

Public Comments on CCPI

This document contains written, public comments received on the Clean Coal Power Initiative (CCPI) subsequent to the public workshop held on September 28, 2001 in Pittsburgh, Pennsylvania. These written comments will be considered by the DOE for the planning and implementation of the CCPI. These comments will serve as a supplement to verbal comments received at the September 28th Workshop. Written comments were received from eighteen contributors. This document is divided into two sections. Section 1 provides a listing of the contributors and affiliations while Section 2 contains verbatim comments.

Section 1: Listing of Contributors

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Section 2: Written, Public Comments - Verbatim

1. Alaska Industrial Development and Export Authority – Robert Poe, Jr.

The Alaska Industrial and Development and Export Authority (AIDEA) attended the Clean Coal Power Initiative (CCPI) Planning Workshop on September 28th in Pittsburgh. The workshop was very informative and an excellent opportunity to share ideas with DOE Staff, Industry, and Academia on how to design a Clean Coal Investment strategy that best meets the needs of prospective participants, stakeholders, and the public. The Alaska Industrial Development has the following comments on the CCPI:

1. AIDEA suggests that the DOE structure the CCPI so that some CCPI funding is available to carry existing technology projects all the way to commercialization. AIDEA believes that first construction does not make a technology commercial and to “get over the hump” to commercialization, additional CCPI funding should be provided.
2. Some CCPI funding should be set-aside for existing technology projects near commercialization, as opposed to entirely new technology projects. In cases where existing technology projects prove uncommercial, CCPI funding should be provided for dismantling that technology and replacing it with more conventional technology. Continued use of coal, albeit with more conventional technology, will increase national security and help ensure low power costs and economic development.
3. AIDEA believes that there is an interrelationship between risk and commercialization. AIDEA suggests that some CCPI funding be provided for risk management. The riskiest projects should have a commensurate level of CCPI funding.
4. “Near term technologies” should have the highest priority for CCPI funding. A separate government funding mechanism is available for R&D projects.

Thanks for providing AIDEA with the opportunity to comment on this funding initiative. AIDEA looks forward to a continuing positive relationship with the DOE. Please contact me, or Art Copoulos, at 907-269-3000, if we can provide any additional input on this exciting funding initiative.

2. Babcock & Wilcox - Dennis McDonald McDermott Technology – Dot Johnson

1. DOE program timing may not always be consistent with Greenfield demonstration plans, permitting, etc. DOE needs to be flexible and patient in permitting industry the time it needs to finalize plans, obtain necessary permits and bring its team together.

DOE needs to shift its thinking from an R&D focus to a commercial/business focus when it seeks to support major coal demonstration programs. It takes much more time and effort to pull these programs together.

2. DOE needs to consider supporting more programs that are between basic research and full-scale demonstration.
 3. DOE should eliminate cost share requirement on risky, research programs.
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3. CQ Inc. – David J. Akers

As a follow-up to the CCPI workshop, I would like to make three comments.

1. A goal of the program should be to reduce emissions without increasing power costs. Technologies that provide a significant reduction in emissions without increasing power costs should be favored over expensive options that may approach zero emissions because the public won't tolerate any large increase in power costs. Also, the developing countries can't afford expensive technologies and will continue to use existing technologies unless we provide cost effective options that significantly reduce emissions. On balance, it is better to reduce pollution in China, India, and the US by 25% than to reduce pollution in the US by 90%.
 2. A significant part of the work should have a near-term focus. I don't think either the public or elected representatives will support a \$2 billion program very long if it will take 10 plus years to show significant environmental or economic gains. Projects that provide short-term, highly visible gains should be part of the mix.
 3. There has been significant increases in our understanding of coal chemistry in the last few years. As one example, note the work on trace element mode of occurrence in coal done by the US Geological Survey. This improved understanding has allowed, for example, the development of methods to pretreat coal to remove trace elements such as mercury. Also, promising methods of pretreating coal to increase reactivity during conversion have been identified. Coal pretreatment options should be pursued as part of the CCPI program because these technologies can be rapidly deployed, tend to be cost effective, and may reduce both the capital and operating cost of advanced combustion and conversion technologies. Finally, in meeting new emissions regulations, power generators and others need a menu of options to meet emissions limits in a cost effective manner.
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4. CQ Inc. – Clark Harrison

Please add my comments to the results of your September 28 meeting.

Low-cost energy should be a priority in emerging countries (and in the US). And, energy should be produced with minimal long-term environmental impacts. And, the realities of the local economies of emerging countries must be considered before we launch our development and demonstration projects in the name of helping them. In the past, we have promoted some very promising technologies they simply cannot afford.

For example, when I visited Kyrgyzstan, I toured power plants and coal mines that were typical of US facilities of the 1940's. And, I saw a government with no capital to invest and energy consumers with no money to pay for the heat and electricity from the outdated facilities. While I was there, a team from the US was also touring the country promoting fluidized bed combustors, advanced pc power plants and customer metering systems, none of which were practical for the Kyrgyz decision-makers. Obviously, no one sold them anything, they didn't solve their immediate problems, and I think we left their citizens with the wrong impression that arrogant Americans came to Kyrgyzstan to flaunt our expertise and wealth, possibly even to take advantage of the Kyrgyz people. What does this experience tell me?

1. DOE's CCPI program must include some near-term, "lower-tech" projects/products that are specifically aimed at infrastructure evolution in emerging countries so they can evolve (with the resources they have) before we expect them to keep up with the US pace (spending billions for retrofits/replacements).
2. DOE's program should also have a mid-term, moderately technical component to support continued growth in more advanced countries and small US businesses that can spend capital for energy improvements, but not necessarily billions for new generation.
3. DOE's longer-term program should focus on breakthrough technologies for countries and companies that can afford them--advanced pc, pressurized FBC, breeder reactors, etc. Don't focus on the technologies and say they will benefit emerging countries unless the US government intends to provide the capital, training and maintenance to build and operate them plants on foreign soil.

Specifically, DOE's program should encompass the entire energy chain from coal reserves in the ground to the busbar. Coal pretreatment, combustion and post combustion are equally important as are near-term, intermediate-term, and long-term results. For example, rudimentary coal cleaning, retrofittable pc-based combustion controls, and low-cost precipitators for Kyrgyzstan(and its neighbors); coal upgrading, opportunity fuels, FBC retrofits, and NOx/SO2 controls for Eastern Europe; and coal gasification/liquefaction, advanced pc, pressurized FBC, and mercury controls for US, Canada and western Europe.

In conclusion, I recommend a broad CCPI program that gives equal opportunity to all technologies throughout the coal power-production cycle. Coal-fired diesels, coal-fueled fuel cells, plasma burners, chemical processes to remove mercury from coal, flue gas treatment to achieve zero emissions, whatever someone can prove to DOE on a technical and commercial basis should have the opportunity to compete for CCPI funds. And, DOE should do its best to select the best cross section of projects to meet the realities of the global marketplace, if DOE intends to promote CCPI technologies in that marketplace.

Please call me if you need any further input from me.

Good luck in your deliberations.

5. Calderon Energy Company – Reina A. Calderon

On behalf of Calderon Energy Company, I attended U.S.DOE/NETL's Clean Coal Power Initiative Workshop on September 28, 2001, and more specifically, the Program Management Breakout session facilitated by NETL's Mike Eastman. I wish to express our company's appreciation for the effort which went into the workshop by DOE/NETL, and for Mike Eastman's able job of session facilitation.

As the group had only two (2) hours, many of the points made within the Program Management session were starting points, and we believe they will require additional dialogue. As a partial response to a comment made by a session participant that DOE energy programs needed to be implemented consistent with a long-range national energy policy sustained from Administration to Administration, the suggestion was made of a long-range, programmatic impact study for the CCPI program, to be undertaken by DOE in coordination with a stakeholder group.

Calderon Energy supports such a long-range programmatic study for the CCPI program, and recommends that it incorporate program management issues. We are therefore submitting the following list of comments to carry forward the discussions of the September 28th CCPI Program Management Session, and identify program management issues which might be addressed:

Stakeholder Group Consistent with HR 4 Section 5004(b)'s inclusiveness and the multiple interests required to be coordinated and involved in CCPI program success, the stakeholder group should include representatives of the regulated and non-regulated segments of the power industry, electric cooperatives and power authorities, energy service companies, technology developers, equipment suppliers (including advanced turbines and fuel cells), the coal mining industry, the chemicals and fuels industries, state energy and environmental agencies, environmental organizations, and other appropriate state and federal agencies.

Environmental Policy Stakeholders In recognition that environmental and energy policies unavoidably impact one another (and consistent with HR 4 5004(b)'s cost and performance goal consultation requirements), we believe it is especially important to include agencies and organizations with environmental missions within any CCPI stakeholder group:

U.S.EPA Office of Reinvention Specifically, we believe the U.S.EPA's Office of Reinvention should be included, as an informal advisory liaison between the CCPI stakeholder group and U.S.EPA.

The Office of Reinvention's mission includes assisting in flexible approaches to environmental compliance, where superior environmental results can be obtained through innovative means. As for example, the Office's Project XL program has been utilized in connection with regulatory compliance extensions to facilitate introduction of new technologies promising superior environmental performance, including in the context of a DOE-funded project (e.g. Georgia Pacific Final XL Project Agreement, dated May 31, 2000).

The Office of Reinvention could well be instrumental in crafting (or assisting other offices within U.S.EPA to craft) innovative regulatory approaches to CCPI projects receiving DOE funding which are aimed at incentivizing significant industry investment, by allowing a reallocation of limited private investment capital from conventional "end of the pipe" emissions solutions to innovative CCPI projects. In this capacity, it might well be able to assist in the introduction of new process technologies which offer both significant energy security and superior environmental benefits, especially where the regulatory compliance timeline would otherwise require or favor investment in conventional pollution controls which do nothing to address energy security needs.

In the context of NOx compliance, U.S.EPA already has approved of state-level NOx credit set asides for energy efficiency projects (which become available once the project is in operation), and the set-aside concept might be revisited in the context of advanced coal technologies such as gasification. The State of Indiana has recently obtained U.S.EPA approval for an innovative NOx credit set-aside program geared toward encouraging technologies such as advanced coal gasification. It could be helpful to CCPI project development to have a coordinated federal regulatory reinvention aspect to the CCPI program, in addition to (or in support of) the existing reinvention efforts being pursued in the clean coal area by different states with U.S.EPA.

As an alternate approach in air policy areas where U.S.EPA has an emissions trading program, DOE might consider evaluating its financial assistance regulations to determine whether purchase of additional

emissions credits for a project “ramp-up” period—in which the existing coal-fired facility is allowed to operate while the CCPI project is being brought on line—might be an allowable cost. DOE might also consider purchasing and banking emissions credits, to ensure availability to address the CCPI project’s ramp-up period. We believe, however, that the concept of a regulatory extension for innovative CCPI projects which offer superior emissions reductions while addressing energy security may be a preferable mechanism.

Non-Governmental Environmental Organizations HR 4’s Section 5004 (b) requires DOE to consult with representatives of organizations formed to further the goals of environmental protection. We believe that it is appropriate to include representatives of environmental organizations within the stakeholder group, in the interests of: (1) promoting a broad base of consensus for CCPI program direction; (2) providing the environmental community with a forum for obtaining accurate information regarding development status and emissions reductions potentials for new clean coal technologies; and (3) public education. We believe that environmental organizations can be made partners in a process of technological discernment and a sustainable energy policy that reasonably balances environmental and energy supply issues. If a coordinated program of innovative environmental regulatory policies applicable to DOE-funded CCPI projects is pursued with U.S.EPA, environmental organizations will be essential stakeholders under U.S.EPA’s XL Project guidelines defining XL Project stakeholder participation.

Scope of Activity The CCPI stakeholder group would take part in:

Program planning activities, including a long-range programmatic study, and periodic technology roadmaps which are developed under the programmatic study. Elements of the programmatic study would include: (i) CCPI program mission, including as relates both to electric supply reliability and energy security; (ii) role of co-production within the CCPI mission; (iii) technology risk profiles and recommended levels of federal investment; (iv) related cost-sharing requirements; (v) technical development timeline in relation to pending energy security goals and environmental regulations; (vi) cost and performance goals for each technology identified; and (vii) other issues. Both the long-range programmatic study and underlying technology roadmaps would be developed by the stakeholder group and DOE, relying on the expertise of DOE and DOE-NETL programming professional input, and approved by DOE headquarters (see Item (5) below).

Review of proposed DOE program solicitations and provision of non-binding written recommendations to DOE.

Periodic program reviews and provision of non-binding written recommendations to DOE.

Neither the stakeholder group, nor any of its members, would be involved in proposal selection.

Written recommendations made by the stakeholder group would be made available to DOE headquarters and to Congressional authorizing and appropriations committees, with an effort made to prepare and submit recommendations in advance of the next annual appropriations cycle.

The decision-making process of the stakeholder group should be by majority vote, with the views of any voting minority having the opportunity to submit dissenting written comments.

Majority recommendations and minority vote dissenting comments must be made equally available to all stakeholder group members and governmental recipients. Majority recommendations and minority vote dissenting comments must also be made available for public viewing as a part of a program docket (although not for public comment). The program docket would also include the programmatic impact study, technology roadmaps, solicitations, and updates.

Federal Role While the CCPI stakeholder's group may assist DOE in program formulation and periodic reviews, DOE should have the final responsibility for CCPI program planning; formulating, writing, and issuing solicitations; program implementation; proposal selection; contract award and negotiation; and disbursement of federal funds. We believe that this allocation of responsibility—and accountability—is appropriate in view of the public impacts of the CCPI program, the multiple interests involved to make the program successful, the level of appropriations authorized, the relatively long period of authorization (10 years), and the need for an active and sustained governmental role in coordinating energy and environmental policy development and RD&D funding to address vital energy security issues.

In this connection, we respectfully disagree with the comments of an OMB program examiner who attended the September 28th session, who indicated that: (1) OMB may prefer a proposal selection approach in which an industry consortia is delegated the responsibility for proposal selections and disbursement of funds; and (2) that the CCPI program could proceed apart from authorizations for appropriations contained within HR 4 (assuming enactment), under existing federal energy statutes. In regards to industry consortia selecting proposals and disbursing funds, we share the conflict of interest concerns expressed by other participants (as well as us) at the September 28th session. Further, we do not believe this role is provided for under existing DOE financial assistance regulations, existing federal energy RD&D statutes, or HR 4. We also believe that (even if technically possible), fashioning a CCPI program which stands apart from Congressional intent is not wise in view of the \$2 billion level of spending authorized by

HR 4, public impacts of the CCPI program, interface with environmental issues, and the urgent need (identified by General Lawson in his remarks on September 28) to educate and gain public opinion support in favor of coal-based programming for National energy security.

Role of Co-Production A significant programmatic issue is the staging and level of funding of co-production projects—and with it whether the CCPI program mission will be focused on electricity reliability exclusively, or has an energy security component via alternate fuels co-production. Co-production of electric power with alternate fuels poses very significant energy security promise (while dramatically lowering air emissions from coal which is currently burned, rather than processed), but co-production also may require an innovative, coordinated set of energy and air policies to encourage project development. The energy security positives and challenges of co-production project development, in our view, favors a high level federal management of CCPI program planning in this area, as well as R&D solicitations (i.e. 80% federal cost sharing) which are specific to co-production projects and their development challenges.

Use of Funds Some discussion at the September 28 session reflected a view that CCPI authorizations might be used to underwrite a portion of technical and/or financial risk which remained after commercial-scale demonstrations of technologies (i.e. underwriting the risks of a second or even a third commercial-scale plant). Our company's view is that other means within HR 4—such as tax incentives—are more appropriate to addressing this risk, and that federal RD&D funds are more cost-effectively applied to technology RD&D rather than the underwriting of risks past a first commercial-scale demonstration. We also feel that a technology which is showing significant technical risk at full-scale plant #2 or #3 most likely has significant flaws associated with it which are due to underlying technology design—in this case, additional federal investment may be serving to entrench systemic design failures and is more in the nature of a subsidy rather than RD&D funding. Finally, we are aware of the availability of risk insurance which covers new plant technology risks (Hartford Steam Boiler offers this type of coverage)—while expensive, the cost is significantly lower than a federal underwriting of plant costs for a second (or even a third) commercial project.

Project Teaming and Cost-Sharing Calderon is in favor of a distinction between industry consortia (which may be helpful as part of a broader-based program planning group) and proposer teams. Team assembly needs to revolve around the needs of the project and team participants, and are in the nature of private contractual arrangements which should not be confused with consortia. A comment was made by a participant that eligibility criteria for proposal submission could be controlled by the DOE solicitation's project teaming eligibility requirements—i.e. the solicitation could specify what types of entities were required to be a part of the project team. We introduced the point (not accepted by the other participants) that if eligibility criteria were to be limited in this manner, a commensurate cost-sharing requirement should be applied to the proposing team's individual team members.

As for example, a 30% of the non-federal cost share might be required of the end-user member of the proposing project team. We believe that this type of cost-sharing requirement is appropriate, if DOE seeks to limit project teams to those with specific types of entities: (1) it tests the seriousness of the participants and the commitment to eventual commercialization; and (2) it ensures that there is some credibility to eligibility limitations—i.e., if the proposing “eligible team” isn’t willing to underwrite a significant portion of the project cost, it shouldn’t be standing in the way of other, differently configured project teams who might be willing and able to underwrite costs. If there is no eligible team willing to step up to the stipulated costs, either the teaming eligibility criteria is not valid, the project is not strong, or (more fundamentally) the status of technology development and/or risk profile requires a higher level of federal cost share from a programmatic perspective.

We appreciate the opportunity to submit comments in relation to this session and the CCPI program.

6. Coal Utilization Research Council – Ben Yamagata

The Coal Utilization Research Council (CURC) appreciates the opportunity to comment on the Clean Coal Power Initiative. The CURC was an active participant in the development of the Power Plant Improvement Initiative, and the organization looks forward to a continuing dialogue with the Department of Energy as this Administration implements the President’s \$2 billion, 10 year program for coal-based, advanced technology demonstrations.

The CURC has drafted and is advocating adoption of a Technology Roadmap that outlines performance targets and timetables for coal technologies in the near-term, mid-term and long term. The Roadmap is based on the principle that investment decisions and technology priorities need to be established at the outset of an integrated research and development program and then the research, development and demonstration activities must be designed and implemented to achieve the specifically enumerated goals. The Roadmap assumes a three-prong approach to a coal RD & D program that incorporates (1) a targeted R&D component, (2) a demonstration component and (3) a deployment component designed to reduce the risks and increase the cost competitiveness of advanced technologies by successive demonstrations of the same or similar technology.

The CURC supports the Clean Coal Power Initiative. It is vitally important that the CCPI be focused on the demonstration and deployment phases of the above-mentioned three-pronged program. In this regard, the CCPI will be important to insuring that the existing fleet, as well as the next generation of coal-fired power plants, is able to meet environmental standards while remaining cost-competitive and reliable. Also, the CCPI should be designed to solicit technologies able to achieve ever more stringent performance standards with each subsequent solicitation. In this manner, the CCPI will continue to facilitate (over time) the commercialization of technologies capable of achieving ever more stringent performance standards as set forth in the CURC Roadmap.

The end result of this process should be to enhance the environmental performance of today's fleet of coal-fired power generation plants and the cost-effectiveness, efficiency and environmental performance of tomorrow's coal-based facilities enabling such facilities to achieve at or near zero emissions. To the extent technologies to capture, sequester or store carbon dioxide are ready for demonstration they too should be included in the CCPI demonstration program.

Finally, there is the issue of funding. During the CCPI conference, the NETL suggested a graduated funding scheme for the series of solicitations, with early solicitations slated for \$150 million and later solicitations scheduled to receive \$200 million or \$250 million. The CURC believes that subjecting the CCPI solicitations to an annual appropriation that may, or may not be provided, discourages industry from making long-term business decisions for fear that expected federal funding would not be forthcoming. Instead, the CURC supports an advance appropriation of the entire \$2.0 billion in funding. In this way potential industry partners would be better assured that the government's funds are likely to be available when needed in the design, construction and operation of multi-year projects.

The CURC looks forward to the first solicitation under the CCPI and intends to remain involved in the development of the President's new coal program. Again, we appreciate this opportunity to comment on the contents of this important initiative.

7. KFX Inc. – Theodore Venners

I would like to bring to your attention that there are several mature technologies that can get "value" out of our country's vast coal reserves. Our particular area of expertise is pre-combustion and power plant optimization using neural networks.

We, and others, have commercial technologies that can take our low-grade Western coal reserves and turn them into high-grade premium fuel. This technology has been successfully demonstrated with private capital.

The CCPI program can be of the most use by providing incentives to use these technologies in the form of tax or electricity credits. Any funding would be best applied to commercial demonstration of already technically viable processes that need to prove commercial acceptance.

Thank you for your support in furthering clean coal technology.

8. MRE, Inc. – Wayne D. Brown

Based on discussions at the Workshop, Meadow River Enterprises is evaluating the possibility of an industrial park based upon a 1st generation circulating pressurized fluidized bed power system. It is my understanding that this would be the first

commercial circulating PFBC ever demonstrated and as such should be a technology allowed under the CCPI. In addition, we will be looking into hydraulic compression as a combustion air source and believe this technology should also be allowed.

Thanks for the opportunity to participate in the workshop.

9. McDermott Technology – Dot Johnson

(See comments listed under Babcock & Wilcox)

10. The North American Coal Corporation – Clifford R. Miercort

Representatives of The North American Coal Corporation attended the Clean Coal Power Initiative (CCPI) Planning Workshop held in Pittsburgh on September 28, 2001. In response to your call for written comments on the scope of the CCPI, The North American Coal Corporation proposes that the following issues should be included in the general list of projects eligible for support.

Coal Pre-treatment

We feel that coal mining and coal preparation are part of the Clean Coal Power Initiative and that mining companies should take an active interest in the development and implementation of Clean Coal Technologies. Mining technology improvement is out of the scope of the CCPI. However, the development of innovative technologies to pre-treat coal, at the mine or the power plant, to improve heat content and/or lower emissions should be included in the list of eligible projects.

“New” Technologies v Incremental Improvements

At the CCPI workshop in Pittsburgh, the discussion in the breakout sessions revealed a split in the focus of the participants. One group of participants favored investment in incremental improvements in existing technology to meet specified efficiency and environmental goals. The other group favored investment in “new” technologies that hold the promise for significant shifts in efficiency and environmental performance.

The North American Coal Corporation’s view is that priority in funding must be directed to the “new” technology projects that promise significant shifts in efficiency and also, by definition, in carbon emissions. The subset of these projects involving Co-production of Power, Fuel, and Chemicals should receive the highest priority. The Vision 21 concept of a zero emission, multi-fuel, multi-product power plant should continue to be the aim of the program.

Incremental improvements at existing power plants will produce lower operating costs for the generating company and have been and should continue to be undertaken by the

companies. These projects should not receive much, if any, R&D funding. The projects that promise a paradigm shift in efficiency and emissions are those that will be of long-term strategic benefit to the nation and should receive the bulk of R&D funding.

Carbon Sequestration

A vital part of the Vision 21 concept is the removal of the Carbon Dioxide produced by the combustion process and sequestering it in some economical and environmentally acceptable way. Given the likelihood of an increasingly carbon constrained world, a high priority should be given to development of viable sequestration programs. Without this investment, coal-fired generation of all types may well be severely constrained by carbon cap legislation at some time in the future.

We hope that you find these comments useful in helping define the strategic focus of the Clean Coal Power Initiative. Our intention is to maintain our interest in Clean Coal Technology, as we believe our future is inextricably bound to it and we hope that we will have a chance to be involved in a new technology project at some point in the future.

11. Anonymous

I would like to thank NETL Director Rita Bajura, Carl Bauer, you and all the other NETL personnel who coordinated such a well-organized public meeting on September 28, 2001 regarding the intended Clean Coal Power Initiative (CCPI). It was very well done.

The following comments are not in any particular rank order.

... supports the concept of the CCPI program and is very interested in encouraging the location of CCPI projects in Ohio with private sector partners. Demonstration and deployment of near-to-term or first-of-a-kind (FOAK) technologies is critical to industry's commercial acceptance of them.recognizes the value of the other coal R&D programs ongoing at USDOE and strongly cautions against rolling them into CCPI. They are very distinct parts, each valuable in and of themselves. While CCPI will concentrate on the demonstration and deployment of technologies, there are other very pressing issues for coal that CCPI simply is not capable of addressing. An example might include the ongoing research into carbon dioxide capture and sequestration, much of which is still in the laboratory stage. We know there are now and will continue to be considerable pressures to combust coal in a more efficient manner and continue even greater reductions in an increasing list of emissions. An example is mercury. Five to seven years ago, there were no good technologies on the boards specifically for the removal of mercury. Now, because of the R&D that first took place in the labs, several of these technologies presently are at demonstration stage. Combining the funding for these programs into CCPI will misunderstand and miss the true need. Both the coal R&D and the CCPI programs are needed.

In one of the sessions, there was question as to whether or not one type of technology should be eligible for more than one demonstration project. There is precedent for this in Ohio. In order for industry to accept a technology as commercially reliable, it must see multiple replications successfully working. This obviates concerns that the one successful unit was a fluke. However, the duplication of a given type of technology is capped at three. Section 1551.32 of Ohio's Revised Code (ORC) states in part, "Encourage, promote, and support siting, financing, construction and operation ... and when necessary or appropriate to demonstrate the commercial acceptability of a specific technology, up to three installations within this state utilizing the specific technology, to more efficiently produce, beneficiate, market, or use Ohio coal; ..." This is also echoed in ORC Section 1555.01 (A). Whether or not a given project ultimately is approved is at the discretion of the agency, however, where it is appropriate, the authority to do so exists. USDOE may wish to avail itself of similar flexibility.

In one session there was a discussion of whether the CCPI program should be managed by an outside consortium. Consortia can be very good and valuable tools that augment the capabilities of agency staff. A consortium within and as a part or subset of CCPI may prove valuable to the extent that it complements USDOE's abilities. However, if the supposition is to turn over the entire CCPI program to one outside management source, the wisdom of this is questioned on several fronts. The entire CCPI program should not be overseen by and federal funds essentially controlled by one private sector source; USDOE should not abrogate its oversight responsibilities. USDOE's Fossil Energy staff has excellent technical and managerial capabilities. To the extent that a CCPI consortium would compliment and assist this, fine. However, note well that with or without a consortium, USDOE still must oversee the effort. Added to this is the cost, which can be substantial, charged by an entity to oversee the program. Adding an entity's managerial and overhead costs will divert funds from actual project R&D to soft overhead and G&A. If such is done, USDOE should establish reasonable overhead limits beforehand and solicit bids for a consortium management effort, as there are probably multiple entities in the United States capable of such work. For a program of this duration and magnitude, there should not be a sole source. Further, consideration should be given to rebidding the work every several years to give others an opportunity and to keep an original consortium competitive.

Combustion efficiencies must continue to be emphasized. While this was not especially discussed at the workshop, it may be because it is taken as a given by this crowd. Improved combustion efficiencies help on every single front and goal USDOE is attempting to achieve with coal. They are a form of pollution prevention, causing less emissions of all kinds—including carbon dioxide—from entering the atmosphere, they lower the cost of fuel because the fuel on hand is used more effectively, etc. Combustion efficiencies will be one of the primary keys in obtaining near-zero or zero emitting coal based electric power plants by 2020 or thereabouts.

Continue the concept of a royalty or repayment. In the past, USDOE's terms have been reasonable. While the risk is still great regarding deployment of these technologies, the royalties requested are fairly modest. (And they should be kept so. If too great a

royalty/payment is required, either industry will not participate, or it will kill the technology that all struggled so hard to birth.) If the public (i.e., taxpayer's funds) via USDOE is bearing a major portion of the risk, it is not unreasonable that the public share in a modest portion of any revenues that subsequently accrue should the technology "go commercial." Further, the public funds in essence become an outright grant should the project fail. Yes, the public benefits from cleaner air, lower costs, etc. So, too, does the public benefit when a new technology of any kind is introduced on the scene. However, the venture capitalist that backed it expects to share also in the subsequently generated revenue. The government is not a venture capitalist, and it is one of government's roles to assume risk in order to assist the private sector in the development and launching of new technologies benefiting the public that otherwise would not occur. Nevertheless, it is not unreasonable for the public via the government to expect a small return on its risk and investment.

As was the case in the Clean Coal Technology program, recognize that this is RESEARCH & DEVELOPMENT, albeit in the last stages. Even though it entails the deployment of near-to-term or first-of-a-kind technologies, not all contingencies are known going in. There is almost always a glitch, which often times will require additional funds to overcome.strongly discourages the concept of a 10-15% "contingency line item" in each project. Such line items almost always seem to be used. However, requiring an entity to apply for and justify a cost overrun (i.e., not the fault of project management, obvious design errors, loose project timing or coordination, etc.) significantly helps hold the line on such costs.

... CCPI projects should consider multiple pollutant reduction and multimedia issues. Reducing multiple pollutants in one device or process is more efficient and often less costly than multiple systems, Further, an air pollution problem should not be traded for a land disposal problem. To the extent possible, technologies should examine the power generation process holistically, from cradle to grave, as it affects the cost, the competitiveness, and the commercialization of the technology in the long run.

... concurs that there should be periodic (not annually, but perhaps every three years?) internal and external (including stakeholders) evaluation of such a long-term program. It is likely that directional adjustments may need to be made along the way as more is learned from experience.

Again, thank you for the opportunity to comment.

12. Ohio (University) Coal Research Center - David J. Bayless

The nation's electrical power supply is at risk from many different elements. One element is the dependence on large power generation to supply reactive power to maintain line voltages, and the associated dependence on large transmission lines. On a peak day, when line voltages may already be sagging, a cascading failure of generators could leave the grid black.

After listening to General Lawson at the CCPI meeting on Friday, I could not help but wonder "how can coal be used to increase our national energy security?" More specifically, "How can the Clean Coal Power Initiative be used to address issues of national energy security?"

Obviously, there is a disconnect between coal and a great deal of foreign energy imports. Excepting for natural gas we obtain from our NAFTA partners, we only import a small amount of LNG and other fuels that compete directly with coal. Most of our foreign dependence is on petroleum. Unless coal is used to produce synfuels, which I would advocate should be an aspect of the CCPI, there is not much we can do to have coal address dependence on foreign petroleum.

However, there is one area that is extremely concern that the CCPI should address that should be of major concern to our national energy security. But first, please do not accept my word for this and please do not think I am fear-mongering or trying to develop the next plot-line for Tom Clancy. However, our dependence on very large power plants (800-1300 MW) units to not only produce power, but also sustain reactive power to maintain line-voltages puts our transmission infrastructure at severe risk. On day where line voltages are sagging due to high demand, a few well-placed simultaneous detonations (say at the generator step-up transformers) at a series of large units could cause a cascading failure that could (if the system operators were not very good) spillover to interconnected utilities. The result, especially for systems like American Electric Power's that depend on huge plants requiring 50+ MW to restart, such a failure could leave industrial and residential customers in the dark for days or weeks, resulting in serious economic and potentially physical damages. And I don't mean this as an insult, but having worked in a number of power plants in my life, security is not tight enough to prevent such a possibility.

As a result, I would strongly urge the Department of Energy to consider advocating distributed power projects to their CCPI targets. Distributed power not only reduces dependence on large power plants and difficult to defend transmission lines, it also offers a greater possibility for higher energy utilization through cogeneration or absorption refrigeration (for district cooling).

If coal is to be used in distributed power applications, and be used in low emission systems, then I would think that the CCPI would have to address at least one critical issue -the fact that gasification systems are extremely costly for small (distributed) systems relative to their large counterparts. Inexpensive gasifiers for small-scale application should receive at least some funding, if for no other reason than energy security.

13. Anonymous

1. One of the major goals set forth in the National Energy Policy is for us, as a nation, to be energy independent by effectively utilizing our abundant coal resources and cut back on oil imports. To achieve this goal, the Clean Coal

Power Initiative (CCPI) program must encompass the following elements, in addition to utilizing coal in an economically and environmentally acceptable manner for power generation. The program should:

Develop and demonstrate technologies for replacing oils with coal (e.g., indirect liquefaction).

Explore and demonstrate concepts of Co-production whereby coal can be used to produce a wide spectrum of High-value byproducts (such as clean fuels and chemicals) in addition to electricity, and fully explore integration benefits for overall economic utilization of coal.

2. Both coal gasification and fluidized bed combustion has matured as clean coal combustion technologies. This is a direct benefit of the past DOE funded Clean Coal Program. CCPI must sustain its continued demonstration development to ensure their full economic commercialization.
3. Clean coal power development must be evaluated from a cradle-to-wire approach where coal production and preparation (beneficiation) technologies also receiving some of the developmental attentions to increase efficiency and minimize waste production.
4. It is well known that there are abundant quantities of coal waste (culm and gob) scattered across the nation as the result of past coal production. Technical development efforts should be spent to recover the energy available in these low-quality coal waste refuse piles and concomitantly reclaiming the land.
5. There's an over emphasis on setting increased generation efficiency as a potential criterion for project selection and funding. While, no doubt, efficiency is important, but it's not necessarily the deciding factor for overall project economics in a coproduction environment.
4. On the issue of "carbon reduction/elimination" one must take a reasonable, and longer-term approach, but offer incentives for any proposed projects that address this issue either partially or in whole.

14. Anonymous

I sadly regret that I will not be able to attend the Clean Coal Power initiative (CCPI) Workshop in Pittsburgh on Friday Sept 28. Nevertheless, since I cannot attend, I did want to pass on some important observations relative to existing coal power plants and the issues for upgrading of these strategic power generators.

1. Too many vested interests promote advanced coal technologies that are at least 10 years away from commercial demonstration with the intent that these "silver bullet" advanced technologies will likely always be 10 years away. This is a

- cleaver con-job for R&D funding and, more importantly, continued life extension of the highly profitable yet dirty and inefficient fleet of existing coal-fired power plants. The 10 year "black-hole" of Wilsonville is a prime example of the games being played. There are many good commercially proven options available that are totally ignored for obvious reason.
2. Many options being promoted for emission reduction upgrades from existing coal-fired power plants reduce the net plant capacity and efficiency due to the increase of in-plant parasitic power requirements. Add-on FGD, SCR, bag houses & Hg scrubbers will reduce both net efficiency and capacity by 2-5%.
 3. The long term CO2 issue requires more focus on upgrades that increase both capacity and especially efficiency while at the same time significantly reducing emissions. Major emission reduction upgrades for conventional pollutants (SO2, NOx, Hg, PM2.5) must also consider the future impacts of CO2 mitigation options. Adding flue gas amine CO2 scrubbers to these upgraded coal-fired boilers is a death wish as this further reduced the both power plant capacity and efficiency by another 30%.
 4. The typical power costs from the over 300,000 MW of existing US coal-fire power plants is only 1.0 to 1.5 cents per kWh due to the low costs of coal and that most of the investment is paid-off. Emission taxes (direct or indirect) on these existing coal-fired power plants have little impact as it is usually cheaper to pay the tax and continue to pollute than invest in major upgrades. Therefore, performance based incentives are clearly required. These must be simple, fair & transparent. A emission reduction tax credit or emission reduction price support payment based on only accrual emissions reduction per net MWh generation output is likely best. There should be no biases to specific technologies or institutional R&D incentives. Simple performance-based incentives avoids "gaming" and the public out-cry of "corporate welfare". For example Section 29 tax credits were highly successful in development large amounts of non-conventional coal-bed methane.
 5. The U.S. coal industry and coal-based power generators are strategic to the energy future of the United States. They require technical, economic and environmental performance standards that are fair, reasonable and, more importantly, do not changes for 10-15 years to justify the major upgrade investments. It is high time to stop the gaming by establishing incentives for meaningful capacity, efficiency and environmental upgrades for existing coal, the fuel that generates over 50% of our nation's electricity.

15. Southern Company – Steve M. Wilson

The successes of DOE coal-use research, development, and demonstration programs are evident and have created a cleaner environment, promoted the creation of new jobs, and improved the competitive position of U.S. companies. Southern Company estimates that the DOE coal-based research program related to large-scale power generation will provide over \$100 billion in benefits to the U.S. economy through 2020 at a cost to the Federal budget of less than \$4 billion through FY' 2000.

The newly proposed Clean Coal Power Initiative (CCPI) can build on these successes and DOE has sought input from industry concerning the objectives and structure of the program. To that end, Southern Company offers the following comments:

The majority of CCPI funding should be directed to demonstration projects that can make a difference in environmental performance or in the domestic energy infrastructure in the next 5-15 years. In addition to technical merit, key considerations for project funding should include whether:

Proposed technologies are widely applicable to their relevant industrial sector, represent significant cost and/or performance improvements beyond existing options, and are likely to be available for commercial adoption at full-scale by industry in this time frame.

There is a clear path and commitment to the market place by an organization with the financial and technical abilities to effectively supply a successfully developed technology.

The project includes active financial and technical involvement by an end-user to ensure that practical operational issues are dealt with.

The focus of the CCPI should be on large-scale commercial demonstrations. However, some important concepts may require integrated pilot-scale testing to optimize design of full-scale demonstrations. Proposals that include pilot-scale testing should be considered if they meet the other criteria outlined here and if the participants indicate a clear ability and intent to demonstrate the technology at a commercial scale in a timely manner if the pilot-scale tests are successful.

Generally, carbon management technologies (beyond efficiency improvements) are not ready for large-scale demonstrations. Unless such proposals are clearly ready for at least integrated pilot-scale testing they are best included in DOE's Fossil Energy R&D Budget rather than as part of the CCPI.

The CCPI needs to be "advance appropriated" by Congress or, alternately, DOE should make it clear as part of the solicitation process that it is prepared to make awards to selected projects from current, as well as, any future CCPI appropriations by Congress. This still places substantial risk on the participant should future appropriations not materialize. However, in the absence of advanced appropriation of CCPI funds, this approach is essential if participants are to consider proposing large demonstration projects.

If the proposals selected by DOE in a particular CCPI solicitation do not merit expending all of the current funds when the above or similar criteria are applied, funds should be carried over until a later CCPI solicitation.

Deployment of cleaner and more efficient technology should be the focus and benefit of the CCPI program. Recoupment provisions that unnecessarily burden projects, cloud their mission, and discourage otherwise technically sound proposals should be avoided.

16. TVA – Joe Hoagland

Additional comments for the CCPI program

What Technologies Should be Addressed in RD&D Programs?

This program should take a strategic perspective with emphasis on getting technologies to the point where industry is willing to assume risks for commercialization. That means focusing on enhancements and next generation technologies that will be able to compete economically and reliably with current coal and gas technologies.

Markets and Business

In order to bridge the gap between development and commercialization, large demonstration projects are going to need to be conducted. In order to spread the risk for large projects, teams need to be formed that encompass the industry with partners each taking a share of the risk of the project. In addition, there needs to be tax incentives for utilities, including in lieu of tax incentives from non-private utilities.

Consideration should be given for in kind assets, such as land or other infrastructure, that could be used as part of the demonstration program.

The contracting arrangements need to be done in such a way that non-private utilities can play an active role in the teams developed for these demonstrations.

17. Upgraded Coal Interest Group (UCIG) - "Signed by Joe Battista for the UCIG"

The following comments are provided for the use by the Department of Energy (DOE) as suggestions from the utility members and associate members of the Upgraded Coal Interest Group toward the upcoming comprehensive Clean Coal Power Initiative (CCPI) which is to be a DOE/industry sponsored program. We understand that this program is currently in the process of being defined and promulgated into a ten-year research, development and demonstration program. Successful management of this program will enable coal to be utilized more efficiently and with fewer emissions than the existing fleet of coal-fired power plants.

High-efficiency combustion and conversion systems that will reduce emissions produced by the use of coal are under development. However, few existing United States boilers are likely to be replaced with advanced boilers within the next 10 years. Further, it is unlikely that these advanced systems will be prevalent enough to have a large impact on air quality or electricity costs in the United States for over 10 years. In order to improve ambient air quality in the United States during this transition period and maintain low

electricity costs, higher-quality/lower-cost coal and coal based fuels are required.

It is important in the near term to continue research on coal and coal-based fuels and emission controls for existing power plants. This can help reduce the trend toward reliance on natural gas for new power generation in order to reduce emissions. By reducing the fuel costs and environmental impact of coal-fired power generation, existing units become more cost effective and thus new units utilizing advanced combustion technologies are more likely to be coal-fired. Natural gas is a premium fuel that is better reserved for high value and transportation purposes. Now, more than ever, fuel diversity and fuel independence or self sufficiency in the United States is vital in order to maintain our national security.

Fuel cost and fuel quality are issues for advanced as well as current coal combustion systems. Reductions in coal cost and improvements in coal quality will, respectively, improve the economics and the performance of advanced combustion systems. In the short and medium-term, coal and coal-based fuels technology research will improve the performance of the existing fleet of boilers, ensuring that replacement units will be coal-fired. In the longer-term, fuels technology research will reduce both the operating and capital cost of advanced combustion systems and may improve the environmental performance of advanced systems.

Enhanced Fuel Technologies

Specific recommended issues and technologies include:

The use of waste coal - Over 2 billion tons of fine-sized coal are impounded in the United States creating both an environmental issue and an opportunity for low-cost fuel. DOE should address this issue by supporting work to recover, clean, dewater, transport, handle and burn coal from impoundments. Initial work in this area should involve characterization of this resource and identification of any technical, environmental, economic, or regulatory barriers to increased utilization. In addition to utilizing this resource as a low cost fuel and as a low cost means of reducing nitrogen oxides in power plant boilers as a coal water slurry, utilizing this fuel will rid the countryside of potential problem impoundments, some of which have failed in various areas in the past.

Development and commercialization of coal water slurry (CWS) cofiring - The use of CWS provides an improved method of handling and burning fine coal, allowing increased utilization of waste coal and fine-sized coal produced by conventional and advanced cleaning processes. The co-firing of low solids CWS with pulverized coal in utility boilers has been demonstrated to be practical; however, additional work is necessary to demonstrate and commercialize the technology.

In addition to solving the serious material handling problems of fine-sized, wet coal, CWS has been shown to reduce NO_x emissions and there has been some private sector development work on using CWS as a trim for NO_x control. Additional research is needed to better understand, and therefore control, the mechanism of NO_x reduction

when co-firing low solids CWS with pulverized coal and to determine if low solids CWS can be utilized effectively as a reburn fuel.

Also, additional work is required optimize slurry formulation (size distribution, viscosity, reagents, etc) for specific coals and boilers and to evaluate the addition of waste materials such as sewage, paper pulp wastes and food preparation wastes.

Finally, research is needed to better select injection locations for CWS burners to maximize combustion efficiency and NO_x reduction. Because CWS can potentially reduce both fuel costs and NO_x emissions, industry cost share funding is likely to be available for this work through organizations like the Upgraded Coal Interest Group which is sponsored by the Electric Power Research Institute.

Biomass/Composite Fuels - Biomass fuels can be co-fired with coal to reduce NO_x and CO₂ emissions and possibly fuel costs. Additional efforts are required to develop and optimize biomass preparation, delivery, and combustion systems. Technologies in this area have the potential to become a viable means for coal burning power plants to generate low cost renewable power and dispose of agricultural and forestry wastes in an environmentally acceptable manner.

Composite fuels involve combining wastes and/or biomass with coal in a synergistic manner. Often coal and wastes/biomass, combined in the correct formulation, produce a fuel that is environmentally superior to either material alone while reducing energy costs. For example, a composite fuel made of coal and paper mill wastes, tested at Westvaco Corporation's Tyrone Mill, was shown to reduce NO_x and SO_x emissions and fuel costs. DOE should support work to develop new composite fuel formulations and production methods and then testing their use in existing combustion facilities to identify the effects on boilers and ancillary equipment.

Improved Dewatering Technologies - The high moisture content of pond fines and biomass places an unusually low economic limit on haulage distance and, by increasing heatrate, thereby increasing CO₂ emissions. Also, the high moisture content of these fuels can cause handling problems. Similar problems can exist with fines from a coal cleaning plant especially if the as-mined coal is highly friable or some amount of crushing has been performed to increase the effectiveness of the cleaning process.

These issues are important to industries using or considering using fuels containing a high proportion of fines or biomass. There is also a need for equipment to thicken fines to 50% solids for CWS. The development of improved mechanical and thermal methods of dewatering should be a research priority. Thermal methods studied should include safe methods to increase the drying capacity of pulverizers to allow wet fines to be blended with the feed coal.

Precombustion Control of Hazardous Air Pollutants (HAPs) - The challenges facing cleaning plant operators and coal users become more severe if a decision is made to regulate air toxics emissions. While most of the trace elements in coal, which are

considered air toxics precursors, are associated with mineral matter and therefore potentially removable by physical cleaning methods, the base of engineering and scientific knowledge concerning the efficient removal of these elements is inadequate. If conventional cleaning technologies are employed, the coal must be cleaned even more intensely, further reducing energy recovery and increasing waste disposal problems.

Coal cleaning offers significant advantages over other methods of air toxics control and improved cleaning technologies should be aggressively pursued. Even conventional methods of cleaning can remove over forty percent of the highly volatile element mercury, which is very difficult to capture by post-combustion methods. Also, physical cleaning technologies leave the captured element in a naturally occurring mineral form while post-combustion control technologies do not. Naturally occurring minerals are likely to pose less risk of groundwater contamination after solid waste disposal than compounds produced by capturing the element after it has been volatilized. If industry is to have the tools available to cost-effectively reduce air toxics emissions without costly post-combustion control systems, funding for this work must be increased.

In addition, coal cleaning has the potential to reduce SCR catalyst poisons such as arsenic and others from shortening the life and effectiveness of the catalysts.

Dry Coal Separation Technologies - The pulverizers used on most utility boilers grind coal to less than 200 mesh. At such a small particle size, much of the mineral matter contained in coal is liberated and can be removed by physical cleaning methods. While wet cleaning methods cannot be used in this application, dry coal separation technologies hold promise. Simply removing the high-density mineral matter from pulverized coal could reduce SO_x and mercury emissions, while reducing problems associated with water-wall erosion in the combustion zone. An example of this approach is the MagMill™ technology for dry on-line separation of pyrites, S, Hg, etc. and ash. The MagMill™ is a dry approach to coal cleaning evaluated and tested with some support from UCIG and with major roles from other sponsors.

Enhanced Emission Control Technologies

Group II boilers have been demonstrated to have high NO_x emission levels which are difficult and expensive to modify. New approaches to reducing emissions without the use of SCR catalyst systems have been proposed and are in the early phase of development. Participation in these programs by DOE can accelerate the commercialization of these low-cost control technologies. UCIG has focused on finding pre-combustion—and/or, possibly, the cofiring of alternate fuels in the combustion stage—to improve performance and cost with a minimum of post-combustion control.

Catalysts - SCR Catalysts have not been tested for extensive periods under the conditions that will be typical of most boilers in the United States. Additional research and development on advanced catalyst formulations that can increase life and resist poisoning is needed. Removal of contaminants like arsenic upstream of combustion may alleviate SCR catalyst poisoning and degrading.

Mercury Control - EPA is considering new regulations for regulating HAPs emissions from existing facilities. The primary element of concern is mercury. Existing technologies for removing mercury from flue gas are expensive and untried. Development of reliable technologies and cost effective technologies should be a priority of the DOE if utilities are to comply with such regulations. Furthermore, new on-line analyzers must be developed that can reliably measure the tiny quantities of mercury that are present in the vast amount of flue gases present in utility stacks.

Conclusion

The United States is at a critical juncture. Global competition is now a reality for a large number of businesses in the United States and, ultimately, almost all United States businesses will compete to one degree or another in the global marketplace. Under these circumstances, maintaining and improving the standard of living of United States citizens requires a plentiful supply of low-cost electric energy to reduce the cost of providing goods and services both in the United States and abroad. At the same time, segments of the public demand increased environmental restrictions on the utility industry.

If the electric utility industry is to successfully respond to the goals of reducing electricity costs, maintaining reliability, reducing emissions, and maintaining our national energy security, fossil fuel technology research is critical. For coal-fired units, fuel cost typically represents from 60-70% of operating costs. Reducing fuel cost, reduces operating costs. This can provide revenue that could be used to finance emissions control systems or advanced type of boilers resulting from post-combustion research. At the same time, improving coal quality reduces emissions from existing boilers without the need for substantial capital investment by the utility. If quality improvements can be accomplished with little or no increase in fuel costs, an immediate improvement in emissions can be achieved without an increase in electricity costs. All of this is directly dependent on continued and expanded levels of research on coal with the cooperation and partnership between government and industry.

Note: These comments have been provided by the Upgraded Coal Interest Group.

The Upgraded Coal Interest Group (UCIG) is a group of utilities, engineering firms, contractors, and universities that are focussed on clean, low-cost options for coal-based power generation via pre-combustion, co-firing and reburning. Its mission is to preserve and expand the economic use of coal for energy. By reducing the fuel costs and the environmental impact of coal-fired power generation, existing units become more cost effective and thus new units utilizing advanced combustion technologies are more likely to be coal-fired in the future.

If you have any questions about any information we have provided or any questions about the UCIG, please contact me by return email or by phone at 814-471-6689.

18. Virginia Tech - Roe-Hoan Yoon

I would like to suggest that the Clean Coal Power Initiative (CCPI) should include i) advanced coal cleaning technologies and ii) advanced ash treatment technologies. Producing coal is an integral part of power generation, and the CCTI should address not only the environmental problems created from burning coal but also from producing the solid fuel (i.e., coal) itself. Coal slurry impoundments are one example of an environmental concern. According to a recent National Research Council Report entitled, "Coal Waste Impoundments: Risks, Responses, and Alternatives," dated October 12, 2001, there are 713 active impoundments in the U.S., many of which are classified as high risk. This reports recommends development of alternative technologies for cleaning and disposing fine coal, which should be part of the CCTI program.

Coal-burning power plants have been disposing large amounts of combustion byproducts (e.g., bottom ash and fly ash) to ponds. However, many power plants are running out of places to dispose these waste materials. On the other hand, the byproducts can be utilized for brick and cement manufacture if they are properly treated and their impurities are removed. It is well known that use of low-NOX burners substantially increases the amounts of unburned carbon in fly ash, which makes it difficult to utilize fly ash as a salable byproduct. The CCTI is a perfect vehicle to develop and/or demonstrate advanced separation technologies that can promote the utilization of combustion byproducts.