United States General Accounting Office

GAO

Report to the Honorable
Philip R. Sharp, Chairman,
Subcommittee on Energy and Power,
Committee on Energy and Commerce,
House of Representatives

March 1990

FOSSIL FUELS

Pace and Focus of the Clean Coal Technology Program Need to Be Assessed

O/RCED-90-67

GAO

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Resources, Community, and
Economic Development Division

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March 19, 1990

The Honorable Philip R. Sharp
Chairman, Subcommittee on Energy and Power
Committee on Energy and Commerce
House of Representatives

Dear Mr. Chairman:

As you requested, this report discusses the Department of Energy's (DOE) evaluation and selection of project proposals under the second round of the Clean Coal Technology program. The preliminary results of our review were presented in our Statement for the Record (GAO/T-RCED-90-3) submitted for your Subcommittee's October 18, 1989, hearing on acid rain control provisions of the administration's proposal to amend the Clean Air Act.

As arranged with your office, we plan to distribute copies of this report to the Secretary of Energy and make copies available to other interested parties upon their request.

This work was done under the direction of the former Director of Energy Issues, Keith O. Fultz. Please call Mr. Victor S. Rezendes, the current Director of Energy Issues at (202) 275-1441 if you have any questions about this report. Major contributors are listed in appendix VII.

Sincerely yours,

J. Dexter Peach
Assistant Comptroller General

Executive Summary

Purpose

Coal, one of the nation's most abundant energy resources, provides about 25 percent of the nation's energy needs. At the same time, however, emissions resulting from the burning of coal are major contributors to air pollution problems, particularly acid rain. The Department of Energy's (DOE) Clean Coal Technology (CCT) program was established in 1984 to provide financial assistance to industry—up to 50 percent of a project's cost—in demonstrating the commercial applications of emerging clean coal technologies that would enhance the use of coal, but in both a more efficient and environmentally acceptable manner.

The Congress has appropriated $2.75 billion for the CCT program. To date, DOE has requested project proposals from industry through three separate solicitations (or rounds) and has selected 39 projects. About $1.55 billion has been committed to the first three rounds. Concerned about the implementation of the program, the Chairman, Subcommittee on Energy and Power, House Committee on Energy and Commerce requested GAO to review DOE's criteria and process for evaluating and selecting round-two projects.

Background

As of December 1989, DOE had completed cooperative financial assistance agreements with sponsors of 13 of the 26 round-one and -two projects in the CCT program. DOE expects to complete cooperative agreements for the remaining round-one and -two projects by July 1990. DOE selected 13 additional projects for the program in December 1989 under the third round and expects to complete negotiations for their funding by December 1990. Public Law 101-121 directs DOE to solicit project proposals for the fourth round by June 1, 1990 and the fifth round in 1991.

The CCT program is especially important in view of the administration's July 1989 legislative proposal to amend the Clean Air Act, which includes requirements to reduce annual sulfur dioxide emissions from fossil-fueled generators by approximately 10 million tons below 1980 levels and annual nitrogen oxide emissions by 2 million tons below projected 2000 levels by December 31, 2000.

Results in Brief

DOE developed an elaborate process for evaluating, ranking, and selecting round-two project proposals. The criteria used to evaluate and select proposals for funding generally conformed to congressional and other program guidance. Also, the evaluation and selection process provided reasonable assurance that proposals were consistently and thoroughly evaluated and that projects were selected using the applicable criteria.

GAO's analysis of the evaluation and selection process showed that DOE picked the highest-ranked proposals submitted for the various mix of technologies that it was interested in seeing demonstrated.

Of the 16 projects DOE selected in round two, 12 were rated weak in meeting certain of the evaluation criteria. Nine of the projects were rated weak in meeting the criterion that a project's technology has the potential to reduce nationwide emissions that cause acid rain. Although emphasis was to be focused on coal-burning projects nationwide to reduce emissions that cause acid rain, it still was only one of many criteria to be considered in evaluating proposals. If DOE had picked more projects with greater potential to reduce nationwide emissions from coal-fired facilities, it would have resulted in (1) the selection of lower-ranked projects demonstrating technologies similar to the projects that were selected, and (2) projects selected which may not be successfully demonstrated or commercialized because of weaknesses in other criteria.

GAO also noted that half of the 48 proposals that were evaluated in round-two fared poorly against 3 or more of the evaluation criteria. This could indicate that DOE may have problems in identifying and funding additional promising clean coal technology projects in future rounds. Furthermore, GAO's past work has shown that problems have delayed finalizing project cooperative agreements, delayed completion of various project phases, and extended the estimated completion dates for some projects in round-one. As of December 31, 1989, only three projects were in the demonstration or operation phase and none had been fully demonstrated. Rather than move into rounds four and five of the program as currently scheduled, it may be beneficial to wait until DOE has more information on actual project demonstration results. This would allow DOE to make more informed decisions regarding the identification, selection, and funding of the more promising technologies in future rounds of the program and would help to ensure that the funds allocated to this program are effectively and efficiently spent.

Principal Findings

Evaluation Criteria Development

DOE appointed a project selection official who formed a Board for developing proposal evaluation and selection criteria and for evaluating the proposed projects. To evaluate project proposals, the Board developed 6

qualification, 3 preliminary evaluation, and 11 comprehensive evaluation criteria. The qualification and preliminary evaluation criteria were intended to ensure that proposals met general program qualification requirements and contained sufficient information for undergoing comprehensive evaluation. The comprehensive evaluation criteria were used to assess the proposals' technical, business and management, and cost aspects. In addition, DOE developed four program policy factors to be considered in selecting projects. GAO's review of DOE's criteria, congressional legislation and accompanying reports, DOE regulations, and other program guidance showed that the evaluation criteria were developed in accordance with the guidance provided.

Evaluation and Selection Process

The Board used teams of experts within DOE to assist in evaluating the 55 proposals submitted. Seven were rejected because they did not meet either the qualification or the preliminary evaluation criteria. The remaining 48 proposals were judged against the comprehensive evaluation criteria, which included a detailed assessment of each proposal's strengths and weaknesses. Using the teams' evaluations, in conjunction with its review of the proposals, the Board also evaluated and rated each proposal against the comprehensive criteria and developed an overall ranking of the proposals.

GAO's review of the evaluation plan and procedures and randomly selected evaluation files disclosed that the Board's evaluation process provided reasonable assurance that the evaluations were based on the criteria, and that the evaluation teams consistently applied the criteria.

Using the Board's evaluation results and four additional program policy selection factors, DOE's selection official picked 16 projects, representing a broad spectrum of technologies, that were consistent with the Board's overall ranking of the proposals and represented the highest-ranked proposals for the range of technologies included in the round-two selections.

Selected Projects' Weaknesses

Although the selected projects represented the highest-ranked proposals for the technologies DOE was interested in seeing demonstrated, the Board's evaluations disclosed that 12 of the 16 selected projects were rated weak in meeting 1 or more of the comprehensive evaluation criteria. The technologies to be demonstrated by 9 of these 12 projects were rated weak in their potential to reduce nationwide emissions of sulfur

dioxide and/or nitrogen oxides when used on existing coal-burning facilities, although they are expected to reduce emissions in those applications where they can be used. For example, DOE selected two projects to demonstrate technologies for use in the steel and cement industries. While beneficial in these industries, according to the evaluation results, the application of these technologies on a widespread basis is limited; therefore, their potential to reduce nationwide emissions is limited.

Five of the 12 projects, including 2 of the above 9 projects, were also rated weak in other criteria relating to the technical readiness of the technology for demonstration; the adequacy of the technical and management approach to design, construct, and operate the project; the adequacy of the project's financing plan; and/or the adequacy of the project's commercialization plan. However, these five projects were rated stronger against a number of other comprehensive evaluation criteria and were the highest ranked for the mix of technologies that DOE wanted to see demonstrated.

Nonselected Projects With Strong Emission Reduction Potential

GAO's review of DOE's evaluation records showed that 14 of the 32 proposals that were not selected were rated to have better potential for reducing nationwide emissions that cause acid rain than the 9 selected projects that were rated weak in meeting this criterion. However, 6 of these 14 nonselected proposals were rated weak in meeting 4 or more of the other comprehensive evaluation criteria. Thus, while they were stronger on the emissions reduction criterion, their chances of successful demonstration and commercialization may be weakened by shortfalls in other areas. Picking the other nonselected proposals would have resulted in the selection of lower-ranked projects demonstrating technologies similar to the projects that were selected.

Matters for Consideration by the Congress

Given the current status of projects in the CCT program and in view of the nation's current budget constraints, the Congress may want to consider amending the clean coal technology provision of Public Law 101-121 to direct DOE to delay requesting proposals and selecting projects for rounds four and five of the program until it obtains additional demonstration results from projects already in the program.

Agency Comments

GAO obtained and incorporated the views of DOE officials on the factual information presented. However, as requested by the Chairman's office, GAO did not obtain official agency comments on a draft of this report.

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Abbreviations

CCT	Clean Coal Technology
DOE	Department of Energy
GAO	General Accounting Office
NO_x	nitrogen oxides
SO_2	sulfur dioxide

Introduction

Coal, Energy, and the Environment

Coal is one of our most abundant energy resources. It represents about 80 percent of our fossil fuel resources and provides about 25 percent of the nation's energy needs. Coal-fired power plants produce more than 55 percent of the electricity in the United States. Although coal is considered an important resource in meeting present and future energy needs, coal combustion produces emissions that contribute to acid rain. Acid rain—which has been linked to a number of environmental problems, including forest damage in the United States and Canada—is formed when sulfur dioxide (SO_2) and nitrogen oxides (NO_x) emitted into the atmosphere return to earth as acid components in rain or snow. Coal-burning power plants are the principle source of SO_2 emissions and a major source of NO_x emissions.

Because of coal's importance in meeting the nation's future energy needs, several initiatives have been undertaken in recent years by both industry and the government to seek new technologies that will allow coal to be burned in an environmentally acceptable and efficient manner. About 20 million tons of SO_2 and 20 million tons of NO_x are emitted annually in the United States. Electric utilities and industrial plants account for about 95 percent of SO_2 emissions and about 50 percent of NO_x emissions. On July 27, 1989, the administration proposed amendments to the Clean Air Act, including requirements to reduce annual SO_2 emissions from fossil-fueled generators by approximately 10 million tons below 1980 levels and annual NO_x emissions by 2 million tons below projected 2000 levels by December 31, 2000. This proposal underscores the importance—and urgency—of industry and government efforts to develop new coal-burning technologies that will allow coal to continue to be used as a major energy source in future years.

The Clean Coal Technology Program

In 1984, under Public Law 98-473, the Congress set aside $750 million in the Energy Security Reserve Fund to establish the Department of Energy's (DOE) Clean Coal Technology (CCT) program. The purpose of this government-industry, co-funded program is to assist industry in accelerating the commercialization of new coal technologies by demonstrating that they burn coal more cleanly, efficiently, and cost-effectively than current technologies. In December 1985, the Congress passed Public Law 99-190 authorizing DOE to use $400 million of the $750 million from the Energy Security Reserve Fund for the first solicitation, or round-one, of the CCT program.

Under the program, DOE can fund up to 50 percent of each project's cost. Industry and other nonfederal sources are expected to fund the balance.

DOE issued the program's first solicitation for project proposals in February 1986. As of December 1989, DOE had cooperative financial assistance agreements with seven round-one project sponsors and was in the process of negotiating agreements with the sponsors of the remaining four round-one projects. DOE expects these negotiations to be completed by July 1990. Of the 7 funded round-one projects, 4 are in the design or construction phases and 3 are in the demonstration (operation) phase. We have issued two reports[1] and testified twice[2] on DOE's first solicitation.

In March 1987, the administration announced plans for expanding the CCT program. This expansion was based on a January 1986 report by U.S. and Canadian envoys that made several recommendations to reduce environmental problems associated with acid rain.[3] Among other things, the report recommended that the United States implement a 5-year program to demonstrate clean coal technologies that would be needed for a future acid rain control program and that the U.S. government and industry each provide $2.5 billion for the program. The administration accepted the recommendation of the special envoys and requested $2.5 billion over a 5-year period to demonstrate new clean coal technologies capable of being used in existing coal-burning plants. The administration also announced that future clean coal technology demonstration projects would be selected, where possible, to reduce emissions that cause acid rain.

In December 1987, the Congress provided $575 million for the program's second-round solicitation for project proposals. In February 1988, DOE solicited round-two proposals, and in September 1988, selected 16 projects from the 55 proposals received. As of December 31, 1989, one of the 16 selected round-two projects, which are listed in appendix I, had been withdrawn from the program and cooperative financial assistance agreements had been completed for 6 of these projects. DOE expects to complete the cooperative agreements for the remaining round-two projects by July 1990.

[1]Fossil Fuels: Commercializing Clean Coal Technologies (GAO/RCED-89-80, Mar. 29, 1989) and Fossil Fuels: Status of DOE-Funded Clean Coal Technology Projects as of March 15, 1989 (GAO/RCED-89-166FS, June 29, 1989).

[2]Views on DOE's Clean Coal Technology Program (GAO/T-RCED-88-47, June 22, 1988) and Status of DOE-Funded Clean Coal Technology Projects (GAO/T-RCED-89-25, Apr. 13, 1989).

[3]Joint Report of the Special Envoys on Acid Rain (Jan. 1986).

In September 1988, the Congress provided an additional $575 million for a third round of the CCT program. In May 1989, DOE solicited round-three proposals and in December 1989, DOE selected 13 projects from 48 proposals submitted. DOE expects to complete the negotiations for the round-three projects by December 1990.

As of December 31, 1989, 39 projects were in the CCT program. DOE was in the process of negotiating agreements with the sponsors of 26 of these projects, and of the 13 projects that had been funded, 3 were in the demonstration (operation) phase and none had been fully demonstrated.

In October 1989, under Public Law 101-121, the Congress appropriated $1.2 billion for funding rounds four and five of the CCT program, of which $600 million is to be made available for round-four and $600 million for round-five. Thus, the Congress has appropriated a total of $2.75 billion for the program ($1.55 billion for the first three rounds and $1.2 billion for rounds four and five). Of the total $2.75 billion, $2.5 billion is for funding the program over a 5-year period from fiscal year 1988 through 1992. DOE plans to solicit project proposals for the fourth round in June 1990 and the fifth round in 1991.

Objectives, Scope, and Methodology

On March 9, 1988, the Chairman, Subcommittee on Energy and Power, House Committee on Energy and Commerce, asked us to review DOE's implementation of the CCT Program. Specifically, the Chairman requested information on the criteria and process used by DOE to select the program's second round of projects. To respond to the Chairman's request, we reviewed DOE's evaluation and selection criteria and the process DOE used to (1) develop the criteria, (2) evaluate proposals, and (3) select projects to determine if the selection of round-two projects was accomplished in accordance with the program's objective and guidance.

To determine the CCT program objective and related guidance, we reviewed the program's legislation, applicable DOE regulations, and congressional reports pertaining to the program. We also reviewed the Joint Report of the Special Envoys on Acid Rain, the Innovative Control Technology Advisory Panel Report that provided guidance for DOE to consider in developing evaluation and selection criteria, and the Vice President's Task Force on Regulatory Relief recommendation that DOE consider selecting projects in states providing incentives to encourage the use of clean coal technologies. In addition, we reviewed public comments on the solicitation and DOE studies or analyses prepared for the

program. We reviewed DOE's criteria to ascertain if they were developed generally in agreement with the program's objective and guidance.

To review DOE's process for developing its project evaluation and selection criteria, we interviewed three of the program's Source Evaluation Board's seven voting members, including its Chairman. We also interviewed its executive secretary and legal advisors assisting in the round-two process. In addition, we reviewed minutes of the Board's meetings, other documents, and applicable DOE regulations.

To review the process the Board used for evaluating proposals, we interviewed its Chairman and two of its members. We also reviewed the Board's evaluation plan, written instructions provided to its evaluation teams, and the Board's evaluation report. We randomly selected and reviewed 11 (20 percent) of the 55 proposals received in response to the round-two solicitation to determine (1) if the evaluation teams' and Board's evaluations were done in accordance with the Board's plan and procedures, and (2) whether the Board and evaluation teams consistently applied and evaluated the proposals in accordance with the project evaluation criteria.

To determine how the final projects were selected for funding, we interviewed DOE's project selection official and reviewed his selection report to see how he applied the program's selection criteria in choosing projects. We also compared the projects selected with the Board's overall ranking of the proposals.

We also reviewed DOE's Financial Integrity Act reports to determine whether DOE had identified any management control weaknesses regarding the process for developing the solicitation and evaluating the proposals. We conducted our review from June 1988 through September 1989 in accordance with generally accepted governmental auditing standards. In accordance with the Subcommittee Chairman's request, we did not obtain official agency comments on a draft of this report. However, we did discuss the information in this report with DOE program officials and have included their comments in the report where appropriate.

DOE's Criteria and Process for Evaluating and Selecting Projects

DOE developed an elaborate process for evaluating and selecting round-two clean coal technology projects. The criteria used to evaluate project proposals generally conformed to legislative and regulatory requirements and other program guidance. Also, the criteria appeared to be consistently applied during the evaluation process.

Round-Two CCT Program Objective

The objective of the round-two CCT program was to select and cost-share projects that would demonstrate innovative clean coal technologies that are (1) capable of being commercialized in the 1990s, (2) more cost-effective than current technologies, and (3) capable of achieving significant reductions of SO_2 and NO_x emissions from existing coal-burning facilities, particularly those that contribute to transboundary (crossing the border to Canada) and interstate pollution. The emphasis on a technology's emissions reduction potential was linked to the recommendations contained in the special envoys' report on acid rain, as discussed in chapter 1, and represents a major shift in program focus from the round-one project solicitation. The first solicitation was directed at demonstrating a broad slate of technologies to enhance the use of coal for all market applications and did not focus on the technologies' potential for controlling emissions from coal combustion. (App. II provides a description of the types of clean coal technologies.)

Selection Official and Board

DOE's regulations establish uniform policies and procedures for all DOE financial assistance awards. For awards with expected values of over $10 million, the regulations require that a Source Evaluation Board be established to solicit and evaluate proposals and a Source Selection Official be appointed to select projects. On December 7, 1987, the Under Secretary of Energy appointed the Principal Deputy Assistant Secretary, Office of Fossil Energy, as the selection official. He was responsible for (1) appointing the Board, (2) reviewing the Board's project evaluation and selection criteria, and (3) selecting projects.

The selection official appointed the Board on December 8, 1987, to prepare evaluation and selection criteria and to evaluate proposals. The Board consisted of seven voting members, including the Chairman, two legal advisors, and an executive secretary. Eight of the 10 members were from DOE headquarters, and 2 were from DOE's technology centers. (App. III provides a chronology of events leading to the selection of the program's second-round projects.)

Evaluation and Selection Criteria

DOE employed a four-phase evaluation process for evaluating and selecting projects from the 55 proposals submitted in response to the round-two solicitation. As shown in table 2.1, a total of 24 criteria were used during the four phases to evaluate and select projects.

Table 2.1: Evaluation Phases Used in Selecting Round-Two Projects

Phases	Purpose
Qualification (6 criteria)	Prescribe basic program qualifications that proposed projects must meet to be considered for preliminary evaluation, e.g., projects must use U.S. coal and be located in the United States.
Preliminary evaluation (3 criteria)	Prescribe standards by which proposals will be evaluated to assure that they address program objectives and contain sufficient technical, cost, and other information to undergo comprehensive evaluation.
Comprehensive evaluation (11 criteria)	Prescribe specific technical, business and management, and cost criteria on which proposals will be evaluated.
Selection (4 criteria)	Prescribe four program policy factors to consider in selecting projects.[a]

[a]DOE's round-two solicitation identified three program policy factors and one other factor to consider in *selecting projects. We refer to these four* factors as program policy factors.

(App. IV provides more detailed information on the criteria used in evaluating and selecting projects.)

According to members of the Board that we interviewed, the process used to develop its evaluation and selection criteria was an informal process within DOE. The process was also systematic, according to DOE officials. Our analysis of the 24 criteria used to evaluate and select projects showed that, although developed in an informal manner, the criteria generally conformed to DOE's regulations and specific legislative and program guidance. For example, congressional legislation concerning the CCT program requires that at least 50 percent of a project's cost be provided from nonfederal sources. Other congressional guidance provided that the projects be located in the United States and use U.S. coal. These requirements were included in the qualification criteria.

Also, the Congress, the special envoys' report, and the Innovative Control Technology Advisory Panel report recommended that the potential for reducing nationwide emissions and the cost-effectiveness of controlling emissions be used as program criteria. These elements were included as two of the comprehensive evaluation criteria. Furthermore, all three of the preliminary evaluation criteria were developed in

accordance with program regulations, and all four program policy factors that were to be considered in selecting projects followed guidance provided by the Congress, the special envoys' report, the advisory panel, and the Vice President's Task Force on Regulatory Relief. (App. V provides additional information on the guidance that DOE used in developing its proposal evaluation criteria. App. VI lists each of the evaluation and selection criteria and identifies the sources used in developing the criteria.)

Evaluation Process and Results

The Board developed an evaluation plan and established teams of experts to assist it in evaluating project proposals. The evaluation plan described the procedures for the qualification and preliminary reviews as well as for the comprehensive evaluations.

Qualification Review Phase

The plan required each proposal to be reviewed initially to ensure that it met the six qualification criteria. To satisfy this requirement, the Board's procurement member and at least two other Board members reviewed the proposals to determine if they met all six criteria. Proposals found deficient were reviewed by the Board, who then voted whether to recommend to the selection official that the proposal be disqualified. This process resulted in 6 of the 55 project proposals being disqualified from further consideration. For example, five of the proposals did not meet the qualification criterion which required that the sponsor agree to provide at least 50 percent of the project's cost for each phase of the demonstration. Also, five proposals did not contain a plan to repay the government's investment in the project should the project's technology be commercialized.

As mentioned in chapter 1, we tested 11 proposals to determine whether the evaluations were done in accordance with the Board's plans and procedures and whether the evaluation criteria were consistently applied to the proposals. Our review disclosed that 9 of the 11 proposals met the qualification criteria, while 2 did not. These two proposals were included in the six proposals that the selection official disqualified.

Preliminary Evaluation Phase

The Board used evaluation teams to assist it in the preliminary evaluation phase of its review of the remaining proposals. For this phase, the teams reviewed each proposal to determine if it contained sufficient information to undergo a comprehensive evaluation. When a team found that a proposal lacked sufficient information for further evaluation, two

Board members reviewed the team's findings. If the members confirmed the team's findings, the Board reviewed the proposal and voted on whether they should recommend to the selection official that the proposal be disqualified from further consideration. This process resulted in one additional proposal being disqualified.

Comprehensive Evaluation Phase

The 48 proposals that met the qualification and preliminary evaluation criteria underwent comprehensive evaluation. This phase of the evaluation process was the most detailed because it addressed the technical merits of each proposal, the business and management structure and plan for conducting the demonstration and commercializing the technology, and the reasonableness of the estimated project costs.

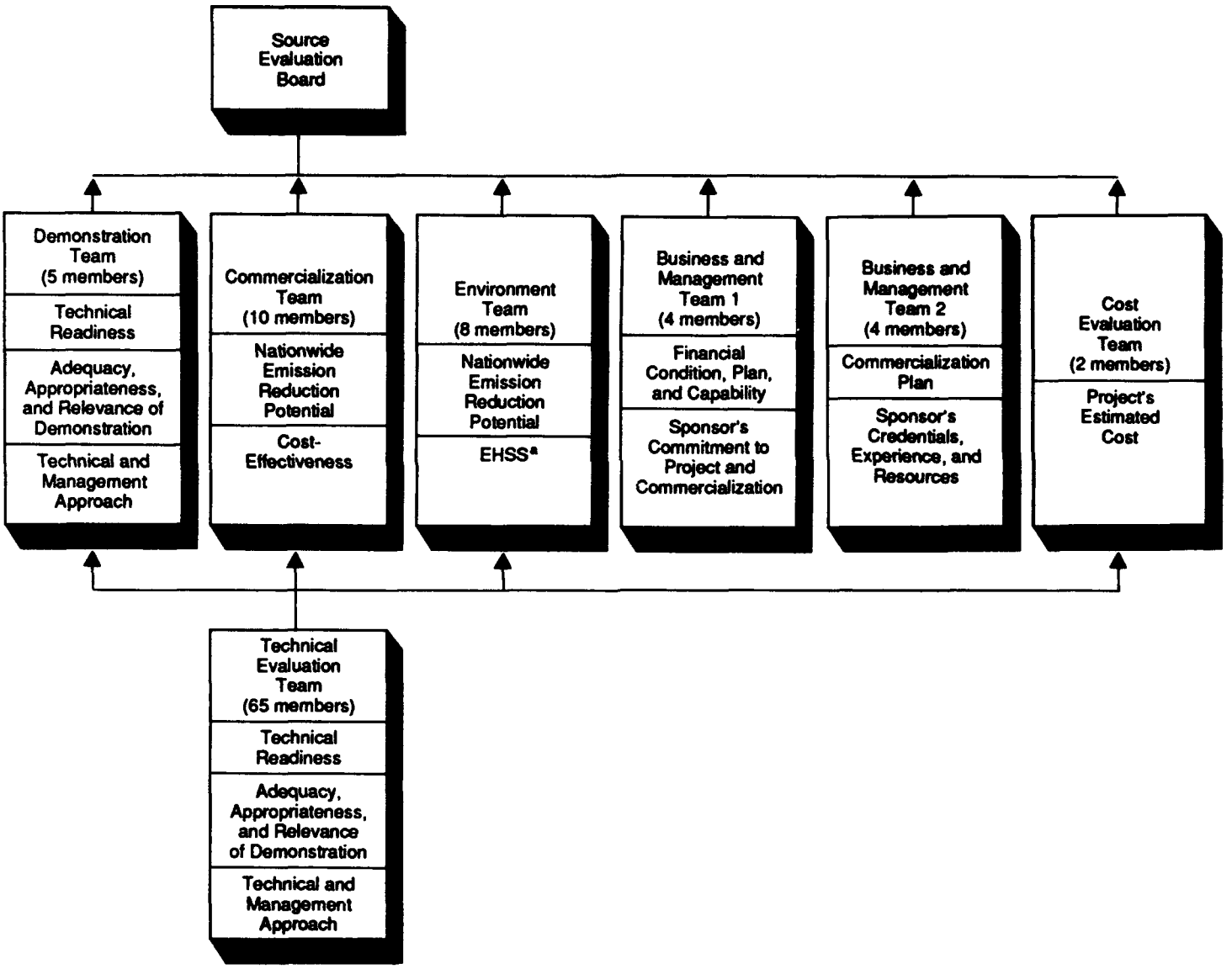
As shown in figure 2.1, the Board established seven teams of experts consisting of about 100 DOE staff in technical, environmental, procurement, and other areas to evaluate the proposals. This approach was used in this phase because of the degree of expertise needed to review each proposal. Also, through legislation appropriating funding for the CCT program, the Congress mandated that DOE complete its evaluation and selection of projects within 160 days after the solicitation's closing date.

The teams were instructed to describe each proposal's strengths and weaknesses and to rate the proposal for each criterion assigned to the team. The instructions contained work sheets that included a section for describing the proposal's strengths and weaknesses, a summary statement of the strengths and weaknesses, and a rating. The instructions also described what justifies certain ratings. For example, an excellent rating was justified when the proposal's strengths were substantially greater than its weaknesses, which were of minor or little importance. Our review of the nine randomly selected proposals that were comprehensively evaluated showed that the team evaluations were done in accordance with the Board's written procedures for evaluating proposals. The results of the team evaluations were submitted to the Board for its evaluation.

Board's Evaluation and Ranking

Using the team evaluations in conjunction with its own review of the proposal, the Board also evaluated and rated each proposal against the comprehensive criteria. These evaluations were first done individually

Figure 2.1: Comprehensive Evaluation Organization Chart



[a]Environmental, health, safety, socioeconomic, and other site-related aspects.

by each Board member. The Board then discussed the individual evaluations and reached a consensus on each proposal's strengths and weaknesses for each of the criterion. The identified strengths and weaknesses

found by the Board members were consistent with the evaluation teams' assessments for the nine randomly selected proposals we reviewed.

The Board used a quantitative scale to rate the technical merits of each proposal and a qualitative scale to rate the business and management criteria. The six technical criteria were rated on a scale of 0 to 100, in accordance with the evaluation plan. Scores of 39 or less meant that the proposal was considered to be weak in meeting the particular criterion. After discussing the proposal's strengths and weaknesses for each of the applicable technical criterion, the Board developed a consensus of the proposal's strengths and weaknesses and developed a final score by criterion. Next, the weights contained in the plan for each of the six criteria were applied to the final scores to arrive at a weighted technical score for each proposal.

The Board used a rating scale ranging from unsatisfactory to excellent to rate each of the four business and management criteria. (The scale consisted of eight categories: unsatisfactory, poor, fair, good minus, good, good plus, excellent minus, and excellent.) The Board considered a proposal to be weak in meeting a criterion if it was rated unsatisfactory or poor. When the Board developed its consensus strengths and weaknesses, it also developed a consensus rating for each proposal for each of the four criteria. Finally, the Board applied the weights contained in its plan to the criteria rating to arrive at an overall consensus business and management rating for each proposal.

The Board also considered the reasonableness, allocability, and allowability of each project's proposed cost but did not assign either a numerical or qualitative rating to this criterion as it did with the technical and business and management criteria. DOE's financial assistance regulations provide that project costs are not to be rated.

After completing its evaluations, the Board developed a consensus ranking of the proposals. In developing this overall ranking, the Board used its numerical technical scores, the adjective business and management rating, and the relative importance of the technical, business and management, and cost criteria, as stated in the solicitation. According to the solicitation, the technical criteria are of somewhat greater importance than the business and management criteria. Cost was viewed to be of minimal importance relative to the other criteria except when everything else was equal, in which case cost became a deciding factor.

These results were presented in a report to the selection official. Among other things, the report contains the Board's ranking of the proposals and information on each proposal, including its strengths, weaknesses, and rating for each criterion except cost.

Selection Official Process for Choosing Projects

After the 48 round-two project proposals were evaluated, DOE's selection official chose 16 projects for funding under the CCT program. In choosing the projects, the selection official first considered the Board's technical criteria evaluations since they were of somewhat greater importance than the other criteria, and then the Board's business and management and cost criteria evaluations. He also considered other information, such as the potential environmental impact of the proposed projects, and applied the selection criteria to select projects from the submitted proposals that would best satisfy the program's goals and objectives.

The criteria used to select projects consisted of four program policy factors. Three of the factors were to ensure that the selected projects, taken collectively, complied with the program's objectives, and included the desirability of selecting projects

- for retrofitting and/or repowering existing coal-fired facilities that collectively represent a diversity of methods, technical approaches, and applications (including both industrial and utility);
- that collectively produce some near-term reduction of transboundary transport of emitted SO_2 and NO_x; and
- that collectively represent an economic approach applicable to a combination of existing facilities that contribute significantly to transboundary and interstate transport of SO_2 and NO_x emissions in terms of facility types, sizes, and coal types.

In addition to these three factors, the selecting official was to consider giving preference to projects in states where the state's rate-making bodies treat clean coal technologies the same as pollution-control projects or technologies.

In applying the above criteria, the selection official told us that he attempted to pick projects that represented a number of different technical approaches and methods. In each case, he picked the proposal that, in his judgment, represented the best overall project within the technology option, according to his review of the proposals and his knowledge of proposed technologies.

In addition, the selection official concluded that in no case was a non-selected project considered to be a better alternative to a selected project within the same technological grouping. Our review of the evaluation and selection results disclosed that the selecting official picked the highest-ranked project for each technology selected for funding. No non-selected project with the same technical approach or method received a higher ranking than a selected project.

We also found the selecting official's selections to be consistent with the Board's overall rankings. Nine of the 16 projects that were selected were the top 9 projects in the overall ranking by the Board. However, seven lower-ranked projects were selected to satisfy the program policy goal that projects representing a mix of technologies be included in the program. These seven projects represented different technologies and were the highest ranked within their technologies, although five of the seven were ranked below the 16th highest-ranked proposal.

Conclusions

The criteria that DOE developed for evaluating round-two project proposals adequately considered congressional and other program guidance, and the comprehensive evaluation process that DOE established resulted in project proposals being consistently and thoroughly evaluated. DOE used the evaluation results, together with several broad program policy project selection considerations, to pick the highest-ranked projects for a variety of different technologies that it wanted to see demonstrated.

Best Projects Were Selected but Many Have Limitations in Meeting DOE's Evaluation Criteria

As discussed in chapter 2, the major emphasis of round two of the CCT program was to demonstrate technologies that can significantly reduce nationwide emissions contributing to acid rain. Our review of DOE's documented evaluation and selection results showed that the selecting official picked the highest-ranked projects for the mix of technologies that DOE wanted to see demonstrated. However, many of the technologies may have limited potential to significantly reduce nationwide acid rain-causing emissions from coal-burning facilities. Also, some of the selected projects were rated weak in meeting other evaluation criteria. In fact, half of the 48 project proposals fared poorly against 3 or more of the evaluation criteria.

Evaluation Criteria in Which Projects Were Rated Weak

Of the 16 proposals that were selected for cost-sharing assistance, DOE determined that 12 were weak in meeting 1 or more of its comprehensive evaluation criteria. The technologies to be demonstrated by nine of the selected projects were determined to have limited potential for reducing nationwide emissions from coal-burning facilities, three projects were rated weak in meeting the commercialization criterion, and two in meeting the technical readiness for demonstration criterion. Also, two projects were rated weak concerning their technical and management approach, and one concerning its financing plan.

Some Selected Projects' Technologies Have Limited Nationwide Emission Reduction Potential

In assessing the emission reduction potential of a proposed project's technology, DOE considered the extent to which the technology, when used at existing coal-fired facilities, could (1) reduce nationwide emissions of SO_2 and NO_x and (2) reduce transboundary and interstate air pollution.

DOE determined that the particular applications (design concepts and features) of the technologies to be demonstrated at 9 of the 16 selected projects had limited potential for reducing emissions on a nationwide basis. These nine projects are to receive about $281.4 million in federal funds. As shown in table 3.1, the technologies' nationwide emission reduction potential for the nine projects with limited potential ranged from 0.2 million tons per year to 2.2 million tons per year. In comparison, the technologies' nationwide emission reduction potential for the seven projects with greater potential ranged from 6.5 million tons per year to 16.8 million tons per year.

Table 3.1: Nationwide Emission Reduction Potential for the 16 Selected Projects' Proposed Technologies

Million tons per year

Project[a]	Sulfur dioxide emissions	Nitrogen oxide emissions	Total emissions
Stronger reduction potential			
A	12.6	4.2	16.8
B	12.1	0.0	12.1
C	12.1	0.0	12.1
D	9.4	0.0	9.4
E	7.2	1.9	9.1
F	5.4	3.7	9.1
G	4.7	1.8	6.5
Limited reduction potential			
H	0.0	2.2	2.2
I	1.2	0.3	1.5
J	0.0	0.9	0.9
K	0.0	0.9	0.9
L	0.5	0.2	0.7
M	0.4	0.0	0.4
N	0.0	0.3	0.3
O	0.2	0.0	0.2
P	0.2	0.0	0.2

[a]We did not identify the selected projects in this table by their title or sponsor because DOE is still in the process of negotiating cooperative financial assistance agreements with the project sponsors. We have therefore used an alphabetic letter.

As previously mentioned, the administration's July 1989 legislative proposal to amend the Clean Air Act calls for an annual nationwide reduction of approximately 10 million tons in SO_2 emissions below 1980 levels and 2 million tons in NO_x emissions below projected 2000 levels by December 31, 2000.

DOE's Basis for Selecting Projects With Limited Nationwide Emission Reduction Potential

In both rounds-one and -two, DOE's policy has been to select projects representing as many different clean coal technologies as possible. According to DOE officials, the nine projects with technologies having limited potential for nationwide emission reduction were selected to provide technological diversity within the program. As discussed in chapter 2, our analysis of DOE's evaluation records showed that each of the nine projects was the highest-ranked proposal submitted for the particular technology. The nine projects are to demonstrate various applications of the following technologies or processes: flue gas cleanup to control NO_x

emissions; coal preparation to reduce sulfur; atmospheric and pressurized fluidized-bed combustion to reduce SO_2 and NO_x emissions; and industrial processes for reducing SO_2 emissions.

Several of the nine projects were selected to demonstrate technologies that could be used to reduce NO_x emissions on different types of boilers in the utility industry—or to demonstrate technologies for use in other markets, such as steel and cement industries. While these technologies have the potential to reduce emissions in the specific areas where they can be used, their application is limited in significantly reducing nationwide emissions that cause acid rain. For example, according to the Board Chairman, SO_2 emissions account for about 80 percent of the total acid rain-causing emissions from coal-fired power generating plants, and NO_x emissions account for about 20 percent. Therefore, technologies that would only reduce NO_x emissions were rated lower on the emission reduction criterion than technologies that would reduce SO_2 emissions or both SO_2 and NO_x emissions.

According to the Board Chairman, the atmospheric and pressurized fluidized-bed combustion technologies are expected to reduce emissions and result in dollar savings per ton of emissions removed (compared to scrubbers), should they be used at existing coal-fired facilities to meet an increase in the demand for electricity. However, if increased generating capacity is not needed, these technologies would probably not be used, and their application would be limited in reducing nationwide emissions.

The other seven projects whose technologies were rated stronger in meeting the nationwide emission reduction criterion are to demonstrate various applications of the following technologies: advanced slagging combustion; flue gas cleanup to reduce both SO_2 and NO_x emissions, or only SO_2 emissions; and integrated gasification combined-cycle technology.

Nonselected Projects With Stronger Nationwide Emission Reduction Potential

Our review of DOE's evaluation records showed that 14 of the 32 project proposals that were not selected for funding were rated to have better potential for reducing nationwide acid rain-causing emissions than the 9 selected projects that were rated weak in meeting this criterion. However, 6 of these 14 nonselected proposals were rated weak in meeting four or more of the other comprehensive evaluation criteria. Thus, while they were stronger on the emissions reduction criterion, their chances of

successful demonstration and commercialization were apparently weakened by shortfalls in other areas.

Of the other eight nonselected proposals:

- Two were to demonstrate a technology for flue gas cleanup to reduce SO_2. Our analysis showed that DOE selected another flue gas cleanup project for funding that was ranked higher and had greater nationwide emission reduction potential than these two nonselected proposals.
- Two were to demonstrate the integrated gasification combined-cycle technology. These two proposals were also lower ranked and had less potential for reducing nationwide emissions than the project DOE selected to demonstrate this technology.
- One was to demonstrate an atmospheric fluidized-bed combustion technology and another was to demonstrate a pressurized fluidized-bed combustion technology. Although these two nonselected proposals had greater nationwide emission reduction potential than the two projects that were selected to demonstrate these technologies, the selected projects were among the four highest-ranked project proposals and were rated stronger in meeting the other comprehensive evaluation criteria.
- One was to demonstrate a particular technology application for NO_x emission reduction. This proposal was ranked lower than the project that was selected to demonstrate a similar technology application, and it also was rated weak in meeting three of the evaluation criteria. The selected project was one of the nine highest-ranked proposals and was rated stronger in meeting the other evaluation criteria.
- One proposal was to demonstrate coal-cleaning processes combined with post-combustion emissions control. This proposal was rated weak in meeting three of the evaluation criteria. DOE did not select any proposal to demonstrate this technology.

As indicated above, if DOE had picked more projects with greater potential to reduce nationwide emissions from coal-fired facilities, it would have resulted in the selection of lower-ranked projects to demonstrate technologies similar to those that were selected.

Other Weaknesses

Three of the 16 selected projects were rated weak in meeting DOE's commercialization criterion. (Two of these three projects were also rated weak regarding the emission reduction criterion.) The commercialization criterion was used to evaluate the adequacy of the sponsor's plan for

bringing the technology from the demonstration to widespread commercial application in the 1990s. Part of the round-two CCT program objective was to demonstrate technologies that were capable of being commercialized in the 1990s. The quality of the commercialization plan, along with other factors, such as demonstration results, affect the technologies' potential for commercialization.

In evaluating projects' commercialization plans, DOE considered the strategy proposed by sponsors for financing, licensing, manufacturing, and marketing the technology. DOE also considered the market potential for the technology, the role of project participants in the commercialization process, and other factors affecting commercialization.

Three of the 16 selected projects were also rated weak in meeting one or more of the following evaluation criteria: (1) the technical readiness of the technology for demonstration; (2) the adequacy and reasonableness of the technical and management approach to design, construct, and operate the project; and (3) the adequacy and completeness of the project's financing plan. These criteria, along with others, relate to the project's potential for a successful demonstration.

Project financing, one of the criterion in which a project was rated weak, has been a problem in the CCT program, as we reported in March 1989.[1] Our report discussed DOE's delays in completing the round-one project cooperative agreements, which occurred primarily because of the time it took to resolve sponsors' problems with project financing and other business arrangements.

Delays have also occurred in completing cooperative agreements under round-two and GAO's past work has also shown that the funded round-one projects were experiencing coordination, equipment, and financing problems that have caused delays in completing project phases, cost overruns, and proposed project modifications.[2]

[1]Fossil Fuels: Commercializing Clean Coal Technologies (GAO/RCED-89-80, Mar. 29, 1989).

[2]Views on DOE's Clean Coal Technology Program (GAO/T-RCED-88-47, June 22, 1988) and Status of DOE-Funded Clean Coal Technology Projects (GAO/T-RCED-89-25, Apr. 13, 1989).

Many Round-Two Proposals Were Rated Weak in Meeting Several Criteria

Not only did many of the 16 selected projects have limited potential to reduce nationwide emissions, but more than half of the 48 proposals evaluated did not fair well in meeting this criterion. A large percentage of the 48 proposals were also weak in more than one area. For example, 60 percent of the proposals were rated weak in meeting two or more of the evaluation criteria, and 50 percent were rated weak in meeting three or more criteria. As shown in table 3.2, both the selected projects and the overall universe of project proposals were rated weak by DOE in meeting the same comprehensive evaluation criteria.

Table 3.2: Project Proposals Rated Weak in Meeting Certain Evaluation Criteria

	Number of proposals rated weak	
Criteria	16 Projects selected	48 proposals evaluated
Nationwide emission reduction potential	9	27
Commercialization plan	3	27
Technical readiness	2	17
Technical and management approach	2	16
Financial plan	1	14

Although not a problem in the selected projects, one other criterion in which 17 of the 48 proposals were rated weak was in the adequacy, appropriateness, and relevance of the demonstration project to enhance technologies, techniques, or processes, and to provide new information that would enable the private sector to make rational commercialization decisions.

Funding of Future Rounds

As noted in chapter 1, in December 1989, DOE selected 13 projects under the round-three solicitation and expects to complete the negotiations for their funding by December 1990. This brings to 39 the total number of projects in the CCT program. Our past work has shown that problems have delayed finalizing project cooperative agreements, delayed completion of various project phases, and extended the estimated completion dates for some projects. According to DOE, as of December 31, 1989, cooperative agreements had been signed with project sponsors for 13 projects (7 of the 11 round-one projects and 6 of the 15 round-two projects) and 3 of the 13 projects were in the demonstration phase—no projects had been fully demonstrated.

In October 1989, under Public Law 101-121, the Congress appropriated $1.2 billion for funding rounds four and five of the CCT program, of which $600 million is to be made available beginning October 1, 1990 and $600 million beginning October 1, 1991. This legislation also stipulated specific dates by which requests for project proposals are to be issued and projects are to be selected. The request for round-four proposals are to be issued by June 1, 1990, and the projects selected by February 1, 1991; the request for round-five proposals are to be issued by September 1, 1991, and the projects selected by May 1, 1992.

Consistent with the legislation, DOE plans to request round-four project proposals in June 1990. However, based on the current status of the 39 projects in the CCT program, it may be prudent to delay the planned solicitation and selection of additional projects until DOE obtains demonstration results from some of the projects already in the program. This information could then be used to focus the remaining funds on the more promising technologies. The major drawback to delaying rounds four and five is that there could be some excellent project proposals that would not be considered for funding until a later date. However, if one assumes that the better projects would have been submitted during the first three rounds of the program, the chances of postponing the selection of quality projects may not be that high—especially when one considers the shortcomings DOE identified with the projects proposals that were not selected in round two.

Conclusions

Although most of the selected round-two projects fell short of meeting all of DOE's proposal evaluation criteria, they were the best projects submitted for the mix of technologies that DOE was interested in seeing demonstrated. However, many of the technologies selected for demonstration may have limited potential for achieving nationwide emission reductions when used at existing coal-burning facilities. Also, some of the selected projects may have difficulties in successfully demonstrating, and ultimately commercializing, their technologies.

With the emission reduction emphasis placed on the round-two solicitation, DOE could have selected more projects with greater potential to meet the emission reduction criterion. However, if DOE had picked more projects with greater potential to reduce nationwide emissions from coal-fired facilities, it would have resulted in (1) the selection of lower-ranked projects demonstrating technologies similar to the projects that were selected, and (2) projects selected which may not be successfully demonstrated or commercialized because of weaknesses in other criteria.

This could indicate that DOE may have problems in identifying and funding additional promising clean coal technology projects in future rounds.

DOE plans to request round-four project proposals in June 1990 and the fifth and final round in 1991. However, in view of the current status of the projects already in the program, and the problems experienced to date, we believe that the Congress needs to evaluate the pace and focus of rounds four and five of the program. It seems that an evaluation of the results of some of the current demonstration projects is needed before DOE solicits and selects additional projects under rounds four and five of the program. This would allow DOE to make more informed decisions regarding the identification, selection, and funding of the more promising technologies in future rounds of the program and help ensure that the funds allocated to this program are effectively and efficiently spent.

Matters for Consideration by the Congress

Given the current status of projects in the CCT program and in view of the nation's current budget constraints, the Congress may want to consider amending the clean coal technology provision of Public Law 101-121 to direct DOE to delay requesting proposals and selecting projects for rounds four and five until DOE obtains demonstration results from some of the projects already under the program.

Appendix I

List of Projects Selected Under the Clean Coal Technology Program's Second Round

Sponsor	Project	Project location
American Electric Power Service Corporation, Columbus, Ohio	Pressurized Fluidized-Bed Combustion Repowering Project	New Haven, West Virginia
The Babcock & Wilcox Company, Alliance, Ohio	Coal Reburning for Cyclone Boiler Nitrogen Oxide Control	Cassville, Wisconsin
The Babcock & Wilcox Company, Alliance, Ohio	Demonstration of the SOX-NOX-ROX BOX Post-Combustion Flue Gas Cleanup Process	Dilles Bottom, Ohio
Bethlehem Steel Corporation, Bethlehem, Pennsylvania	Innovative Coke Oven Gas Cleaning	Sparrows Point, Maryland
Combustion Engineering, Inc., Windsor, Connecticut	Innovative Clean Coal Gasification Repowering Project	Springfield, Illinois
Combustion Engineering, Inc., Windsor, Connecticut	Post-Combustion Dry Sorbent Injection Technology Demonstration[a]	Yorktown, Virginia
Combustion Engineering, Inc., Windsor, Connecticut and Snamprogetti, USA Inc., New York, New York	WSA-SNOX Technology for Catalytically Reducing Sulfur Dioxide and Nitrogen Oxides from Flue Gas	Niles, Ohio
Otisca Industries, Ltd., Syracuse, New York	Production of Compliance OTISCA FUEL (Coal Water Slurry) and its Combustion in Retrofitted Industrial Boilers	Oneida, New York; Syracuse, New York; Jamesville, New York
Passamaquoddy Tribe, Thomaston, Maine	Innovative Sulfur Dioxide Scrubbing System for Coal Burning Cement Kilns	Thomaston, Maine
Pure Air, Allentown, Pennsylvania	Advanced On-Site Flue Gas Desulfurization Process	Gary, Indiana
Southern Company Services, Inc., Birmingham, Alabama	Advanced Tangentially-Fired Combustion Techniques for Reduction of Nitrogen Oxides	Lynn Haven, Florida
Southern Company Services, Inc., Birmingham, Alabama	Advanced Wall-Fired Combustion Techniques for Reduction of Nitrogen Oxides	Rome, Georgia
Southern Company Services, Inc., Birmingham, Alabama	Demonstration of the Chiyoda Thoroughbred-121 Flue Gas Desulfurization Process	Newman, Georgia
Southern Company Services, Inc., Birmingham, Alabama	Selective Catalytic Reduction Technology for Control of Nitrogen Oxides	Pensacola, Florida
Southwestern Public Service Company, Amarillo, Texas	Circulating Fluidized-Bed Repowering Project	Amarillo, Texas
TransAlta Resources Investment Corporation, Alberta, Canada	Low Nitrogen Oxide/Sulfur Dioxide Burner Retrofit for Utility Cyclone Boilers	Marion, Illinois

[a]Project withdrew.

Description of Clean Coal Technologies

DOE defines clean coal technologies as any advanced coal-based system that offers significant potential for improved environmental and economic performance in utility and industrial applications. These technologies remove harmful emissions from coal prior to the coal combustion process, during combustion, after combustion or by converting coal to a cleaner burning liquid or gaseous fuel.

Pre-Combustion Technologies

Pre-combustion technologies pertain to coal preparation or coal-cleaning techniques that remove sulfur from coal before the coal reaches the boiler. Coal cleaning includes coal preparation and fuel upgrade.

Combustion Technologies

Combustion technologies include advanced combustion processes that remove SO_2 and/or NO_x emissions while burning coal inside the combustor or boiler. SO_2 emissions are controlled by using an agent, such as limestone, to chemically react with and neutralize the SO_2 while NO_x emissions are reduced by controlled or multi-stage burning. Combustion technologies may include retrofit technologies, which are added to existing power plants to reduce emissions, or repowering technologies, which replace or repower an existing plant's boiler. Repowering technologies reduce emissions and have the potential to increase plant efficiencies. Examples of repowering technologies include atmospheric and pressurized fluidized-bed combustion. Retrofit combustion technologies include limestone injection multi-stage burning, in-duct sorbent injection, gas reburning, and advanced slagging combustors.

Post-Combustion Technologies

Post-combustion technologies consist of advanced devices for cleaning the flue gases released from coal boilers. These technologies include advanced flue gas cleanup devices (which include combined SO_2/NO_x control, NO_x control, SO_2 control-injection, and SO_2 control-tailgas), in-duct sorbent injection, and advanced scrubbers.

Coal Conversion Technologies

The coal conversion process converts coal into a cleaner burning liquid or gaseous fuel. Coal conversion includes the following generic technologies: coal liquefaction, surface coal gasification, underground coal gasification, and integrated gasification combined-cycle, a repowering technology.

Chronology of Major Events Related to the CCT Program's Second Round

Date	Major event
December 7, 1987	Selection official designated
December 8, 1987	Source Evaluation Board established
December 22, 1987	Public Law 100-202 signed by the President[a]
January 28, 1988	Draft solicitation issued
February 5, 1988	Public comments due on draft solicitation
February 22, 1988	Final solicitation issued[b]
March 15, 1988	Pre-proposal conference held
May 23, 1988	Closing date for receipt of proposals[b]
May 31, 1988	Proposal evaluations started
July 8, 1988	Sponsors of proposals failing qualification or preliminary evaluation notified
July 29, 1988	Evaluations completed
September 8, 1988	Board report issued to selection official
September 27, 1988	Selection statement signed by selection official[b]
September 28, 1988	Selections announced

[a]Public Law 100-202 provided funding and other program guidance for round-two of the CCT program.

[b]The timing of these events was in accordance with Public Law 100-202, which established maximum time frames between the events.

Criteria Used to Evaluate and Select Projects

Qualification Phase Evaluation Criteria

The project must be located in the United States.

The project must use U.S. coal(s).

The sponsor must agree to provide at least 50 percent of total project cost with at least 50 percent in each project phase.

The sponsor must have access to, and use of, the proposed site for the duration of the project.

The sponsor project team must be identified and committed to fulfilling its role in the project.

The sponsor agrees that, if selected, it will submit a plan to repay the federal government's investment.

Preliminary Evaluation Phase Criteria

The proposal must be consistent with the solicitation objectives.

The proposal must contain sufficient technical, cost, and other information, as described in the solicitation, to enable comprehensive evaluation.

The proposal must be signed by a responsible official of the sponsor.

Comprehensive Evaluation Phase Criteria

Technical Criteria	
National emission reduction potential	The extent to which the technology, when used at existing coal-fired facilities, can reduce national emissions of sulfur dioxide and/or nitrogen oxide and reduce transboundary and interstate air pollution.
Cost effectiveness	The extent to which the technology, when used at existing coal-fired facilities, is likely to improve the cost-effectiveness of controlling sulfur dioxide and nitrogen oxide emissions.
Technical readiness	Technical readiness of the technology for demonstration.
Adequacy, appropriateness, and relevance of demonstration	Adequacy, appropriateness, and relevance of the project to contribute to the enhancement of technologies, techniques, or processes, and provide new information to enable the private sector to make rational commercialization decisions.
Environmental, health, safety, socioeconomic, and other site-related aspects	Adequacy and appropriateness of proposed approaches to meet and exceed all environmental, health, safety, and socioeconomic requirements during the project.
Technical and management approach	Reasonableness and adequacy of the technical approach to design, construct, operate, and if applicable, dismantle the project.

(continued)

Business and management criteria	
Financial condition, plan, and capability	Adequacy and completeness of the plan to finance the project.
Sponsor's commitment to project and commercialization	Degree of priority placed by the team's management on the project and subsequent commercialization.
Commercialization plan	Adequacy of the sponsor's plan to commercialize the technology in the 1990s.
Sponsor's credentials, experience, and resources	Credentials, experience, and commitment of the sponsor, key personnel, and other resources needed to support the project.
Cost Criteria	
Project's estimated cost	Reasonableness, allocability, and allowability.

Selection Phase Criteria

Program Policy Factors

The desirability of selecting projects for retrofitting and/or repowering existing coal-fired facilities that collectively represent a diversity of methods, technical approaches, and applications (including both industrial and utility).

The desirability of selecting projects that collectively produce some near-term reduction of transported transboundary sulfur and nitrogen emissions.

The desirability of selecting projects that collectively represent an economic approach applicable to a combination of existing facilities that significantly contribute to the transboundary transport of sulfur and nitrogen emissions in terms of facility types, sizes, and coal types.

The desirability of encouraging the adoption of the technologies and considering giving preference to projects in states where the state's rate-making bodies treat clean coal technologies the same as pollution-control projects.

Summary of Guidance Used in Developing Evaluation and Selection Criteria

DOE used the following guidance in developing its criteria for evaluating and selecting project proposals under round-two of the CCT program.

DOE Assistance Regulations

DOE's Assistance Regulations (10 CFR Subchapter H) prescribed the solicitation's format and required that it contain the evaluation criteria, including the relative importance assigned to each criteria, to provide the basis for ascertaining significant distinctions among proposals. The regulations also required that if other factors were to be used in selecting projects, they be specified in the solicitation. In addition, the regulations contained criteria, such as the overall technical feasibility of the project and the sponsor's qualifications, that, to the extent applicable, were to be considered in evaluating proposals. Since the regulations were applicable to all assistance programs, the Board was permitted to develop additional criteria applicable to the program's goals in addition to the criteria in the regulations.

DOE Procurement Guidelines

The regulations required the Board to use, to the extent practicable, DOE's procurement guidelines in developing the solicitation.[1] The Board, the selection official, and others who participated in the preparation of solicitations and evaluation and selection of proposals are also to use these guidelines. The guidelines required the solicitation to contain the program's evaluation and selection criteria, including its relative weights or importance. The guidance also stated that the criteria contained in the solicitation must be used to evaluate proposals and may not be changed without the approval of the selecting official and an amendment to the solicitation.

Congressional Guidance

Congressional requirements for the program were contained in Public Laws 99-190 and 100-202. The Conference, Senate Committee on Appropriations, and House Committee on Appropriations reports accompanying these laws also provided guidance for the program. Public Law 100-202 incorporated the requirements of Public Law 99-190. This law authorized DOE to fund up to 50 percent of the project's cost.

The congressional reports contained guidance that was primarily technical in nature and involved the technology's emission reduction, cost-effectiveness potential, and applicability to existing facilities. The

[1] Acquisition Regulations Handbook, Source Evaluation Board, U.S. Department of Energy, (May 1984).

reports also included general guidance, such as demonstrating a diversity of technologies, requiring the project to be located in the United States, and having the sponsor repay the government its investment if the technology is commercialized.

Special Envoys on Acid Rain

In March 1985, President Reagan and the Prime Minister of Canada appointed special envoys to assess the problems associated with acid rain and to recommend solutions. In January 1986, the envoys recommended the following four project selection criteria.[2]

- The U.S. government should co-fund projects with the greatest potential for emission reduction measured as a percentage of sulfur dioxide or nitrogen oxide emissions removed.
- Among projects with similar potential, funding should go to those that reduce emissions at the lowest cost per ton.
- More consideration should be given to projects that demonstrate retrofit technologies applicable to the largest number of existing sources, especially those that, because of their size and location, contribute to air pollution across the U.S.-Canadian border.
- Special consideration should be given to technologies that can be used at facilities currently using high-sulfur coal.

In March 1987, the President directed DOE to select projects consistent, as fully as practicable, with the envoys' recommendations.

Innovative Control Technology Advisory Panel

In response to a March 1987 presidential directive, DOE established the Innovative Control Technology Advisory Panel on April 27, 1987, with the Under Secretary of Energy as Chairman. This Panel, which advises DOE on funding and selecting projects for the CCT program, consisted of 39 members representing federal and state agencies, coal mining and utility companies, environmental and citizen groups, unions, the research community, and Canada.

At its first meeting on September 30, 1987, the Panel was briefed on the program's first solicitation, the draft appropriations bills, congressional and envoys' reports, and comments from the four public meetings. Using this information, the Panel developed guidance for DOE to consider in developing the program's project evaluation and selection criteria. This

[2]Joint Report of the Special Envoys on Acid Rain (Jan. 1986).

guidance was presented to DOE in December 1987 and covered the project's technical and business and management aspects.[3]

Vice President's Task Force on Regulatory Relief

In March 1987, President Reagan asked the Vice President's Task Force on Regulatory Relief to examine incentives and disincentives to the demonstration and deployment of new technologies. The Task Force recommended that DOE consider giving preference to projects in states that offer regulatory incentives to encourage such technologies. On January 23, 1988, the President accepted this recommendation.

Public Meetings

To obtain the public's views and comments on the program, DOE hosted a public meeting in each of the following cities in August and September 1987: Albuquerque, New Mexico; St. Louis, Missouri; Pittsburgh, Pennsylvania; and Washington, D.C. The results of these meetings were summarized and furnished to the Board and the Advisory Panel for their consideration.

[3]Report to the Secretary of Energy Concerning Factors to be Considered in the First Innovative Clean Coal Technologies Program Solicitation (DOE/EH 0059, Dec. 1987).

Comparison of Guidance Used in Developing Qualification, Preliminary, and Comprehensive Evaluation and Selection Criteria

	Source of Criteria			
	P.L. 99-190	DOE regulations	Congressional reports	Advisory panel
Qualification Criteria				
The project must be located in the U.S.			X	X
The project must use U.S. coal(s)			X	
The sponsor must agree to provide at least 50 percent of total project cost with at least 50 percent in each project phase	X			
The sponsor must have access to, and use of, the proposed and alternate site for the duration of the project		X		X
The sponsor's project team must be identified and committed to fulfilling its role in the project		X		X
The sponsor agrees that, if selected, it will submit a plan to repay the federal government's investment			X	
Preliminary evaluation criteria				
The proposal must be consistent with the solicitation objectives		X		
The proposal must contain sufficient technical, cost, and other information, as described in the solicitation, to enable comprehensive evaluation		X		
The proposal must be signed by a responsible official of the sponsor		X		

	Source of Criteria			
	DOE regulations	Congressional reports	Envoys' report	Advisory panel
Comprehensive evaluation criteria				
Technical				
National emission reduction potential		X	X	X
Cost effectiveness		X	X	X
Technical readiness	X			X

(continued)

	Source of Criteria			
	DOE regulations	Congressional reports	Envoys' report	Advisory panel
Adequacy, appropriateness, and relevance of demonstration		X	X	X
Environmental, health, safety, socioeconomic and other site related aspects		X		X
Technical and management approach	X		X	
Business and management				
Financial condition, plan, and capability	X			
Sponsor's commitment to project and commercialization	X			X
Commercialization plan	X	X		X
Sponsor's credentials, experience, and resources	X			X
Cost				
Reasonableness,allocability and allowability	X			

	Source of Criteria		
	Congressional reports	Envoys' report	Advisory panel
Selection criteria			
Program policy factors[a]			
The desirability of selecting projects for retrofitting and/or repowering existing coal-fired facilities that collectively represent a diversity of methods, technical approaches, and applications (including both industrial and utility)	X	X	X
The desirability of selecting projects that collectively produce some near-term reduction of transboundary transport of emitted sulfur dioxide and nitrogen oxide	X	X	X
The desirability of selecting projects that collectively represent an economic approach applicable to a combination of existing facilities that significantly contribute to transboundary and interstate transport of sulfur dioxide and nitrogen oxide in terms of facility types and sizes and coal types	X	X	X

[a]One other consideration in selecting projects was to consider giving preference to projects in states where the state's rate-making bodies treat clean coal technologies the same as pollution control projects. This consideration is based on the Task Force on Regulatory Relief recommendation to give such consideration and the Advisory Panel's recommendation not to give any geographic preferences.

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