COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

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B-198007

APRIL 8, 1980

The Honorable John D. Dingell
Chairman, Subcommittee on
Energy and Power
Committee on Interstate
and Foreign Commerce
House of Representatives

45E02303

Dear Mr. Chairman:

Subject: Need for a System to Establish Priorities Among Fossil Energy Technologies (EMD-80-65)

This report summarizes the results of our followup review of the Department of Energy's (DOE's) response to a key recommendation in our September 18, 1978, report, "Fossil Energy Research, Development, and Demonstration: Opportunities for Change" (EMD-78-57). The report recommended that DOE develop a system of formal program priorities, based on predetermined criteria, ranked or weighted according to their importance in meeting program goals, to allocate limited resources among different fossil energy technologies.

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BACKGROUND

Your letter of January 2, 1979, (See enc. I) referred to (1) the length of time involved between receiving DOE comments on a draft of the report and report issuance and (2) DOE's industry cost participation policies for nonnuclear energy technologies. You also requested our comments as may be appropriate on DOE's response to you on the report's recommendations. We responded to you on the first two concerns on February 14, 1979, and October 2, 1979, respectively. This report provides our comments on DOE's response to our report's recommendation.

DOE's letter, dated March 21, 1979, responded to your questions concerning, among other things, DOE's implementation of the report's recommendations. (See enc. II.) On July 27, 1979, DOE sent its comments on the report's recommendations (See enc. III) to the Chairmen of the Senate

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Committee on Governmental Affairs and House Committee on Government Operations as required by section 236 of the Legislative Reorganization Act. In response to our recommendation that DOE establish a system of program priorities to allocate limited resources among different fossil energy technologies, DOE stated that legislative requirements and the budget formulation process serve as major elements in setting priorities.

We did not review legislative requirements which are mandated by the Congress. However, we performed a followup review of the fiscal year 1980 budget process, wherein DOE has consideralbe flexibility in proposing budget priorities. This review demonstrated again that DOE needs to establish a priority-setting system to supplement its current process.

During our followup review, we discussed with DOE fossil energy program officials the status of our September 1978 report recommendation. These officials provided additional documentation on priorities set during the fiscal year 1980 budget cycle and discussed, in general, the factors considered in setting the priorities. We also discussed DOE's use of criteria in determining budget priorities with officials from the Office of Management and Budget (OMB) who review DOE's budget request. In addition, data was obtained from and discussions held with officials from the Environmental Protection Agency (EPA) who are required by law to continuously analyze the adequacy of attention to environmental factors in the application of nonnuclear energy technologies.

We did not attempt a detailed evaluation of decisions made at each step of DOE's budget process but rather focused on the overall process used to set priorities.

Because little data exists for emerging technologies, considerable reliance is placed on estimates and projections. As a result, whatever method is used to establish priorities will still rely heavily on subjective judgment. However, subjective judgment using consistently applied, ranked or weighted explicit criteria, can better insure the inclusion of all significant factors, and provide a better-documented basis for priority-setting and systematic analysis of the trade-offs involved. Thus, the Congress and others would have a better basis for evaluating the adequacy of required funding levels of the fossil program or for funding alternative approaches.

THE BUDGET PROCESS IS INSUFFICIENT FOR ASSIGNING PRIORITIES

We asked DOE fossil energy program officials what priorities were established for fossil energy technology programs. We were given a June 1978 memo from the Assistant Secretary for Energy Technology to the Program Director for Fossil Energy which identifies priorities to be used in the fiscal year 1980 budget for fossil energy programs. These priorities were set by the Assistant Secretary after reviewing the fossil energy fiscal year 1980 budget request submitted by the Program Director. The June 1978 memo is also DOE's documentation of the criteria used to determine fiscal year 1980 budget priorities.

As shown in the following table, eight technologies are identified as having the "highest" priority for the fiscal year 1980 budget. In this category, there is no individual ranking which places technologies in a priority order.

Fossil Energy Priorities

for the Fiscal Year 1980 Budget (notes a and b)

Highest priority	Second priority	Third priority	Fourth priority
Enhanced oil recovery	Coal liquefaction (third generation)	Some Mining research and development (other than coal preparation)	Drilling and offshore technology
Coal liquefaction (excluding third generation	Coal surface gasification (third generation)	Environmental study for coal liquefaction, in-situ gasification, and enhanced oil recovery	Advanced process technology
Coal-oil mixture	Shale oil		
Surface gasification of eastern coal (excluding third generation)	In-situ coal gasification	Advanced research and technology development	
Advanced environmental control technology	Gas recovery (including geopressure program)		
Coal preparation			
Atmospheric fluidized-bed			
Pressurized fluidized-bed			

a/The source of this table is a June 5, 1978, memo from the Assistant Secretary for Energy Technology to the Program Director for Fossil Energy on the fiscal year 1980 budget for the fossil energy program.

b/The technologies are not individually ranked within the priority categories.

Within the "highest priority" category, questions remain as to how these priorities were developed. DOE did not explicitly identify the criteria used for setting priorities in its memo nor did it indicate the weight given to the criteria.

DOE's January 1979 publication, "Fossil Energy Program Summary Document," or "Gold" book, identifies some criteria used in its coal strategy to select demonstration projects for Government support. These criteria include (1) the project's range of application, (2) the extent that projects complement each other, and (3) the project's potential for environmental acceptability and technical and economic success. This book, however, does not identify what rank or weight was given to the criteria. Furthermore, it is uncertain whether these criteria are used consistently in making funding decisions on alternative techniques. DOE still needs to identify explicitly all criteria used in setting fossil energy technology priorities and the rank or weight of each. Further, DOE should make fully visible how the criteria were applied to allow testing of the objectivity and reasonableness applied in its allocation of resources among fossil energy technologies.

We discussed DOE's reliance on the budget process for setting program priorities with OMB officials responsible for reviewing DOE's fossil energy budget justifications. According to OMB officials, DOE budget justifications are not well prepared and lack adequate detailed support. Furthermore, OMB officials stated that this is also true of the fiscal year 1981 budget even though DOE has made improvements in some areas such as enhanced gas and oil recovery through the development of management plans that supplement budget proposals. Also OMB officials stated that certain broad criteria are considered in evaluating the submissions. The criteria include the resource being funded (coal-oil-gas), economics (including the cost to produce a product, product price, and the basis for price projections), market potential, how the program or project relates to the National Energy Plan, and the technological benefits of pilot and demonstration plants. Although these criteria are not specifically required by OMB to be addressed in the funding request for each technology, the criteria are discussed during budget review meetings with DOE. And, OMB officials further stated that the criteria are not consistently applied or routinely presented by DOE in its budget justifications.

We also found that an EPA January 1980 report, includes criticism of one aspect of DOE's priority-setting process--adequacy of attention given environmental criteria in establishing priorities for research, development, and demonstration of technologies. During 1979, EPA reviewed DOE's environmental planning and assessment process for technology research and development. A public hearing was held in Washington, D.C., to discuss potential issues disclosed in workshops which were held in Atlanta, Denver, San Francisco, and Pittsburgh with representatives from Federal, State, and local agencies, environmental and public interest groups, labor, industry, and the general public who discussed DOE's management system and the adequacy of attention this system gives to environmental protection.

Although the EPA report noted that some environmental criteria have been periodically used by DOE in its research and development priority setting, based on the hearing, workshops, and its own analysis of DOE's management process, EPA stated in its report that it is not clear if environmental criteria are used consistently or how these criteria have affected DOE decisions.

In addition, we issued a report 1/ on the role of DOE's Office of Environment in decisionmaking which concludes that until a mechanism is in place that uses environmental factors as one criterion in assessing program alternatives and rationalizing why one course of action is chosen over another, this Office cannot play an effective role in decisions concerning emerging energy technologies.

CONCLUSIONS

The DOE budget process does not satisfy our September 1978 report's recommendation that DOE develop a system to establish priorities, based on predetermined criteria, ranked or weighted according to their importance in meeting program goals, to allocate resources among the different fossil energy technologies and programs. After reviewing DOE's basis for its fiscal year 1980 budget priorities and discussing with OMB officials the fiscal years 1980-81 budget submissions, we could find no evidence that predetermined criteria were ranked or weighted according to their importance in meeting program goals or were used consistently. OMB and EPA

1/"The Energy Department's Office of Environment Does Not Have A Large Role In Decisionmaking," EMD-80-50, Jan. 29, 1980.

officials also expressed concern over DOE's priority-setting process. We believe DOE needs to improve its establishment of priorities for fossil energy programs and make visible the basis for those priorities through the consistent application of weighted criteria.

We are recommending, as we did in our September 1978 report, that the Secretary, Department of Energy, develop a system to establish priorities among the different fossil energy technologies and processes. As a part of this system, the Secretary should

--identify explicitly all criteria used in setting fossil energy technology priorities and the rank or weight of each and

--make fully visible how the criteria were applied to allow testing of the objectivity and reasonableness applied in its allocation of resources among fossil energy technologies.

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As you requested, we have not obtained written agency comments, but the report was discussed with DOE officials to determine its factual accuracy. We plan no further distribution of this report until arrangements are made with your office for release of the report or 30 days from the date of its issuance, whichever is the earliest. At that time, we will send a copy of this report to the Secretary, Department of Energy, so he may comply with section 236 of the Legislative Reorganization Act. At such time, we will also send copies to interested parties and make copies available to others upon request.

Sincerely yours,

Comptroller General
of the United States

Enclosures - 3

ENCLOSURE I

ENCLOSURE I

ROOM 3264
HOUSE OFFICE BUILDING ANNEX NO. 2
PHONE (202) 225-1030

CONGRESS OF THE UNITED STATES
HOUSE OF REPRESENTATIVES
SUBCOMMITTEE ON ENERGY AND POWER
OF THE
COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE
WASHINGTON, D.C. 20515

January 2, 1979

The Honorable Elmer B. Staats
Comptroller General of the United States
U. S. General Accounting Office
441 G Street, N.W.
Washington, D. C. 20548

Dear Mr. Staats:

Thank you for your report (EMD-78-57) of September 18, 1978 concerning the DOE's fossil energy R, D and D program. Enclosed is a copy of our letter to the DOE releasing the report.

The report is very helpful. We commend the GAO for its efforts and particularly the work of the Energy and Minerals Division.

Please note that the enclosed letter requests your opinion concerning DOE compliance with the industry participation provisions of the laws applicable to the DOE. We also asked the DOE to provide a copy of its reply to the GAO so that you can review it and provide such additional comments as may be appropriate.

We note that sometime before July 6, 1978 the GAO provided a draft of this report to the DOE for comment and review. The DOE replied on July 6. However, more than two months lapsed before the GAO provided the report to us. We think this period is too long. It is particularly objectionable because of its vagueness and it was made by a DOE official who lacks any program responsibility. We stress that in the case of reports requested by our Subcommittee, the GAO should, as needed, review them with appropriate agency officials to insure that they are factually accurate. However, this review should not include providing a draft report to the agency and waiting for a

ENCLOSURE I

written response thereon. We want the opportunity to request the agency's comments as we have done in the enclosed letter.

With best wishes,

Sincerely,

John D. Dingell
Chairman

JDD:Frm

Enclosure

ENCLOSURE II

Department of Energy
Washington, D.C. 20585

March 21, 1979

Honorable John D. Dingell
Chairman, Subcommittee on
Energy and Power
Committee on Interstate and
Foreign Commerce
House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

We are providing the following comments in response to your January 2, 1979 letter regarding the General Accounting Office (GAO) report EMD 78-57, "Fossil Energy Research, Development, And Demonstration: Opportunity For Change".

Question 1.

(a) We request that you explain the need for, and purpose of, the DOE Division of the GAO Liaison Office and state how many positions were allocated to the division as of January 1, 1979, and how many of those positions were vacant as of that date.

(b) To whom does the Division Director report directly?

(c) Did the Under Secretary or any other Secretarial office and the Director of Research review the draft GAO report and the July 6 reply? If not, why not?

A central coordinating focal point in DOE is essential to both DOE and GAO activity due to the organizational and work complexity, audit manpower and the wide range of GAO activity. The DOE/GAO Liaison Staff assists not only the DOE Secretarial staff but also GAO personnel in obtaining necessary access, information, documentation and direction to authoritative and knowledgeable DOE personnel in subject matter areas of interest under review by GAO. During Fiscal Year 1979 GAO plans to devote about 200 professional staff years to audits and review of DOE programs and activities. Of this about 120 staff years are planned to be spent auditing activities at the Washington Headquarters location and 80 staff years directed at DOE field activity. Currently GAO has about 150 audits and reviews underway involving DOE's programs and activities. These audits and reviews vary in scope and detail and require frequent coordination.

ENCLOSURE II

The DOE Office of GAO Liaison was created for the purpose of assisting the Secretary in the discharge of his responsibility in implementing the Provisions of Section 236 of P.L. 91-510, the Legislative Reorganization Act of 1970. In this capacity, the Director, GAO Liaison, who reports directly to the Controller provides a departmental overview to ensure consistency with policy and serves to enhance coordination and consistency in DOE's interactions with the General Accounting Office (GAO). In addition to other GAO related activity of this office, the Director reviews and distributes all GAO reports and surveys. Distribution is made to those DOE Secretarial offices directly involved in the audit survey, and to other organizational units where the mission of that organization is, or might be, affected.

Upon circulation of the report in the various Secretarial offices, the Director consults with responsible program officials and furnishes advice and guidance relative to the GAO report or survey. He reviews, analyzes and highlights the draft or final reports and advises the program officials of the implications and possible impacts of contested points, and he recommends alternative approaches and required follow-on corrective action. The Director also serves as advisor for resolution of divergent views of DOE officials concerning the impact of the GAO report recommendations and proposed corrective action to be developed.

The preparation of comments on the draft report are prepared by the Director based on written comments received from the responsible Secretarial offices within the Department. Due to time constraints on responding to draft reports, the Director prepares a coordinated and concurred response which is forwarded directly to GAO. Based on these comments, the GAO may or may not make changes to the draft report prior to publication of a final report.

Published or "final" GAO reports which contain recommendations for action by DOE are distributed for review to the principally affected Secretarial offices. Internal DOE due dates are established for receipt of comments pertaining to the recommendations contained in the published GAO report. Concurrences are obtained from those organizations directly involved or affected by the GAO review and the General Counsel's office is provided a copy for legal determination of the subject matter. The Department's official response to the published GAO reports, as required by Section 236 of the Legislative Reorganization Act of 1970, is fully coordinated within the Department and is prepared for the signature of the Secretary or the Under Secretary.

ENCLOSURE II

All of this activity is accomplished by the DOE Office of GAO Liaison which consists of a Director, a Financial Management Specialist and two clerical positions. The position of Director requires the application of a high degree of professionalism and a thorough knowledge of budgeting, accounting, auditing principles, program activities, and various Government regulations and legislation affecting the Department. As of October 1978, the position of Director has been filled with a GS-15.

I firmly believe that GAO, in their response to you, will confirm the need for this office.

Question 2.

The first set of GAO recommendations are set forth on page 24 of the GAO report. We request that the DOE:

(a) identify the programs and projects for which priorities have been established and list the priorities for each,

(b) identify the programs and projects for which no priorities have been established and provide a timetable indicating when those priorities will be established,

(c) identify the projects and processes for which evaluation criteria have been established and list the criteria for each,

(d) identify the other projects and processes now being examined and provide a timetable for establishing such criteria, and

(e) state what office in the DOE establishes these priorities and criteria and indicate in detail the extent to which this effort has been aided by contractors and consultants (include the identity of the contractors, purpose of each contract, cost, and status of each contract).

Before addressing current prioritization criteria, it may be useful to review briefly the process by which they are derived. Fossil Energy does not operate in a vacuum and develops its direction in a dynamic, interactive fashion. First, there are the National Energy Act and the DOE Organization Act, both of which give definitive guidance as to our National goals and how the Department should go about addressing them. There are, of course, other laws as well as guidance from public speeches by members of the Administration and the Congress.

ENCLOSURE II

The budget formulation process itself is a major step in setting priorities and formulating policy. The activity starts with the Comptroller's annual budget call. This call sets the tone for the work to follow, and generally sets urgencies and priorities. Using available guidance, and the principles of Zero Base Budgeting (ZBB), a Fossil Energy RD&D Program is formulated. This program is reviewed at successively higher levels of management, from the Assistant Secretary for Energy Technology on up, and revisions are usually made at each review stage. The final DOE program is then reviewed by OMB and the Congress. It is safe to say that each step in the review questions the priorities and funding levels and does not pass on the submission until they are satisfied that the most appropriate program has been formulated.

With this background the current priorities for the Fossil Energy Program are:

- Assure, through technology development, that stationary facilities now burning coal can continue to do so while meeting applicable environmental standards, and that coal combustion can become an increasingly viable option for new facilities in the industrial and utility sectors during the next decade.

- Demonstrate the capability for producing synthetic liquid and gaseous fuels from coal by the mid 1980's so that significant capacity can be built in the 1990's if economics justify.

- Develop systems that will use coal in a more economic, efficient and environmentally acceptable manner for the 1990's and beyond.

- Increase the domestic production of liquid hydrocarbon fuels to substitute directly for imported petroleum.

- Increase domestic supplies of gaseous fuels to assure adequate use of distribution system and to prevent switching to petroleum.

- Provide fundamental improvements in the technology base for economic, efficient, and environmentally acceptable production and use of all fossil fuel resources.

These are the broad statements of the current Fossil Energy priorities. They are derived from the need to address the fact that our current demand for petroleum derived products far exceeds our ability to produce them. The thrust is to increase our level of domestic production of oil, for example, through Enhanced Oil Recovery. New sources of liquids, such as shale and coal liquefaction, are being developed. New sources of gases that can substitute for petroleum directly, such as unconventional gas and coal gasification, are being developed. In addition, technologies then can displace petroleum directly, such as Fluidized Bed Combustion are being developed.

With this broad guidance as to priorities, the entire Fossil Energy Program was divided into four groups based on the end use of the RD&D efforts. These groups were:

- Advanced Processes and Direct Coal Use
- Liquids
- Gas Replacement
- Improved Conversion Efficiency.

These priority groupings reflect our view on the emerging role of Fossil Energy in developing the technology base needed to support early commercialization. ZBB rankings were then conducted in two separate and distinct steps. First, the basic R&D program comprised of operating expenses, capital equipment and General Plant Projects were ranked in their entirety in accordance with the relative priorities given above. Then, because of their large claim on the R&D budget and the fact that they are candidates for early commercialization, the demonstration plants and other construction projects were ranked independently. This second part took some interaction but once a satisfactory plant level of funding was established it was merged with the previouly developed ranking of the R&D programs.

Since the total Fossil Energy Program is comprised of several hundred individual projects, it does not seem feasible to go through the process in a response such as this. The above gives a good overview of how the process was implemented. If more detail is needed, it should be done on a case by case basis. If you, or your staff members, would like to have this detail, perhaps the best way would be through a series of briefings by the appropriate project offices and project officers. We are prepared to arrange such a series of meetings at your convenience.

Question 3.

Additional GAO recommendations appear on pages 35-36 of the report.

The first of these recommendations relates to establishing criteria for evaluating and selecting processes for demonstration. The second recommendation is that DOE evaluate all potential processes and select the best for demonstration. The July 6 letter states that the DOE concurs with both recommendations and is taking "action" to establish criteria. Please

ENCLOSURE II

(a) state what office within the DOE has this responsibility,

(b) provide the details of any contracts executed or proposed to aid in this effort, including the purpose, costs, term, and other pertinent data, and

(c) provide a timetable for completing the criteria and for evaluating all potential processes within each fossil energy technology.

It is important to understand that technical demonstration is just one of several phases in the process development cycle. Work usually starts in a laboratory, proceeds through bench scale tests to the larger, more complex Process Development Unit and pilot stages before demonstration is considered. A new process is constantly undergoing evaluation and only advances to the next phase when it shows promise - in terms of lower cost, environmental and siting considerations, or if it makes a substantial contribution to the technical data base. Although the demonstration stage is the largest and most expensive and tends to attract the most attention, the weeding out process begins in the laboratory and continues throughout process development.

While the Program Director for Fossil Energy, with the advice of the various technical line divisions, makes recommendations, it is the Secretary, Deputy Secretary and Under Secretary who must ultimately bear the responsibility for deciding when technical process demonstrations are appropriate. The Major Systems Acquisitions (MSA) reviews and the Energy Systems Acquisitions Project Plans (ESAPP) provide them with the requisite information to make these determinations on a timely basis. In the final analysis, each decision to proceed with a technical demonstration must be made on a case by case basis depending on the specifics of the technology in question. Because of the uniqueness of each decision, depending on technological advances and breakthroughs (both of the given technology and competing technologies), energy prices, environmental regulations and the total demand for energy, the criteria used to determine when a demonstration is warranted must be allowed to evolve in response to changing conditions. To our knowledge, no contractors participate in this decision process.

Question 4.

The third recommendation (pages 35-56) relates to the size of demonstration plants "needed to obtain the necessary commercialization information". The fourth recommendation relates to the 50 percent cost sharing rule imposed by the DOE and the Office of Management and Budget on demonstrations.

We request that the Department's Secretarial officers review both of these GAO recommendations and promptly make the changes recommended by the GAO. Please indicate in your response when these changes will be made.

ENCLOSURE II

The size of a technical demonstration plant is determined by agreement between the Fossil Energy Program Division and the industrial participant. Normally, the industrial participant proposes a demonstration plant size that will allow the generation of data or process economics and scale factors that enable decisions to be made concerning the feasibility for commercialization of the process. The appropriate sizes vary from technology to technology.

The Department is currently revising its Procurement Regulations, with a considerable amount of effort being devoted to the subject of cost participation. The new policy is that cost participation will be decided on a case by case basis, with no fixed minimum outside participation level. Also, cost participation can begin as early as the laboratory stage in the process development cycle. These draft regulations have been reviewed and commented on by more than 70 independent outside reviewers. A final draft will be issued either in March or April of this year.

We will be pleased to provide any additional information you may desire.

Sincerely,

Dale D. Myers
Under Secretary

ENCLOSURE III

ENCLOSURE III

JUL 27 1979

Honorable Abraham A. Ribicoff
Chairman, Committee on
Governmental Affairs
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

As required by Section 236 of the Legislative Reorganization Act of 1970, we are providing the enclosed comments on General Accounting Office (GAO) report concerning "Fossil Energy Research, Development, And Demonstration: Opportunities For Change."

We would be pleased to provide any additional information that is desired in this matter.

Sincerely,

Signed

John H. Deutch
Acting Under Secretary

Enclosure:
DOL Comments on GAO
Report EMD 76-57

cc: Honorable Charles Percy
United States Senate

MC#15019 (CROS 29 79 01) ES#28207
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IDENTICAL LETTER FORWARDED TO:
HONORABLE JACK BROOKS
CHAIRMAN, COMMITTEE ON
GOVERNMENT OPERATIONS
HOUSE OF REPRESENTATIVES
WASHINGTON, D.C. 20515

CC: HONORABLE FRANK HORTON
HOUSE OF REPRESENTATIVES

ENCLOSURE III

DOE COMMENTS ON GAO REPORT EMD 78-57
"FOSSIL ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION:
OPPORTUNITIES FOR CHANGE"

The Department of Energy (DOE) has reviewed the subject report and our comments pertaining to the applicable GAO recommendations are presented below.

GAO Recommendations (p. 24)

The Secretary, DOE, develop and include as part of the Department's overall and/or individual program and project plans:

> A system of formal program priorities to be used to allocate limited resources among different fossil energy technologies and among alternative approaches within each technology. To make visible the bases for establishing priorities, this system should be supported by comparative studies, based on a set of predetermined criteria, ranked or weighted according to their importance in meeting program goals.
>
> Program and project cost objectives for all fossil energy technologies. These objectives should specify target costs and dates by which those targets are expected to be met.
>
> Specific evaluation criteria for determining process advancement.

DOE Comments

The policy by which priorities and criteria are established for DOE emanate from legislative requirements such as the National Energy Act and the DOE Organization Act, which give definitive guidance as to our national goals and how the Department should go about addressing them. There are also other laws specifically related to RD&D which have been incorporated into the DOE Organization Act, i.e. the Federal Non-nuclear Research and Development Act of 1974 and the Energy Reorganization Act of 1974 which projects specific criteria. Further, annual Authorization and Appropriation Acts provide detailed program guidance.

The budget formulation process itself is also a major element in setting priorities and making recommendations regarding formulating policy. The activity starts with the establishment of policy and fiscal guidance and the Comptroller's annual budget call which sets the tone for the work to follow, and generally sets urgencies and priorities. Using available guidance, and the principles of Zero Base Budgeting (ZBB), a Fossil Energy RD&D Program is formulated. This program is reviewed at successively higher levels of management, from the Assistant Secretary for Energy Technology on up, and revisions are usually made at each review stage. The final DOE program is then reviewed by OMB and the Congress. Each step in the review questions the priorities and funding levels and does not pass on the submission until it is satisfied that the most appropriate program has been formulated.

ENCLOSURE III

With this background the current priorities for the DOE Fossil Energy Program are:

> Assure, through technology development, that stationary facilities now burning coal can continue to do so while meeting applicable environmental standards, and that coal combustion can become an increasingly viable option for new facilities in the industrial and utility sectors during the next decade.
>
> Demonstrate the capability for producing synthetic liquid and gaseous fuels from coal by the mid 1980's so that significant capacity can be built in the 1990's if economics justify.
>
> Develop systems that will use coal in a more economic, efficient, and environmentally acceptable manner for the 1990's and beyond.
>
> Increase the domestic production of liquid hydrocarbon fuels to substitute directly for imported petroleum.
>
> Provide fundamental improvements in the technology base for economic, efficient, and environmentally acceptable production and use of all fossil fuel resources.

These are the broad statements of the current Fossil Energy priorities. They are derived from the need to address the fact that our current demand for petroleum-derived products far exceeds our ability to produce them. The thrust is to increase our level of domestic production of oil, for example, through enhanced oil recovery. New sources of liquids, such as shale and coal liquefaction, are being developed. New sources of gases that can substitute for petroleum directly, such as unconventional gas and coal gasification, are being developed. In addition, technologies which then can displace petroleum directly, such as fluidized-bed combustion, are being developed.

These priority groupings reflect our view on the emerging role of the DOE Fossil Energy Program in developing the technology base needed to support early commercialization. First, the basic RD&D projects considered in terms of its annual authorization (operating expenses, capital equipment and General Plant Projects) are ranked in their entirety in accordance with the relative priorities given above. Then, because of the large claim on the RD&D budget and the fact that they are candidates for early commercialization, the demonstration plants and other construction projects were ranked independently of the basic RD&D projects. This second part takes some interaction but, once a satisfactory plant level of funding is established, it is merged with the previously developed ranking for the RD&D projects.

ENCLOSURE III

The target costs objectives for energy delivered by processes being developed in the Fossil Energy Program are those of existing or comparable alternate commercial systems. That is, a project is not supported if initial product cost estimates are higher than anticipated alternatives. Likewise, at each successive level of review in the process development route, continued promise must be indicated, or the project is terminated -- as has happened, for instance, with the CO_2 Acceptor Process, the Agglomerating Ash Process, and the Synthoil Process, among others. The GAO recommendation has already been separately addressed for the more mature technologies through the Commercialization Task Force under the direction of the Under Secretary. Here, all relatively mature technologies were characterized and evaluated for commercial readiness by factors to include economics, technological readiness, environmental implications, etc.

For less mature technologies, cost objectives become an integral part of the entire budget development and ranking process, as discussed above.

Further, within the DOE planning process, the specific activities and directions for each major technological program are defined and approved by a series of documents that detail technological approach, problems, costs, and expected results. These documents, such as the Multi-year Program Plans, provide an ability to evaluate the goals and measure the progress of each technology program.

For example, each plan is required to identify current technological performance, targeted performance goals, and the methodology by which these goals will be reached. These targeted performance goals, when coupled with the timing and budget proposed in the Plan, become the criteria by which successful development can be measured.

It must be clearly understood, however, that these are not the only measures for program or process evaluation. R&D does not lend itself to scientific breakthroughs on schedule. The synergistic relationships between technologies, and between programs, may ultimately provide a retrospective justification for a technology that was not conceived of in the original plan.

GAO Recommendations (pp. 35 and 36)

To improve the Fossil Plants Demonstration Program, we recommend that the Secretary, DOE:

> Establish specific criteria for evaluating the selecting processes for demonstration. These criteria should consider the (1) contribution that each process can make in meeting the Nation's energy goals; (2) total cost and timing of commercializing the process; and (3) incremental cost of producing energy from the process and the means by which that cost would be assimilated by the economy.

ENCLOSURE III

Evaluate in detail all potential processes within each fossil energy technology and, based on the selection criteria discussed above, select the best processes for demonstration. The selected processes and their timetables for development, as well as the criteria used to select them, should be included in DOE's overall research, development, and demonstration program plans as recommended in chapter 3 (see p. 21).

Change the approach in specifying the size of the demonstration plants needed to obtain the necessary commercialization information by determining beforehand the size of the plant needed to achieve program and/or project objectives and basing its request for proposals on that determination.

Change the cost-sharing policy to provide for more flexibility in achieving program and/or project goals. This should be done by (1) varying the cost-sharing amount for each process and request for proposals depending on the priority that is assigned to the process and the relative risks involved in constructing and operating a demonstration plant, and (2) requiring cost sharing with industry from the beginning of the project while, at the same time, developing a procedure which would allow industry to input into the decision-making process when a project is proceeding from one phase to another.

DOE Comments

It is important to understand that technical demonstration is just one of several phases in the process development cycle. Work usually starts in a laboratory, proceeds through bench scale tests to the larger, more complex Process Development Unit and pilot stages before demonstration is considered. A new process is constantly undergoing evaluation and only advances to the next phase when it shows promise - in terms of lower cost, environmental and siting considerations, or if it makes a substantial contribution to the technical data base. Although the demonstration stage is the largest and most expensive and tends to attract the most attention, the weeding out process begins in the laboratory and continues throughout process development.

In the final analysis, each decision to proceed with a technical demonstration must be made on a case by case basis depending on the specifics of the technology in question. Because of the uniqueness of each decision, depending on technological advances and breakthroughs (both of the given technology and competing technologies), energy prices, environmental regulations and the total demand for energy, the criteria used to determine when a demonstration is warranted must be allowed to evolve in response to changing conditions.

ENCLOSURE III

While the exact criteria should remain flexible and should be expected to vary from technology to technology, each technology's potential market penetration, total development cost, and the cost of energy are always among the factors considered when choosing between processes.

The size of a technical demonstration plant is determined by agreement between the Fossil Energy Program Division and the industrial participant. Normally, the industrial participant proposes a demonstration plant size that will allow the generation of data or process economics and scale factors that enable decisions to be made concerning the feasibility for commercialization of the process. The appropriate sizes vary from technolgoy to technology.

The Department has recently issued procurement regulations effective June 30, 1979 with a section dealing with the subject of cost participation. The new policy is that cost participation will be decided on a case by case basis and, as in the past, no fixed minimum outside participation level is specified. It also provides that cost participation can begin as early as the laboratory stage in the process development cycle.