S. HRG. 106–150

CREDIT FOR EARLY REDUCTIONS ACT

HEARINGS

BEFORE THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE

ONE HUNDRED SIXTH CONGRESS

FIRST SESSION

ON

S. 547

A BILL TO AUTHORIZE THE PRESIDENT TO ENTER INTO AGREEMENTS TO PROVIDE REGULATORY CREDIT FOR VOLUNTARY EARLY ACTION TO MITIGATE POTENTIAL ENVIRONMENTAL IMPACTS FROM GREENHOUSE GAS EMISSIONS

MARCH 24, 1999—WASHINGTON, DC
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ADDITIONAL MATERIAL

CREDIT FOR VOLUNTARY REDUCTIONS ACT

WEDNESDAY, MARCH 24, 1999

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
Washington, DC.

The committee met, pursuant to notice, at 9:30 a.m. in room 406, Senate Dirksen Building, Hon. John Chafee (chairman of the committee) presiding.

Present: Senators Chafee, Voinovich, Inhofe, Baucus, Lieberman, Thomas, and Wyden.

OPENING STATEMENT OF HON. JOHN H. CHAFEE, U.S. SENATOR FROM THE STATE OF RHODE ISLAND

Senator CHAFEE. I want to welcome everyone this morning. This is a meeting of the full Committee on the Environment and Public Works on the subject of credit for voluntary greenhouse gas mitigation. In other words, credit for early reductions.

Today's hearing has been called to receive testimony on voluntary greenhouse gas mitigation projects performed by U.S. firms.

Specifically, we hope to learn more about the challenges set by official policy and technical issues surrounding the proposed crediting of these voluntary reductions.

It sounds simple, the range from governmental to certification of legitimate, voluntary—just remember the word "voluntary" is all through here—emission reductions. Companies that have taken, or are interested in taking voluntary steps to reduce or sequester greenhouse gases, have come to Congress to secure legal assurance that such actions would be taken in the event the U.S. decides to establish a regulatory program.

Why shouldn't the government provide a safe haven for entities that decided to move forward voluntarily to improve the efficiency of generating and delivering electricity, for example, or to increase the use of renewables, or to manage forests and crop lands in a sustainable way, or manufacture new consumer products that would require less power to function?

As a general principle, not too many are opposed to this. But there are a few who contend that this kind of endeavor is pointless without the imposition of regulations, without the ratification of the Kyoto Protocol and its cap on emissions. This isn't true. Just ask the leading decisionmakers in industry what they would pay for certainty. That is what we are seeking here, legal certainty that their self-determined cost, their voluntary cost to lower greenhouse gas outputs, will not put their organization at a disadvantage relative to competitors who have done nothing in the event that at

some time in the future there should be regulatory requirements for reduction.

I am the first to admit that there are legitimate and tough policy issues that are going to require our careful attention. To ensure both the environmental and economic integrity of this program we must assure that government credits are issued only for verifiable actions that can contribute to climate stabilization.

The alternative to this path, of what we are suggesting, the alternative is to do nothing. To do nothing to protect business, to do nothing to create incentives, to do nothing to begin dealing with what could turn out to be a substantial environmental and economic problem.

Senator Voinovich, do you have some comments you would like to make?

OPENING STATEMENT OF HON. GEORGE V. VOINOVICH, U.S. SENATOR FROM THE STATE OF OHIO

Senator VOINOVICH. Yes, I would, Mr. Chairman. First of all, I want to thank you for conducting this hearing today to discuss how to create incentives and remove barriers to companies that voluntarily attempt to clean up gas emissions.

As you know, I signed on as an original cosponsor of your Credit for Voluntary Reductions Act, Senate Bill 547. I believe it is a good starting point for discussions on how to give credit to companies that are trying to invest in opportunities to reduce or sequester greenhouse gas emissions.

I look forward to working with you to address the concerns that have been raised about the specifics in the bill. Again, I commend you and Senators Baucus and Lieberman and others for taking the lead on this important issue.

As Governor of Ohio, I challenged the top 100 companies that released toxic wastes to join our Prevention First Program to develop comprehensive pollution prevention plans. This is one of the programs that I am most proud of because the response was overwhelming. Think of this: More than 160 companies joined this voluntary program. These companies have already reduced 651,000 tons of hazardous wastes, 229,000 tons of solid wastes and 135 million pounds of toxic release inventory wastes. They are good actors and we have honored them every year.

One of the things I worry about, however, is that they are doing these things voluntarily and at some point the Federal Government may come in with stringent regulations to make them reduce their wastes from their current base line. I think we should reward companies that act voluntarily, and that is what I believe we are trying to do under Senator Chafee's bill.

I think the purpose of providing a credit program is to remove uncertainty for companies that initiate voluntary greenhouse gas mitigation projects. Currently companies are uncertain how their efforts will be treated if there is a future regulatory program to reduce greenhouse gas emissions.

For instance, if regulations were put in place in the future, companies that reduced their emissions now need assurances that they would receive credit for their actions. Otherwise, they might be forced to make additional and most costly reductions while compa-

nies that did not act early on make their target at lower cost. This scenario penalizes companies that took the initiate to reduce their emissions early on and puts them at a competitive disadvantage to those that did.

As you know, during the 105th Congress the Senate voted 95–0 that the U.S. should not be a signature to any protocol that would result in serious harm to the U.S. economy or require companies to limit or reduce emission unless such an agreement also requires developing countries to limit or reduce emissions within the compliance period.

I strongly agree with this rationale. I would not put the United States in an economic or competitive disadvantage with other countries that are not required to reduce emissions as well.

I do believe that creating a credit system—and I think this is important, Mr. Chairman—for voluntary reductions means that we are not trying to implement what some people would allege in the 1997 Kyoto Protocol, or some other regulatory measure prior to Senate ratification.

We are trying to create a voluntary program that creates incentives and reduces uncertainty in the future for companies that are good citizens to act now to reduce their emissions. I believe that if business is willing to voluntarily invest in measures that reduce greenhouse gases and protect our forests and agriculture, then Congress should put in place a framework that rewards those actions.

Thank you.

Senator CHAFEE. Well, I certainly agree with that statement and I thank you for it.

Senator Baucus?

OPENING STATEMENT OF HON. MAX BAUCUS, U.S. SENATOR FROM THE STATE OF MONTANA

Senator BAUCUS. Thank you very much, Mr. Chairman.

Mr. Chairman, this hearing is about how the free markets can help us face the challenge of climate change. Some people think these gases are not a problem; they would rather do nothing. But personally, I have heard from a lot of experts and scientists and I am convinced that the continued growth in the emissions of greenhouse gases is a risk with potentially serious consequences, like changes in growing seasons, violent weather extremes, melting glaciers.

I believe it is prudent to take common sense steps now to deal with this question. That is why I think this hearing is very important. If we get it right, we can use the marketplace to harness people's ingenuity and reduce greenhouse gases. We got it right when we set up the sulfur allowance trading System in the Clean Air Act. That works better, more efficiently than anyone expected.

There is no guarantee this kind of approach will work with greenhouse gases, but it might. If we design it right it will be like an insurance policy. It won't cost much. But it will help to protect our economy and the environment.

A lot of discussion thus far has focused on manufacturing companies, utilities. But the agriculture and forestry sectors could well benefit from this approach as well. It could generate credits and in-

come by removing carbon from the atmosphere and blocking it up to the soils and trees.

Today's witnesses can help us define the concept of credit trading so it can work for everyone, not just for big, sophisticated companies. It can also tell us about what kind of information we will need to make sure we get real reductions.

So thank you very much, Mr. Chairman, for your leadership. And Senator Lieberman, for your leadership as a sponsor of this bill, and Senator Mack and Senator Voinovich, you are starting us on the path of positive constructive steps to be taken. We will do our very best to begin to take significant steps to reduce the threat of climate change.

[A letter submitted by Senator Baucus commenting on the article submitted by Senator Inhofe follows:]

UNIVERSITY OF COLORADO AT BOULDER,
INSTITUTE OF ARCTIC AND ALPINE RESEARCH,
1560 30TH STREET,
CAMPUS BOX 450,
Boulder, Colorado 80309–0450, July 12, 1999.

Hon. MAX BAUCUS,
U.S. Senate,
Dirkson Senate Office Building,
Washington, DC 20510.

DEAR SENATOR BAUCUS: In late May I was asked by a member of your staff to comment on testimony Senator Inhofe entered into the record, which was based in part on a newsletter article, "Behavior of World's Glaciers Fails to Prove Global Warming Theory," by John Carlisle. The Carlisle article is misleading and contains errors, and Senator Inhofe's testimony also is not entirely correct.

One problem with Senator Inhofe's view is that a small number of scientists have come out against the prevailing view of global warming in the climatological community. Many of these 'contrarians' have high scientific credentials, although I only know of three who are recognized climatologists. They are articulate, well supported, and deliver a message some persons wish to hear. Thus these few people effectively mask a near universal scientific consensus. My experience with the 1995 IPCC Scientific Assessment (I was a Lead Author of the sea-level change chapter) demonstrated that this study had a remarkable scientific consensus. Yes, there are particular items that are not yet completely understood, but these do not negate the firm statistical conclusions based on observational data. Yes, that we cannot prove that the current warming is due to human action, but we can prove that global warming is occurring and that it is very unlikely to be caused by natural climate variability (see Nature, vol. 399, 10 June 1999, p. 569–572). If you haven't seen it, take a look at Jerry Mahlman's seminal paper on the degrees of uncertainty in our knowledge of global warming (Science, vol. 278, 21 Nov. 1997, p. 1416–1417).

The Carlisle article, from the National Center for Public Policy Research, is based in part on a press release from the Langhein Memorial Lecture I gave at the May, 1998, Annual Meeting of the American Geophysical Union. There are serious mixstatements in the Carlisle article. For instance, he suggests that the response times of glaciers are long so that they are not reacting to current climate change. The actual response time of glaciers in our observational suite ranges from 1 to 100 years or so; to claim that they are "remembering" the Medieval Warm Period 1000 years ago is ludicrous. Although these small glaciers mav rake up only 6 percent of the ice on Earth, they cycle more water from the atmosphere to the ocean per year than do the major ice sheets, contrary to what Carlisle indicates.

Vice-President Gore was correct in his comments on the glaciers of Glacier National Park. Anyone can look at the numerous topographic maps of Grinnell Glacier and note the striking shrinkage, and it is easy to extrapolate that shrinkage to its disappearance in the next century. I am glad that Carl Key has made a more definitive and authoritative study of that issue. Of course a few examples from Montana do not make a global conclusion. I showed, however, in my Langbein Lecture and in a subsequent USGCRP seminar last July in the Dirksen Building that this shrinkage is, in fact, a near-global phenomena.

Please let me know if I can supply any more information.

Sincerely yours,

MARK F. MEIER, *Professor Emeritus, Geological Sciences, Fellow of INSTAAR.*

Senator CHAFEE. Thank you very much, Senator.

Senator Inhofe?

OPENING STATEMENT OF HON. JAMES M. INHOFE, U.S. SENATOR FROM THE STATE OF OKLAHOMA

Senator INHOFE. Thank you, Mr. Chairman. I am glad you are having this hearing before you are finalizing all the details in your legislation. I hope you have other opportunities to hear from people during the course of this. The way you normally conduct things, I am sure we will. I do applaud your efforts at the introduction of the voluntary program. I look forward to working with you. I do have a number of concerns.

First, the question of global warming is far from certain. In our hearings of this committee last year we heard from leading scientists who did not agree on on whether there is global warming, much less what the cause might be.

In addition, since the treaty was negotiated, a number of scientists disagreeing with the Clinton-Gore administration conclusions has far outnumbered those who agree. I want to submit for the record a copy of an article that explains the relationship between the world's glaciers and global warming theory by John Carlyle of the National Center for Public Policy Research. It explains quite clearly why the Vice President's claims at Glacier National Park in Montana 2 years ago were completely wrong.

[The referenced article follows:]

[From the National Policy Analysis, February 1999]

BEHAVIOR OF WORLD'S GLACIERS FAILS TO PROVE GLOBAL WARMING THEORY

(by John Carlisle)

Global warming theory proponents have resorted to the politics of fear to drive their point home. They argue that man-made greenhouse gases are already causing the world's glaciers to melt, causing sea levels to rise and threatening humanity with a multitude of economic and environmental calamities. A recent Smithsonian Institution exhibit on climate change, for instance, included a depiction of the Washington Monument partially submerged in the Atlantic Ocean, leaving visitors with the distinct impression that we must reduce greenhouse gas emissions now if we want our descendants to be able to visit the famous monument. But such scenarios belong in the realm of science fiction, not science fact.

Glaciers Are Inaccurate Barometers of Climate Change

Global warming theorists argue that examples of receding glaciers, primarily those located in the mid-latitude regions of the planet, provide evidence that climate change caused by human activities is underway. But glaciers are poor barometers of global climate change.

Glaciers are influenced by a variety of local and regional natural phenomena that scientists do not fully comprehend. Besides temperature changes, glaciers also respond to changes in the amount and type of precipitation, changes in sea level and changes in ocean circulation patterns.[1] As a result, glaciers do not necessarily advance during colder weather and retreat during warmer weather.

A major obstacle to linking glacial behavior to global warming is that mountain glaciers, the types of glaciers found in places like Switzerland and the United States, are especially difficult to understand due to the complex topography of

[1] Dr. Martin Beniston, "Climatic Change and its Consequences for Mountain Regions," Institute of Geography, University of Fribourg, Switzerland, 1996.

mountain areas. Furthermore, Global Climate Circulation Models (GCMs) used by global warming theory proponents to forecast future climate, including the climate's effect on glaciers, have been notoriously inaccurate. NASA scientist James Hansen, the man who helped ignite the global warming debate in the United States in the late 1 980's, admitted last year that it was impossible to come up with reliable climate models because there is too much about the climate that scientists don't understand. [2]

Those same inaccurate GCMs have been even less reliable when it comes to assessing the impact of warming on mountain glaciers. According to Professor Martin Beniston of the Institute of Geography at the University of Fribourg, Switzerland, "Numerous climatological details of mountains are overlooked by the climate models." This makes it difficult to predict the consequences of global warming on glaciers. Beniston says it is "difficult to estimate the exact response of glaciers to global warming, because glacier dynamics are influenced by numerous factors other than climate, even though temperature and cloudiness may be the dominant controlling factors. According to the size, exposure and altitude of glaciers, different response times can be expected for the same climatic forcing."

That may explain why there are several Swiss glaciers that are advancing even though Switzerland has experienced a decade of mild winters, warmer summers and less rainfall. [3]

Other scientists agree that it is unwise to look to glaciers for evidence of global warming. Keith Echelmeyer, a glaciologist at the University of Alaska's Geophysical Institute, says, "To make a case that glaciers are retreating, and that the problem is global warming, is very hard to do. . . The physics are very complex. There is much more involved than just the climate response." Echelmeyer points out that in Alaska there are large glaciers advancing in the very same areas where others are retreating. [4]

Dr. Richard Alley of Pennsylvania State University agrees that the response of glaciers to global temperatures can be difficult to predict. "Glaciers do odd things sometimes," observes Alley. "They flow fast, then slow down. . . You could anthropomorphize [apply human characteristics to] them and say they have a mind of their own."

Vice President Al Gore would have done well to remember this point before he held a major press conference in 1997 announcing that the century-long retreat of the Grinnel Glacier in Montana's Glacier National Park was caused by global warming.

Size appears to be one of the most significant determinants in the response time of glaciers to climate change. Basically, the larger a glacier, the longer it takes to be affected by climate change. For example, it would take a polar ice sheet 10,000–100,000 years to respond to any global warming that might be occurring now. A large mountain glacier would take 1,000 to 10,000 years to respond to warming today, while a small mountain glacier would take 100 to 1,000 years to respond. [5] Thus, one explanation for some glaciers retreating today is that they are responding to natural warming that occurred either during the Medieval Warm Period in the 11th century or to an even warmer period that occurred 6,000 years ago.

Global warming theory proponents point to the retreat of glaciers in the mid-latitude regions of the planet areas where the United States, Europe and Africa are located—as evidence of human-induced global warming. As mentioned above, these mid-latitude glaciers cannot be used as reliable indicators of global climate change given that they are affected by a complex mixture of local and regional phenomena. By focusing so much attention on these glaciers, however, one gets the distinct impression that global warming theory proponents are deliberately picking glaciers to analyze that support their thesis that global warming is underway while ignoring those glaciers that don't support their theory.

In May 1998, for example, scientists at the University of Colorado at Boulder released a study purporting to show that glaciers are in headlong retreat due to global warming. According to one of the study's authors, Professor Mark Meter: "In the last century, there has been a significant decrease in the area and volume of glaciers, especially at mid- and low-latitudes. . . The disappearance of glacier ice is more pronounced than we previously had thought." To support this claim, Meier

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[2] "NASA's Hansen Recants on Warming," Electricity Daily, November 19, 1998.

[3] Beniston.

[4] "Gore's Defense of Glacier Tourism Trivializes Global Warming Debate," press release, Science and Environmental Policy Project, September 2, 1997.

[5] "How Do Glaciers Deal With Environmental Change?" article downloaded January 21, 1999 from the GLACIER web site of the National Science Foundation at http://www.glacier.rice.edu/land/5—glaciersandtheir2.html.

noted that Africa's Mount Kenya had lost 92 percent of its mass over the last 100 years while Spain's glaciers had fallen in number from 27 in 1980 to just 13 today.[6]

Because glaciers respond to a variety of phenomena and glaciers in warmer regions tend to be more susceptible to these phenomena, it is unwise to point to a loss of ice volume in vulnerable mid-latitude glaciers to draw ambitious conclusions about alleged warming worldwide.

More important, any melting of mid-latitude glaciers that has occurred has had little effect on sea levels. This is because mid-latitude glaciers represent a mere 6 percent of the world's total ice mass while Antarctica and Greenland glaciers represent the other 94 percent of the ice mass. As even the University of Colorado study noted, there is no evidence that the glacial ice sheets in Antarctica and Greenland are melting. Nevertheless, the study suggested that alleged melting of the mid-latitude ice was enough to cause a major sea level increase because the water from mid-latitude glaciers would be "recycled more quickly" than water from polar glaciers.[7] This conclusion is suspect, however, since some of the glaciers in the mid-latitude region are advancing and glaciers currently in retreat could very easily start advancing again. The fact that mid-latitude glaciers are not uniformly retreating coupled with the fact that they represent only 6 percent of the world's glacial ice strongly argues against the claim that these glaciers are contributing to a rise in sea level. If there is going to be any major sea level increase, it is going to have to come from the melting of the Antarctica and Greenland ice sheets.

Antarctica

Although the Colorado study did not allege that the Antarctic ice sheets are in retreat, other global warming proponents have made such claims. This is understandable from their perspective since a theoretical meltdown of the world's ice caps has the potential to scare the public into supporting major reductions in greenhouse gas emissions.

According to the West Antarctic Ice Sheet Study, a project of the National Science Foundation, if all of the world's ice melted, the sea level would rise by 235 feet.[8] NOVA, the Corporation for Public Broadcasting's science program, estimates that the melting of the Antarctic ice sheets alone would raise the oceans by 187 feet. One hundred 70 feet of this rise would be caused by the melting of the East Antarctic Ice Sheet while just 17 feet of this rise would be caused by melting of the West Antarctic Ice Sheet. But the East Antarctic Ice Sheet is considered stable and not threatened by warming because it rests on land above sea level, making any significant sea level rise unlikely.[9] The West Antarctic Ice Sheet, however, has attracted the attention of global warming theory proponents because it rests mostly below sea level where it is allegedly more sensitive to any global warming that may occur.[10] The balance of scientific evidence suggests that the West Antarctic Ice Sheet isn't melting either.

To begin with, the Antarctic is extremely cold with a high average temperature of just −56 degrees F. Even if the Antarctic temperatures did rise a few degrees, they wouldn't be high enough to melt the glaciers as the temperatures would still be well below −87 degrees F below—freezing. The latest GCMs predict warming of just 1-3 degrees F by 2100, still leaving the Antarctic bitterly cold. Furthermore, the Antarctic ice sheet is very large, and thus it takes a long time for the ice sheet to respond to warming. For instance, it would take the West Antarctic Ice Sheet 50,000 years to react to any warming that may be occurring now—so the world is not in any imminent danger of a catastrophic flood.[11]

So what does the scientific evidence say about a human-induced shrinking of the Antarctic today?

In December 1998, an international team of scientists announced that after analyzing 5 years of satellite radar measurements, they concluded that the West Antarctic Ice Sheet is not melting rapidly. The scientists determined that the West Antarctic Ice Sheet has actually been stable for the last 100 years—precisely when glob-

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[6] "World's Glaciers Continue to Shrink," press release, University of Colorado at Boulder, May 26, 1998.

[7] Ibid.

[8] "What is the West Antarctic Ice Sheet," article downloaded January 19, 1999 from the GLACIER web site of the National Science Foundation at http://www.glacier.rice.edu/misc.whatisglacier.html.

[9] "Water World," NOVA Online, Warnings From the Ice, downloaded January 19, 1999 from http://www.pbs.org/wabh/nova/warnings/waterworld/.

[10] "What is the West Antarctic Ice Sheet," article downloaded January 19, 1999 from the GLACIER website of the National Science Foundation at http://www.glaciers.rice.edu/misc.whatisglacier.html.

[11] Ibid.

al warming theory proponents insist human-induced warming should have been causing the glaciers to retreat. Dr. C.K Shum, an Ohio State University professor who participated in the study, said that while the team assumed that global warming was underway, they found no evidence that this purported warming was affecting the Antarctic ice sheet.[12]

In October 1998, the British Antarctic Survey also announced that it had found no evidence of global warming on the continent. The study noted that it did find 3–4 degrees F of warming on the Antarctic Peninsula over the last 50 years, but that there was no evidence that this localized warming was the result of global warming. The scientists believed it more likely that the origins of the warming "could be found in regional mechanisms."

The survey also analyzed the behavior of two major ice shelves, the Ross and Filchner-Ronne shelves, for any retreat. Again, the study concluded that "it is no longer clear that the small warming that is predicted to result from anthropogenic emissions of greenhouse gases is likely to cause a retreat" of those ice shelves. On the more vulnerable West Antarctic Ice Sheet, scientists likewise concluded that the "dramatic vision of a rapid collapse of the West Antarctic Ice Sheet resulting from atmospheric warming is becoming less acceptable."[13]

The Antarctic Cooperative Research Centre, a scientific union of the Australian Antarctic Division, the Bureau of Meteorology, the Australian Geological Survey Organization, and the University of Tasmania, released a position statement in April 1997 announcing that it is "very unlikely" that the Antarctic ice sheet will melt enough to cause a significant rise in sea level. Even more interesting, the report stated that over the next one to two centuries, "it is probable that greater snowfall on Antarctica" will outweigh any loss of ice due to warmer ocean water—thus causing the Antarctic ice sheet to expand.[14]

The prospect that the Antarctic ice sheet is expanding was also noted by the British Antarctic Survey. The British scientists concluded that it is possible that the Antarctic expansion was actually counteracting a rise in sea level.[15] Indeed, many other scientists have concluded that even if the world continues to get warmer, whether human-induced or naturally, the Antarctic ice sheet would grow because warming increases the amount of precipitation which leads to increased snowfall in the polar regions.

Indeed, it seems that historically the Antarctic glaciers have frequently expanded during warm conditions. A study by E.W. Domack, A.J.T. Jull and S. Nakao on the history of glacial expansions in Antarctica found that over the past 10,000 years, several glaciers expanded during conditions that were a lot warmer than today.

This uncomfortable fact has not escaped the attention of environmentalists, some of whom are now arguing that glacial expansion supports the global warming theory. Greenpeace's Climate Impacts Data base now cites the Domack study in an effort to link the expansion of the Antarctic ice cap with man-made global warming. The summation of the study notes that "the new data suggest strongly that Antarctica's response to future warming will be an increase in mass balance."[16] Of course, now they can't claim that the sea level is rising since expansion lowers the level. Nevertheless, environmental groups still make contradictory claims about apocalyptic sea level rises in their haste to mobilize public opinion to stop greenhouse gas emissions.

Greenland

Like the Antarctic, the Greenland ice sheets show no evidence of receding due to alleged global warming. The record shows that the Arctic region where Greenland is located is cooling despite the fact that, under global warming models, it should be the first area of the planet to show significant temperature increases. According to these models, the polar regions should have warmed 2–5 degrees F since 1940. But between 1955 and 1990, the Arctic cooled by 1 degree F and Greenland's glaciers actually expanded. According to the scientific journal Geophysical Research

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[12] "West Antarctic Ice Sheet Not In Jeopardy," Environmental News Network, December 1, 1998.

[13] "Antarctica: Climate Change and Sea Level," Ice and Climate Division, British Antarctic Survey, Cambridge, UK, October 1998.

[14] "Global Change, Antarctica and Sea Level," Position Statement, Antarctica Research Centre, April 1997.

[15] "Antarctica: Climate Change and Sea Level," Ice and Climate Division, British Antarctic Survey, Cambridge, UK, October 1998.

[16] Advance of East Antarctic Outlet Glaciers during the Hypsithermal," E.W. Domack, A.J.T. Jull and S. Nakao, Summary downloaded January 6, 1999 from Greenpeace Climate Impacts Data base, http://193.67.176.1/climate/database/records/zgpz0774.html.

Letters, the West Greenland Ice Sheet, the largest mass of polar ice in the Northern Hemisphere, has thickened by up to seven feet since 1980.[17]

Furthermore, some scientists believe that atmospheric circulation, not temperature, has been the greatest influence on the accumulation of snow and ice in central Greenland for the past 18,000 years. In an article that appeared in Nature magazine in 1995, the authors explained that changes in the way storms move across the island play the key role in how glaciers will thicken or recede.[18]

Conclusion

There is no indication that the world's glaciers are melting significantly due to global warming and, thus, there is little to fear from sea level rises in coming decades. Proponents of the global warming theory have been irresponsible in attempting to use glaciers as barometers of global temperatures since glaciers respond to a range of natural phenomena that have nothing to do with global temperature changes. In addition, the advance of the Antarctic and Greenland glaciers, which contain more than 90 percent of the world's glacial ice, completely contradicts previous predictions that warming would cause these glaciers to retreat. Far from providing scientific proof of global warming, the behavior of glaciers represents yet another powerful indictment of the already controversial global warming theory.

Senator INHOFE. However, Mr. Chairman, I understand your bill is not tied directly to the Kyoto Treaty, but instead will create an early credit program in case the treaty or any other greenhouse gas regulation should become effective in the future. I have two major issues with the proposed bill and I am anxious to see how we can address those during the markup of this bill.

First of all, I agree with the comments of Senator Voinovich concerning the 95 to nothing vote that we took on the Floor. I just come to a different conclusion as a result of that. I think we may be sending a message to an administration who has said, "We don't care if you don't ratify this treaty. We are going to go on anyway and implement it by executive order or by legislation."

I don't want this to be sent as a signal of agreement with that philosophy.

My second major concern is that we not provide EPA with the authority to list CO_2 as a criteria pollutant. The EPA General Counsel issued a paper last year claiming they currently have the authority under the Clean Air Act, although the paper was roundly dismissed by environmental attorneys everywhere, my concern is that the bill would provide the agency with a stronger argument that should only be debated and considered by Congress in the context of the Clean Air Act reauthorization.

So, I want to stress that although I do not support your bill at this time I am looking forward to working with you to address the concerns that I have. Thank you.

Senator CHAFEE. Thank you very much, Senator. You have legitimate concerns that, as we noted earlier, we have not done the science part of this, but I look forward to your continued interest in this and see if we can't come up with something that is mutually acceptable. The key word, I think, throughout all of this is it is voluntary. We are not pushing anybody into doing anything.

Senator LIEBERMAN.

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[17] Patrick Michaels, "Post Fans Administration's Pre-Kyoto Fires," World Climate Report, December 13, 1997.

[18] "Dominant Influence of Atmospheric Circulation on Snow Accumulation in Greenland over the Past 18,000 Years," W.R. Kapsner et. al., Summary downloaded on January 21, 1999 from the web site of the Global Change Research Information Office at http://www.gcrio.org/ASPEN/AGCI-ABS/orig/444.html.

OPENING STATEMENT OF HON. JOSEPH I. LIEBERMAN, U.S. SENATOR FROM THE STATE OF CONNECTICUT

Senator LIEBERMAN. Thank you, Mr. Chairman, for holding this hearing and thank you for the active leadership role that you have taken, characteristically in encouraging us to deal with this difficult but very important problem.

Last October I was proud to join with you and Senator Mack in introducing the Credit for Early Action legislation in the Senate for the first time. Since then there has been active debate about the concept and policy choices involved in this new approach to climate change. Now, I am very pleased at the number of original cosponsors on the Credit for Voluntary Early Action Act which we introduced in this Session has grown to twelve, six Republicans and six Democrats.

I think that the number of original cosponsors has grown because people have concluded that you don't have to have reached a final judgment on whether global warming and climate change is real to support the Credit for Voluntary Early Action proposal. In fact, this proposal embraces and builds on two of the most significant trends in environmental protections in our country over the last decade.

The first is the introduction of market incentives through law to encourage environmental protection by the private sector. The second is the extraordinary embrace by large segments of the private sector of an environmental ethic. Some of the most significant steps forward in environmental protection in recent times have come as a result of judgments by individual companies and their leadership to be good environmental citizens. This measure intends to built on those two developments, and in doing so to break what might otherwise be a legislative logjam here in Congress on this problem.

My own conclusions are that global warming is real and that climate change is happening and that the sooner we begin to act, the sooner we will deflect the alarming upward trend of our own American greenhouse gas emissions. The sooner we begin to act the sooner we can turn the problem of climate change into an opportunity to use one of our most valuable resources, which is American ingenuity, to help us sustain our economy that is vibrant and growing while we make our air healthier to breathe and safer to live in.

Early actions to address climate change enjoy the distinct environmental and economic advantages of achieving near term greenhouse gas emission reductions while extending the period of time in which our companies and communities can innovate to maximize efficiency and minimize the cost of protecting the environment.

Time is a factor here. Between 1990 when nations of the world agreed we should attempt to stabilize greenhouse gas emission levels, and 1997, our own greenhouse gas emissions increased 11 percent according to the EPA. The U.S. Energy Information Administration predicts if we continue to pursue a status quo business as usual path, America's contribution to global greenhouse gas pollution will almost double by 2020 to 145 percent of 1990 levels. Since greenhouse gases remain in the atmosphere for generations, the longer we wait to reduce our emissions, the more drastic, I fear,

our future our future efforts will have to be to deal with this problem.

The scientists have spoken in a way that, to me, is compelling, more than 2,500 of them, the best of them worldwide have concluded that the trend of increases in the temperature is likely to increase, so that our own earth's temperature will go up between two to six degrees in the next century, which would have grave impact for not only our global environment, but for life as we know it.

While it is difficult to link specific weather events to global climate change, the extreme weather we have seen in the past year is consistent with what scientists have told us under current models of global warming. Underscoring the importance of confronting this problem, the American Geophysical Union, a professional society comprised of 35,000 geoscientists, recently stated "The present understanding of the earth's climate system provides a compelling basis for legitimate public concern over increased concentration of greenhouse gases."

Today we have an opportunity, whatever one thinks about the science I have just quoted, to discuss the concept of credit for voluntary early action. I think the hearing provides us a great opportunity to learn from one another as we discuss the arguments for and against providing these credits.

I look forward, therefore, to the witnesses and to the discussion.

[The prepared statement of Senator Lieberman follows:]

STATEMENT OF HON. JOSEPH I. LIEBERMAN, U.S. SENATOR FROM CONNECTICUT

Thank you, Mr. Chairman, for holding this hearing and for taking an active leadership role on this difficult but important issue. Since last October, when I joined with you and Senator Mack in introducing credit for early action legislation in the Senate for the first time, there has been active debate about the concept and policy choices involved Ems new idea. The number of original cosponsors on the Credit for Voluntary Early Action Act, which we recently reintroduced in this session, has grown to 12—6 Republicans and 6 Democrats. While we may not all agree on the extent of the problem of global climate change, we all support the use of market mechanisms to solve environmental problems and I want to encourage the environmental ethic that is developing in industry.

The sooner we begin to act, the sooner we turn the challenge of climate change into an opportunity to use one of our most valuable resources—American ingenuity—to help us sustain an economy that is vibrant, growing and sustainable, while we make our air healthier to breath and safer to live in. Early actions to address climate change enjoy the distinct environmental and economic advantages of achieving near-term greenhouse gas emissions reductions while extending the period of time in which our companies and communities can innovate to maximize efficiency and minimize costs of protecting the environment.

Time is a relevant factor in the debate about global warming. Between 1990, when nations of the world agreed we should attempt to stabilize greenhouse gas emissions levels, and 1997, U.S. greenhouse gas emissions increased 11 percent according to the EPA. The U.S. Energy Information Administration predicts that if we continue to pursue a "business as usual path," our contribution to global greenhouse gas pollution will nearly double by 2020 to 145 percent of 1990 levels. Since greenhouse gases remain in the atmosphere for generations, the longer we wait to reduce our emissions, the more drastic and difficult our future efforts will have to be to address the problem.

Greenhouse gas pollution is a major and growing problem. Emissions of greenhouse gases, due in substantial part to the combustion of fossil fuels, are causing greenhouse concentrations in the atmosphere to rise faster and higher than they would naturally. More than 2,500 of the world's best scientific and technical experts have concluded that this trend is likely to increase the Earth's temperature by 2–6 degrees in the 21st Century with serious impacts on the global environment.

While it is difficult to link specific weather events to global climate change, the extreme weather we have seen in the past year is consistent with what scientists predict under current models of global warming. Last year in our country, severe drought in the South and West had devastating effects on agricultural production. Wildfires in Florida consumed roughly .5 million acres burning timber, worth more than $300 million. Flooding in Texas and Mexico claimed lives and devastated communities. Record temperatures in Texas were so high that sections of Interstate Highway 35 melted.

Underscoring the importance of confronting the problem of climate change, the American Geophysical Union, a professional society comprised of 35,000 geoscientists, recently stated that "present understanding of the Earth climate system provides a compelling basis for legitimate public concern—over . . . increased concentrations of greenhouse gases."

Since we introduced this voluntary early action bill, climate change discussions have heated up and many stakeholders have expressed their desire to constructively participate in this important debate. Big businesses such as BP/Amoco, Shell, Lockheed Martin, and United Technologies are finding ways to contribute solutions by improving energy efficiency and reducing emissions. Communities are also showing leadership. For example, the International Council for Local Environmental Initiatives has helped more than 48 American cities and counties that are committed to climate change protection, to undertake local action plans to achieve voluntary emissions reduction goals. Part of our responsibility as legislators is to make sure that we recognize and encourage these acts of good environmental citizenship. We must not inadvertently discourage or penalize early actions that are good for companies, communities, and the environment.

I hope that our panels today will focus not on the science of climate change nor on the specifics of our legislation but on the concept of crediting voluntary early actions to control U.S. greenhouse gas emissions. This hearing provides an opportunity to learn from one another as we discuss the arguments for and against providing credits to those who take voluntary early actions to address climate change. This discussion should pave the way for improving our bill so that it delivers on the promise embodied in the idea of credit for voluntary early action to break the current legislative stalemate on this increasingly critical global environmental problem. I look forward to hearing from our witnesses. Thank you.

Senator CHAFEE. Thank you, Senator. Those are good points you made. I think there is a sense of urgency here and the longer we wait the more difficult the situation gets.

Senator Thomas?

OPENING STATEMENT OF HON. CRAIG THOMAS, U.S. SENATOR FROM THE STATE OF WYOMING

Senator THOMAS. Thank you, sir. I do think voluntary reduction of greenhouse gases, of course, is an honorable goal. We ought to be doing that, looking at that. Voluntary emissions for the sake of credit makes me a little uneasy. I am not sure how that works, as a matter of fact, and so I am anxious to know more about it. As you know, in the Kyoto arrangement, we would have to have a reduction under that of 31 percent. We are about 4 percent of the world's population and we produce about 25 percent of the world's products. So it is not unusual that we have a unique situation.

We are having a hearing over in the Energy Committee on the impacts of Kyoto. I think that would be interesting for all of you to listen.

So, I don't think the goals of economic growth and environmental protection have to be mutually exclusive. I am not certain about this plan leading to credits. So I am anxious to hear more. In the electric industry in the past I would say it has not been a great producer.

Senator CHAFEE. Well, thank you, Senator. I am glad that you are doing that in the Energy Committee. The more attention we get with this the better. Trying to devise this credit system is not

easy. This involves a lot of challenges, what happens to the normal growth that is going to occur for these companies. So the more the merrier, as far as I am concerned. I am glad the committee is taking an interest in this subject that I think is so terribly important.

Now we will start with our first witness, Ms. Eileen Claussen, Executive Director of the Pew Center on Global Climate Change. Welcome, Ms. Claussen. There is no trap door there, but if you can keep it within 5 minutes or close to that, it would be helpful.

STATEMENT OF EILEEN CLAUSSEN, EXECUTIVE DIRECTOR, PEW CENTER ON GLOBAL CLIMATE CHANGE

Ms. CLAUSSEN. I will do my best.

Mr. Chairman, Senator Baucus and members of the committee, thank you for your invitation to testify this morning on voluntary efforts to reduce greenhouse gas emissions. The Pew Center on Global Climate Change was founded in the belief that our generation's challenge will be to address global climate change while sustaining a growing global economy. And there is no better place for us to begin than with early action to reduce greenhouse gas emissions.

Mr. Chairman, throughout your career you have been at the forefront of the movement to protect and enhance our Nation's environment. Your recent decision to retire from the Senate at the end of your current term represents a profound loss to the Senate and to our country. It will also be a profound loss in the field of global climate change where leadership will be vitally needed, and where your vision and pragmatism will be sorely missed.

Senator CHAFEE. Thank you very much for those kind comments. I appreciate it.

Ms. CLAUSSEN. My time is going faster here.

Senator CHAFEE. I will give you time off for my comments. And if you want to add some more, go to it.

Ms. CLAUSSEN. I am the Executive Director of the Pew Center on Global Climate Change, an organization founded by the Pew Charitable Trusts to work constructively on the climate change issue and to forge a consensus for action.

The Pew Center and its Business Environmental Leadership Council were established in May 198. We formed the Business Environmental Leadership Council because we believe that the business community is ready and willing to provide the impetus to move forward on the issue of climate change. The Council consists of over 20 of the Nation's and the world's largest corporations. Together their annual revenues total more than $550 billion.

Mr. Chairman, we do not believe that action on climate change should be delayed until we are satisfied with the progress that has been made on this issue internationally. Instead, we believe that companies can and should take concrete steps now in the U.S. and abroad to assess their opportunities for emission reductions and establish and meet emission reduction objectives.

Perhaps some examples of company efforts would be instructive. BP Amoco, for example, has established a target to reduce its greenhouse gas emissions by 10 percent from the 1990 baseline by 2010. These reductions will be measured using established protocols and will be verified by external observers.

America Electric Power has implemented climate challenge programs with a total cumulative effect of avoiding approximately 10 million tons of carbon dioxide that would otherwise have been emitted into the atmosphere.

United Technologies, by 2007, will reduce its energy and water consumption per dollar of sales by 25 percent below 1997 levels, with approximately the same reductions in emissions that cause climate change.

The DuPont Company will, by 2000, cut its annual global greenhouse gas emissions by about 45 percent below 1991 levels. Shell International aims to reduce greenhouse gas emissions by 10 percent below 1990 levels by 2002. Since 1990 Baxter International has reduced the global warming impact of its emissions by 81 percent. In 1995, Entergy committed to eliminating over four million tons of carbon dioxide emissions per year through the year 2000.

Regardless of the outcome of negotiations on an international climate change agreement, the members of the Business Council will continue to move forward because they believe that this is a serious issue that demands a serious response.

We do expect that at some time in the future the United States will ratify a climate change treaty that includes a commitment to reduce emissions of greenhouse gases. So, while our companies are already taking voluntary actions to reduce their emissions, they also want to be sure that they will receive credit for these actions under any future climate change treaty, particularly since many of these actions are and were taken at the request of the U.S. Government to fulfill the goal of the Framework Convention on Climate Change.

But the issue is not primarily one of getting credit or providing incentives to act early. The key issue is one of eliminating disincentives: voluntary action, in the absence of credit, can work to the disadvantage of companies who act early to reduce their emissions. It is clearly not in our interest for companies that do the right thing by voluntarily attempting to slow the rate of greenhouse gases entering our atmosphere to be penalized and economically harmed for their efforts.

Solving this problem requires leadership from the Congress. An analysis undertaken by the Pew Center and published in October 1998 finds that Federal agencies do not have sufficient legal authority to provide the certainty that firms need to make significant early investments.

So while the Pew Center doesn't take a position on the merits of any particular bill, we believe there are a number of issues that must be addressed in a legislative framework. We would like to stress the following:

First, credit should only be provided for actions that are real and verifiable. This means that reductions must be measured and monitored using standardized measurement techniques. Any system that is adopted should reward virtuous actors, not those who engage in sham or paper reductions, or who "game" and manipulate the system. There can be no effective credit or early action program if we are not committed to establishing a robust and vigorous monitoring and verification effort.

Two, the program should be simple and flexible. Participation in a system of credit for early action would be voluntary, but it is in our collective interest to encourage as many businesses as possible to reduce their emissions. Companies and sectors that are experiencing high growth must be accommodated as must those who produce products, be they appliances or autos, that use significant quantities of energy. We must also keep transaction costs to a minimum, so that the costs of participation do not exceed the benefits to the participants.

Three, the legislative framework should not prejudge the future national implementation scheme. We are not at a point now where we can predict the design of the program that will be implemented in the United States to meet a future international obligation. So no system of credit for early action should prejudge the scheme that might be used.

Four, domestic action should be the primary emphasis, but verifiable international projects should be included. For example, international projects that earn credits for reductions achieved after the year 2000 under the Clean Development Mechanism should be incorporated into an early action crediting scheme. The small number of projects already accepted into the U.S. Initiative on Joint Implementation that achieve reductions prior to 2000 should also be recognized if they meet rigorous monitoring and verification standards.

Five, the legislative framework should not over-mortgage a possible U.S. greenhouse gas allocation. The Kyoto Protocol, in its current form, does not contain any incentive to act early. As long as this remains a feature of a possible future international control regime credits allocated for early domestic reductions would have to come out of any U.S. allocation granted under a treaty. Allocating too many credits early could increase the difficulty of complying with a regulatory regime. On the other hand, removing the disincentives for early action is an early action objective of an early action program. The design of the program should balance these two objectives, perhaps through the establishment of appropriate baselines.

The Pew Center and its Business Environmental Leadership Council believe climate change is serious business and that early action is smart business. And the Pew Center and the Business Environmental Leadership Council are not alone. A national survey taken this weekend showed that among those with an opinion on early action, establishing a legal framework is favored by a ratio of four to one.

Thank you very much, Mr. Chairman.

Senator CHAFEE. Thank you very much, Ms. Claussen.

We will hear from all the witnesses and then we will come back with questions.

Senator CHAFEE. Our next witness is Mr. Dale Landgren, Vice President for business Planning, Wisconsin Electric Power Company. Mr. Landgren, we welcome you here.

STATEMENT OF DALE LANDGREN, VICE PRESIDENT FOR BUSINESS PLANNING, WISCONSIN ELECTRIC POWER COMPANY

Mr. LANDGREN. Thank you. Mr. Chairman and members of the committee, I am Dale Landgren from Wisconsin Electric Power Company in Milwaukee, Wisconsin. Mr. Chairman, let me begin by commending you for your leadership on this issue and for beginning the important dialog that we are having today.

I appreciate the opportunity to appear before you today to express Wisconsin Electric's support for the concept of credit for early and voluntary greenhouse gas reduction actions and to encourage Congress to enact legislation that establishes a program to provide credit to companies that undertake voluntary actions to reduce greenhouse gas emissions.

We do not believe that support for this concept binds us or binds you as Senators to support the Kyoto Protocol or any other greenhouse gas action. We view a credit for early action program simply as an insurance policy in the event that greenhouse gas reductions are required. Congress should view credit for early action in the same way as an insurance policy, where there is zero cost for the premium.

Wisconsin Electric is acting now because: first, we want the experience to determine what works and what doesn't; our customers want us to be environmentally sound and sensitive; we have been successful as a trader in the sulfur dioxide market, and believe that we can be as successful and prosperous under a greenhouse gas trading regime; and finally, we want to be good corporate citizens.

We are working to develop strategies that integrate environmental, economic, and energy goals to assure that the energy industry has as many options as possible, including non-emitting nuclear power, to meet any potential greenhouse gas reduction goals.

The business reasons for early action are driven by our assessment of the high probability that some controls will be placed on greenhouse gas emissions in the next 10 years. Plus, if we can identify and get experience in low-cost ways to reduce greenhouse gases, our company will be better positioned in the long run.

The short-run cost of this strategy to us is the out-of-pocket dollars we spend on early action with no contribution to the bottom line. The biggest risk for this strategy is that we will not be given credit for these actions and this has two negatives that you need to understand. First, we will need to spend the money twice and second, we will spend more because the inexpensive opportunities will have been lost.

Currently there is no legal framework regarding the treatment of early greenhouse gas reductions or credit for these early actions. This uncertainty is inhibiting companies from investing in greenhouse gas reduction activities and projects. We have been proactive in implementing greenhouse gas reduction strategies through a variety of programs such as joint implementation projects, a very successful green pricing program and participation in the Climate Challenge program.

Wisconsin Electric is a partner in two joint implementation projects. We helped fund a coal-to-gas repowering project in the City of Decin in the Czech Republic and a carbon sequestration

project in Belize in Central America. Our Energy for Tomorrow Green Pricing Program is the largest and most successful of its kind in the country. We are participating in the Department of Energy's voluntary Climate Challenge program, the world's most successful voluntary greenhouse gas reduction effort. The programs we are involved in are outlined in more detail in my written statement.

Any credit for early action program should include a number of basic principles, such as credit to companies that made commitments under the voluntary Climate Challenge program and under the United States Initiative on Joint Implementation. I agree with Ms. Claussen that these commitments need to be verified. We call this "real credits for real reductions." We would include a certification process that provides clear and consistent standards for determining early reduction credits. Such standards would prohibit double-counting of the emission reductions: that is, crediting of the same emission reductions to multiple parties.

We would also include provisions that adjust the displacement of emissions, which is also known as leakage, as a necessary component of the integrity of the program. Other recommended principles are outlined in more detail in my written statement.

In conclusion, Wisconsin Electric has undertaken and wants to continue to pursue opportunities to voluntarily reduce greenhouse gas emissions through low and no-cost strategies. However, the lack of assurance that credit will be provided for our voluntary actions to reduce greenhouse gas emissions causes us to be reluctant to pursue additional reduction activities.

Congress should enact legislation to establish a credit for early and voluntary greenhouse gas reduction program to provide the assurance we need in the event that greenhouse gas reductions are required.

Mr. Chairman, thank you again for the opportunity to appear before you today.

Senator CHAFEE. Well, thank you very much, Mr. Landgren.

Now we will hear from Dr. Richard Sandor, Chief Executive Officer, Environmental Financial Products.

STATEMENT OF RICHARD SANDOR, CHIEF EXECUTIVE OFFICER, ENVIRONMENTAL FINANCIAL PRODUCTS

Mr. SANDOR. Thank you very much, Mr. Chairman. It is a privilege to be here before this committee. I would like to add my praise to the other members of the panel for your great work in this effort.

Environmental Financial Products is a small investment bank that specializes in inventing, launching and trading new products. We have been involved in the mortgage-backed securities business, in financial futures, inventing those, in insurance derivatives, catastrophe derivatives, and the (SO_2) market.

I got involved in the environmental trading business in 1990, writing a paper for a public interest group in Ohio to advocate market-based solutions to environmental problems. During that time I worked and chaired the Clean Air committee of the Chicago Board of Trade and led the effort to partner up with the EPA, ultimately acting in the business, doing the first registered trade, trading op-

tions on SO_2 allowances with Wisconsin Electric in the early 1990's, financing utilities and being an active participant in the market.

At the outset of the market there were tremendous skepticism whether this would work. Many argued it would not be possible to "commodicize" the environmental good: "The prices will be high." In fact, the median was estimated to be $600 a ton. Throughout six auctions at the Chicago Board of Trade, however, we have averaged $118 per ton as opposed to $600. We are 40 percent ahead of schedule in cutting emissions, and we are at 10 to 20 percent of the cost that Congress had predicted.

Senator CHAFEE. I must say, Doctor, we remember that. Senator Baucus, I believe, was chairman of the committee at the time. We foresaw the day when those tradings would be up there on the list. There would be hog bellies and next there would be tradings.

Mr.Sandor. That is what we are hoping for, greenhouse gases right next to soybeans. Let me explain our position on that. We have been involved—and I think your efforts for early action are actually the start, the beginning of the end of climate change problems as we know them. I think this committee's efforts are unambiguously that important.

We, for the last 9 years, have been working on greenhouse gases in the private sector. We have clients today such as the country of Costa Rica that we work with on AIJ, landfill gas collection projects, coal bed methane, major U.S. electricity generating companies, as well as agriculture and farm interests. There is an inchoate market already starting in greenhouse gases. We need the framework from all of you to get it started, just as the Internet needed the URLs and the other infrastructures. This is aside from Kyoto.

I am here, in contrast to my fellow members who are speaking about the industrial area, to emphasize what Senator Baucus said, the role of U.S. agriculture. I had the privilege in 1973 of serving as vice president and chief economist of the Chicago Board of Trade. Many of you will now remember that was the year of the Arab oil embargo, $4 corn, $10 soybeans, and in fact, the end of the western world as we knew it because of problems associated with inflation.

American agriculture found 50 million acres. That came into production once you put the price up on the board. That was critical. We have 450 million acres in agriculture, 550 million in forestry. If we just take the 300 million that we have, put best management practices in, we could generate 200 million tons of carbon credits, another 100 million from forestry, without even stretching it, all of that could be thrown in the pot in a private trade system.

Why is that important? In fact, Charles River Associates, Wharton Econometrics, Bob Stavins at Harvard, a number of economists think that carbon is worth $200 a ton. Given that, American agriculture could have $60 billion in net income if those forecasts are right. I don't believe those forecasts. I think it is going to be $10 or $20 a ton. I think it is going to be a small percentage. But nevertheless it is going to provide a new stream of income for American agriculture.

Remember, whether you mine the soil or fossil fuels, you put carbon into the air. We have taken out 40 percent of the sequestered carbon since the turn of the century when we plowed up the prairies. We have an opportunity to put it back and to incentivize the farm sector to do it.

So, what I am hoping is that all of you will take a look at the area of American agriculture and forestry and make sure they are included in such a program.

Let me conclude with a few statements.

Senator CHAFEE. Yes, they can come in if they want to come in.

Mr. SANDOR. If they want to come in. But give them the opportunity. Make sure soil sequestration and sinks are part of the effort to voluntarily comply or to voluntarily participate in any bargaining.

In conclusion, I agree with my colleagues that it is very, very simple. The steps are simple. No. 1, you need a homogeneous commodity that is fungible.

No. 2, very importantly, tradeability, that is voluntary credit, we must talk about transferability of ownership and the ability to trade and know each other on a voluntary basis.

No. 3, monitoring and verification are critical drivers. I do believe that a voluntary program with the proper infrastructure will unleash the American agriculture's productivity and the capital market's ability to design and efficiently trade carbon permits. Thank you.

Senator CHAFEE. Thank you very much, Doctor.

Our next witness is Ms. Tia Nelson, Deputy Director, Climate Change Program, of the Nature Conservancy.

Ms. Nelson?

STATEMENT OF TIA NELSON, DEPUTY DIRECTOR, CLIMATE CHANGE PROGRAM, THE NATURE CONSERVANCY

Ms. NELSON. Good morning, Mr. Chairman. The Nature Conservancy is happy to be here today to discuss the concept of credit for voluntary early action and to share with you the Nature Conservancy's experience in developing carbon sequestration projects. We believe that a well-crafted early action bill could be a critical and cost-effective step encouraging companies to act now to help reduce greenhouse gases while achieving other important environmental benefits.

In particular, the Conservancy urges that any credit for early action legislation include scientifically valid, credible carbon sequestration provisions to provide adequate incentives for projects which slow or reverse the pace of deforestation, encourage better forestry and agricultural management practices.

I am sure you know, Mr. Chairman, that over 20 percent of the annual greenhouse gas emissions today are attributable to land use change and forestry activities, not to the agricultural sector. This is an important component of any climate change program, in our view.

The Conservancy believes the carbon sequestration project, properly designed, can achieve real and measurable greenhouse gas benefits while also protecting biodiversity and enhancing sustainable growth, which after all is our mission.

Our experience in developing and helping implement carbon sequestration projects has convinced us that we can meet the technical challenges of demonstrating and quantifying carbon sequestration benefits. Projects we have developed to slow the release of carbon dioxide and to enhance the so-called carbon sinks are protecting some of the most important natural areas in the world, sequestering millions of tons of carbon dioxide, and in a cost-effective manner, and helping local communities develop their economies in a sustainable way.

We are doing these projects in partnership with other conservation organizations and industry. Government action to provide these companies with clear incentives in this area, in our view, could have a dramatic positive effect on greenhouse gas mitigation as well as associated environmental benefits to society including biodiversity and watershed protection, sustainable development, sustainable agriculture, et cetera.

I would briefly like to tell you a little of our project experience to help illuminate what we believe the potential of this type of incentive mechanism could be. Our first project was in the country of Belize with substantial support from Wisconsin Energy that is appearing on this panel with me today. In 1994 Wisconsin Energy and the Nature Conservancy discussed the idea of undertaking a project which could demonstrate the potential forest conservation and sustainable management as a greenhouse gas mitigation strategy.

Our simple goal was to develop a model which balanced carbon sequestration, biodiversity and sustainable development benefits in a cost-effective way.

Subsequent to Wisconsin Electric Company coming to the Nature Conservancy, Cinergy of Ohio, Detroit Edison of Michigan, the PacifiCorp of Oregon, and Utilitree Carbon Company, which is a consortium of over 64 utility companies in the United States, provided the Conservancy and its Belizean partner the money necessary to purchase an imminently threatened parcel of unique tropical rain forest, provided funding for small scale sustainable forestry, a project certified under the Forest Stewardship Council principles and supported community education programs. We provided local jobs and income for local people.

We have protected forests and we have had a net positive impact on the environment. We are very excited about these types of opportunities.

Our second project, the largest of its kind in the world, was done with support from American Electric Power, PacifiCorp again, and BP Amoco. It was in Bolivia. We retired some forestry concessions, established an endowment for the now largest national park in the world, funded rehabilitation of a local school, all this with industry money. We funded a local health facility.

Senator CHAFEE. Is this the Bolivian thing?

Ms. NELSON. Yes, sir. The local health facility provided regular doctor visits to the community, funding for capital and local communities for sustainable development, orchid propagation, sustainable palmetto harvest. The multitude of benefits from this project, beyond the climate change benefits, are enormous. Estimated carbon benefits are over 15 million tons, just over 3 years. Just to give

you a perspective, that is equal to the lifetime emissions of 850,000 automobiles.

Both of these projects include the most rigorous monitoring verification methodologies currently in use today. They were developed for us by Winrock International Institute for Agricultural Development, a nonprofit out of Arkansas. They are peer-reviewed, field-based methodologies. They have proven to us that it is possible to measure and quantify the carbon benefits of forest protection management.

Our work to encourage additional companies to get involved in these types of projects, domestically and internationally, in the forestry sector and in the agriculture sector, has led us to conclude that without clear incentives from government and assurances that their investments will be recognized under a future crediting program, this type of activity will be quite limited.

Since I am running out of time I will move quickly, if I could, to a set of recommendations which we would like to make to the committee as they contemplate this mechanism. As I have noted, the Conservancy strongly favors the inclusion of carbon sequestration provisions in any early action program.

We do encourage the legislators to move carefully in developing these provisions so as to create valid and measurable benefits and to avoid the creation of any kind of perverse incentive.

There are four principles we would like the committee to keep in mind. All projects, we believe, should be subject to rigorous monitoring and verification and transparent reporting. Credits for forest projects should take into account the potential for the displacement of their benefits, the so called ''leakage'' problem. And these should be addressed in project design.

Carbon sequestration provisions under any early action bill should be awarded for additional changes in land management above and beyond current practices. There should be no credit in cases where landowners are clearing land and establishing monocultured tree plantations. A proper carbon accounting system would not allow that anyway, in our view. Credit should not be awarded for business as usual scenarios.

Last, we believe that international projects accepted under the USIJI program, which meet the subsequent legislative criteria considered by this body, should be eligible for early action.

With these principles we think the carbon sequestration projects can play an important role in any early action program.

Thank you, sir, for your leadership and the opportunity to testify today.

Senator CHAFEE. Well, thank you, Ms. Nelson. There is no question but that Wisconsin Power has certainly been a good citizen. What is the reaction in a country like Belize when you make these tremendous purchases and in effect it is going to remain in forest as opposed to being deforested and then subsequently raising soybeans or something to that effect? What do the people of Belize think about that?

Ms. NELSON. Increasingly, it is the Conservancy's experience, and we are after all an international organization with a number of activities abroad, the developing countries in which the Conservancy has been working for some years on protected areas, man-

agement strategies, these developing countries have come to view—particularly in Latin America which is the area of my experience so I will try to stick to that—they have come to view this mechanism as a fascinating opportunity to do something that we have struggled to do for many, many years, in essence to value an environmental service, and by doing so, provide a greater incentive to protect and manage a forest than to clear it and convert it to other non-sustainable purposes.

In our view and in the view of the partners with whom we work in developing countries, it is one of the promising conservation tools we have ever had.

Senator CHAFEE. Well, I have had the experience of going to Belize as a tourist, and the reason we went there was because of what you described in your testimony here, places with romantic names like Gallon Jug.

Ms. NELSON. I came from there last week, as a matter of fact. The Belizeans are quite proud of the visitors they attract with their natural resources.

Senator CHAFEE. Well, you say hello to everybody in Gallon Jug.

Ms. NELSON. I will do that for you, sir. Now that you are retiring maybe you will have some extra time and you can go and relax down there.

Senator CHAFEE. All right. Well, I certainly would like to go back.

Ms. Claussen, there have been some suggestions that this is a dark plot by these large companies such as you represent or that are part of your coalition. Somehow through inexplicable ways they are going to make out like bandits and it is really a big profit scheme that translates into their bottom line. Have you heard those charges and what is your answer?

Ms. CLAUSSEN. Yes, I have. I think there are lots of different kinds of motivations that make these companies do some of the things that we think they ought to be doing. I think, first of all, many of them, in fact all of the ones affiliated with the Pew Center accept the views of the scientists that this is a serious problem and that they ought to be doing something about it. All of these companies believe that companies have a really strong role to play here and that they themselves should take actions. I don't think there is any question that there is a motivation here stemming from the science and environmental impacts.

I think they believe that taking action will give them a seat at the table when policies are developed and give them an opportunity to talk about what they think makes sense. So, I think that is in there as well.

Obviously, these companies are in business to make money. I think some of them think that at least parts of their business could be more profitable under some climate change regime. But what I think really motivates them on early action is that they don't want to be penalized. They want to be able to do some things that they think are important. They want to do what they are asked, but they certainly don't want to incur a penalty.

Senator CHAFEE. I certainly have not objection to any company making some money. I certainly understand their concern that they take these steps now, and obviously the steps they take in the be-

ginning, with the low-hanging fruit, the easy ones. Then if there comes a subsequent starting point that delays, they don't get the early starting point but a later starting point, it makes it very difficult for them. The competition is starting at zero whereas they are starting at minus 30 or whatever it is. Their reductions are going to be much harder to obtain. So I can perfectly well understand their concerns.

Senator Baucus, do you have some questions?

Senator BAUCUS. Thank you, Mr. Chairman.

Ms. Claussen, one question I have is how do you get a lot of American companies to participate? I am thinking of small business now. There are many more small business enterprises than there are big business. I can see big business finding an economic opportunity here, you know, like Westinghouse. You know, it makes sense. But most companies don't have the size, don't have the sophistication, the research capabilities. What is the opportunity for small business in credit for early action?

Ms. CLAUSSEN. It seems to me that small business has opportunities just like big business does. I think by and large small business understands less about how this whole thing will work, even what the climate change problem is.

Senator BAUCUS. Could you give us an example? Say a small grocery store or a print shop or an accounting firm. You know, not a utility.

Ms. CLAUSSEN. I mean based on long years of working in this field, it seems to me that there are always efficiency improvements that people don't take advantage of because they don't think about them. So I think there are always those.

In terms of carbon emissions, there are also opportunities to switch fuel. So, I think small business will have opportunities. The issue is whether they can take advantage of them, whether they know how to do it and whether the system that you eventually, I hope, agree on gives them something that is simple enough so that they don't need a large staff and a lot of people to help them understand the intricacies.

So the challenge is really, I think, to make it possible for them to take advantage of opportunities that exist.

Mr. LANDGREN. Senator, could I just add to that to enlighten?

Senator BAUCUS. Yes.

Mr. LANDGREN. As I mentioned in my testimony, Wisconsin Electric has a very large green pricing program. Most of those have always been focused on residential customers. We are now trying to target small business because we do know that there are some small businesses that would like to do something to assist the environment.

Today, green power in the Midwest costs more than our regular power does. So, if we asked them to sign up for our green pricing and we allowed them to purchase 25 percent of their use, 50 percent of their use, or all of it that will come from a green source, they will pay more for that.

If we were able to have you folks give credit for early action, there could be a procedure by which those small businesses could also receive that credit for early action; whether or not it was a ne-

gotiated split between us and them or if we just decided that it was appropriate for them to get all of that.

So, another way in which small business could participate, and we know that they want.

Senator BAUCUS. Other than a reduction in their power bill, what else could they do? Examples for small business, you know, so that they could have some ownership, be part of all of this, and ways to provide incentive, to think of new ways to do things. I just think that most small businessmen will see this as a—"well, it is interesting, but what can I do?"

Ms. CLAUSSEN. Yes, but you could do anything, from changing your lighting to changing your insulation. I mean, there is a whole spectrum. Thirty-five percent of greenhouse gas emissions come from buildings. I mean all of these small businesses are in buildings. There is lots of opportunity.

Senator BAUCUS. But how are you going to measure that and get a credit for it, I mean a small company?

Ms. CLAUSSEN. Well, you can. Actually you can.

Mr. LANDGREN. It has been measured in the SO_2 program. Utilities were allowed, for verifiable energy efficiency improvements, to obtain additional SO_2 credits. The U.S. Government did a very good job of insisting on strict verification, but my company along with others were able to prove that we had real reductions and we received real SO_2 credits for those reductions.

Those efficiency improvements came from small businesses and residential customers.

Mr. SANDOR. Senator, if we consider farmers or small farms as small business people, I think there is an enormous opportunity there in the sequestration level. It is relatively easy to monitor. We have been in touch with several major——

Senator BAUCUS. I was interested in your figures. They are massive, I mean 450 million—what were your figures on forestry and agriculture?

Mr. SANDOR. I thought about 300 million tons. I have used numbers from Rattan Lal at Ohio State. He has estimated that the carbon sequestration with low-till or no-till practices, plus biomass fuels can generate half of that.

Senator BAUCUS. So that is in addition to what agriculture now sequesters?

Mr. SANDOR. Yes, just by switching.

Senator BAUCUS. By switching? That is it?

Mr. SANDOR. That is it. And that doesn't speak to new soil cover.

Senator BAUCUS. What is the most cost-effective switch?

Mr. SANDOR. To low-till or no-till agriculture, where you don't deep plow.

Senator BAUCUS. So what percent of that 300 million is that?

Mr. SANDOR. That is 100 million tons.

Senator BAUCUS. That is a third. So, one-third would be no-till, low-till?

Mr. SANDOR. Yes.

Senator BAUCUS. I am just curious. How much has deforestation of the world, you know, since the Middle Ages, contributed? I mean, you go across Europe and there are no trees anymore. In the

eastern United States there aren't any trees any more. I'm just curious.

Ms. NELSON. There are two figures that I can refer to, both the World Resources Institute, Inter-governmental Panel on Climate Change, and others have looked at this question. On an annual basis, estimates are that more than 20 percent of CO_2 emissions today, on an annual basis, are attributable to deforestation, principally in the tropics, in land use change.

Historically, WRI just recently released a report which I found quite interesting, that sought to estimate emissions attributable to deforestation and land use change since the beginning of the industrial age until now. That number exceeded 30 percent. So, over 30 percent of the problem historically has been attributed to deforestation.

Right now on an annual basis it is a little bit more than 20 percent.

Senator BAUCUS. How much does the ocean sequester?

Ms. NELSON. I don't understand the ocean cycle.

Senator BAUCUS. Does anybody here understand it? Do you want to take a stab?

Ms. NELSON. No.

Senator BAUCUS. Well, that is an interesting question. If nobody understands it——

Ms. NELSON. Well, lots of people do; just not me. I would rather not speak to it. It is part of the carbon cycle. It is complicated. It both releases carbon dioxide, takes in carbon, cycles through coral reefs and other complicated chemical processes that I dare not venture to. I will stick with my expertise which is forests.

Senator BAUCUS. OK. Well, my time is up. Thank you.

Senator CHAFEE. Senator Wyden.

Senator WYDEN. Thank you, Mr. Chairman. Mr. Chairman, I want to commend you and Senator Baucus for, I think, extremely important work. I am very pleased to be a sponsor of this legislation and look forward to working closely with you and Max so we can get it passed in a bipartisan way.

I will tell you, however, that I am very troubled as I listen to this panel, that so much of the discussion is about forestry actions that remove carbon from the atmosphere, so much of the discussion involves projects that are located overseas. I feel very strongly about trying to take sensible steps to deal with forestry issues in Belize, Ms. Nelson, but I care about Bend, Oregon as well.

We have to do some things there as well, both from the standpoint of the environment, protecting habitat and watersheds, as well as steps that are going to help promote jobs in rural communities. We have a crisis in our rural economy, and yet all of this discussion seems to focus on forestry overseas rather than a lot of the forestry concerns in this country.

For example, if we were to do nothing else but to plant trees on the millions of unforested conservation reserve lands in our country and to help some of the private landowners who are willing to put conservation easements on their private lands, by paying some of the upfront costs we would be taking steps in our country that would deal with the kind of early action that we are talking about with respect to forestry as well as creating jobs in the rural West.

Yet, I hear virtually no discussion of this. All the major projects seem to involve forestry overseas. My question to you, Ms. Nelson—I see the gentleman at the other end is raising his hand and gyrating frantically as well——

Ms. NELSON. That is Dr. Sandor, yes.

Senator WYDEN. Do you share my view of the enormous potential for domestic reductions in our country, and if so, what can we do as this debate goes forward to make sure that we think about people, say in the rural west of this country who I think very much would like to be part of this solution in a way that would help our environment and protect jobs.

Ms. Nelson?

Ms. NELSON. Thank you, Senator. That is a good question. I have a couple of comments. I do share your view that there is enormous domestic potential, if done right. I think one of the reasons the first pilot projects were abroad would speak very well to the issue before you today. There were clear rules. The U.S. Initiative on Joint Implementation has guidelines and criteria on how to meet a test of additionality and what leakage is and how to establish your baseline.

It has a process for approving and accepting these projects into a U.S. Government reporting mechanism. There is greater certainty and understanding of the operational guidelines and criteria necessary to demonstrate the validity of this mechanism under the USIJI guidelines, a voluntary program established by this government after the conference of the parties in Berlin several years ago.

There are no rules or guidelines for domestic projects. Nobody is quite sure what to do and what would count. Properly designed, we believe there is enormous potential both in the forestry and the agriculture sector in the United States to incentivize additional activities above and beyond what is going on now that will provide that benefit.

To date, these pilot projects have taken place abroad because there was a clear set of rules, for one. They were cost-effective experiments. And I only just want to add in the interest of sharing one fact with you, the greenhouse gas benefits of our projects in Belize know no boundaries. Greenhouse gases, after all, are global pollutants. So, the benefit from a greenhouse gas standpoint is one that we feel here domestically as well.

But your point is well taken as regards to forestry activities at home and I think that if this body would provide some clear guidelines and rules and do it in a credible way, you would see an enormous amount of activity in that area and I think that would be good.

Senator WYDEN. I want to let your associate comment. Your point is well taken as well. I will tell you, when you go to the rural West and you see all these people, you know, hurting. These are people who have been left out of this economic transformation. They do not own Microsoft stock. They are not going to be able to run a biotechnology company. We have to make sure that they have an economic future as well.

As I said, I think your point is well taken. If we tell them, gee, you know, the priorities are overseas, the priorities are in Belize,

that is not going to cut it with them. So we are going to be anxious to work with you.

As you know, I am about to introduce a comprehensive bill and we have asked for your organization's input and others. Let us not create a situation where we pit Belize against Bend, Oregon because there are a lot of folks in Bend, Oregon, in the rural West.

Senator Baucus and I both have huge sections of the rural West where folks are really hurting. We have to get them into this equation as well. Suffice it to say, when you do the benefits, as you say, are worldwide. But they have special ramifications for the people who give Senator Baucus and I an election certificate.

Ms. NELSON. Absolutely.

Mr. SANDOR. Well, I couldn't agree more with you. I just had the privilege to be in Missoula, Montana last week with the Montana Carbon Coalition. It is precisely the problem that there are no credits voluntarily created and no standards for those folks to reforest. There are Indian reservations. There is wide-open rural poverty where tree planting could be an enormous source of revenue.

We have 145 million acres of forests that are now grazed. That could be theoretically reforested. At a recent presentation that we made at the National Conservation Reserve Program in San Diego a lot of ranchers asked me, "How can I switch from this grazing? The land is not too productive. Can you somehow help me certify it?"

At 2 tons sequestration per year for 60 years, which can be gotten out of some projects using any of the leading forecasts, it is a far better use of that land to reforest than to keep it idle in either the CRP Program or to have it poorly grazed.

I don't get it. I feel like I am Tom Hanks in the movie, "Big." We are not paying any attention to monitor certification of forest sequestration in the U.S. The West, I think, has enormous opportunities and I think the Deep South—we were looking at a project in Mississippi the same way.

We are involved in doing this, but we have no signal from all of you that there is a certification process. We are not asking you to do anything more than help us certify that and make it tradable so it can be easily transferred. So, if you can help us out that way, I think that is of enormous value.

Mr. LANDGREN. Could I just add briefly, and maybe it is an oversight on our part, but Wisconsin Electric has actually spent more time and money working with organizations like the Nature Conservancy in Wisconsin, doing things to either donate land or to purchase land and to safe it and restore it and use the proper land management techniques that Ms. Nelson referred to.

Again, what we are looking at is in the U.S. many of the opportunities are reforestation. In places like Belize, it is a massive opportunity at a much lower cost to save the rain forest before it is chopped down and then you have to work to restore it. So it is a matter of priorities, but we would also support the fact that there is much that can be done in this country.

Senator WYDEN. My time is up. Your testimony has been very good. Hopefully, it will give some impetus as we go forward with this legislation and come up with these standards.

I will tell you, I am just struck at how this country talks about spending billions of dollars on various technologies and whiz bang gadgets to deal with this global climate problem and we have got a much cheaper solution in front of us.

You have issued a challenge to this committee and to the Congress to get in place some sensible kinds of standards. We will make sure that that will be part of the legislation that I introduce and we will look forward to having your comments on how to do it right.

I am pleased to join Chairman Chafee and Senator Baucus in support of their bill. I yield back.

Senator CHAFEE. Thank you very much. Dr. Sandor, I have just one question here that troubles me. I don't know how you deal—I can understand Amoco and British Petroleum and companies like DuPont, companies that are part of Ms. Claussen's coalition. I can understand that we can institute some kind of a system whereby we start here and if they reduce they get credits for going below the area.

In the next panel there will be folks representing small businesses. You were talking about farms, for example. Let us just say methane gas that is being produced there. But could you envision some kind of a system that seems like such a leap that farms would have a target ascribed to them? Let us say I have a fairly prosperous family farm. I have 300 milkers in a dairy farm. I am not sure the American public is going to countenance having a system whereby somebody is going to come to my farm and tell me that I have to reduce the CO_2 gases.

Mr. SANDOR. I would hope that the committee would not get hung up on the accuracy of measurement to make a market successful. In 1848 the Chicago Board of Trade graded grain and came up with standards. There were no microscopes. They had protein content, infestation. We traded mortgage-backed securities with houses in Rhode Island and houses in California and houses in Chicago and Madison and we managed to homogenize them and come up with a certificate.

Rating agencies rate department stores in Chicago as junk bonds along with the countries of Belize and the capital markets manage to trade them. We trade credit card receivables. We trade silver ounce bars that are deliverable on our world's exchanges here in America that have a 10 percent variance. Yet, we are the envy of the world.

There are mechanical means of measurement. We did some work with Jet Propulsion Laboratory that can now estimate biomass within a 10 percent tolerance, very much similar to what a bond market does. We know that 9 percent of the U.S. carbon emissions are from methane. We know 3 percent of the 9 percent is from animals. We know that there are 100 million cattle and 150 hogs and pigs on feed. That is 250 million. We can take the average methane emission per animal.

These numbers, we don't have to get it exactly right. This is our first job. I think all of us working together is not to design your first plane as a 747. OK? You know, Orville and Wilbur flew for 56 seconds and that was a big deal.

Financial inventions, industrial inventions start with small and simple bases. I have watched the capital markets in almost every different area and I think if you get it close enough you can get a trading instrument that will be acceptable. You over-collateralize. You can in fact do that.

We have FCIC people out there in the field. They take a look and rate farmers for crop insurance. They are visiting. It is a very successful program. We have all the USDA districts, the Conservation Reserve Program.

I would only hope that this committee would not reinvent the wheel. Take a look at what is out there. Get it close enough so that we can have a voluntary pilot market, and I think the private sector will take care of the rest.

Senator BAUCUS. I take it that essentially you four are saying that even though the Kyoto Treaty has not been ratified, let alone submitted, which would set caps, that you feel as a matter of faith that the time is going to come, sometime relatively soon, when the world will recognize the need, including developing countries, to sign a treaty. You, as a matter of faith, want to get ahead and get credit for thinking ahead and for being wise, omnipresent, and all those things.

Is that basically it? I mean, do you advise Congress to pass this bill prior to the treaty or not? How would it work without caps? How could you set a value on the amount of greenhouse gases without caps? There are no caps because there is no treaty.

So, I guess I am asking two questions. Do we proceed, in your judgment, irrespective of the treaty, proceed in passing this legislation? And second, are you saying, well, I don't know if you want to pass the bill, but we are taking a certain amount of early action because we think that the time is going to come fairly quickly?

The question I have is why pass this bill when there are no caps? How do you quantify the amounts traded when there are no caps?

Mr. SANDOR. I will take a first jump at it and then I hope that, if you will forgive me, if I can excuse myself. Today happens to be, fortuitously, the seventh annual auction at the Chicago Board of Trade of SO_2 and I must go host it. So, quickly, I would say, one, I believe that caps are coming somewhere in the world. I would like us to be able to export our reductions. If they come in Ireland or Australia——

Senator BAUCUS. The caps are coming?

Mr. SANDOR. Not necessarily in the United States; in other jurisdictions. I think that British Petroleum, if it cleans up and registers, and Amoco, and reduces here, it might want to use it in another jurisdiction.

Senator BAUCUS. Why will caps come in another jurisdiction when there is no agreement on caps in other countries?

Mr. SANDOR. I have been going to a lot of other countries around the world. We are talking to Canada and we are advising them on an emissions trading system, our company is. I think they will have a cap independent of what happens internationally. England is looking at it. The International Petroleum Exchange has a greenhouse gas program.

Senator BAUCUS. Ms. Claussen, could you answer that, please?

Ms. CLAUSSEN. Yes. First of all, let me say that I think that some form of binding commitments are inevitable, globally. I mean inevitable for the United States, and for the rest of the world, including the developing countries. I do think that some countries may move forward faster than we in dealing with a cap. I think that is certainly true for some countries in Europe which I think will go ahead and ratify the Kyoto Protocol.

Even if the treaty doesn't enter into force, they will, as a domestic matter, impose caps. So I think there is some truth in what was said down at the end of the table here.

Senator BAUCUS. So you advise what?

Ms. CLAUSSEN. I think it is very important for the Congress to pass some legislation that grants credit for early action. I think that is one way for us to get moving and for our emissions path to move in a more reasonable way.

Senator BAUCUS. Even though we don't know what the value is?

Ms. CLAUSSEN. Even though we don't know what the value is.

Mr. SANDOR. Senator Baucus, could I answer one last question? We in fact trade the largest commodities in the world with no caps. Those are called currencies. Any central bank can print as much as it wants and the market doesn't have a problem and hasn't had a problem in trading it. So we could trade it and put a value on it even though there is no cap. It might have a depreciated value relative to it, if it did have a cap.

But the markets can handle it. They have handled hyper-inflated currencies, traded them all.

Senator BAUCUS. That is true, but there are only a few institutions who can print money, whereas in this case we are talking about a multitude of entities who could emit greenhouse gases. So that is a huge difference, frankly.

Mr. SANDOR. That is a difference. But I think that there is an argument that could be made. I would hope that you would offer credit for early action.

Senator BAUCUS. I appreciate that. Thank you.

Mr. Landgren?

Mr. LANDGREN. I would just respond, No. 1, my company does believe in the inevitability that there will be some kind of regulation on greenhouse gases. But the point I tried to make in my testimony was that if you believe otherwise, this is really a zero cost to the government, other than the minor costs of verification and monitoring. In return for that you are getting a lot of companies being willing to invest money to do good things like improve the efficiency of the American work place and to save rainforests.

Senator BAUCUS. I am just asking these questions to try to force us to think more clearly, frankly, so we can move more definitely and less pie in the sky. That is why I am asking these questions.

Mr. LANDGREN. So we would support this bill—not this bill because again we are not necessarily here supporting this bill—but this concept going forward ahead of a treaty.

Senator BAUCUS. Thank you very much.

Senator CHAFEE. Also, I would stress the point that you have made, Mr. Landgren, in your testimony where you talk about—and you others have likewise—that there is a certain value that comes from certainty.

In your statement you say: "We do not believe we do not believe this support binds us to support the Kyoto Protocol. We view credit for early action simply as an insurance policy in the event that domestic or international programs to reduce greenhouse emissions is implemented, Congress should view the credit for early action in the same way, as an insurance policy."

Well, thank you all very much for your testimony. Ms. Nelson, please give our regards to your Dad.

Ms. NELSON. Thank you very much. I will.

Senator CHAFEE. I served here with him.

Ms. NELSON. I will have dinner with him tonight. I will tell him you asked about him.

Senator CHAFEE. Please do. That is very, very nice. Thank you.

Would the next panel come forward? That will consist of Mr. John Passacantando, and Mr. Raymond Keating.

Gentlemen, if you will take your seats, we will be glad to hear from you. Why don't we start with you, Mr. Passacantando? We look forward to your testimony.

Mr. Passacantando is the Executive Director of Ozone Action.

STATEMENT OF JOHN PASSACANTANDO, EXECUTIVE DIRECTOR, OZONE ACTION

Mr. PASSACANTANDO. Thank you. Senator Chafee, thank you for the invitation to be here today. I am John Passacantando, Executive Director of Ozone Action, a nonprofit organization dedicated to building a public constituency for leadership to address global warming.

We are here to talk about the concept of early action. I want to emphatically state that we support this concept. Even before the Kyoto Protocol was agreed upon, Ozone Action was promoting the importance of early emissions reductions. By promoting measures to get industry to voluntarily reduce their missions, you can foster the type of paradigm shift that encourages leadership by the industries that will dominate in the 21st century.

Unfortunately, as currently written, S. 547 does not do this. In fact, in our eyes it is a Band-Aid approach that may ultimately be counterproductive.

A doctor, when treating a patient with high cholesterol will likely prescribe medication, but no responsible doctor would limit that treatment to medication. He would insist that the patient address the source of the cholesterol problem. To do anything less would be irresponsible.

In many ways our climate shows the symptoms of an ailing patient. Scientists around the world recognize that glaciers are retreating, ice caps thinning, our seas are rising, violent storms increasing and rising temperatures are breaking records that go back to the Middle Ages.

S. 547 would be like giving the sick patient a pill without addressing the source of the problem. It is imperative that any bill focus on the source of global warming, the escalating emissions of greenhouse gases from the burning of fossil fuels.

Our country's history of strong environmental regulation and economic prosperity is the clearest indicator that properly crafted reg-

ulations can provide incentives for the innovations that drive our markets.

Michael Porter, Harvard Business School professor and former member of President Reagan's Commission on Industrial Competitiveness, has written in his most recent book that ''The data clearly show that the costs of addressing environmental regulations can be minimized, if not eliminated, through innovations that deliver other competitive benefits.''

Like Porter, I do not come at these issues purely as an environmental advocate. My background is on Wall Street. I spent 8 years of my career in decidedly non-environmental roles. For a majority of that period I worked for Jude Wanniski, the high priest of supply side economics. I believe in the careful use of government intervention and remain as suspicious of corporate welfare as any conservative.

The history of environmental regulation in the U.S. is one of the government raising environmental standards, usually over the strong objections of the effected industries, only to have those standards met by creative innovations that come in at a fraction of the initially projected costs or even as new profit centers for these industries.

The Clean Air Act, removing lead from gasoline, phasing out ozone-depleting chemicals, these are just a few examples of regulations that have spurred innovations. The fight against global warming is no different from these other efforts. It is just larger. Overall, S. 547 fails to promote the better angels of our industrial base. Instead of promoting innovation, the bill rewards our biggest polluters, even if they have made no changes whatsoever.

It also has the potential to preempt real emissions reductions just as a mandate is emerging from the American people who are increasingly concerned about global warming.

There are several key flaws of the bill that the committee should be aware of as it assesses its merits. First, it allows blanket crediting of unverified reductions claimed under the Department of Energy's (1605(b)) program, some going back almost 10 years.

This loophole sacrifices environmental integrity and threatens America's ability to meet our commitment under the Kyoto Protocol.

Second, this bill also would provide incentives for increasing our dependence on nuclear power.

To further subsidize this uncompetitive industry in the name of global warming would exacerbate an existing problem. Nuclear energy may not emit carbon dioxide, but it is unacceptable to trade one environmental threat for another.

Third, the bill diverts attention from sorely needed domestic pollution prevention and rewards vague and unverifiable overseas projects.

Fourth, as for all aspects of this or any bill on global warming, the science must drive the policy. Carbon absorbing sinks projects must be left out of the early credit discussion, at least until the international scientific body completes its study next year and defines the way sinks will be dealt with under the Kyoto Protocol.

There are a number of other flaws, some of which were outlined in my submitted testimony. Many of them have been described in

a memo circulated as a legislative analysis offered by a majority of the members of the environmental community.

If this bill becomes law, any future efforts to lower industrial emissions may be met with the cry of "I already gave at the office." Passing the bill as a means to combat global warming would be like a doctor combating a patient's high cholesterol by giving him a pill and then treating him to a steak and fries dinner. Our global climate deserves better.

Thank you again for the opportunity to share our concerns with you about this bill. We stand ready to help you in any way possible.

Senator CHAFEE. Well, thank you very much. That is why we are having this hearing, to find out some of the challenges and difficulties you envision. I have always felt that this is very, very difficult. The concept is readily understandable. Why shouldn't somebody get credit if subsequently some caps or regulatory levels are imposed? It is voluntary. Absent some legislation such as this, there is certainly no incentive for any company to make the effort, unless it is because they are just plain good citizens.

So, Mr. Keating, your testimony comes from the Small Business Survival Committee.

STATEMENT OF RAYMOND KEATING, CHIEF ECONOMIST, SMALL BUSINESS SURVIVAL COMMITTEE

Mr. KEATING. Thank you, Mr. Chairman. As a side note, I also worked for Jude Wanniski once, and I hope you won't hold that against me.

I am Raymond Keating, Chief Economist for the Small Business Survival Committee. SBSC is a nonpartisan, nonprofit, small business advocacy group, with more than 50,000 members across the Nation. SBSC opposes the Kyoto Protocol on Climate Change for a variety of reasons, including the significant costs it would impose on small businesses, consumers and the U.S. economy in general, as well as the global competitive disadvantage U.S. small businesses would suffer.

Unlike others here today, obviously we have been asked to discuss formal recognition or crediting of voluntary greenhouse gas mitigation activities.

First, we need to understand or come to agree on what these credits would be used for. Obviously the credits would only have meaning and value under the Kyoto Protocol or some similar regulatory regime which would implement an emissions "cap and trade" system. Otherwise the entire early credit endeavor would be pointless. Therefore, we must take a look at how emissions trading would likely work, and what problems it presents.

The Kyoto Protocol would require dramatic reductions in energy usage. One method for reducing energy consumption and emissions would be an emissions trading program whereby the government would cap emissions and then ration or auction off credits equivalent to certain levels of emissions.

I think we need to understand that trading emission credits is really another regulatory system, shifting around, maybe with some flexibility, but shifting around massive government-imposed costs. The bottom line is that the government would place severe

restrictions on CO_2 emissions and therefore on energy consumption and, quite frankly, economic activity.

Many problems exist with such a system. It is costly and stealthy. Like other forms of regulation, in fact the costs would remain largely a mystery to consumers, but nonetheless they would be paying in the form of increased cost, lost GDP and lost jobs.

The most daunting problem with an emissions trading regulatory system is compliance. In summary, countless dollars would be spent in pursuit of, quite frankly, what we see as an impossible compliance goal.

Administration of this treaty would require monitoring all sources of emissions, and comparing those results with permissible credit amounts. Stationary sources would be bad enough. Think of the number of businesses, nonprofit and governmental facilities that would be under surveillance. But remember there are more than 200 million more vehicles in use in the United States today.

Now, take this scenario and apply it internationally. The complexity, costs and extent of government intrusiveness grow exponentially in pursuit of this compliance. If this treaty is meant to be taken seriously, the developing nations eventually must be brought into the fold.

An exclusion for developing nations would provide them with a tremendous economic advantage, allowing them to attract industries, businesses and jobs away from nations forced to impose significant costs under the treaty. Obviously, this cannot stand.

But what would happen if the developing nations are placed under some sort of Global Warming Treaty emissions caps? If imposed and somehow enforced, limiting emissions in such nations, we would argue, would sentence millions of people to permanent poverty.

Under emissions trading smaller enterprises would be at a distinct disadvantage as bidding raises the price of credits. As is the case with other forms of regulation, these added costs will hit smaller ventures harder. Many small businesses operate under the slimmest of margins, and simply would be unable to play the credits game.

As it stands now, most small businesses find it daunting to comply with the hundreds of laws and regulations required under all levels of government. In addition, basic business matters require their hour-by-hour, day-to-day attention.

The credits game will be viewed by most as being the domain of big business, or be construed as some complex and vague program that offers no or little current quantifiable benefit in running their day-to-day operations. In addition, the high risk nature of smaller, entrepreneurial firms require the opportunity, at least the possibility, of making substantial returns.

The Kyoto Treaty and emissions trading raise costs, and therefore reduce potential returns, which means that many start-up, innovative, potentially high-growth enterprises would be nipped in the bud.

Indeed, it certainly does not take an active imagination to see mature, entrenched large enterprises gaining a clear advantage over smaller businesses under an emissions trading regulatory system. Large firms with greater ability—including the necessary cap-

ital—to survive the added cost of playing the credits game will actually face reduced competition from smaller upstarts who will not survive.

Having noted the many problems with emissions trading, it becomes obvious that any kind of early action to reduce emissions—so-called "voluntary" or not—manages to only make matters worse. For example, the Federal Government would most likely enter into early implementation agreements with large established businesses who have the legal expertise, the technical abilities, and discretionary capital to undertake early actions.

Since there would only be so many credits to go around under the Kyoto Protocol, or a national cap as part of, perhaps, a domestic program, those who do not participate in the early actions would suffer accordingly. Small and mid-sized businesses would bear a heavy burden.

Politics, no doubt, would play a major part in this early implementation program. Those with political connections and lobbying clout would have the clear advantage when it comes to entering into early implementation agreements at the expense of the non-politically connected, i.e., smaller enterprises.

Even if so-called "pooling" is allowed, its usefulness would be quite limited. For example, established businesses would have absolutely no incentive to pool with other firms. Why would they? For the rest, the costs or organizing in terms of dollars, time, personnel, education et cetera would be formidable.

Also, mature businesses in predictable industries would more easily participate in early implementation than would small, high-growth businesses in new, dynamic and far less predictable industries.

Credits for early implementation would establish a strong special-interest group favoring Kyoto implementation or a comparable domestic regulatory program. I believe this would effectively split some of the business community in its opposition to the Kyoto Protocol, pitting many large companies with special interests in seeing the treaty and its trading system become reality, against a far more dispersed opposition overwhelmingly populated by small and mid-sized firms.

Especially from the small business perspective, early action credits are a bad deal. The economics of the Kyoto Protocol, or a similar program, including its emissions trading scheme, are dismal. In our view, Congress should not be looking for ways to advance Kyoto and its attendant implementation systems, but instead should be stating quite clearly that it will not ratify this costly, misguided, and highly dubious treaty.

Once again, thank you for allowing me to testify. I would be glad to answer any of your questions.

Senator CHAFEE. Well, Mr. Keating, you seem to base your presentation on the fact that the chances are good that the Kyoto Protocol will be implemented. That is not the basis for this, from my point of view anyway. There may be something coming along and there may not. What we want to do is assure that this legislation—and it is very difficult to draw this legislation, as you pointed out—the thrust of it is that the companies, small or large, that make efforts now to reduce emissions will get credit for it. What is the

matter with that? By the way, it is voluntary. In your statement you are pretty concerned about what is going on here. If it is strictly voluntary, what is the problem?

Mr. KEATING. Well, whatever your intentions may be, I think this legislation sends a clear message that Kyoto is coming or something like Kyoto is coming and that this is laying the groundwork for it, quite frankly. We hear they are setting up a group that will be advocating the advancement of the treaty.

So, all signals from legislation such as this are that Kyoto is coming or something very similar is coming.

Now, in terms of voluntary actions, that is great. Every business can make their own decisions on whatever they would like to do. I would argue that most businesses make such investments to increase their efficiency and help their bottom line. Fantastic. More power to them. They are going to gain benefits from that as are consumers in the marketplace.

The question is whether those investments should necessarily be counted toward a system that is leading us, taking us down the road to increased regulation on all business. I would argue that that is not a good idea. It takes us further down the road to a treaty that is costly. I would be glad to submit for the record my testimony when I testified on this treaty last year over in the House. I went through stacks and stacks of economic analysis and studies. This is going to be quite costly. There is no way of getting around it.

The trading system might be more flexible, but this type of regulation which this legislation envisions happening, one day is going to be quite costly. So, obviously, we are going to oppose any kind of measure that advances something like this that is going to hurt the small business community and the economy overall.

Senator CHAFEE. It seems to me that there is a fundamental question here that we all have to answer. That is, are we concerned about global warming? Is there a problem? Now, if you conclude that there is no problem, then this is all hogwash. What do we care about how much CO_2 is emitted or methane or any of the greenhouse gases?

If we think there is a problem and we are convinced through the science that this is serious business, then our steps to do something about it, and I don't really know what that might be, but it seems to me to take the attitude—if you assume, as I do, that there is a problem here, that global warming is serious business, then you try to do something about it. It may not be perfect, but at least you try.

But your attitude, I assume, is that there is no problem, that the science does not indicate that the earth is gradually warming through man's activities. I assume that that is the position you take.

Mr. KEATING. We are certainly not climate scientists at SBSC, but in terms of what I have looked at in the literature, it is often being presented as a complete unified opinion in the science community that global warming is happening.

I would disagree. Again I will go back to the testimony I gave last year that shows that there is large disagreement in the scientific community over this. There is no majority opinion, I don't

think you can find anywhere that this is seriously happening and it is being caused by man. So you are right. You have to get back to the fundamentals here as to whether these mighty costs that will be imposed on the economy, consumers, and businesses make any sense in terms of what we are trying to accomplish.

We certainly have serious, to be gentle, questions about the existence of global warning and the science behind it. So, yes, I think that is the fundamental issue that everybody has to wrestle with.

Senator CHAFEE. I think you are not quite accurate in stating that the majority view—you know, we have all read these opinions of climate scientists. Are they unanimous? No. I suspect it would be pretty hard to find any unanimity from a whole bunch of scientists. But the evidence is pretty overwhelming. There have been samples that they have taken in the Antarctic and so forth. It is not going to be 100 percent, that is for sure.

Mr. KEATING. I don't even think you need to get to 100 percent. This is from my testimony from last year. Jethrow Hickey did an article in late 1997 in Inside Magazine, laying down a few facts that I think a lot of people are not aware of. For example, only 13 percent of the scientists polled by Greenpeace believe that there will be catastrophic consequences if consumption remains at present levels. A recent Gallup poll of members of the American Geophysical Society and Meteorological Society found that just 17 percent believe that greenhouse gas emissions have been responsible for global warming. Citizens for a Sound Economy found that 89 percent of scientists they polled believe that, ''current science is unable to isolate and measure variations in local temperatures'' caused by humans. The United Nations surveyed 400 scientists and they did not agree that ''global warming is a process that is caused by greenhouse gas emissions.''

So, I would argue that. There are two scientists from the Oregon Institute of Science and Medicine that argue with the science as well. Just based on that, I think it is pretty clear that we hear a lot about, you know, this is an insurance policy, but this is a mighty, mighty expensive insurance policy for something that we don't know is going on, that we don't know what may be causing it, quite frankly.

I don't think it is an insurance policy. It is a much more dangerous game than that for our economy and for our way of life.

Senator CHAFEE. Well, I think it behooves us to have some hearings here on the science. I suspect no matter who we come up with there will be those who disbelieve. We are all familiar with that.

I think we know here in the Senate that there are polls and polls, Gallup polls and so forth have been taken of various groups. I would hope we have an opportunity to have them in here and let us go at it. I am sure when we finish—I am not sure everybody will be convinced one way or the other.

Mr. Passacantando, do you have some thoughts on this issue?

Mr. PASSACANTANDO. Well, I would report that essentially with scientists—and the one thing I can tell you is that it is remarkable and it is overwhelming the number of scientists, the number of legitimate climate scientists who have spoken out and encouraged leadership by Congress, by the United States in addressing global warming.

The IPCC, in assessing the work of thousands of scientists, says there is a human fingerprint on global climate. We were involved in pulling together 2,400 scientists who signed a statement written by George Woodwell, of Woods Hole Research Institute, and John Holdren at Harvard, which urged U.S. leadership in global warming.

Additionally, The Union of Concerned Scientists had a similar statement, signed by 1,500 scientists from all around the world. You rarely see this kind of unanimity on any threat, if ever. At least not since the nuclear threat. Rare is it to have this many scientists speaking out with a political voice, urging leadership.

It really comes down to asking the question, can you find a scientist who at this stage would say, "There should be no concern with the excess amount of carbon dioxide that human behavior, human action has put into the atmosphere?" You would have to look under rocks. You could not find a scientist, in my opinion, who would actually say it. Maybe two or three in the entire world would say it is good for us.

Senator CHAFEE. I will tell you what we would like to do. I would like to get a copy of the testimony that you gave last year over at the House. I would appreciate if you would send us a copy of that. I would just like to check out some of the references that you mentioned.

Mr. KEATING. I will make sure that it gets over here. My copy has scribble on it. I will get you a clean copy.

[The referenced material follows:]

TESTIMONY OF RAYMOND KEATING CHIEF ECONOMIST SMALL BUSINESS SURVIVAL COMMITTEE BEFORE THE HOUSE COMMITTEE ON SMALL BUSINESS, JUNE 4, 1998

On behalf of the Small Business Survival Committee (SBSC) and its more than 40,000 members across the nation, I appreciate the opportunity to offer the following comments regarding the potential impact of the Kyoto Protocol, or "Global Warming Treaty," agreed to this past December by the Clinton Administration in Kyoto, Japan.

SBSC is an advocacy and information organization that supports policies which promote the survival and growth of the entrepreneurial sector of our economy.

As I will more fully explain in a moment, SBSC opposes the Global Warming Treaty for several reasons, but primarily due to the crushing costs that would be imposed on businesses of all sizes and in practically all industries, as well as on consumers and the economy in general. As most studies of the Global Warming Treaty indicate—whether performed by private industry or by the Clinton Administration itself—this treaty will be an indiscriminate killer of businesses and jobs. And this will be the case no matter what the means utilized to reduce so-called "greenhouse gas emissions"—primarily CO_2—that is, whether through higher taxes, increased regulations, an emissions "cap and trade" system, or some combination of these options.

Like other Americans, we also have other concerns about this treaty, such as national security implications, the fact that it is based on, to be generous, debatable science, the exclusion of "developing" nations, the foreign aid and transfer of wealth implications among nations, as well as the often secretive and at times misleading methods used by the Clinton Administration in seeking to advance its global climate policies.

BACKGROUND

Make no mistake, government-imposed costs inflict considerable harm on smaller enterprises.

Small businesses often operate on tight margins, struggling to stay alive month to month and year to year. This is perhaps best illustrated by the fact that more than half of new businesses fail or reorganize within 5 years, as noted by the U.S. Small Business Administration (SBA).

At the same time, however, small businesses have long proven to be the wellspring of innovation, invention and job creation in our economy. In any given year, smaller businesses also account from anywhere from two-thirds to more than 100 percent (large firms often shed more jobs than they create) of net job creation. So, these high-risk ventures are critical to the economy.

Unfortunately, increased government-imposed costs weigh heavily around the necks of entrepreneurs. For example, according to an SBA study, the annual per employee costs of Federal regulations range from $2,979 for businesses with 500 or more employees to $5,195 for businesses with 20 to 499 employees to $5,532 for businesses with fewer than 20 employees. Regulatory economist Thomas Hopkins estimates that the real costs of Federal regulations are expected to rise by more than 30 percent between 1988 and 2000.

Starting up and investing in businesses are high-risk ventures. If government imposes weighty taxes and regulations, then fewer enterprises will be created, fewer will survive, and job creation will wane.

If implemented, the Kyoto Protocol would guarantee that governmental burdens on entrepreneurs—indeed, on businesses of all sizes—would continue to rise, thereby damaging economic growth and job creation.

QUESTIONABLE SCIENCE

When it comes to global warming, a major question persists: Does it make sense from either an economic or environmental viewpoint to impose weighty costs (as will be illustrated later) given the current state of science on the issue?

While we at SBSC are not climate scientists, a general review of the literature and results of various polls show that a scientific consensus on the existence of global warming and its potential effects simply does not exist.

For example, according to ground-level measurements, the earth's average temperature has increased by 0.5C over the past 100 years. However, much, if not all of that increase occurred before 1940. Meanwhile, satellite measurements indicate no warming trend over the past two decades, but a slight cooling.

Meanwhile, in the December 15, 1997 issue of Insight magazine, reporter Jennifer Hickey noted the following findings:

- Only 13 percent of scientists polled by Greenpeace believe that there will be catastrophic consequences if consumption remains at present levels.
- A recent Gallup Poll of members of the American Geophysical Society and the Meteorological Society found that just 17 percent believe that greenhouse-gas emission have been responsible for global warming.
- Citizens for a Sound Economy found that 89 percent of the scientists they polled agreed that "current science is unable to isolate and measure variations in global temperatures" caused by humans.
- The United Nations' Climate Change Bulletin surveyed 400 climate scientists and found they could not agree that "global warming is a process that is already under way."

In addition, S. Fred Singer, an atmospheric physicist and president of the Science & Environmental Policy Project, noted the following in the May 5, 1998 Washington Times ("Scientists Add to Heat Over Global Warming"):

"The Global Warming Treaty and its shaky science are under attack by the largest group of scientists ever. A petition, initiated by the Oregon Institute of Science and Medicine and endorsed by more than 15,000 scientists, urged President Clinton not to sign the Climate protocol negotiated in Kyoto, Japan, last December."

"The 15,000-plus signers, about two-thirds of whom hold advanced academic degrees, question the uncertain science underlying the protocol, noting it does not agree with atmospheric data."

Singer goes on in his article to also note how some top proponents of global warming—including the National Academy of Sciences—were warning of a drastic cooling of earth temperatures in the 1970's.

Writing in The Wall Street Journal on December 4, 1997 ("Science Has Spoken: Global Warming Is a Myth"), Arthur Robinson and Zachary Robinson, chemists at the Oregon Institute of Science and Medicine, simply declare:

"The global warming hypothesis . . . is no longer tenable. Scientists have been able to test it carefully, and it does not hold up. During the past 50 years, as atmospheric carbon dioxide levels have risen, scientists have made precise measurements of atmospheric temperature. These measurements have definitively shown that major atmospheric greenhouse warming of the atmosphere is not occurring and is unlikely ever to occur.

"The temperature of the atmosphere fluctuates over a wide range, the result of solar activity and other influences. During the past 3,000 years, there have been

five extended periods when it was distinctly warmer than today. One of the two coldest periods, known as the Little Ice Age, occurred 300 years ago. Atmospheric temperatures have been rising from that low for the past 300 years, but remain below the 3,000-year average.''

In contrast, the myth that the scientific has arrived at a consensus on global warming is supposedly buttressed by a letter circulated by a group called Ozone Action and signed by 2,600 scientific experts. However, an analysis by Citizens for a Sound Economy indicates that less than 10 percent of signees possess expertise in any scientific discipline related to climate science.

Also, it is quite interesting that Janet Yellen, chairwoman of President Clinton's Council of Economic Advisers, has raised the issue regarding the ''futility'' of econometric models to predict the future—specifically, ''the economic impacts of a given climate change policy''—but the Administration raises no questions about models predicting future climate changes. Meanwhile, Frances B. Smith reports in the September 1997 issue of Consumers' Research Magazine that ''as computer models are adjusted and new data are incorporated, the predicted temperature rise has gotten smaller and smaller—from about SC over the next century to the current prediction of less than 2C.''

THE EXCLUSION OF DEVELOPING NATIONS AND FOREIGN AID

In the November-December 1997 issue of Foreign Affairs, Thomas C. Schelling, a Distinguished Professor of Economics and Public Affairs at the University of Maryland, and a believer in the potential woes of global warming, acknowledged the following: ''Any costs of mitigating climate change during the coming decades will surely be borne by the high-income countries.'' He continued: ''Any action combating global warming will be, intended or not, a foreign aid program.''

Therefore, problems with the Kyoto Protocol are two-fold. First, ''developing'' countries are not required to reduce their ''greenhouse-gas'' emissions, and therefore, businesses in those nations will avoid the draconian costs heaped onto the backs of U.S. firms. These ''Third World'' companies will possess clear cost advantages in international markets, hurting U.S. exports, as well as advantages in U.S. markets themselves, cutting consumption of domestically produced goods and services by U.S. consumers.

Under this treaty, U.S. industry also will possess the perverse incentives to move manufacturing facilities—and therefore jobs—to these nations. (Environmentally, one has to ask whether this makes any sense, given the fact that these nations will be jacking up their CO_2 emissions considerably one way or another?) However, small firms rarely, if ever, shift their operations overseas, and will therefore bear a heavy burden under the global warming treaty here at home.

Salt is rubbed into these U.S. economic wounds by the fact that under any kind of international system of CO_2 credits (a system approved in Kyoto but in no way detailed) the U.S. will wind up sending resources to other nations in a kind of foreign aid payment.

ADMINISTRATION TACTICS

Another concern regarding the Kyoto Protocol has been the Clinton Administration's tactics in advancing their agenda. For example, in order to reach an agreement in Kyoto, Administration negotiators set a dangerous precedent regarding national sovereignty and security. The Center for Security Policy explains in a December 15, 1997 Perspective (''The Senate Must Insist on an Early Vote on the Kyoto Treaty''):

''. . . the GCCT [Global Climate Change Treaty] sets a totally unacceptable precedent that must be repudiated at once. According to The Washington Times, in order to get agreement on Al Gore's treaty, the U.S. delegation was obliged to abandon 'its plan to exempt U.S. military training and overseas operations from fuel cutbacks that would be needed for the United States to reach its target.'' The Times goes on to report that, 'In the draft treaty, only overseas actions approved by the United Nations would remain exempt as would training and combat in international waters.'''

My SBSC colleague, Christopher Homer, noted in recent congressional testimony another worry, i.e., that the Clinton Administration might not wait for Senate approval before implementing the Global Warming Treaty:

''Recently uncovered internal EPA documents disclose that as far back as 1994 the Administration began cataloging ways to reduce 'greenhouse gases.' As the documents also show, the effort expressly was to focus on those efforts most likely not requiring legislative approval. Included among the recommendations are a shocking assortment of big government dream programs: 1) a 50 cent per gallon additional

gas tax, to be implemented without congressional approval under Section 232 of the Trade Expansion Act of 1962 (estimated cost to motorists-$47 billion in the year 2000 alone); 2) seven individual energy taxes, including a carbon tax, 'greenhouse tax,' and the failed Btu tax; 3) ways to encourage an increase in state taxes to fund the highway Trust Fund, to 'fully price roads,' at an estimated cost per household of $400 per year, 4) further auto emission reduction requirements; 5) increased fees on automobile inspection and maintenance.''

Another issue is the Administration's cavalier treatment of U.S. Senate concerns. In July 1997, the U.S. Senate had expressed unanimous approval (95–0) of the ''Byrd/Hager Resolution,'' which expressed the Senate's position that the Administration should neither sign a treaty, nor send one to the Senate for ratification if such a treaty would a) harm the U.S. economy, or b) not include binding commitments by ''developing countries'' to reduce greenhouse gases. The Administration then promised the Senate ''meaningful participation'' from developing nations currently exempt from the treaty. However, in mid-May at the Birmingham Summit of the G–8, the Administration signed a communique stating, ''We look forward to increasing participation from developing countries, which are likely to be most affected by climate change and whose share of emissions is growing. We will work together with developing countries to achieve voluntary efforts and commitments, appropriate to their national circumstances and development needs.''

Finally, Janet Yellen, chairwoman of the White House Council of Economic Advisors, claims that a new Administration study shows the Kyoto protocol having only ''modest'' impacts on the U.S. economy and jobs. However, while the Administration is reportedly using this analysis to negotiate with developing nations in order to get them to ''meaningfully participate'' in the Global Warming Treaty, this information is not being released to the American public for evaluation. This, despite the fact that the Administration promised the Congress and the American public a full economic impact analysis on reduced greenhouse gas emissions to 1990 levels a year prior to the Kyoto negotiations. Now, of course, emissions are to drop to 7 percent below 1990 levels, but still no economic analysis.

As a result, SBSC filed a Freedom of Information Act request with the Council of Economic Advisors on May 18 for any and all of the economic analysis developed, utilized and cited by the Clinton Administration in the context of the Kyoto Protocol. The American public has a right to know what taxpayer-financed economic studies conclude and why top advisors at the White House were and are so divided on the issue of the Global Warming Treaty.

COSTS

Still, as a small business group, SBSC's primary concerns grow from the massive costs that would have to be imposed on businesses, consumers, and the economy in order to implement the Kyoto Protocol. And even if such costs were imposed, it is highly doubtful that emissions reduction goals could ever actually be met.

In his aforementioned November-December 1997 Foreign Affairs article, Professor Thomas C. Schelling of the University of Maryland exhibited incredible cavalierness regarding the costs of dealing with global warming by offering a declaration that only could be made by a cloistered ideologue: ''Slowing global warming is a political problem. The cost will be relatively low: a few trillion dollars over the next 30 or 40 years. . . '' Of course, those lost trillions of dollars in GDP across the globe translate into lost businesses, jobs, consumer goods for adults and children, and continued or increased poverty for many.

At least one can say that Schelling is honest. Proponents of the Global Warming Treaty must be aware of the costs that would be inflicted, but, like Schelling, they cannot really care all that much. For the United States, the cost of emission reductions will be particularly brutal because, as Professor Richard Cooper points out in the March-April issue of Foreign Affairs, emissions are expected to grow by 30 percent between 1990 and 2010. That means, given the Administration's Kyoto pledge that U.S. emissions would be decreased to 7 percent below 1990 levels by 2012, the U.S. will have to reduce emissions by almost 40 percent.

Indeed, most studies attempting to access the impact of the Global Warming Treaty—whether performed by private industry or by the Clinton Administration itself—indicate this treaty will be an indiscriminate killer of businesses and jobs. And this will be the case no matter what the means utilized to reduce so-called ''greenhouse gas emissions''—primarily CO_2—that is, whether through higher taxes, increased regulations, an emissions ''cap and trade'' system, or some combination of these options.

Taxes. The most often cited tax that would be implemented in order to reduce energy consumption and therefore ''greenhouse gas'' emissions is a carbon tax.

The administration of such a tax is fairly simple-boosting its appeal to those advocating tax increase—as it would be levied at the wholesale level on fossil fuels based on carbon content. However, it is not necessarily efficient in terms of controlling CO_2 emission because different uses of fuel produce different emission levels. Yet, the costs would be massive.

Emissions "Cap and Trade" System. Another method for reducing energy consumption and emissions would be a CO_2 trading program which would require the purchase of CO_2 credits in order to maintain current or possibly expand emissions. In a 1994 document, the EPA noted the troubles facing an overt energy tax, and then cynically noted the following about a "cap and trade" system: "A cap would likely not be as unpopular as a tax, since people are generally less familiar with the concept."

The administration of such a tradable credit system would be nearly impossible both domestically and internationally. In an October 1997 study for the Center for the Study of American Business, Frank Reuter notes:

Even within a single nation, administering a tradable emission permit policy would be difficult and expensive. It would involve monitoring the emissions of greenhouse gases from all sources, comparing the measured emissions with the amounts authorized for individual sources by the permits that they possess after all trading has been completed, and enforcing compliance with the terms of their permits by sources that have discharged excess emissions. These tasks would be exacting even if greenhouse gases were released only from stationary sources.

"A substantial portion of CO_2 emissions, however, is discharged from mobile sources. The administrative feasibility and cost-effectiveness of applying emission permits to mobile sources are doubtful. More than 200 million motor vehicles are currently registered in the United States alone. . . . "Moreover, administering the implementation of an emission permit policy would be even more difficult if the permits were tradable internationally. Different nations perceive different risks from prospective climate change, and face different domestic issues that are competing for their scarce resources and attention. . . .

"As a result, negotiating suitable inducements to achieve universal participation in such a policy among a group of sovereign nations and establishing adequate international sanctions to ensure uniform compliance with the policy by all nations would be arduous tasks. Obtaining full cooperation among developing nations would be particularly daunting. Yet, such cooperation is essential to coherent policy."

Bottom line, the purchase of such tradable credits will raise costs to businesses, consumers and the economy. Auctioning off such credits assures that the "cap and trade" system carries the same costs as straightforward taxes, with the same detrimental economic effects.

Smaller businesses would be at a distinct disadvantage under such a scheme as bidding—perhaps international bidding—raised the price of credits. Particularly perverse, such a system could have the effect of protecting entrenched businesses by jacking up costs for smaller and new enterprises. Indeed, many businesses would not come into existence at all due to higher energy costs.

In addition, manufacturers exposed to international competition at home and in foreign markets—which most are today—would suffer due to lower energy costs in developing nations.

Estimating the Economic Costs. A wide range of studies show tremendous losses in output and jobs resulting from the Global Warming Treaty. For example:

WEFA (formerly Wharton Economic Forecasting Associates) analyzed the potential economic impact of reducing U.S. carbon emissions to 1990 levels by 2010. They found the following:

- Lost GDP, just in the year 2010, would equal $227 billion (in 1992 dollars).
- "On a per person or per household basis, the cost of adopting the Administration's carbon abatement policy results in a real GDP loss by 2010 of $838 per person and $2,061 per household. Cumulatively, for the period 2001 to 2020, the loss of aggregate income (real GDP) per household would average almost $30,000 (in 1996)."
- Steep price increases would be felt by both consumers and businesses. For example, consumer's would face price increases of 55 percent on home heating oil by 2010, and 79 percent by 2020; 50 percent on natural gas by 2010, and 79 percent by 2020; 48 percent on electricity by 2010, and 71 percent by 2020; 36 percent on motor gasoline by 2010, and 65 percent by 2020 (translating in an additional 44 cents per gallon by 2010, and 65 cents by 2020).
- Commercial establishments would see price hikes of 74 percent on distillate fuel oil by 2010, and 106 percent by 2020; 58 percent on natural gas by 2010, and 90 percent by 2020; and 52 percent on electricity by 2010, and 77 percent by 2020.

- Industrial facilities would witness price increases of 139 percent on residual fuel oil by 2010, and 200 percent by 2020; 91 percent on natural gas by 2010, and 132 percent by 2020; and 73 percent on electricity by 2010, and 101 percent by 2020.
- Trucking and rail would see a 42 percent increase in the price of diesel by 2010, and 61 percent by 2020 (translating into 51 cents per gallon by 2010, and 76 cents by 2020).

A May 1998 report by CONSAD Research Corporation ("The Kyoto Protocol: A Flawed Treaty Puts America at Risk") estimated that the Kyoto Protocol would devastate the U.S. economy. Specifically:

- By 2010, employment losses would range between 1.6 million and 3.1 million. Lost output in 2010 would register between $ 178 billion and $316 billion (in 1995 dollars).
- The analysis estimates job and output losses by state and region as well. For example, regionally, by 2010, New England could lose up to 133,000 jobs and $12.5 billion in output (again, in 1995 dollars); the Mid-Atlantic states up to 400,000 jobs and $39.8 billion in output; East North Central 524,000 jobs and $49.9 billion in output; West North Central 184,000 jobs and $17.8 billion in output; South Atlantic 533,000 and $45.4 billion in output; East South Central 180,000 jobs and $19 billion in output; West South Central 523,000 jobs and $65.2 billion in output; Mountain 201,000 jobs and $20.8 billion in output; Pacific Contiguous 522,000 jobs and $45.2 billion in output; and Pacific Noncontiguous 24,000 lost jobs and $2.3 billion in lost output.
- Also, the study estimates lost jobs and output by industry sectors. By 2010, manufacturing could see as many as 695,000 lost jobs and $137 billion in lost output; mining 260,000 jobs and $47.6 billion in output; construction 117,000 jobs and $9.3 billion in output; finance, insurance and real estate 180,000 jobs and $22.8 billion in output; trade 738,000 jobs and $47.9 billion in output; services 1,118,000 jobs and $41.9 billion; and agriculture/forestry/fishing services 30,000 jobs and $533 million in output. Also, transportation and public utilities would be estimated to actually gain 11,000 jobs, but still lose $9.9 billion in output.

In March 1998, the American Petroleum Institute (API) released a blunt and alarming report assessing the costs of reaching the Kyoto Protocol goal of reducing U.S. "greenhouse gas" emissions to 7 percent below 1990 levels by 2008–2012. API senior economist Ronald A. Sutherland notes in "Achieving the Kyoto Protocol: An Analysis of Policy Options," "If the U.S. were to achieve this target by the year 2010, carbon emission would have to decline by 2.32 percent per year from the year 2000, instead of increasing by 1.5 percent per year as in the [Energy Information Administration's] Reference Case projection."

The author shows that altering the carbon/energy ratio or the development of new technologies will not come close to being enough to reduce carbon emissions. Indeed, continued economic growth and capital stock renewal will ensure that carbon levels continue rising.

The author notes only two avenues that will allow the U.S. to meet its Kyoto Protocol goals: "A decline in GDP of about 4 percent per year would reduce the demand for energy and thereby carbon emissions sufficient to achieve the Kyoto target. Alternatively, an increase in the price of energy of about 12 percent per year for a 10-year period also would achieve the Kyoto target."

He concludes: "Either of these changes would impose unacceptable costs on the American economy." To say the least. According to these estimates, in effect, an extended U.S. economic depression would be necessary in order to meet Kyoto Protocol goals.

A DRI-McGraw Hill study by Dr. Lawrence Horowitz found the following:

- A $100 per ton carbon tax could lower emission levels close to 1990 levels by 2010 and would cost the economy $203 billion annually in lost output;
- A $200 per ton carbon tax would be required to reduce emissions below 1990 levels, and would cost the economy $350 billion in lost products and services;
- Annual job losses from 1995 to 2010 under a $100 per ton carbon tax would hit 520,000, and would leap to 1.1 million annually under a $200 per ton carbon tax;
- Gasoline prices could jump by as much as 60 cents per gallon, and electricity costs could increase by 50 percent, and home heating oil by 50–100 percent.

Resources Data International Inc. (RDI) was retained last year by Peabody Holding Company Inc., reportedly the world's largest private coal producer, to study the economic impact of a new global warming treaty. RDI estimated that a $100 per ton carbon tax imposed in order to reduce CO_2 emissions to 1990 levels would:

- Limit the annual growth rate in the supply of electricity between 1995 and 2015 to 0.83 percent from a projected 1.45 percent;

- Place up to $ 1.314 trillion, or 14 percent of GDP, at risk in 2010 and up to $16.823 trillion cumulatively from 2005 to 2015.

RDI estimates that any kind of CO_2 trading program would mimic the effects of a tax, with the Federal Government collecting at least $133 billion annually.

As the Heritage Foundation notes in a recent report (''The Road to Kyoto'' by Angela Antonelli, Brett D. Schaefer and Alex Annett, October 1997), the U.S. Department of Energy had the Argonne National Laboratory perform a study on the Kyoto Protocol under consideration. In February 1997, the study found that it would cause:

- 20 to 30 percent of the basic chemical industry to move to developing countries within 15 or 20 years;
- All primary aluminum smelters to close by 2010;
- A 30 percent decline in the number of steel producers at a cost of 100,000 jobs;
- Domestic paper production to be displaced by imports;
- A 20 percent reduction in the output of petroleum refiners; and??
- The closing of between 23 percent and 35 percent of the cement industry, which is significant because many cement plants are major employers in small communities.

However, as noted above, recent statements by the Chairwoman of the White House's Council of Economic Advisers, Janet Yellen, claim a ''modest'' impact on the economy. J.T. Young, chief economist for the Republican Policy Committee in the U.S. Senate, explained the woes of Ms. Yellen's assertions in a recent Washington Times article (''Kyoto Treaty's Ultimate Costs,'' May 11,1998):

''. . . hyperbolic assumptions allowed Mrs. Yellen to give the lowest estimate of the Kyoto agreement's costs ever released [in March 4, 1998 congressional testimony]. 'Our overall assessment is that the economic cost to the United States will be modest; an emissions price in the range of $14 to $23 per ton of carbon equivalent. This translates into an increase in gasoline prices of 3 to 4 percent (or around 4 to 6 cents per gallon).'

''Strangely enough, the administration is known to have done three recent studies of the economic costs arising from lowering greenhouse gas emissions just to the 1990 level: the Interagency Analytical Team (IAT) estimate done in June 1997; the Department of Energy (DOE) estimate done by five of its laboratories (the Five lab Study) in September 1997; and the estimate by the Energy Information Administration (EIA) of DOE done in October 1997.

''All three studies were conducted by the administration within the last year. In contrast to Mrs. Yellen's statement, all three provide a detailed list of assumptions and calculations on which their estimates are based. All three also assume less emissions reduction-only to 1990 levels, not 7 percent below it. Yet all three assume anywhere from double (the Five lab Study) to nine times (EIA study) the cost cited by Mrs. Yellen.''

Frederick H. Reuter notes in his study for the Center for the Study of American Business (''Framing a Coherent Climate Change Policy,'' October 1997) that ''estimates from standard, multi-industry econometric models indicate that stabilizing annual CO_2 emissions at their 1990 levels by 2010 will reduce GDP by 0.2 to 0.7 percent and will decrease total employment by 900,000'' by 2005. In addition, Reuter finds:

''Although the proposed economic incentive mechanisms would encourage firms to undertake pertinent technological research and development, they also would reduce firms' net revenues. The decline in net revenues would diminish firms' ability to fund research, development, and implementation of new technologies. Thus, on balance, the economic incentive mechanisms may impede crucial technological advancement instead of stimulating it.''

A 1997 study by Gary W. Yohe for the American Council for Capital Formation found that reducing CO_2 emissions to 1990 levels by 2010 would:

- cause a 1 percent cut in the nation's annual rate of GDP growth rate;
- cut real annual wages and income by 5 percent;
- reduce fuel oil/coal consumption by 25 percent overall;
- cut electricity consumption by 20 percent overall; and??
- reduce vehicle purchases by 3 percent overall.

In a chapter in the 1997 book The Costs of Kyoto, edited by Jonathan Adler and published by the Competitive Enterprise Institute, W. David Montgomery offers a chapter based on a study by Charles River Associates, which found that if emissions from OECD countries were to be reduced to 1990 levels by 2010 and maintained at that level through 2030, then:

- combined OECD GDP would decline by an estimated 2.8 percent in 2030;
- U.S. GDP in 2030 would fall by better than 3 percent.

In a report for the Center for the Study of American Business, Christopher Douglass and Murray Weidenbaum note the following possible perverse effects from a global warming treaty that excludes developing nations (''The Quiet Reversal of U.S. Global Climate Change Policy,'' November 1996):

''Whichever means of curtailing carbon emissions is used, limiting emissions will degrade living standards. Moreover, if a carbon tax fell solely on industrialized nations and not on developing nations, as is currently the plan in every protocol before the Framework Convention, total worldwide greenhouse gas emissions would be likely to rise, not fall. If emission reduction standards become law in industrialized nations, total consumption of carbon-emitting goods will fall.

Thus, the price of goods such as oil is likely to substantially decline on the world market. However, the lower prices of these goods would encourage poorer developing countries—with much less fuel efficient technology—to increase their use of fossil fuels, resulting in a net increase in greenhouse gas emissions.''

Douglass and Weidenbaum also note interesting results from another study examining impact that economic growth has on carbon emissions:

''A study by Douglas Holtz-Eakin and Thomas Selden of Syracuse University finds that the marginal propensity to emit carbon shrinks as economies grow and develop. According to their report, if economies continue to grow at their present rates, the annual emissions growth will fall from its 1955–87 average of 3.2 percent a year to 1.8 percent annually for the period 1990–2025. Thus, any efforts which limit economic growth unwittingly slow down progress toward carbon emissions reduction.''

The Coalition for Vehicle Choice has noted that various economic studies on the impact of a global warming treaty predict price increases at the gas pump of up to 60 cents per gallon. The Coalition has noted:

''Annually, U.S. cars and light trucks are driven more than 2 trillion miles, getting an average of 17 miles per gallon. A 50-cent hike in gas prices could therefore skyrocket the price of driving by $66 billion. On an individual basis, every licensed driver in America could face a $381 increase in the cost of driving.''

The Washington Times reported the following on October 4, 1997 regarding Administration plans for complying with a global warming treaty:

''Administration documents show it is considering phased-in fees ranging from $25 to $100 per ton of carbon in fuels such as coal, oil and gas. The fees would raise gasoline prices by as much as 25 cents per gallon and add hundreds of dollars a year to the average homeowner's heating and electricity bills, analysts say.''

At a conference of financial analysts sponsored by the Edison Electric Institute, Todd Myers, a senior consultant at Resources Data International Inc., noted that U.S. electric utilities may be forced to close some 58 coal-fired power plants due to more stringent Federal air pollution standards (as reported by Reuters on May 15, 1998). If the U.S. signs on to the Global Climate Treaty, compliance would force the closure of even more plants. In such a case, Myers declared: ''You are cutting 50 percent of coal-fired generation according to the Kyoto accord.'' He warned that resulting cuts in coal-fired generation and the boost in the demand for natural gas could add a 10 percent premium on electricity prices by 2010.

In the November 3, 1997 Forbes (''Bill and Al's Global Warming Circus'' by Ronald Bailey), the following chart provided a summary of the major economic forecasts regarding a reduction in ''greenhouse gas'' emissions.

Note that only one study out of the ten cited called for emission levels to come in below 1990 levels, when in reality the Kyoto Protocol calls for U.S. emission levels to be 7 percent below 1990 levels. Also, each study may be optimistic in terms of the total amount emissions need to be cut, as emissions may have to be reduced by as much as 40 percent below baseline levels. Therefore, these dismal scenarios for the U.S. economy will become even more dire.

And make no mistake, all industry sectors and businesses—from home-based businesses to the largest U.S. corporations—will be adversely impacted.

For example, for argument sake, let's cut the prestigious WEFA firm's estimates in half.

Under such a scenario, by 2010, home-based businesses will still be confronted by a 27 percent increase in home heating oil costs, a 25 percent hike in natural gas, a 24 percent increase in electricity costs, and a price hike of 22 cents at the gas pump.

As for commercial establishments, price hikes on distillate fuel oil would register 37 percent, 29 percent for natural gas, and 26 percent on electricity.

Industrial facilities would be confronted by price increases of 70 percent on residual fuel oil, 46 percent on natural gas, and 37 percent on electricity.

Trucking and rail firms would face a 21 percent increase in the price of diesel (translating into 51 cents per gallon)—all half of WEFA's estimates.

Absolutely no businesses will escape these costs and their economic fallout; many will not survive; and countless will never come into existence. Imagine the devastation, for example, wrought on truckers, delivery companies and cab drivers due to higher diesel and gas prices; bakeries, grocery stores, and delis due to higher electricity costs; and small manufacturers due to across-the-board higher fuel costs. The damage to the economy and devastating job losses should be obvious to all.

However, no good reason exists to believe that WEFA's, estimates—or any of the others above—need to be cut at all. In fact, the American Petroleum Institute's projects that in order to reach Kyoto Protocol emission goals would require either a decline in GDP of about 4 percent per year or an energy price hike of about 12 percent per year for a 10-year period. These numbers are frightening and compelling.

Resulting Deaths. Of course, even more sobering than lost businesses and jobs are the possibility of lost lives if officials decide to boost CAFE standards. Again, Frances B. Smith explains:

"Most critically, climate change policies will have a lethal effect on people. They will kill more people through raising the Federal Corporate Average Fuel Economy (CAFE) mandate for cars from 27.5 mph to 45 mph—a proposal pushed by several environmental groups. President Clinton recently one-upped this by promising to triple auto fuel efficiency over the next few years.

"But the human cost of CAFE is already too high; CAFE causes manufacturers to downsize cars in size and weight to meet the Federal standard for their fleets, and smaller cars are much less safe than large cars in crashes.

"According to a 1989 Harvard-Brookings study by Bob Crandall and John Graham, the current CAFE standard causes nearly 2,000 to 4,000 additional traffic deaths per year. If the standard were raised to 40 mph, a 1992 study by Graham estimated, there would be an even greater increase in highway deaths—resulting in a total of 3,800 to 5,800 fatalities each year. Each day, from 10 to 16 people would die unnecessarily."

In conclusion, I leave you with this thought offered by Cornell University political scientist Jeremy Rabkin as quoted in the December 15, 1997 Wall Street Journal ("Shanghaied in Kyoto"): "One way or another, the climate control system means a global plan for reducing energy consumption or, in other words, a scheme for rationing energy use. If the world can have global governance to ration energy—the lifeblood of modern economies—what might global governance not attempt. Indeed.

The Kyoto Protocol choices are clear: devastate U.S. businesses, consumers and the economy because of a dubious theory; or allow entrepreneurs to flourish and innovate, create jobs, boost the economy, and thereby aid, rather than hinder, environmental health.

Thank you for this opportunity to address the Kyoto Protocol, or "Global Warming Treaty." I look forward to answering any of your questions.

Senator CHAFEE. That would be helpful. Thank you.

Mr. KEATING. One of the things I wanted to say is, there are strong feelings on both sides of this issue right now. What makes sense, I think, would be to have a greater exploration of the science by the Senate, by Congress in general, as well as the costs involved. We always have to remember that.

There has been talk by some folks about the opportunities here. We'll have a trading system set up, and therefore, we will be additional opportunities in the economy.

As an economist, I warn you about the opportunity costs for those resources. Investors and other people in the marketplace otherwise would be deciding where those resources would go to ultimately please consumers rather than where regulators think they should go.

So, I would say that all sides of this, the science and the economics have to be explored in far greater detail before we step forward on something of this magnitude.

Senator CHAFEE. Well, I am not so sure that we have to have every detail in place before we get this legislation, which is a voluntary piece of legislation, enacted. Also, I think it is terribly im-

portant when we talk about costs involved in doing something, that we also pay attention to costs involved if we don't do something.

In this case if indeed polar ice caps are melting and glaciers, if sea level is rising, then there are costs involved, not only if we do nothing. To do something is better than to do nothing.

Well, I want to thank you both very much for coming. We appreciate it. This is a subject that we will spend more time on and it is a subject, as I have indicated, is important to me personally and many members of this committee. Thank you very much.

[Whereupon, at 11:18 a.m., the committee adjourned, to reconvene at the call of the Chair.]

[Additional statements submitted for the record follow:]

STATEMENT OF EILEEN CLAUSSEN, EXECUTIVE DIRECTOR, THE PEW CENTER ON GLOBAL CLIMATE CHANGE

Mr. Chairman, Senator Baucus, and members of the Committee, thank you for your invitation to testify this morning on voluntary efforts to reduce greenhouse gas emissions. The Pew Center on Global Climate Change was founded in the belief that our generation's challenge will be to address global climate change while sustaining a growing global economy. To ensure that future generations enjoy a healthy environment and sound economy, it is imperative that we address the issue of climate change. And there is no better place for us to begin than with early action to reduce greenhouse gas emissions.

Mr. Chairman, throughout your career, you have been at the forefront of the movement to protect and enhance our nation's environment and natural resources. Your recent decision to retire from the Senate at the end of your current term represents a profound loss to the Senate and to our country. It will also be a profound loss in the field of climate change where leadership will be vitally needed, and where your vision and pragmatism will be sorely missed.

I am the Executive Director of the Pew Center on Global Climate Change, an organization founded by the Pew Charitable Trusts to work constructively on the climate change issue and to put forward meaningful and credible information and analyses to help us forge a consensus for action. The Pew Center and its Business Environmental Leadership Council were established in May 1998. While Council members serve as active participants and advisors to the Pew Center, we do not accept financial contributions from these or any other corporations. We formed the Business Environmental Leadership Council because we believe that the business community is ready and willing to provide the impetus to move forward on the issue of climate change. The Council consists of over 20 of the nation's and world's largest corporations. Together, the annual revenues of these companies total more than $550 billion dollars. Total employment for the companies is well over 1 1/2 million people.

The Pew Center and its Business Council accept the views of most scientists that enough is known about the science and environmental impacts of climate change for us to begin to take actions to address the problem. We recognize that the concentration of greenhouse gases is steadily increasing, and that these gases will remain in our atmosphere for many years—in some cases, for thousands of years. The current scientific consensus indicates that greenhouse gases generated by human activities could increase the temperature of the earth's atmosphere by 1.8 to 6 degrees Fahrenheit over the next 100 years with potentially serious impacts on the global environment.

Concern over changes occurring to the earth's climate led to United States' ratification of the Rio Framework Convention on Climate Change in 1992. This Convention calls upon our nation to voluntarily reduce our emissions of greenhouse gases to 1990 levels by the year 2000. We will not come close to meeting our obligations under the Rio Convention, nor will many of the other industrialized nations who accepted the same voluntary target. And while we debate the reasons for our failure to meet our Rio obligations, our emissions continue to increase, and the global concentrations of greenhouse gases continue on their inexorable upward path.

For this reason, we do not believe that action on climate change should be delayed until we are satisfied with the progress that has been made on this issue internationally. Instead, we believe that companies can and should take concrete steps

now in the U.S. and abroad to assess their opportunities for emission reductions and establish and meet emission reduction objectives.

The companies of the Pew Business Environmental Leadership Council support the view that they should act now, not later. Perhaps some examples of current company efforts would be instructive. BP Amoco, for example, has established a target to reduce its greenhouse gas emissions by 10 percent from a 1990 baseline by 2010. These reductions will be measured using established protocols and will be verified by external observers. BP Amoco has also created a pilot project for internal emissions trading. This allows individual business units to find the lowest cost way of meeting the companywide target. At this stage, 12 business units are involved in this internal trading program, and five trades have occurred. The program will expand to include all the activities of BP Amoco over the next 18 months.

Another of our companies, American Electric Power (AEP), has implemented Climate Challenge programs that fall into four main categories: improvements in the efficiency of generating and delivering electricity; increasing the use and output of its nonfossil fuel plants; establishing energy conservation programs at AEP facilities and for its customers; and sequestering carbon in forests. The total cumulative effect of these actions will be the avoidance of approximately 10 million tons of carbon dioxide that would otherwise have been emitted into the atmosphere.

In one of the more innovative programs designed to reduce carbon emissions, AEP joined with BP Amoco, The Nature Conservancy, PacifiCorp and the Bolivian Friends of Nature Foundation to establish the Noel Kempff Mercado Climate Action Project in December 1996. The primary goal of this project is to preserve threatened tropical forests in the Province of Santa Cruz, Bolivia, thereby protecting its rich biological diversity and reducing releases of carbon dioxide into the atmosphere. The Noel Kempff Mercado Climate Action Project was approved by the US Initiative on Joint Implementation in December 1996.

Other ambitious examples from Business Council companies include the program of United Technologies which will, by 2007, reduce its energy and water consumption per dollar of sales by 25 percent below 1997 levels, with approximately the same reduction in emissions that cause climate change. This program is global in scope, covering 229 facilities in 36 countries, including 96 in the U.S. DuPont will, by 2000, cut its annual global greenhouse gas emissions by about 45 percent below 1991 levels. Shell International aims to reduce greenhouse gas emissions by 10 percent below 1990 levels by 2002. Since 1990 Baxter International has reduced the global warming impact of its emissions by 81 percent. Baxter also has a goal to improve their energy efficiency 10 percent per unit of production by the year 2005, based on 1996 levels of production. In 1995, Entergy committed to eliminating over four million tons of carbon dioxide emissions per year through 2000.

Regardless of the outcome of negotiations on an international climate change agreement, the members of the Business Council will continue to move forward, because they believe that this is a serious issue that demands a serious response. These programs will include internal audits of their emissions, the establishment of baselines, and the implementation of programs to reduce their greenhouse gas emissions.

The Pew Center recognizes that the nations of the world unanimously adopted the Kyoto Protocol and that this Protocol has already been signed by 84 countries. We believe that this Protocol represents a first step. But we also believe that more must be done to fully design and implement the market-based mechanisms that were adopted in principle in the Protocol. Further, the present Protocol does not ensure the participation of many important countries, and this omission must be remedied if we are to meet our environmental and economic objectives. However, we do not know when this will occur.

But we do expect that at some point in the future, the United States will ratify a climate change treaty that includes a binding commitment to reduce emissions of greenhouse gases. And while our companies are already taking voluntary actions to reduce their emissions, they also want to ensure that they will receive credit for these actions under any future climate change treaty, particularly since many of these actions are and were undertaken at the request of the U.S. Government to fulfill the goal of the Framework Convention on Climate Change.

But the issue is not primarily one of getting credit or providing incentives to act early. The key issue is one of eliminating disincentives: voluntary action, in the absence of credit, can work to the disadvantage of companies who act early to reduce their emissions. It is clearly not in our interest for companies that do the right thing by voluntarily attempting to slow the rate of greenhouse gases entering our atmosphere to be penalized and economically harmed for their efforts.

How could this happen? It is because companies typically delay the most expensive steps until the most cost effective options have been undertaken. Consider the

following scenario. One company acts early, and begins by first making the most cost effective reductions. Its competitor does nothing, and continues to emit greenhouse gases. After a number of years, a binding treaty is ratified by the United States. Both companies are now asked to make the same level of reductions. However, if the company who acted early has not received credit for its reductions, its emissions baseline will be set at its new lower level, and it will be required to make additional and more costly expenditures. The competitor, who did nothing, can now meet its emissions target with lower cost reductions, resulting in a competitive advantage. The company who acted early is penalized. And for that reason, many companies may choose not to act early and voluntarily. Without credit for early action, there is a disincentive to act before rules are in place. Thus credit for early action is not just an issue of providing incentives for early emission reductions. It also removes the disincentives that penalize companies that recognize and work to ameliorate the threat that greenhouse gases pose to our atmosphere.

Solving this problem requires leadership from Congress. An analysis undertaken by the Pew Center and published in October 1998 finds that Federal agencies do not have sufficient legal authority to provide the certainty that firms need to make significant early investments. Congress must provide the legislative framework to remove the disincentives to early action. Such a legislative framework would also demonstrate that the United States takes its commitments under the Framework Convention seriously, and that we, as the Nation with the world's highest emissions, are committed to addressing the problem of climate change.

While the Center does not take a position on the merits of any particular bill, we believe there are a number of issues that must be addressed in such a legislative framework. We would like to stress the following:

- Credits should only be provided for actions that are real and verifiable. Verifiability means that reductions must be measured and monitored using standardized measurement techniques. Any system that is adopted should reward virtuous actors—not those who engage in sham or paper reductions, or who ''game'' and manipulate the system. Paper reductions could occur if companies are allowed to count the same reduction twice, or to report a reduction at one facility, while transferring the production—and the emissions—to another facility. There can be no effective credit for early action program if we are not committed to establishing a robust and rigorous monitoring and verification effort.
- The program should be simple and flexible. Participation in a system of credit for early action would be voluntary, but it is in our collective interest to be inclusive, so that many businesses are encouraged to mitigate and reduce their emissions. Companies in sectors that are experiencing high growth must be accommodated as must those who produce products, be they autos or appliances, that use significant quantities of energy. We must also keep transaction costs to a minimum, so that the costs of participation do not exceed the benefits to the participants.
- The legislative framework should not prejudge the future national implementation scheme. We are not at a point now where we can predict the design of the program that will be implemented in the United States to meet a future international obligation. Any system for credit for early voluntary action should therefore be designed to operate within the framework of any likely domestic regulatory or tax program that might be fashioned to control domestic greenhouse gas emissions. It should also be accompanied by, and integrated into, a set of policies that stimulate early action, including fiscal policies and funding for research and development.
- Domestic action should be the primary emphasis, but verifiable international projects should be included. The framework should focus primarily on domestic early action, but should also consider provisions related to international actions that comply with accepted international standards. International projects may earn credits for reductions achieved after the year 2000 under the Clean Development Mechanism. These should clearly be incorporated into any early action crediting framework. The small number of projects already accepted into the U.S. Initiative on Joint Implementation that achieved reductions prior to 2000, and meet rigorous standards for verification and monitoring, should also be recognized.
- The legislative framework should not over-mortgage the U.S. greenhouse gas allocation. The Kyoto Protocol, in its current form, does not contain any incentives to act early. As long as this remains a feature of a future international control regime, credits allocated for early domestic reductions will have to come out of any U.S. allocation granted under a treaty. Therefore, careful consideration needs to be given to the impact of an early credit program on the availability of credits to those who choose not to participate in the early action initiative. Allocating too many credits too early could significantly increase the difficulty of complying with a regulatory regime. On the other hand, removing the disincentives for early action is the objec-

tive of an early action program. The design of the program should balance these two objectives, perhaps through the establishment of reasonable baselines.

The Pew Center and its Business Environmental Leadership Council believe climate change is serious business, and that early action is smart business. Our effort is founded on the belief that enough is known about the science and environmental impacts of climate change for us to take action now to address its consequences. Awarding credit for early action is an important first step in what we believe will be a long and intense effort.

STATEMENT OF DALE A. LANDGREN, ASSISTANT VICE PRESIDENT OF BUSINESS PLANNING, WISCONSIN ELECTRIC POWER COMPANY

Mr. Chairman and Members of the Committee: Good morning. My name is Dale Landgren. I am Assistant Vice President of Business Planning for Wisconsin Electric Power Company. I appreciate the opportunity to appear before you today to express Wisconsin Electric's support for the concept of credit for early and voluntary greenhouse gas reduction actions, and to encourage Congress to enact legislation that establishes a program to provide credit to companies that undertake voluntary actions to reduce greenhouse gas emissions.

Wisconsin Electric, a subsidiary of Wisconsin Energy Corporation, is headquartered in Milwaukee. Wisconsin Electric provides electricity, natural gas and/or steam service to approximately 2.3 million people in a 12,000 square mile service area which includes southeastern Wisconsin (including the Milwaukee area), the Appleton area, the Prairie du Chien area, and in northeastern Wisconsin and Michigan's Upper Peninsula. Our electric energy mix is 67 percent coal, 24 percent nuclear, 2 percent renewable including hydro, 1 percent natural gas/oil and 6 percent purchased power.

Mr. Chairman, let me commend you for your leadership on this issue, and for holding this hearing and beginning a dialog. As I stated earlier, I am here today to express my company's support for the concept of credit for early action. We do not believe this support binds us to support the Kyoto Protocol or any other greenhouse gas action. We view a credit for early action program simply as an insurance policy in the event that a domestic or international program to reduce greenhouse gas emissions is implemented. Congress should view the credit for early action concept in the same way . . . as an insurance policy where there is zero cost for the premium.

Wisconsin Electric is a strong proponent of options and flexibility based on business strategies—rather than political strategies—to address the global climate change issue in the context of modernizing the energy industry.

Clearly there are strong positions on both sides of the climate change debate. Finding common ground on the issues and reaching consensus on a policy solution will be a very difficult task, at best. Wisconsin Electric could enter the debate on whether or not the climate is changing and what should be done. But, instead of focusing on reasons why we should oppose the Kyoto Protocol or a possible climate change mandate, Wisconsin Electric is trying to find ways that we can prosper from any climate change policy. While we are not advocating such a policy, based on a number of issues including the environmental regulation trend and the public perception on the climate change issue, we do believe there will be a future mandate to reduce greenhouse gases. I don't wish to debate this point; I am simply stating my company's belief. As a result of this belief, we are acting now to position ourselves to prosper in the future. We are undertaking voluntary greenhouse gas reduction measures for the following reasons:

- Experience—We are experimenting now to determine what works and what doesn't. Acting now gives us invaluable experience for the future.
- Customers—We are responding to our customers' desire to be an environmentally sound company. Their interest in a clean environment and their willingness to personally get involved is evidenced by our successful green pricing program.
- Trading—We have had a very successful experience as a trader of sulfur dioxide credits and believe we can be as successful and prosperous under a future trading regime for greenhouse gases. Profit—We are working now to determine how to be profitable in the future if greenhouse gas emissions reductions are required. Corporate Citizenship—Wisconsin Electric pledges environmental accountability and includes environmental factors as an integral part of our planning and operating decisions.

Wisconsin Electric has a longstanding commitment to the environment as part of our business strategy. Despite the scientific uncertainty surrounding the climate change issue, we believe it is appropriate to start moving toward stabilization, then

reduction of greenhouse gases. At a minimum, we should explore and expand low- and no-cost strategies to reduce, avoid or sequester greenhouse gas emissions. We believe it is important to develop reasonable solutions to address the climate change issue in the context of modernizing the energy industry. Thus, we are working to develop strategies that integrate environmental, economic and energy goals, and assure that the energy industry has as many options as possible—including non-emitting nuclear power—to meet any potential greenhouse gas reduction goals.

Currently, there is no legal framework regarding the treatment of early greenhouse gas reductions or credit for these early actions. This uncertainty is inhibiting companies from investing in greenhouse gas reduction activities and projects. Wisconsin Electric supports establishment of a program that guarantees credit that can be applied against a future requirement . . . should there be one. Appropriate credit for these early actions is necessary to account for the investments that have already been made. Disallowing these credits puts the "good actors" at an economic disadvantage in attempting to meet any future potential greenhouse gas limits since the next tier of options is more costly than options available to companies that choose to wait for mandates. In addition, impending competition in the electric utility industry increases the importance of making sound strategic investment decisions now.

Wisconsin Electric is an active participant in ongoing efforts to address the climate change issue. Through our efforts, we lead by example, proactively implementing greenhouse gas reduction strategies through a variety of programs such as carbon sequestration and coal-to-gas repowering projects, a successful green pricing program and participation in the Climate Challenge program. Wisconsin Electric has undertaken and continues to pursue voluntary efforts to reduce greenhouse gas emissions. We should be given credit for these actions and not be penalized for our good deeds in any subsequent climate program.

A brief summary of our voluntary efforts to reduce greenhouse gas emissions follows.

Joint Implementation (JI) Projects

Wisconsin Electric is a partner in two projects approved by the United States Initiative on Joint Implementation (USIJI). The USIJI encourages U.S. private-sector investment and innovation in developing and disseminating technologies and procedures to reduce or sequester greenhouse gas emissions; promotes cost-effective projects that encourage technology cooperation and sustainable development projects in developing countries and emerging economies; and promotes a broad range of projects to test and evaluate methodologies for measuring, tracking and verifying costs and benefits of JI projects. The JI concept was introduced in 1992 during the negotiations leading up to the Rio Earth Summit.

Joint implementation projects involve a collaborative effort between entities from two or more countries to mitigate greenhouse gas emissions. This approach enables these entities to achieve greenhouse gas reductions at a lower cost than would otherwise be possible. JI projects can take the form of emission reduction efforts (e.g., energy efficiency or renewable energy) or can involve protection and enhancement of greenhouse gas sinks (e.g., forests, grass lands, or coral reefs).

Wisconsin Electric has supported the JI concept since its introduction. In 1994, we submitted two proposals in the first round of the USIJI solicitation. Of the 30 proposals submitted, both of our projects were among the seven approved. Our projects demonstrate the two types of greenhouse gas mitigation strategies I previously discussed:

Decin Project—The Decin Project is an energy efficiency/emission reduction project that involves the replacement of inefficient, highly polluting district heating boilers at the Bynov District Heating Plant with high efficiency, natural gas-fired internal combustion engines. An important strategy in reducing greenhouse gas emission in the face of growing demand for energy is to produce and use energy as efficiently as possible.

The Decin Project is a partnership with the City of Decin in the Czech Republic, Wisconsin Electric and two other U.S. energy companies. Development of the project was coordinated by the Center for Clean Air Policy. Each energy company partner provided to the City of Decin an interest-free loan, which enabled the City to secure the additional required financing from sources within the Czech Republic.

The project was developed in response to the local need for air quality improvement coupled with the global goal of reducing greenhouse gas emissions. Through the energy efficiency improvements and the switch to natural gas, carbon dioxide emissions are reduced by about 8,000 metric tons annually, along with reductions in nitrogen oxides, sulfur dioxide, particulates and ozone emissions, and reductions in energy consumption of over 30 percent.

The Decin Project is a first-of-its-kind joint implementation pilot project, which serves as a model for other efforts. The project has encouraged the Czech government to become increasingly involved in domestic and international global climate issues. And while the City of Decin was keenly interested in improving local air quality and reducing air emissions, it was only through development of this project that they learned of the opportunity to achieve these goals through focusing on greenhouse gas emissions. Bynov plant operators use state-of-the-art equipment and provide educational opportunities and experience for other communities interested in improving air quality. It also demonstrates the ability of voluntary partnerships in market-based initiatives to accomplish environmental goals cost-effectively.

Rio Bravo Project—The Rio Bravo Project is a carbon sequestration project that consists of two components: the purchase and protection of endangered tropical forests in Belize, Central America; and development and implementation of a sustainable forestry management program that will increase the total pool of sequestered carbon in a 120,000 acre area. The size of the original project has been more than doubled due to the recent acquisition of an additional parcel of contiguous land. Wisconsin Electric played a significant role in accomplishing this expansion.

The Rio Bravo Carbon Sequestration Project is a partnership with Programme for Belize (PfB), The Nature Conservancy, Wisconsin Electric, and several other energy companies. Development of the project was coordinated by Wisconsin Electric.

The forest land purchased as part of the project was threatened by imminent conversion to intensive agricultural land. By retaining the parcel in its native forest cover and combining its acreage with adjoining forested lands, an area large enough to implement a sustainable forestry program has been created. Retaining the forest cover and natural habitat it provides also satisfies the need to conserve the region's biodiversity.

The Rio Bravo project will realize carbon benefits over 40-plus years of 2.4 million tons of carbon. Through its management and preservation aspects, the project has many direct and indirect benefits to the people and natural resources of Belize.

Although some have suggested that forestry initiatives be discounted as a climate change mitigation strategy, our efforts in Rio Bravo prove that measurable and verifiable results can be demonstrated and documented.

We believe that all types of JI projects—including energy efficiency, carbon sequestration and renewable energy—should receive full credit, including credit for early actions.

While we are aware that there are new opportunities for investments and participation in joint implementation projects, the lack of certainty over credit for early action causes us some reluctance to pursue these opportunities.

"Energy for Tomorrow" Renewable Energy Program

Green pricing of electricity is a concept that allows individual consumers to vote on the environment with their purchase of electricity. With approximately 8,500 green pricing subscribers, Wisconsin Electric's "Energy for Tomorrow" renewable energy program is the largest and most successful of its kind in this country. Since its inception, the program has offset CO_2 emissions by over 40,000 tons.

The program was launched in 1996 in response to increased customer interest in reducing dependence on fossil fuels like coal and natural gas and a growing public awareness of the benefits of using renewable resources to generate electricity. This voluntary program allows our customers to personally and positively impact the environment by electing to purchase electricity generated from renewable resources. Power for the Energy for Tomorrow program comes from a combination of biomass and hydroelectric facilities. This year we are building two utility scale wind turbines that will be on line by the end of June, and we are evaluating opportunities for additional sources of renewable based generation.

One aim of the Energy for Tomorrow program is to help expand the market for renewables, which will prompt more investment and technological developments that will further decrease the costs.

Climate Challenge Program

As a participant in the U.S. Department of Energy's (DOE) voluntary Climate Challenge Program, Wisconsin Electric has successfully implemented a wide range of climate change initiatives. The Climate Challenge program, established in 1994,is a joint, voluntary partnership of the electric utility industry and the DOE to reduce, avoid or sequester greenhouse gas emissions. The Climate Challenge Program is the world's most successful voluntary greenhouse gas reduction initiative.

As one of the original 30 electric utilities that signed a Climate Challenge Participation Accord with DOE in 1995, Wisconsin Electric agreed to cut annual greenhouse gas emissions by 16 percent from what would occur absent these actions. We

will achieve a cumulative total of 10–14 million tons of voluntary reductions between 1995 and 2000.

Our commitment calls for using a broad array of approaches to reduce greenhouse gases, including innovative energy efficiency measures, beneficial ash use, carbon sequestration and alternative fuels. In addition to the initiatives I have already described, a few examples of our projects and actions include:

- Providing demand-side management (DSM)programs to assist customers in using electrical and natural gas energy more efficiently.
- Improving energy efficiency at all fossil fuel power plants, maintaining hydroelectric operations and improving output and net capacity at our Point Beach Nuclear Plant.
- Developing or supporting cost-effective waste-to-energy projects through such activities as purchasing electricity generated from landfill gas. Maximizing utilization of our fly ash by actively seeking opportunities to market ash for use in other products primarily within the construction industry.
- Providing assistance in the conversion of motor vehicles to dual fuel (Compressed Natural Gas/gasoline) capability. Reducing transmission and distribution system line losses by such actions as upgrading low voltage lines to higher voltages and improving operating equipment.

We are well-positioned to meet our Climate Challenge Participation Accord commitments, and have implemented many promising approaches for carbon dioxide reductions and mitigation that can be replicated across industry sectors and across international borders.

Credit for Early Action—Basic Principles

Following the Rio Earth Summit in 1992, Wisconsin Electric anticipated proposals for greenhouse gas limits and began investing in voluntary greenhouse gas reduction programs.

Providing credit for these early actions is appropriate and necessary to account for the investments that have already been made. As I mentioned earlier, Wisconsin Electric supports the concept of credit for early actions in the event that a domestic or international program to reduce greenhouse gas emissions is implemented.

Wisconsin Electric believes that any program to provide credit for early action should include the following:

Credit to companies that made commitments under the voluntary Climate Challenge Program and under the United States Initiative on Joint Implementation program. A certification process that provides clear and consistent standards for determining early reduction credits; such standards should prohibit double counting of emissions reductions (crediting of the same emission reduction to multiple parties). Allowance for the use of third party verification firms, at a company's option, to certify reductions. Provisions that address displacement of emissions (a.k.a. "leakage") as a necessary component to ensure the integrity of the program.

- A simple mechanism to account for changes of ownership, and provisions that establish baselines for new sources that want to participate in the credit for early action program. Annual accounting for credits earned to better facilitate the formation of a viable market for emission reductions.

Conclusion

As I stated earlier, Wisconsin Electric believes it is appropriate to start moving toward stabilization, then reduction of greenhouse gases. We have undertaken and continue to pursue opportunities to voluntarily reduce greenhouse gas emissions through low- and no-cost strategies. We believe this is the right thing to do. However, the lack of assurance that credit will be provided for our voluntary actions to reduce greenhouse gas emissions causes us to be reluctant to pursue additional reduction activities.

Wisconsin Electric believes that if a program to reduce greenhouse gas emissions is implemented either nationally or internationally, then we should not be penalized for the early, voluntary actions that we have undertaken. Congress should enact legislation to establish a credit for early and voluntary greenhouse gas reduction program to provide the assurance we need in the event that a greenhouse gas mitigation program is implemented.

Mr. Chairman, thank you again for the opportunity to appear before you today.

STATEMENT OF RICHARD L. SANDOR, CHAIRMAN AND CHIEF EXECUTIVE OFFICER, ENVIRONMENTAL FINANCIAL PRODUCTS LLC

Mr. Chairman, thank you for inviting our participation in today's hearing. Our company, Environmental Financial Products, is a small business dedicated to de-

signing, launching and trading new market mechanisms. We have had some success with new financial and agricultural markets, and over the past 10 years we have had the privilege of helping the U.S. sulfur dioxide allowance market take root and succeed.

While a serving as a director of the Chicago Board of Trade, I encouraged the exchange to support the SO_2 emission allowance market. The EPA ultimately selected the CBOT to administer its annual allowance auctions. The results of the seventh auction were announced today in Chicago today. The success of that program truly represents a milestone in environmental and financial history. It gave us faster-than-required pollution cuts at far lower cost than predicted. This success has been realized despite the predictions of the naysayers. We were told the sulfur program would never work. We heard: ". . . it's too complicated, it will cost too much, its too hard to measure, utilities don't know how to trade, where will the price data come from?" Despite this huge success, those of us who believe we can harness a market to protect against global climate change are now hearing the same protests. People have not learned the lesson: never sell short America's entrepreneurial ingenuity.

The success of emissions trading is further proof that the private sector brings forth enormous creativity in solving social problems if we introduce a profit motive and a price signal. The Credit for Voluntary Early Actions bill offers just the sort of signal that will unleash the creativity and innovation needed to prevent, at low cost, the economic damage that sudden climate changes threaten to bring.

In anticipation of opportunities to export credits for greenhouse gas cuts, we have been working with a wide range of businesses, most of them small ones, that are eager to act for the good for the environment while doing well for themselves. We work with farmers and foresters, with entrepreneurs who collect landfill and coalbed methane to produce electricity, and with large electric power companies. All these businesses are prepared to cut and capture even more greenhouse gas emissions if we give them a signal. These businesses are ready to take action, and they view the emerging international carbon credit market as a new business line. It is not just the producers of carbon credits who will gain. We will see a wide range of new opportunities for small businesses in the fields of new energy efficiency technologies, remote sensing, carbon certification, soil testing, project finance and trading. Credit for Voluntary Early Actions is the positive signal needed to unleash this new economic sector.

By getting us moving sooner, we can further cut the cost of the global climate insurance policy that the public wants. My company's high-end estimate of the cost of cutting net GHG emissions 7 percent below 1990 yield a cost to the U.S. comparable to raising gasoline prices by a nickel per gallon. If we implement the proposed legislation, we will stimulate early action and innovation, which will help us realize the even lower costs that we believe a trading system will produce.

Of course, these low costs do not take into account the wide range of additional environmental benefits that emerge from cutting and capturing greenhouse gases. We are likely to also realize improved air quality in our cities, making it easier for children with asthma to enjoy the outdoor activities most of us take for granted. Expanding our forests will give more families a chance to enjoy hunting and hiking. Fishermen win because no-till farming and capturing carbon through grass and tree plantings will improve water quality in our rivers and lakes. The benefits that hunters, hikers and fishermen bring to small businesses in our rural economies are enormous.Mr. Chairman, thank you again. We encourage the Committee to contribute to a safer future for the planet and cleaner future for our country by moving this bill forward.

CREATING A MARKET FOR CARBON EMISSIONS: OPPORTUNITIES FOR U.S. FARMERS

(By Richard L. Sandor and Jerry R. Skees)

Reducing greenhouse gases has become a major international objective. While the international community debates the Kyoto protocol, a number of countries have already announced that they will reduce greenhouse gases. The November 1998 Buenos Aires meeting on the Kyoto Protocol helped advance the trading approach as one means for reducing greenhouse gases. Since carbon dioxide is a major greenhouse gas, creating a market for carbon emissions is under consideration. Should such a market evolve, U.S. farmers could be big winners.

Even though some in the scientific community do not believe carbon emissions contribute to global warming,

eryone agrees carbon emissions are increasing rapidly. Since it is possible that carbon emissions increase the likelihood of significant climate change, a market

should be at the top of the list of policy options to cost-effectively manage emissions. In effect, a carbon trading system may be cheap insurance against potentially large societal problems.

Sulfur Emissions Trading Paves the Way

Emission allowance trading is a straightforward concept that is already operational on a national scale. The U.S. sulfur dioxide emissions market provides a good example. Congress placed an overall restriction on power plant emissions nationwide, effectively allowing power plants to comply by either 1) investing in cleaner fuels or pollution control technologies or 2) buying extra emissions rights from another power plant that made extraordinary emission cuts. Buying excess rights from a more efficient power plant allows the older and less efficient plant to meet its obligations at lower cost to consumers. In short, trading emissions permits allows industry to meet emissions goals in a least cost way.

Title IV of the 1990 Clean Air Act Amendments cleared the way for trading sulfur emissions among 110 power plants. During the debate on this legislation, experts estimated that these emission rights would command a very high premium. Some initial estimates ran as high as $1500 per ton. Hahn and May report several pre-1992 estimates of forecasted per ton prices for sulfur emission allowances, ranging from $309 (Resource Data International) to $981 (United Mine Workers). In 1998, the Chicago Board of Trade (CBOT) auctioned off a large number of allowances at an average price of $115. Carlson et. al. argue that many factors, in addition to trading of emissions rights, created low prices of sulfur emission allowances: improved technologies for burning low sulfur coal, improvements in electrical generating efficiency, and lower fuel costs.

Evaluations of the sulfur emissions trading program suggest that it has been a success. By 1998 actual sulfur emissions averaged 30 percent below the allowable level. There has also been steady growth in the interutility trading of allowances from 700,000 tons in 1995 to 2.8 million in 1997. The full effects of the trading have not been realized as the market is still adjusting to this new innovation. Carlson et. al. estimate that this innovation will save $784 million annually beginning in the year 2000. Further, they estimate the net cost of the cap and trade system is 43 percent of the estimated costs under a command and control system.

The Potential of Carbon Trades for U.S. Agriculture

If a market evolves for greenhouse gas emissions, those who are now contributing to carbon emissions may be willing to pay others to sequester carbon (remove it from the atmosphere) as a permanent offset to emissions, or as a means of buying time to invest in technologies needed to reduce emissions. When sequestering carbon costs less than reducing carbon emissions, the carbon market would provide a more efficient solution. Firms would likely use a combination of reductions in emissions and offsets with carbon trades.

A market would also motivate technological improvements to both sequester carbon and reduce emissions. For example, if prices signal farmers to sequester additional carbon, the market would respond with new technologies. Price incentives would encourage bioengineering plants that more efficiently and effectively sequester carbon. Most soil organic carbon is in the upper meter of soil. Could plants with deeper roots sequester more carbon to deeper levels?

The agricultural sector provides a number of effective alternatives for sequestering carbon. Forests and cropland offer the most promise. A large number of solutions will be needed to offset the increase in carbon emissions, and a market offers the best way to orchestrate them. Agronomists (Lal et. al) estimate the overall potential for carbon sequestration using U.S. cropland at 120–270 million metric tons of carbon per year (MMTC/yr). Around 100 MMTC/yr would come from increased use of Best Management Practices (BMPs). The remainder comes largely from acreage conversion and biofuels. Worldwide carbon emissions are growing by about 3,000 MMTC/yr. The U.S. emissions target under the Kyoto protocol is roughly 600 MMTC/yr below the level projected by 2010 under current trends. Thus, U.S. cropland could be used to reduce the projected annual world increase in carbon by about 7 percent, or about 30 percent of the U.S. share under the Kyoto protocol.

Most soils have a capacity for sequestering additional carbon. Tilling the soil, however, releases carbon into the atmosphere. Lal et al. report that Corn Belt soils likely have about 61 percent of the carbon that was present in 1907. Minimum and no-till systems can sequester more carbon. In 1997, about 37 percent of the arable land in the U.S. was under conservation tillage. Lal et. al estimate that using more BMPs (primarily reduced and minimum tillage systems) could sequester 5000 MMTC in cropland soils over the next 50 years. That converts to 100 MMTC/yr via

wider use of BMPs, while other options offer the possibility of up to an additional 100 MMTC/yr.

Estimates of the value of carbon emissions allowances range from $15 per ton (Council of Economic Advisers)

$348 per ton (Energy Information Administration). Based on early market signals, Environmental Financial Products is using market values between $20 and $30 per ton of carbon. Without a market to trade carbon emissions, the lower prices (and the lower mitigation cost to society) will not be possible.

Using the low-end estimates of $20 to $30 per ton, paying farmers to sequester 200 MMTC/yr could add $4 to $6 billion of gross income to the farm economy—and possibly up to 10 percent of typical net farm income. The market for carbon could be a major supplement to the Conservation Reserve Program and, if managed properly, opportunities in the international carbon market could soften farm income cycles by taking land out of crop production and putting it into conservation uses when relative prices favor carbon sequestering over food production.

BMP's increase the agronomic productivity of U.S. cropland, reduce soil erosion, and improve water quality and wildlife habitat. Thus, BMP's help both the global and local environments. The local benefits are consistent with the goals of the much discussed 'green support payments' (Lynch and Smith). However, rather than using taxpayer dollars, this green support payment could evolve in a marketplace with more diligent monitoring and enforcement. Paying farmers to sequester carbon will heighten the stakes for verification that farmers make changes in their farming practices or that they are actually sequestering more carbon. Lal et. al. estimate the long-term nutrient value of an additional ton of soil organic carbon at $200. A ton of soil organic carbon can be added in 4–5 years. In 4–5 years the value of some of the country's most productive farmland could increase 10 to 15 percent. In summary, a carbon market could increase both income and net worth in the farming community by 10 percent or more.

Leading scientists expect that climate change brought about by increased greenhouse gases may bring more extreme droughts and floods. Thus, American farmers can not only sell a new "crop" in the international environmental service market, but also help solve, at least in a marginal way, long-term weather problems affecting farming.

Implementing a Carbon Emissions Allowance Trading Program

A number of factors must be considered when designing a market for carbon emissions. In contrast to the sulfur market, carbon emission sources are less concentrated. In addition, sulfur could be reduced only by cutting emissions. A carbon market, on the other hand, may work through both outright reductions and sequestration. Considerable care must be taken to assure that incentives do not encourage farmers or others to change the baseline used to reward additional carbon sequestered. For example, in the short run a farmer or forester could release more carbon via changed practices so that they are ready to gain more when trading begins.

Low-cost systems to measure carbon in the soils are becoming more feasible. As the market develops, new technologies should emerge to make this task economically feasible. Lal et. al have provided estimates of the existing soil organic carbon for the lower 48 states, but improved estimates are needed. The existing base of carbon needs to be mapped. Only additional tons of carbon that are added to the baseline should be eligible for the market.

While many will get bogged down worrying about monitoring how much additional carbon is sequestered on an individual field, there are more effective means for monitoring and verification. Consider the opportunity for farmer cooperatives, grain merchandizers, biotech firms, and almost any agribusiness. Any of these firms could become a wholesaler for carbon sequestering. Estimates of the amount of carbon actually in the soil on an individual parcel may be flawed. However, the error likely has typical statistical properties and conventional statistics apply—estimating many individual parcels and aggregating them into one measurement will improve the estimate considerably. The agribusiness firm would be responsible for monitoring the individual farmers, possibly with some advisory role from USDA on adoption of BMPs. Under this system farmers could be rewarded for adopting BMPs and the agribusiness firm would be rewarded based on estimates of actual carbon sequestered.

Sandor, a student of the history of markets, has been heavily involved in inventing a number of new markets. He postulates a simple seven-stage process for market development:

- a structural economic change that creates a demand for new services; the creation of uniform standards for a commodity or security; the development of a legal instrument which provides evidence of ownership; the development of informal spot

markets (for immediate delivery) and forward markets (non-standardized agreements for future delivery) in commodities and securities where "receipts" of ownership are traded; the emergence of securities and commodities exchanges; the creation of organized futures markets (standardized contracts for future delivery on organized exchanges) and options markets (rights but not guarantees for future delivery) in commodities and securities; and (7) the proliferation of over-the-counter markets (p.2).

Based on this experience, Sandor develops recommendations for implementing an international pilot program for carbon emissions trading. An international pilot is in keeping with the Kyoto protocol which, during the first phase, puts the burden on developed economies. With trading, those in developed countries would also have the option of involving developing countries by funding low-cost emission reduction projects and by helping developing countries finance their efforts to prevent destruction of existing forests.

An effective carbon emissions market must have a clearly defined tradable commodity for greenhouse gas emissions—the standard measure to be traded must be agreed. An oversight body is needed, along with emissions baselines and clearly specified allocation and monitoring procedures. Once these standards are in place, existing exchanges and trading systems can be used to facilitate trades. Widely accepted standards will increase the credibility of the trades and help standardize the legal mechanics more quickly. All of these steps will lower the transaction costs in the new market.

With standardization and use of existing exchanges and trading systems, a carbon emissions market is very feasible. If we can trade corn on the Chicago Board of Trade, we can trade carbon. A system of quotes, hedging, and options will evolve. The market for carbon trades is, if fact, already evolving (Sandor). Niagara Mohawk (an electric power company in New York) and Arizona Public Service completed a swap of carbon offsets for sulfur dioxide emission allowances in 1996. Environmental Financial Products purchased rainforest protection carbon offsets from the Republic of Costa Rica in 1997. A subsequent 1.1 million acre program also includes assurance from the Costa Rican government that the area will be placed in a national preserve. In 1998, the Japan-based Sumitomo began converting coal-fired electric power plants in Russia to natural gas to earn carbon offsets.

The road to price discovery is being built. A market for carbon reduction services is now emerging. Carbon markets are being designed in the United Kingdom on the International Petroleum Exchange and in Australia at the Sydney Futures Exchange. Major companies such as United Technologies, British Petroleum and Royal Dutch Shell have also committed to large and early reductions in their own greenhouse gas emissions. Therefore, regardless of whether the U.S. approves the treaty, firms in other countries may soon be willing to pay American farmers to sequester carbon. U.S. action to limit net carbon emissions would help make the benefits and incentives to U.S. agriculture even greater.

Carbon trading is feasible. The prospects of a market will increase this feasibility as new investments are made in technologies and research needed to monitor and standardize carbon measurement. Active trading of carbon could prove an inexpensive insurance policy against the unknown problems that may emerge because of the rapid increase in global carbon emissions. An effective and efficient market-based solution will become even more important as governments around the world tighten restrictions on carbon emissions. U.S. farmers are well-positioned to help in sequestering more carbon. While helping to clean up the air, the benefits to the sector could be substantial. Farm income and land values should both increase. Local soil, water, and wildlife should benefit. All the while, carbon trading could also make the sector more resilient to other forces that have persistently created cycles in farm income through a market-based CRP program.

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Dr. Richard Sandor is CEO of Environmental Financial Products, L.L.C. and Dr. Jerry Skees is professor of agricultural economics, at the University of Kentucky.

This article emerged from two presentations by Dr. Richard Sandor. First, at Monsanto in St. Louis, Mo. and then at the University of Kentucky (UK) as the fall seminar of Gamma Sigma Delta. Dr. Sandor expresses his appreciation to Dr. Bruno Alesii, agronomic systems manager at Monsanto, and Dean Oran Little of the College of Agriculture, University of Kentucky. Both authors are also grateful for reviews of this article provided by Dr. Craig Infanger, Dr. Barry.

STATEMENT OF TIA NELSON, DEPUTY DIRECTOR, CLIMATE CHANGE PROGRAM, THE NATURE CONSERVANCY

My name is Tia Nelson. I am Deputy Director of the Climate Change Program at The Nature Conservancy. The Nature Conservancy is a non-profit conservation organization founded in 1951. The Conservancy's mission is to protect rare and endangered plants, animals, and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. Throughout its history, the Conservancy has protected more than 10 million acres of land in North America and millions more in Latin America, Asia, and the Pacific. The Nature Conservancy owns or manages approximately 2 million acres in the United States, comprising the largest system of private nature preserves in the world. Although it is known primarily as the organization that buys land to create nature preserves, the Conservancy also engages in many other conservation activities such as purchasing or holding conservation easements, working with private landowners to improve land management practices, and working with local communities to help them determine their environmental future. Internationally we work with in-country conservation partners, local governments, multilateral institutions, U.S. Government agencies, and private sector firms to foster support for conservation and develop additional sources of funding. The Conservancy has more than 900,000 members and has at least one office in every state and in many other countries.

I am happy to be here today to discuss the concept of credit for voluntary early action and the Conservancy's experience in developing carbon sequestration projects as a climate change mitigation strategy. We believe that a well crafted early action bill can be a critical and cost effective step in the process of slowing the buildup of greenhouse gases in the atmosphere while achieving other important societal benefits. In particular, the Conservancy hopes that any early action legislation will contain scientifically valid, credible carbon sequestration provisions that will provide incentives for projects which slow or reverse the pace of deforestation of sensitive environmental areas in both the U.S and abroad, and encourage better forestry and agricultural management practices.Deforestation and land degradation account for more than 20 percent of the annual greenhouse gas emissions and thus is an important component of any effort to address the threats of climate change. We believe that carbon sequestration, properly designed, can achieve real and measurable greenhouse gas benefits while protecting biodiversity and enhancing sustainable development. There are also important opportunities in the agricultural sector. Dr. Rattan Lal, a leading expert of soil science at Ohio State University, states that 116 million tons of carbon is released into the atmosphere each year from conventional agricultural activities in the U.S. Through better soil conservation practices such as reduced tillage, we have the potential to conserve substantial amounts of soil carbon, and reward farmers for good agricultural practices. We commend Senator Chafee and his co-sponsors for introducing legislation to start the process of creating these incentives.

The Conservancy's experience with carbon sequestration projects, funded voluntarily by private companies, has shown us the potential inherent in this mechanism. Our experience in developing and helping implement these types of projects has convinced us that we can meet the technical challenges of demonstrating and quantifying carbon sequestration benefits. Projects developed by the Conservancy to slow the release of carbon dioxide and enhance carbon reserves into the atmosphere are protecting two of the most important natural areas in the world, sequestering over 20

millions tons of carbon in a cost-effective manner and helping local communities develop their economies in a sustainable way. Governmental action to provide companies with clear incentives in this area could have dramatic positive results for greenhouse gas reductions and mitigation as well as other environmental benefits by encouraging more of these types of investments.

I would like tell you about several of our projects in order to help you understand the potential that we believe could lie in well-crafted incentives for carbon sequestration projects. Our first project is in the country of Belize and was carried out with significant support from Wisconsin Energy, a company that is represented here today. Wisconsin Energy approached The Nature Conservancy in 1994 with the idea of undertaking a project that would demonstrate the potential of forest conservation and sustainable forest management to address the buildup of greenhouse gases. Both the company and The Conservancy were aware that, according to experts such as the World Resources Institute, forests act as both a source of CO_2 emissions and also as an important carbon "sink", absorbing atmospheric CO_2 concentrations through the process of photosynthesis and storing it as biomass—both above and below ground. The volume of carbon stored by forestland increases as the volume of biomass increases.

The Conservancy has long sought the protection of the rainforests of central and western Belize for conservation activities. This is one of the world's hotspots of biodiversity. These forests are home to 70 different mammals (including several cat species like the jaguar and howler monkeys), 340 species of birds (many of which spend their summers in the U.S) and 240 different species of trees. Unfortunately, these forests are being bulldozed, burned and converted to agricultural fields in many areas. The result is a significant emission of carbon dioxide into the atmosphere as well as a tremendous loss of biodiversity.

In 1995, a 14,000-acre parcel of rainforest was put up for sale by a local land owner. The leading bidder was a local farm interest that intended to use the land for soybean production. Instead, Wisconsin Energy and other companies—Cinergy, Detroit Edison, PacifiCorp, and Utilitree Carbon Company—gave the Conservancy and its Belizean partner, Programme for Belize, $2.6 million. With this funding Programme for Belize was able to purchase the land and set aside funding for its management. Special care was taken to ensure that the potential for "leakage" of benefits was adequately addressed through project design. Funding also allowed for a small-scale sustainable forestry operation, certified by the Forest Stewardship Council, as well as community education programs. This provided jobs and income for the local population. In 1998, with additional funding from Wisconsin Energy and Suncor, a Canadian oil company, the Conservancy and Programme for Belize were able to purchase an additional parcel of land and add it to the holdings managed under the carbon sequestration project. In all, $5.6 million has been generated for this project. This would not have been possible without investments from companies seeking to demonstrate the validity of this mechanism through the U.S. government's initiative on Joint Implementation. Our estimate is that, if the area purchased had been converted to agriculture instead of maintained as an intact forest, the additional carbon dioxide released into the atmosphere and the decrease in carbon stored would total 2.4 million tons over the next 40 years. This estimate is based on an analysis undertaken by the Winrock International Institute for Agricultural Development, a non-profit organization with considerable expertise in carbon measurement. Winrock was retained to develop a system to measure the greenhouse gas benefits of the project. The monitoring protocol involved the use of permanent sample plots in which carbon from soil, trees and leaves is measured and analyzed in laboratories. Thus, the actual carbon sequestered by the project, which is registered with the U.S. Initiative on Joint Implementation, is backed by a scientifically rigorous measurement system.

Our second and largest project to-date is the Noel Kempff Climate Action Project in Bolivia. This $10 million project, supported by American Electric Power, PacifiCorp, and BP Amoco, has been used to retire forestry concessions in one of the most biologically diverse areas in Latin America. This allowed the Bolivian government to double the size of the Noel Kempff National Park, a long-time goal. While much of the rainforest in Bolivia has been destroyed by unsustainable forestry practices, Noel Kempff has now been expanded by 1.5 million acres and is protected by one of the best-funded management programs in the region. In addition to funding the retirement of forestry concessions and the establishment of a permanent endowment for the park, funding also has been used to rehabilitate a local school and health facility and to provide capital to local communities for sustainable economic development projects.

The carbon sequestered by the project has been estimated using scientifically rigorous methodology developed by Winrock. Of the $10 million project budget, nearly

$2 million is for monitoring and verification of greenhouse gas benefits. Our current estimate is that the project will reduce, avoid or mitigate 15 million tons of carbon in the next 30 years. This amount is equal to the lifetime emissions of approximately 850,000 cars. These estimates will be verified periodically over the life of the project by on-the-ground measurement. The project and its monitoring and verification protocol is viewed as an important model in demonstrating scientifically valid carbon measurements.

In addition to these two projects, The Nature Conservancy is working closely with other companies to encourage support for other carbon sequestration projects domestically and internationally that can help achieve climate change mitigation and conservation benefits. We know from these discussions that many companies are hesitant to commit to this kind of investment without assurances that these investments will be recognized. It is important to remember that the size of these investments vastly exceeds traditional corporate giving for conservation purposes and that the companies which have been involved to date have done so in an effort to help develop new cost-effective mechanisms for climate mitigation. They have been leading by doing.

We believe the potential to expand this mechanism to slow the buildup of greenhouse gases, preserve carbon sinks and simultaneously achieve conservation goals will not be achieved unless the U.S. Government offers some incentives and clear guidelines to companies prepared to act now. Without clear rules, companies which have acted responsibly and made investments in slowing the buildup of greenhouse gases will be treated the same as those which ignored the problem. We believe this would be a mistake, and a lost opportunity.

As I have noted earlier, the Conservancy strongly favors the inclusion of carbon sequestration provisions in any early action program. We do encourage legislators to move carefully in creating such provisions so as to create measurable greenhouse gas benefits and improvements in the ways in which lands are managed and to avoid the creation of perverse incentives that might have a counter-productive impact. Some principals we think the committee should keep in mind are:

- All projects should be subjected to rigorous monitoring and verification and transparent reporting.
- Credits for forest conservation should take into account potential displacement of these benefits to other areas, to ensure that "leakage" is addressed.
- Carbon sequestration provisions under early action should be awarded for additional changes in land management above and beyond current practices. There should be no credit in cases where landowners deforest land and then engage in tree planting. Neither should credits be accrued for business as usual scenarios.
- International projects screened by the joint implementation program should be eligible for early action credits. The key sources of emissions from the land use sector stem from deforestation of the tropics. Companies should have an incentive to help address this issue.

With these principles, we believe that carbon sequestration projects can play an important role in an early action program. We thank you for the opportunity to present our views here and look forward to providing the committee with whatever assistance we can as it continues its work.

THE ROLE OF

FORESTS IN CLIMATE CHANGE

Forests play a dual role in climate change by acting both as a source of greenhouse gas emissions, particularly emissions of carbon dioxide (CO_2), and as a storehouse of carbon, also called a "carbon sink." By avoiding or reducing the CO_2 emissions that result from the destruction of forests, and enhancing their ability to absorb and store carbon, forest conservation and management projects work to reduce net CO_2 emissions and thereby help mitigate the effects of climate change.

1

UNLEASHING CARBON

When trees decay or are burned, carbon is returned to the atmosphere as carbon dioxide. With its demise, a single tree can release a ton or more of carbon.

2

THE GREENHOUSE EFFECT

Carbon dioxide is one of several gases that insulate the Earth. As their concentrations rise, they trap more heat.

3

ABSORBING CARBON

In the cells of leaves, carbon dioxide from the air mixes with water drawn from roots. Charged by the sunlight, molecules split and reassemble, forming oxygen and carbohydrates—otherwise known as sugar, the food of plants and all who feed on them.

GRAPHIC ILLUSTRATION by Bob Tope.

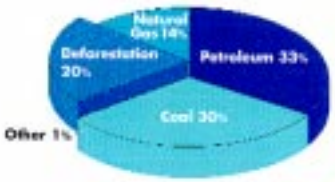
SINKS AND SOURCES

Forests act as a carbon sinks by absorbing atmospheric CO_2 through photosynthesis and storing the carbon in leaves, trees, roots and soils. The amount of carbon stored by a forest increases as the volume of its biomass increases.

When forests are cleared or otherwise degraded, the carbon that they had stored is released into the atmosphere as CO_2. Approximately 22 percent of annual CO_2 emissions result from the deforestation (See chart). Since 1850, changes in land use have contributed to 30 percent of the carbon accumulated in the atmosphere.

Tropical forests are a particularly important factor in climate change because of their high capacity for absorbing and storing carbon, and, most important, the rapid rate at which they are being destroyed. Therefore, the conservation and management of tropical forests offers an excellent opportunity to reduce global levels of CO_2 in the atmosphere, both by preventing future emissions and by enhancing their current ability for carbon storage.

Sources of Global Carbon Dioxide Emissions



Based on estimates by: IPCC (1990); WRI (1990)

The Nature Conservancy
Saving the Last Great Places

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STATEMENT OF JOHN PASSACANTANDO, OZONE ACTION

Senator Chafee, Senator Baucus, and members of the Committee, Thank you for the invitation to be here today. My name is John Passacantando, Executive Director of Ozone Action. Ozone Action is a 6-year-old non-profit organization dedicated to working on the atmospheric threats of global warming and ozone depletion. Our mission is one of public education, spreading the word on the science of global warming, and helping to build the public constituency for leadership to address these global threats.

Facing the threat of global warming, this Committee must decide whether to address the root of the problem or simply to treat its symptoms. I am here today to challenge this Committee to do the former by passing a bill that will start U.S. industries on a path to greater efficiency, less pollution, and put the U.S. in a leadership role as the key exporters of the new and exciting energy efficient technologies that are beginning to emerge. I am also here to warn you against taking the Band-Aid approach to global warming that S. 547 now presents.

Any doctor, when treating a patient with high cholesterol, will likely prescribe some type of medication. But no responsible doctor would limit his treatment to just medication. He would insist that the patient address the source of his cholesterol problem by changing his eating and exercise habits. To do anything less would be not only irresponsible, but obviously dangerous to the patient's health. It is widely recognized that one of the inherent dangers in our ever-advancing medical technologies is the belief that there will always be some pill, whether it is for cholesterol, dieting, blood pressure, or otherwise that will solve our problem so that we won't have to change our habits.

In many ways, our global climate shows the symptoms of an ailing patient. Scientists around the world recognize that our glaciers are retreating, our ice caps are thinning, our seas our rising, our violent storms increasing, and rising temperatures are breaking records that go back to the middle ages. To pass S. 547 as it currently stands would be like giving this sick patient a pill without addressing the source of the problem—escalating emissions of CO_2 from the burning of fossil fuels. Just as it would have been irresponsible for the doctor in the cholesterol analogy to send his patient off without changing the habits that caused his problem, it would be irresponsible for this Committee to pass a bill that allows companies to continue increasing their emissions while being rewarded for everything from creating tree plantations to unverifiable, self-reported projects almost a decade old.

Our country's history of strong environmental regulation and economic prosperity is the clearest indicator that properly crafted regulations can provide incentives for the innovations that drive our markets. Michael Porter, Harvard Business School professor and former member of President Reagan's Commission on Industrial Competitiveness notes in his most recent book that "the data clearly show that the costs of addressing environmental regulations can be minimized, if not eliminated, through innovation that delivers other competitive benefits." He goes on to suggest that we should "focus, then, on relaxing the tradeoff between environmental protection and competitiveness by encouraging innovation and resource productivity."

Like Porter, I do not come at these issues purely as an environmental advocate. While it is my duty as the leader of an environmental organization that focuses on atmospheric protection to speak as one, my background is in business, economics and Wall Street. I spent 8 years of my career in decidedly non-environmental roles, and for a majority of that period, working for Jude Wanniski, the high priest of supply side economics. That is to say, I believe in a very careful use of government intervention, and am as suspicious of corporate welfare as any conservative.

The history of environmental legislation in the United States is one of the government continually raising environmental standards, usually over the strong objections of the affected industries, only to have those standards met by creative innovations that come in at a fraction of the initially projected costs or even as new profit centers for these industries. The Clean Air Act, removing lead from gasoline, phasing out ozone depleting chemicals are just a few of the examples.

The fight against global warming is no different than these other efforts—it's just larger. Cheap and abundant fossil fuels have been important to our economic growth. But so have intelligence, technology and innovation. The most recalcitrant companies are still fighting even the thought that human actions may be contributing to global warming. Meanwhile, the most innovative companies are investing in highly efficient technologies for cars, buildings and homes.

Overall, S. 547 is a failure in that it does not promote innovation and resource productivity. Instead, the bill rewards our biggest polluting companies even if they make no changes whatsoever. It also has the potential to preempt real emissions reductions, just as a mandate is emerging from the American people, increasingly concerned about global warming.

Specific flaws with S. 547 include:

1605(b) credits: The bill allows for the issuing of emissions credits for past voluntary emissions reductions reported to the Department of Energy (1605(b)). These projects simply cannot be given credit without a tight screen to rule out unverifiable projects (according to the General Accounting Office, more than 1,800 claims under 1605(b) during 1994–1996 have at best a "moderate" level of accuracy) those with negative environmental impacts or those that would have taken place anyway in the course of normal business. Perhaps more importantly, these unverifiable 1605(b) credits could completely offset emissions reductions targets adopted by the U.S., (credits claimed under just 2 years of 1605(b) reporting represent 80 percent of U.S. emissions reductions requirement). Furthermore, according to the nonprofit National Environmental Trust, just a handful of companies reporting under 1605(b) could potentially get credits worth $11 billion for questionable global warming pollution reduction cuts.

A great example of the flawed accounting within the 1605(b) program is in a submission from General Motors. GM filed for 1605(b) credits for reduced emissions of their portion in the U.S. vehicle fleet. Twenty-five percent of the reductions GM claimed came not from efficiency improvements, but simply because they didn't sell as many cars and trucks—their fleet diminished. Awarding credits for lost market share amounts to no more than corporate welfare, a handout to big business.

Nuclear incentives: Sen. Wyden, in his letter supporting the bill, eloquently outlined many of the problems that are embedded in the bill as presently drafted. He drew specific attention to the incentives this bill could provide for increased use of nuclear power and the inadequacy of many of the 1605(b) reported projects. For example, 60 percent of Southern Company's 1605(b) projects are nuclear plant upgrades and increased output from nuclear plants. To further subsidize this moribund industry in the name of global warming, would exacerbate an existing problem, and one the American public has resoundingly rejected. While nuclear energy does not omit carbon, it is unacceptable to trade one environmental threat for another.

International projects: By allowing for the granting of credits for overseas greenhouse gas abatement efforts, this bill diverts the focus from innovative investments at home where they are most needed. It instead relies on difficult-to-measure efforts in the developing world, many of which these companies are undertaking as profitable business investments anyway. In addition, there is great potential to corrupt the international negotiation process, as it will be done ahead of the global effort to create the framework for cooperation within the Kyoto Protocol. For example, S. 547 allows a double standard in which U.S. corporations can get credit for reducing emissions overseas but do not get penalized for increasing emissions overseas.

Sinks: Carbon absorbing "sinks" projects should be left out of the early credit discussion at least until the international scientific body, the Intergovernmental Panel on Climate Change completes its study in the year 2000 and defines the way sinks will be dealt with under the Kyoto Protocol. The science must drive the policy, not the other way around. Any U.S. credits for such actions promised prior to that report have great potential to set false expectations for companies or even to put the U.S. in a position of advocating a less rigorous accounting for these projects. If you can find a way to protect our forests and stop global warming, terrific. But if you are encouraging polluters to offset their emissions by putting their own fences around existing forests or for planting tree plantations destined for the paper mill, then the bill has no environmental integrity. Regardless, to ensure environmental integrity, policy decisions must be based on scientific decisions that are not yet available.

Additionally, as sinks are related to agriculture, it is one thing to promote no regrets measures to insure sustainable farming practices designed, in part, to buildup the organic matter in the soils—a process which helps the soil hold more carbon dioxide. However, it is troublesome if false hopes are created that companies will be able to offset their emissions through a change in practices in the agricultural sector. In our opinion, including soil-based sinks could create false hopes and the potential for greater backlash down the road if the international community decides not to include soils in the Kyoto Protocol. There are so many other benefits of soil conservation and other sustainable agricultural practices; there must be a better way to provide incentives for this behavior.

There are other flaws as well. Among them are: any early action program must be capped to provide security that the credits given out prior to a Kyoto Protocol compliance period do not overwhelm and obviate any action during that period; instances where more than one entity might claim credit for the very same action must be avoided; and a static baseline as presently stipulated in the bill is not aggressive enough. A steadily declining baseline target would both encourage real progress and weed out and discourage business-as-usual emissions reductions.

Until these flaws are fixed, any future efforts to lower industrial emissions of greenhouse gases will be met with the cry of "I already gave at the office." Passing the bill before you as a means to combat global warming is like a doctor combating a patient's high cholesterol by giving him a pill and then treating him to a steak and fries dinner. Our global climate deserves better treatment.

In 1960, President Kennedy said, "It is time for a new generation of leadership, to cope with new problems and new opportunities. For there is a new world to be won." His words are as true today as they were almost 40 years ago. Today's new world will not be won if we cling to old technologies at the expense of our environment and fail to promote the innovations our companies need to be competitive internationally. The challenge before this Committee is to pass a bill that will ad-

dress the source of global warming so that the US will continue to lead tomorrow as we have led in the past in both environmental protection and economic strength.

STATEMENT OF RAYMOND J. KEATING, CHIEF ECONOMIST, SMALL BUSINESS SURVIVAL COMMITTEE

Thank you Mr. Chairman and Members of the Committee for the opportunity to testify today. I am Raymond J. Keating, chief economist for the Small Business Survival Committee (SBSC). SBSC is a nonpartisan, nonprofit small business advocacy group with more than 50,000 members across the nation.

As explained in many of our publications, articles and in previous congressional testimony, SBSC opposes the Kyoto Protocol to the United Nations Framework Convention on Climate Change for a variety of reasons, including, and primarily due to, the significant costs it would impose on small businesses, consumers and the U.S. economy in general, as well as the competitive disadvantage U.S. small businesses would face versus exempted international businesses in most other countries.

As noted in the invitation letter for this hearing to SBSC from the Committee Chairman and Ranking Minority Member, what we have been asked to specifically address today are the issues related to "formal recognition or crediting of voluntary greenhouse gas mitigation activities." These fundamental issues, for example, are raised by the proposed "Credit for Voluntary Reductions Act" (S. 547).

First, we need to understand, or come to agree on what these credits would be used for. Obviously, the credits would only have meaning and value under the Kyoto Protocol or some similar regulatory regime which would implement an emissions "cap and trade" system. Otherwise, the entire early credit endeavor would be pointless. Therefore, we must take a look at how emissions trading would likely work, and what problems it presents.

Under the Kyoto Protocol, the U.S. would be obliged to reduce so-called greenhouse gas emissions mainly CO_2 to 7 percent below 1990 levels by 2012. That would require dramatic reductions in energy usage. One method for reducing energy consumption and emissions would be an emissions trading program whereby the government would cap emissions, and then ration or auction off credits equivalent to certain levels of emissions. (Under S. 547, for example, a "greenhouse gas reduction credit" means an authorization to emit 1 metric ton of greenhouse gas.) The credits would be tradable. For example, nations or companies seeking to maintain current or expand emissions would buy credits from nations or companies cutting their emissions and not needing the credits.

U.S. Assistant Secretary of State Melinda Kimble, a top climate negotiator, told Reuters (October 21, 1998), "In the United States, first and foremost domestic action is going to be a trading system."

Trading emission credits is called a market-based system, but in fact, it has very little to do with markets. It is merely another regulatory system for shifting around massive government-imposed costs. The government would place severe restrictions on CO_2 emissions and therefore on energy consumption and economic activity then implement a kind of shell game to shift around and attempt to hide the enormous costs.

Massive problems exist with such a system.

- Costly and Stealthy. A "cap and trade" system does the same amount of damage to small businesses, consumers and the economy as do overt energy taxes, but in a dangerously stealthy manner. In a 1994 document, the Environmental Protection Agency reportedly noted the problems facing an overt energy tax, and then cynically declared: "A cap would likely not be as unpopular as a tax, since people are generally less familiar with the concept." Like other forms of regulation, the exact costs would remain largely a mystery to consumers, but nonetheless they would be paying in the form of increased costs, lost GDP, and lost jobs.
- Impossible Enforcement. The most daunting problem with an emissions trading regulatory system is compliance. In summary, countless dollars would be spent in pursuit of an impossible compliance goal.

Administration of this treaty would require monitoring all sources of emissions, and comparing those results with permissible credit amounts. Environmental bureaucrats would have to monitor both stationary and mobile sources of emissions. Stationary sources would be bad enough think of the number of business, nonprofit and governmental facilities that would be under surveillance but remember there are more than 200 million motor vehicles in use in the U.S. today.

Now, take this scenario, and apply it internationally. The complexity, costs and extent of government intrusiveness grow exponentially. After all, the U.S. cannot even successfully monitor chemical and nuclear weapons activities in Iraq, never

mind global monitoring of practically all economic activity. This would require either a massive international environmental policelike force sticking their noses into private-sector and public-sector ventures nation by nation, or extensive domestic regulation under the assumption that each nation will be equally faithful and efficient in their monitoring activities. Either route is naive and costly, but be sure that our Environmental Protection Agency our likely Kyoto Protocol regulator will be the most aggressive enforcer.

- Developing Nations. If this treaty is meant to be taken seriously, then developing nations eventually must be brought into the fold. Currently, developing nations are excluded from emissions caps.

An exclusion for developing nations would provide them with a tremendous economic advantage, allowing them to attract industries, businesses and jobs away from nations forced to impose draconian costs under the treaty. Obviously, this cannot stand.

But what would happen if developing nations are placed under the Global Warming Treaty emissions caps? Imagine the insurmountable obstacles involved in monitoring emissions in many Third World nations where it can be a formidable task just to feed the populace. If imposed and somehow enforced, limiting emissions in such nations would sentence millions of people to permanent poverty.

- Small Business at a Disadvantage. Under emissions trading, smaller enterprises would be at a distinct disadvantage as bidding domestically and/or internationally raises the price of credits. As is the case with other forms of regulation, these added costs will hit smaller ventures hardest. Many small businesses operate on the slimmest of margins, and simply would be unable to play the credits game. As it stands now, most small businesses find it daunting to comply with the hundreds of laws and regulations required under all levels of government. In addition, basic business matters require their hour-by-hour, day-to-day attention.

The credits game will be viewed by most as being the domain of big business, or be construed as some complex and vague program that offers no or little current quantifiable benefit in running their day-to-day operations. In addition, the high-risk nature of smaller, entrepreneurial firms require the opportunity to make substantial returns.

The Kyoto treaty and emissions trading raise costs, and therefore reduce potential returns, which means that many startups, innovative, potentially high-growth enterprises would be nipped in the bud.

Indeed, it certainly does not take an active imagination to see mature, entrenched large enterprises gaining a clear advantage over smaller businesses under an emissions trading regulatory system. For large firms with greater ability including the necessary capital to survive the added costs of playing the credits game will actually face reduced competition from smaller upstarts who will not survive.

Trading emission credits merely would shift the costs of the Kyoto Protocol around, but certainly would not make them disappear. The economic costs and dislocations promise to be severe.

Having noted the many problems with emissions trading, it becomes obvious that any kind of early action to reduce emissions so-called "voluntary" or not of such a system manages to only make matters worse. For example:

- The Federal Government would most likely enter into early implementation agreements with large, established businesses who have the legal expertise, technical abilities, and discretionary capital to undertake early actions. This level of resources would naturally give an advantage to big business to become "volunteers" in an early action program. And since there would only be so many credits to go around under the Kyoto Protocol or a national cap as part of a domestic program, those who did not participate in early actions would suffer accordingly. Small and mid-sized businesses would bear a heavy burden in 2008 and beyond.
- Politics no doubt would play a major part of this early implementation program. For example, S. 547 would authorize "the President to enter into binding agreements under which entities operating in the United States will receive credit, usable in any future domestic program that requires mitigation of greenhouse gas emissions, for voluntary mitigation actions taken before the end of the credit period."

Those with political connections and lobbying clout would have the clear advantage when it comes to entering into early implementation agreements, at the expense of the non-politically connected, i.e., smaller enterprises. Even if so-called "pooling" is allowed whereby a group of participants act as one participant for purposes of early action its usefulness would be quite limited. For example, established, politically connected businesses would have absolutely no incentives to pool with other firms. Why would they? For the rest, the costs of organizing in terms of dollars, time, personnel, education, etc. would be formidable.

As noted earlier, most business owners struggle day after day for long hours to keep their business going, or hopefully growing constantly assessing the best way to serve their customers, to keep their employees productive and happy, and to project where their market is headed. These are the folks that will not have the ability to play the politics of credits for early action, and they then will be the ones most savaged by the costs of the Kyoto Protocol, or any other domestic initiative to reduce greenhouse emissions, or another domestic regulatory regime developed to manage, monitor and attempt to reduce emissions.

- Mature businesses in predictable industries would more easily participate in early implementation than would small, high-growth businesses in new, dynamic and far less predictable industries. None of us really know what the new businesses and industries of tomorrow will be. But we do know that under a credit for early action plan, they will be especially hurt, as they obviously cannot take advantage of early action.
- Credits for early implementation would establish a strong special-interest group favoring Kyoto implementation or a comparable domestic regulatory program. Credits potentially worth untold millions of dollars would act as powerful incentives to push and lobby for treaty ratification, or some type of regulatory structure that would give value to such credits. In other words, without a program to give value to such credits they would be worthless. I believe this would effectively split some of the business community in its opposition to the Kyoto Protocol pitting many large companies with a special interest in seeing the treaty and its trading scheme become reality, against a far more dispersed opposition overwhelmingly populated by small and mid-sized firms. Already, whatever ruptures that exist in the business community over whether the Kyoto Protocol should be implemented or not are largely based on whether certain industry sectors believe they can take advantage of the new regulatory structure. For example, it is no surprise that we see renewable energy companies and large corporations with vast natural gas reserves cheerfully supporting Kyoto or a similar domestic version of it.

Emissions caps on nations effectively are caps on economic growth. As entrepreneurs try to startup and grow businesses, they will be at a severe disadvantage in securing credits in a highly political system, and then will be hurt as the prices of domestically and/or internationally traded credits rise. Naturally, there is a trade-off between risks and potential rewards. The higher costs resulting from the Kyoto Protocol would mean reduced rewards, and therefore, less risk taking. Less risk taking means slower economic growth and reduced job creation.

Especially from the small business perspective, early action credits are a bad deal. The economics of the Kyoto Protocol or a similar program, including its emissions trading scheme, are dismal. Congress should not be looking for ways to advance Kyoto and its attendant implementation schemes, but instead should be stating quite clearly that it will not ratify this costly, misguided, and highly dubious treaty.

As a final point, it is well worth noting the increasing energy efficiency in the United States brought about mainly by businesses and entrepreneurs without any such draconian measures along the lines of a Kyoto Protocol. For example, between 1970 and 1996, total energy consumption increased by 41 percent, while our economy more than doubled in real terms over the same period. Indeed, the private sector possesses every incentive to become more and more efficient in terms of energy usage.

Once again, thank you for allowing me to testify today, and I would be glad to answer any of your questions.

CREDIT FOR VOLUNTARY REDUCTIONS ACT

THURSDAY, JUNE 3, 1999

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
Providence, Rhode Island.

The committee met, pursuant to notice, at 10:30 a.m. at Faunce House, Brown University, Providence, Rhode Island, Hon. John H. Chafee (chairman of the committee) presiding.

Present: Senator Chafee.

OPENING STATEMENT OF HON. JOHN H. CHAFEE, U.S. SENATOR FROM THE STATE OF RHODE ISLAND

Senator CHAFEE. The subject we're gathered to hear about this morning, climate change caused by human activity and what to do about it, is very controversial. The science is challenging because we're considering the long-term future of a global system that involves interactions of atmosphere, oceans, forests and human society, and the politics is challenging because the US Government has signed a far-reaching treaty, the Kyoto Protocol of 1997, that is, regrettably, strongly opposed by much of US industry. I had the privilege of being at that Kyoto gathering in 1997.

The uncertainty and controversy seemed daunting, but it's important, it seems to me, that we struggle with this issue. If we are headed in the direction most scientists predict we're headed in, we can't afford to put off starting solutions until the day when all our questions are completely answered. If we wait around until everything is absolutely clear, no controversy, it may be well too late. Some things are certain, we know that greenhouse gases trap heat in the atmosphere. We know that greenhouse gasses exist naturally and are cycled through oceans and forests. From the ice cores taken from glaciers we've been able to examine the concentration of atmospheric carbon dioxide, an important greenhouse gas over the past 400,000 years. Now, that's a long time, 400,000 years. We know that increases in carbon dioxide have always been associated with increases in temperature over that period.

In 1995, an organization of 2,500 scientists formed the intergovernmental panel on climate change, IPCC, that's a term we'll hear frequently today and in the continuing study of this matter, and this group of scientists, 2,500 of them, the IPCC issued a report summarizing the evidence gathered over the past 100 years on the greenhouse effects of carbon dioxide and other gases. They concluded there's a small but discernible human influence on global climate, and they warned that this impact may be gathering momentous. The concentration of carbon dioxide in the atmosphere

has steadily increased over the past 200 years. The earth is warmed by one degree Fahrenheit over the past hundred years. It may warm another two to six degrees Fahrenheit over the next 100 years. Now, those are incredible statistics. That would be the fastest increase in temperature experienced by the species now comprising life on earth. Whether the complex ecosystems that are involved evolved over eons can adapt successfully, the change is so rapid, in other words, two to six degrees change in Fahrenheit in 100 years, can we adjust to that? It's the most important unanswered question. But we humans will face challenges as well. For instance, IPCC predicts that sea levels may rise an additional ½ to 3½ feet in that 100-year period. All of us in Rhode Island can appreciate the significance of a result like that, an increase in sea levels of ½ to 3½ feet.

The bill we're considering, S. 547, this morning makes only the modest beginnings on this large problem. It would encourage voluntary reductions in greenhouse gas emissions by U.S. industries by promising those industries credits for the reductions they took if a mandatory program is ever adopted. In other words, the legislation we have says if you—we don't have any mandatory statute on the books yet about having to reduce greenhouse emissions, but some companies are willing to do it, and if voluntarily they want to do it, reduce their greenhouse emission, if subsequently legislation is enacted requiring such reductions, then the companies that have made the reductions prior thereto will get credit for it, and they're doing it voluntarily and they deserve credit for it. Now, this is a modest start, but getting a start is very important.

Carbon dioxide accumulates in the atmosphere. From the perspective of climate, the ton of carbon dioxide that we voluntarily avoid emitting today is just as important as the ton that may eventually be prevented by the Kyoto Protocol of some other mandatory program.

It may be many years before our political system responds to the threat of climate change in any meaningful way. When it does, and I, for one, am convinced that we must change our course, the reductions that have been accumulated year after year from this modest beginning will pay big dividends, and the companies that take advantage of this opportunity will realize much lower compliance costs because they had a longer period to adjust their business practices.

Now, even this modest beginning, you say who can object to that, it's voluntary, you get credit later on if you make the reductions, who can complain. Well, welcome to Washington. Even this modest beginning is not without its controversy. Everyone salutes the concept of giving credit for voluntary reductions, but, indeed, there are devils in the details. What Government agency should run the program? How do we ensure that our accounting methods only count real reductions in greenhouse gases? How do we recognize projects like reforestation or preservation that sequester carbon rather than reduce emissions? Should foreign investments count? Should we give credit to the reductions that have been made since the Rio Treaty was signed in 1982? How far back do we go?

We've got a distinguished group of witnesses to wade into this controversy and help us answer these questions.

We all appreciate the time and thought that's evident in their written statements and welcome the opportunity to hear from them.

Now I want to express my appreciation for all the witnesses coming, some of considerable distance. Mr. Fay came from Washington, Mr. Colburn came from New Hampshire, Mr. Rabideau came from the northern part of the state. Dr. Hamburg is here. Let me see where Ms.—oh, you're from Massachusetts, that's right. So we are grateful for all of you to come, being here.

We'll start with the Honorable Scott Rabideau, who is a member of the Rhode Island House of Representatives. Scott, why don't you go first.

STATEMENT OF HON. SCOTT P. RABIDEAU, RHODE ISLAND HOUSE OF REPRESENTATIVES

Mr. RABIDEAU. Thank you, Senator. And, first and foremost, I want to thank you and your staff for giving me the opportunity to testify here today. You know as a legislator I often have the opportunity to testify, but never in my wildest dreams did I think I would be on the record for a U.S. Senate Committee, so I thank you for that.

It is also interesting that you chose to have the politician go first. We have quite a distinguished panel of people here testifying before your committee, these people probably know a lot more about the concepts that we're talking about than I do, but what I think I bring to this panel is a local political view on how a bill of this magnitude can have far-reaching impacts, not only here in Rhode Island, but across the country, when politicians and local legislators get a hold of this bill and understand just exactly what this bill will do.

As you stated in your summation, you know, the ingenuity of this bill is the fact that it gives credit for reductions in carbon emissions prior to any regulations being in place, and I think that is a fantastic process. It is an incentive for Corporate America. We all like to participate in our mutual funds today, and sometimes we put money into aggressive funds, where we're not quite sure if they're going to be extremely productive funds or if we're going to lose a little money, but corporations are the same way, they can utilize some of their capital spending. Corporate profits are at record levels right now. They can utilize some of their corporate spendings today to make those reductions as a hedge fund against possible regulations in the future, and I think that's imperative.

Beyond voluntary credit for reductions, one of the things that interest me the most, and I think has the most potential to impact Rhode Island, is the fact that you are giving credit for carbon sequestration.

Senator CHAFEE. Why don't you tell them what sequestration means? That's a big term that we'll be hearing a lot of today.

Mr. RABIDEAU. Would you like me to tell it?

Senator CHAFEE. Yes.

Mr. RABIDEAU. Very good. All undeveloped and vegetated space has the ability to sequester atmospheric carbon. Plants take in carbon dioxide and fix that carbon dioxide within the plant itself, they give off oxygen, so the carbon is taken out of the atmosphere and

fixed in a plant. If this were a wooden table, which it probably isn't, and I banged on it, that's sequestered carbon, the wood in this table is sequestered carbon, and as long as we don't burn the wood, we take it out of the atmosphere and kept in it in an earth state where it is not a greenhouse gas, and that's carbon sequestration.

Your bill allows companies to take credit for carbon sequestration on a per ton basis, and this isn't an unprecedented thing. From what I've been able to gather, in Oregon, for example, the Oregon Climate Trust worked with a local power producer to allow that producer to, when they were trying to cite the facility through the local and Federal regulations, they were allowed to create a sequestered landscape as part of their emissions standards, so they were allowed a certain level of emissions as long as they took care of this sequestered landscape for a fixed period of time. The Oregon Climate Trust is taking the initiative to monitor that landscape on every 10 years to prove that the amount of sequestered carbon that they thought they were going to get is actually occurring, or disproven, but those are the type of studies that are taking place right now, and I think, on a local level, it had the potential to just reap great rewards for states.

I brought a picture, am I'm going to describe it for you, Senator. I know you probably like aerial photographs. This is an aerial photograph for Warwick, Rhode Island. What we're looking at here is, this is Route 117, this is the Valley Country Club up in this area. The West Warwick/Warwick line is right in here. This is a real world case, Senator. You can see the development around the area. This is a very densely populated portion of our state. Residential development all to the west, commercial development on Route 2 all to the east. There's one lonely track of farmland left here, and I'll highlight it in blue for you so you can see it. The farmer right now is faced with the problem of having to pay the taxes. The farmer is currently in the process of developing this land. So, in all likelihood, if I bring you an aerial photograph of this in the year 2000, the end of the year 2000, you won't see this farmland. What you're going to see are these homes. If there were a mechanism in place for Corporate America to participate in the preservation and management of open space, this might not have to be developed, because at this point in time this farmland, because it's pasture, may not sequester that much carbon; however, if a reforestation plan were put in place over a period of 20 to 30 years with the help of U.S. Generation, or Ocean State Power, or Powell Edison, for that matter, we could probably have the Natural Resource Conservation Service work with these farmers, come up with a figure of how much carbon could be sequestered over that time, then we can approach these corporations and say, you get your credit if you help this state with open space. It's a unique concept, and I think it bears looking into.

I mean, you know, Senator, that in my profession I'm a wetlands biologist, and had anybody thought in 1972, when the Federal Government passed the Clean Water Act, that wetlands were going to be such a huge issue. Today, the Federal Government has allowed people to work in wetlands only if they demonstrate that there is a mitigation of impact.

When the Senators and the Congressmen worked with that bill in 1972, they faced the same problems you're facing with this bill today, with business and industry, but I think that everybody recognizes in 1999 the importance of protecting wetlands. Businesses, industries, farmers, land owners alike, they all now understand the value of those ecosystems. I think the same thing is going to happen here. Your vision in providing us with this bill today and your colleagues who cosponsored it with you is such that in the future, 20 years from now, we will be dealing with corporations and not just public money, in maintaining over space for the people in our state and in our country. That piece of property right there next year will go from the carbon reservoir to a carbon source. My hope is that if your bill passes and I can take legislation on the state level that will mimic it, in the 21st Century we will be stopping things like that and helping farmers preserve their land through the carbon sequestration process, and I thank you for the opportunity.

Senator CHAFEE. Thank you very much, Representative Rabideau. That's very, very helpful.

I thought what we would do is hear from each of the witnesses and then we'll have questions for the group gathered here.

Now we're going to hear from Ken Colburn, Director, Air Resources Division of the New Hampshire Department of Environmental Services.

Mr. Colburn?

STATEMENT OF KEN COLBURN, DIRECTOR, AIR RESOURCES DIVISION, NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES

Mr. COLBURN. Thank you, Senator Chafee. I'm pleased to be with you. I should add that I also serve as chair of the Global Warning Committee for Staff at the National Association of Air Directors.

In those capacities, I'm pleased to have the opportunity to address you today relative to S. 547, the credits for early reductions, Voluntary Reductions Act of 1999. In doing so, I'm mindful of the fact that S. 547 is only one of a number of environmental leadership initiatives that you and your staff at EPW has brought forward over the years. I think that your timing is going to leave some significant shoes to fill, Senator.

I'm also in a comfortable situation here as an environmental regulator. It's usually the case that I'm between the legislature and the business community, so I'm on familiar ground.

In New Hampshire, our economic livelihood has long been directly linked to the health of our natural environment, whether you harp back to the hay days of the paper and timber industries or look today toward our tourism-based economy and quality of life attractiveness. This linkage has remained a constant. Two other constants have been our State's traditional parsimoniousness and frugality and our stubborn reluctance to control and regulate, when outcomes equally good, outcomes can be achieved through properly encouraged voluntary action. Thus, it comes as no surprise, I'm sure, that we strongly support S. 547, a measure that shares these values. S. 547 would directly benefit both the economy and the en-

vironment and promote innovative, cost effective solutions on a voluntary basis.

S. 547 encourages U.S. entities, businesses, institutions, governments, etc., to pursue actions that will mitigate the threat of global climate change. In doing so, that will provide our Nation with other benefits as well, including substantial savings in energy expenditures, reduced air and water pollution, less waste, better natural resource management and enhanced technological competitiveness. Early voluntary greenhouse gas reduction measures will help ensure that the legacy we leave our children is not one of myopic selfishness and environmental degradation, but rather one of sustainable stewardship and respect for our planet. This Act is not about the science of global climate change, it's not about the Kyoto Protocol, it's not about what level of reductions are necessary or how much they will cost or through what flexible mechanisms they should be approved. S. 547 is about reducing uncertainty for U.S. businesses and other entities by ensuring that any reductions of greenhouse gas emissions that they undertake voluntarily will be appropriately recognized and credited.

U.S. businesses and other entities are reluctant to make such reductions at this point because of uncertainty about future regulatory programs that may be imposed on them to mitigate atmospheric concentrations of carbon dioxide and other greenhouse gases. Many are concerned that if the example of the Federal Clean Air Act amendments of 1990 holds true, that actions now will not be appropriately recognized and lead to increased burdens later on. The State of New Hampshire has had direct experience with this dynamic, inasmuch as the closure of the Pease Air Force Base in 1989 was not recognized as an emission reduction under the 1990 baseline in those amendments. This dynamic applies even if actions would yield cost savings, because the known benefits of today might be outweighed by the as yet unknown costs under a future program, and this isn't just a theoretical concern. Anytime an American company refrains from making itself more cost competitive, our Nation's competitive advantage suffers as well. S. 547 will encourage reduction of greenhouse gases and greater competitiveness by eliminating the potent disincentive of uncertainty.

How should a credit for early action program be designed? I think Mr. Fay and Mr. Hamburg and Ms. Fantozzi will go into greater detail on that, so in the interest of time, I will only leap over a couple of cornerstones that I think are important.

First, the reductions must be strictly quantifiable and verifiable, subject to third-party verification.

Second, they should not be limited to any particular program, particular carbon source, economic sector or even a particular greenhouse gas.

Some have suggested, for example, that only certain emission restrictions should count, based, for example, on whether they reflect genuine environmental intent. I would suggest that this approach irresponsibly cripples the vital linkage between economic and environmental well-being that we cherish and are trying to foster. It also introduces more lawyers into the process rather than engineers who are actually going to make the reductions. We should be

less concerned with motives and more concerned with getting tons out of the air.

Third, just as there are a variety of ways to reduce greenhouse gas emissions, we may need to employ a variety of yardsticks for measuring them.

And, fourth, great care I think should be taken in limiting the number of credits available because we might, similarly, limit the incentives available to folks who would participate in the program. I understand that may be necessary ultimately, but we should do so only with care.

Similarly, who should these entities be? Who should the participants be? They should—these incentives should apply across the broadest possible array of participants. I think S. 547 at this point does encompass that, and it also includes, as Representative Rabideau has mentioned, sequestration of carbon sources and sinks, not only one. That's important for us in north country state that have the opportunity to sequester additional carbon, such as those companies operating in the northern forestlands.

I'm particularly pleased that states and municipalities are allowed to participate in the early emission credits program envisioned by S. 547, both because they generate emissions themselves, who are also users, but also because we're typically left to implement whatever it is the Federal Government decides to do. Great uncertainty prevails here as well. In the case of the acid rain program, for example, the Federal Government, through EPA, dealt directly with emission sources. States have no role at all. In EPA's proposed NOx Transport SIP call, states were assigned emissions budgets, and, thus, did have a say in how these budgets were allocated.

Since most multiple environmental benefits, including significant reductions in the criteria pollutants and toxic air contaminants already regulated by states will accompany harmonized approaches to reducing greenhouse gases, the sooner states have more certainty and clarity about their future role, the better.

In an effort to reduce such uncertainty for New Hampshire entities, including the state itself, we've introduced legislation to create a state registry of voluntary greenhouse gas reduction. That bill, as it was introduced, is attached to the handouts. I can, with your forbearance, read the pertinent part. In order to help protect the interest of New Hampshire sources and the State's economy under a future Federal regulatory scheme relating to greenhouse gas emissions and to help encourage the voluntary reduction of greenhouse gas emissions by New Hampshire sources, the Department shall establish and administer a mechanism whereby sources of greenhouse gas emissions may record and register early voluntary greenhouse gas emission reductions made after 1990. The purpose of this registry shall be to help sources establish a baseline against which any future Federal greenhouse gas emission requirements may apply. I'm sure that——

Senator CHAFEE. That's rather unique, isn't it? I wonder if any other state has done anything like that.

Mr. COLBURN. Not to my knowledge, Senator.

Senator CHAFEE. State registry.

Mr. COLBURN. But I think that—I hope at least that many will. The bill at this point has been supported by our State Business Association and a letter to that effect is also in the packet. It was introduced in and has passed in our State Senate and has gone from the Policy Committee of the House to the floor of the House with a recommendation of ours to pass. So it's in pretty good shape at this point.

Besides states and municipalities similarly look forward to the opportunity to earn credits, the International Council for Local Environmental Initiatives, ICLEI, has worked with over 60 American towns and cities, and in doing so has reduced greenhouse gas emissions by almost 5 ½ million tons of carbon equivalent per year. In doing so, incidentally, they've saved almost $30 million a year in energy costs and have reduced thousands of tons of criteria pollutants.

As this example shows, states and locals have substantial experience and knowledge infrastructure in achieving cost effective, cost savings emission reduction. I urge you to tap into that experience in developing S. 547.

In conclusion, S. 547 and the Credit for Voluntary Reductions Act of 1999, is a crucial measure to remove existing disincentives to early constructive environmental action. By providing legal guarantees that responsible early actors will receive appropriate credit, S. 547 will spur entities to voluntarily undertake cost-effective, multiply beneficial strategies that include greenhouse gas reduction and economic competitiveness. We thus believe that establishing such an early reduction credit system at this time is in New Hampshire's best interest, in the Nation's best interest and future generations' best interest, and we urge you to move forward with it aggressively.

Thank you for the opportunity to assist in the creation of a sound, responsible early credits program, and I hope you'll call on the considerable expertise of states and local governments as you refine this groundbreaking initiative.

Senator CHAFEE. Thank you, Mr. Colburn.

Now, Mr. Kevin Fay, who is the executive director of International Climate Change Partnership. Mr. Fay came up from Washington. We appreciate that. Why don't you proceed, Mr. Fay?

STATEMENT OF KEVIN FAY, EXECUTIVE DIRECTOR, INTERNATIONAL CLIMATE CHANGE PARTNERSHIP

Mr. FAY. Thank you, Senator. I appreciate the opportunity to appear before you today. It's also a good opportunity, I appreciate the opportunity to come back to my home here in the State of Rhode Island.

I guess as the industry representative here I'm going to be burdened with representing the left, the middle and the right based on your comments at the beginning. I'll do my best.

The International Climate Change Partnership is a coalition of U.S. industry representatives and associations, as well as the international associations, interested in the policy development process with respect to global climate change.

We appreciate the opportunity to appear before you today and commend you for holding this hearing on this increasingly important topic.

ICCP, as in contrast to IPCC, was organized in 1991 to provide an industry forum to address this issue and to be a constructive participant in the policy debate. We continue to recognize the climate change issue as an important matter which the Government should and are concerned, and we are one of, if not, the largest industry coalition in the world focused exclusively on this issue. A list of our member companies and our associations is attached to our testimony.

Senator CHAFEE. You're not just U.S.?

Mr. FAY. Not just U.S. Not just U.S. We have memberships in Europe, Canada, Japan and Sydney, Australia, and, as you can see, these are large industries and most of the key manufacturing sectors in this country and elsewhere in the world.

We have consistently stressed the need to provide legally binding assurances that voluntary actions to reduce greenhouse gas emissions will be credited for any future mandatory scheme adopted by the Government. We believe that such credits should be granted to those companies that achieve verified reductions between 1990 and the commencement of any mandatory program.

Senator CHAFEE. Can everybody in back hear OK? Yes, raise your hand. OK. No? Put the microphone down a little bit.

Mr. FAY. OK. ICCP last year outlined a series of principles on credit for early action that we believe could help guide the legislative and policy process on this issue. There are ten principles which I have enumerated in my testimony. I thought I would just highlight a few of these principles.

The first, we do not believe that there should be a limit placed on the amount of emission reductions on enhancement of sinks for which early action credit can be earned. If you can achieve verifiable reductions, you ought to be able to receive credit for them. The environment knows the benefits.

Second, credit should be granted for action resulting in verified emissions reductions or enhancement of sinks that occur between 1990 and the beginning of any official budget commitment period or mandatory regulatory action, whether or not these were part of a government sponsor initiative, such as the Climate Change Action Plan or as one of the permitting referred to as the Department of Energy, 16.05 (b), Reporting Permit, and, again, industry can show that they achieved verifiable emission reductions, whether it was part of an ongoing government program, they ought to be able to apply for that to the Government and be credited for that.

Third, we think it's critical that a process is established to determine and lock in appropriate baselines for emission reduction activities, including facility operations, product-based initiatives, as well as enhancement of sinks. This process should be flexible enough to reflect special circumstances, including unique consideration relating to reductions already achieved.

And, fourth, credit programs should be integrated to ensure consistency and to avoid double counting. This is a big concern in the environment community, but it's also a large concern in the industrial community as well, and, in fact, the registry in New Hamp-

shire that Ken has referred to is an area where we found that there is a start of an increase of state activity in this area, and we want to make sure that we don't get into conflicting principles in terms of registering the credits to make sure that they are integrated and consistent and that we aren't counting twice. So those are just a few of the principles that we've highlighted as part of consideration of this issue.

In February of this year we sent a letter to each member of the U.S. Senate urging them to cosponsor your bill, S. 547, the Credit for Voluntary Reductions Act. We believe the bill is a credible start in addressing the issue. We've also identified several issues as part of that bill that we need to continue to discuss, and we encourage that this hearing is the start of that process in working with you and your staff on those.

As discussions have progressed, we've also come to the conclusion that in the current political climate the efforts to enact credits for early action legislation will be enhanced by at least identifying a simplified approach or goal so we can explain to everybody what it is that we're doing here, because the complexity of the issue quickly gets us into a level of detail that's going to slow down the legislative process.

The goal of the legislation should be to accomplish, we think, three things.

One, to provide legal guarantees to any entity that acts voluntarily to achieve verifiable reductions related to products, processes or operations, that it will not be disadvantaged by the future regulatory program to control greenhouse gas emissions, that should be the first principle.

Second, to provide a mechanism for verifying any actions that occurred between 1990 and 1999 under either the Energy Policy Act, Section 16.05 (b), Reporting; or as part of the Climate Change Action Plan; or, as I said before, any other activity in which the entity is able to demonstrate verifiable reductions, and the significance here is we think we need to separate out the past actions from future actions. Everybody is getting concerned with the difference between things that have already occurred versus things that could occur in the future.

And the third goal should be then to provide the mechanism for prospective actions, which subject to negotiation of agreement with the Government will produce additional verifiable reductions.

We believe that S. 547 embodies these three goals. We believe this program, the intent of this program should be to encourage experimentation on the part of the Government, industry and the environmental community and not to constrain the ability to develop new and creative methods for implementing and achieving reductions.

While the program may require flexibility in terms of the precise value of the credit perceived, it should be clear that the credits exist as a matter of legal right.

In order to ensure an open process, it should also provide for public participation in the verification procedure, notice and comments, public disclosure, a future of negotiated agreements.

Also, we don't believe that the program should limit government participation by any particular department or agency. The prin-

ciples of the bill, similar to the principles we outlined earlier, could be used by any department, whether it was the Department of Energy, or agency, the Environmental Protection Agency or the Department of Agriculture, to craft verification agreements with individual actors.

Senator CHAFEE. I'm not quite sure what you're saying there.

Mr. FAY. We think that the bill should outline——

Senator CHAFEE. I mean, don't they have to have some definiteness?

Mr. FAY. Yes.

Senator CHAFEE. I don't know what sort of shopping, the Agriculture Department or EPA or Energy Department.

Mr. FAY. No. We think the bill should outline the basis of the principles for future agreements, but that if you're an agricultural interest, the principle should be the same no matter who is doing the implementing, but the president should be able to authorize the Agriculture Department to enter into agreements with its farm community or its forest community, the Energy Department should be able to enter into agreements with its utilities, but the principle should be the same, the president should be required to ensure that in all cases that they're following the same principles in doing that, but that they—we have this constant comment from our own industry members, as to whether farm shopping, some industry sectors work primarily with EPA today, some work primarily with DOE, some work primarily with the ag department. We don't think it's necessary to have to put the entire program at any one of those agencies, but the principle should be the same for each one.

It has been suggested that supporting credit for early action legislation may unwittingly create support for the Kyoto Protocol.

Senator CHAFEE. That's one of the arguments used against it. It's the camel's nose under the tent, that wicked Kyoto Protocol is in some way going to be approved if we have credit for early reduction.

Mr. FAY. And we don't agree with that. The Kyoto Protocol——

Senator CHAFEE. I have difficulty following the train of thought.

Mr. FAY. Well, as was explained to me by one of your former colleagues in a meeting recently, is that once industry has these credits, that they're somehow going to want a mandatory regulatory program so they can cash their credits in. I haven't met too many of my industry clients who get so excited about having something, that they then need to create a regulatory program, so I think that Kyoto is going to have to stand on its own. Kyoto was actually a very successful negotiation from the standpoint of achieving a market-based framework for dealing with the issue, but it is still an incomplete agreement and requires a great deal of work on the part of our Government or other Governments to finish that agreement, whether it's Kyoto or son of Kyoto or something else. Most industry, in our view, has recognized that the climate change process, policy process is moving forward and that the science is enough to be concerned with.

But many companies have already taken action based on the framework convention on climate change, which was ratified by the Senate in 1992. This agreement called for the U.S. to attempt to stabilize greenhouse gas emissions at the 1990 levels by the year

2000. Those who have acted in good faith or who have taken action prior to any mandatory program should be able to receive legally binding assurance that their verified reductions will be credited, regardless of the underlying basis for some future regulatory mandate.

I have attached to my testimony the just released report from the Energy Information Administration of DOE that summarizes the voluntary actions taken in 1997. These are the actions reported under Section 16.05 (b), and as you can see from that report, and I'd ask that it be included as part of the record here, that they are reporting hundreds of millions of metric tons of carbon equivalent reductions being reported by industries from a variety of industry sectors. Similarly, the Environmental Protection Agency reports annually on the results of efforts under the President's voluntary climate change action plan. Clearly, industry is already acting. Now, with the fear of a future mandatory program, there is something of a disincentive, which Ken Colburn has referred to, for acting now until the answer is ascertained as to whether they will receive credit for those actions.

ICCP believes that the precedent for crediting early action was established in the 1990 Clear Air Act amendments, when companies who moved early on sulfur dioxide emission reductions received additional considerations in the subsequent sulfur trading program. Relying on this statutory precedent is important for the climate change issue; however, given the scope of industries covered and the enormous task of the effort to be undertaken, we believe that Government should go on record now by developing a program for creditory action in advance of the regulatory requirements, not waiting until after the passage of some omnibus climate change bill here in this country.

The fact remains that the United States is on record in support of responsible action to address greenhouse gas emissions, and many, if not, most in industry now are also on record of pledging their support, if not for Kyoto, at least for dealing with the issue.

We have ratified the Framework Convention on Climate Change. Congress has funded a variety of activities with the Climate Change Action Plan and other significant programs. It is not unreasonable to request assurance from the Government that these activities, whether past or in the future, not place the voluntary actors in future regulatory jeopardy.

We're prepared to work constructively to arrive at consensus with other business groups, the environment NGO's, government officials on a workable voluntary program.

We applaud you, Senator, and cosponsors of S. 547 for a commendable start, and we look forward to working with you to ensure a successful conclusion.

Senator CHAFEE. Well, thank you very much, Mr. Fay. That's very helpful. I might say you got a little missionary work to do with Mobile.

Mr. FAY. Not a member.

Senator CHAFEE. I read with interest the outburst of the president of Mobile. At the last stockholder's meeting they had, he indicated that the Kyoto agreement was negotiated by boy scouts and

he's going to fight it all the way. I wouldn't say that his approach was very helpful. OK. Thank you very much, Kevin.

Now Dr. Steve Hamburg, Ittleson Associate Professor in Environmental Studies right here at Brown. Doctor, I appreciate your coming. The Doctor testified before us in Washington several times, and he's always done a good job, we appreciate it.

STATEMENT OF STEVEN HAMBURG, ITTLESON ASSOCIATE PROFESSOR OF ENVIRONMENTAL STUDIES, BROWN UNIVERSITY

Mr. HAMBURG. Thank you. I appreciate the opportunity to testify again today, and I would also like to welcome you here at Brown.

Senator CHAFEE. Thank you.

Mr. HAMBURG. It's seldom the Senate comes to you.

Senator CHAFEE. Well, my grandfather was a Brown graduate, my father was a Brown graduate, my son was a Brown graduate, so we're dipped in Brown.

Mr. HAMBURG. I should mention, since you mentioned the IPCC, that I have been involved as a member of the IPCC both in the second assessment and currently am involved in writing a special report on land use and land cover change that's trying to address some of the issues that you are attempting cover in S. 547. Today I'd like to speak about the overall strengths or the concept of an early action accrediting program, and then more specifically about the carbon sequestration aspects of the bill, which is my area of expertise.

The science underlying climate change and impacts often baffle people, and, as a result, the issue is often dismissed out of ignorance rather than knowledge. In particular, the complexity of the accounting necessary to verify changes in carbon storage in natural ecosystems all too often leads people to dismiss the potential of land use changes to reduce the impacts of the increase in atmospheric concentrations of carbon dioxide, and I think this is misplaced. We know enough about the global carbon cycle to be able to predict potential impacts of energy and land use practices on the rate of increase in atmospheric carbon dioxide concentrations. What we do not know is too often the focus of discussions about the carbon cycle and certainly other aspects of the cycle that require further elucidation, but this uncertainty is not central to the viability of the legislation that you propose. The science of both climate change and carbon cycling is sufficiently well understood to provide a solid basis for the enactment of the credit for early action bill. It's important to remember that the underlying science on which we base our understanding of the carbon cycle originates not with the debate concerning climate change, but far earlier with the advent of a series of professionals from solar culture, oceanography and many others. Even though it has only been during the last several decades that a large number of scientists have focused on the carbon cycle, our underlying understanding is based on scientific discoveries accumulated for over more than half a century.

S. 547 attempts to encourage energy users and land owners to think about how they can reduce emissions, while at the same time serving their own direct interest, and I think that leads to a very positive outcome.

Since other members of the panel have talked about the energy side of the bill, I'm going to focus my remaining remarks on the land use side of the Act.

Tens of thousands of land owners, including some the one described today by Representative Rabideau, make decisions every year what to do with their land, should they cut timber, should they develop, should they use no till agriculture or simply do nothing. Each of these decisions has an impact on the carbon cycle, albeit very small. In the aggregate, the impact of all these decisions could have a significant impact on the carbon cycle, and, in turn, on the change.

Since there's consensus that we want to encourage America's land owners to make wise land use decisions and we want to ensure that we manage these resources sustainably for generations to come, S. 547 makes a lot of sense. S. 547 can provide a powerful tool in helping land owners to make sustainable long-term land use decisions.

As a land owner myself, I often get solicitations requesting that I cut my forest, selling the timber to basically fly-by-night companies, and a lot of my neighbors do that, but I think that with a bit more planning and with management, we can actually increase the profit to these individuals and increase the productivity of the land and do something to mitigate climate change.

Maximizing carbon storage in the land is a very good metric for examining long-term sustainable management of America's lands. If we give people an incentive to maximize carbon storage on their land, what we're doing is encouraging them to remove resources in a conservative manner. If this bill is crafted wisely, and, of course, I've included some legislation as to how I think it can be wisely crafted, we can reduce the buildup of greenhouse gases in the atmosphere, at the same time as increasing the use of best management practices, and, even better yet, we can do that at little cost to the taxpayers.

Some people may be concerned that by conserving carbon we will be reducing fiber or timber or agricultural production, but I think it's very unlikely. The value of carbon credits will not be sufficiently great to get people to take productive land out of production, but it's very reasonable to expect the value of carbon credits to be high enough to get people to manage productive lands a bit more conservatively. S. 547 will provide people with the potential to get a bit of extra revenue for managing lands wisely.

All too often we know what we should do but we just don't quite get around to doing it. The proposed legislation will help give people a little extra push.

I heard an argument against the bill based on interpretation of the legislation that assumes that land owners will be given an opportunity to benefit from intensifying land management, but this need not be the case. It's not difficult to write language for inclusion in S. 547 which requires vigorous carbon accounting, which others have spoke about, which means that clearing overgrown forests or intensifying agricultural production will not yield carbon credits.

There are three elements that I would like to see included in the language with regards to the land use side of the bill. There needs

to be low transaction costs so that most land owners can participate. The carbon accounting needs to be correct, as others have spoken about, and there needs to be——

Senator CHAFEE. When you say low transaction costs, what does that mean?

Mr. HAMBURG. It means that sort of what you have to put in to comply, what does an average land owner have to do in order to be able to participate in the program. If it requires that you go out and measure every tree and dig soil pits and measure the soil carbon and do lots of things, most people won't get involved because of the value of the carbon would be too low relative to the cost of participation, so we need to make it easy for the land owner to be able to actually participate, and I can design a program that will do a great job of accounting for the carbon and no one would participate because the value of the carbon would be less.

Senator CHAFEE. You mean you indicate what kind of trees to grow?

Mr. HAMBURG. Just what kind of trees are there. There's some simple approaches that you can use where you can characterize the land, and on average calculate the amount of carbon increase, the net carbon storage fairly accurately without the land owner actually having to do a lot of work.

Senator CHAFEE. A deciduous tree must be a lot of different than an evergreen, the absorption of carbon?

Mr. HAMBURG. Yes. They're actually not that different, but there good ways of estimating that without having to know a lot, and that's where we can use the forest inventory program that the US foresters conducts nationally, and we have really good statistics on which we can base this, and we can, basically, we can get it right on a national basis, I mean quite accurate quite easily.

The third element would be a requirement of additionality. We need to, we have lots of actions we take on the land now. What we wanted people to do is take additional actions. We reward them for simply doing what they're already doing, or which they are not going to change. We're not effecting a net change in atmospheric carbon.

Keeping those transaction costs low will facilitate greater participation, particularly amongst small land owners, which are the bulk of America's land owners. At the same time, we have to get the carbon counting correct. These two things could create tension in the way we just talked about, but, in fact, I think they can be, the legislation can make them compatible. We need to be comfortable in saying that we're crediting only net increases in carbon and not simply carbon being fixed through photosynthesis, and this came up a bit, and, again, in Representative Rabideau's testimony, and I want to take a moment to talk about this.

Plants take atmospheric carbon and convert it into organic compounds through photosynthesis. The annual amount of carbon that is removed from the atmosphere through photosynthesis is very large. It's actually an order of magnitude greater than the emissions from fossil fuels on an annual basis. Yet, almost all of that photosynthetically fixed carbon is released back into the atmosphere on an annual basis, so what we're interested in crediting is

the net carbon, the difference between those two, and it is easy to lose track of what we are actually after here.

Senator CHAFEE. What's respiration mean, how is it released back into the atmosphere?

Mr. HAMBURG. You release, you perspire and you're burning off the food, the carbon and the food back off a CO_2. Trees are doing the same thing as our plants. So the carbon, the CO_2 in the atmosphere is fixed through photosynthesis into organic compounds, those are actually burned by the plant or by animals, given off as CO_2. And, in fact, I've seen language that's been proposed for inclusion in the bill that would net this gross carbon, not the net carbon. Basically, some would propose a free lunch. You go out and we give credit for lots of carbon that is not in any way helping the atmosphere, and so we have to guard against doing this, and, in fact, I think we can quite easily.

The third element that I want to see included, or encourage inclusion in the bill relates to this additionality. We should reward only increases in net carbon that are attributable to decisions made after enactment of this bill. Forestry or land use is a little different than on the energy sector, where often you lock yourselves into a future as a function of a past action. We only want, or I would suggest we should only credit carbon for which the land owner has an option for doing something else, and we want to encourage them to take the correct action.

I've attached legislative language that I think meets these three objectives in an operationally viable and clear manner. The language is relatively technical, but I believe it's effective in meeting the criteria.

We have a hundred years of accumulated knowledge in the forestry profession that I think we can take good advantage of, as well as a very robust data base that is collected by the U.S. Forest Service, and I think that we can do all of that.

I think S. 547 can increase wide stewardship over natural resources while greatly reducing the increase in atmospheric concentration for carbon dioxide. It's important to get started on addressing climate change in the proposed legislation, it is a logical first step, and I would be happy to work with staff on incorporating the language that I propose. Thank you very much.

Senator CHAFEE. Thank you very much, Dr. Hamburg.

OK, Ms. Peggy Fantozzi, Chair, Massachusetts Commission for Conservation of Soil, Water and Related Resources. Thank you very much for coming today.

STATEMENT OF PEGGY FANTOZZI, CHAIR, MASSACHUSETTS COMMISSION FOR CONSERVATION OF SOIL, WATER AND RELATED RESOURCES

Ms. FANTOZZI. First, I wanted to thank you for providing us an opportunity in Rhode Island as opposed to Washington, D.C. to do this, it's quite a short trip by those standards. And I also would explain that as Chair of the Massachusetts State Commission, I am a member of what we call the Conservation Partnership, and I know that you are aware and your staff of what that term means. Basically, it means that there's a state entity, there's a Federal entity, which is the Department of Agriculture's Natural Resource

Conservation Service, and then there's a local entity, which are conservation districts and resource conservation development councils, which are volunteer groups. The Chair of the Massachusetts State Commission has traditionally been a conservation district volunteer, and I fill that slot in that manner. I am not a state official, I am conservation district person who chairs that commission, and the testimony that I'm giving today will reflect on the Conservation Partnership, not only Massachusetts, Rhode Island, New England, but on a national basis, and it will emphasize the voluntary, you know, your constituents, what we do, how this will affect the work that we do and make us do better things all around, hopefully, for the communities that we serve.

I have provided information with my testimony that gives background on who we are and what we do. I won't necessarily go into that today, but, just for the record, if those people who are not familiar with the Conservation Partnership.

For the record, there are more than 3,000 conservation districts nationally, they are based on a county basis, based along county lines. There are, also—and they are in every state and in every territory of the United States. There are also more than 300 RC&D councils, Resource, Conservation and Development Councils, they cover most of the United States, and provided the graphics, the green is where they are and the yellow is where they are in the process of being, hopefully. And, as I said, we are not only your constituents, but we are the voluntary army that tries to link land users, land owners in the private sector and community-based sectors with services within state government and within Federal Government, so we provide a bridge to do the work on the ground and get the results, I hope.

I have provided written testimony, and I am not going to go over point by point, because I think I'm in sync with most of the speakers that have already addressed some of those, but I would like to emphasize what I didn't really stress in my written testimony, and that was the need for this bill and the need for this bill from a practical sense. Right now carbon sequestration, or the short term that we use in the voluntary community is carbon storage because people seem to understand that better.

Senator CHAFEE. I think that's a better word. I've never understood why the word "sequestration" was used.

Ms. FANTOZZI. Because those of us that deal with science or legislation like flashy terms, those of us that deal on the ground with the average citizen like the direct term, so I'll use storage, if I may.

Senator CHAFEE. All right.

Ms. FANTOZZI. In any event, right now it's risky business, as we see it, and when we talk with land owners and when we talk with industry. The biggest plus of your bill is that it takes the risk out of the goodness that can be done, and that shouldn't be understated. Conservation districts and the Resource Conservation councils are already doing what you talk about setting up the mechanism for in the real world. There was a reference to Oregon. Oregon and Washington, we have RC&D councils out there that are literally working with utility companies, with utility company money to establish credits. We have projects going on in Iowa that also deal with the science of actually validating what type of land

use, what type of best management practice will yield what amount of carbon storage, and we're dealing in Montana with the forestry aspect of it, linking two state programs, as was referenced by Mr. Colburn from New Hampshire, so we need this because we're doing it.

The other component of your bill that I think is helpful is that it doesn't set a standard by itself, it just recognizes the need to set a standard, and it also gives the flexibility to make that standard appropriate to where you are in the United States, whether you're in New England or whether you're in Hawaii or whether you're in Arkansas, I guess would be a good place to pick. The characteristics of the climate are almost more important in some instances than the land use, and so the credit that gets attributed to the land use is significantly altered by the climate.

I learned from a conference sponsored by the Northeast Governors Coalition relative to forest impacts of carbon storage, that our area, New England and the middle Atlantic state, probably could get more credit per acre than Hawaii or some of the southern states, and, although that might not seem like new news to some of the scientific community, there are a lot of people out there that think southern climates grow faster, grow more carbon, therefore, you know, would be of more value. That's not necessarily the case. Your bill allows every region of the country to understand its own capabilities in terms of its land use and its vegetative growth patterns and its land use management practices, and that flexibility is critical to making the program succeed.

Your bill also will provide a validation of our work and a recognition of the environmental benefit and stewardship, and it will provide, I think, a mechanism to develop that third-party verification system, and I will later get into an area that you mentioned before, and I don't mean it as a he said/she said and who said which agency should do what, but some suggestions relative to that.

I think the bill also recognizes that a strictly regulatory approach to control emissions and require storage of carbon may not be the most effective and will not maximize the opportunity for implementation. I think that the Federal Government, the agencies, EPA in particular, have set a precedent for saying this is true through the Clean Water Action Plan and the Clean Water Act itself, saying, yes, the regulated community can be controlled to a large degree, but the greater majority of the land that's critical for this to succeed is held in private ownership or municipal and state ownership that isn't regulated, so we need to set a way of getting to those folks, and this bill allows that and recognizes it.

Further, by being voluntary you don't get into a lot of the court appeals. I haven't read the case, but I know recently EPA was in court on the air quality issue and they came out a little bit short in terms of the legal decision. So we're not getting into those kind of contests, if you will, with the way that this bill sets the stage for providing an opportunity to everyone.

I'm skipping through because I had made some notes, but I don't want to be repetitious of those comments that were already made.

I guess one of the cautions that I would put into the testimony, if I would, that other speakers have alluded to some limitations on how to apply the credit system, and the two issues that jumped up

to me was by side or by ownership, and I would suggest to you that I think it would be an error on the part of the legislation to try to get into either one of those. Ownership shouldn't be an issue, as was said by some of the speakers who were there, it's the intent, we want to store carbon, we don't care who's doing it, and it shouldn't be penalized by who the land owner is. So ownership of the land I think is maybe the least important criteria for moving forward and implementing what you're talking about. Quite frankly, in my neck of the woods, on Cape Cod and in Massachusetts and in Rhode Island, municipal and state ownership of forest lands are primary that I think should be able to take advantage of some of the revenues and providing some of the storage, so I would hate to see a limitation be placed on private land. I think it should be wide open.

The other area of concern in terms of limiting it to size, I think the sciences out there, I know the Natural Resource Conservation Service and the Forest Service have established a way of formulating credit values by land parcel and by land use, so they can break that down to a small parcels, as well as expand it up to large parcels. The problem with doing a size limitation, in my opinion, would be limiting the willingness, ability or incentive for urban areas to take part in it. Urban areas, or highly developed areas, like the northeast, don't have much land. I mean, you can talk about a thousand acres or 5,000 acres in the middle part of the country or the western part of the country, and it's an easy fix and it's an easy match, but I would say to you that if downtown Boston could put two acres into some sort of forested use and would seek some carbon credit payment for that, I would champion that and say that it was money wise spent in a location better suited maybe than 5,000 acres out in Arizona. Not being from Arizona I can say that, I guess.

Anyway, those would be some of the comments that I would make in a generic sense.

In terms of the testimony that I provided, I did make some suggestions, as everyone has, and a couple of them I think are a little bit different than some of the things that have been mentioned.

Oh, and if I can go back. Some of the things that I like that the bill doesn't do is the bill doesn't promote regulation, it doesn't inhibit private enterprise, and I think a couple of speakers related to that. It opens the playing field wide open, so that as we learn more, we can apply it, whether it's in relation to wetlands, forests or any other kind of mechanisms for storing some of these carbon gases. It does not require linkage to existing or proposed international agreements, it does not restrict private business options, it does not subsidize commercial interests, and I include farming as a commercial interest, and it doesn't create an additional bureaucratic layer.

In terms of maybe improving the bill, I would suggest that maybe if, in the bill or as a cover to the bill, there was verbiage that urged the president to recognize a leadership role for USPA, the NRCS, the Natural Resource Conservation Service and the Forest Service, to share in setting guidelines for the voluntary credit system. These agencies should rely on their internal technical expertise, as well their partnership capabilities and connection to the

private sector, and I think that that's important to recognize, that these agencies not only have that technical expertise and already have the data to support that, but they also have the connection through the partnership, to districts and to RC&D councils to actually talk to and get the private sector on board. To recognize the technical expertise, not only of USDA, but EPA, NOAA, the Department of Interior, the Department of Energy in development of regional or state-specific guidelines, and that's very important, the national guidelines won't apply, they won't hold up, at least as I've learned about this. Also, to instruct Federal agencies to revisit their own land management polices and practices, to encourage minimization of greenhouse gas emissions and maximize best land use management practices on Federal lands, as well as any other public lands that receive Federal dollars, and then recommend to Congress itself that some additional funding be available for regionally located demonstration projects that partner greenhouse emitters and land owners providing carbon storage or carbon sinks and the Federal technical expertise, to help provide preliminary scientific baseline information. I do know that the NRCS budget for fiscal year 2000 actually proposes some additional funds to do this, but I think if Congress recommended it, there could be some guidance so as to make sure that these demonstration projects were all done in all parts of the country, to generate the data that we need from all parts of the country.

And then in closing, I just, I would take this opportunity to thank the committee and the office for sponsoring the bill, for their efforts in bringing this issue forward, and I would also like to express the sincere appreciation of the Conservation Partnership here in New England, the east region and across the Nation, for your, Senator Chafee, support of our efforts and your constant champion of the environment for its own safe, as well as for the common good. You and your staff are to be commended for your relentless efforts to do the right thing for the common good in a way that makes common sense. That doesn't happen very often.

I have family ties in Bristol and in a Providence, and, therefore, I have taken pride in your service to Rhode Island, but as a resident of Massachusetts, I can tell you that I'm honored to lay claim to you as a New Englander and as a United States senator, and as you will no longer in the future be with us in that role, I just wanted to say thank you.

Senator CHAFEE. Aren't you nice. Thank you very much. That was thoughtful of you. I want to thank everybody for their presentations, which were excellent, and now I've got some questions that I'll ask.

Dr. Hamburg, it seems like you plant trees and they absorb the carbon, but then there comes a time when they release the carbon, and have we made any progress?

Like you, I'm a small land owner. Suppose I want to do the right thing, what would you recommend, Dr. Hamburg?

Mr. HAMBURG. I think——

Senator CHAFEE. Also, I don't envision that when we get this regulatory system in effect, that they're going to be dealing with a small land owner, that Dr. Hamburg's 20 acres, wherever it is, I

think it's more of just a voluntary thing that you're doing to wrestle with this problem of carbon dioxide in the atmosphere.

Mr. HAMBURG. Well, let's start with the 20 or 30 acres. I actually think they can be included in the program in the language that I submitted. What we do is actually create a, sort of a consortium, a way of coming together, sort of equivalent to small business owners. You know, the average small business owner can't participate easily because of the regulatory framework, but land owners, as the NRCS and other groups, or the Timberland Owners Association in New Hampshire and elsewhere, they come together regularly, so I think actually you could have 20-acre land owners participating quite effectively without it becoming burdensome on either side.

In terms of land management, New England, it's about how you cut your forest, do you cut your forest. When you cut it, do you get a fly-by-night outfit that sort of cuts everything and leaves a lot of trees lying on the ground that are just going to rot or do they selectively go in and effectively remove the timbers so that you're maximizing the usefulness of what they remove as opposed to having lots of waste.

It actually turns out there's quite a options there, and that if you talk to state foresters, they're constantly trying to push their land owners toward that best management practice, but they have trouble figuring out how to do it, and if you actually give them an incentive, where you say, well, there's this program here that is going to accumulate some credits that may some day be worth something, that may help to push them toward wise management.

Senator CHAFEE. OK. Mr. Fay, here is one for you. What are we going to do about the growth issue when we deal with this? We're trying to anticipate—what we're trying to do is give people credit for early reduction, but let's say you're BP, you're British Petroleum, and you're growing, so that you've done the right thing, you've come forward, you've made reductions, but at the same time, because you're growing, you are producing more CO_2, what do we do about that?

Mr. FAY. Until we get to a future regulatory program, it seems to us that what it requires is for the entity, whether it's an energy company or a manufacturing entity, to first look at what their product is and how they might measure their reductions. One proposal is to have what's referred to as a rate-based approach, where you measure your emissions per unit of product manufacturer or per dollar of sale of the company, and that's one potential. Frankly, we could use some experimentation on it in this period to determine if it's an effective way, does it still produce a verified reduction. Ultimately, when you get to, if there is a hard cap in the future, we have to figure out how a rate-based approach would work in that kind of a scheme, but you certainly do not want to set a system that would artificially cap your ability to grow because of the need to achieve the climate change reduction requirements, and so it's a question of trying to find a creative way to do the accounting for that that produces a verifiable reduction, but that at the same time also allows the economic activity to continue.

There are other industries who may not be grown. There are other industries who may be declining, you have that constant transition, but right now what's needed is the experience with the

accounting procedure of how you do that, and we think that the rate-based approach is one method, some type of percent approach may be another, and I think those are areas that we should be looking at as we move forward with the bill.

Senator CHAFEE. We have discovered that the concept is a wonderful one. You know, obviously I'm for it, of getting credit for early reduction, but then once you start drafting your legislation, it gets very complicated, as you know, you've been helpful in sitting in and giving us a hand, and you get this whole business of growth that we just discussed. But let me try this to a couple of the local officials over here.

How would you—I mean what New Hampshire is doing is very interesting, as they say, the registration bureau, I don't know, whose department is that under?

Mr. COLBURN. The legislation charge is the Department of Environmental Services.

Senator CHAFEE. Which is your state Department of Environmental Management?

Mr. COLBURN. It's our EPA.

Senator CHAFEE. Your EPA. And so that's the way your state is responding to this global climate change?

Mr. COLBURN. Yes. We don't see as much of a conflict with the multiple agency issue that Mr. Fay mentioned, because, remember, this is only a registry, we don't have the opportunity yet to assign credits because we have no authority to engender credits, so effectively what we're doing is suggesting that by a source coming in and registering with us, they gain the ally of the state so that the state stands with them against any future baseline determinations, which may be inappropriately low.

Senator CHAFEE. Mr. Rabideau, I just wanted to say that there is a lot going on in the area that you're interest in, in other words, more Federal funding, the Land and Water Conservation Act is a source of funding in Washington that we're trying to get moved, dedicated to open space purchases so that we can give a hand to communities, such as Warwick. I think, in this particular case I think they looked at that farm and there's just a limit to how much the city can takeover.

Mr. RABIDEAU. That's correct, Senator.

Senator CHAFEE. They've got an outstanding Mayor down there, so.

Mr. RABIDEAU. Why do you think I chose Warwick.

Senator CHAFEE. You looked into it. I will report that the City of Warwick in the last 5 years has purchased more open space than in the prior 31 years, so they've done aggressive campaigning.

Mr. RABIDEAU. If I could echo one thing, and Ms. Fantozzi just touched on it very briefly. The Natural Resource Conservation Service is an arm of the Department of Agriculture that is uniquely positioned to help with this issue. One of the things I'm hoping to have our northern district here do is to acquire some Federal money, if the budget reflects it, to start to put together a data base of degraded lands in our state, because it doesn't always have to be a forested land. We have a number of degraded freshwater wetlands throughout this state, and if we start, as they're starting in New Hampshire with their registry, OK, of emitters, my thought

here in Rhode Island is we will start to register the data base of land that's available that could be effectively changed to assist with the sequestration rate or the storage rate of carbon in this state. So, you know, those efforts are important, and I can't echo enough the importance of a Natural Resource Conservation Service to this state and to my community.

Ms. FANTOZZI. Senator, if I can followup on that. The Partnership, not just NRCS, first of all, but the point that I was trying to make in suggesting adding language to the bill to recognize that the data base that you're talking about exists within the Partnership across the country, and so it's not something that needs to be recreated or things like that, there are systems already out there, and I think part of what I hope your legislation or direction that it will go in either verbiage, direct verbiage or attached guidance, is to say let's not recreate the wheel here, let's use what's available and recognize what's available to help solve some of these problems.

Senator CHAFEE. Now, one of the things that we keep hearing from the environmental community is that the science of carbon sequestration isn't well enough developed to rely on in a program like ours, in other words, you get all kinds of arguments, some power company, you were mentioning some power company, they buy 2,000 acres in Guatemala and use that as an offset and we get into all kinds of discussions back and forth. I suppose it can be measured more accurately than some of us think, is that right?

Mr. HAMBURG. Yes. I mean, actually, there's very good procedures for measuring it, verifying it. The biggest issues are the social ones that are associated, what we refer to as leakage, so did that activity go somewhere else, and because in the domestic arena we actually have such a robust inventory system of our forest, that I think we can deal with that problem, so that if you protect your 20 acres and let's say don't cut them, did I cut mine to meet that same demand, and that becomes an important issue. We can deal with that because we have a national data base that we collect. The big question when you go to Costa Rica or to Bolivia or somewhere is knowing that the fact that you protected that piece of land didn't just mean the piece next door got cut. I think that we have the know how to measure it and we have the know how to verify it, and I think that the environmental community that's subjected is really a guide for different arguments, that argument is related to a philosophy that the only way we should deal with climate change is by solving energy use problems, it's a philosophical argument, and personally I have not, I've worked with a lot of environmental communities, seen any evidence that the carbon accounting is suspect. The bottom line is, I mean the science is sound, it's a philosophical argument, should you include land use or should you not purely because they argue the fossil fuels are the problem. You should solve it with fossil fuels.

Ms. FANTOZZI. Senator, I would like to add to that, that I agree and that I think defining and measuring the carbon storage for the emission is much better and scientifically sound than measuring such things as biodiversity, impacts to wildlife habitat, and those folks are right up there for, you know, validating whatever process

is there, so I think we're ready, it's just a question of jumping in and doing it.

Mr. FAY. Senator, let me add to that. We participated in a lot of discussions over the last 6 months on this topic and this inordinate fear among some of the environmental community that they we're going to give something away, and it gets raised by others in industry, we don't want to see anything happen, or some inordinate fear that in giving something away, they may be somehow disadvantaged, the nonaccurate is they think may be disadvantaged in the feature as well, and we think the logic for this type of an approach that your bill takes has to be just the opposite, that, yes, these are very complicated issues and that the purpose for doing it is to help the experimentation to develop a mechanism for the point when we get to, if we get to a mandatory regulatory program, and so that I think that we would be better off risking getting good information and good experience with the chance that perhaps, you know, something might slip through the cracks and somebody got a credit that maybe they shouldn't have gotten, but that we got a lot better experience because of it, and that that will all be taken into account in the future if there is a mandatory program. I mean, there's no guarantee there's going to be a mandatory program, and so companies who can't act, people who can sequester who can't act on the basis now should be encouraged to act, and we ought to find that if we're going to have the flexibility, it ought to be in how we make the tent better, now how we make sure we keep everybody just under such a tight thumb.

Senator CHAFEE. Yes, I think you're right. I think you're right. Well, any other questions?

[No response.]

Senator CHAFEE. Well, I want to thank everybody for coming, and we've got your testimony here and your suggestions, and Dr. Hamburg has told us to do it right. Anybody want to add anything else? Here's your chance.

Ms. FANTOZZI. Just that we would be happy from any source that we can provide additional information or followup, if you need it.

Senator CHAFEE. OK. I do want to say something. Scott Rabideau mentioned the open space. I think that sometimes we get discouraged, but there are a lot of good things happening, well, up in your state, and in connection with open space bond issues. You might have seen what New Jersey did. New Jersey had, as I understand it, a billion dollar bond issue for the purchase of open space. Now, that's what we call stepping up to the mark. Here in our state we had a series of bond issues on the local communities, I think we've got 39 local communities and I think we had them about 10 or 12, and plus a statewide bond issue, and they all passed, and it isn't something that just is a legalist at all, everybody believes, and we ought to do the best we can, and so the statewide bond issue passed by something like 70 percent, which for any political figure is a landslide, and we'd all like to record that personally, and the local bond issue, for instance, in Warwick they had one, and that passed handsomely, so across the Nation likewise. So good things are happening, and if we get some dedicated funds out of this Land and Water Conservation fund, it would be a big step forward. The administration, as you know, in its budget has come forward with

dealing with open space, and it's very interesting, traditionally we've always felt that this is something that the east likes, but the west doesn't. The west is, there's incredible statistics, something like 40 percent of Colorado is owned by the Federal Government, or some figure such as that, and so it goes to those western states, and so the theory has always been that the last thing in the world they wanted is the Feds to come in and buy any more land. Well, it turned out to be true. It turns out that Mayor Boisie, who is hardly a radical hothead, has supported both these open space bond issues, because he sees, in his city and the neighboring hillside, seen urban sprawl that Scott is so interested in, has taken over and something should be done.

So I want to leave everybody with, on that particular issue of a sense of upbeatness and optimism, that doesn't mean we can slack in our efforts, but it does mean that good things are happening around the country. As far as this legislation goes, your comments have been very helpful. It is complicated. I'll say this, it's turned out to be more complicated than I thought it was. You go out hunting for rabbits and you look down the hole and there's a bear, but with the help of Kevin and everybody else around here, we're getting there.

Jimmy, do you want to give us a little report on how far along the legislation is. This is a staff director of the Environment of Public Works Committee who has the responsibility of seeing that this—the man we had in charge of this is moving to Texas, and I don't know whether it's caused an effect or not.

Go ahead, Jim.

Mr. POWELL. Well, I think during the month of June we're going to be adding the suggestions that we have here and at other hearings and try to have a new draft of the bill by the end of the month to circulate, and I expect that in July the committee will be having a hearing and trying to report it out before the August recess, so over the next couple of months the activity will be pretty intense.

Senator CHAFEE. OK. Thanks, everybody, for coming. We're very grateful.

[Whereupon, at 12 noon, the committee was adjourned, to reconvene at the call of the Chair.]

[Text of S. 547 and additional statements submitted for the record follow:]

STATEMENT OF SCOTT P. RABIDEAU, RHODE ISLAND STATE REPRESENTATIVE

Mr. Chairman and members of the Committee on Environment and Public Works, I cannot tell you what an honor it is to have the opportunity to testify before this U.S. Senate Committee. As a member of the Rhode Island General Assembly, I appear before legislative committees on what seems like a daily basis. But I never imagined that I would 1 day testify before the U.S. Senate.

The bill that I wish to testify on behalf of is perhaps one of the most visionary pieces of legislation I have ever come across. In essence, S. 547 allows U.S. corporations to receive credit for voluntarily reducing greenhouse gas emissions or increasing the sequestration of carbon. The ingenuity of this bill is due to the fact that these credits shall be applied to future laws and regulations. It is a way for a good corporate citizen to gain recognition and a potential fiscal reward for reducing carbon emissions. This is something that many companies have been preparing for in their capital planning. Should this bill become law, it may well move up the timetable for such capital spending.

Beyond the credit for voluntary reductions is the truly unique issue of carbon sequestration. I would like to speak to how I believe this portion of the bill would positively affect my little state of Rhode Island.

All land which is undeveloped and vegetated annually sequesters varying amounts of atmospheric carbon. I will leave the issue of metric tons of carbon sequestered per acre (or hectare) to the academics that will surely testify at some point in time on this issue. Suffice to say, an acre of young, well managed forest in a temperate climate like Rhode Island's can annually sequester multiple tons of atmospheric carbon. That's correct, multiple tons of carbon are sequestered by an acre of forested land. Therefore, it is safe to presume that the permanent preservation of as little as 100 acres of open space can sustain a carbon reservoir and avoid creating a carbon source.

I would like to present you with a real world example of how land can quickly change from reservoir to source. The first picture shown within this text is an aerial photograph of a section of Warwick, Rhode Island. This photo clearly depicts a densely populated residential community, a golf course, and a large tract of undeveloped farmland. This represents perhaps the last tract of farmland within a radius of one mile or more. As of this moment, the owner of the property is in the process of subdividing his farmland to establish a residential subdivision. If you skip over and review the next photograph, I have taken the liberty to demonstrate what the property might look like after the summer of the year 2000. In one short year's time, this property will go from carbon reservoir to carbon source.

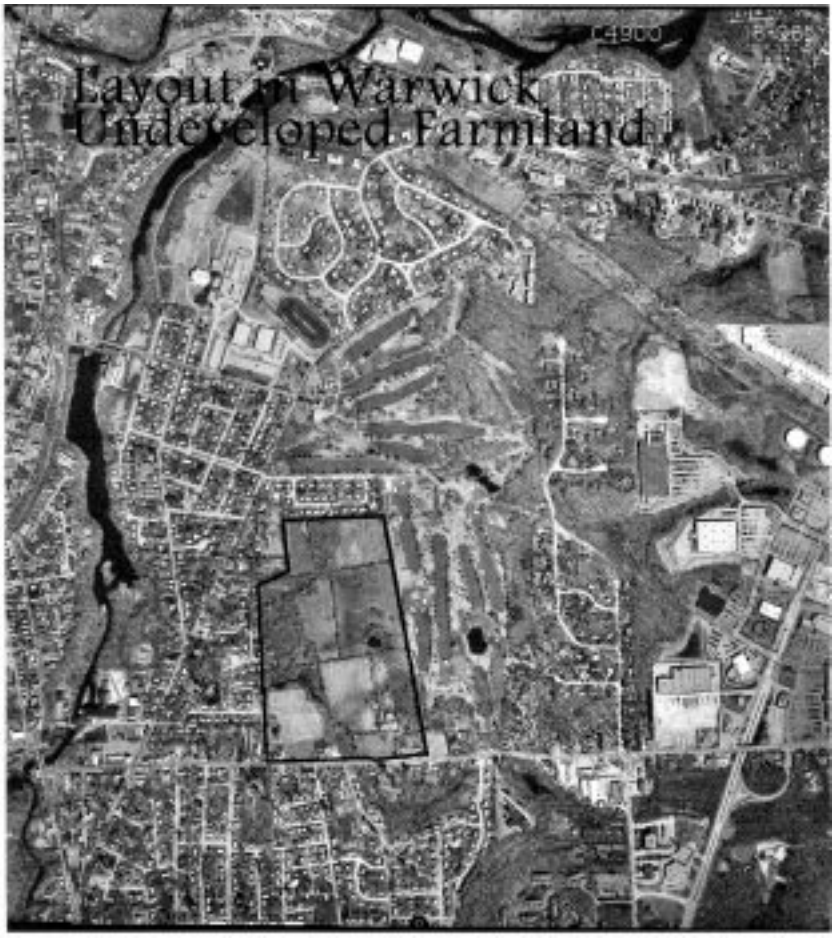
Figure #1 depicts the results of a Brown University study evaluating Rhode Island's greenhouse gas emissions from 1990–1996. Residential development was responsible for approximately 18 percent of the total increase in greenhouse gas emissions during that time period. In 1999, the enormous demand for housing in Rhode Island has driven up the value of raw land. To further complicate issues, the schools in Rhode Island are funded primarily on the local revenues received from property taxes. The result, landowners are faced with exceptionally high taxes on their open space parcels, while developers are constantly dangling large sums of money before them to acquire the properties for residential housing. It is a no win situation for the environment.

Believe it or not, 55 percent of Rhode Island is currently forested. That's right, over one half of this state consists of trees. But that percentage is dwindling rapidly. Therein lies the opportunity of S. 547.

I believe that corporate America can play a pivotal role in the preservation of open space in Rhode Island and the entire United States. The ability to acquire a greenhouse gas credit for the demonstrated sequestration of atmospheric carbon could well be the incentive necessary to motivate the boardrooms across America to take an active role in the management and preservation of the country's forests. Not only could a company receive a regulatory credit for the dedication of permanent open space, but also the marketing potential of the effort could offer a higher profile when targeting today's environmentally conscious consumer.

I realize that the environmental community will express deep concern that corporate giants may abuse such a process. Corporations and their lobbyists will bemoan the fact that there may be a tacit acknowledgement of the Kyoto Protocol in this bill.

I however applaud the sponsors of this bill and stand firm in a belief that change, true change in society, does not come from the actions of a government regulatory, CEO or a multinational corporation, or even a well meaning environmental organization. A politician with vision effects true change. We become politicians for many reasons. But first among them is the desire to improve our state, our country or even the world. This bill will change the world.


Layout in Warwick
Undeveloped Farmland

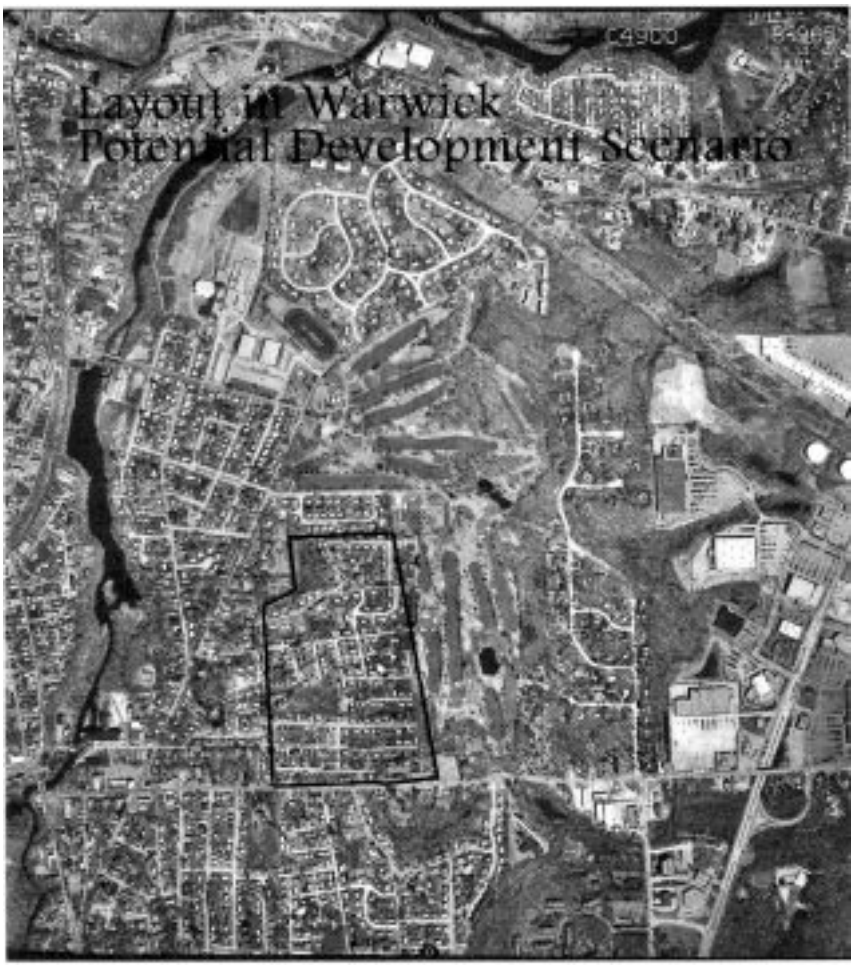

Layout in Warwick
Potential Development Scenario

Figure 1

Greenhouse Gas Emissions

	1990	1996	1990-1996	
Sector	Total CO2	Total CO2	CO2 Increase	% Increase
	(Tons of CO2)	(Tons of CO2)	(Tons of CO2)	
Residential	2,344,657	2,924,327	579,670	25%
Commercial	1,165,833	1,552,454	386,621	33%
Industrial	773,508	1,966,271	1,192,764	154%
Transportation	4,486,582	4,606,675	120,093	3%
Electric Utility	520,249	1,533,270	1,013,021	195%
Total	9,290,829	12,582,997	3,292,168	35%

STATEMENT OF KENNETH A. COLBURN, DIRECTOR, AIR RESOURCES DIVISION, NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES, PROVIDENCE, RHODE ISLAND

Thank you, Mr. Chairman. My name is Kenneth A. Colburn, and I am the Director of the Air Resources Division of the New Hampshire Department of Environmental Services (DES). The Department appreciates this opportunity to address the Committee regarding S. 547, the Credit for Voluntary Reductions Act of 1999.

In New Hampshire, a state rich in natural resources, our economic livelihood has long been directly and inextricably linked to the health of our natural environment. Whether we hark back to the heyday of the timber and paper industries, or look instead at today's tourism-based economy and high quality of life, this linkage has remained a constant. Two other constants have been our state's traditional frugality; and our stubborn reluctance to control and regulate when equally favorable outcomes can be achieved by properly encouraging voluntary actions. Thus it comes as no surprise that we strongly support S. 547, an initiative that shares these values. S. 547, the Credit for Voluntary Reductions Act of 1999, would directly benefit both the environment and the economy, and encourage cost-effective solutions on a voluntary basis.

S. 547 encourages U.S. entities business, institutions, governments, etc. to pursue actions that will mitigate the threat of global climate change. In doing so, they will provide our nation with other benefits including substantial savings in energy expenditures, reduced air and water pollution, less waste, better natural resource management, and enhanced technological competitiveness. Early voluntary greenhouse gas reduction measures will help to ensure that the legacy we leave our children and grandchildren is not one of myopic selfishness and environmental degradation, but one of sustainable stewardship and respect for our planet. This Act is not about the science of global climate change, nor is it about the Kyoto Protocol. It is not about what level of reductions is necessary, or when they must be accomplished, or what flexible mechanisms should be employed to achieve them. S. 547 is about reducing uncertainty for U.S. business and other entities by ensuring that any reductions of greenhouse gas emissions that they voluntarily undertake are appropriately recognized and rewarded.

U.S. business and other entities are not making greenhouse gas reductions largely because of uncertainty about what future regulatory programs may be imposed in an effort to stabilize atmospheric concentrations of carbon dioxide and other greenhouse gases. Many are concerned that, if the example of the Federal Clean Air Act Amendments of 1990 hold true, action now will not be appropriately recognized, and will result in increased burdens later. The State of New Hampshire has had direct experience with this dynamic, inasmuch as the closure of the Pease Air Force Base in 1989 was not recognized as emission reductions under the 1990 baseline of the latest Clean Air Act reauthorization. This dynamic applies even if actions now would yield cost savings, because the certain benefits today might be outweighed by

the as-yet-unknown costs imposed by the future program. S. 547 will encourage reductions of greenhouse gases simply by eliminating the potent disincentive of uncertainty.

How should a credit for early action program be designed? In order to be most effective, a program to encourage early action must be simple, flexible, and applicable to a broad array of emissions sources. At the same time, it needs to reflect sufficient discipline that the integrity of its credits is never in doubt. A few cornerstones are thus essential.

First, all reductions must be strictly quantifiable and subject to third party verification. The integrity of the credits hinges on the processes by which they are quantified.

Second, reductions should not be limited or tied to a particular program, a particular economic sector, or a particular greenhouse gas. Criteria for establishing credible baselines, coupled with appropriate, broadly applicable quantification and verification methodologies, should determine what constitutes a verifiable ton, not what carbon source the reduction came from. In the end, all verified tons no matter what their source or how they were reduced are equal in the eyes of the atmosphere.

Some have also suggested that only certain emission reductions should count, based, for example, on whether they reflect genuine environmental intent. I would suggest that this approach unconscionably cripples the vital linkage between economic and environmental well being that we cherish and seek to encourage. We should be less concerned with motives, and more concerned with establishing simple, workable, and effective quantification and verification protocols.

Third, just as there is a variety of ways to reduce greenhouse gas emissions, a variety of yardsticks for measuring such reductions may be necessary. Entities should certainly receive credit for absolute emission reductions below a historical baseline. In other circumstances, however, percentage reductions from a defined baseline may be appropriate, or credit for achieving very-low-emission performance standards. Reductions provided by a manufacturer's products (e.g., lower emission vehicles) might also be creditable, although we would need to ensure that they are not double-counted by purchasers.

Fourth, great care should be taken in placing a limit or cap on the number of credits available under an early reduction program. Though some upper bound may ultimately be necessary, it must be balanced against the fact that such limits could reduce the incentive for entities to participate.

Who should participate? The early credit incentives should apply across the broadest possible array of participants. In addition to the traditional industrial and electricity sectors, for example, other sectors and entities should be allowed and encouraged to participate, including transportation, residential, commercial and agriculture. Further, the program should include both carbon sinks and sources, inasmuch as carbon sequestration may provide significant opportunities for agricultural and forest products participants such as those operating in the Northern Forest Lands.

In what may be a relatively unusual suggestion, I would recommend that states and municipalities also be allowed to participate in an early emission credit program, both because they generate emissions themselves, but also because they are often left to implement whatever it is the Federal Government has decided. Great uncertainty prevails here as well. In the case of the Acid Rain program, the Federal Government dealt directly with emission sources. In EPA's proposed NOx Transport SIP call, states were assigned emission budgets, and thus had a say in how allocations were made within their borders.

In an effort to reduce such uncertainty for New Hampshire entities, including the State itself, we have introduced state legislation to create a state "registry" of voluntary greenhouse gas reductions. By having the State of New Hampshire stand with them under some potential future regulatory reduction requirements, this bill would protect New Hampshire companies and other entities by reducing the risk that they might not receive appropriate credit for greenhouse gas emission reduction activities they already undertook. This measure has received bipartisan support in the New Hampshire Legislature, and has been strongly supported by the state's business community. To date, the bill has passed the State Senate and has been recommended to the full House by the relevant policy committee.

Similarly, municipalities should be able to receive credit for verifiable greenhouse gas reductions. The International Council for Local Environmental Initiatives (ICLEI), for example, working with 61 (1998 figure) U.S. towns and cities, has reduced greenhouse gas emissions by 5.4 million tons per year. In achieving these reductions, incidentally, these ICLEI communities have saved $27.5 million in energy and fuel costs, and also reduced 7,000 tons of criteria pollutants. If all verifiable tons are equal, then these towns and cities should also be credited appropriately.

As this example shows, states and locals have substantial experience and knowledge infrastructure in achieving cost-saving emissions reductions. I urge you to tap into that experience in developing S. 547.

In conclusion, S. 547, the Credit for Voluntary Reductions Act of 1999 is a crucial measure to remove existing disincentives to early, constructive environmental action. By providing legal guarantees that responsible early actors will receive appropriate credit, it will spur entities to voluntarily undertake cost-effective, multiply beneficial strategies that include greenhouse gas reductions. We thus believe that establishing such an early reduction credit system at this time is in New Hampshire's best interest, the nation's best interest, and future generations' best interest, and we urge you to move forward with it aggressively.

Thank you for the opportunity to assist in the creation of a sound, responsible, early emission credit program. I hope you will continue to call on the considerable expertise of state and local governments in developing this ground-breaking initiative.

STATEMENT OF KEVIN J. FAY, EXECUTIVE DIRECTOR, INTERNATIONAL CLIMATE CHANGE PARTNERSHIP

Good Morning, Mr. Chairman and members of the Committee. My name is Kevin Fay and I serve as Executive Director of the International Climate Change Partnership (ICCP), a coalition of U.S. industry representatives and associations, as well as international associations, interested in the policy development process with respect to global climate change. We appreciate the opportunity to appear before the Committee today on the subject of credit for early action to voluntarily reduce greenhouse gas emissions.

ICCP was organized in 1991 to provide a forum to address the issue of global climate change and to be a constructive participant in the policy debate. We continue to recognize the climate change issue as an important matter with which governments should be concerned. We are one of the largest industry coalitions in the world on this issue. A list of our member companies and associations is attached.

ICCP has consistently stressed the need to provide legally binding assurances that voluntary actions to reduce greenhouse gas emissions will be credited in any future mandatory scheme adopted by the government. Such "credits" should be granted to those companies that achieve verified reductions between 1990 and the commencement of any mandatory program.

Voluntary efforts to reduce emissions of greenhouse gases now can slow the rate of growth of emissions and contribute to the longer-term goal of achieving appropriate greenhouse gas concentration levels. In circumstances where there is marginal value in an emission reduction investment, granting credit may provide the incentive for such investments.

Companies that have already taken action or are contemplating doing so want to ensure that these contributions are not ignored when a mandatory phase of emission reductions begins. Failure to recognize these contributions could unfairly force companies to make reductions through increasingly more costly options. This would have the perverse effect of penalizing those companies who act early, while potentially benefiting competitors who save their least costly reductions to respond to regulatory mandates.

Industry's aim is to ensure that these early investments that result in emission reductions are recognized and "credited." Such credit could be used to offset future obligations that may arise from any domestic allocation, cap, tax or permit program or sold to parties unable to meet their obligations in a cost-effective manner.

ICCP has outlined a series of principles on credit for early action that we believe should guide the legislative and policy process on this issue.

ICCP Credit for Early Action Principles

Credit for early action programs will require new statutory authority. Failure to enact a credit program at the Federal level may stop companies from making commitments now and encourages a patchwork of inconsistent Federal, state, and local initiatives.

No limit should be placed on the amount of emissions reductions or enhancement of sinks for which early action credit can be earned.

Credit should be granted for actions resulting in verified emissions reductions or enhancement of sinks that occur between 1990 and the beginning of any official budget commitment period, whether or not such actions were part of a government-sponsored voluntary initiative.

A process should be established to determine and "lock-in" appropriate baselines for emission reduction activities including facility operations, product-based initiatives, and enhancement of sinks. Such a process should be flexible enough to reflect special circumstances, including unique considerations related to reductions already achieved.

Credits granted prior to a first budget commitment period should be available without discount as offsets against any greenhouse gas emission allocation, cap, tax, permit, or other requirement to limit or reduce greenhouse gas emissions that subsequently may be imposed.

Credits granted prior to a first budget commitment period should be usable in any national emission budget that may be subsequently imposed. Credits should remain with the earning entity for use at their discretion.

Emissions reductions or enhancement of sinks produced from participation in the Clean Development Mechanism, Joint Implementation, or a domestic emissions trading program should be eligible for early action credit if they occur prior to a first budget commitment period.

Credits generated from credit for early action programs should be eligible for emissions trading.

Credit accounts should be updated on an annual basis.

Credit programs should be integrated to ensure consistency and to avoid "double counting".

In February of this year ICCP sent a letter to each member of the Senate urging them to cosponsor S. 547, the "Credit for Voluntary Reductions Act." At that time we stated that the bill was a credible start in addressing the issue of credit for early action, but we also identified several issues that needed additional discussion and resolution such as how to address products that use or emit greenhouse gases and how to deal with growth.

As discussions on this issue have progressed, ICCP has come to the conclusion that, in the current political climate, efforts to enact credit for early action legislation would be enhanced by pursuing a simplified approach. We are currently having discussions with Senate staff on how to address these issues.

The goal of the legislation should be to accomplish three things:

1.Provide legal guarantees to any entity that acts voluntarily to achieve verifiable reductions related to products, processes, or operations, that it will not be disadvantaged by a future regulatory program to control greenhouse gas emissions.

2.Provide a mechanism for verifying any actions that occurred between 1990 and 1999, under Energy Policy Act Section 1605 (b), as part of the U.S. Climate Change Action Plan, or any other activity in which the entity is able to demonstrate verifiable reductions.

3.Provide a mechanism for prospective actions which, subject to negotiation of an agreement with the government, produce verifiable reductions.

We believe that S. 547 embodies these three goals.

With respect to past and future reductions, a series of principles should be delineated to guide the private sector, other entities, and government officials to use in both verifying past reductions and negotiating agreements for future reductions.

The intent of the program should be to encourage experimentation on the part of government, industry, and the environment community, and not to constrain the ability to develop new and creative methods for implementing and achieving verifiable reductions.

While this program may require flexibility in terms of the precise value of the credited reductions, it should be firm that the credits exist as a matter of legal right.

In order to ensure an open process, it should also provide for public participation in the verification procedure, notice and comment, and public disclosure of future negotiated agreements.

The program should not limit government participation by any particular department or agency. The principles of the bill could be used by any department or entity to craft verification agreements. These principles, in our view, should be consistent with those we have previously outlined and are found in S. 547.

For purposes of prior acts, the bill should require all those who seek credits for prior acts to file a request with the government within 12 months of enactment. The government would be required to certify the credited reductions within 12 months after submission in a direct final rule. The direct final rule would be subject to comment and would take effect unless challenged during the comment period.

It has been suggested that supporting credit for early action legislation may unwittingly create support for the Kyoto Protocol. We do not agree. Many companies have already taken action based on the Framework Convention on Climate Change, which was ratified by the U.S. Senate in 1992. This agreement called for the United

States to attempt to stabilize its greenhouse gas emissions at their 1990 level by the year 2000. Those who have acted in good faith or who take action prior to any mandatory program should receive legally binding assurances that their verified reductions will be credited, regardless of the underlying basis for some future regulatory mandate.

The Energy Information Administration of the Department of Energy just released a report that summarizes voluntary actions taken in 1997. (Executive Summary is attached.) Similarly, the Environmental Protection Agency reports annually on the results of efforts under the voluntary Climate Change Action Plan. These actions amount to hundreds of millions of metric tons of carbon equivalent emission reductions.

The precedent for crediting early action was established in the 1990 Clean Air Act amendments, when companies who moved early on sulfur dioxide emissions reductions received additional consideration in the subsequent sulfur trading program. Relying on this statutory precedent is important for the climate change issue. However, given the scope of industries covered and the enormous task to be undertaken, the government should go on record now by developing the program in advance of any regulatory requirements.

Climate change presents a complex environmental challenge. The political and economic concerns raised in attempts to address the issue are significant both internationally and here in the United States. Credit for early action discussions can be neutral on whether it advances or detracts from the Kyoto Protocol.

The fact remains, though, that the United States is on record in support of responsible action to address greenhouse gas emissions. We have ratified the Framework Convention on Climate Change. Congress has funded a variety of activities under the Climate Change Action Plan and other significant government programs. It is not unreasonable to request assurance from the government that these activities, whether past or in the future, not place the voluntary actors in future regulatory jeopardy.

At this time we are discussing a voluntary and verifiable program. To the extent that some wish to see much greater detail in this legislation, to turn the discussion to the design of a pseudo-regulatory program, we would say that such detail may be unachievable.

We are prepared to work constructively to arrive at a consensus with other business groups, environment NGO's, and government officials, on a workable voluntary program.

We applaud Senator Chafee and the cosponsors of S. 547 for a commendable start. We look forward to working with you to ensure a successful conclusion.

ICCP 1999 MEMBERSHIP LIST

3M Company
Air Conditioning and Refrigeration Institute
Alliance for Responsible Atmospheric Policy
Alliance for Responsible Environmental Alternatives—Canada
Allied Signal
Association of Home Appliance Manufacturers
Association of International Automobile Manufacturers
Boeing
BP Amoco
Carrier
Dow Chemical
Halliburton Industries
Dupont
Eastman Kodak
Elf Atochem
European Chemical Industry Council (CEFIC)—European Fluorocarbon Technical Committee (EFCTC) Sector
General Electric
General Motors
Honeywell
Intel Corporation
Intercontinental Energy Corporation
Japan Fluorocarbon Manufacturers Association
Japan Industrial Conference for Ozone Layer Protection
National Electrical Manufacturers Association (NEMA)Polyisocyanurate Insulation Manufacturers Association
Sun Company
Trane
Trigen Energy Corporation
United Technologies
Vulcan Chemicals
Whirlpool Corporation
York International

EXECUTIVE SUMMARY, DEPARTMENT OF ENERGY REPORT [EIA–0608(97)]

The Voluntary Reporting of Greenhouse Gases Program, required by Section 1605(b) of the Energy Policy Act of 1992, records the results of voluntary measures to reduce, avoid, or sequester greenhouse gas emissions. In 1998, 156 U.S. companies and other organizations reported to the Energy Information Administration that, during 1997, they had achieved greenhouse gas emission reductions and carbon sequestration equivalent to 166 million tons of carbon dioxide, or about 2.5 percent of total U.S. emissions for the year. For the 1,229 emission reduction projects reported, reductions usually were measured by comparing an estimate of actual emissions with an estimate of what emissions would have been had the project not been implemented.

Both the number of projects and the quantity of emission reductions reported have roughly doubled since 1994, and the number of organizations participating in the Voluntary Reporting Program has increased by 44 percent (Table EST). Fifty-six of the organizations reporting in 1998 provided estimates of emissions and/or emission reductions for the entire organization. Sixty-five reporters recorded commitments to take action to reduce emissions in future years, mostly by the year 2000.

Table ES1. Reporting Indicators for the Voluntary Reporting of Greenhouse Gases Program. Data Years 1994–1997

For the 56 organizations that estimated their total 1997 emissions, the combined total was 1.5 billion metric tons carbon dioxide equivalent, equal to about 23 percent of all U.S. emissions. Forty-nine of the 56 companies also estimated corporate-wide emission reductions in addition to (or instead of) the reductions reported for individual projects. The combined total reduction for the 49 companies was 128 million metric tons carbon dioxide equivalent.

The Voluntary Reporting of Greenhouse Gases Program is used as a registry by several U.S. Government-sponsored voluntary programs to limit greenhouse gas emissions, notably the Climate Challenge program for electric utilities and the Climate Wise program for manufacturers. Most (71 percent) of the reporters to the Voluntary Reporting Program were electric utilities, usually participants in the Climate Challenge program. Nonutility participants included manufacturers such as General Motors, IBM, Dow, Johnson & Johnson; facilities such as Alcan's Sebree aluminum plant and Motorola's Austin, Texas, integrated circuit fabrication plant; a coal company (Peabody Holdings); several operators and developers of landfill methane recovery projects; a trade association (the Integrated Waste Services Association); and private voluntary organizations, such as American Forests.

Some 360 of the projects reported in 1998 were related to the generation, transmission, or distribution of electricity. Another 273 were related to energy end use, 20 were cogeneration projects, and 62 were transportation projects. The energy-related projects accounted for about 79 percent of the total 166 million metric tons of emission reductions reported. The largest reductions were reported for projects that improved the performance of nuclear power plants.

Public interest in the Voluntary Reporting Program increased in 1998, in part because of growing awareness of climate change issues inspired by the signing of Kyoto Protocol and in part because of public interest in the concept of credit for early reductions. In October 1997, the White House announced that it favored offering "credit for early reductions" as a means to limit future U.S. greenhouse gas emissions. Generally, an early credit program would offer regulatory credit—in the form of "carbon allowances" against a future cap on greenhouse gas emissions—for organizations that take steps to reduce their emissions now. Neither "credits" nor "reductions" were defined, however, and the exact nature of such a program is a subject of ongoing debate among policymakers, interest groups, and private organizations.

STATEMENT OF STEVEN P. HAMBURG, ITTLESON ASSOCIATE PROFESSOR OF ENVIRONMENTAL STUDIES AND ASSOCIATE PROFESSOR OF BIOLOGY, BROWN UNIVERSITY

I very much appreciate the opportunity to appear before you today. My name is Steven Hamburg, I am a scientist with training as an ecosystem ecologist and currently hold the Ittleson Associate Professorship in Environmental Studies here at Brown University.

I would like to testify with regards to Senate bill 547, Credit for Voluntary Early Action Act. Over the past two decades I have studied the effects of land-use change on carbon storage in forest ecosystems, with a particular focus on the old-field forests of New England. I have participated in the Intergovernmental Panel on Climate

Change Second Assessment as a review team editor focusing on.the ecological impacts of climate change. I am currently actively involved as a principal lead author in the writing of the IPCC's special report on land-use/land-cover change. I have also worked with the Environmental Defense Fund and Trexler Associates as a consultant on the design of carbon sequestration projects.

Today, I would like to speak to the overall strengths of the concept of an early action crediting program, and then more specifically to the carbon sequestration aspects of the bill. The science underlying climate change and its impacts often baffle people, and as a result the issue is often dismissed out of ignorance rather than knowledge. In particular, the complexity of the accounting necessary to verify changes in carbon storage in natural ecosystems all too often leads people to dismiss the potential of land-use changes to reduce the increase in atmospheric concentrations of carbon dioxide.

We know enough about the global carbon cycle to be able to predict the potential impacts of energy and land-use practices on the rate of increase in atmospheric carbon dioxide concentrations. This is not to say we know everything, but rather that our knowledge is sufficiently robust to allow us to craft public policy that can have a desired outcome, such as reducing the rate of increase in the atmospheric concentrations of carbon dioxide. What we do not know is too often the focus of discussions about the global carbon cycle, and certainly there are aspects of the cycle that require further elucidation, but this uncertainty is not central to the viability of the early action legislation. The science of both climate change and carbon cycling is sufficiently well understood to provide a solid basis for the enactment of the Credit for Voluntary Early Action Act.

Our knowledge about carbon cycling is more than adequate to justify action on changing patterns of energy use and land-use practices. It is important to remember that the underlying science on which we base our understanding of the global carbon cycle originates not with the debate concerning climate change, but far earlier with the advent of silviculture and oceanography among many other disciplines. Even though it has only been during the last several decades that large numbers of scientists have focused on the carbon cycle, our underlying understanding is based on scientific discoveries accumulated over more than a half century.

S. 547 is based on sound science, science that includes the use of land-use changes to reduce greenhouse gas emissions. The Credit for Voluntary Early Action Act attempts to encourage energy users and landowners to think about how they can reduce their emissions while at the same time serving their own direct interests. The proposed legislation is designed to reduce the potential penalty involved in taking action that reduces greenhouse gas emissions. Without such legislation not only would our country not be recognizing the threat that climate change poses to our well being, but we would be making the situation even worse. If corporations and landowners do not know what year will be used as a baseline for any future domestic greenhouse gas reductions legislation, then any action to reduce emissions today could create the need for deeper cuts in the future. This disincentive keeps people from acting and we need to reverse the situation, S. 547 would do that. Without this legislation it can be argued that there is advantage for most companies and land owners to allow emissions to increase unchecked, as it would effectively position a company or landowner should mandated cuts come into play. If Congress does not provide incentives to reduce greenhouse gas emissions, the lack of incentives could actually accelerate the rate of increase in greenhouse gas emissions, making any future reductions even more difficult. The sooner there are incentives for reducing greenhouse gas emissions, the less need there will be for dramatic reductions later. The proposed act will make long-term planning viable and economically advantageous, whether it is in the energy sector or the land-use arena.

Since other members of the panel will be testifying today on the energy side of the bill I will focus my remaining remarks on the land-use side of the Act. Tens of thousands of landowners across America make decisions every year about what to do with land they own. Should they cut timber, use no-till agriculture or do nothing, let nature run its course. Each of these decisions has an impact on the global carbon cycle, albeit very small. In the aggregate the impact of all of these decisions could have a significant effect on the global carbon cycle. Since, there is consensus that we want to encourage America's landowners to make wise land-use decisions, decisions that will insure the sustainability of our natural resources for generations to come, S. 547 makes a lot of sense. S. 547 could provide a powerful tool toward helping landowners make sustainable long-term land-use decisions.

As a landowner I get regular solicitations exhorting me to contact the soliciting company to find out how much the timber on my land is worth. Many of my neighbors sell their timber in just such a shortsighted manner. Yet, with a bit more planning and management it would be possible to increase both the profit of my neigh-

bors and the productivity of their land. Maximizing carbon storage on the land is a very good metric for examining long-term sustainable management of America's lands. If we give people an incentive to maximize carbon storage on the land, what we are doing is encouraging them to remove resources in a conservative manner. If this bill if crafted wisely (I will come back to some proposed language) we can reduce the buildup of greenhouse gases in the atmosphere at the same time as increasing use of best management practices, and better yet at little if any cost to the taxpayers. Some people may be concerned that by conserving carbon we will be reducing fiber, timber or agricultural production, but that is very unlikely. The value of carbon credits will not be sufficiently great to get people to take productive land out of production, but it is very reasonable to expect the value of carbon credits to be high enough to get people to manage productive lands a bit more conservatively. S. 547 would provide people with the potential to get a bit of extra revenue from managing trends wisely.

All to often we know what we should do, but we just don't quite get around to doing it. The proposed legislation will help give people a little extra push. Since, the bill involves only voluntary actions it does not require people to take actions they do not want to take. I have heard an argument against the bill based on an interpretation of the proposed legislation that assumes that landowners would be given the opportunity to benefit from intensifying land management, but this need not be the case. It is not difficult to write language for inclusion in S. 547 which requires rigorous carbon accounting, which means clearing old growth forest or intensifying agricultural production will not yield carbon credits.

Specifically I would like to see that the land-use aspects of this legislation meet three objectives:

a. low transaction costs;
b. carbon correct accounting;
c. a requirement of additionality.

A legislative framework that allows transaction costs to be kept low will facilitate greater participation, particularly among small landowners that own the bulk of America's land. At the same time it is critical that there is carbon correct accounting incorporated in the bill. These two requirements could create tension, but in fact are compatible. We need to be comfortable in saying that we are crediting only net increases in carbon and not simply carbon being fixed though photosynthesis. This is an important point, so let me take a moment to explain. Trees take atmospheric carbon and convert it into organic compounds through the process of photosynthesis. The annual amount of carbon that is removed from the atmosphere through photosynthesis is very large, an order of magnitude greater than annual fossil fuel emissions. Yet, almost all of that photosynthetically fixed carbon is released back into the atmosphere through respiration, so only a small amount of net carbon stays on the land. It is the net carbon sequestered that is potentially creditable. If we credit more than the amount of net carbon sequestered on the land then we have not accomplished anything relative to addressing the atmospheric buildup of greenhouse gases. I have seen proposed language for this bill that credits gross, not net, carbon.

Since, some of that net carbon is the product of past actions, and will accumulate with or without this bill, the early action bill should reward only increases in net carbon that are attributable to decisions made after the enactment of this bill. We want the bill to encourage more conservative use of the land, use that will increase the carbon sequestered on the land.

How do we meet the three criteria I have listed above? I have attached legislative language that I think meets these three objectives in an operationally viable and clear manner. The language is relatively technical, but I believe it is effective in meeting the criteria I spoke about earlier. On the land-use side we have the advantage of 100 years of accumulated knowledge in the forestry profession that we can call upon to develop viable measurement approaches to quantifying the amount of net carbon sequestered. Measuring the amount of carbon in a tree or in the soil is not magic, but rather straightforward science, well-established science.

In the language I have given you we have attempted to exploit what we know in order to establish a system that requires a landowner to measure a minimal number of variables in the field. We have assumed that getting it "right" on each parcel of land is important, but even more important is insuring that the aggregate net carbon credited is accurate. I believe the attached language does just that.

In summary, I believe the Credit for Voluntary Early Action Act can increase wise stewardship of our natural resources while greatly reducing the increase in atmospheric concentrations of carbon dioxide. It is important to get started on addressing climate change and the proposed legislation is a very logical first step. I would be happy to work with you or your staff on specific language for inclusion in this bill. Thank you for the opportunity to testify before you today.

INCREASES IN CARBON STOCKS

(A) In general

An early action agreement may provide that a participant shall be entitled to receive greenhouse gas reduction credit for the net increase in carbon stocks during the credit period within ecosystems on land owned by the participant that are additional to that which would have occurred as a result of current and projected practices in the absence of this legislation. In the case of permanent protection of mature primary forest from logging activity after the date of enactment of this Act, greenhouse gas reduction credits shall be equal to 50 percent (50 percent) of the carbon stock in above and below ground live biomass, measured at the end of the credit period.

(B) Calculations

d. Additionality. Except for lands on which there is reforestation, afforestation, or permanent protection from logging activity, the amount of the carbon stock increase that is considered additional to that which would have occurred as a result of current and projected practices in the absence of this legislation shall be determined as the difference between the net increase in carbon stocks during the credit period on land owned by the participant and the product of the number of acres of land owned by the participant and the average per acre change in carbon stocks during the credit period in similar forests within the region. If the average per acre change in carbon stocks during the credit period in similar forests within the region is less than zero, it shall be regarded as zero for the purpose of this calculation. For purposes of this analysis regulations promulgated under section 4(c) shall establish average rates of change of carbon stocks by forest type, productivity class, age, and region, taking into account the most recent forest inventory and analysis data. All analysis of such average rates of change of carbon stocks shall exclude all submerchantable timber. In the case of reforestation, afforestation, or permanent protection from logging activity after the date of enactment of this Act, the full net increase in carbon stocks during the credit period shall be considered additional to that which would have occurred as a result of current and projected practices in the absence of this legislation.

e. Leakage. The net increase in carbon stocks eligible for greenhouse gas reduction credit shall be calculated by deducting any leakage of benefits due to related greenhouse gas emissions or reduced carbon stocks on land not covered by the early action agreement. If an early action agreement results in a reduction in timber supply, the amount of the deduction shall be the product of the amount of reduction in timber supply and the average carbon emissions associated with supplying similar timber. The deduction for related greenhouse gas emissions associated with land management practices shall include, but not be limited to, emissions from fossil fuel consumption, fertilizer application and land preparation activities deemed significant according to the rules developed pursuant to Section 4 (C) of this Act.

Leakage of benefits will be assumed to be zero in the case of:

a) Lands on which there is natural regeneration or establishment of plantations leading to afforestation or reforestation of agricultural lands in regions where on a net basis the forest type being regenerated is not being converted to agricultural lands during the credit period.

b) Improved forest management practices that increase carbon stocks while maintaining production of timber, fiber, and/or energy, as applicable, from the participant's lands.

c) A demonstration that the rate of increase in carbon stocks in the forests of the region has increased for the last period for which such data is available and the aggregate output of all timber, fiber, and fuel producing mills and facilities in the region has not declined, subtracting any production which relied on imports of timber or fiber from outside the region.

d) Permanent protection of forests from logging activity after the date of enactment of this Act.

(C) Limitations

(1) Coverage

a) Only private lands are eligible to participate in the program established by this section.

b) Landowners must enroll their entire forest land base to participate in the program established by this section. Landowners may exclude lands from enrollment if the dominant use of the property is ecosystem preservation and there are no timber management activities occurring on the property. Notwithstanding the preceding sentence, a participant may enroll preservation lands if it wishes to do so. If

property excluded from consideration under this provision comes under active timber management it must be included in all future carbon accounting. If a participant purchases land during the agreement period, then the net change in carbon stocks on that land must also be included in the applicable agreement. A participant owns land if it owns a controlling interest in the timber on the land. Participants may exclude from enrollment tracts of lands smaller than 50 acres that are non-contiguous with other land owned by the participant. Changes in carbon stocks on all lands enrolled need to be included and for those lands with a net loss of carbon stocks the loss needs to be subtracted from the creditable gain in carbon stocks calculated under this section.

c) For landowners undertaking improved forest management practices, including improved forest management in conjunction with reforestation, a minimum parcel size of 5,000 acres is required to enroll as an individual. Otherwise, landowners must pool their lands together with other landowners for purposes of enrolling in the program. Such landowner pools must have a minimum enrolled acreage of 5,000 acres. These requirements for pooling and minimum tract size do not apply to landowners who enroll lands where no timber harvests will be conducted during the early action period and where activities will consist of reforestation on agricultural lands and/or improved agricultural practices. To enroll in a landowner pool, individual landowners must enroll all their land into an early action agreement.

d) Rules issued under this Act shall establish the age at which each forest type described above produces merchantable pulpwood, sawtimber or other timber products commonly sold by landowners in the region. Only lands on which the forest is older than this minimum age will be eligible, except for lands on which reforestation and afforestation takes place during the early action period. For forest management units (each not to exceed 100 acres) with multiple tree age cohorts, for purposes of this act, the age of the forest is the oldest age cohort representing at least 20 percent of the standing timber.

(2) Durability

a) The participant may elect to count the greenhouse gas reduction credits accruing from their early action agreement based on the number of "ton-years" that carbon stock increases have been maintained. Each "ton-year" will be awarded a fraction of one ton of credit. The fraction shall be determined, by rule, based on the ratio of the reduction in greenhouse gas forcing over a 100 year time period as a function of the period during which a carbon stock increase of one ton has been maintained, to the reduction in greenhouse gas forcing over a 100 year time period from the permanent avoidance of the emission of one ton of carbon, taking into account the most recent findings of the Intergovernmental Panel on Climate Change.

b) If the participant elects not to count the greenhouse gas reduction credits accruing from their activities in "ton-years", the participant shall receive credit equal to the participant's net increase in carbon stocks during the credit period, as determined under this section. Under this election, if at any time after end of the credit period, and before the land covered by the agreement is accounted for under a mandatory emissions reduction program, the stock of 6 carbon on the land covered by the agreement is less than the stock of carbon at the end of the credit period, the participant shall retire a number of greenhouse gas reduction credits equal to the difference between the two amounts.

(3) Land stewardship

a) In order to prevent the establishment of forests in areas that currently support natural vegetative communities other than forests, no credits will be granted for afforestation of areas historically not forested unless those areas have been in cropland since 1990.

b) No credits shall be granted for offsite increases in carbon stocks including but not limited to those associated with paper and other wood products and landfills.

c) Credits for carbon stock increases from land-use activities should encourage wise stewardship of land, including land used in production of forest and agricultural products, land providing environmental service or land set aside for the preservation of natural areas. All lands enrolled in a program for early action carbon credits must adhere to best management practices as specified on a regional or state basis by the appropriate Federal or state agency.

(4) No more then 20 percent of the greenhouse gas reduction credits allocated under this Act shall be awarded for carbon stock increases under this section.

(D) Monitoring, Reporting and Verification

(1) The rules issued pursuant to section 4(C) shall include monitoring guidelines that, at a minimum, provide:

a) Tables of estimated greenhouse gas emissions associated with land management activities that result in a significant indirect increase in greenhouse gas emissions (e.g. fertilizer production, herbicide production, fossil fuel consumption).

b) Guidelines that identify all carbon stocks on a participant's lands that may be decreasing during the credit period. All carbon stocks that may be decreasing must be monitored. Monitoring of carbon stocks that are increasing is at the discretion of the participant.

c) Guidelines that ensure accurate and transparent monitoring based on statistically robust inventory, soil sampling, ecological survey, and other applicable scientific techniques.

d) Requirements to perform monitoring in the first year of the early action agreement, the last year of the credit period, and at least once every 3 years during the credit period. Procedures for estimating baseline carbon stocks on the participant's lands included in an early action agreement.

f) Procedures to allow appropriate estimation of carbon stocks using tables and models derived from USFS Forest Inventory and Analysis data for the appropriate region, forest type, age, stand management history, and site productivity for tracts of land included in an early action agreement.

(2) The rules issued pursuant to section 4.(C). shall include reporting guidelines that, at a minimum, provide that:

a) Participants shall report claimed net increases in carbon stocks during the credit period to the appropriate government agency, which will then evaluate the participants' compliance with the guidelines. If not in compliance, the participant will be notified and advised what remedial actions are needed. Participants may not receive greenhouse gas reduction credits until they are in compliance with the guidelines issued under this Act.

b) Each participant's report must be supported by a report from a recognized independent third party auditor. The auditor must verify the carbon credits using a statistically robust evaluation of a valid subsample of the participants lands.

(3) Participants who own less than 50,000 acres will be eligible for monitoring and verification assistance.

DEFINITIONS

(1) Afforestation.—Conversion of non-forest to forest on lands that have, historically, not contained forests and did not in 1990.

(2) Reforestation.—Conversion of non-forest to forest on lands which had, historically, contained forests but which had been converted to some other use as of 1990.

(3) Carbon Stocks.—Living biomass carbon, dead biomass carbon, and soil carbon (organic and mineral soils) .

(4) Baseline Carbon Stocks.—the average amount of carbon stocks (in tons carbon) estimated to be present on a participant's land during the participant's base period.

(5) Ecosystems.—include above and below-ground living biomass, soils (organic and mineral), and necromass. *Forest.*—Land at least 10 percent occupied by forest trees of any size or formerly having had such tree cover and not currently developed for non-forest use. Lands developed for non-forest use include areas for crops, improved pasture, residential, or administrative areas, improved roads of any width, and adjoining road clearing and powerline clearing of any width. The land must be a minimum of one acre in area. Roadside, streamside, and shelterbelt strips of timber must have a crown width of at least 120 feet to qualify as forest land; and unimproved roads, trails, streams, and clearings within forest areas are classified as forest land if they are less than 120 feet wide (USDA Forest Service 1972).

(6) Tree.—A woody plant usually having one or more perennial stems, a more or less definitely formed crown of foliage, and a height of at least 12 feet at maturity.

(7) Mature primary forest.—

(8) Region.—Region shall be defined by the U.S. Forest Service Inventory and Analysis survey unit(s) in which the participant's lands are located.

(9) Ton-year.—One ton-year represents the maintenance of a carbon stock of one ton for 1 year.

(10) Best management practices.—sustainable land-management practices that conserve resources while maintaining long-term productivity.

STATEMENT OF PEGGY FANTOZZI, CHAIR, MASSACHUSETTS COMMISSION FOR THE CONSERVATION OF SOIL, WATER AND RELATED RESOURCES

I am pleased and honored to be allowed to present testimony in support of Senate Bill 547, a bill to encourage reduction of greenhouse gases by providing credit for voluntary mitigation actions. As noted, I am currently Chair of the Massachusetts State Commission for the Conservation of Soil, Water and Related Resources. I am also the immediate past President of the Massachusetts Association of Conservation Districts and am currently the Massachusetts Director of the National Association of Conservation Districts, a member of the Legislative Committee for the National Association of Resource Conservation and Development Councils and Partnership liaison member of the United States Department of Agriculture/Natural Resources Conservation Service Team on Carbon Sequestration. I would emphasize that my testimony here today reflects my expertise, experience and ongoing work at state, regional and national levels on behalf of the Conservation Partnership.

We, the conservation districts are strongly supportive of Senate Bill 547 and applaud its adoption of a voluntary incentive-based problem solving approach We, as your constituent based, local connection to non-regulated and regulated landowners, business operators and land managers, recognize the value of and need for this type of approach. The Conservation Partnership consisting of USDA/Natural Resources Conservation Service (NRC S), state environmental agencies and local volunteers have been practicing implementation of best land use practices and delivery of technical assistance throughout the country for more than 60 years.

Senate Bill 547 as proposed

- will diminish the regulatory and financial risk for voluntary, "common good" actions initiated by corporate leaders, business owners, farmers and foresters. The passage of this bill will allow industry to put a real value on credits, rather than current speculative value.
- puts the marketplace in the driver's seat to determine new cost-effective ways to reduce greenhouse gas emission and sequester more carbon . The passing of this bill will result in a market based/market driven commodity that has real value to the buyer and to the seller. Passage of this bill will lessen a governmental role both in terms of regulation and potential subsidy.
- provides direct one for one credit to an entity if it reduces its aggregate emissions from U.S. sources below the applicable baseline and/or a one for one credit if an entity increases its net sequestration above the applicable sequestration baseline. The passage of this bill would provide investment security and promote a land use ethic to all involved in the process.
- recognizes the need to require that government credits are issued for verifiable and legitimate actions that contribute to climate stabilization. The passage of this bill would require performance standard evaluation based on scientific documentation and monitoring from credible sources. The Conservation Partnership, recognizing NRCS for its technical expertise, is ready to serve in this capacity now as evidenced by the information provided in the attachments to this testimony and would be the perfect connection given its existing local delivery system linked to state and Federal agencies.
- recognizes the need and opportunities for domestic and oversees sequestration activities.
- provides the mechanism whereby businesses and landowners can serve their own economic self-interest while bringing about environmental improvements and promoting a sustainable land use ethic for all.
- creates opportunities to deal with an existing problem in a creative and flexible manner. Passage of this bill does not establish Federal performance standards but allows for local, state and regional climate (soils, vegetation, rainfall and temperature) characteristics to be evaluated for credit in the verification process. This is significant and necessary for state support, recognition of state efforts to date(like the 1998 Coalition of Northeast Governors conference) and scientific validation.

This bill does not:

- promote regulation
- inhibit private enterprise
- require linkage to existing or proposed international agreements
- restrict private business options
- subsidize commercial interests

- create additional bureaucratic layering.

Although we strongly support Senate Bill 547 as proposed, we believe that it could be significantly improved by inserting language that specifically:

1) urges the President to:

- recognize a leadership role for USDA/NRCS and the Forest Service to share in setting guidelines for the Voluntary Credit System. These agencies should rely on their internal technical expertise as well as their Partnership capabilities and connection to the private sector;
- recognize technical expertise within USDA/NRCS, EPA, NOAH, DOI/Forest Service, etc in the development of region and/or state specific guidelines for credit validation, verification and monitoring;
- instruct Federal agencies to revisit their own land management policies and practices to encourage minimization of greenhouse gas emissions and maximization of best land use practices for carbon sequestration on Federal lands as well as other public lands that receive Federal dollars;

2) recommends Congress to allocate funding for regionally located Demonstration Projects partnering greenhouse gas emitters, landowners providing carbon sinks, and Federal technical expertise to provide preliminary scientific baseline information.

In addition to this direct testimony, I would call your attention to the attachments provided. Included are letters of support for Senate Bill 547 from the National Association of Conservation Districts, the National Association of Resource Conservation and Development Councils and USDA/Natural Resources Conservation Service, with general information about the Conservation Partnership also provided.

If you have any questions on any items of my testimony or the attachments please let me know so that I can provide clarification and followup. Also if I may be of assistance to you or your staff in following through with the recommendations made please let me know.

In closing, I would take this opportunity to thank the Committee and the authors and sponsors of Senate Bill 547 for their efforts in bringing this issue forward. I would also like to express the sincere appreciation of the Conservation Partnership here in New England, the East Region and across the Nation for Senator Chafee's support of our efforts and his constant championing of the environment for its own sake as well as for the common good. He and his staff are to be commended for their relentless efforts to do the right thing for the common good in a way that makes common sense. I have family ties to Bristol and Providence and therefore have taken pride in Senator Chafee's service to Rhode Island but as a resident of Massachusetts I can tell you that I am honored to lay claim to him as a New Englander and as a United States Senator. I say thank you for myself, for my family, for this region and for future generations.

II

106TH CONGRESS
1ST SESSION

S. 547

To authorize the President to enter into agreements to provide regulatory credit for voluntary early action to mitigate potential environmental impacts from greenhouse gas emissions.

IN THE SENATE OF THE UNITED STATES

MARCH 4, 1999

Mr. CHAFEE (for himself, Mr. MACK, Mr. LIEBERMAN, Mr. WARNER, Mr. MOYNIHAN, Mr. REID, Mr. JEFFORDS, Mr. WYDEN, Mr. BIDEN, Ms. COLLINS, Mr. BAUCUS, and Mr. VOINOVICH) introduced the following bill; which was read twice and referred to the Committee on Environment and Public Works

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A BILL

To authorize the President to enter into agreements to provide regulatory credit for voluntary early action to mitigate potential environmental impacts from greenhouse gas emissions.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE; TABLE OF CONTENTS.

(a) SHORT TITLE.—This Act may be cited as the "Credit for Voluntary Reductions Act".

(b) TABLE OF CONTENTS.—The table of contents of this Act is as follows:

SEC. 2. PURPOSE.

The purpose of this Act is to encourage voluntary actions to mitigate potential environmental impacts of greenhouse gas emissions by authorizing the President to enter into binding agreements under which entities operating in the United States will receive credit, usable in any future domestic program that requires mitigation of greenhouse gas emissions, for voluntary mitigation actions taken before the end of the credit period.

SEC. 3. DEFINITIONS.

In this Act:

(1) CARBON RESERVOIR.—The term ''carbon reservoir'' means quantifiable nonfossil storage of carbon in a natural or managed ecosystem or other reservoir.

(2) COMPLIANCE PERIOD.—The term ''compliance period'' means any period during which a domestic greenhouse gas regulatory statute is in effect.

(3) CREDIT PERIOD.—The term ''credit period'' means—

(A) the period of January 1, 1999, through the earlier of—

(i) the day before the beginning of the compliance period; or

(ii) the end of the ninth calendar year that begins after the date of enactment of this Act; or

(B) if a different period is determined for a participant under section 5(e) or 6(c)(4), the period so determined.

(4) DOMESTIC.—The term "domestic" means within the territorial jurisdiction of the United States.

(5) DOMESTIC GREENHOUSE GAS REGULATORY STATUTE.—The term "domestic greenhouse gas regulatory statute" means a Federal statute, enacted after the date of enactment of this Act, that imposes a quantitative limitation on domestic greenhouse gas emissions, or taxes such emissions.

(6) EARLY ACTION AGREEMENT.—The term "early action agreement" means an agreement with the United States entered into under section 4(a).

(7) EXISTING SOURCE.—The term "existing source" means a source that emitted greenhouse

gases during the participant's base period determined under section 6.

(8) GREENHOUSE GAS.—The term "greenhouse gas" means—

(A) carbon dioxide; and

(B) to the extent provided by an early action agreement—

(i) methane;

(ii) nitrous oxide;

(iii) hydrofluorocarbons;

(iv) perfluorocarbons; and

(v) sulfur hexafluoride.

(9) GREENHOUSE GAS REDUCTION CREDIT.—The term "greenhouse gas reduction credit" means an authorization under a domestic greenhouse gas regulatory statute to emit 1 metric ton of greenhouse gas (expressed in terms of carbon dioxide equivalent) that is provided because of greenhouse gas emission reductions or carbon sequestration carried out before the compliance period.

(10) NEW SOURCE.—The term "new source" means—

(A) a source other than an existing source; and

(B) a facility that would be a source but for the facility's use of renewable energy.

(11) OWN.—The term "own" means to have direct or indirect ownership of an undivided interest in an asset.

(12) PARTICIPANT.—The term "participant" means a person that enters into an early action agreement with the United States under this Act.

(13) PERSON.—The term "person" includes a governmental entity.

(14) SOURCE.—The term "source" means a source of greenhouse gas emissions.

SEC. 4. AUTHORITY FOR EARLY ACTION AGREEMENTS.

(a) AUTHORITY.—

(1) IN GENERAL.—The President may enter into a legally binding early action agreement with any person under which the United States agrees to provide greenhouse gas reduction credit usable beginning in the compliance period, if the person takes an action described in section 5 that reduces greenhouse gas emissions or sequesters carbon before the end of the credit period.

(2) REQUIREMENTS.—An early action agreement entered into under paragraph (1) shall meet either—

(A) the requirements for early action agreements under sections 5 through 8; or

(B) in the case of a participant described in section 9, the requirements of that section.

(b) DELEGATION.—The President may delegate any authority under this Act to any Federal department or agency.

(c) REGULATIONS.—The President may promulgate such regulations (including guidelines) as are appropriate to carry out this Act.

SEC. 5. ENTITLEMENT TO GREENHOUSE GAS REDUCTION CREDIT FOR EARLY ACTION.

(a) INTERNATIONALLY CREDITABLE ACTIONS.—A participant shall receive greenhouse gas reduction credit under an early action agreement if the participant takes an action that—

(1) reduces greenhouse gas emissions or sequesters carbon before the end of the credit period; and

(2) under any applicable international agreement, will result in an addition to the United States quantified emission limitation for the compliance period.

(b) UNITED STATES INITIATIVE FOR JOINT IMPLEMENTATION.—

(1) IN GENERAL.—Subject to paragraph (2), an early action agreement may provide that a participant shall be entitled to receive greenhouse gas reduction credit for a greenhouse gas emission reduction or carbon sequestration that—

(A) is not creditable under subsection (a); and

(B) is for a project—

(i) accepted before December 31, 2000, under the United States Initiative for Joint Implementation; and

(ii) financing for which was provided or construction of which was commenced before that date.

(2) LIMITATION ON PERIOD DURING WHICH CREDIT MAY BE EARNED.—No greenhouse gas reduction credit may be earned under this subsection after the earlier of—

(A) the earliest date on which credit may be earned for a greenhouse gas emission reduction, carbon sequestration, or comparable project under an applicable international agreement; or

(B) the end of the credit period.

(c) PROSPECTIVE DOMESTIC ACTIONS.—

(1) EMISSION REDUCTIONS.—A participant shall receive greenhouse gas reduction credit under an early action agreement if, during the credit period—

(A) the participant's aggregate greenhouse gas emissions from domestic sources that are covered by the early action agreement; are less than

(B) the sum of the participant's annual source baselines during that period (as determined under section 6 and adjusted under subsections (a)(2), (c)(1), and (c)(2) of section 7).

(2) SEQUESTRATION.—For the purpose of receiving greenhouse gas reduction credit under paragraph (1), the amount by which aggregate net carbon sequestration for the credit period in a participant's domestic carbon reservoirs covered by an early action agreement exceeds the sum of the participant's annual reservoir baselines for the credit period (as determined under section 6 and adjusted under section 7(c)(1)(B)) shall be treated as a greenhouse gas emission reduction.

(d) DOMESTIC SECTION 1605 ACTIONS.—

(1) CREDIT.—An early action agreement may provide that a participant shall be entitled to receive

1 ton of greenhouse gas reduction credit for each ton of greenhouse gas emission reductions or carbon sequestration for the 1991 through 1998 period from domestic actions that are—

(A) reported before January 1, 1999, under section 1605 of the Energy Policy Act of 1992 (42 U.S.C. 13385); or

(B) carried out and reported before January 1, 1999, under a Federal agency program to implement the Climate Change Action Plan.

(2) VERIFICATION.—The participant shall provide information sufficient to verify to the satisfaction of the President (in accordance with section 8 and the regulations promulgated under section 4(c)) that actions reported under paragraph (1)—

(A) have been accurately reported;

(B) are not double-counted; and

(C) represent actual reductions in greenhouse gas emissions or actual increases in net carbon sequestration.

(e) EXTENSION.—The parties to an early action agreement may extend the credit period during which greenhouse gas reduction credit may be earned under the early action agreement, if Congress permits such an exten-

sion by law enacted after the date of enactment of this Act.

(f) AWARD OF GREENHOUSE GAS REDUCTION CREDIT.—

(1) ANNUAL NOTIFICATION OF CUMULATIVE BALANCES.—After the end of each calendar year, the President shall notify each participant of the cumulative balance (if any) of greenhouse gas reduction credit earned under an early action agreement as of the end of the calendar year.

(2) AWARD OF FINAL CREDIT.—Effective at the end of the credit period, a participant shall have a contractual entitlement, to the extent provided in the participant's early action agreement, to receive 1 ton of greenhouse gas reduction credit for each 1 ton that is creditable under subsections (a) through (d).

SEC. 6. BASELINE AND BASE PERIOD.

(a) SOURCE BASELINE.—A participant's annual source baseline for each of the calendar years in the credit period shall be equal to the participant's average annual greenhouse gas emissions from domestic sources covered by the participant's early action agreement during the participant's base period, adjusted for the calendar year as provided in subsections (a)(2), (c)(1), and (c)(2) of section 7.

(b) RESERVOIR BASELINE.—A participant's annual reservoir baseline for each of the calendar years in the credit period shall be equal to the average level of carbon stocks in carbon reservoirs covered by the participant's early action agreement for the participant's base period, adjusted for the calendar year as provided in section 7(c)(1).

(c) BASE PERIOD.—

(1) IN GENERAL.—Except as provided in paragraphs (2) and (3), a participant's base period shall be 1996 through 1998.

(2) DATA UNAVAILABLE OR UNREPRESENTATIVE.—The regulations promulgated under section 4(c) may specify a base period other than 1996 through 1998 that will be applicable if adequate data are not available to determine a 1996 through 1998 baseline or if such data are unrepresentative.

(3) ELECTIONS.—The regulations promulgated under section 4(c) may permit a participant to elect a base period earlier than 1996 (not to include any year earlier than 1990) to reflect voluntary reductions made before January 1, 1996.

(4) ADJUSTMENT OF PERIOD DURING WHICH CREDIT MAY BE EARNED.—Notwithstanding subsections (c) and (d) of section 5, except as otherwise

provided by the regulations promulgated under section 4(c), if an election is made for a base period earlier than 1996—

(A) greenhouse gas reduction credit shall be available under section 5(c) for the calendar year that begins after the end of the base period and any calendar year thereafter through the end of the credit period; and

(B) greenhouse gas reduction credit shall be available under section 5(d) only through the end of the base period.

SEC. 7. SOURCES AND CARBON RESERVOIRS COVERED BY EARLY ACTION AGREEMENTS.

(a) SOURCES.—

(1) IN GENERAL.—

(A) COVERED SOURCES.—Except as otherwise provided in this subsection, a participant's early action agreement shall cover all domestic greenhouse gas sources that the participant owns as of the date on which the early action agreement is entered into.

(B) EXCLUSIONS.—The regulations promulgated under section 4(c) (or the terms of an early action agreement) may exclude from coverage under an early action agreement—

(i) small or diverse sources owned by the participant; and

(ii) sources owned by more than 1 person.

(2) NEW SOURCES.—

(A) IN GENERAL.—The regulations promulgated under section 4(c) may provide that an early action agreement may provide for an annual addition to a participant's source baseline to account for new sources owned by the participant.

(B) AMOUNT OF ADDITION.—The amount of an addition under subparagraph (A) shall reflect the emission performance of the most efficient commercially available technology for sources that produce the same or similar output as the new source (determined as of the date on which the early action agreement is entered into).

(b) OPT-IN PROVISIONS.—

(1) OPT-IN FOR OTHER OWNED SOURCES.—Domestic sources owned by a participant that are not required to be covered under subsection (a) may be covered under an early action agreement at the election of the participant.

(2) OPT-IN FOR CARBON RESERVOIRS.—

(A) IN GENERAL.—An early action agreement may provide that domestic carbon reservoirs owned by a participant may be covered under the early action agreement at the election of the participant.

(B) COVERAGE.—Except in the case of small or diverse carbon reservoirs owned by the participant (as provided in the regulations promulgated under section 4(c)), if a participant elects to have domestic carbon reservoirs covered under the early action agreement, all of the participant's domestic carbon reservoirs shall be covered under the early action agreement.

(3) OPT-IN FOR SOURCES AND CARBON RESERVOIRS NOT OWNED BY PARTICIPANT.—Any source or carbon reservoir not owned by the participant, or any project that decreases greenhouse gas emissions from or sequesters carbon in such a source or carbon reservoir, may be covered by an early action agreement—

(A) in the case of a source or carbon reservoir that is covered by another early action agreement, if each owner of the source or car-

bon reservoir agrees to exclude the source or reservoir from coverage by the owner's early action agreement; and

(B) in accordance with the regulations promulgated under section 4(c).

(c) ACCOUNTING RULES.—

(1) TRANSFERS.—If ownership of a source or carbon reservoir covered by an early action agreement is transferred to or from the participant—

(A) in the case of a source, the source's emissions shall be adjusted to reflect the transfer for the base period and each year for which greenhouse gas reduction credit is claimed; and

(B) in the case of a carbon reservoir—

(i) the carbon reservoir's carbon stocks shall be adjusted to reflect the transfer for the participant's base period; and

(ii) the carbon reservoir's net carbon sequestration shall be adjusted to reflect the transfer for each year for which greenhouse gas reduction credit is claimed.

(2) DISPLACEMENT OF EMISSIONS.—An early action agreement shall contain effective and workable provisions that ensure that only net emission

reductions will be credited under section 5 in circumstances in which emissions are displaced from sources covered by an early action agreement to sources not covered by an early action agreement.

(3) PERIOD OF COVERAGE.—Emissions from sources and net carbon sequestration in carbon reservoirs shall be covered by an early action agreement for the credit period, except as provided under paragraph (1) or by the regulations promulgated under section 4(c).

(4) PARTIAL YEARS.—An early action agreement shall contain appropriate provisions for any partial year of coverage of a source or carbon reservoir.

SEC. 8. MEASUREMENT AND VERIFICATION.

(a) IN GENERAL.—In accordance with the regulations promulgated under section 4(c), an early action agreement shall—

(1) provide that, for each calendar year during which the early action agreement is in effect, the participant shall report to the United States, as applicable—

(A) the participant's annual source baseline and greenhouse gas emissions for the calendar year; and

(B) the participant's annual reservoir baseline and net carbon sequestration for the calendar year;

(2) establish procedures under which the participant will measure, track, and report the information required by paragraph (1);

(3) establish requirements for maintenance of records by the participant and provisions for inspection of the records by representatives of the United States; and

(4) permit qualified independent third party entities to measure, track, and report the information required by paragraph (1) on behalf of the participant.

(b) AVAILABILITY OF REPORTS TO THE PUBLIC.—Reports required to be made under subsection (a)(1) shall be available to the public.

(c) CONFIDENTIALITY.—The regulations promulgated under section 4(c) shall make appropriate provision for protection of confidential commercial and financial information.

SEC. 9. AUTHORITY TO ENTER INTO AGREEMENTS THAT ACHIEVE COMPARABLE REDUCTIONS.

In the case of a participant that manufactures or constructs for sale to end-users equipment or facilities that

emit greenhouse gases, the President may enter into an early action agreement that does not meet the requirements of sections 5 through 7, if the President determines that—

(1) an early action agreement that meets the requirements of those sections is infeasible;

(2) an alternative form of agreement would better carry out this Act; and

(3) an agreement under this section would achieve tonnage reductions of greenhouse gas emissions that are comparable to reductions that would be achieved under an agreement that meets the requirements of those sections.

SEC. 10. TRADING AND POOLING.

(a) TRADING.—A participant may—

(1) purchase earned greenhouse gas reduction credit from and sell the credit to any other participant; and

(2) sell the credit to any person that is not a participant.

(b) POOLING.—The regulations promulgated under section 4(c) may permit pooling arrangements under which a group of participants agrees to act as a single participant for the purpose of entering into an early action agreement.

SEC. 11. RELATIONSHIP TO FUTURE DOMESTIC GREENHOUSE GAS REGULATORY STATUTE.

(a) IN GENERAL.—An early action agreement shall not bind the United States to adopt (or not to adopt) any particular form of domestic greenhouse gas regulatory statute, except that an early action agreement shall provide that—

(1) greenhouse gas reduction credit earned by a participant under an early action agreement shall be provided to the participant in addition to any otherwise available authorizations of the participant to emit greenhouse gases during the compliance period under a domestic greenhouse gas regulatory statute; and

(2) if the allocation of authorizations under a domestic greenhouse gas regulatory statute to emit greenhouse gases during the compliance period is based on the level of a participant's emissions during a historic period that is later than the participant's base period under the participant's early action agreement, any greenhouse gas reduction credit to which the participant was entitled under the early action agreement for domestic greenhouse gas reductions during that historic period shall, for the purpose of that allocation, be added back to the partici-

pant's greenhouse gas emissions level for the historic period.

(b) LIMITATION.—Nothing in this Act authorizes aggregate greenhouse gas emissions from domestic sources in an amount that exceeds any greenhouse gas emission limitation applicable to the United States under an international agreement that has been ratified by the United States and has entered into force.

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