materials while ERDA is responsible for researching, developing, and demonstrating facilities and techniques for treating, storing, and disposing of radioactive wastes. ERDA is also responsible for the eventual operation of waste storage facilities.

We are currently assessing the obstacles faced by ERDA in solving the spent fuel storage and commercial high-level waste problems as well as the possible timing for a realistic solution to these problems. We are also

assessing the waste management problem as it relates to this country's nuclear nonproliferation objectives.

ERDA has also produced 215 million gallons of high-level liquid waste from its weapons and research programs. We plan to begin a review during 1977 of ERDA's efforts to dispose of those wastes.

How reliable are ERDA's estimates of domestic uranium supplies and how available are foreign sources?

Another crucial factor affecting the growth of nuclear power and the need and timing for commercializing the LMFBR is the availability of uranium. In the past, the nuclear industry assumed that uranium would continue to be available in abundant quantities and at reasonably low prices. However, recent market activity resulting in rapidly escalating prices has caused uranium consumers and producers to more closely examine the uranium supply situation. Many utilities are without uranium contracts to fill the lifetime requirements of their reactors, and producers may be unable to meet the demand. ERDA projections indicate that without fuel reprocessing there may be a shortage of uranium after 1990. The foreign supply may also be uncertain. Because many industrialized foreign countries--such as Japan and West Germany--must rely heavily on nuclear power and do not have adequate supplies of uranium of their own, worldwide demand may exceed the supplies of the major supplier nations. The restrictive export policies of some of these supplier nations further complicates the situation.

On the other hand, some experts believe, contrary to ERDA's assessments, that an adequate supply of uranium exists for meeting this country's nuclear power needs under any conditions. These conflicting opinions have helped to make utilities unsure of their actions.

We are currently assessing the factors affecting worldwide uranium supply and demand. We are examining, among other things, the reliability of the estimated domestic uranium resource base, how this base can be increased, and what present and future Government actions would be beneficial.

How urgent is the need for additional uranium enrichment capacity and how should that capacity be provided?

Before uranium can be used in a nuclear reactor, it must be enriched in the fissionable isotope uranium -235. Currently, most of the worldwide enrichment capacity exists at three ERDA enrichment plants. An add-on to one of these plants is currently in the design phase.

There was a great deal of debate during the 94th Congress as to when additional capacity would be needed to meet growing domestic and foreign demand and how that capacity should be provided--Government or private ownership. We have reported on this subject on several occasions (see p. 65) and are currently assessing the need and timing for additional enrichment capacity and identifying ways that current capacity can be extended. We also plan to begin a review of ERDA's efforts to develop and commercialize new enrichment technologies.

How reasonable are ERDA's uranium enrichment pricing policies?

ERDA receives considerable revenues for its enrichment services. These revenues are used to offset ERDA's operating expenses. In fiscal year 1977 ERDA expects to receive about $660 million for its enrichment services. ERDA's price for these services is governed by the Atomic Energy Act of 1954 (42 U.S.C. 2201) which requires cost recovery over a reasonable period of time.

Legislation was introduced during the 94th Congress to increase the price of enrichment services to a "commercial" rate. Proponents for this change contend that the existence of the artificially low ERDA price stifles industry interest in investing in private enrichment facilities. They also argue that it represents a subsidy to the nuclear industry and thus provides a competitive advantage to nuclear power over other energy alternatives. We plan to evaluate ERDA's enrichment pricing policy during the 95th Congress. In addition, our current review of the need and timing for additional enrichment capacity will address certain specific pricing policies relating to ERDA's uranium feed stockpile.

Fossil energy development

ERDA's fossil energy development activities are directed toward researching, developing, and demonstrating technologies to expand the use of coal and oil shale and improve recovery methods for oil, natural gas, and oil shale.

ERDA's coal research effort includes programs in coal conversion and coal utilization. In its coal conversion program, ERDA is attempting to develop processes to convert coal into synthetic fuels that substitute for those derived from oil and gas. Its coal utilization program is directed at developing environmentally acceptable processes to produce energy by burning coal directly. These include improved coal combustion systems, advanced power systems with gas turbines, and magnetohydrodynamic electric power.

ERDA's oil shale program is attempting to reduce the water requirements of the oil shale industry, increase the recoverable reserve base through improved production technology, and insure that environmental safeguards are built into the process.

In its oil and natural gas recovery programs, ERDA is attempting to demonstrate the technical and economic feasibility of advanced (tertiary) techniques to increase the yield of currently producing oil wells and to produce gas in areas where commercial gas production on a large scale is not now possible.

Is ERDA addressing all research and development options to solving the environmental and socio-economic problems associated with expanded use of coal?

This issue is closely related to the problem of minimizing the environmental and socioeconomic impacts of accelerated energy development discussed on page 38. This question, however, concerns ERDA and Environmental Protection Agency efforts to research and develop improved technology to reduce air pollution caused by burning coal directly.

Such technology may reduce air pollution either by removing pollutants before the coal is burned or by removing them before smoke is released to the atmosphere.

Current technology using stack gas scrubbers to clean coal emissions from coal-fired plants is inadequate and expensive to implement. The Environmental Protection Agency is attempting to improve scrubber technology, while ERDA is placing major emphasis on developing fluidized bed combustion.

Our ongoing study (see p. 40) of the issues influencing the future of coal addresses this question and, during the 95th Congress, we plan to determine whether research and development options to improve the environmental and socioeconomic acceptability of coal have been adequately considered.

What is the future role of synthetic fuels from coal and oil shale?

This Nation has huge resources of oil shale that can be converted into synthetic crude oil, and coal that can be processed into both synthetic crude oil and natural gas. Although technologies for these processes are generally proven, development costs are enormous and the ultimate cost of synthetic fuels is uncertain. Consequently, the contribution that synthetic fuels can be expected to make over the next 25 years or so and the role it will play in reducing oil imports is far from certain. Further, if the United States is, as some claim, already in a transition period from oil and gas to renewable resources, it may not make sense for the Government to spend billions of dollars to develop a synthetic fuels industry that might soon be outdated.

We are currently reviewing the objectives, status, and potential of ERDA's synthetic fuel demonstration program--paying particular attention to the extent that environmental, technical, socioeconomic, and regulatory information needed for eventual commercialization is being obtained. Also, our previously cited review of the issues influencing the future of coal will consider this question.

Renewable resources development

Federal funding for renewable resource technologies has increased dramatically over the past few years. Yet, there is considerable debate about the contribution these technologies can make toward meeting this Nation's energy needs and the research and development priority being assigned to them by ERDA.

What is the long-term potential of geothermal energy? and is a Federal loan guarantee program or other incentive needed?

Recent public concern about dwindling supplies of oil and gas has resulted in legislation intended to advance the date by which renewable energy sources, such as geothermal energy, can be made available. Several pieces of energy legislation enacted in the 93rd Congress give ERDA authority to conduct a wide range of activities intended to make available economically competitive and environmentally acceptable geothermal technologies to the Nation as soon as possible. ERDA can also provide loan guarantees up to $200 million for financing geothermal projects.

For the most part, however, ERDA believes that geothermal energy will have little, if any, impact before 1985 and that accelerating the development of this technology will contribute little in the near term. From 1985 until 2000, ERDA does not expect geothermal to have an appreciable impact in meeting energy needs. Others disagree with these estimates.

During the coming year, we plan to identify the potential near-, mid-, and long-term use of geothermal energy as a renewable energy source, and determine the proper role the Federal Government should play in developing geothermal energy.

How does ERDA plan to solve the institutional barriers associated with implementing new technologies into the current energy system?

Increased use of renewable energy technologies as a partial substitute for existing energy technologies will require advance planning. Possible economic and social dislocations that result from changes in energy sources must be minimized. Because many of these technologies can be decentralized and used on a smaller scale than current systems, changes in investment characteristics also must be anticipated. Other considerations, such as land and water use, public acceptance, and legal and institutional barriers must be identified as the technology is being researched

and developed if rapid development of such technologies is to take place.

Our work during 1977 will include a review of such institutional barriers as environmental, socioeconomic, and legal constraints to commercializing solar and geothermal energy. We will also assess ERDA's role in overcoming these barriers.

How are priorities determined for these new technologies?

ERDA's funding of and priority assigned to renewable resource research and development has been the subject of some controversy. Some believe that ERDA is emphasizing high cost nuclear technologies at the expense of renewable resource development. Thus, an important question is whether renewable resource technologies should be developed at a faster pace.

A related question concerns the way ERDA established its priorities to assure that it is emphasizing the most promising technologies and approaches. We are planning efforts during the 95th Congress in ERDA's solar, geothermal, and fusion research and development programs which will address this question as it applies to these specific technologies. For example, we are currently reviewing ERDA's fusion research program and will attempt to determine the funding priority that should be given to that program.

What are the environmental impacts associated with implementing these technologies and what is being done to identify and overcome them?

The environmental effects of solar energy technologies have not yet been fully determined and assessed, and potentially serious problems associated with nuclear fusion and geothermal energy must be studied further. Will nuclear fusion, for example, introduce as many problems as nuclear fission? What is being done to assure that necessary environmental controls are developed?

Environmental studies are essential to identify and solve potential impacts as these technologies are developed to avoid delays in their implementation

once the economic and technical problems are solved. As part of broader studies, we are currently assessing ERDA efforts in identifying, assessing, and overcoming the environmental impacts associated with fusion and geothermal research and development.

How effective are new demonstration programs, such as the solar heating and cooling program, in meeting program goals?

One goal of ERDA's solar heating and cooling program is to bring about commercial acceptability by the early 1980s. To this end, solar heating equipment is currently being demonstrated by the Department of Housing and Urban Development, with ERDA funding, in about 120 homes, apartments, and office buildings around the country. This program, as well as some geothermal programs, should be evaluated to determine how well they are being conducted, and if they will be able to meet program goals.

Conservation

While FEA has responsibility for commercializing existing energy conservation technologies, ERDA is responsible for researching and developing new technologies.

ERDA is conducting a variety of activities in energy conservation research, development, and demonstration geared primarily toward reducing energy waste by developing more efficient energy technologies. Its activities include efforts to increase the efficiency of consumer products, electrical transmission and distribution systems, manufacturing systems, agricultural and food process industries, and automobiles. As part of its conservation program, ERDA is attempting to develop improved energy storage systems.

Is the near-term priority role established by ERDA for new energy conservation technologies the appropriate one?

ERDA has designated conservation research, development, and demonstration as a high-priority program for the near-term. ERDA plans provide that

energy conservation opportunities now ready for commercialization will receive special attention. The President's Council on Environmental Quality, however, has criticized ERDA for placing too much emphasis on off-the-shelf technologies and questioned the adequacy of ERDA's planning for mid- and long-term conservation efforts.

The 95th Congress, in authorizing funds for ERDA's program, will be faced with the question of whether ERDA is placing too much emphasis on off-the-shelf, conservation technologies at the expense of new higher payoff technologies. We plan to begin a review during the 95th Congress of ERDA's conservation research and development program. As part of that effort, we will attempt to determine whether ERDA's priorities are appropriate.

What is the appropriate Federal role in automotive conservation research, development, and demonstration?

The Federal role in automotive conservation research, development, and demonstration has been to support the development of high risk, advanced propulsion systems which could be demonstrated in the early 1980s and commercialized later in the decade. Several bills were introduced in the 94th Congress to accelerate the development of these advanced systems. One recently enacted law authorizes $160 million for a 6-year electric car research and development program. Another bill, which passed both the House and Senate but did not become law, would have authorized $100 million for the first 2 years of a 5-year Government research, development, and demonstration program for new auto systems and advanced alternatives to existing autos.

Some questions could be raised, however, about the energy efficiency of some of these proposals. For example, an electric car may reduce the use of petroleum in the transportation sector, while at the same time, it increases total energy use. Such questions will need to be fully assessed and resolved before a commitment is made.

There has also been considerable debate over what the proper Federal role should be. Hearings were held on this issue in 1975 and 1976 and numerous studies

have been made. Opponents of Government involvement contend it is not needed because the industry has the necessary resources. These opponents believe that industry will make economically efficient research and development decisions. Proponents of increased Government involvement say it is needed because the industry resists new technology and drags its feet on the introduction of advanced engines. These proponents believe that new technology needs to be pushed by Government regulation and federally funded research and development.

PAST EFFORTS

Nuclear power development

ERDA's activities in nuclear power research and development are directed primarily at researching, developing, and demonstrating improvements in (1) the nuclear fuel cycle, (2) nuclear safeguards, and (3) advanced fission power reactors--such as the LMFBR. Thus, our efforts in nuclear research and development have been directed at these programs.

Nuclear fuel cycle and safeguards

The need for and timing of additional enrichment capacity and how that capacity will be provided has been a subject of debate over the past several years. We addressed various aspects of this issue in several reports issued during the 94th Congress (RED-76-36, 10/31/75; RED-76-55, 11/28/75; and RED-76-110, 5/10/76). In those reports, we concluded that:

--There should be a greater risk-sharing between the Government and private enrichers in cooperative agreements between ERDA and private companies wishing to provide future enrichment capacity.

--The Government should provide the next increment of enrichment capacity with an add-on plant.

--ERDA's existing enrichment plants should be operated as a Government corporation.

--Legislation may be required to commercialize advanced enrichment technologies.

As a result of these reports, significant changes were made to proposed legislation authorizing cooperative agreements between ERDA and private industry for private uranium enrichment facilities, (S. 2035-94th Congress). The proposed legislation did not pass in the 94th Congress principally because of opposition to a proposal by one private company to build an enrichment plant using existing technology. This proposal would have involved significant Government risk, and we opposed it in all our reports on the subject.

The development and use of adequate systems to safeguard nuclear material during all phases of the nuclear fuel cycle is essential to establishing a viable nuclear power industry. In a July 22, 1976, report on ERDA's system to control and protect highly dangerous nuclear material (EMD-76-3), we discussed many serious shortcomings in the system such as the need for additional guards, alarms, doorway detectors, night vision devices, and improved communication equipment. We made several recommendations aimed at improving the system and, according to ERDA, it has initiated corrective actions. We are currently following up on these actions.

Fission power reactors

ERDA's priority and most expensive effort in researching and developing fission power reactors is the LMFBR program. Over the past two years, we have issued nine reports addressing various aspects of this program. Three of the reports provided broad analyses of the LMFBR reactor program's problems, potential, and prospects for commercialization. In one of our reports (OSP-76-1, 7/31/75), we concluded that there has been premature concern and emphasis on commercializing the LMFBR at a time when the Nation is years away from demonstrating that commercial LMFBR plants can be operated reliably, economically, and safely. We also concluded that a decision does not need to be made about whether the LMFBR should be a major source of electrical energy in the United States until some point in the future--perhaps 7 to 10 years.

In a followup report (EMD-77-5, 11/29/76), we discussed the actions necessary for commercial development of the LMFBR if the Nation decides that such development is desirable. We concluded that:

--If basic uncertainties of safety, safeguards, and environmental effects are resolved early and forthrightly, the start of LMFBR commercialization by the mid-1990s is feasible. This can be achieved, however, only through an integrated approach to the development of four required technologies: reactor, fuel fabrication, plutonium reprocessing, and radioactive waste disposal.

--1990 may be the earliest time by which licensability and routine performance can be demonstrated for all four required technologies.

--Because of the time required for development of fuel cycle technologies, the year 2000 represents the most likely time frame for commercialization of the LMFBR, with four to six LMFBRs in commercial operation.

--Additional funding for the LMFBR program is not likely to hasten the initial commercial availability of technology. However, early development of program plans and increased commitment of resources could accelerate by 1 or 2 years the research, development, and demonstration of the three supporting fuel cycle technologies required for LMFBR commercialization.

We recommended several improvements to the program to better achieve LMFBR commercialization objectives if such commercialization is approved as a desirable national objective.

We also reported (EMD-76-12, 9/30/76) on our evaluation of a pro-nuclear ERDA pamphlet issued as part of a claimed internal LMFBR motivational program 2 to 4 months before a nuclear referendum in California on June 8, 1976. We concluded that the pamphlet was not objective, was propaganda, and thus was not a proper document for issuance to the public or any internal program. We noted that the pamphlet was printed and distributed far in excess of the program needs and that ERDA placed little or no restrictions on its distribution. As a result, it was distributed beyond the scope of the program and was used by some recipients in an attempt to influence voters in California. We made several recommendations aimed at preventing the recurrance of such distributions in

the future. As a direct result of this report, ERDA recalled outstanding copies of the pamphlet and two bills were introduced just before congressional adjournment to place restrictions on Federal agencies issuing materials which affect State elections.

Fossil energy development

Most of our work on ERDA's fossil energy development programs has focused on the status and obstacles to commercialization of synthetic fuels from coal and oil shale (RED-76-81, 5/3/76) and with Administration proposals to provide financial incentives for commercial development of synthetic fuels (RED-76-82, 3/19/76; EMD-76-10, 8/24/76). We concluded that processes which produce synthetic fuels are commercially available but are not competitive with conventional oil and gas when discounted to present price equivalents. We took the position that loan guarantees for commercial development of synthetic fuels should not be provided at this time. Instead, we suggested that full priority be directed to developing improved synthetic fuels technologies. When commercialization does become a prime objective, consideration should be given to approaches other than loan guarantees for gaining the interest of private industry. We believe that these reports and subsequent testimony had an impact on proposed legislation to provide financial incentives for synthetic fuel commercialization (H.R. 12112-94th Congress).

We also issued a report on the status and problems to be resolved in coal research (RED-75-322, 2/18/75). Our report identified potential problems in areas such as mining technology, manpower, transportation, and environment that must be solved before coal's potential can be realized.

Our most recent report on ERDA's fossil energy research and development program dealt with its management of the enhanced oil and gas recovery program (EMD-77-3, 1/28/77). We identified problems in and made recommendations aimed at improving ERDA's management of that program.

Renewable resources development

ERDA efforts to research and develop new, essentially inexhaustible, energy resources fall into three broad categories: solar energy, geothermal energy, and nuclear fusion. We have made reviews in two of these areas during the past Congress.

Solar energy

ERDA is supporting research and development in a wide range of solar technologies. ERDA is placing the most emphasis, however, on demonstrating solar heating and cooling systems. These include systems to heat and cool residential and commercial buildings and to dry agricultural crops. Other longer range development activities include solar thermal electric conversion, photovoltaic energy conversion, and fuels from biomass.

Our reports (RED-75-376, 6/10/75; EMD-77-8, 11/30/76), on solar energy research and development have discussed the status of the program and the need for establishing a formal priority system for developing and demonstrating the various solar technologies. ERDA has taken action to improve its management systems.

Fusion power

ERDA's fusion research and development program is aimed at developing and demonstrating the production of commercial electric power using nuclear fusion. In a May 22, 1975, report (RED-75-356), we discussed the status of the program and noted that ERDA's management system was hampering the development of fusion technologies and that ERDA needed to establish priorities for different fusion approaches to have a better basis for managing the program.

CHAPTER 7

MULTIAGENCY ISSUES

Changing from an economy dependent largely on oil and gas to one dependent on new and different energy sources will require enormous capital outlays. Similarly, efforts to increase the production of oil and gas through improved extraction methods and by developing new sources of oil and gas--such as the trans-Alaska oil pipeline and the proposed trans-Alaska gas pipeline--will also require huge amounts of capital. Thus, a major question, which affects almost all of the energy agencies, concerns the proper Federal role in assisting and encouraging private industry to develop and commercialize these various energy sources.

In addition, the need to reorganize the Federal energy structure and to develop a national energy policy was a major issue during the Presidential campaign, and the Administration has introduced legislation to reorganize the Federal energy agencies (S. 826). Such proposals may affect each agency discussed in the report.

ISSUES FACING THE 95th CONGRESS

What is the appropriate Government role in commercializing new energy technologies?

The Government is already heavily involved in researching, developing, and demonstrating new energy technologies. However, questions about when a process is commercial and what the Government's involvement should be in assisting or encouraging private industry to commercialize that process are key issues. Related questions concern the types of assistance that should be given--such as direct financial assistance, loan guarantees, and indirect incentives.

Almost every major energy agency has programs aimed at providing financial incentives for commercializing new technologies or will soon be faced with this problem. FEA is responsible for commercializing conservation and renewable resource technologies, and ERDA has responsibility for providing loan guarantees for geothermal energy. Several bills, such as the proposed Energy Independence Authority Act and the synfuels' commercialization legislation, were introduced during the 94th Congress to provide

Federal assistance. Similar such bills have been reintroduced in the 95th Congress. Industry's role in providing additional uranium enrichment capacity has been an issue since the early 1970's. The need for Government assistance in further commercialization of nuclear power--particularly in the areas of waste management and reprocessing--and in constructing a trans-Alaska gas pipeline will certainly be a matter of debate in the years to come.

We have a number of ongoing and planned studies, mentioned previously, which will address parts of this question. These include reviews of (1) the effectiveness of FEA attempts to commercialize conservation and renewable resource technologies, (2) the economics of nuclear power, (3) ERDA efforts to develop and commercialize geothermal energy, and (4) ERDA's efforts to develop and commercialize advanced uranium enrichment technologies.

How should the Federal energy organization and processes be improved?

The inability to solve many energy problems stems at least in part from the diffusion of major energy programs among several Federal agencies. For example, ERDA is responsible for research, development, and demonstration of energy technologies, while FEA formulates short-term energy policy, and the Department of the Interior makes decisions regarding the development of energy resources on Federal lands. There are also two national energy planning systems: FEA's--which produced the original 1974 "Project Independence Report" and the 1976 "National Energy Outlook"--and ERDA's--which produced "A National Plan for Energy Research, Development, and Demonstration: Creating Energy Choices for the Future", and the 1976 revision of the plan. As a result of such fragmentation, policymaking and management of Federal energy activities have not proceeded as effectively as they might have, and at times work at cross purposes.

For example, there seems to be some confusion as to FEA's and ERDA's roles. This confusion is particularly pronounced in assigning responsibility for new technology commercialization. FEA and ERDA have not fully coordinated and defined their respective roles in this area. As a result of this confusion, FEA and ERDA, in April 1976, entered into a memorandum of understanding to formalize the working relationship

between them. Although a step in the right direction, the memorandum of understanding leaves open the question of commercialization responsibility. Timely availability of newly developed technologies cannot proceed smoothly without a clear understanding of how the key agencies responsible for energy are to proceed and interact with the private sector to actually achieve viable commercial adaptation of new technologies into the economy.

As far back as 1971, the President proposed a Department of Energy and Natural Resources, but the Congress has not approved such a reorganization. The most recent proposal was introduced on March 1, 1977, to create a Department of Energy (S. 826). While it is not possible to centralize all energy-related programs, the major ones can and should be consolidated as a further step towards a nationalized energy decision-making system.

We have expressed long-standing support for such centralization of energy activities and have suggested possible organizations in testimony in April 1976 before the Senate Committee on Government Operations.

As discussed below, we recently reported on, among other things, the reorganization of energy functions. In that report we expressed our general support for the Administration's recent energy reorganization proposal and made several suggestions for inclusion in the bill. We will continue to monitor the Federal energy organization and decisionmaking process and expect to provide input to the Congress on these efforts to reorganize the Federal energy program.

PAST EFFORTS

In a recently issued report (EMD-77-31, 3/24/77) on the activities of the executive agencies having primary responsibility for policy decisionmaking--FEA, ERDA, FPC, and Department of the Interior--we identified national goals and related decisions to the goals and considered the consistencies or inconsistencies of the decisions. We noted that there was a need for better coordination among agencies carrying out energy functions and for establishing a system of priorities among energy goals.

In addition, the report discussed the organization of energy functions of the Federal Government, including the Administration's recent proposal to establish a Department of Energy (S. 826). We concluded that the

Administration's proposal has considerable merit, and we generally endorsed its enactment. However, we discussed several issues which we believed the Congress should address in enacting such legislation:

--Make clear the continued existence of the Professional Audit Review Team to provide an independent review of and reporting on Federal energy data functions. (See p. 4.)

--Give the proposed Department of Energy responsibility for the automobile fuel economy standards program with the Department of Transportation having an advisory role.

--Specify more clearly the Department of Energy's responsibility for energy production formulation, planning, and programing to provide an appropriate basis for interface with agencies having health and safety responsibilities.

--Make clear the relationship between the Department of Energy and the Department of the Interior with respect to whether the Secretary of the Interior has veto power in the leasing of specific areas.

--Establish a high-level council to coordinate energy and energy-related issues and reconcile energy goals with other national goals.

--Reaffirm GAO's authority to continuously monitor, evaluate, and report to the Congress on the policies, plans, and programs of the Department of Energy.

We also said that the Congress needs to examine how energy regulatory functions should be treated in reorganizing energy functions. The Administration's proposal would include in the new department only economic regulatory functions and certain other functions of the Interstate Commerce Commission and the Securities and Exchange Commission. It would not include health and safety regulation.

The Congress should choose one of three options listed below:

--Include energy regulation, both economic and health and safety related, in the new Department of Energy. Both regulatory activities

could be separate entities, but under a single Assistant Secretary. Statutory provisions should be included to assure maximum insulation of regulatory decisions from the policy process.

--Include only economic regulation in the new Department of Energy because of the perceived importance of establishing energy price regulatory policies which are consistent with other energy goals and consolidate energy health and safety regulation in a separate independent Energy Health and Safety Regulatory Agency. Strong statutory provisions should be included to assure maximum insulation of economic regulatory decisions from the policy process.

--Continue to separate energy regulation, both economic and health and safety related, from energy policy formulation. Should this be done, we believe that creation of a single energy regulatory agency is desirable.

In addition, in an August 24, 1976 report (EMD-76-10), we provided a framework and perspective for considering actions by the Federal Government which could contribute to solving energy problems over the next 10 to 25 years. In so doing, we discussed the factors that must be considered in choosing between technologies and financing mechanisms for commercializing those technologies.

CHAPTER 8

SUMMARY

The Nation's energy problems are long term in nature. The harsh winter of 1977 and the resultant shortage of natural gas once again brought the realities of the Nation's energy problems to the forefront. Because energy is so pervasive, finding solutions acceptable to all areas of society is difficult, and will require political consensus among competing areas of national concern, such as balancing economic and environmental goals and objectives. In such sensitive areas, concensus is very hard to achieve.

In this report, we have summarized our views on the significant energy issues facing the Congress and the Nation. Those views were based partly on our past efforts in the area and partly on our continuing assessment of critical national issues.

Our basic objective in developing this report was to provide the Congress, the executive branch, and the public with a perspective and framework for analyzing the many diverse and sometimes conflicting energy problems facing the Nation. We feel that its principal use will be by the Congress and congressional committees in setting legislative priorities, reviewing and considering the programs and needs of the individual energy agencies, and developing a cohesive national energy policy. The report should be used in conjunction with our January 27, 1977, report entitled "National Energy Policy: An Agenda for Analysis" which discusses major concerns and questions in the context of eight broad issue areas.

We recognize that there will likely be some major changes in the organization and structure of the Federal energy agencies in the coming months. Nevertheless, the issues discussed in this report will continue to be relevant to the Congress as it considers the questions of Federal energy reorganization, energy priority and goal setting, and the resolution of tradeoffs and conflicts inherent in establishing priorities and goals.

Also, although this report is directed primarily to the Congress and the executive agencies, the issues discussed must also be addressed by everyone concerned with energy--including the academic community, scientists,

industry, and concerned citizens. Hopefully, this report along with the "Agenda for Analysis", will help develop a public awareness of the critical energy issues and in providing those outside Government with a basis for providing input into the development of a cohesive national energy policy.

LIST OF GAO REPORTS ISSUED

DURING THE 94th and 95th CONGRESSES

FEDERAL ENERGY ADMINISTRATION

Conservation	Date
National Standards Needed for Residential Energy Conservation (RED-75-377)	06-20-75
Alternative Energy Proposals Developed by the General Accounting Office in Response to Congressional Inquiries Including a Statement of the Comptroller General Before House Ways and Means Committee (B-178205)	01-31-75
Energy Conservation at Government Field Installations: Progress and Problems 1/ (LCD-76-229)	08-19-76
Status of Federal and Private Research and Development Efforts to Conserve Energy by Reducing Electric Power Transmission Losses (RED-76-107)	06-01-76
Progress and Problems of the Government's Utility Conservation Programs (LCD-76-311)	12-30-75
Feasibility of Using Electric Vehicles on Federal Installations (LCD-76-206)	03-03-76
Energy Consumption in Five Federal Office Buildings (LCD-75-341)	04-18-75
Bulk Fuels Need to be Better Managed (B-163928)	04-08-75
Using Solid Waste to Conserve Resources and to Create Energy (B-166506)	02-27-75
Department of Defense's Conservation of Petroleum (B-178205)	02-24-75

1/ Separate reports issued from 02-24-75 to 01-05-76 to officials at 77 Government field installations.

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	Date
Review of the Department of Commerce Activity to Convey "Save Energy Citations" to American Industry (OSP-76-27)	05-27-76
Quantitative Information on Various Energy Proposals (B-178205)	02-26-75
Analysis of the Energy, Economic, and Budgetary Impacts of H.R. 6860 (OSP/OPA-76-3)	09-02-75
Need for Balanced Federal Automobile Standards (EMD-77-13)	01-13-77
Policies and Programs Being Developed to Expand Procurement of Products Containing Recycled Materials (PSAD-76-139)	05-18-76
The 55 Mile-Per-Hour Speed Limit: Is It Achievable? (CED-77-27)	02-14-77
Petroleum and natural gas regulatory programs	
Federal Energy Administration's Efforts to Audit Domestic Crude Oil Producers (OSP-76-4)	10-02-75
FEA Efforts to Audit Fuel Oil Suppliers of Major Utility Companies (OSP-76-2)	07-15-75
Problems of Independent Refiners and Gasoline Retailers (OSP-75-11)	04-04-75
Problems in Developing, Implementing, and Enforcing FEA's Regulation of the Price of Natural Gas Liquids (OSP-76-15)	02-25-76
FEA State Petroleum Set-Aside Program (OSP-75-13)	05-08-75
Review of Gulf Oil Corporation's Involvement in Double Dipping of Increased Crude Oil Costs (OSP-76-13)	02-09-76

	Date
Staffing of FEA's Compliance and Enforcement Program (OSP-75-12)	03-31-75
Report of Oil Company Requests to Federal Regulatory Agencies for Waivers and/or Modifications to Regulations (OSP-76-25)	06-15-76
Energy information and analysis	
Improvements Still Needed in Federal Energy Data Collection, Analysis, and Reporting (OSP-76-21)	06-15-76
Review of the 1974 Project Independence Evaluation System (OPA-76-20)	04-21-76
Review of the Information-Gathering Practices of the Federal Energy Administration (OSP-76-18)	05-11-76
Domestic Energy Resources and Reserves Estimates--Uses, Limitations, and Needed Data (EMD-77-6)	03-17-77
Strategic Petroleum Reserves	
Issues Needing Attention in Developing the Strategic Petroleum Reserve (EMD-77-20)	02-16-77
FEDERAL POWER COMMISSION	
Electricity	
Problems in Licensing Hydroelectric Projects (RED-76-13)	09-23-75
Federal Power Commission: An Evaluation of the Federal Power Commission's Rulemaking on Utilities' Construction Work in Progress (EMD-77-7)	12-02-76

	Date
Federal Power Commission: Management Improvements Needed in the Federal Power Commission's Processing of Electric-Rate-Increase Cases (EMD-76-9)	09-07-76
Petroleum and natural gas regulatory programs	
Need for Improving the Regulation of the Natural Gas Industry and Management of Internal Operations (B-180228) (RED-76-108)	09-13-74 05-24-76
Implications of Deregulating the Price of Natural Gas (OSP-76-11)	01-14-76
Reliable Contract Sales Data Needed for Projecting Amounts of Natural Gas That Could Be Deregulated (RED-76-11)	09-18-75
The Economic and Environmental Impact of Natural Gas Curtailments During the Winter of 1975-76 (RED-76-39)	10-31-75
Need for the Federal Power Commission to Evaluate the Effectiveness of the Natural Gas Curtailment Policy (RED-76-18)	09-19-75
International concerns	
Natural Gas Shortages: The Role of Imported Liquefied Natural Gas (ID-76-14)	10-17-75
DEPARTMENT OF THE INTERIOR	
Pipeline rights of way	
Trans-Alaska Oil Pipeline--Progress of Construction Through November 1975 (RED-76-69)	02-17-76

	Date
Outer continental shelf	
Outlook for Federal Goals to Accelerate Leasing of Oil and Gas Resources on the OCS (RED-75-343)	03-19-75
OCS Oil and Gas Development--Improvements Needed in Determining Where to Lease and At What Dollar Value (RED-75-359)	06-30-75
The Coastal Zone Management Program: An Uncertain Future (GGD-76-107)	12-10-76
Followup on Recommendations of Report on Progress of Regulation Changes for Outer Continental Shelf Oil Operations (RED-76-48)	11-21-75
Outer Continental Shelf Sale #35--Problems in Selecting and Evaluating Land to Lease (EMD-77-19)	03-07-77
Public lands	
Role of Federal Coal Resources in Meeting National Energy Goals Needs to Be Determined and the Leasing Process Improved (RED-76-79)	04-01-76
Problems in Identifying, Developing, and Using Geothermal Resources (RED-75-330)	03-06-75
Management of and Plans for the Naval Petroleum Reserves (LCD-76-313)	05-14-76
Federal Coal Research--Status snd Problems to be Resolved (RED-75-322)	02-18-75
Further Action Needed on Recommendations for Improving the Administration of Federal Coal Leasing Program (RED-75-346)	04-28-75
Acreage Limitation on Mineral Leases Not Effective (RED-76-117)	06-24-76

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	Date
Follow-up Review of the Naval Petroleum Reserve (LCD-75-321)	07-29-75
Information on Federal Coal Leases (RED-76-26A)	10-15-75
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