2nd Annual Conference on Carbon Sequestration
Hilton Alexandria Mark Center Hotel, Alexandria, Va.
May 6, 2003
Keynote Address: The President's Carbon Intensity Reduction Initiative

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This audience probably does not need to be reminded that on June 11, 2001, President Bush made an important speech about the increase in the atmosphere of greenhouse gases. Greenhouse gases trap heat and thus warm the Earth. Concentrations of greenhouse gases, especially carbon dioxide, have increased substantially since the beginning of the industrial revolution. Careful studies show that around 1750 the concentration of carbon dioxide in the atmosphere was 280 parts per million (ppm) and the concentration today is 370 ppm. The National Academy of Sciences indicates, in a report prepared at the request of the White House, that the increase of carbon dioxide is due in large part to human activity, although we cannot rule out that some significant part of these changes is also a reflection of natural variability. And the carbon dioxide increases are expected to result in additional warming of the Earth's surface. The science of global warming produced by greenhouse gases is very complex. The U.S. is in the process of creating a 10-year strategic plan to outline a program to reduce the many scientific uncertainties associated with evaluation of the projections of how climate may change.

The U.S. has endorsed the U.N. Framework Convention on Climate Change, known as UNFCCC, which aims to "achieve a stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."

There are only two ways to stabilize concentrations of greenhouse gases in the atmosphere. One is to avoid emitting them in the first place; the other is to try to capture and store them after they have been produced.

The policy challenge is to act in a serious and sensible way, given the limits of our knowledge. While scientific uncertainties remain, we can begin now to address the factors that contribute to climate change.

My purpose here this morning is to describe the Administration's approach to the stabilization of the concentration of greenhouse gases in the atmosphere.

Greenhouse Gas Emission Intensity

Greenhouse gases consist of many components, some natural and some human-made. Water vapor, carbon dioxide, nitrous oxide, methane, and ozone are the primary greenhouse gases. Greenhouse gases that are entirely human-made are halocarbons and other chlorine and bromine containing substances, sulphur hexafluoride, hydro-fluorocarbons (HFCs) and perfluorocarbons (PFCs). The cumulative radiative effect of all the greenhouse gases, which are well mixed throughout the atmosphere, is often represented by an equivalent carbon dioxide concentration.

On February 14, 2002, President Bush announced a strategy to vigorously pursue emission reductions in the near term and initiate investments in advanced energy and sequestration technologies that will provide the breakthroughs needed to dramatically reduce emissions in the longer term. The President's approach recognizes that sustained economic growth is an essential part of the solution, not the problem. Economic growth will make possible the needed investment in research, development, and deployment of advanced technologies.

Specifically, the President's plan will reduce the greenhouse gas intensity of the U.S. economy by 18% by 2012. Greenhouse gas intensity measures the ratio of greenhouse gas emissions to economic output. This new approach focuses on reducing the growth of greenhouse gas emissions, while sustaining the economic growth needed to finance investment in new, clean energy technologies. It sets the U.S. on a path to slow the growth of greenhouse gases, and ñ as the science justifies ñ to stop the growth and then to reverse that growth.

In 2002, the U.S. greenhouse gas emission intensity was about 183 metric tons carbon equivalent per million dollar gross domestic product. All estimates are based on 2001 dollars. The national goal is to reach 151 metric tons carbon equivalent per million dollars gross domestic product in 2012. This represents an annual decline of about 1.8%. When the annual decline in intensity equals the economic growth rate, which is currently about 3% per year, emission growth will have stopped. When the annual decline in intensity exceeds the economic growth rate, emission growth will reverse. Reversing emission growth will eventually stabilize atmospheric concentrations.

Strategy of the President's Climate Change Plan

In the President's Rose Garden speech on global climate change on June 11, 2001, two new Presidential Initiatives were announced to speed the progress on finding solutions to the carbon problem. The Climate Change Research Initiative, known as CCRI, was begun in FY2003 with $40 million to reduce scientific uncertainties about how the complex climate system operates. For FY2004, the CCRI budget request is $182 million, an increase of $142 million above the previous year. In the second initiative, the National Climate Change Technology Initiative, known as NCCTI (pronounced necktie), will accelerate the development of climate change technology options to avoid, capture

and store greenhouse gas emissions and to monitor and measure greenhouse gas emissions and inventories.

Both CCRI and NCCTI add to the Administration's considerable investments in climate change. On climate change science, the U.S. Global Change Research Program, known as USGCRP, was established by the Global Change Research Act of 1990 and the FY2004 budget request is nearly $1.6 billion. An additional $1.3 billion is invested in climate science related activities. The science funds are distributed across 13 agencies. On climate change technology, about $1.6 billion has been requested for FY2004. Nearly 90% of the technology funds are spent in Department of Energy and about 10% in the Environmental Protection Agency.

Implementation Plan to Reduce Greenhouse Gas Emission Intensity

I would like to mention several activities that the Administration has implemented to reduce greenhouse gas emission intensity. These activities have several key aims -- to avoid carbon emissions through renewable energy; to reduce greenhouse gas emissions in manufacturing and in agricultural communities; and to develop new energy sources without greenhouse emissions.

Reduce Greenhouse Gas Emissions in Manufacturing. The President's Climate, Voluntary Innovative Sector Initiatives: Opportunities Now, which is known as Climate VISION, was launched on February 12, 2003. This voluntary, public-private partnership to pursue cost effective initiatives will reduce greenhouse gas emission. Energy-intensive sectors include energy, manufacturing, transportation and forest industries. Climate VISION builds upon the progress made by the industrial sector during 1990-2001 when the economy grew by 40% while greenhouse gas emissions in the industrial sector were constant. Sustaining and accelerating this progress will help us meet our goal of reducing the greenhouse gas intensity of the U.S. economy by 18% by 2012. Every sector of the economy will need to contribute to efforts to achieve our ambitious national goal.

Reduce Greenhouse Gas Emissions in Agriculture. The recent Farm Bill initiated a 10-year commitment to implement and improve the forest and agricultural sequestration of greenhouse gases. The terrestrial biosphere is a sink of carbon dioxide but a source of other greenhouse gases, such as methane. In the short term, the potential of the terrestrial biosphere to offset the increase of greenhouse gases in the atmosphere lies in the ability to modify existing practices that contribute emissions, including enhancement of practices that absorb carbon dioxide. A severe challenge to the land community is the development of improved technologies to measure terrestrial carbon fluxes and carbon stock, such as soil carbon, wood product carbon, and carbon in wood wastes in landfills.

Develop New Energy Sources. Reduction of greenhouse gas emission intensity has a multi-phase approach. During the next 25 years, reduce greenhouse gas emission intensity by the above incentives and by carbon sequestration, and, at the same time,

begin developing new technology for the Hydrogen Economy, beginning in 25 years from now, and for Fusion, beginning perhaps 50 years from now.

Hydrogen-based technologies offer an opportunity to promote energy independence. In the State of the Union address in January 2003, President Bush announced the Hydrogen Fuel Initiative to develop technologies to enable mass production of clean, hydrogen-powered automobiles, and the infrastructure to support them, by 2020. This initiative complements the FreedomCAR partnership, which supports advanced automotive technology research that will improve the energy efficiency and reduce carbon intensity of our transportation systems, both for near-term technologies such as hybrid-electric vehicles and for fuel-cell vehicles.

Fusion is the energy source that powers the sun and stars. In fusion, the nuclei of light elements, like hydrogen, fuse together to make heavier elements, producing tremendous amounts of energy. It takes extremely high temperature and pressure to force the nuclei together and make them fuse. In the Sun and stars, massive gravitational forces generate the conditions for fusion to occur naturally. On Earth these conditions are much harder to achieve, and alternate methods have to be used. The deuterium and lithium fuel for a fusion plant are abundant and easily available for thousands of years. A fusion plant would produce electricity and hydrogen, without carbon emissions. The President announced on February 3, 2003 that the U.S. will join Canada, European Union, Japan, Russia and the United Kingdom in the creation of ITER ñ an international fusion experiment designed to achieve and sustain a burning plasma. This is the next step on the road to fusion power.

Carbon Sequestration. As many of you know, carbon sequestration is the capture of carbon dioxide produced by industry and the storage of carbon dioxide, but not in the atmosphere, for very long time periods, sometimes called "permanent" storage. Two likely reservoirs for very long-term storage of carbon dioxide are geological formations beneath the surface of the Earth, for example, salt dome, and the ocean. This conference is very timely because it is focused on these important topics, as well as on how forestry and agriculture can enhance the uptake of carbon dioxide from the atmosphere and how agricultural practices can reduce the emission of methane to the atmosphere.

The President's Sequestration and Hydrogen Research Initiative, known as FutureGen, was announced on February 27, 2003. FutureGen is a $1 billion prototype coal-burning 275-megawatt, which is medium size, power plant to generate electricity and hydrogen with near-zero (about 10%) emissions of carbon dioxide to the atmosphere. Hydrogen produced by the power plant will be used in a turbine to produce electricity and in fuel cells for automobiles and the new hydrogen-powered economy. Carbon dioxide produced by the power plant would be geologically sequestered. Some carbon dioxide may be pumped into geological formations for oil recovery enhancement. Our next speaker, Department of Energy Undersecretary Robert Card, intends to describe many exciting aspects of this 10-year demonstration project.

The ocean could provides two other potential modes for carbon sequestration, one at depths of 3000 -- 4000 m where it appears that very little vertical mixing occurs, although this view is being challenged, and the other in the biologically productive zone in the upper ocean where sunlight penetrates to about 100 m. Ocean carbon sequestration is an area of active research in order to learn about and understand more clearly the cost feasibility and the environmental impacts.

One of the strategic elements of the Administration's plan to reduce greenhouse gas emission intensity is to measure and monitor the carbon in the atmosphere with the NASA Orbiting Carbon Observatory (OCO) being readied for launch in 2007. OCO will make global integrated carbon dioxide measurements with a 2-km by 2-km footprint for analyses of the monthly distributions of carbon dioxide in 400-km by 500-km areas. This makes possible the interpretation of carbon dioxide sinks and the relative roles of uptake of atmospheric carbon dioxide by ocean and terrestrial biosphere. Where is the missing carbon dioxide emitted into the atmosphere may soon be known.

Carbon sequestration is an important tool to achieve a reduction in the greenhouse gas emission intensity. This conference will have exciting discussions and results and further demonstrate the robustness of the science, engineering and technology research communities to advance our knowledge on carbon sequestration. I encourage you to conquer the challenge of environmental prediction and to enjoy the adventure.

Thank you.