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Energy Department Pursues Technological Answers to Climate Change

Hydrogen fuel cells, carbon sequestration, expanded nuclear energy studied

U.S. Energy Secretary Spencer Abraham has outlined three areas of research into technologies that may reduce greenhouse gas emissions and the effects of climate change. Abraham spoke December 3 at a Washington meeting of more than 1,300 scientists and experts from 30 countries, assembled to assess the U.S. climate change research strategy.

The U.S. climate change research strategy sets priorities for the nation's \$1,800-million annual multi-agency research program focused on the planet's warming trend. The Bush Administration launched the intensified research effort to develop scientific and technological solutions to the climate change problem.

President Bush has committed the United States to an 18 percent reduction in emissions over the next decade.

Abraham outlined three significant projects underway at the Energy Department:

- The FreedomCar Partnership, devoted to the development of efficient, affordable hydrogen fuel cells to power vehicles. Given that transportation accounts for one third of all U.S. carbon emissions, Abraham said producing an effective hydrogen cell energy source "will mark a huge leap forward in our drive to control GHG emissions."
- Development of improved carbon sequestration technologies that would allow storage of carbon created in the burning of fossil fuels rather than its emission into the atmosphere. "Five years ago, the idea of capturing carbon dioxide from power plants and sequestering it was considered by most knowledgeable people to be technically difficult and economically impossible," Abraham said. "But today, in large part thanks to research conducted by the Department of Energy, conventional thinking has turned around." The Energy Department has 60 sequestration research projects underway, Abraham said.
- Ensuring that nuclear energy will remain a key element of the U.S. strategy "to slow the growth of, and ultimately halt or reverse, the emission of greenhouse gases," the energy secretary said.

Following is the text of the Abraham speech:

U.S. Department of Energy

**Remarks by Energy Secretary Spencer Abraham
Plenary Session of the Planning Workshop for Scientists and Stakeholders
U.S. Climate Change Science and Technology Programs Washington, DC
December 3, 2002**

Good afternoon. It's a pleasure to be here at this valuable workshop on the state of United States climate change and technology programs.

I know you have already heard from some impressive speakers, like President Bush's science advisor, John Marburger; NASA Administrator Sean O'Keefe; and my assistant secretary for Energy Efficiency and Renewable Energy, Dave Garman. I want to follow on some of the things they said to give all of you a fuller perspective on the Administration's efforts to combat global climate change and the role my Department will play.

Before I begin discussing our progress in this area, I want to express my appreciation to Secretary of Commerce Don Evans. I'm sorry he could not be here today. Secretary Evans has provided outstanding leadership in helping implement the President's climate change vision.

From the first months of this Administration, President Bush has made the subject of global climate change a priority.

The President has reaffirmed America's commitment to the United Nations Framework Convention and its central goal to stabilize atmospheric greenhouse gas concentrations at a level that will prevent dangerous human interference with the climate.

The challenge, of course, is fashioning a program to accomplish these goals. In this regard, the options could include anything from either outlawing GHG producing entities to taxing the use of such things in an attempt to reduce greenhouse gas emissions. But, obviously, any such draconian actions would surely be accompanied by drastic economic dislocation.

Accordingly, we determined that the only pathway forward to address GHG emissions consistent with economic growth was to develop the science and technology needed to devise real answers to the challenges of climate change. Our approach reflects a belief that the most sensible way to slow, halt, and even reverse the emission of greenhouse gases is to harness the very best technology and science ... to take advantage of the strengths of a robust economy ... to call on the genius found in our national labs, universities, and in the private sector ... and to work in close cooperation with other nations as we proceed.

It is important to note that our approach is one that relies on economic growth, not one that condemns it. "Sustained economic growth," as President Bush said earlier this year, "is the solution, not the problem, because a nation that grows its economy is a nation that can afford investments and new technologies."

President Bush called on nine cabinet agencies, along with other government offices, to develop a coordinated and coherent plan to seriously address global climate change.

What he made clear to us was the need to enhance our scientific understanding of the climate system even as we advance the technology we can employ to help us address the problem.

The Department of Commerce has been tasked with leading the government's efforts to understand the science involved in climate change.

A better understanding of the climate system and the role human activities play in that system will guide and pace our response to the threat of climate change.

However, since 79 percent of human-induced greenhouse gases result from our

production and use of energy, our response to the threat of climate change will in no small measure depend on the development of new energy technology, implemented over the long-term.

That's where the Department of Energy comes in, and that is why we are leading the government's efforts on the technology front.

We are moving aggressively in those areas where the course is clear and where the technology makes sense, and we will expand our efforts as the Commerce Department moves forward with its findings.

Indeed, the President's new climate management structure allows the strengths of the scientific effort -- led by the Commerce Department -- and the strengths of the technological effort -- driven by the Department of Energy -- to effectively complement one another in the drive toward solutions.

In February of this year, the President spelled out the first concrete challenge. He committed the United States to an aggressive strategy to cut greenhouse gas intensity by 18 percent over the next decade -- a first step to eventually stopping, and then reversing, greenhouse gas growth.

Doing this will avoid more than 500 million metric tons of greenhouse gas emissions by 2012, or the equivalent of taking nearly one out of every three cars off the road.

It is worth pointing out that this is comparable to the average progress that nations participating in the Kyoto Protocol are required to achieve -- without the economic consequences.

The Department of Energy has been moving forward on a broad front to implement our climate change policies. I would like to highlight for you several of the initiatives we are taking.

First, we are looking to do what we can to combat GHG emissions from our current energy portfolio. An obvious place to start is by advancing energy efficiency and working to bring down the cost of renewable energy.

Our most recent budget request sought more funding for our energy efficiency and renewable energy programs in nominal dollars than was appropriated last year or any prior year since 1981.

But enhancing energy efficiency and renewable energy, by themselves, won't solve all our problems. That's why we are working on a number of other fronts, including some whose payoffs might be decades down the road, that address questions about energy dependence in addition to the environment and climate change. I'd like to discuss three of these with you today.

One of the most exciting of these programs deals with transportation, which accounts for one third of U.S. carbon emissions. In January of this year the Department of Energy launched the FreedomCAR Partnership. The goal of FreedomCAR is a revolution under the hood -- efficient, affordable hydrogen fuel cells powering the vehicles consumers drive in the 21st Century.

FreedomCAR aims to develop the component technologies necessary to provide a full range of emissions-free, affordable cars and light trucks -- in short, an approach that will end our personal transportation system's dependence on petroleum without sacrificing people's freedom of mobility or freedom of vehicle choice.

As we work toward that ultimate goal, FreedomCAR will also support the development of nearer-term technologies that significantly reduce petroleum consumption and the environmental impacts of conventional vehicles -- which will help us achieve the 18 percent reduction in greenhouse gas intensity called for by President Bush.

Of course, there are many technological obstacles that will need to be surmounted for the widespread use of hydrogen as an "energy carrier." Cars and trucks that run on hydrogen powered fuel cells are not about to roll off the assembly lines in the near term.

But it is clear, I think, that this is the wave of the future. However many years away hydrogen powered fuel cells may be, when they do finally come online they will mark a huge leap forward in our drive to control GHG emissions. To support FreedomCAR and to aid in solving the technological riddles a hydrogen economy presents, we recently announced the release of the National Hydrogen Energy Roadmap, the first step toward the creation of a revolutionary new hydrogen infrastructure that could one day be used to fuel not just cars and light trucks, but buses, ships, and perhaps even trains -- with virtually no emissions.

The hydrogen R&D programs in the Department will use this Roadmap to define directions and priorities. Next steps will include the development of detailed research and development plans for hydrogen production, delivery, storage, conversion, and end-use applications.

Another critical R&D project is carbon sequestration, which also offers a tremendous opportunity to address the challenge of global climate change. President Bush has committed to spending \$2 billion on our Clean Coal initiative over the next decade on a host of technologies to reduce the greenhouse gases and other pollutants produced by coal. Sequestration technologies are among the Clean Coal program's most promising carbon mitigation approaches. Five years ago, the idea of capturing carbon dioxide from power plants and sequestering it was considered by most knowledgeable people to be technically difficult and economically impossible. But today, in large part thanks to research conducted by the Department of Energy, conventional thinking has turned around.

Today, we have more than 60 sequestration research projects underway. Our annual budget is approaching 50 million dollars, and our funding attracts another 35 million dollars annually from industry and others. And most importantly, we're beginning to see results:

Already, technology coming out of the laboratory has reduced the cost of capturing carbon from a power plant's exhaust by as much as 10-fold.

We're beginning to move into the field to test ways to permanently store carbon gases in geologic formations.

We're working with power companies to enhance the carbon uptake of soils and vegetation using the byproducts of their coal combustion plants.

We're exploring innovative concepts for turning carbon dioxide into a solid mineral -- it takes nature thousands of years to do this, we've succeeded in reducing the time to 30 minutes.

And we're doing all of this with the voluntary participation -- and voluntary contributions of financial and human resources -- by private companies. That's the essence of the President's climate change initiative -- joint government-industry partnerships working together to find sensible, low cost solutions.

Two weeks ago, I announced the Department of Energy is moving our sequestration program into a new and expanded phase, setting up a nationwide network of regional sequestration partnerships.

These partnerships, made up of private industry, universities, and state and local governments, will help us determine the technologies, regulations, and infrastructure that are best suited for specific regions of the country. Our goal is straightforward -- we want to know which sequestration technology is likely to be most effective in a region. Will it be injecting carbon gases into active or abandoned oil fields? Or perhaps into coal seams or deep brine-filled reservoirs? Will it be processes that make forest and crop lands more productive? Or will it be new, novel concepts just now emerging from our laboratories?

But equally important, we want to begin planning the permitting processes that will be necessary -- on the state and local level. And we want people to begin thinking about the pipelines and other infrastructure that might be needed. We want to be ready if the science tells us that large-scale carbon reductions are necessary in the future.

If carbon sequestration works, if it can be made affordable, if it can be proved practical -- then it may be the long-term key to stabilizing the level of CO₂ in the atmosphere or perhaps ultimately reducing it.

Finally, there is nuclear energy.

Fifty years ago, in the aftermath World War II, engineers and scientists began considering the civilian uses of nuclear power. It is safe to say that when nuclear energy was considered for civilian uses, the arguments recommending nuclear power were very different from the arguments recommending it today. Back then, arguments were put forth explaining how nuclear energy could be mobilized to apply to the fields of agriculture, medicine, and who knew what else the future might hold. Moreover atomic energy might be employed to generate electricity -- at the time, not so much for the United States and other developed nations, it was argued -- but for the "power-starved areas of the world."

These were compelling arguments then, and they successfully bolstered the civilian application of nuclear energy. So successful have these efforts been that nuclear energy now accounts for 20 percent of American electricity generation, and not much less worldwide.

But what I'd like to suggest is that there are additional arguments for nuclear power today that are relevant to today's realities.

First and foremost, nuclear power generates no greenhouse gas emissions. Given that fact, it must be a key element of our strategy to slow the growth of, and ultimately halt or reverse, the emission of greenhouse gases. There are other benefits as well.

Our commitment to a clean environment can be well served by nuclear energy. Nuclear power plants emit virtually none of the pollutants associated with the burning of fossil fuels. Nuclear powered plants in the eastern United States have made it possible for many states to meet the requirements of the Clean Air Act. Since the mid-1970s, in fact, nuclear energy has enabled the U.S. to avoid emitting over 80 million tons of sulfur dioxide and about 40 million tons of nitrogen oxides.

Moreover, nuclear energy promises to cleanly and efficiently produce hydrogen -- a potentially unlimited, clean energy carrier for the hydrogen economy. For these reasons we have been working hard to ensure that nuclear energy remains an important component of our energy future, and that it can be used safely and

efficiently.

Advanced energy technologies ... FreedomCAR and the hydrogen economy ... carbon sequestration research ... enhancing the role of nuclear power -- these are just some of the investments we are making to provide the breakthroughs needed to dramatically decrease our emissions in the long term.

There are, of course, many other initiatives and programs throughout the federal government, along with valuable partnerships with private industry and with other nations, which aim at this goal. You have been briefed on many of these by earlier speakers.

These are all part of a comprehensive, responsible strategy for dealing with climate change. We are taking a sensible approach to a complicated issue. And we are committed to dealing with it on the basis of cold facts and hard science. Make no mistake, however -- the key to real progress on the subject of climate change will not be found in government mandates, nor in the activities and comments of Congress or Administration officials.

Real solutions, real answers, meaningful advancement in dealing with the challenge of global climate change -- that must come from the people in this room, from your colleagues around the world, and from talented men and women in our labs and in the academy working on breakthrough technologies. Genuine progress can only come about as a result of your efforts -- working in the field, applying the latest scientific knowledge, and through trial and error. I hope that this week's gathering is serving you well for your hard work in the months and years ahead.

What this Administration promises is to aid in this effort, to give you the resources and support and backing that are needed. This is a course of action I am convinced will provide the framework for other nations to follow in dealing with the subject of global climate change, and I look forward to working with all of you to ensure its success.

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