DRAFT INTERIM REPORT
OF THE
ADVANCED COAL TECHNOLOGY WORK GROUP
CLEAN AIR ACT ADVISORY COMMITTEE
JUNE 27, 2007

I. Executive Summary

This Draft Interim Report reflects the work of the Advanced Coal Technology Work Group ("Work Group"), chartered under the Clean Air Act Advisory Committee, at its six-month milestone. More information regarding the charge to the Work Group is provided in Attachment A.

The recommendations set forth in this report represent substantial consensus. However, the options identified to implement the recommendations have undergone only preliminary review and are subject to change.

The Work Group achieved general consensus that regulatory, financial, and other incentives directed towards advanced coal technologies should exist on a sliding scale, where there is a greater incentive for higher performing projects, and less reliance on incentives over time for a given technology. During the next six months, the Work Group will further explore the types, timing, and applicability of various incentives.

The Work Group developed six recommendations to accelerate the transition to advanced coal technologies (ACTs), especially technologies for CO_2 capture and storage (CCS), consistent with protection of public health and the environment. These technologies are critical to allow the United States to sustain both a clean environment and a growing economy. The six recommendations are as follows:

- Mechanisms to enhance, expand, develop and coordinate existing and new incentives to encourage early commercial use of ACTs should be implemented.
- Legislative and regulatory drivers should be utilized to accelerate the near- and long-term deployment of ACTs.
- Risk characterization, risk management, and liability mechanisms should be developed to enable the accelerated deployment of CCS technologies.
- Research, development, and demonstration (RD&D) programs focusing on ACTs should be expanded and strengthened to accelerate commercial deployment at new and existing facilities.
- Mechanisms to address the uncertainty and delay associated with permitting should be developed for ACT projects.
- The importance of, and basic information about, ACTs should be effectively communicated to the public, policymakers and other key stakeholders.

II. Introduction

Roughly half the electricity in the United States is generated from coal, and domestic coal reserves exist to supply up to 200 years of power demand at current levels. Because of the economic, political, and energy security issues related to U.S. domestic supplies of this fuel, coal is likely to remain a significant part of the U.S. energy portfolio into the future. At the same time, there is broad recognition that the environmental impacts of mining, transporting, and using coal, including emissions of greenhouse gases (GHGs) that contribute to climate change, must be mitigated if coal use is to continue as a major U.S. energy source. Those impacts can be minimized through development and use of advanced coal technologies, including innovations that allow for higher efficiencies and the capture and storage of emissions inherent to coal use.

Technological innovation is critical to enable the growth of the U.S. economy with simultaneous protection of human health and the global environment. Recognizing the vital role ACTs will play in America's energy and environmental future and the rapid pace with which these technical advances are evolving, the Clean Air Act Advisory Committee (CAAAC) recommended the formation of the Advanced Coal Technology Work Group. The full charge from CAAAC to the Work Group, a list of Work Group members, and information regarding the Work Group's activities from January through June 2007 are included in Attachment A.

This is the ACT Work Group's six-month Draft Interim Report. A final report from the Work Group is expected in January 2008.

III. Background on CO_2 from Coal

Climate change is a global challenge. The United States can and should be a world leader in a possible global solution. Because CO_2 persists in the atmosphere for 50-100 years, supporting, developing and deploying technologies to reduce emissions of this greenhouse gas in the near-term must be essential elements of a U.S. climate change strategy. Time is of the essence.

The Intergovernmental Panel on Climate Change (IPCC) reports that power generation is the largest global source of CO_2 emissions, and U.S. EPA's *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005* reports that electricity production makes up about 42 percent of the U.S. contribution to global CO_2. Burning coal to generate electricity is a significant source of domestic CO_2 emissions, according to the EPA *Inventory*, and also produces emissions of criteria and hazardous air pollutants. Additionally, there are considerable environmental impacts associated with coal mining and transportation. While there are existing authorities to address all of these impacts under U.S. environmental statutes, a more direct approach for reducing emissions from all sectors is needed.

Momentum is building for near-term solutions to reduce CO_2 emissions. The U.S. Supreme Court has ruled that CO_2 is a pollutant under the Clean Air Act, and a number of cities, states, and regions have already led with various efforts to regulate CO_2 or otherwise address climate change. In general, CO_2 emissions from all sources are orders of magnitude greater than conventional pollutants: while millions of tons of SO_2 reductions have been achieved, for example, billions of tons of CO_2 will need to be avoided or captured and stored to address climate change.

Because of the importance of coal in the U.S. economy, and its significant carbon footprint, deployment of ACTs provides one of the critical near-term domestic opportunities to reduce CO_2 emissions from the power generation sector. Due to the additional cost of these new technologies as compared with existing practices, the rapid development and deployment of ACTs should be supported by robust federal investments and incentives, regulatory programs, and demonstration projects (as necessary), if the United States is to achieve near- or long-term CO_2 emissions reductions without experiencing adverse domestic economic impacts.

The federal government is in the logical position to promote, coordinate, direct, and oversee this effort, which requires near-term and long-term cooperation by many stakeholders, including federal regulatory agencies, state and local agencies, public utility commissions (PUCs), utilities and independent power producers, developers of other coal-intensive projects, the financial industry, and non-governmental organizations with an interest in environmental improvement and consumer protection, and of course citizens and rate-payers.

IV. Overview of Advanced Coal Technologies

The definition of advanced coal technologies is continually evolving, and includes a suite of innovative processes and technologies that are designed to substantially reduce or eliminate the environmental footprint (e.g., for CO_2, criteria and hazardous air pollutants, waste, water) of coal-based energy production processes.

ACTs offer significant environmental and economic advantages over coal-based technologies in widespread commercial use today. ACTs not only reduce the environmental footprint associated with coal utilization, but also enable the use of coal as a more sustainable and affordable component of the U.S. and world energy supply. Because more than 90% of coal used in the United States is for the production of electricity, most ACTs are power-generation related; however, considerable efforts are underway to use ACTs for other coal-based energy production processes, such as coal-to-liquids and coal-to-gas. The Work Group recognizes that ACTs have the potential to reduce the overall, multi-media footprint associated with coal-based energy processes.

A number of measures available today, such as demand-side management or offset utilization, reduce CO_2 and other emissions associated with coal use without necessitating changes at the plant level. With regard to traditional "control" technologies, however, because CO_2 generated from coal combustion is far more costly to control than criteria pollutants, the most immediately available measures for reducing CO_2 emission rates involve improving generation efficiency. Advanced pulverized coal (including ultra supercritical and supercritical) and IGCC technologies, available today, both have the potential to reach efficiencies above 40% (compared to the average U.S. coal fleet performance of 33%). In addition, existing pulverized coal, or PC, units should be able to make modest efficiency improvements to reduce CO_2 emission rates per unit of energy output.

Efficiency improvements alone, however, will not provide the CO_2 reductions necessary to significantly reduce the carbon footprint of energy conversion systems where coal is the feedstock, or to stabilize the concentration of CO_2 in the atmosphere at acceptable levels. Coal-based plants that capture a significant proportion (80-90% or more) of CO_2 emissions for permanent storage will be needed to accomplish these goals.

The technological outlook for such capture technologies is encouraging. There are a number of different technologies at various stages of development that enable capture of CO_2, including oxy-fuel combustion, enhanced solvent innovations, chemical looping, gasification, and synthetic natural gas production. Promising technologies are already in use at large-scale commercial facilities in the U.S. and abroad. IGCC plants, for example, can undertake capture of CO_2 with existing technology; the process involves use of a catalytic reactor in which syngas from the gasifier is reacted with steam to convert CO to CO_2 and additional hydrogen. CO_2 is then separated using a physical or chemical absorption process. Capturing CO_2 is also technologically feasible for both existing and new PC units. For example, PC plant demonstrations using a technology based on chilled ammonia for CO_2 capture are underway.

Current proposals exist for the first projects involving commercial application of CO_2 capture for power plants. Ultimately, all ACTs will face several cost hurdles, including the challenge posed by emissions reduction costs (including the significant energy penalty associated with parasitic load requirements required to capture CO_2) as well as the challenge of demonstrating reasonable energy costs. However, these costs need to be balanced with the benefits of ACTs.

While capture of CO_2 poses technical and cost challenges, storage (or geological sequestration) raises significant deployment issues. The identification and characterization of viable CO_2 storage reservoirs is a common and important factor for all ACTs that incorporate carbon capture. In addition to the lack of an economic driver for CO_2 sequestration, significant hurdles for CO_2 storage include uncertainty and risk surrounding legal, regulatory and operational issues. In order to facilitate significant CO_2 emission reductions it will be necessary to identify suitable geologic reservoirs for CO_2 and create a comprehensive regulatory framework for safe, long-term CO_2 storage.

Solving these issues regarding storage or geologic sequestration will facilitate a more rapid transition from research, development, and demonstration (RD&D) projects, to full-scale commercial deployment and use. Early capture and sequestration experience will be crucial to help the power sector drive down future costs and provide sufficient volumes of compressed CO_2 to certify geology for later large-scale sequestration. At the same time, it should be noted that much of the knowledge gained from decades of experience with use of CO_2 in enhanced oil recovery (EOR) projects can be applied towards current efforts regarding permanent carbon sequestration. Using CO_2 for EOR purposes, where technically and economically feasible, can also favorably improve the economics of CCS through the reduction of overall costs.

V. Recommendations

The Work Group agreed that the development of a set of recommendations and actions to be undertaken by different stakeholders would provide the greatest potential to accelerate the transition to ACTs. Over the course of the first six months of Work Group activity, members identified six areas for which recommendations would be the most useful in accelerating ACT deployment. Because of the complex interrelationships among technical, economic, policy, environmental, and legal considerations, and the diversity of stakeholders involved in the development and deployment of ACTs, the Work Group also agreed to examine and identify barriers and opportunities outside of the Clean Air Act to accelerate the use of ACTs. As a result, some of the six recommendations overlap and complement each other.

The remainder of this report presents the Work Group's recommendations, along with lists of options the Work Group has considered for implementing those recommendations. The lists are not exhaustive, but rather represent a sample of options examined thus far in the Work Group process. Over the next six months, the Work Group will further refine the recommendations, identify the most useful implementation options, and discuss the roles different stakeholders will play in implementing the recommendations.

The six areas for which the Work Group identified recommendations are:

- Incentives to encourage early commercial use of ACTs
- Legislative and regulatory drivers for ACTs
- Risks and liability regarding CCS
- Research, development, and demonstration mechanisms for ACTs
- Ways to address uncertainty and delay in permitting for ACT projects
- Education and outreach regarding ACTs

Incentives to Encourage Early Commercial Use of Advanced Coal Technologies

> **Recommendation: Mechanisms to enhance, expand, develop and coordinate existing and new incentives to encourage early commercial use of advanced coal technologies should be implemented.**

Significance

Incentives that encourage early commercial use of ACTs can be a critical complement to other policy instruments. Examples of incentives include, but are not limited to, grants, tax credits, loan guarantees and mechanisms to make funds available to assist with ACT investments. Used effectively and equitably, the incentives can limit the cost of government investment and participation, improve the market competitiveness of ACT projects, and permit learning from "first mover projects" by the private sector and government.

Discussion

Incentives are best used in the context of risk sharing among sponsors of early commercial ACT projects: equity and debt investors, equipment suppliers and other private-sector participants, and agencies on behalf of rate payers, taxpayers, and the general public. In particular, government's best use of incentives is in accepting all or part of certain critical technical, policy and regulatory, and market risks of early commercial projects if the private sector cannot manage them cost-effectively or at all and if the projects will not be built and operated without government risk sharing.

In providing incentives to a specific early commercial project, the government should select from a toolkit the most appropriate incentive(s) for addressing a critical project risk(s) and offer just sufficient incentives to tip private investment decisions in favor of building and operating the project. In general, government should use firm rules to limit the public's exposure to risk, target limited incentive resources, and assure equitable and fair distribution of such resources; it also should exercise sufficient due diligence when providing incentives to ensure that all significant project risks are adequately addressed.

Options
The Work Group is considering several implementation options, including:

- For projects that meet technical standards, State and federal financial incentives including grants, several types of tax credits, accelerated depreciation, and loan guarantees (available regardless of alternative minimum tax rules).
- Long-term purchase agreements (provided by any creditworthy entity).
- Public utility commission actions to assure dispatch, assure returns from, or otherwise favor projects that employ ACTs.
- Soft landings for failed good-faith efforts to employ ACTs (e.g., relative to compliance with environmental regulations, to buttress private performance insurance [such as performance warranties], to limit private liability for transportation and long-term storage of CO_2).
- Establishment of an investment fund to provide incentives for early commercial applications of ACTs, RD&D and commercialization (e.g., supported by a charge on the use of electricity and in the absence of a tax).

Legislative and Regulatory Drivers for Advanced Coal Technologies

> **Recommendation: Legislative and regulatory drivers should be utilized to accelerate the near- and long-term deployment of advanced coal technologies.**

Significance
Mandatory policy drivers are needed to bring about the scale of investment in ACTs in a timeframe necessary to stabilize the concentration of CO_2 in the atmosphere at acceptable levels. While complementary approaches, such as funding for research and development to accelerate emerging technologies and financial incentives to encourage early commercial use of ACTs are important, these approaches alone are insufficient to bring about the depth of investment required across the entire coal-utilizing sector. A more comprehensive, mandatory approach is needed to accelerate the near- and long-term deployment of ACTs.

Discussion
Mandatory policy drivers will allow for the accounting of economic externalities and enable emitters of GHGs to capture the economic value of emissions reductions. Without corrective regulation, the external impacts of emissions, including GHGs, are not accounted for in the economic decisions of the emitting facility. Lack of federal regulation also creates a barrier to appropriate cost recovery in utility ratemaking exercises. Federal regulatory policy directives should provide consistency, predictability, stability, and clarity over longer timeframes, while recognizing State prerogatives and authorities.

Any policy that is implemented must take into account the maturity of the technology, and avoid actions that would delay development and deployment of ACTs. The policy should strive to attain public policy goals in the most timely and cost-effective manner. GHG regulation must also be supported by incentives for early adopters who will bear the greatest risk, and comprehensive research, development, and demonstration (RD&D) programs.

Options

The Work Group is considering several potential legislative/regulatory options to accelerate the use of ACTs, including:

- A national cap-and-trade program that would set limits on GHGs over a significant timeframe. There is considerable agreement on many design elements of such a system. For instance, to allow participants to find the most cost-effective emission reduction technologies throughout the economy, the program should cover all major emitting sectors – not just the electricity sector.
- Depending on how they are structured, GHG performance standards that would limit electricity generation or coal-to-liquids facilities to a maximum emissions rate. Examples include sector-wide emission portfolio standards and the California electricity procurement standard.
- Administration of the Clean Air Act's Best Available Control Technology (BACT) and Lowest Achievable Emissions Rate (LAER) requirements to achieve best CO_2 emissions and performance, as well as best performance for other air pollutants, is a possible near-term tool for accelerating commercial deployment of ACTs for coal-based energy production applications.
- An appropriately-sized tax on every ton of GHG emitted into the atmosphere that would create a financial incentive to deploy ACTs to reduce GHG emissions.
- Other regulatory policy drivers could include requirements for new facilities to capture and store CO_2 emissions or, at a minimum, a requirement to designate and conduct detailed site characterization for locations where CO_2 would be stored at a future date.

Risks and Liability Regarding CO_2 Capture and Storage

Recommendation: Risk characterization, risk management, and liability mechanisms should be developed to enable the accelerated deployment of CCS technologies.

Significance

There is a need for substantial leadership by and coordination among governmental organizations at all levels and the private sector to ensure that the financial, natural resources, performance, and other risks associated with CCS projects are properly characterized, allocated, assessed and managed. Lack of certainty regarding methods and requirements for risk characterization and management, including liability, has the potential to delay the widespread adoption of CCS, a critical component in the ACT portfolio.

Discussion

Risks can be categorized and allocated along at least three different lines. First, various *entities* will need to be involved in the development and operation of CCS projects, including: federal, state, tribal and local governments; lenders and project financiers; operators (utilities and other industrial sources); CO_2 transporters; CO_2 well operators and managers; property owners; equipment suppliers; construction and engineering firms; and insurers. Each of these entities will be interested in identifying, understanding and managing CCS-related risks. Second, risks are present at nearly every *stage* of CCS, including: energy conversion and production processes; capture; transportation; underground injection; and sequestration. Third and finally, differing *risk types* are associated with each stage of CCS, including performance-related, health and safety, natural resource damage-related, technical, regulatory/policy, and market risks. From a technical

perspective, the Work Group concurs with the IPCC that these risks can be reasonably characterized and assessed (see IPCC 2005 *Special Report on Carbon Dioxide and Storage*).

The technical ability to characterize CCS risks does not remove the need to address further the full range of risks facing a potential CCS project proponent or investor. Risks can vary widely in their probability of occurrence and in the severity of their potential impact. Risks of low to moderate impact probably can be managed reasonably through traditional market risk-management tools, such as warranties, performance guarantees, testing and insurance mechanisms. However, there are other types of risks (i.e., higher impact events and long-term risks), which in character, severity, or duration pose significant obstacles to the deployment of CCS and which may need to be addressed by government rather than through traditional risk-management tools.

Options
The Work Group is considering a number of implementation options, including:

- Allocation of risk among private and public sector entities based on their respective capacity to manage and address each particular risk efficiently.
- Risk-management tools, such as: insurance and cost spreading (e.g., fees and taxes) strategies; indemnification; conveyance of title; loan guarantees; monitoring, verification and reporting provisions, including related liability provisions; and permit shield and other compliance assurance mechanisms.

Research, Development, and Demonstration Mechanisms for Advanced Coal Technologies

> **Recommendation: Research, development, and demonstration programs focusing on advanced coal technologies should be expanded and strengthened to accelerate commercial deployment at new and existing facilities.**

Significance
Deployment of a suite of ACTs – including those designed for more efficient power generation, CO_2 capture, and CO_2 storage – is necessary to fulfill the concurrent goals of meeting demand for electricity and other energy production processes and mitigating the resulting environmental impacts, including GHGs and other emissions. While the promise of a number of ACTs has been identified through smaller-scale projects or applications in non-power industries, the advancements required to achieve the full benefits of these technologies have yet to be demonstrated. An essential component in realizing ACTs' full potential to achieve environmental goals, therefore, must be RD&D programs.

Discussion
Because coal is a heterogeneous natural resource that is consumed in many ways by a variety of industries, a portfolio of ACTs is needed to significantly reduce both CO_2 emissions and the overall environmental footprint of new and existing facilities. The portfolio of options represents an evolving set of strategies to improve process efficiencies and reduce or capture emissions. Ultra supercritical PC and IGCC technologies, combined with CCS, are among the ACTs with the greatest potential to reduce environmental footprints and support current and future coal utilization. Ongoing RD&D programs and commercial deployments for each of these technologies

actively contribute to the evolution of the ACT portfolio. This RD&D will also expand the identification and availability of new and other options.

The implementation of new regulatory programs, the existence of various risks (e.g., those associated with technical/scientific uncertainties and costs), and the lack of capacity with regard to materials and ancillary support processes, may individually or collectively limit the rate and magnitude of achievements that can be commercially deployed. Therefore, RD&D programs and associated regulatory requirements should be designed to drive improvements at a rate that balances and/or mitigates development risks with the desire to achieve the full benefits of ACTs as expeditiously as possible. Technological progress is likely to be incremental.

Options
The Work Group is considering a number of potential options to implement this recommendation, including:

- Funding mechanisms to accelerate research, development, and demonstration of ACTs.
- Statutory incentives: for example, those that may exist under the Clean Air Act.

Ways to Address Uncertainty and Delay in Permitting for Advanced Coal Technologies

> **Recommendation: Mechanisms to address the uncertainty and delay associated with permitting should be developed for advanced coal technology projects.**

Significance
Permitting is the bedrock of the air quality protection system, and is crucial to the deployment of new technologies. Various permitting processes have the potential to introduce significant delay and uncertainty in the development of projects utilizing advanced coal technologies. Delays add cost to projects, and uncertainties may make financing/obtaining tax credits more difficult and may ultimately adversely affect a project's viability. An array of policy measures could potentially assist in reducing the uncertainty and delay in permitting ACT projects.

Discussion
Air permitting. Projects utilizing ACTs can be delayed by issues concerning any number of elements in the air permitting process, including incomplete information in permit applications, technology (e.g., Best Available Control Technology [BACT]) determinations, disagreements regarding modeling protocols, and permit appeals.

CO_2 sequestration permitting. ACT projects that include CO_2 capture and sequestration must obtain permits for the underground injection and storage of large quantities of CO_2. There are currently several layers of permitting requirements that can affect these projects. On the Federal level, permitting has generally occurred through the Underground Injection Control (UIC) program of the Safe Drinking Water Act (SDWA). For demonstration projects, EPA has established guidance for permitting the projects as Class V research wells. At the state level, permitting for small-scale demonstration projects tends to fall under various state agencies.

Other permits. Other permits may be required for ACT projects, including pipeline/CO_2 transport permits, NEPA permits, and/or water and waste permits. Permits for siting (i.e., property rights) are beyond the scope of Work Group activity and will not be addressed.

Options
The Work Group is considering a number of options to implement this recommendation, including:

- **Air:** A comprehensive "facilitated permitting" process for ACT projects might be appropriate under certain (yet-to-be determined) circumstances. Such a process might include early coordinated communication between various stakeholders to ensure clear and consistent expectations around the permitting process, priority processing, and timelines by which the permitting authority must act. Any process must preserve the substantive integrity of the permitting process, including the role of public participation. Issuance by EPA of technical guidance for some ACTs may facilitate faster control technology (e.g., BACT) decisions.
- **CO_2 sequestration:** Clear regulatory frameworks are needed for the coming large-scale demonstrations and, ultimately, commercial-scale sequestration operations. At the federal level, EPA could use its authority under the SDWA, though Congressional action may provide for a more specifically tailored process. For the states, a federal model rule or guidance could be written to encourage uniformity among the states, as well as to encourage clear authority for injection permitting among various state agencies/EPA.

Education and Outreach

> **Recommendation: The importance of, and basic information about, advanced coal technologies should be effectively communicated to the public, policymakers and other key stakeholders.**

Significance
The development and deployment of ACTs will present the public and other stakeholders with a host of new questions and issues about ACTs and CCS (hereinafter collectively referred to as ACTs), including those related to liability, safety, environmental benefits, and costs. For example, the public may oppose CCS without a clear understanding of the risks and benefits of CCS in relation to the broader costs and benefits of climate change policies. To address such issues and concerns while concurrently communicating the importance of developing and deploying ACTs, an effective education and outreach campaign must be developed and implemented.

Discussion
An effective campaign of education and outreach regarding ACTs should include three elements: (1) clear and concise messages, (2) an information clearinghouse accessible by individuals, organizations and jurisdictions alike, and (3) an array of strategies, including strategic and focused outreach, to address diverse audiences.

Clear and concise messages for the education and outreach campaign are imperative. The messages need to be strong and reflect the sense of urgency with which our nation should move forward to develop and deploy ACTs, including CCS. The messages should also be simple, identifiable and frequently repeated.

The established messages should then be attached to a comprehensive information clearinghouse about ACTs that will mobilize a toolbox of products such as a website, printed materials,

presentations, training modules, and videos. In addition, a well-designed outreach strategy to be undertaken by experts in the field and communication specialists is also needed to enhance awareness and improve knowledge about ACTs for the public and other stakeholders. The toolbox of products would be accessible by individuals, organizations, and jurisdictions that might use them to learn about ACTs or to develop their own tools to communicate about them to other groups. The success and breadth of this information clearinghouse, however, requires an organization that will be charged specifically with operating and maintaining it, keeping information both relevant and current.

As a complement to the message and clearinghouse in support of the development and deployment of ACTs, a well-designed education and outreach strategy will need to be developed that will enhance awareness, improve knowledge, and develop skills concerning ACTs. At the outset of the campaign, an advisory committee should be established that will include individuals well-versed in ACTs (e.g., legal, policy, technical, as well as communications professionals).

Options
The Work Group is considering the following options to implement this recommendation: development of clear messages, a clearinghouse of updated information, and an integrated and thorough outreach strategy.

VI. Next Steps

Over the next six months, the Work Group will further refine the recommendations, identify the most useful implementation options and discuss the roles different stakeholders will play in implementing the recommendations.

Attachment A

1. Charge to Work Group

> To discuss and identify the potential barriers and potential opportunities to create incentives under the Clean Air Act to the development and deployment of advanced coal technologies.
>
> This may include discussion of technical and economic information, environmental performance and characteristics, state and regional developments, and questions related to the Clean Air Act and the deployment of advanced coal technology.
>
> The Work Group should also consider potential updates to the information in EPA's technical report entitled "The Environmental Footprints and Costs of Coal-Based Integrated Gasification Combined Cycle and Pulverized Coal Technologies," and carbon capture and sequestration, among others.

The Work Group's duration should be no longer than one year, with agreement to produce an interim report at six months, and a final report at the conclusion of the year. The Work Group's membership should reflect a diversity of stakeholder views and perspectives.

Based on the Work Group's discussion, the Group determined it is appropriate and useful to also examine the barriers and opportunities outside the Clean Air Act to accelerate the deployment of ACTs.

2. Advanced Coal Technology Work Group Members

Utilities
AEP (American Electric Power)
Xcel Energy
Sempra Energy
Southern Company
PSEG Services Corp. (Public Service Enterprise Group)

IGCC and Pulverized Coal Technology/Pollution Control Equipment Providers
Siemens Power Generation
Institute of Clean Air Companies
Shell Gas & Power
General Electric Energy
Alstom Power, Inc

Coal Companies
Rio Tinto Energy America
Arch Coal, Inc.

State and Tribal Representatives
New Mexico
Illinois
Florida

National Tribal Environmental Council

NGO/Environmental Organizations
Environmental Defense
Natural Resources Defense Council
Clean Air Task Force

Public Utility Commissions
Commonwealth of Kentucky

Academic Institutions
East Tennessee State University
Northern Arizona University

Experts in Carbon Capture, Storage and Sequestration and other Approaches to Manage and Provide Incentives for CO2 Reductions
Lawrence Berkley National Laboratory
Pew Center on Global Climate Change
Clean Air Action Corporation

Federal Agencies
Department of Energy
Department of Defense
Environmental Protection Agency

Other interests represented
Latham & Watkins (legal)
Center for Toxicology & Environmental Health, LLC
United Mine Workers of America
CH2M Hill (permitting consultants)
Caterpillar, Inc.

3. Substantial Consensus

Pursuant to the Work Group Charter, the Work Group agreed to operate according to a "substantial consensus" principle. Substantial consensus means that it is understood that not every member may completely agree with every decision the Work Group makes. In these cases, the Work Group will balance views to the extent possible in reporting on the recommendation and incorporate alternate viewpoints.

4. Work Group Activities

For an overview of Work Group activities over the past six months, please visit the Work Group's website at http://www.epa.gov/air/caaac/coaltech.html. The website lists meeting and conference call dates, and includes meeting summaries and all presentations made thus far to Work Group members.