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U.S. Department of Energy
Assistant Secretary for Fossil Energy
Washington, D.C. 20585

March, 1981

STATEMENT SUBMITTED BY

ROGER W.A. LEGASSIE
ASSISTANT SECRETARY (ACTING)
FOR FOSSIL ENERGY

TO THE

SUBCOMMITTEE ON ENERGY RESEARCH
AND DEVELOPMENT
COMMITTEE ON ENERGY AND NATURAL
RESOURCES

U.S. HOUSE OF REPRESENTATIVES

MARCH 23, 1981

DISCLAIMER

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ASSISTANT SECRETARY (ACTING)
FOR FOSSIL ENERGY

U.S. DEPARTMENT OF ENERGY

TO THE

SUBCOMMITTEE ON ENERGY RESEARCH AND DEVELOPMENT,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,

U.S. SENATE

MARCH 23, 1981

Department of Energy

Mr. Chairman and Members of the Committee:

The Fiscal Year 1982 revised budget request for Fossil Energy has been forged from two basic principles which undergird the Administration's energy and economic policies.

First, we must take unprecedented steps to regain control of the Federal budget. Every federal government program has been examined in detail, and nearly every agency has been required to contribute to the effort to reduce growth in Federal spending. The Department of Energy is no exception.

Second is the nature and extent of the energy problems facing this nation. Our domestic policies must continue to be made within the shadow of an uncertain and increasingly expensive supply of foreign energy. Yet, it is naive to believe that the Federal government can develop and force the introduction of new technologies before the economic or regulatory climate is ready. This is not to say that we cannot allocate enough money to construct some large-scale projects, but the commercial acceptance of these technologies depends on their relative economics. We believe we can expand the development of our vast domestic resources and accelerate the commercial introduction of new and better technology by creating the proper climate for private investments and risk taking.

A key aspect of the President's energy program is to remobilize technological innovation within the private sector to bring about the expanded development and production of untapped energy resources and to foster private allocation of resources to new technologies in both the production and use of energy.

Therefore, this budget reflects a fundamentally different philosophy of the Federal government's role in the field of energy — a philosophy which we believe improves the climate for technological innovation within the private sector, while allowing the reduction of Federal expenditures.

The system in which private funds are invested at risk with the potential for significant return has served this country well in the past. It can and should be permitted to serve in the rebuilding of our energy security.

The Federal government in turn will focus its support on that longer-term, high-risk research and development which industry has generally been less willing to undertake. Once the conceptual hurdles have been surmounted, the final scale-up and deployment of a new technology will be the responsibility of industry.

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This is the foundation on which we have structured the Fossil Energy budget. The $435 million we are requesting in budget authority for Fiscal Year 1982 is money that will be spent in a tightly focused manner. Our primary mission will be reoriented to support longer-term, high-risk programs which have the potential for significant payoffs. These activities will focus on acquiring the technology base necessary for industry to develop and demonstrate hardware without the need for substantial government assistance. Near-term technical support for processes or demonstrations will be limited to cases where the government has a unique resource or facility. Demonstration and commercialization of technology will be the responsibility of industry with, in the case of synthetic fuels, the assistance of the Synthetic Fuels Corporation.

This approach, as reflected by the budget we are submitting, is one that we believe will restore a prudent balance between government and industrial R&D.

Our 1982 budget proposals will have an impact, of course, on the conduct of our program during fiscal 1981. Therefore, concurrently with the submission of a revised budget request for FY 1982, we are proposing appropriate rescissions for portions of the unspent funds in those FY 1981 programs which we are proposing be discontinued or which will be redirected. Including rescissions proposed by the past Administration, we are proposing to reduce the 1981 appropriated budget for Fossil Energy by $322 million.

In the more detailed program descriptions that follow, we will be outlining the specific actions we propose to take in fiscal years 1981 and 1982.

In concluding this introduction, Mr. Chairman, I would like to stress one point particularly. The revised budget we are submitting for your consideration must be viewed within the overall context of the new Administration's energy policy. The reductions in Federal R&D spending must be balanced by improvements in the investment climate resulting from the Administration policies in areas such as tax and regulatory relief. Decontrol of oil prices will increase domestic exploration and discovery of new conventional petroleum resources as well as the application of improved recovery techniques. Removal of unnecessarily cumbersome permitting and regulatory policies will unshackle a coal industry that has not yet begun to approach its full potential.

By letting private firms allocate resources among technologic choices, there will be no need in the future to select which projects proposed by private industry should receive Federal support. These judgements can best be made in private markets. The risk of wrong government decisions or the attempt to balance Federal support among competitive firms will no longer be a problem.

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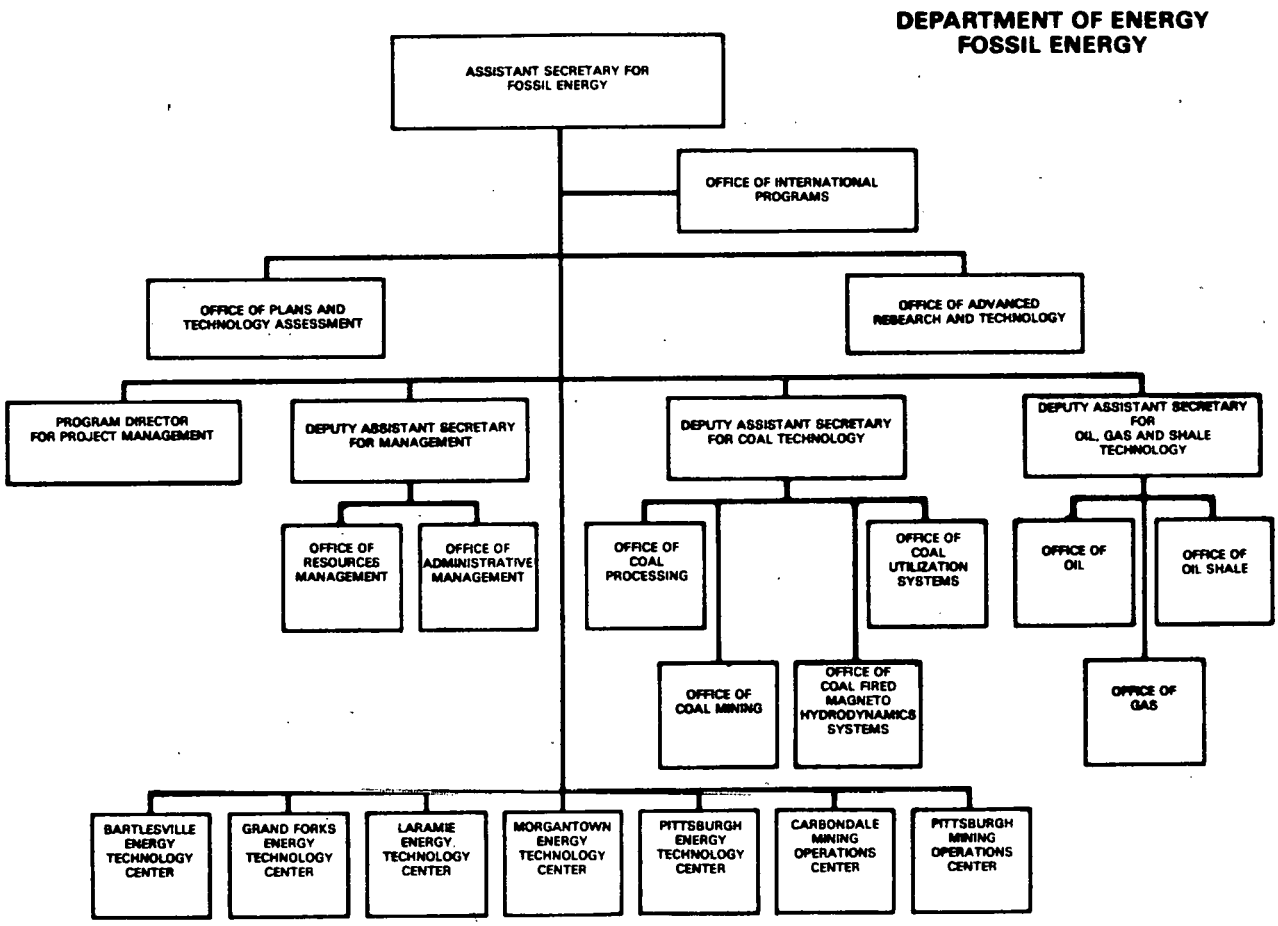
ORGANIZATION

The organization of the Fossil Energy office, as shown in the chart below, remains essentially unchanged at the present time from our presentation last year.



As the committee is aware, however, Energy Secretary Edwards announced on February 25 a realignment of the Department to improve management and to reflect a decreased emphasis on regulation and commercialization activities.

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A key part of this realignment is the transfer to Fossil Energy of several functions previously conducted by the Office of Resource Applications. Specifically, programs involving coal resource management, oil, natural gas, oil shale, leasing policy, and the interim Alternative Fuels activities will be integrated into the Fossil Energy organization. We will be pleased to report to the Committee specifically on this reorganization within Fossil Energy as soon as the details are in place.

The policy of decentralizing Fossil Energy project management to the field has been successful and is expected to continue. Two distinct functional roles, therefore, are delineated with the Fossil Energy organization: (1) Headquarters is responsible for formulating overall policy and programs; while (2) field organizations, including DOE's Energy Technology Centers, Operations Offices and national laboratories, are responsible for implementing fossil projects and technology base activities.

COAL PROGRAM

More than any other fuel resource, the coal beneath the U.S. is evidence of America's vast energy wealth. Conservative estimates place the total amount at nearly 4 trillion tons. Approximately 2.23 trillion tons are estimated undiscovered resources, and 1.74 trillion tons are identified resources. Included in the latter are about 438 billion tons which are readily mineable by today's methods -- enough to take us well into the 22nd Century. In terms of energy content, the coal we know can be mined is equivalent to almost 10 times the recoverable supplies of oil in Saudi Arabia.

Underground mining could be used for nearly 297 billion tons of the Nation's coal reserve, while an estimated 141 billion tons could be mined by surface methods. The amount of coal that can be recovered from the reserve base, however, varies from area to area. It ranges from less than 50 percent in some underground mines to more than 90 percent at some surface mines. Even subtracting the coal that must be left untouched to form roof-supporting pillars, or that runs through folded, faulted or interlayered rock strata, or that underlies towns and cities, an estimated 219 billion tons of coal can be recovered -- still the largest recoverable coal reserve base in the world.

In 1980, driven by its favorable economics in the face of escalating world oil prices, U.S. coal production topped 835 million tons -- the most ever and 60 million tons more than 1979. Still, the turn toward coal can be accelerated even more, particularly if utilities can acquire the necessary capital to make the necessary equipment modifications and if unnecessary regulatory obstacles can be removed. Coal

industry analysts estimate that the capacity exists to mine at least another 100 million tons annually without major strains on its current productive capacity. Industrial ingenuity will make it possible to use more coal and still preserve our environmental goals. Such technology exists today and even better, more efficient technologies are on the commercial horizon.

With the Administration's removal of price controls on petroleum and the continuing trend towards further natural gas deregulation, the economics of producing and using more coal are improving within the private sector. Therefore, the Federal coal technology program has been refocused to support longer term, high-risk research and development.

We are also focusing both attention and funding within our coal program on the environmental issues associated with increases in coal burning, particularly in the areas of acid rain and carbon dioxide. Presently, for example, it is uncertain what benefits might accrue from any particular strategy to reduce acid precipitation, and DOE is working cooperatively with other groups within both the Department and the Environmental Protection Agency to develop a better understanding of the origins, transport and effects of coal-based pollutants.

The Administration is requesting $381 million in budget authority to carry out coal research and development programs in FY 1982. This represents a reduction of $1.084 billion from the budget submitted by the previous Administration on January 15, 1981, with the major part of the reduction resulting from the restructuring of the Federal government's synthetic fuels program. Concurrently with the revised FY 1982 budget request, the Administration is requesting that $309 million be rescinded in FY 1981 (including $25.5 million in proposed rescissions proposed by the Carter Administration budget on January 15, 1981), thereby reducing the FY 1981 appropriated amount to $735 million.

The following describes briefly the refocused approach applied to each of the activities within the coal technology program:

MINING RESEARCH AND DEVELOPMENT

(BA in Millions)

	January 15 Budget		Revised Budget	
FY 1980	1981	1982	1981	1982
$ 59.3	$ 49.5	$ 32.8	$ 41.5	$ 21.8

To improve coal's economic attractiveness, the Department's mining R&D program will focus on these objectives: an increase in the efficiency of labor and capital for the entire coal mine operation; and the improvement of mining technologies which can be applied to currently

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uneconomical, inaccessible or underused coals. Research is conducted on both a contract and an in-house basis, making full use of the Department's unique laboratory and test facilities.

Underground Mining

Within the overall mining R&D budget, the Department is requesting that $15 million be allocated to underground coal mining in FY 1982. Major components include (1) mine planning, (2) production, and (3) in-mine transportation.

The selling price of coal is affected directly by the speed with which a mine can be developed, openings cut, and access reached to the coal seam -- each of which can be streamlined by proper mine planning. Mine planning can also assure the health and safety of miners and a reduction in environmental degradation by identifying potential concerns early and then developing the mine in a manner that mitigates the concerns.

In FY 1982, DOE's mine planning activities will continue to develop a technologic data base on major health, safety and environmental concerns. Attention will be focused on improving the mine operator's ability to predict and control gases and fluids encountered in the mine, as well as the evaluation of ground subsidence, techniques to dispose of mine waste, and control of mine effluents.

Underground coal production in the U.S. relies on two principal mine designs: (1) room-and-pillar, which accounts for nearly 95 percent of the Nation's underground mining, and (2) longwall mining, which makes up the remaining 5 percent. In FY 1981, a machine which combines both mining and roof bolting for room-and-pillar operations began its first field trials in Pennsylvania, and a high capacity longwall conveyor was tested in northern West Virginia. In FY 1982, trials will continue on longwall techniques which can be applied to inclined seams representative of many in the East and Midwest and to the thick seams found in the West. Trials will be completed on a prototype longwall shearer control subsystem, a necessary component for mine automation.

The budget level requested for in-mine transport in FY 1982 will permit an underground demonstration of a prototype for an automated rail haulage system.

The Mining Equipment Test Facility at Bruceton, Pa., will be operated at a reduced level to support the underground mining program.

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Surface Mining

The surface mining program is also being reoriented to focus on longer-term R&D, and therefore no new funding is requested for FY 1982. Efforts will be directed at completing or phasing out projects with near-term benefits. Since many of the projects are initiated by private companies and since the improvements in productivity would accrue to the individual companies, industry has sufficient incentives to pursue this kind of technology development without continued Federal involvement.

Coal Preparation

The Department is requesting $6 million for its coal preparation program in FY 1982. Coal cleaning is a critical link between the mining and use of coal. While coal cleaning is logistically part of the mining operation, its specific requirements are determined by end use, whether as steam coal, metallurgical coal, or synfuel feedstock.

DOE's coal preparation program includes advanced development of physical processes, in which mineral-bound impurities are separated by their different densities or by magnetic properties, and limited exploratory work on chemical processes, which achieve a much higher degree of coal cleaning including the removal of organically bound sulfur as well as very finely dispersed inorganically combined sulfur. Attention is also given to cost-intensive ancillary operations, such as grinding and and dewatering.

In FY 1982, activities will focus on tests to establish the most cost-effective processes for cleaning selected Appalachian coals to various quality levels. Economic and technical analyses will be undertaken to evaluate the economics of various coal preparation techniques in relation to specific user conditions, such as coal source, location, plant operating requirements, operational cost sensitivitives, environmental regulations, and coal cleaning degree.

Capital Equipment

The $800,000 requested will permit acquisition of specific coal cleaning and analytical equipment, rock mechanics instrumentation for use in subsidence and ground control research; and general test equipment related to the Mining Equipment Test Facility.

The Administration is also requesting an $8 million rescission in the FY 1981 Mining R&D program, appropriated at a level of $49.5 million. The rescission would include $3.0 million from the underground mining budget, $3 million from the surface mining budget, and $2 million from the coal preparation budget.

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LIQUEFACTION

(BA in millions)

	January 15 Budget		Revised Budget	
FY 1980	1981	1982	1981	1982
$248.9	$521.4	$887.0	$353.9	$105.9

With the recent creation of the Synthetic Fuels Corporation (SFC), the DOE coal liquefaction technology program will be reconfigured to support a number of processes in parallel from the laboratory stage through process development units. Responsibility for demonstration activities will be shifted to the SFC. This is consistent with the Administration's policy to focus the Federal role on long-range research and development while relying on private market forces, with the financial help of the SFC, to set the pace for the introduction of synfuel technologies into the marketplace.

Within the guidelines of this new policy, the Department will complete ongoing operations in FY 1982 at the H-Coal Pilot Plant (FY 1982 request: $20 million) in Catlettsburg, Kentucky. Since last summer, we have overcome many of the equipment problems encountered during start-up, and on February 17, the first long-term operation of the plant began. The plant is currently converting up to 200 tons per day of Illinois #6 coal into synthetic crude oil suitable for refining. Early this fall, the facility will be switched to the production of boiler fuel and will process up to 600 tons per day of Illinois #6 coal. The second series of test runs will be completed in FY 1982, and no further Federal support for plant operations is planned. If appropriate, DOE will undertake discussions with the project's industrial participants, or possibly other interested firms, should they wish to continue privately-funded operations to support their own commercialization plans.

The FY 1982 request for the Exxon Donor Solvent Pilot Plant ($30 million) will continue the testing program using a limited range of coals. The 250 ton-per-day plant near Baytown, Texas, has been undergoing full testing operations on Illinois #6 coal since January, following a successful start-up which began last summer. Since the FY 1982 request represents a decrease in the Government's commitment, the funding level will be presented to the Sponsors Management Committee (in accordance with the cooperative agreement) for their decision regarding further use or disposition of the facility. Further operation of the facility, however, if the private participants determine it appropriate, would be financed from private funds.

DOE will also continue efforts in FY 1982 to improve indirect liquefaction technology (FY 1982 request: $14 million). While current processes exist for indirect liquefaction -- where coal is first converted into a mixture of gases, then the gases recombined to form liquids -- the potential and need exists for improving efficiencies, costs, and the capability of meeting U.S. market requirements. Catalyst and process R&D currently underway will be continued in FY 1982,

emphasizing improved product selectivity, integration with advanced gasifiers, and reduced thermal losses. Operations will begin at an internationally-sponsored, 100-barrel per day methanol-to-gasoline pilot plant in the Federal Republic of Germany that will test a more efficient version of the M-gasoline process. The revamping of a liquid phase synthesis gas conversion process development unit at La Porte, Texas, will be completed in FY 1982.

The refocused liquefaction program will continue efforts to develop long-term, high-risk third generation technologies (FY 82 request: $18.3 million). Such techniques include the testing of natural and synthetic catalysts, improved integration liquefaction and upgrading systems in multi-step processes, improved methods for the pyrolysis of coal, and other technology base activities. A common characteristic of these techniques is an increase in the efficiency of hydrogen use which can be valuable in reducing the synthetic gas costs.

DOE will also continue support studies/engineering evaluations (FY 1982 request: $10.6 million) which involve environmental and toxicology R&D, the coordination of environmental data among liquefaction processes, engineering assessments, independent technical reviews, and evaluations of ancillary processes such as hydrogen generation. Much of the environmental-related work is done in cooperation with research efforts conducted by the Department's former Office of Environment and recently shifted to the Office of Energy Research. Funding from this category is also allocated for maintenance of unused liquefaction facilities currently awaiting re-use or disposal.

The major change from the January budget submission is reflected in the liquefaction demonstration plants category (FY 1982 request: $12.3 million in operating expenses, no funding for construction). In 1978, DOE began a program to design, construct and operate single modules of a full-size commercial plant that would demonstrate two variations of the Solvent-Refined-Coal process. Preliminary designs have been completed for both plants, and detailed process designs are now underway.

The Administration recommends that funding for major synthetic fuel construction projects be focused in the Synthetic Fuels Corporation which will be asked to support construction of the plants. Authority to conduct less-than-full scale technical demonstrations is contained within the Energy Security Act of 1980 which created the independent Corporation.

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During FY 1981, the Administration is requesting a rescission of construction funds ($157.5 million) appropriated for the SRC-I demonstration plant proposed for Newman, Kentucky. Process design will continue until Congress acts on the rescission request. Should Congress concur in the decision, the project would be terminated on or before the end of FY 1981. This however does not preclude the industrial partners from pursuing the demonstration and commercialization of this technology with funding solely from the private sector, nor applying for financial assistance from the Synthetic Fuels Corporation.

The Administration has recognized the unique international nature of the SRC-II demonstration plant planned for Morgantown, West Virginia. In July, 1980 the U.S. signed agreements with the governments of the Federal Republic of Germany and Japan, who with their industrial partners propose to fund half of the $1.439 billion current estimated cost of the project. Consultations are expected to begin soon to determine if the international participants consider it mutually beneficial to continue this project with the potential support of the Synthetic Fuels Corporation. We will make every effort to ensure that there is no loss of momentum during the transition and that adequate time is provided for a mutual decision to be reached by all participants as required by the international agreement.

The $12.3 million budget request for operating expenses in FY 1982 will support the continued operation of the SRC pilot plant at Ft. Lewis, Washington, should the SRC-II demonstration project move forward under the aegis of the Synthetic Fuels Corporation. In the absence of joint support associated with the demonstration plant, the funds will be used to redirect the SRC pilot plant efforts to long-term research and development.

DOE is also requesting FY 1982 funding for capital equipment (FY 1982 request: $700,000) to provide for laboratory and other equipment for use at the Energy Technology Centers and National Laboratories in support of the liquefaction program.

In addition to the $157.5 million rescission request for the SRC-I demonstration project, the Administration is requesting a $6 million rescission in the indirect liquefaction category in FY 1981. Included in this rescission would be $3 million for the feasibility study of the W.R. Grace coal-to-gasoline plant proposed for Baskett, Ky. Rescission of the funding would leave $3 million in FY 1981 to continue conceptual design of the full-scale plant. Support for this

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commercial project must come from private sources or from the SFC where it would compete with other proposals for commercial coal-to-gasoline plants. DOE plans no future financial participation in the project. Also, $3 million is proposed to be rescinded from the $12 million appropriated in FY 1981 for environmental studies and other support, and $1 million is proposed for rescission from the $47 million appropriated for the SRC pilot plant operations.

SURFACE COAL GASIFICATION

(BA in millions)

	January 15 Budget		Revised Budget	
FY 1980	1981	1982	1981	1982
$113.3	$159.9*	$216.9	$65.5	$54.0

In similar fashion to the liquefaction program, the surface gasification technology efforts have been refocused to emphasize long-range, high-risk technology. Major demonstration plants supported previously under this budget category will now be proposed for consideration by the Synthetic Fuels Corporation.

The FY 1982 budget request will permit sufficient funds to complete a recently-begun evaluation of the future role of the BiGas Pilot Plant (FY 1982 request: $1.1 million) and to place the facility on standby status.

The FY 1982 budget request contains no specific funding for the peat gasification program. Studies are currently ongoing in 10 states to determine the amount and location of fuel grade peat. The technical feasibility of peat gasification has been demonstrated at the bench scale and process development unit scales with peats which realistically bracket the types expected to be found throughout the U.S. Bench scale testing of peat dewatering technology will be completed in FY 1981, and several studies are being continued this year on peat gasifiers at several levels of capacity. The information generated by these efforts will enable a broad technology data base to be established for use by private firms wishing to pursue peat gasification, therefore no funds are requested specifically to support the production of high-Btu gas from peat. DOE is also proposing a rescission of $5 million from the $13 million appropriated in 1981 which will terminate ongoing efforts to convert the HYGAS pilot plant to utilize peat as a feedstock.

We will continue several peat-related efforts, however, including harvesting and dewatering studies, environmental assessments, and combustion tests with new technologies such as atmospheric fluidized bed.

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*Includes a proposed rescission of $5.0 million for a preliminary design study of a demonstration project based on the HYGAS technology.

Within the FY 1982 surface gasification budget request, funding will be provided for continued operation of technologies for low/medium-Btu gasification (FY 1982 request: $13.2 million). Included in this category is the operation of two configurations of fixed bed gasifiers to produce low/medium-Btu gas for studies of various clean-up and end use systems, a fluidized bed gasifier to test process performance and other factors, and an entrained bed gasifier which will complete its testing program in FY 1982.

Third generation processes (FY 1982 request: $27.1 million) comprise the largest funding category in the refocused surface gasification program. Work will continue on gasifiers which produce substantially all methane within the gasifier -- as compared to currently available gasifiers which require the gas exiting the gasifier to be upgraded to form methane. In FY 1982, data from the 3/4 ton-per-hour hydrogasifier in Canoga Park, Calif. will be analyzed to determine future Government support for this technology.

DOE will continue to participate in the operation of the 1 ton-per-day catalytic gasification process development unit at Baytown, Texas, to improve the data base for several U.S. coals. The continued involvement at this level is expected to complement a redirected program announced by Exxon in 1980 in which the company intends to build a 100-ton per day privately-funded pilot plant in Europe. As part of a cooperative agreement negotiated between DOE and Exxon, the Department will have access to data generated by the pilot plant on two U.S. coals previously studied in the Baytown unit.

In addition to these efforts, DOE will continue work on a high rate entrained flow gasifier, and on those projects that offer the potential for significant advances in components, materials, and instrumentation that would increase the operational efficiency and reliability of coal gasification processes.

The FY 1982 funding level for technical support (FY 1982 request: $12 million) will continue many crosscutting studies and engineering evaluations, environmental analyses and comparisons of pilot plant data, continued development of a gasification data book, and independent evaluations of competing advanced gasification processes.

As part of the restructuring of the Federal synthetic fuels program, the DOE gasification demonstration program will be discontinued and FY 1981 funding will be proposed for rescission. The sponsors of some of the projects currently in the program may decide to submit proposals to receive Synthetic Fuels Corporation support either as synthetic fuel projects or as synthetic fuel modules.

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The Conoco Coal Development Company and the Illinois Coal Gasification Group, both selected in 1977 to design high-Btu pipeline gas demonstration plants, will complete their designs this summer. The Administration does not support DOE funding to construct a demonstration plant at the completion of the designs. Sufficient funding is available from prior years to essentially complete the designs; therefore the Department proposes to rescind the $44 million appropriated for FY 1981. Carryover funds from past years will also be used to continue final design work through FY 1981 for a joint project with the City of Memphis to design, build and operate a medium-Btu fuel gas demonstration plant. At the end of this fiscal year, the Administration proposes to conclude direct DOE support for the project. FY 1981 funds ($45.4 million) will be proposed for rescission. The project sponsor may propose continuing the project under incentives provided by the Synthetic Fuels Corporation.

The Department is requesting for FY 1982 funding for capital equipment (FY 1982 request: $550,000) to provide new or replacement equipment at the Energy Technology Centers and National Laboratories involved in the gasification program. Such equipment includes both analytical and general purpose equipment.

In addition to the rescissions outlined above, DOE is also requesting that $5 million appropriated in FY 1981 for a conceptual design of a HYGAS demonstration plant be rescinded.

IN SITU COAL GASIFICATION

(BA in millions)

	January 15 Budget		Revised Budget	
FY 1980	1981	1982	1981	1982
$10.0	$10.0	$10.8	$10.0	$8.6

Today, much of the Nation's vast coal resource is not technically or economically recoverable by conventional underground or surface mining. Gasifying the coal underground, without mining, could significantly increase our recoverable coal supplies. Once the synthetic gas is piped to the surface, it can be used as boiler fuel, upgraded for transport, or converted into transportation fuels such as methanol and gasoline. The technology is amenable to small-scale (3,000-10,000 barrel per day) production of liquid transportation fuels for use locally or regionally.

During the past six years, successful field tests have produced both low Btu and medium Btu gases. One recent test completed in the fall of 1979 produced a medium Btu gas for a 55-day period at a rate sufficient to have produced up to 3,300 gallons of gasoline per day.

Within the FY 1982 budget request, funding will be provided for tests to determine the feasibility of gasifying coal in a 600-foot deep, 47-foot thick seam near Centralia, Washington. In addition, work with Gulf Research and Development Company to study the gasification of steeply-dipping coal beds will enter its last year with an expected 90-day test burn designed to produce medium-Btu gas.

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Funding would also be provided for environmental studies, including the monitoring of ground water at the sites of past tests, the prediction and mitigation of subsidence, and permitting activities in conjunction with the Centralia, Washington activity.

Several small studies focused primarily on basic issues impeding the progress of underground coal gasification will also be conducted by university researchers and industrial groups. Under the reduced funding level from the January 15 budget request, a planned cooperative program with the Gas Research Institute will not begin in FY 1982.

ADVANCED RESEARCH AND TECHNOLOGY DEVELOPMENT

(BA in millions)

	January 15 Budget		Revised Budget	
FY 1980	1981	1982	1981	1982
$ 56.2	$58.3	$72.6	$58.3	$67.6

Consistent with the refocused Federal energy policy, the Advanced Research and Technology Development activity plays an important role in the Department's Fossil Energy program by developing a sound technology base for coal processes. Through applied and exploratory high risk, potentially high payoff research at DOE's field centers and at universities and industrial laboratories, this activity provides ideas for new processes, improves the fundamental understanding of coal characteristics and reactions, and holds the potential for significant improvements or breakthroughs in the use of coal.

In FY 1982, more emphasis will be placed on developing a better fundamental understanding of the transformation coal undergoes in fossil energy technologies. Process research in coal liquefaction will focus on basic coal conversion concepts and exploratory liquefaction processes that may lead to novel and more efficient technologies. Process research in coal gasification will center on the development of innovative gasification concepts through improved understanding of the basic chemical processes involved, and the development of improved gas stream treatment, and processing.

Direct utilization research will support an expanded effort in fundamental coal and synfuel combustion and generic heat exchanger technology. Modeling procedures and data base development will also be emphasized. These efforts will also provide for preliminary, small-scale investigations of novel combustors and coal-based fuels aimed at retrofit of oil-designed boilers and process heaters for direct coal utilization.

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All advanced fossil energy processes and utilization systems require a strong supporting research program in materials and components. Materials research will be directed at developing a basic understanding of the phenomena of materials performance on a micro- and macroscopic scale. Component research will focus on investigations of unique speculative component designs which have the potential for dramatically increased efficiency and life.

The University Coal Research program will continue to insure the influx of new ideas from the Nation's universities while encouraging faculty and students to enter the field of coal technology.

Two major new thrusts will begin in advanced research in FY 1982. Instrumentation and control research will be aimed at developing new instruments capable of functions in the harsh environments of many coal processes. This work will establish the foundation for advanced generic control systems. Technology base synthesis will provide for the coordinated development of advanced research plans and for the seed funding of very long term and fundamental projects as well as high-risk/high-payoff fossil energy initiatives.

The Advanced Research and Technology Development activity also provides for construction at the Energy Technology Centers. Under the proposed funding level, we will complete the design of a program support building at the Pittsburgh Energy Technology Center, however, an assessment will be required to determine whether construction can begin.

ADVANCED ENVIRONMENTAL CONTROL TECHNOLOGY

(BA in millions)

	January 15 Budget		Revised Budget	
FY 1980	1981	1982	1981	1982
$38.3	$37.5	$37.8	$34.5	$26.9

Nearly 90 percent of the coal consumed in this country is, and will continue to be, burned directly. Therefore, a primary objective in expanding the use of coal to decrease our over-dependence on foreign oil is to assure that coal can continue to be burned within environmental standards. Sulfur, nitrogen, alkali and halogen compounds, and volatile trace metals are found in varying amounts in coal and are released during the combustion and conversion processes. Besides having harmful effects on health and the environment, these substances can also degrade the performance of key components in energy conversion systems such as turbines and fuel cells.

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DOE's Advanced Environmental Control Technology program encompasses three major areas of combustion gas cleanup: (1) flue gas cleanup systems which remove contaminants from the stack gases of conventional combustion systems and (2) gas stream cleanup systems which remove contaminants from the gas produced by coal gasifiers or pressurized fluidized bed combustors before it is used in gas turbines or fuel cells, and (3) clean-up base technology.

The flue gas cleanup activity (FY 1982 request: $6.5 million) will move away from direct participation in near-term lime/limestone scrubber refinement and advanced flue gas desulfurization, both of which are receiving increased private sector emphasis. (A rescission is being proposed for $3 million of the $9 million appropriated in FY 1981 for advanced flue gas desulfurization.) Instead, the research program will extend flue gas technology beyond sulfur cleanup to combined or integrated systems for removal of sulfur oxides, nitrogen oxides and particulates. New filtering techniques for ultrafine particulates will focus on improving efficiency and the ability to operate at higher temperatures. Applied research will also begin on advanced pollutant removal concepts involving the use of electron beams, lasers, or plasma-jets.

As the economic advantages increase for combined cycle systems powered either by a coal gasifier or pressurized fluidized bed combustor, the need is heightened for efficient gas stream cleanup (FY 1982 budget request: $14.4 million) system. Particularly important will be the development of systems capable of operating in the high temperature and pressure environment typical of the gases exiting a coal gasifier or pressurized fluidized bed combustor. These hot gas streams contain contaminants that, if not removed, will erode or corrode downstream equipment or violate environmental emission standards. DOE's program in FY 1982 will concentrate on completing bench scale testing of various particulate removal concepts. The most promising ones will be scaled up and tested at the process development unit scale.

As part of the gas stream cleanup category, DOE will also continue work to determine contaminant effects on fuel cell performance. The studies are expected to lead to a decision as to the desirability of continuing high temperature, clean-up process work.

Also within the gas stream cleanup program is an effort to determine the effectiveness of modifying the combustion or gasification process itself to suppress or remove pollutants. A major effort will be focused on the Limestone Injected Multi-Stage Burner (LIMB), a joint EPA/DOE effort which mates low nitrogen oxide burner technology with the injection of limestone to capture sulfur dioxide. This concept

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could provide an environmentally viable approach to retrofitting existing coal-fired boilers to reduce these emissions. Research and development of this concept will be completed in FY 1981.

The clean-up base technology program (FY 1982 request: $5.5 million) involves waste management, applied research and advanced instruentation, as well as technical and economic comparisons on common aspects of flue gas and gas stream clean-up technology. Specifically in FY 1982, DOE's efforts in waste management will continue the development of new techniques for disposing and/or using solid and slurry wastes from clean-up processes; efforts with the Department of Agriculture to determine if spent limestone from fluidized bed combustion might serve as a replacement for increasingly expensive lime for eastern U.S. crops; and several other activities involving wastes associated with combined flue gas cleanup systems currently under consideration.

Instrumentation development will concentrate on improved systems that continuously monitor sulfur dioxide and measuring techniques for determining how the concentration of sulfur, nitrogen, alkali metals, and other contaminants changes during the energy production process.

COMBUSTION SYSTEMS

(BA in millions)

	January 15 Budget		Revised Budget	
FY 1980	1981	1982	1981	1982
$50.9	$36.0*	$76.7	$36.0	$38.8

A significant opportunity exists for the increased use of coal in the utility, industrial and commercial sectors, large proportions of which currently rely on increasingly expensive oil and natural gas.

To assist the private sector in developing combustion options, the Department's program involve (1) the fluidized bed combustion of all ranks and grades of coals and (2) the substitution of coal or coal-derived fuels for a substantial portion of the oil burned in existing oil-fired combustors.

Significant results have been achieved in the combustion program, particularly in moving the atmospheric fluidized bed combustion (FY 1982 request: $11.3 million) to the threshold of commercial acceptance. The 100,000 pound/hour fluidized bed boiler on the campus of Georgetown University has now passed its second winter of service. In FY 1982,

(MORE)

*Reflects $20.5 million in rescissions proposed in the Carter Budget for coal-oil mixtures ($17.5 million) and the Rivesville 30 MWe atmospheric fluidized bed boiler ($3.0 million).

the Georgetown unit will be joined in operation by units of different configurations at the Great Lakes Naval Training Center near Chicago and at Shamokin, Pennsylvania. Because results from the Shamokin project, which is designed specifically to burn anthracite wastes, will available substantially earlier than from a previously-planned second anthracite boiler proposed for Wilkes-Barre, Pa. DOE support for the Wilkes-Barre project will be terminated at the completion of the design and no construction funds are being requested in FY 1982.

DOE will also place the 30 MW atmospheric fluidized bed boiler at Rivesville, West Virginia on "mothball" status until funds are available to begin the required dismantling. Despite problems encountered in the operation of this pioneering facility, the Rivesville unit achieved many of its design goals including a 200-hour continuous test run in 1979. The technology for atmospheric fluidized bed utility applications has now advanced beyond that which can be effectively supported by continuing operations at Rivesville. A $3 million rescission, therefore, is proposed in FY 1981 for the Rivesville project.

DOE will also begin an expanded effort in FY 1982 to design advanced fluidized bed systems, possibly including such concepts as circulating beds, staged combustion, and combinations of fluidized bed gasifiers and char combustors. Advanced concepts can be evaluated at the newly planned Fluidized Bed Combustion Research Facility in Morgantown, West Virginia.

DOE's primary effort in fluidized bed combustion in FY 1982 will be the continued development of the pressurized fluidized bed combustion (FY 1982 request: $17 million) technology which the combustor is pressurized from 6 to 16 times atmospheric pressure. This increases the efficiency of power generation by permitting the combustor to be used in a combined-cycle arrangement, while also increasing the sulfur capture within the boiler. The major portion of the funding in this category would be allocated for continued construction of the 13 MW PFB combined cycle pilot plant at Wood-Ridge, New Jersey. Construction is now scheduled for completion in the second quarter of FY 1983.

Sufficient data should be available from the Wood-Ridge pilot plant to support technology development of the pressurized fluidized bed system in the U.S. Therefore, DOE is not requesting funds to conduct test efforts at the International Energy Agency PFB test facility located in Grimethorpe, England, and will initiate consultations with the United Kingdom and the Federal Republic of Germany regarding appropriate actions to withdraw from the IEA joint program following Congressional approval of this action.

(MORE)

Funding is being requested for the initial design effort of alternate turbine machinery for testing of a U.S. type gas turbine at the Wood-Ridge PFB pilot plant and for the investigation of advanced coal combustor concepts, such as staged slagging combustors.

Funding in the advanced combustion technology program (FY 1982 request: $1.1 million) will focus on new coal combustor concepts for oil-designed utility and industrial boilers and furnaces. A competitive solicitation to begin this effort will be issued in late FY 1981.

With private sector involvement expanding in the preparation and use of coal-oil mixtures, DOE's alternative fuel utilization program (FY 1982 request: $6.4 million) is shifting its emphasis to yet-unproven concepts with significant potential for replacing oil or gas with coal. We concur in the rescission request of $17.45 million in FY 1981 funding for coal-oil mixture demonstration already pending from the January 15 budget request. Efforts will now concentrate on the preparation and combustion of other coal based fuel mixtures, such as coal-water, peat-coal-oil, methanol-coal, and ethanol-coal.

Following the initiation of conceptual designs in FY 1981 for advanced combined cycle gasification technology (FY 1982 request: $3 million), funding in FY 1982 will be used to expand the R&D technology base. Included would be environmental and reliability analyses of combined cycle gasification power generation, and an assessment of the trade-offs in the integration of advanced turbine and cleanup technology on the overall combined cycle system.

HEAT ENGINES AND HEAT RECOVERY

(BA in millions)

	January 15 Budget		Revised Budget	
FY 1980	1981	1982	1981	1982
$50.5	$36.4	$29.5	$31.4	$16.1

By advancing the state-of-the-art, the heat engines and heat recovery program can potentially result in savings in fuel consumption in: (1) central power systems, where DOE estimates that high-efficiency systems will be ready for commercial deployment by the private sector in the 1990-2000 timeframe; (2) dispersed power systems, where more efficient fuel utilization technology for industrial and residential/commercial applications could be available by 1985-2000, and (3) the recovery of waste heat from utility, residential/commercial, or industrial applications.

(MORE)

In the central power systems activity (FY 1982 request: $9.1 million), DOE will concentrate on open-cycle high temperature turbine technology. Temperature goals are in the range of 2600 to 3000 degrees F, a level required to offset energy losses in gasifying and cleaning the coal. The funding level will continue the program begun in 1977 in which four contractors completed Phase I (Program And System Definition Studies), and two were chosen for Phase II (Technology Testing). Phase II will be completed in FY 1981, and current plans are for a single design to be selected for Phase III (Verification Testing). The High Temperature Turbine Technology program has been stretched from the orginally estimated six years to the present schedule for completion in ten years.

The dispersed power systems activity (FY 1982 request: $6.5 million) will continue to support development of stationary diesels and gas turbines specifically tailored to burn coal-derived fuels instead of conventional petroleum. Funding would be used for projects in gas turbine low nitrogen oxide combustors and ceramic coatings, both critical areas for attaining acceptable environmental performance and durability. A rescission of $3.0 million for directly fired heat cycles is being requested for FY 1981, which will leave $2.6 million to continue a reduced effort.

No additional funding is requested in FY 1982 for the heat recovery component technology activity. Feasibility studies on the implementation of heat recovery technology at DOE's uranium enrichment plants will be completed in FY 1982. The proposed rescission of $2 million from the $4.3 million appropriated to the Fossil Energy office in FY 1981 for this activity would still provide sufficient funds to complete these initial design efforts.

FUEL CELLS

(BA in millions)

	January 15 Budget		Revised Budget	
FY 1980	1981	1982	1981	1982
$26.5	$32.0	$28.6	$32.0	$28.6

Fuel cells offer and electrochemical approach to energy conversion with the potential of efficiencies well beyond combustion based technology and with little to no environmental impact. The high efficiency of fuel cell power plants at full or modular scales, the negligible environmental intrusion, and the ability to operate using a wide range of hydrocarbons make fuel cells attractive for a variety of applications. If economic targets can be met, fuel cells could find significant use in electric utility applications, industrial cogeneration, and for on-site total energy systems where the utilization efficiency can exceed 80 percent.

(MORE)

DOE's fuel cell program has been shaped as part of a mission-oriented program coordinated by the National Fuel Cell Coordinating Group, an organization made up of government, manufacturer and user representatives who share the costs of the national fuel cell program.

In FY 1981, field tests of a 4.8 megawatt prototype fuel cell utility power plant sited on Manhattan Island will begin. Field testing of the 40 KW on-site phosphoric acid system will also be continued in FY 1982. With these tests underway, current fuel cell efforts by DOE are being devoted to the higher-risk R&D activities necessary to increase power density and reliability.

The phosphoric acid systems development activity (FY 1982 request: $10.1 million) will concentrate on technology development in support of two electric utility powerplant designs (a 10 MW and a 7.5 MW air cooled design), on the development of competitive technical concepts for the key components of the on-site integrated energy systems powerplant ranging in size from 40 KW to 120 KW, and on supporting technology base activities.

The molten carbonate systems development activity (FY 1982 request: $14.1 million) will complete the transition begun in FY 1979 from an applied research program to an effort that is primarily cell and stack technology development. Tests of the first sheet metal cells -- the first of a type suitable for potential economic viability -- will continue in FY 1982. In addition, testing will continue on electrolyte structures made by methods suitable to low cost mass production.

The advanced concepts activity (FY 1982 request: $4.4 million) will continue development of solid oxide fuel cells and thermionic energy conversion.

MAGNETOHYDRODYNAMICS

(BA in millions)

	January 15 Budget		Revised Budget	
FY 1980	1981	1982	1981	1982
$79.0	$67.0	$60.0	$61.0	$ 0

The Administration is recommending to the Congress that all program activities in magnetoydrodynamics (MHD) power development be discontinued at the conclusion of FY 1981. MHD is a long-range technology whose potential payoffs do not justify its substantial development costs, particularly in the context of a tight fiscal climate. Initial tests will be conducted in FY 1981 at the recently-completed Component Development and Integration Facility in Butte, Montana, and the Coal Fired Flow Facility at Tullahoma, Tennessee. Following these tests, the facilities will be closed and other ongoing research and development efforts will be brought to an orderly conclusion. A rescission of $6 million from FY 1981 funds is also requested.

(MORE)

PETROLEUM PROGRAM

The Department's Petroleum technology program has been fashioned within the context of oil price decontrol. There is no question that the petroleum industry has the technical and financial resources to continue development of new petroleum technologies. Elimination of artificially low domestic oil prices, which have discouraged exploration and production and hindered the commercial development of new technology, will increase markedly private sector initiatives in the development of improved petroleum production techniques.

The Federal program, therefore, has continued its shift toward the development of the longer-term, higher-risk technologies which are not being pursued significantly today by private industry.

At least two out of every three barrels of oil discovered in the U.S. remains unrecoverable by conventional production technology. This amounts to more than 330 billion barrels left in the ground. Tar sands may contain some three to six billion barrels of oil that can be recovered from a resource of almost 36 billion barrels. The Nation's abundant western oil shales have the potential for contributing up to 600 billion barrels to our domestic oil supply, and additional shale oil may be recovered from the leaner shales in the East.

DOE's petroleum technology program encompasses three major activities designed to develop new and improved techniques to recover significant portions of these untapped petroleum resources and to expand the technology base for upgrading the petroleum products for transportation fuels. The three areas are: (1) enhanced oil recovery, (2) oil shale R&D, and (3) advanced process technology.

ENHANCED OIL RECOVERY

(BA in millions)

	January 15 Budget		Revised Budget	
FY 1980	1981	1982	1981	1982
$23.1	$18.6	$23.9	$16.6	$20.9

DOE is assisting the development of technologies for recovering petroleum from (1) heavy oil, (2) light oil, and (3) tar sand resources. In addition, the Department is conducting analyses of selected projects initiated under the Economic Regulatory Administration's tertiary incentives test program. This program demonstrates the effectiveness of price incentives. More than 300 enhanced oil recovery projects, many using advanced technology, are planned by industry under this program. The increased taxes which will be paid on the incremental production may produce more revenues than the program's cost.

(MORE)

Within the heavy oil activity (FY 1982 request $7.1 million), work will continue to improve the recovery efficiency of thermal processes, such as steam injection. Improving this efficiency from the current 50 percent to a 60 percent level would add two to three billion barrels of oil to domestic reserves. In addition, DOE is continuing efforts to tap deeper heavy oil reservoirs by developing technologies that allow steam to be injected to as much as twice the approximate 2500-foot depth limit of conventional systems. In Project Deepsteam, engineers are developing a steam generator that can be lowered into the borehole. Surface tests of a prototype were completed last year, and in 1981 the first downhole tests will begin. In FY 1982, an 8-12 month test of the Sandia Laboratory-developed downhole steam generator will be undertaken to determine reliability, performance, and the frequency required for maintenance.

Development of new, low-cost materials for insulating the well casing is planned for FY 1982. Reducing heat losses in deep wellbores could increase domestic oil reserves by one to two billion barrels.

The FY 1982 funding request also reflects a reduced and refocused program of research and development with Venezuela and Canada, the continuation of university research to develop improved heavy oil recovery processes, and the monitoring of three ongoing field experiments testing steam drive with additives.

Improved recovery techniques for light oil (FY 1982 request: $8.0 million) would add from 12 to 23 billion barrels to domestic crude oil reserves. DOE's FY 1982 program will continue support of inhouse light oil recovery research at the Bartlesville Energy Technology Center and the support of university research projects. The focus will be on developing advanced techniques that flood a reservoir with a miscible gas, such as carbon dioxide, or with special chemicals. Analyses will continue on selected tests from the 350 enhanced oil recovery field projects begun by industry following the announcement of the ERA incentives program. Emphasis will be on the analysis of advanced processes. Coupled with the results of 22 previously-funded DOE cost-shared field experiments, these analyses are expected to provide better information for industry to make its decisions on commercial application of improved enhanced recovery processes.

The Department's tar sands program (FY 1982 request: $5 million) will continue development of underground, or "in situ", recovery techniques. Nearly 90 percent of the U.S. tar sand deposits are not recoverable by surface technology, and either steam injection or in situ combustion will be needed to obtain significant amounts of oil from these deeper reservoirs. In FY 1982, DOE will use the information gathered from last year's successful small-scale steam injection test at Vernal, Utah, to conduct the engineering and environmental design of a second tar sand steam drive experiment.

(MORE)

Funding requested for captial equipment (FY 1982 request: $750,000) will be used for such items as stirred reactors, filters, pumps, and chromatographs to be used in the enhanced oil recovery program.

The Administration is also proposing that $2 million be rescinded in FY 1981 funds, including $1 million from the heavy oil activity and $1 million from the tar sands activity.

ADVANCED PROCESS TECHNOLOGY

(BA in millions)

	January 15 Budget		Revised Budget	
FY 1980	1981	1982	1981	1902
$6.0	$4.0	$4.2	$4.0	$4.2

Exploratory research in advanced recovery processes, the characterization and utilization of heavy crude oil and synthetic products, and studies of processes for upgrading shale oil, heavy oil and tar sand bitumen are conducted within the Advanced Process Technology program.

Two major microbial processes for enhanced oil recovery will be started in the advanced exploratory research activity (FY 1982 request: $1.0 million). These studies will build on information gathered from research projects begun in 1981 to identify microbe strains that can survive underground conditions while stripping oil from the formation rock.

The product characterization and utilization activity (FY 1982 request: $2 million) will continue the analysis and tabulation of data on crude oils and products, the stability of blends of synthetic and conventional oils, and the correlation of road life with the chemical breakdown of asphalt. These research projects are basic in nature and provide a fundamental data base for advancing petroleum research efforts.

Upgrading processes for heavy crude oil and shale oil will be studied in the upgrading and utilization activity (FY 1982 request: $700,000). Small quantities of specification or reference fuels will be produced and tested for the Department of Defense and made available for industry use. This activity is important in closing the loop between new synthetic feedstocks and fuels and the engines that will use them.

The capital equipment budget request ($500,000) will provide for essential new or replacement equipment needed at the field centers to support the Advanced Process program.

(MORE)

OIL SHALE R&D

(BA in millions)

	January 15 Budget		Revised Budget	
FY 1980	1981	1982	1981	1982
$28.2	$33.0	$28.1	$33.0	$17.2

Higher oil prices and the creation of the Synthetic Fuels Corporation have stimulated a surge of private sector activity in commercial projects to tap the huge domestic oil shale resource. These commercial projects could contribute substantially to a reduction in oil imports in the future.

DOE's oil shale program has therefore begun a transition from the support of field projects to the development of a forward-looking technology base program.

Within the in situ conversion activity (FY 1982 request: $15.25 million), DOE's involvement in current field projects with Occidental Oil Shale (Colorado), Geokinetics Inc. (Utah), and the Equity Oil Co. (Colorado) will be phased out in FY 1981, and no new funding will be requested for FY 1982. The technologies being demonstrated in these projects have progressed to the point where completion of existing projects or subsequent development and commercialization would be a candidate for funding from the Synthetic Fuels Corporation, from private institutions or by the developers themselves. DOE's research program will now focus on work at the Laramie Energy Technology Center, National Laboratories, and universities, in such areas as the chemistry and physics of oil shale conversion, instrumentation and diagnostics, oil shale fracturing, and environmental impact mitigation. This research is expected to point the way to advanced and improved processes for extracting oil from shale.

The surface conversion activity (FY 1982 request: $1 million) will carry forward a new effort begun in FY 1981 to develop advanced processes capable of converting lean eastern shales to synthetic oil. This resource is far different from the rich western shales that have been the focal point of research for the past two to three decades. The surface conversion activity will also support a waste management experiment to address problems with disposing of spent western shale.

Funding requested for capital equipment (FY 1982 request: $1 million) will provide for instruments and hardware to monitor in situ shale oil production experiments in the laboratory and at government-owned experimental retorts.

(MORE)

ENHANCED GAS RECOVERY PROGRAM

Natural gas continues to provide one-quarter of all the energy used in the U.S. Four large unconventional gas resources have been identified as having significant potential for development and positive impact on future gas supplies. Research in three of the resources is conducted by the Office of Fossil Energy. The fourth, geopressured aquifers, is part of the Department's geothermal energy program. The three within the Fossil Energy program are:

- o Western tight gas-bearing sandstone and limestone formations. (FY 1982 request: $6.0 million) This unconventional gas resource exists in blanket and lenticular formations in the Rockies, Northern Great Plains and the Southwest. Estimates of the producible reserve base range from 190-570 trillion cubic feet. Because of its huge size and potential for future development, this is the highest priority in the Fossil Energy enhanced gas recovery program. The bulk of this gas is in lenticular formations which cannot be produced with current technology. In FY 1982, DOE will complete drilling, coring, logging and preliminary production testing of three wells at the Multiwell Experiment Site in Colorado. This experiment is a crucial step in developing a better understanding of how to extract gas from these lenticular formations. Also, standardized core analysis techniques will be developed, and acoustic and seismic instrumentation systems will be tested to enable mapping of the geometry of the tight sand rock formations.

- o Eastern gas-bearing shales. (FY 1982 request: $2.6 million) Located in the Applachian, Michigan and Illinois Basins with an estimated producible reserve base of 12-39 trillion cubic feet. The U.S. Geological Survey is working with DOE in a six-year research effort to study geology, geochemistry, rock mechanics, and other research disciplines applied to the eastern shale. In FY 1981, the major resource characterization activities will be completed. In FY 1982, an assessment of the Devonian shale gas resource will be published and an "offset well" test will be completed and data obtained on gas production rates. Excavation will also be completed for a project in which researchers will mine back through a fractured Devonian shale seam to verify visually the effectiveness of fracturing technology and diagnostic instrumentation.

- o Natural gas trapped in coalbeds. (FY 1982 request: $1 million) Technologies for recovering methane from coalbeds in conjunction with mining are relatively well-developed; however, the more attractive, long-term target is recovery from unmineable coal seams, for which considerable technology development and increased fundamental knowledge is required. Estimates of producible reserves range from 25-45 trillion cubic feet. DOE's current program involves some 20 contracts including nine

industry cost-shared efforts to test different extraction and utilization techniques. In FY 1982, lab and field experiments will continue leading to improved designs for hydraulic fracturing of coal seams, and an evaluation will be completed of methane production from deep, unmineable seams at two sites in the Rocky Mountain basins.

Environmental assessments plus technical and cost benefits analyses of the field experiments in the enhanced gas recovery program would be funded in the environment and support activity (FY 1982 request: $400,000).

In refocusing the enhanced gas recovery program on longer-range/high-risk and technology base activities, the Department is proposing rescissions totalling $3 million -- $1 million from each of the three unconventional gas categories in the Fossil Energy program -- from an FY 1981 appropriation of $30.5 million.

RESOURCE APPLICATIONS FUNCTIONS

As indicated on page 2, the recent realignment of the Department transferred several functions to the Office of Fossil Energy that were originally conducted by the Office of Resource Applications. The following is a description of these functions and their budgetary status:

Coal Resource Management

(BA in millions)

	January 15 Budget		Revised Budget	
FY 1980	1981	1982	1981	1982
$2.25	$ 0.5	$ 1.2	$ 0	$ 0

Through the Office of Coal Resource Management, the Department has assisted the commercialization of coal synthetic fuel processes that have the greatest potential for displacing imported oil. Assistance has been offered in such areas as permitting and licensing, streamlining regulatory processes at all government levels, and Environmental Impact Statement preparation. This office also provided technical evaluation to determine which proposals submitted under the Alternative Fuels program should be supported and has continued monitoring the selected projects to determine the status of licenses, permits, environmental and socioeconomic efforts. With cessation of activities under the interim Alternative Fuels Program on June 30, 1981, this evaluation function will be completed within DOE.

Many of the analyses conducted previously by this office in support of the near-term commercialization of coal-based technologies either will no longer be required or will be conducted elsewhere. The Administration, therefore, is proposing a rescission of the $0.5 million appropriated in FY 1981 for these efforts.

This activity also includes administering the coal loan guarantee program, authorized by the Energy Policy and Conservation Act of 1975. Under that legislation, the Department may provide financial incentives to small- and medium-sized coal producers to develop, expand, or reopen underground low-sulfur coal mines. The authority was expanded in 1978 to include coal preparation plants designed to reduce the sulfur content of coal. Congressional appropriations in 1978 provided $62 million of loan guarantee authority with a $6 million loan default fund. To date no coal producers have qualified under the guidelines of the Act. No guarantees have been issued, and only two conditional guarantees have been approved. The Administration is proposing to rescind the $6 million of unobligated funds.

The Department has also conducted technical information and guidance programs directed at the revitalization of the anthracite coal industry in the Northeast. Through a combination of public awareness programs and field projects, this activity has sought to improve the prospects for anthracite production and use. With the improving economic climate in the coal industry, this near-term Federal function will be phased out and no funds are requested for FY 1981 or FY 1982. The problems for increased anthracite production are related to its high price. Increases in oil and gas prices due to certain regulatory reforms as well as the tax reduction policies of the Administration are expected to improve the economic climate for the anthracite industry.

Oil and Gas

(BA in millions)

	January 15 Budget		Revised Budget	
FY 1980	1981	1982	1981	1982
$ 4.0	$5.1	$1.5	$ 4.2	$ 0

By assisting the private sector through technical guidance, and demonstrations, the Oil and Gas program encourages new, enhanced, and marginal oil and gas production, as well as the opening of restricted or closed areas for oil and gas exploration, and the acceleration of the permitting process for various pipeline and refinery projects. In addition, the program is the focal point for activities undertaken by the National Petroleum Council Federal Advisory Committee, the major conduit for the transmittal of industry's analysis of critical oil and gas issues.

(MORE)

Oil-related efforts have included: a major role in the development of the Economic Regulatory Administration's tertiary front-end incentive regulations that, when combined with other incentives, have resulted in a significant increase in industry enhanced oil recovery activity; appearances before the California Air Resources Board on air quality standards for SOx and NOx emissions which impact thermal oil recovery operations; appearances in refinery permitting cases to demonstrate the importance of new refinery capacity capable of refining heavy sour crudes and producing light transportation products; and the development of an abandoned fields file to be used by industry to develop potential oil resources which now may be economical due to changed economic conditions. The office has also published Trends in Refinery Capacity and Utilization, an authoritative document of future domestic refinery activity and capability to supply U.S. product demands and the growth of foreign refined product export capabilities.

In the natural gas area, the office has: conducted an unconventional gas demonstration program to assist industry in demonstrating the feasibility of utilizing natural gas from Devonian shale and coalbeds in small community and rural development, and provided technical assistance to TVA in the use of unconventional gas for development of an industrial park.

The office has also conducted assessments of the oil and gas potential of lands being considered for withdrawal by the Bureau of Land Management, the Forest Service, and the National Oceanic and Atmospheric Administration (marine sanctuaries).

With the added economic incentives provided the private sector by the decontrol of domestic oil and the trend towards further deregulation of natural gas, in addition to certain regulatory changes such as increased Federal land availability for domestic oil and gas exploration, this activity will no longer be necessary to increase domestic oil and gas supplies. The Oil and Gas program will be phased out during FY 1982 and no funding is requested.

Oil Shale Industrialization

(BA in millions)

	January 15 Budget		Revised Budget	
FY 1980	1981	1982	1981	1982
$3.0	$1.5	$5.5	$1.5	$ 0

The Oil Shale Industrialization program was begun in 1978 with the goal of assisting the development of a commercial oil shale industry in the U.S. by pursuing economic, environmental, regulatory, institutional and socioeconomic issues which have constrained past development.

(MORE)

In FY 1981, the program assisted in the start of three commercial projects for oil shale production. An investment tax credit for oil shale equipment was developed and implemented in Department of Treasury regulations issued on January 23, 1981. Grant awards were made to Colorado and Utah for socioeconomic impact planning to prepare for shale oil development. The office was also the Department's focal point on a DOE-DOI Task Force which prepared recommendations resulting in the revision of the DOI oil shale land policies.

Working with the Soil Conservation Service, the office prepared an analysis of future needs by commercial seed growers for seed stock to revegetate oil shale lands. A market analysis of shale co-products was completed to justify leasing multimineral lands and determine the financial feasibility of these projects. Work also began with the Departments of Housing and Urban Development and Agriculture in an effort to provide housing assistance in shale development areas.

Increased oil prices, the creation of the Synthetic Fuels Corporation, and the proposed tax structure revisions have created a favorable climate for oil shale development to continue. Therefore, the oil shale industrialization activity is no longer needed to carry out the development of a commercial shale oil industry. Any constraints which may still exist for commercial oil shale development will be addressed by other Federal programs such as EPA's environmental regulations and DOI's leasing program. The level of private sector investments in the development of oil shale have reached the point where commercial production will clearly result from the improved economic outlook for this resource. No funding is requested therefore for this activity in FY 1982, and the program will be phased out beginning this fiscal year.

Industrialization Planning

(BA in millions)

January 15 Budget		Revised Budget	
1981	1982	1981	1982
...	$0.8	...	...

The Office of Industrialization Planning was originally established in July 1980 to unify the Federal program for the industrialization of diverse energy resources, including energy transportation efforts formerly conducted elsewhere in the Department. With the Congressional passage of the Alternative Fuels program, the focus of the office was subsequently shifted to manage this interim program. Funding for this effort was provided to the Department of Energy under a separate budget category.

(MORE)

With the transfer to the Fossil Energy program, this office will continue to oversee the $200 million in feasibility studies and cooperative agreement awarded during the first round of the Alternative Fuels Program. With respect to the $300 million appropriated for a second round, the Administration believes proposed projects under this program should more properly compete for financing in the private market along with other energy projects. A rescission is proposed for this $300 million. This decision will not effect either the number or quality of projects which are ultimately selected by the SFC.

The Administration will propose no changes in the $5 billion currently available to the Department for its activities in support of the Defense Production Act (DPA) and the Federal Non-Nuclear Energy Research and Development Act (NNA). Negotiations are currently underway with three proposers -- TOSCO, Union Oil, and the Tennessee Synfuels Associates -- under provisions of the DPA, and our evaluation of proposals received under the NNA are expected to be completed by the end of March.

In addition, we are expecting a revised proposal from the Great Plains Gasification Group for its proposed high-Btu synthetic gas project in North Dakota, and we anticipate a final decision on increasing the amount of the conditional commitment for the loan guarantee for this project within a few weeks of receiving the new proposal.

Because the Synthetic Fuels Corporation will assume the primary Federal role in providing the financial stimulus for construction of these commercial projects, no funds will be necessary for this activity in FY 1982.

Federal Leasing

(BA in millions)

	January 15 Budget		Revised Budget	
FY 1980	1981	1982	1981	1982
$ 2.15	$2.78	$3.5	$2.38	$ 0

While we recognize that the Federal leasing program is not part of this Committee's oversight responsibilities, we have included a brief description to provide a complete picture of all functions now conducted by the Fossil Energy office under the recent Departmental reorganization.

During FY 1981, the DOE Federal leasing program will be phased out with a wrap-up of all ongoing activities during FY 1982. In FY 1981, leasing activities will conclude the development of onshore and Outer Continental Shelf (OCS) oil and gas production rate setting procedures and methodology. During FY 1981, the Leasing program will conclude analyses of Federal-State OCS oil and gas along with onshore oil and gas, coal and geothermal permitting barriers. Recommendations to remove onshore energy permitting barriers will be completed in FY 1982 along with the OCS work commitment leasing system. In addition to these leasing program activities, DOE will comply with the U.S. District Court order to promulgate variable work commitment and variable net profit share regulations before July 1981.

All of the DOE Leasing program responsibilities are expected to be transferred to the Department of the Interior in FY 1982; therefore no funding is requested for FY 1982 and a rescission of $0.4 million is proposed for FY 1981 as part of the phase out of the program by the Department.

SUMMARY

In short, the change in strategy reflected in this Fossil Energy R&D and industrialization budget will result in a less costly and more tightly focused Federal program. This budget is a clear signal to private energy companies that they will once again play the primary role in commercializing new technologies. We anticipate that this change in philosophy will not slow down the technological creativity in this country but will in fact stimulate it. In turn, these changes will make it possible to devote more governmental resources to true research needs as the more capital-intensive applied and market-oriented Federal activities are scaled back. In addition, the anti-competitive effects of Government subsidies for commercialization will be eliminated, ultimately benefiting the consumer through lower costs for new energy sources.

The FY 1981 and FY 1982 revised budget proposals are summarized in the attached charts.

Department of Energy
FY 1981 Requests for Rescission
Fossil Energy Research and Development
(Budget Authority in Thousands)

Program	Presently Available	Revised Appropriation	Proposed Rescission
COAL			
Mining R&D			
Underground	$31,000	$28,000	-$3,000
Surface	8,000	5,000	- 3,000
Coal Prep & Anal.....	9,000	7,000	- 2,000
Liquefaction			
Indirect Liq	18,000*	12,000	- 6,000
Support Studies/..... Eng. Eval.	12,000	9,000	- 3,000
Demonstration			
Plants/SRCI-Const.....	157,500	...	-157,500
SRC pilot plants	47,000	46,000	- 1,000
Surface Gasification			
Peat Gasif.....	13,000	8,000	- 5,000
Demo. Plants.			
High-Btu Gas-Opex ...	6,000	1,000	- 5,000**
" " " -Const....	44,000	...	-44,000
Low-Btu Gas -Const....	45,400	...	-45,400
Adv. Envir. Cntrl Tech.			
Adv. Flue Gas Desulfurization.....	9,000	6,000	- 3,000
Combustion Systems			
AFB boiler, 30MWe	3,100	100	- 3,000**
Coal-oil mixtures	22,000	4,550	-17,450**
Heat Eng/Heat Rec			
Directly fired heat cycles.....	5,600	2,600	- 3,000
Low grade heat rec....	4,300	2,300	- 2,000
Magnetohydrodynamics			
Engineering Dev.....	31,800	27,800	- 4,000
Supporting Res.....	11,400	9,400	- 2,000
TOTAL COAL RESCISSIONS			-$309,350

* Includes $6.0 million appropriated in FY 1981 for the Grace medium-Btu gasoline plant design ($3.0 million of which is proposed for rescission). The project is included in the Surface Coal Gasification activity.

** Also proposed in the January 15 Carter Budget Request.

Department of Energy
FY 1981 Requests for Rescission
Fossil Energy Research and Development
(Budget Authority in Thousands)

Program	Presently Available	Revised Appropriation	Proposed Rescission
PETROLEUM			
Enhanced Oil Recovery			
Heavy Oil.....	$7,300	$6,300	- $1,000
Tar Sands.....	5,500	4,500	- 1,000
TOTAL PETROLEUM RESCISSIONS.....			- $2,000
GAS			
Enhanced Gas Recovery			
Eastern gas shales.....	12,400	11,400	- 1,000
Western tight sands.....	12,400	11,400	- 1,000
Methane from coalbeds...	5,000	4,000	- 1,000
TOTAL GAS RESCISSIONS.....			- 3,000
RESOURCE APPLICATIONS (transferred to FOSSIL ENERGY)			
Domestic Energy Supply			
Coal.....	500	0	- 500
Loan Guarantee	6,000*	0	- 6,000
Oil and Gas.....	5,100	4,200	- 900
Federal Leasing.....	2,775	2,375	- 400
TOTAL RESOURCE APPLICATION RECISSIONS (for functions transferred to Fossil Energy).....			- 7,800
TOTAL FOSSIL ENERGY RESCISSIONS			-$322,150

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* Appropriated in 1978

Department of Energy
FY 1982 Budget Request
Fossil Energy Research and Development
(Budget Authority in Thousands)

Program	FY 1981 Appropriation*	January 15 Budget Request	Revised Budget Request
COAL			
Mining R&D			
Underground Mining	$ 31,000	$ 20,000	$ 15,000
Surface Mining	8,000	2,000	...
Coal Prep & Analysis	9,000	10,000	6,000
Capital Equipment	1,500	800	800
Subtotal	49,500	32,800	21,800
Coal Liquefaction			
Direct Hydrogenation	57,000	65,000	20,000
Solvent Extraction	32,000	63,000	30,000
Indirect Liquefaction	18,000**	22,000	14,000
Third Generation Proc	17,200	18,300	18,300
Support Studies/Eng Evaluations	12,000	14,600	10,600
Liquefaction Demo Plants	384,500	703,400	12,300
Capital Equipment	700	700	700
Subtotal	521,400	887,000	105,900
Surface Gasification			
High Btu Gasification	23,000	8,700	1,140
Low/Med Btu Gasfication	19,000	13,200	13,200
Third Generation Proc	17,000	28,870	27,100
Technical Support	10,000	12,000	12,000
Gasification Demo Plants	95,400	153,600	...
Capital Equipment	500	550	550
Subtotal	164,900	216,920	53,990
In Situ Gasification			
Low/Medium Btu Gas	9,200	3,000	3,000
Gov/Industry Coop Proj	...	2,200	...
Steeply Dipping Beds	...	3,200	3,200
Environmental Support	500	1,300	1,300
Supporting Research	200	800	800
Capital Equipment	100	300	300
Subtotal	10,000	10,800	8,600

* Does not include proposed rescissions listed on the previous pages.
**Includes $6.0 million appropriated for the Grace medium Btu gasoline plant.

Department of Energy
FY 1982 Budget Request
Fossil Energy Research and Development
(Budget Authority in Thousands)

Program	FY 1981 Appropriation*	January 15 Budget Request	Revised Budget Request
COAL (con'd)			
Adv Res & Tech Dev			
Processes	$ 20,400	21,400	21,400
Direct Utilization	9,100	12,800	12,800
Materials & Components	9,000	12,000	12,000
Program Direction & Coordination	7,861	11,500	8,500
University Coal Res	5,000	5,400	5,400
General Plant Projects	3,000	6,000	6,000
Capital Equipment	500	500	500
Construction	3,400	3,000	1,000
Subtotal	58,261	72,600	67,600
Adv Environ Cntrl Tech			
Flue Gas Cleanup	18,000	17,400	6,500
Gas Stream Cleanup	13,000	14,400	14,400
Cleanup Base Tech	6,000	5,500	5,500
Capital Equipment	500	500	500
Subtotal	37,500	37,800	26,900
Combustion Systems			
Atmospheric Fluidized Bed Combustion	12,800	15,300	11,300
Pressurized Fluidized Bed Combustion	21,400	50,900	17,000
Adv Combustion Tech	...	4,100	4,100
Alternative Fuel Util	22,000	6,400	6,400
Capital Equipment	300	...	...
Subtotal	56,500	76,700	38,800
Heat Eng & Heat Rec			
Central Power Systems	22,200	16,500	9,100
Dispersed power Systems	9,900	6,500	6,500
Heat Recovery Component	4,300	6,000	...
Capital Equipment	...	450	450
Subtotal	36,400	29,450	16,050

* Does not include proposed rescissions listed on previous pages.

Department of Energy
FY 1982 Budget Request
Fossil Energy Research and Development
(Budget Authority in Thousands)

Program	FY 1981 Appropriation*	January 15 Budget Request	Revised Budget Request
COAL (con'd)			
Fuel Cells			
Phosphoric Acid Sys Dev...	$ 21,000	$ 10,100	$ 10,100
Molten Carbonate Sys Dev..	9,000	14,100	14,100
Advanced Concepts.....	2,000	4,400	4,400
Subtotal.....	32,000	28,600	28,600
Magnetohydrodynamics			
Open Cycle Systems.....	65,500	59,500	...
Closed Cycle System.....	1,000	500	...
Capital Equipment.....	500	...	...
Subtotal.....	67,000	60,000	...
Program Direction.....	10,818	12,520	12,520
COAL TOTAL .....$	1,044,279	$1,465,190	$ 380,760
PETROLEUM			
Enhanced Oil Recovery			
Heavy Oil.....$	7,300	9,100	7,100
Light Oil.....	5,200	8,000	8,000
Tar Sands.....	5,500	6,000	5,000
Capital Equipment.....	600	750	750
Subtotal.....	18,600	23,850	20,850
Advanced Process Tech			
Adv Exploratory Res.....	1,800	1,000	1,000
Product Characterization.. & Utilization	1,300	2,000	2,000
Shale Oil Refining &..... Utilization	400	700	700
Capital Equipment.....	500	500	500
Subtotal.....	4,000	4,200	4,200

* Does not include rescissions listed on previous pages.

Department of Energy
FY 1982 Budget Request
Fossil Energy Research and Development
(Budget Authority in Thousands)

Program	FY 1981 Appropriation*	January 15 Budget Request	Revised Budget Request
PETROLEUM (con'd)			
Oil Shale			
In Situ Conversion	$ 31,298	$ 25,850	$ 15,250
Surface Conversion	750	1,300	1,000
Capital Equipment	1,000	1,000	1,000
Subtotal	33,048	28,150	17,250
Drilling & Offshore Tech			
Drilling	500	...	...
Offshore Technology	1,300	...	...
Environment & Support	200	...	...
Capital Equipment	370	...	...
Subtotal	2,370	...	...
Program Direction	1,475	1,620	1,620
PETROLEUM TOTAL	$ 59,493	$ 57,820	$ 43,920
GAS			
Enhanced Gas Recovery			
Eastern Gas Shales	$ 12,400	$ 10,900	$ 2,600
Western Tight Sands	12,400	11,000	6,000
Methane from Coal Beds	5,000	5,000	1,000
Environment & Support	248	700	400
Capital Equipment	500	600	200
Subtotal	30,548	28,200	10,200
Program Direction	415	460	460
GAS TOTAL	$ 30,963	$ 28,660	$ 10,660

* Does not include rescissions listed on previous pages.

Department of Energy
FY 1982 Budget Request
Fossil Energy Research and Development
(Budget Authority in Thousands)

Program	FY 1981 Appropriation*	January 15 Budget Request	Revised Budget Request
RESOURCE APPLICATIONS (transferred to FOSSIL ENERGY)			
Domestic Energy Supply			
Coal	$ 500	$ 1,200	...
Oil Shale Industrialization	1,500	5,500	...
Oil and Gas	5,090	1,500	...
Industrialization Planning	...	800	...
Program Direction	5,096	3,000	...
Subtotal	$12,186	$12,000	...
Federal Leasing	2,775	3,489	...
TOTAL RA FUNCTIONS TRANSFERRED TO FOSSIL ENERGY	$14,961	$15,489	...
FOSSIL ENERGY TOTAL...	$1,149,696	$1,567,159	$ 435,340

* Does not include rescissions listed on previous pages.

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