

Remarks by Mark Maddox
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to the Third Annual Conference on Carbon Sequestration
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"The Mobilization for Carbon Capture and Sequestration:
The Key to Energy, Economic, and Environmental Security"

Thank you Rita... good morning everyone.

It's good to see so many of you here from various government agencies, the private sector, and other nations to participate in this important Conference on Carbon Sequestration.

Your presence this morning is proof of the potential and the importance of carbon sequestration to our national and international energy, environmental and economic future.

President Bush has stated America's goals in all these areas — and the primary role technological advances will play in the reaching of these goals — through his:

- * National Energy Policy, which will provide for dependable, affordable, environmentally sound energy for the future;
- * Clear Skies Initiative for the reduction of polluting air emissions by 70 percent by the year 2018, and
- * Global Climate Change Initiative for the reduction of greenhouse gas intensity by 18 percent by 2012.

Later this morning, Energy Secretary Abraham and others will have more to say about the visionary and practical consequences of these far-reaching and beneficial policy initiatives.

I would like to brief you on the activities of the Office of Fossil Energy that pertain to the carbon initiatives we will be discussing over the next three days.

Our job in Fossil Energy is to help advance the technology that will allow the United States and our international partners to get the most out of our resources of coal, oil and natural gas while achieving the President's environmental goals.

Because greenhouse gas emissions are an inescapable result of fossil fuel use, carbon sequestration could play a large role in helping us to do our jobs.

We are attacking the carbon sequestration challenge in several ways and we hope to produce several different beneficial effects.

We want to reduce the quantity of produced greenhouse gases by increasing the efficiency and optimizing the performance of fossil energy-based power generation, particularly from coal and natural gas; the more efficient the process, the less fuel is required, and the less greenhouse gas

is produced. In fact every one percent gain in efficiency causes a three-to-four percent reduction in carbon dioxide emissions per kilowatt hour of output.

We want to capture and safely and permanently store produced greenhouse gases.

And, where possible, we want to get two bangs for our buck by permanently storing carbon dioxide in depleted oil reservoirs and coal-bed methane fields, where the pressure of injected CO₂ will increase the production of our still-abundant oil and gas reserves.

The continued prominence of fossil fuels in energy production — and world economic growth — could depend on the success of our shared carbon sequestration R&D. The importance of our work cannot be over estimated. A few statistics and projections from the U.S. Energy Information Administration will help illustrate my point.

Fossil fuels now account for about 85 percent of America's and the world's total primary energy production. The EIA projects that growing economies and rising standards of living around the world will raise the world's energy requirements almost 60 percent by 2025, with fossil energy's share of total primary energy production rising to approximately 90 percent.

Coal alone accounts for 22 percent of the primary energy America consumes today and generates more than 50 percent of our electricity supply. U.S. coal consumption is expected to grow by 36 percent over the next 20 years.

Worldwide, coal accounts for 25 percent of total primary energy consumption and generates 36 percent of the world's electricity. World coal consumption is expected to grow by 40 percent in 2025 to meet increasing energy demand. Coal's energy contribution is vital to our shared future.

Fortunately there is more than enough to go around. Coal accounts for almost 95 percent of America's fossil fuel reserves. And it accounts for almost 70 percent of the world's fossil reserves.

At current rates of consumption the world has enough coal reserves to last more than two centuries.

Imagine what would happen to the world's economies if fossil fuel use, particularly coal use, were subtracted from the energy equation with no affordable alternative in sight. Imagine what would happen to our shared dream of a better life for future generations.

That is why Secretary Abraham, in Berlin last Fall, told the European nations: "...it is unreasonable to expect any country that possesses abundant supplies of inexpensive fossil fuels to forego their use." And that is why we are mobilizing in the U.S. to get the best possible use out of fossil fuels, notably coal.

Coal stands for flexibility and diversity in primary energy, especially in producing reliable and affordable supplies of electric power, the most critical factor in a modern economy.

Developing the technologies that will eliminate polluting emissions and greenhouse gases from coal-based energy production is an urgent and shared world concern.

We are addressing that technological need through:

- * Our domestic Regional Carbon Sequestration Partnerships;
- * Our core carbon sequestration research effort;
- * The FutureGen project to build and operate the world's first pollution-free, coal-based power plant featuring carbon sequestration, and
- * The International Carbon Sequestration Leadership Forum.

The seven Regional Carbon Sequestration Partnerships comprise 40 state agencies, three Indian nations, three Canadian provinces, universities and private companies dedicated to identifying the best regional sequestration options, and to designing supporting permitting and regulatory frameworks. Reports on the Partnerships are at the top of Thursday's conference activities.

The \$1 billion, 10-year FutureGen project to build a 275-megawatt power plant of the future will be the prototype for emissions-free, coal-based power generation; and a test-bed for advanced technologies.

FutureGen will generate affordable and reliable electric power at almost twice the efficiency of the average power plant today, and produce a source of commercial energy in a purer form – hydrogen.

Carbon sequestration technology is integral to FutureGen, which will be capable of capturing and sequestering one million metric tons of CO₂ a year.

CO₂ from FutureGen and other powerplants based on the FutureGen concept could be both permanently stored and employed in enhanced oil and natural gas recovery.

And hydrogen produced from FutureGen-inspired plants could help fuel the transportation fleet and the hydrogen economy of the future, reducing both our growing reliance on imported oil and natural gas, and indirectly contributing to the reduction of polluting emissions and greenhouse gases from other sectors of the economy.

The member nations of the International Carbon Sequestration Leadership Forum account for more than 80 percent of the world's coal reserves and an even larger share of its growing energy demand. The Forum will be a force in leading the world toward the use of FutureGen and other appropriate technologies, including hydrogen.

Together, we are bringing an impressive array of resources to bear on carbon sequestration research and development. They include:

- * The federal government;
- * Our national defense and energy laboratories;
- * Our universities;

- * The regional partnerships;
- * The International Carbon Sequestration Leadership Forum;
- * And, most important, private industry.

Private industry's participation, as always, is critical. We need industry's creative drive, its realistic business sense, and its knowledge and experience with the transfer of technology into the marketplace.

Joint-venture research, development and demonstration projects conducted by government, industry and other participants allow us to leverage needed intellectual resources and capital while eliminating duplication and waste. Our project agreements include provisions for information sharing and the protection of intellectual property rights.

The Department of Energy is spending \$380 million this year for coal-specific activities that support President Bush's initiatives. We're asking for more than \$470 million for the coming fiscal year. These appropriations include funding for both standing activities and the early stages of newer research programs that will be carried out over the next 10 years.

Under President Bush, carbon management has become a top governmental priority. The Department of Energy's carbon capture and sequestration funding has increased from \$9 billion to a little more than \$40 billion since President Bush took office. We have proposed \$49 billion for carbon sequestration in fiscal year 2005.

Our activities comprise more than 80 specific projects that include:

- * 15 projects on the pre- or post-combustion capture and removal of carbon dioxide;
- * 17 projects on sequestration in all its forms - terrestrial, geologic and some oceanic;
- * 14 projects for measurement, monitoring and verification of sequestered carbon;
- * 9 projects exploring potential breakthrough concepts;
- * 2 projects to manage the non-carbon greenhouse gases of landfill gas and ventilation methane from underground coal mines; and
- * 16 basic research projects within the National Energy Technology Laboratory.

There is additional work underway on a separate CO₂ Capture Project. You will be hearing more about this later this morning. And finally, the Office of Fossil Energy's projects also include proposals to improve the carbon-related performance of existing coal-based power plants.

As I mentioned earlier, one proposed method of sequestration offers the promise of new natural gas in a time of rising need. The injection of CO₂ into very deep, unmineable coal seams could displace coal-bed methane, which could then be recovered and used to augment the gas supply. Our deep coal seams and deep saline reservoirs together may be capable of holding more than 500 billion metric tons of carbon dioxide, more than 280 years emissions from coal-based power plants at today's CO₂ emissions rate. And, again, we are assessing the potential use of CO₂ from coal-based generation for enhancing oil and gas recovery in declining oil fields.

We are seeking to develop a portfolio of technologies that gives us the highest possible degree of

flexibility in managing our response to developments in energy and the environment in both the near term and the longer term – that is, up to 2025 and beyond.

That is what President Bush means when he says, "America must have an energy policy that plans for the future, but meets the needs of today."

Our goals for carbon sequestration are ambitious but achievable. We aim to demonstrate a series of safe and cost-effective capture and sequestration technologies at commercial scale by 2012; and to establish the potential for commercial deployment after 2012.

To meet the goal of affordable energy, we aim to lower the costs of removal and sequestration by as much as 97 percent. We want to knock down these costs from as much as \$300 a ton, to no more than \$10 a ton.

The work we are doing on the technologies of the future also has near-term applications.

A coal-research priority is improving existing advanced clean coal technologies - in particular the application of integrated gasification combined-cycle generation, or IGCC. America's two currently operating IGCC plants, the repowered Wabash River plant in Indiana, and the new Polk Plant in Florida, have successfully demonstrated the environmental gains IGCC can deliver.

Now the mission is to improve and extend the capabilities of IGCC by raising efficiencies and lowering capital costs. Remember, every one percent efficiency gain results in a three to four percent reduction in CO₂ emissions. The less CO₂ we produce, the less we have to sequester.

Once developed, technologies have to be demonstrated. Under the President's \$2 billion, 10 year Coal Research Initiative, the Clean Coal Power Initiative, or CCPI, is home to our clean coal demonstration projects. CCPI has advanced at a steady pace from its creation in 2001 to the signing of final agreements last month to begin work on three of eight CCPI projects chosen after a rigorous selection process.

The Clean Coal Power Initiative's goals include:

- * Continued improvement of existing plants;
- * Continued improvement of gasification technology and IGCC generation;
- * Higher efficiency turbines;
- * Linking these turbines with combined cycle-generation with fuel cells in power production;
- * Pushing generation efficiencies toward 60 percent;
- * Economic hydrogen production at lower costs and higher efficiencies;
- * Carbon separation and sequestration that is economic and effective;
- * And, the sequestration-ready power plants;

FutureGen is a special CCPI project that has attracted most of the nation's major power producers, coal producers and equipment makers as partners. FutureGen is also open to international participation.

FutureGen's detailed objectives include commercial demonstration of:

- * Electric power from coal with very low and, ultimately, zero emissions of pollutants and carbon dioxide;
- * Total energy efficiency, with reuse of heat, of up to 85 percent;
- * Effective, safe, permanent carbon sequestration;
- * And, commercial hydrogen production.

FutureGen should prove conclusively that we can count on affordable, coal-based commercial electricity generation and hydrogen production with near-zero emissions in the relatively near future.

Achieving our ambitious goals — developing and deploying clean coal and fossil fuel technology for the betterment of America's and the world's energy, economic and environmental security — will depend largely on the work of the men and women in this room today. You and your colleagues will create the new science and technology of carbon management - an entirely new tool with which to answer some big challenges.

Our objectives are to do more than change the rules of the energy game for the century to come. They are to change the game itself. We propose nothing less than to consign to the history books the energy and environmental challenges that preoccupy our country and the world today – and to do it in a relatively short time.

Government cannot do it alone and the private sector cannot do it alone. I can't think of any more hopeful and satisfying legacy for government, private sector and international collaboration than the transformation of our energy and environmental world.