CLEAN COAL TECHNOLOGY PROGRAM: MODEL FOR GOVERNMENT/INDUSTRY COOPERATION

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I. INTRODUCTION

The government/industry partnerships that have evolved through the U.S. Department of Energy's Clean Coal Technology (CCT) Demonstration Program can serve as a model for future public-private cooperative efforts in technology development and demonstration. The CCT Program was established in 1985 to demonstrate, at commercial scale, advanced technologies that would allow the continued use of coal as a major domestic energy source while improving environmental performance over current technologies. The program has leveraged $2.7 billion of federal funds to design, build, and test advanced technologies at forty-five projects valued at nearly $7 billion. Many of the technologies demonstrated in the earlier stages of the program are beginning to enter the commercial marketplace, and the pace of market introduction is expected to accelerate in the early part of the 21st century.

At the outset, the CCT Program was seen by both Congress and the Administration as an opportunity to forge a new kind of cooperative partnership between government and industry. The role that the U.S. Government would play in this effort would be distinctly different from other large technology development efforts. The CCT Program would address technologies that have shown promise at the research and development stage and offer potential for wide-scale commercial development and replication. The government would assure accountability for the use of taxpayer funds through project monitoring and information sharing. The government would assume no "ownership" of the technologies. Direct management of projects and commercial initiatives would be left to industrial project sponsors. At least half of each project's cost would be required to come from non-federal sources as a basic requirement for the program. Such a limited federal role differed greatly from other government-sponsored technology development programs.

The CCT Program overcame many of the obstacles experienced in past public-private technology efforts while continuing to preserve government accountability. The program avoided many of the unwieldy and

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sometimes impractical practices of past government-sponsored technology development programs. This article outlines how the CCT Program evolved into a successful government/industry partnership that is today producing a new generation of environmentally clean, high efficiency energy technologies.

II. BACKGROUND

The CCT Program had its beginning with the demise of the Synthetic Fuels Corporation in 1984.[1] The Synthetic Fuels Corporation had been established by Congress[2] with the goal of reducing U.S. vulnerability to disruptions of crude oil imports. In 1984, Congress transferred responsibility for the ongoing projects to the Department of the Treasury (DOT) and rescinded most of the remaining funds. Of the funds rescinded, Congress retained $750 million in a separate account at the DOT entitled "Clean Coal Technology Reserve." At the time of this rescission, the funds set aside were intended for cost-shared projects to construct and operate first-of-a-kind facilities that would demonstrate the feasibility of future commercial applications of clean coal technologies. In the same action,[3] Congress directed the Secretary of Energy to solicit from the private sector "statements of interest in, and proposals for projects employing emerging clean coal technologies." This Congressional action set in motion what is now the CCT Program.

In November 1984, the Department of Energy (DOE) published a Program Announcement[4] which sought expressions of interest and informational proposals from the private sector regarding emerging clean coal technologies. In subsequent reports to Congress,[5] the DOE reported that it had received 175 responses, with project values exceeding $8 billion. Congress responded to this broad level of interest by directing the DOE to "issue a general request for proposals for clean coal technology projects for which the Secretary of Energy upon review may provide financial assistance awards."[6]

This first appropriation legislation also included a number of important structural features which have proven to be critical to the success of the overall program:

(1) Congress made an advance appropriation of $400 million from the Clean Coal Reserve, representing the full amount of the government's

1. Continuing Appropriations, 1985, Comprehensive Crime Control Act of 1984, Pub. L. No. 98-473, 98 Stat. 1874 (1984).

2. Appropriations, Department of the Interior and Related Agencies, Pub. L. No. 96-126, 93 Stat. 970 (1979).

3. Continuing Appropriations, 1985, Comprehensive Crime Control Act of 1984, Pub. L. No. 98-473, 98 Stat. 1874 (1984).

4. Program Announcement; Information Regarding Emerging Clean Coal Technologies, 49 Fed. Reg. 46,696 (1984).

5. DOE, REPORT TO CONGRESS ON EMERGING CLEAN COAL TECHNOLOGIES DOE/S-0034 (1985); DOE, SUPPLEMENT REPORT TO CONGRESS ON EMERGING CLEAN COAL TECHNOLOGIES DOE/MC/22121-1 (1985).

6. Further Continuing Appropriations, 1985, Pub. L. No. 99-190, 99 Stat. 1251 (1985).

share of selected projects. Assuring that complete government funding would be available for all projects selected gave prospective proposers confidence in the government's financial participation for the entire life of the project.

(2) Title to all property acquired in the project would be vested with the industrial participant. Use of the project assets as security for financing was thus assured.

(3) The government's cost-share for selected projects was limited to a maximum of fifty percent of actual project cost. With the private sector contributing at least fifty percent of costs, the project would be managed using the industrial participant's best practices, rather than being viewed as a "government project."

(4) The government could share in project costs that exceeded the estimate at the time of award, but only up to twenty-five percent of the government's share of the original award cost estimate.

These features formed the foundation of the DOE involvement, which has remained unchanged through the government's five solicitations for industrial proposals comprising the multi-billion dollar CCT Program.[7]

From this beginning, the CCT Program evolved into a five solicitation effort spread over nine years. Currently, it is comprised of forty-five projects[8] with a total project value of almost $7 billion dollars. These projects span the full spectrum of advanced, environmentally clean coal systems. They range from more effective pollution control technologies that can be retrofitted onto existing coal-fired electric power plants, to full-scale, innovative power generating systems that offer substantial increases in electricity generating efficiencies. Technologies that can improve the environmental performance of industrial processes, such as cement manufacturing and steel making, and processes that can convert coal into

7. In parallel with the first solicitation of the CCT program, the Governments of Canada and the United States held discussions relating to environmental concerns with transboundary air pollution. In March 1985, Drew Lewis was appointed as the U.S. Special Envoy on Acid Rain. William Davis, a former Premier of the Province of Ontario, was the Canadian Special Envoy. Their findings and recommendations were presented in a January 1986 report and included the following recommendations:

> (1) Establishment of a joint $5 billion program with U.S. industry to demonstrate technologies that would reduce the level of transboundary migration of acid rain precursors (half of the funding, $2.5 billion, coming from the government and half from industry);
>
> (2) A commitment to on-going cooperative efforts including bilateral consultations and information exchange; and
>
> (3) An increased emphasis on conducting research essential to resolving transboundary acid rain issues.

William Davis & Drew Lewis, Transboundary Air Pollution Recommendations (January 1986). In March 1986, the President endorsed the CCT Program as the vehicle for executing these recommendations. This action established the CCT Program as a $5 billion environmental program with fifty percent funding from the government and the remaining fifty percent from industry.

8. *See infra* Appendix A (listing projects and additional information).

cleaner, higher-value fuels and chemicals are also part of the program[9]. Finally, cost sharing has exceeded the expectations of the Special Envoys.

An important element of the CCT program's success has been its ability to adapt to public input and concerns. The DOE used informational solicitations in the form of formal requests for information on possible projects, public meetings, and workshops to obtain the public's views and recommendations before committing to a competitive solicitation. Typically, at least two public meetings would be held before each solicitation. While the meetings would focus on programmatic matters, the agendas allowed organizations that had not previously worked with the government to gain a better understanding of government requirements and policies.[10]

III. SOLICITATION PROCESS

A. Contracting Vehicle

In contracting with the CCT participants, the DOE could select from the basic approaches of either Acquisition or Financial Assistance.[11] The key distinction between these two options is the level of government direction contemplated in the specific procurement action. The government uses its Acquisition Rules[12] when it seeks to procure supplies or services.[13] By contrast, Financial Assistance[14] is used after the DOE makes a determination that the program is principally one of accomplishing "a public purpose of support or stimulation authorized by federal statute."[15]

The DOE opted to use cooperative agreements as the appropriate contract vehicle based on the Envoys' Report, which recommended that industry propose the projects, and public law, which placed a maximum government cost share of fifty percent. This balance between the accounta-

9. DOE, CLEAN COAL TECHNOLOGY PROGRAM: COMPLETING THE MISSION, COMPREHENSIVE REPORT TO CONGRESS DOE/FE-0309P (1994); DOE, CLEAN COAL TECHNOLOGY PROGRAM UPDATE 1993 DOE/FE-0299P (1994).

10. Another important vehicle for soliciting stakeholder input was the issuance of a draft Program Opportunity Notice (the actual solicitation document) for public comment. These drafts contained the specific information on how the subsequent solicitation would be held. The Department would also hold a "preproposal conference" after the final Program Opportunity Notice was issued to clarify any remaining issues. These approaches to seeking public input not only provided a means for improving the solicitation documents and approaches, but also provided outreach opportunities to increase the awareness of the CCT Program within the fossil fuel community and with the public.

11. Typically, in acquisition, the DOE has the decision-making role and directs its contractor in carrying out the statement of work. In Financial Assistance, the DOE plays a less direct role in accomplishing the project objective. Within Financial Assistance, two contract vehicles can be used, grants and cooperative agreements. The level of government involvement in the specific project determines which contract form is used. Grants usually have minimal government direction and are appropriate to open-ended projects such as research and independent study. Cooperative agreements represent something of a middle ground between contracts and grants. This vehicle affords government monitoring of project activities and a limited government role in project decision-making.

12. Department of Energy Acquisition Regulations, 48 C.F.R. §§ 901.1-971.301 (1993).

13. *Id.* § 901.103.

14. Financial Assistance Rules, 10 C.F.R. §§ 600.1 to .452 (1994).

15. *Id.* § 600.3.

bility for the use of taxpayer money and a minimally invasive role in project decision-making has been a constant theme in the CCT Program.

B. Program Opportunity Notices

The partnership aspect of the CCT Program is mirrored in the solicitation document used by the DOE—the Program Opportunity Notice (PON). The PON's most striking feature is that it does not contain a statement of work. Rather than specifying the technologies to be demonstrated and the exact nature of the projects being sought, the PON presents a statement of the government's overall programmatic objective and requests that proposers present their concepts.[16]

The PON will also list the criteria by which proposals will be evaluated and the weight that each criterion has in the overall evaluation.[17] This approach reduces much of the subjectivity of the evaluation process and highlights those aspects of the proposed projects which are most important to the DOE. It has helped to clearly state the performance criteria expected by the government, while keeping proposal expense from becoming prohibitive and allowing industry, in effect, to set the technical agenda for each solicitation.

Since multiple awards have been anticipated in each solicitation, certain programmatic issues cannot be addressed by the criteria themselves because they fall outside the purview of an individual proposer. For example, the DOE desired geographic diversity and the use of various domestic coal types in making its selections. To deal with these broader programmatic issues, the DOE included the use of Program Policy Factors in the selection process. These factors were used by the Source Selection Official in making the final selection of projects and insuring that overall programmatic needs are addressed.

Along with specifics about the DOE objectives, PONs have become reference documents for the entire process from proposal preparation, through award and project implementation. As a result, the PONs contain a number of features which may, at first reading, appear out of place but have shown their value in the development of the program. Several of these features are:

(1) A chapter in the PON is devoted to the nature of the government's financial participation. Among other items, the categories of allowable and unallowable costs are presented in detail. This has proven helpful since government financial involvement in the CCT Program differs from other government programs, including those using Financial Assistance.

(2) A chapter is also included that describes the post-selection preaward period. In an effort to reduce proposal preparation costs, the DOE

16. As an example, the objective for the PON issued for the fifth round of CCT competition was "to solicit Proposals to conduct cost-shared Demonstration Projects that advance significantly the efficiency and environmental performance of coal using technologies and that are applicable to either new or existing facilities."

17. *See infra* Appendix B (listing and explaining the criteria of the Round V PON).

limited its informational requirements in the proposals to those needed for selection. However, the amount of information for award is larger than that needed for selection. Such additional information includes more detail on cost estimates, project teaming arrangements, and specific environmental impacts.[18]

(3) Model Cooperative and Repayment Agreements, presenting the terms and conditions which the government expects in a final agreement, are also included. The model agreements also indicate those areas where negotiation is needed to arrive at a final agreement.

C. *Selection Process*

For each CCT Program solicitation, Congress has specified a schedule for the solicitation process. The DOE first forms a Source Selection Board (SEB) to prepare the PONs and to evaluate proposals. The SEB is assisted by teams of evaluators who are experts in the technical, financial, environmental, or commercial areas. Due to the financial size of these solicitations and the congressionally mandated dates for selection, the SEBs and the evaluation teams are comprised entirely of government employees who are assigned on a full-time basis to these activities. The tight schedules have also precluded any interaction with proposers after proposals have been submitted. Under these circumstances, clarity in PON language has proven to be essential to a good response to the solicitations. The SEB presents its evaluations in a report to the Source Selection Official (SSO) along with its findings and proposal evaluations. The SSO uses this report and applies Program Policy Factors in reaching the final selections.

D. *Post-Selection Process*

After selection, the DOE and the industrial participants enter into a fact finding process. Along with financial, environmental, and commercial issues, the DOE has a number of administrative requirements which must be satisfied, e.g., auditing of accounting systems. This is followed by formal negotiations in which the specific terms and conditions of the Cooperative and Repayment Agreements are defined. Before the DOE can sign the agreements, it must send a report describing the project to Congress. Congress has thirty legislative days to comment or take any other appropriate action after which the DOE can sign the agreements.[19]

In the first two competitive rounds a number of projects did not reach the point of award. Conflicts arising from the uniqueness of this industry/

18. The DOE has found that these information requests can cause unanticipated costs for selected projects in this post-selection period. This chapter, therefore, describes the level of interaction with DOE that is necessary to reach a signed award after the proposal stage, and allows proposers a better basis for preparing cost proposals.

19. Further Continuing Appropriations, 1985, Pub. L. No. 99-190, 99 Stat. 1185, 1251 (1985), *amended by* Department of the Interior and Related Agencies Appropriations Act, 1992, Pub. L. No. 102-154, 105 Stat. 990, 1020 (1991) (permitting by amendment that reports on selected projects which are received by the Congress less than 30 legislative days prior to the end of each Congressional session to be deemed to have met the criteria upon expiration of 30 calendar days).

government partnership played a major role in these early projects not proceeding. As a consequence, the DOE made the following two major changes in approach in anticipation of the third competitive solicitation:

(1) The DOE decided that the PONs were not presenting a total picture of how the partnership would operate. It was also decided that the amount of information being requested was far in excess of what would be needed to make a selection, and consequently, prospective proposers' costs were becoming prohibitive. For these reasons, the SEB for the third solicitation rewrote the solicitation document to make it clearer and to reduce the amount of information requested in proposals. A direct consequence of this approach, however, was that some information that had previously been requested with the original proposals now had to be requested after selection for those projects that were chosen for negotiations.

(2) To expedite the post-selection pre-award process and to streamline its administrative review and approval process, the DOE (i) set a one year limit from the time of selection to the time for submitting the report to Congress for each project; (ii) established the Clean Coal Technology Executive Board, comprised of assistant secretary-level personnel from the relevant parts of the agency and reporting to the Secretary, to oversee the process; and (iii) established the Clean Coal Technology Review Panel, comprised of senior staff from the relevant parts of the agency, to be responsible for the day-to-day review, approval, and coordination of all pre-award activities. Together, these steps greatly reduced both the number of projects that had dropped out of negotiation and the time for negotiating the necessary agreements.

E. Award

After the DOE and the industrial partner have completed negotiations, the DOE must send a report to Congress which describes the project and the arrangements made in the various agreements. Congress has thirty days to take any action that would preclude the DOE from signing the cooperative and repayment agreements.[20] It is worth noting that Congress has taken no negative actions on any of the forty-five project reports that the DOE has sent to it. At the conclusion of the thirty-day period, the DOE signs the agreements which formally initiate the projects.

IV. Cooperative Agreements and Repayment Agreements

The unique nature of the CCT Program is reflected in the cooperative and repayment agreements signed between the parties. In broad outline they have the appearance of partnership agreements. Typical of a partnership agreement, the roles and responsibilities of both government and industry are carefully delineated, whereas government acquisition contracts

20. Further Continuing Appropriations, 1985, Pub. L. No. 99-190, 99 Stat. 1185, 1251 (1985), *amended by* Department of the Interior and Related Agencies Appropriations Act, 1992, Pub. L. No. 102-154, 105 Stat. 990, 1020 (1991).

require that precise terms and conditions for the delivery of either goods or services be specified.

A. *Industry and Government Roles*

The government plays the primary role in the early stages of the program, as it initiates and carries out the entire program development, proposal solicitation, and selection process. The emphasis shifts, however, after award of the negotiated agreements. The CCT Program is designed to let industry do what it does best: manage the day-to-day activities associated with major facility construction and operation. The government plays a lesser role in actual project execution. Its function is closer to that of a member of a corporate board of directors, insuring that the broad project objectives are being met.

The first article of each cooperative agreement is a statement of joint objectives which underscores the partnership aspect of these agreements. The roles of the two signatories are presented as follows:[21]

(1) "Participant Role:" The Participant shall be responsible for all aspects of project performance as set forth in the Statement of Work . . . . All services, personnel, facilities, equipment, materials, and supplies shall be furnished by the Participant, unless otherwise specified under this Cooperative Agreement.

(2) "DOE Role:" DOE shall monitor the Participant's progress in performing the project, and shall, as indicated in this paragraph and in Article VIII, have a substantial role in project decision making. The DOE also shall approve or disapprove all actions for which, by the terms of this Cooperative Agreement, the Participant is required to obtain DOE's approval.

B. *Project Decision Making*

To better manage their respective roles during the project execution stage, the DOE and the industrial partner agree on a number of decision points during the negotiation of the agreements. These decision points may or may not coincide with the actual project phases (i.e., design, construction, and operation). The periods between decision points are called budget periods. During a budget period, the DOE relies on a variety of reporting mechanisms and meetings to monitor project performance. Once decision points are reached, however, the DOE plays a more direct role. If an industrial participant wants to continue a project into the next budget period, it must present a continuation application to the DOE which includes: (1) a Project Evaluation Report which details the status of the project as well as the technical progress made during the budget period; and (2) a detailed description, including a budget, of the industrial participant's plan for conducting the project during the next budget period. Shortly after the start of a budget period, this latter item is broadened into

21. DOE, CLEAN COAL TECHNOLOGY V, PROGRAM OPPORTUNITY NOTICE DE-PS01-92FE62647, at L-4 (1992).

a Project Evaluation Plan for the DOE's approval. The DOE commits to timely action on continuation applications so that project progress is not affected. These limits on the DOE response times are included in the cooperative agreements. If overall project progress is within reasonable bounds of what was anticipated at the time of award, the DOE approval of an application is assured.

Congress was farsighted at the initiation of the CCT Program by providing for limited government participation in project costs that exceed the estimates provided at the time of award. Given the developmental nature of the projects in the program and the multi-million dollar size of many of the projects, cost increases are a reality. In making decisions regarding participating in cost increases, the DOE uses the following philosophy:

(1) No project overrun is considered for funding: (i) in the event that the industrial participant made definitive statements in its prior representations to the DOE that it would unequivocally provide additional funds in the event of a shortfall; and (ii) such representations were material to the DOE selection decision;

(2) The DOE would consider sharing cost increases involving the demonstration of a technology that has a positive potential for market penetration; and

(3) The DOE would consider cost growths as they occur and fund them to the extent that funds are currently available in the management reserve pool and are consistent with PON requirements (i.e., no more than twenty-five percent of the original DOE funding for the project).

The DOE recently presented the specific criteria it uses when deciding on its participation in overruns.[22] During the time of proposal evaluation, the DOE places a significant emphasis on the likelihood that a technology will achieve commercial success. When considering whether to provide additional financial support for cost increases, the DOE again takes into account the prospects for the technology ultimately entering the commercial market. The DOE does not allow itself the right to unilaterally terminate a project. As long as the participant wants to continue and progress is as anticipated, the DOE will meet its commitments as defined in the cooperative agreements.

C. Property

Title to all real property is held by the industrial participant in fee simple.[23] This action has had positive implications. When the CCT Program was initiated, the implicit project model was a corporate entity that would own the technology, plan to construct and operate a demonstration facility, and commercialize the technology upon successful demonstration. This model proved to be too simplistic for many of the projects, particularly

22. DOE, CLEAN COAL TECHNOLOGY PROGRAM: COMPLETING THE MISSION DOE/FE-0309P, at Appendix A (1994).

23. Further Continuing Appropriations, 1985, Pub. L. No. 99-190, 99 Stat. 1251 (1985), *amended by* Pub. L. 102-154, 105 Stat. 990 (1991).

the larger, more complex power generation projects. Many of these projects have involved complicated team arrangements and, very often, nonrecourse financing by the industrial participants. In these situations, having title for all property vesting with the participant is a critical component to successful project financing.

D. Indemnity

In the first PON, the DOE presented the following provision regarding indemnity:

> The Participant shall indemnify the Government and its officers, agents or employees for any and all liability, including litigation expenses and reasonable attorneys' fees, arising from suits, actions, or claims of any character for death, bodily injury, or loss of or damage to property or the environment in connection with or resulting from the fault or negligence of the Participant or the Government, jointly or severally, in the implementation, operation, use, possession, handling, management, or disposition of the project under this Cooperative Agreement.[24]

This provision was found to be unacceptably broad to the proposers. It was subsequently modified to the following:

> The Participant shall indemnify the Government and its officers, agents or employees for any and all liability, including litigation expenses and attorneys' fees, arising from suits, actions, or claims of any character for death, bodily injury, or loss of or damage to property or the environment resulting from the fault or negligence of the Participant in performing the project under this Cooperative Agreement.[25]

This change was instituted during the negotiations of the cooperative agreements arising from the first solicitation. The change allows each partner to be responsible for the actions of its own employees and reduces the risk of litigation. There has been no reason to modify the latter provision.

E. Intellectual Property

The government objective in the CCT Program is the successful commercial replication of the technologies that are demonstrated in the program. To achieve this goal, it is important that the industrial participant retain ownership of the technology and the right to market it for commercial use. The government, on the other hand, needs to verify that its money has been spent for the intended purpose and that the technology performance is described accurately. Balancing these somewhat conflicting objectives has led to the intellectual property provisions currently practiced.

1. Data Rights

The handling of technical data is critical to the success of the government/industry partnership. Misuse of the data relating to a specific project

24. DOE, CLEAN COAL TECHNOLOGY, PROGRAM OPPORTUNITY NOTICE DE-PS01-86FE60966 (1986), *modified*, PROGRAM OPPORTUNITY NOTICE DE-PS01-FE60647 (1992).

25. DOE, PROGRAM OPPORTUNITY NOTICE DE-PS01-92FE62647 (1992), *modifying* CLEAN COAL TECHNOLOGY, PROGRAM OPPORTUNITY NOTICE DE-PS01-86FE60966 (1986).

may lead to inadvertent disclosure of sensitive data which could compromise the technology owner's competitive position. Of equal importance is the ability of taxpayers to know that their moneys are being well spent. The basis of the DOE policy for the CCT Program is its standard Rights in Technical Data clause.[26] Two classes of technical data are defined in this clause:

> (1) "Proprietary data" means technical data which embody trade secrets developed at private expense, such as design procedures or techniques, chemical composition of materials, or manufacturing methods, processes, or treatments, including minor modifications thereof, provided that such data: (i) are not generally known or available from other sources without obligation concerning their confidentiality; (ii) have not been made available by the owner to others without obligation concerning their confidentiality; and (iii) are not already available to the government without obligation concerning their confidentiality. . . .
>
> (2) "Contract data" means technical data first produced in the performance of the contract in technical data which are specified to be delivered under this contract; technical data that may be called for under the Additional Technical Data Requirements clause of the contract, if any, or technical data actually delivered in connection with the contract.

Generally, proprietary data cannot be disclosed outside of the government without prior permission of the participant (the legal entity that is responsible for all aspects of project performance under the cooperative agreement) and is protected from the Freedom of Information Act.[27] The DOE policy regarding contract data, however, requires that it be freely available.[28]

In line with its goal of commercial replication, the CCT Program has an added provision for the treatment of certain technical data. Congress allowed the DOE to establish a new class of technical information for CCT projects called Protected Clean Coal Technology Data.[29] This class of data may be withheld from public disclosure for up to five years after the completion of the operating period of a cooperative agreement. The data that falls in this category is the subject of negotiations and would be either a

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26. 48 C.F.R. §§ 952.227 to .275 (1993).

27. 5 U.S.C. § 552 (1988). However, disclosure or use may be made solely for the following purposes:

> (a) Proprietary data may be disclosed for evaluation purposes under the restriction that the "proprietary data" be retained in confidence and not be further discussed;
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> (b) Proprietary data may be disclosed to other contractors participating in the Government's program of which the Cooperative Agreement is a part, for information or use in connection with the work performed under these contracts and under the restriction that the "proprietary data" be retained in confidence and not be further disclosed; and
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> (c) Proprietary data may be used by the Government or others on its behalf for emergency repair or overhaul work at the facility under the restriction that the "proprietary data" be retained in confidence and not be further disclosed.

48 C.F.R. §§ 952.227 to .275 (1993).

28. *See* Atomic Energy Act of 1954, 42 U.S.C. § 2051(d) (1988); Energy Reorganization Act of 1974, 42 U.S.C. § 5817(e) (1988); Department of Energy Organization Act, 42 U.S.C. § 7135(g) (1988).

29. Federal Nonnuclear Energy Research and Development Act of 1974, 42 U.S.C. § 5903nt (1988).

trade secret, or commercial or financial information if it had been generated by the industrial participant in a non-governmental project. The high level of private sector cost sharing is a major reason for the adoption of this policy. It has proven highly successful in assuring technology owners that their competitive position would not be jeopardized by their involvement in the CCT Program.

2. Patent Waivers

Any participant in the CCT Program may request a patent waiver for any subject inventions resulting from a Cooperative Agreement. One of the considerations used by the DOE in granting such requests is the amount of cost sharing in the project. With private sector cost sharing at fifty percent or greater in all projects, such requests have routinely been approved. Small businesses and nonprofit organizations automatically receive such a waiver and do not need to request one.[30] The appropriate waiver language is included in the cooperative agreement for such organizations.

3. Commercialization

To obtain cost sharing in the CCT Program, each industrial participant must agree to "commercialize" the demonstrated technology on a nondiscriminatory basis in the United States under reasonable terms and conditions. The government does not negotiate royalty agreements or dictate how the technology is to be used in commercial application. These decisions are left to the normal market considerations between the technology owner and potential users of the technology. The technology description details not only patents arising from this project, but also includes background patents, proprietary data, know-how, and copyrighted works including improvements or enhancements. If the market is not being satisfied or if the technology owner does not adhere to this policy, the government reserves the right to enter into arbitration to resolve the dispute. Protection is also afforded to technology owners so that these provisions cannot be used by a competitor to force unwarranted disclosure of confidential information. This clause is intended to assure potential domestic users of the demonstrated technologies in the CCT Program that the technologies will be available to them under reasonable terms and conditions.

F. National Environmental Policy Act Compliance

The National Environmental Policy Act[31] (NEPA) states in part:

> [A]ll agencies of the Federal Government shall include in every recommendation or report on proposals for . . . major federal actions significantly affecting the quality of the human environment, a detailed statement on: (1) the environmental impact of the proposed action; (2) adverse environmental effects which cannot be avoided; (3) alternatives to the proposed action; (4) the relationship between local short-term uses of man's environment and . . . long-

30. 35 U.S.C. §§ 202, 301-07 (1988).

31. National Environmental Policy Act of 1969, 42 U.S.C. §§ 4321-4370d (1988 & Supp. IV 1992).

term productivity; and (5) any irreversible and irretrievable commitments of resources . . . .[32]

The government role in the CCT Program constitutes a major federal action from the NEPA context.[33] The DOE has developed a three step strategy for complying with NEPA:

First, it developed a Programmatic Environmental Impact Statement[34] which evaluated the potential impact of projects and their widespread commercialization impact assuming successful demonstration.

Second, during the review of proposals at each solicitation, a pre-selection, project-specific environmental review is performed. This analysis assesses the environmental aspects of each proposed demonstration project including site-specific environmental, health, safety, and socioeconomic issues. This review is also in addition to the evaluation and scoring of the environmental criteria which account for fifteen percent of the overall score.

Third, after selection, the DOE completes the appropriate post-selection site-specific documentation. Each successful proposer must submit additional site-specific and project-specific detailed environmental information. With these data and separate analyses, the DOE prepares the necessary documentation to comply with its regulations.[35] This documentation is in the form of a memorandum-to-file, environmental assessment, or environmental impact statement depending on the nature of the environmental impact for the specific project.

G. Repayment

A mechanism to recover the Government's financial participation in each CCT project has been a feature of the program from the first solicitation. The Government's primary objective in the CCT Program is the demonstration of technologies that will be replicated by the private sector. The payoff lies in a cleaner environment, not necessarily in a financial return on the Government's investment. In the same sense that the Government shares in the development risk, however, the Government also shares in the financial benefit of a successful demonstration project. The policy for repayment reflects this vision.

Repayment is required only from successful commercial application of demonstrated technologies. In the first solicitation, the repayment provisions included a sharing of the revenues from the demonstration project itself. This provision was found to be counterproductive to the projects' success. Sharing in the revenue stream by the Government reduced the project's attractiveness to potential investors. In one of the major lessons

32. *See Id.* § 4332.

33. This was an internal DOE decision based on the degree to which the Federal Government would be retaining control. The Department concluded that sufficient federal control over the projects would be present to constitute the proposed actions subject to NEPA. *Id.* § 4321.

34. DOE, CLEAN COAL TECHNOLOGY DEMONSTRATION PROGRAM, FINAL PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT DOE/EIS-0146 (1989).

35. National Environmental Policy Act Implementing Procedures, 10 C.F.R. § 1021 (1994).

learned from the first solicitation, the DOE decided that this level of involvement in project financing was overly invasive and disruptive of its goal of promoting these new, riskier technologies. Through the next two solicitations, the DOE evolved a new policy that called for repayment from the successful commercial application of the technology and not from the demonstration project itself.

The key aspects of the current provisions, which have remained unchanged from the third round of CCT competition and extending through the fifth and final round are:[36]

(1) The government's right to recover its contribution shall continue until either the government has recouped its contribution or twenty years have elapsed from the effective date of the Repayment Agreement.

(2) The Repayment Agreement shall remain in effect unless the Secretary of Energy or designee determines the repayment places the participant at a competitive disadvantage in domestic or international markets. The participant's request for this determination will not be considered before the effective date of the Repayment Agreement.

(3) Any unpaid amount remaining at the end of the twenty-year period will be forgiven by the government.

(4) Repayment shall only apply to that portion of the technology identified as being inside the "technology envelope," as defined in the cooperative agreement. The envelope used is the same as that in the negotiated clauses dealing with Rights in Technical Data for large businesses. For small businesses and nonprofit organizations where such technical data provisions are not included, the technical envelope for repayment will be defined during negotiations.

(5) Repayment will be generated only from the revenue sources specified in the negotiated Repayment Agreement (i.e., corporate assets are not pledged to the repayment).

(6) Repayment shall be based on the following potential sources of revenue arising from the commercialization of the demonstrated technology: (a) one-half of one percent of gross revenues from the sale or lease of equipment that is manufactured and embodies the demonstrated technology; and (b) five percent of gross fees resulting from the licensing of the demonstrated technology.

(7) Successful proposers may provide an alternative plan during negotiations whereby any revenue source may be used to provide payment that, on an annual basis, is equivalent to the revenue that would be realized from the two sources listed above. Once the alternative plan has been agreed to, the participant can use the alternative plan as the sole basis for repayment or provide documentation on sales and licensing so that the amount repaid the government shall not exceed, on an annual basis, the revenue realized from the above two sources.

36. DOE, CLEAN COAL TECHNOLOGY V, PROGRAM OPPORTUNITY NOTICE DE-PS01-92FE62647 (1992).

(8) To promote commercialization, negotiators may agree that a grace period for repayment may be appropriate to facilitate introduction of the technology into the marketplace. This grace period may be a set period, a certain number of facilities, or a certain number of licenses. The terms for any grace period shall be developed during negotiations but will not exceed five years or ten percent of projected sales during the repayment period, whichever is less. The entire duration of any negotiated grace period will be part of the twenty year repayment period.

(9) Repayment is limited to facilities and applications in the United States.

These provisions are included in a separate Repayment Agreement which is signed at the same time as the Cooperative Agreement. By including repayment in a separate agreement, the administrative and financial burden of keeping the cooperative agreement open for over twenty years is avoided.

V. CONCLUSION

The CCT Program has evolved through five competitive rounds into a model for joint government/industry technology development. Currently there are forty-five projects with almost seven billion dollars of total project costs.[37] The private sector has contributed roughly two dollars for every dollar of federal government money. This level of support and the broad variety of technologies in the program speak to the vitality of this partnership effort.

A combination of legislative guidance, incorporation of lessons learned, and strong private sector support has contributed to the strong foundation for this effort. The elements of this program provide an outline for the successful translation of this activity to other programs within the government. The DOE has successfully used this model in the Advanced Oil Recovery Field Demonstration Program.[38] This program aims to increase the producibility of domestic oil resources by demonstrating improved or advanced technologies in reservoirs threatened with premature abandonment. As the government seeks to better assist private industry in becoming globally competitive, the Clean Coal Technology Demonstration Program provides a proven and successful model for other areas of government/industry participation.

37. *See infra* Appendix A.

38. DOE/Office of Fossil Energy, OIL RESEARCH PROGRAM IMPLEMENTATION PLAN DOE/FE-0188P (1990); DOE, CLASS I OIL PROGRAM: NEAR-TERM ACTIVITIES, PROGRAM OPPORTUNITY NOTICE NUMBER DE-PS22-92BC14804 (1991); DOE, CLASS I OIL PROGRAM: MID-TERM ACTIVITIES, PROGRAM OPPORTUNITY NOTICE NUMBER DE-PS22-92BC14805 (1991).

APPENDIX A
CLEAN COAL TECHNOLOGY DEMONSTRATION PROJECTS

PROJECT AND INDUSTRIAL PARTICIPANT	TECHNOLOGY DESCRIPTION	PROJECT SITE	TOTAL COST	DOE COST SHARE	STATUS
Tidd Demonstration Project (The Ohio Power Company)	Pressurized Fluidized Bed Combustion (70 Megawatt)	Brilliant, OH	$189.8M	$67M (35%)	Operations
Nucla Demonstration Project (Tri-State Generation and Transmission Association, Inc.)	Circulating Fluidized Bed Combustion (110 Megawatt)	Nucla, CO	$54.1M	$19.9M (37%)	Operation Completed
York County Circulating Fluidized Bed Cogeneration Project (York County Energy Partners, L.P.)	Circulating Fluidized Bed Combustion (250 Megawatt)	West Manchester, PA	$379.6M	$74.7M (20%)	Design
Combustion Engineering IGCC Repowering Project (ABB Combustion Engineering, Inc.)	Pressurized Airblown Entrained Flow Gasification & Heat Recovery	Springfield, IL	$270.7M	$129.4M (48%)	Design
PFBC Utility Demonstration Project (The Appalachian Power Company)	Utility Scale Greenfield Pressurized Fluidized Bed Combustion	New Haven, WV	$917.9M	$184.8M (20%)	Design
Healy Clean Coal Project (Alaska Industrial Development and Export Authority)	Advanced Slagging Coal Combustor and Heat Recovery	Healy, AK	$242.1M	$117.3M (48%)	Design
Tampa Electric Co. Integrated Gasification Combined Cycle Project (Tampa Electric Company)	Oxygen Blown, Entrained Flow Gasification	Lakeland, FL	$260.7M	$130.4M (50%)	Construction
PCFB Demonstration Project (DMEC-1 Limited Partnership)	Pressurized Circulating Fluidized Bed Combustion	Pleasant Hill, IA	$203M	$93.3M (46%)	Design
Toms Creek IGCC Demonstration Project (TAMCO Power Partners)	Pressurized, Air Blown Integrated Gasification Combined Cycle	Coeburn, VA	$196.6M	$95M (48%)	Design
Pinon Pine IGCC Power Project (Sierra Pacific Power Company)	Air Blown Fluidized Bed Gasification Combined Cycle	Reno, NV	$270M	$135M (50%)	Design

Wabash River Coal Gasification Repowering Project (Wabash River Coal Gasification Repowering Project Joint Venture)	Entrained Flow Gasification Combined Cycle	West Terre Haute, IN	$396M	$198M (50%)	Construction
Warren Station EFCC Demonstration Project (Pennsylvania Electric Company)	Externally-Fueled Gas Turbine Using a Ceramic Heat Exchanger	Warren, PA	$146.8M	$73.4M (50%)	Design
Coal Diesel Combined Cycle Project (Arthur D. Little, Inc.)	Coal-Water Slurry Diesel Engine	Easton, MD	$38.3M	$19.2M (50%)	Design
Clean Energy Demonstration Project (Clean Energy Partners, L.P.)	Integrated Gasification Combined Cycle/Fuel Cell	Baltimore, MD	$907M	$183.3M (20%)	In Negotiation
Four Rivers Energy Modernization Project (Four Rivers Energy Partnership, L.P.)	Second Generation Circulating Fluidized Bed Combustion	Calvert City, KY	$360.7M	$142.5M (39%)	Design
LIMB Demonstration Project Extension and Coolside Demonstration (The Babcock & Wilcox Co.)	Limestone Injection Multistage Burner plus Sorbent Injection	Lorain, OH	$19.4M	$7.6M (39%)	Operation Completed
Enhancing the Use of Coals by Gas Reburning and Sorbent Injection (Energy and Environmental Research Corp.)	Gas Reburning and Sorbent Injection	Springfield, IL and Hennepin, IL	$37.5M	$18.7M (50%)	Hennepin: Complete Springfield: Operation
SNOX Flue Gas Cleaning Demonstration Project (ABB Combustion Engineering, Inc.)	SNOX Technology for Catalytically Reducing Sulfur and Nitrogen Oxides	Niles, OH	$31.4M	$15.7M (50%)	Operation
SOX-NOX-ROX Box Flue Gas Cleanup Demonstration Project (The Babcock & Wilcox Co.)	Combined Removal of Sulfur Dioxide, Nitrogen Oxides and Particulates	Dilles Bottom, OH	$13.3M	$6.1M (46%)	Operation Completed
Innovative Applications of Technology for the CT-121 FGD Process (Southern Company Services, Inc.)	100 Megawatt Demonstration of the CT-121 Flue Gas Desulfurization System	Newnan, GA	$44.4M	$21.7M (49%)	Operation
Advanced Flue Gas Desulfurization Demonstration Project (Pure Air, a Joint Venture Company)	Advanced Flue Gas Desulfurization System	Chesterton, IN	$151.7M	$63.9M (42%)	Operation

Advanced Combustion Techniques for a Wall-fired Boiler (Southern Company Services, Inc.)	Three Advanced Nitrogen Oxide Control Technologies	Coosa, GA	$14.7M	$6.6M (45%)	Operation
Demonstration of Selective Catalytic Reduction Technology for Nitrogen Oxide Control (Southern Company Services, Inc.)	Retrofit Selective Catalytic Reduction Technology	Pensacola, FL	$23.2M	$9.4M (40%)	Operation
Demonstration of Advanced Tangentially-Fired Combustion Techniques (Southern Company Services, Inc.)	Three Advanced Tangentially-fired Combustion Technologies for Nitrogen Oxide Control	Lynn Haven, FL	$9.2M	$4.4M (49%)	Operation Completed
Demonstration of Coal Reburning for Cyclone Boiler NOx Control (The Babcock & Wilcox Company)	Demonstration of Coal as a Reburning Fuel on Cyclone Boilers	Cassville, WI	$13.6M	$6.3M (46%)	Operation Completed
10 Megawatt Demonstration of Gas Suspension Absorption (AirPol, Inc.)	Retrofit Demonstration of Gas Suspension Absorption System	West Paducah, KY	$7.7M	$2.3M (30%)	Operation Completed
Full-Scale Demonstration of Low-NOx Cell Burner Retrofit (The Babcock & Wilcox Company)	Low-NOx Cell Burner Designed for Nitrogen Oxide Reduction	Aberdeen, OH	$11.2M	$5.4M (48%)	Operation Completed
Confined Zone Dispersion Flue Gas Desulfurization Demonstration (Bechtel Corp.)	Retrofit Demonstration of Confined Zone Dispersion Process to Remove Sulfur from Flue Gas	Seward, PA	$10.4M	$5.2M (50%)	Operation Completed
Evaluation of Gas Reburning and Low-NOx Burners on a Wall-Fired Boiler (Energy and Environmental Research Corp.)	Combined Gas Reburning and Low-NOx Burners on a Wall-Fired Utility Boiler	Denver, CO	$17.8M	$8.9M (50%)	Operation
LIFAC Sorbent Injection Desulfurization Project (LIFAC-North America)	Demonstration of Injecting Limestone into Upper Regions of Furnace	Richmond, IN	$21.4M	$10.6M (50%)	Operation
Commercial Demonstration of the NOXSO Flue Gas Cleanup System (MK-Ferguson Company)	NOXSO Flue Gas Cleanup System for Removal of Sulfur Dioxide and Nitrogen Oxides	Niles, OH	$66.2M	$33.1M (50%)	Design

Integrated Dry NOx/SO2 Emission Control System (Public Service Company of Colorado)	Demonstration of Low-NOx Burners, Overfired Air Port, Urea Injections, and Sorbent Injection	Denver, CO	$27.4M	$13.7M (50%)	Operation
Milliken Clean Coal Technology Demonstration Project (New York State Electric & Gas Corporation)	Demonstration of a Combination of the S-H-U Flue Gas Desulfurization Process and the NOxOUT Injection System	Lansing, NY	$158.6M	$45M (28%)	Construction
Micronized Coal Reburning Demonstration for NOx Control (Tennessee Valley Authority)	Coal Reburning for a Pulverized Coal, Wall-Fired Unit	West Paducah, KY	$7.3M	$3.4M (48%)	Construction
Advanced Coal Conversion Process Demonstration (Rosebud Syncoal Partnership)	Novel Coal Cleaning Process Coupled with Physical Coal Cleaning	Colstrip, MT	$105.7M	$43.1M (41%)	Operation
Development of the Coal Quality Expert (ABB Combustion Engineering, Inc., and CQ, Inc.)	Coal Quality Expert Computer Model for Predicting Benefits of Using Cleaned Coal	Homer City, PA Wilsonville, AL Bayport, MN Oologah, OK Sumerset, MA Grand Forks, ND Gulfport, MS Windsor, CT Alliance, OH	$21.7M	$10.9M (50%)	Operation
Commercial-Scale Demonstration of the Liquid-Phase Methanol Process (Air Products & Chemicals, Inc.)	Liquid Phase Methanol and Dimethyl Ether Synthesis from Coal-Derived Gas	Kingsport, TN	$213.7M	$92.7M (43%)	Design
ENCOAL Mild Gasification Project (ENCOAL Corporation)	Mild Gasification Process to Produce Clean Solid Fuel and Liquids from Coal	near Gillette, WY	$72.6M	$36.3M (50%)	Operation
Self-Scrubbing Coal: An Integrated Approach to Clean Air (Custom Coals International)	Integration of Advanced Physical Coal Cleaning	Laurel Site in Somerset County, PA	$89.7M	$38.0M (42%)	Construction
Advanced Cyclone Combustor (Coal Tech Corporation)	Slagging Combustion and Sorbent Injection into Combustor	Williamsport, PA	$984,394	$490,122 (50%)	Operation Completed

Cement Kiln Flue Gas Recovery Scrubber (Passamaquoddy Technology L.P.)	Advanced Scrubbing System to Reduce Sulfur Dioxide Emissions from Cement Kiln	Thomaston, MA	$17.8M	$6.0M (34%)	Operation Completed
Innovative Coke Oven Gas Cleaning System for Retrofit Applications (Bethlehem Steel Corporation)	Technology to Remove Sulfur-Bearing Compounds and Ammonia from Coke Oven Gases	Sparrows Point, MD	$45.2M	$13.5M (30%)	Construction
Blast Furnace Granulated-Coal Injection System (Bethlehem Steel Corporation)	Advanced Process for Using Granulated Coal Directly in Iron Making Blast Furnace	Burns Harbor, IN	$191.7M	$31.3M	Construction
Pulse Combustion In an Application for Steam Gasification of Coal (ThermoChem, Inc.)	Novel Coal Gasification Unit Producing a Clean, Medium-Btu Fuel	Gillette, WY	$37.3M	$18.7M (50%)	Design
Clean Power from Integrated Coal/Ore Reduction (COREX)-CPICOR (Centerior Energy Corporation)	Integrated Coal/Ore Reduction Process Producing Hot Metal and Cogenerated Electricity	Vineyard, UT	$825.1M	$149.5M (18%)	In Negotiation

APPENDIX B
COMPREHENSIVE EVALUATION CRITERIA CLEAN COAL TECHNOLOGY—ROUND V COMPETITION

The Technical Evaluation Criteria are divided into two major categories. The Demonstration Project Factors deal with the proposed Demonstration Project itself. The criteria in this category assess the technical and environmental merit of the Project, and the technical and management approaches to execute the Project.

Commercialization Factors address the projected commercial applications for the demonstrated technology. The criteria in this category assess the potential of the proposed technology to significantly improve environmental performance and efficiency in new or existing facilities, and to achieve wide commercial acceptance. Also, the criteria assess the cost effectiveness of the proposed technology against existing technologies.

A. Demonstration Project Factors

(1) Technical Readiness

Technical readiness for demonstration at the size proposed, as evidenced by the adequacy, availability, suitability, and quality of the data and analyses that support a decision to advance to demonstration scale.

(2) Adequacy, Appropriateness, and Relevance of Demonstration

Adequacy, appropriateness, and relevance of the proposed Project to advance the development of the proposed technology to commercial status and provide new information to enable the private sector to make rational commercial decisions concerning utilization of the proposed technology.

(3) Environmental, Health, Safety, Socioeconomic, and other Site-Related Aspects

Adequacy and appropriateness of proposed approaches for meeting or exceeding all EHSS requirements and minimizing potentially adverse EHSS impacts of the proposed Demonstration Project. The suitability, quality, and adequacy of the site(s) and/or facility(ies) for the proposed Demonstration Project.

(4) Technical and Management Approaches

Reasonableness and adequacy of the technical approach to the proposed Demonstration Project. Degree to which all aspects of the Project are addressed, including design, construction, operation, and disposition of the Demonstration Facility. Quality and completeness of the management approach to the proposed Demonstration Project. Commitment by the Proposer and each Project Team member to pro-

vide the personnel as well as other resources necessary to execute the Demonstration Project.

B. Commercialization Factors

(1) Environmental Performance

The extent to which the proposed technology enables the continued and increased use of coal for conversion to useful energy forms in new or existing facilities by improving control of noxious emissions associated with its use, including sulfur dioxide, the oxides of nitrogen, and air toxics. The extent to which control levels exceed those of technologies commercially practiced in the United States. The degree to which the proposed technology minimizes the amount and adverse environmental impacts of solid and liquid waste.

(2) Energy Efficiency

The extent to which the proposed technology, applied alone or as part of a larger process, converts coal to electricity or other useful products or provides a useful service with higher efficiency than existing technology commercially practiced in the United States.

(3) Cost Performance

The extent to which the proposed technology, applied alone or as part of a larger process, converts coal to electricity or other useful products or provides a useful service at a competitive cost in commercial applications.

(4) Commercialization Potential

The potential of the proposed technology, following its successful demonstration, for widespread commercial deployment. Adequacy of the proposed marketing plan to bring the technology from demonstration to full realization of its commercial potential. The capability and commitment of the proposed Project Team to commercialize the technology demonstrated in this Project.

C. Cost and Finance Evaluation Criteria

(1) Reasonableness of Cost Estimate

The extent to which the cost estimate is reasonable and adequate for completing the SOW activities for all Budget Periods of the Demonstration Project.

(2) Funding of the First Budget Period

Financial condition, capability, and firmness of the commitment of the proposed funding sources to provide their respective share of the non-DOE portion of the first Budget Period. Adequacy of plans in the event that Project costs increase.

(3) Funding of the Remaining Budget Periods

Adequacy and completeness of the plan to fund the remaining Budget Periods for accomplishing the SOW activities for the Project. Financial condition and capability of the proposed financing sources to commit the non-DOE share of the Project costs. Ability to demonstrate that market agreements can be obtained to provide the Program Income (if applicable) for financing the Project. Adequacy of plans in the event that Project costs increase.

(4) Project Team Commitment

Extent of Project Team commitment to the Demonstration Project and subsequent commercialization of the technology.

D. Relative Importance of Criteria

The Technical Evaluation Criteria are three times as important as the Cost and Finance Evaluation Criteria.

Within the Technical Evaluation, each criterion will have the following weight:

Demonstration Project Factors	
Technical Readiness	20%
Adequacy, Appropriateness, and Relevance of Demonstration	15%
EHSS and other Site-Related Aspects	5%
Technical and Management Approaches	10%
SUBTOTAL Demonstration Project Factors	50%
Commercialization Factors	
Environmental Performance	15%
Energy Efficiency	15%
Cost Performance	10%
Commercialization Potential	10%
SUBTOTAL Commercialization Factors	50%
TOTAL	100%

Within the Cost and Finance Evaluation, each criterion will have the following weight:

Reasonableness of Cost Estimate	15%
Funding of the First Budget Period	35%
Funding of the Remaining Budget Periods	40%
Project Team Commitment	10%
TOTAL	100%