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GLOBAL WARMING MOUNTAINTOP "SUMMIT": ECONOMIC IMPACTS ON NEW ENGLAND

HEARING

BEFORE THE

SELECT COMMITTEE ON
ENERGY INDEPENDENCE
AND GLOBAL WARMING
HOUSE OF REPRESENTATIVES

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GLOBAL WARMING MOUNTAINTOP "SUMMIT": ECONOMIC IMPACTS ON NEW ENGLAND

MONDAY, JUNE 4, 2007

HOUSE OF REPRESENTATIVES,
SELECT COMMITTEE ON ENERGY INDEPENDENCE
AND GLOBAL WARMING,
Washington, DC.

The committee met, pursuant to call, at 11:05 a.m. In Franconia, New Hampshire, on the summit of Cannon Mountain, Hon. Edward J. Markey [chairman of the committee] presiding.

Present: Representatives Markey, Larson, Hodes, Shea-Porter, Sensenbrenner and Walden.

The CHAIRMAN. This hearing will come to order.

I am Congressman Ed Markey from the State of Massachusetts. I am the chairman of the Select Committee on Energy Independence and Global Warming. We thank all of you for coming here today to the summit of Cannon Mountain for our field hearing on this very important issue of global warming.

When we initially scheduled the hearing, we had hoped that the weather would cooperate and we would have a clear view of New Hampshire and New England. However, as Mark Twain once said, one of the brightest gems of the New England weather is the dazzling uncertainty of it.

Despite the clouds, today's hearing will still give us a lot of clarity about the ways that global warming is affecting New England and its economy. We are sitting at an elevation of 4,180 feet, and our hopes are that it will help to give us a perspective as to how this issue is affecting New England and other parts of our country and the world that are at higher elevations.

Critical components of the New Hampshire economy, such as skiing, tourism, maple sugaring, hunting, and fishing are especially vulnerable to the impacts associated with global warming. Tourism spending associated with many of these industries currently brings billions of dollars into New Hampshire every year. We are already seeing impacts associated with global warming here in the Northeast such as warming winters with less snow and more rain, a shorter snow season, earlier leaf and bloom dates in the spring and a growing number of heavy precipitation events.

According to a 2006 analysis by a team of climate experts, including one of whom will be testifying today, the average temperatures in the Northeast have been increasing at a rate of almost a half a degree Fahrenheit per decade since 1970 and during winter months at a much faster rate of roughly 1.25 degrees per decade.

Over the last 35 years, winter temperatures in the Northeast have increased overall by a remarkable 4.4 degrees Fahrenheit.

As we will hear from our panel today, global warming has the potential to completely devastate the winter outdoor recreational industries that are essential components of the New England economy and their way of life. We already know that if we don't cut global warming pollution we may need to rename Glacier National Park because one day there may be no glaciers in that park, and now it appears we may also have to one day rename the White Mountains because there may be no more snow.

However, the response from the people of New Hampshire at the State and local level has been astonishing. At the local level, the residents of 164 cities and towns all across the State went to their town meetings and passed a climate change resolution. The resolution in part calls on the President and the Congress to take action to set up a national program to reduce greenhouse gas emissions.

At the State level in August of 2006, Governor John Lynch endorsed the goal of producing 25 percent of New Hampshire's energy from clean renewable sources by the year 2025 and last month signed the Renewable Energy Act to set the renewable energy standards for electric utilities in the State.

New Hampshire is also an inaugural member of the Regional Greenhouse Gas Initiative, a landmark bipartisan agreement between the Governors of 10 Northeastern and mid-Atlantic States to reduce emissions of carbon dioxide from power plants 10 percent below current levels by 2019.

Being in New Hampshire today further highlights the economic risk of global warming and the growing public support around the country for taking bold action. The Congress now needs to catch up to the American people who are calling for national mandatory programs to reduce our heat-trapping emissions.

And now I would like to recognize the ranking member of the select committee, the gentleman from Wisconsin, Mr. Sensenbrenner.

[The statement of Mr. Markey follows:]

Opening Statement for Chairman Edward J. Markey (D-MA)
"Global Warming Mountaintop 'Summit': Economic Impacts on New England"
Select Committee on Energy Independence and Global Warming
June 4, 2007

This hearing is called to order.

Thank you all for joining us here on the summit of Cannon Mountain for the inaugural field hearing of the Select Committee on Energy Independence and Global Warming. Today, we will examine the impacts of global warming on New England and its economy. I would also remind our witnesses to be sure to take an appropriate number of pauses during your testimony because we are at 4,186 feet and it is easy to get out of breath.

It is important for Members of Congress to get outside of Washington, DC to hear directly from state and local leaders, businesses, and citizens around the country who are concerned with the effects of global warming that they are already seeing. As a New Englander, I am pleased that the Select Committee's first hearing outside of Washington is here in New Hampshire, where global warming is already adversely impacting many industries that are vital to the state. From the top of Cannon Mountain, it is also easy to see that the groundswell of public support for taking action to cut global warming pollution is reaching new peaks.

Critical components of the New Hampshire economy such as skiing, tourism, maple sugaring, hunting and fishing, are especially vulnerable to the impacts associated with global warming. Tourism spending associated with many of these industries currently brings billions of dollars into New Hampshire every year.

We are already seeing impacts associated with global warming here in the Northeast such as warming winters with less snow and more rain, a shorter snow season, earlier leaf and bloom dates in the spring and a growing number of heavy precipitation events.

According to a 2006 analysis by a team of climate experts, average temperatures in the Northeast have been increasing at a rate of almost 0.5 degrees Fahrenheit per decade since 1970 and during winter months at a much faster rate of roughly 1.25 degrees per decade. Over the last 35 years, winter temperatures in the Northeast have increased overall by a remarkable 4.4 degrees. As we will hear from our panel today, global warming has the potential to completely decimate the winter outdoor recreational industries that are essential components of the New England economy and way of life.

If we don't cut global warming pollution, we may have to rename the White Mountains because there may be no snow.

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in part, calls on the president and Congress to take actions to set up a national program to reduce greenhouse gas emissions.

At the state level, In August 2006, Governor John Lynch endorsed the goal of producing 25 percent of New Hampshire's energy from clean, renewable sources by the year 2025 and last month signed the Renewable Energy Act to set renewable energy standards for electric utilities in the state. New Hampshire is also an inaugural member of the Regional Greenhouse Gas Initiative (RGGI), a landmark bipartisan agreement between the governors of 10 Northeastern and Mid-Atlantic states to reduce emissions of carbon dioxide from power plants 10 percent below current levels by 2019.

Being in New Hampshire today further highlights the economic risks of global warming and the growing public support around the country for taking bold action. The Congress now needs to catch up to the American people who are calling for a national, mandatory program to reduce our heat-trapping emissions.

And now I would like to recognize the Ranking Member of the Select Committee, the gentleman from Wisconsin, Mr. Sensenbrenner.

Mr. SENSENBRENNER. Thank you very much, Mr. Chairman.

This is the first of many expected field hearings with the Select Committee and with the possible exception of Holy Hill in my southeastern Wisconsin district, I can't imagine a more beautiful location for this committee to begin its road show than here at Cannon Mountain and Franconia, New Hampshire.

The chairman has said this committee will travel to several locations in an effort to get a firsthand look at climate change, although I doubt we will go to anywhere with a more potential scenic view than the one that we have. I would hope that our friends in the press would not put a headline saying, Global Warming Committee Starts Out with Heads in Clouds, because that is where we are here.

With these field hearings, we will get a closer look at how warming temperatures specifically affect some regions. Undoubtedly, there will be an emphasis caused by climate change and greenhouse gas emissions, and in some respects perhaps not every effect is all bad. For example, Mr. Perkins, the Director of the University of Vermont's Proctor Maple Research Center, will tell us today that the maple syrup season is getting shorter. But he also knows that the shorter season has not yet resulted in lower syrup harvests. Not only that, Dr. Perkins points out that increased carbon dioxide concentrations also lead to higher sugar production in maples.

It is no stretch of the imagination to say that a warming climate will reduce days that one can ski or harvest sap from maple trees. There is little doubt that these kind of changes would also have negative effects on New England's economy and culture. But it will take the imagination to develop solutions that will help protect ski seasons and maple sap harvest without hurting the economy any even more. For that, the solution will have to include ways to adapt to the changing climate.

Dr. Perkins notes that the growth potential of maples in the Northeast is limited because of marginal soil nutrition and long-term nitrogen saturation, among other reasons. We know that healthy forests can help take carbon dioxide out of the atmosphere and that smart forest management should be a component of any climate change policy.

I believe healthy forests management policies that help encourage maple tree growth are more likely to have a positive effect on those trees than greenhouse gas regulations whose effect may never be seen.

When considering climate change policy, most of the important principles Republicans will insist on is that the policy actually leads to measurable, tangible improvements to the environment. Republicans will insist that any policy that puts an emphasis on advancements in energy technology while also making sure that the policy doesn't hurt the economy or cost us jobs. And I would point out that some of the Kyoto compliance proposals that have been out there will result in an increase in the price of gasoline by over a dollar a gallon over and above the high prices that we are already paying, and that is certainly going to have an impact on any economy that is heavily dependent upon the tourist trade.

While this magnificent mountain provides a great vantage point to see the surrounding countryside when the clouds are gone, I am

not sure this location will help bring realistic solutions into view. We need a mountain high enough to see to India and China, but I doubt that the summit of Mount Everest is one of the designations that Mr. Markey has on our agenda.

It may seem hard to believe that these faraway nations could have an effect on this beautiful mountain a half a world away, but the scientific consensus appears to tell us just that. Already, China is expected to surpass the U.S. in carbon dioxide emissions this year. That is why Republican Members of congress will insist that any policy addressing greenhouse gas reduction also includes China and India.

I do salute President Bush last week in announcing a policy that engages both China and India which have walked away from the Kyoto Policy beginning in 1995 and thus the Kyoto Treaty and the mechanism that is set up only apply to countries which are in the developed world, rather than the 134 countries which are not. When talking about global warming, there is a lot to think about locally, but if we act, we must do so globally.

Thank you.

The CHAIRMAN. The Chair recognizes the gentleman from our neighboring State of Connecticut, the gentleman who is the vice chairman of the Democratic Caucus, Mr. John Larson.

Mr. LARSON. Thank you, Mr. Chairman. I thank you for holding this hearing in our distinguished colleague Paul Hodes' district, and it is great to be up here in New Hampshire.

We have just come from a trip with the Speaker and the chairman of this committee to Greenland, then on to Germany to meet with Chancellor Merkel, then on to the U.K. To meet with a number of MPs whose top priority is climate change as well, and then on to the European Union and back home. And our first stop, of course, was here in New Hampshire. It is good to be here with my colleague, Carol Shea-Porter as well.

They are an outstanding addition who, I think, understand intuitively, as do the 164 communities in New Hampshire, what we face. It is a sense of urgency, and to that sense of urgency the worst thing I think any elected official or any person can utter was "we were too late." we will be if we don't respond in the kind of manner that we need to do. Making sure, as Mr. Sensenbrenner said, that the science is right.

In Greenland, we also relied on the Inuit Indians, who actually fish in that area and hunt in that area, so there was firsthand, anecdotal proof of what is going on, something that your eyes could not deny in terms of the glacial melt that is occurring there.

I yield back.

The CHAIRMAN. The gentleman's time has expired.

The Chair recognizes the gentleman from Oregon, Mr. Walden.

Mr. WALDEN. I am Congressman Greg Walden. I represent the people of Oregon's Second Congressional District. It is great to be here on your mountaintop in New Hampshire. The one in my district rises 11,232 feet; and the base of our ski run, 45 minutes from where I live, starts at 4,000 feet. So we are no strangers to these issues and the importance of having a good snow pack for our winter recreation.

I, too, just returned from a week overseas meeting with leaders in places like Denmark and Belgium and in Germany and in London; and we talked a lot about the issues related to greenhouse gas emissions, what we can do about them, what has worked over there in terms of their cap and trade system and how we can learn from mistakes that they made as we look at legislation that works for our country.

The chairman of our subcommittee, Rick Boucher, who is a Democrat from Virginia, laid out a timeline that he thought that Congress might work on to produce a bill for first consideration as early as this September. But he also said it should be bipartisan, industry supported, supported bicamerally between the Senate and the House and the President and that it wouldn't put an adverse burden on America's economy and consumers.

For example, we learned in Germany, when they did the initial allocations in credit in their carbon and cap system, they overallocated; and the utilities took that opportunity cost and passed it on to their rate payers, resulting in electricity price increases of up to 20 percent in some cases. So, as they move into the next phase, they are trying to figure out how not to repeat that.

These are lessons we are trying to learn here as we look at what works for New Hampshire may be different than what may work in Oregon or a southern State. How do we pull together as a country to address this very important issue as an environment and then internationally? How do we pull everybody in to do the right thing?

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you very much.

Now I turn to recognize the Congressman who represents this district, the host congressional district for our first field hearing here in the United States. I consider our trip to Greenland to be a field trip of historic import as well. The gentleman from New Hampshire, Paul Hodes.

Mr. HODES. Thank you very much, Mr. Chairman.

I want to welcome everyone to the Second Congressional District of New Hampshire and to Cannon Mountain where the steep trails and challenging conditions challenge old knees like mine.

This is a very important hearing. We are all aware of the scientific reports outlining the dangerous environmental impacts of global warming. In New England and in New Hampshire, however, global warming also poses a threat to our economic well-being and our way of life. An increase in the average temperature by even a few degrees would be disastrous to the agriculture, forestry, and tourism industries here.

Previous Congresses and the Bush administration, frankly, have ignored the growing crisis of global warming. Now we, as Members of the 110th Congress, must enact a solution that meets the challenges posed to both our environment and our economy.

The issues of energy, climate change, environment, and national security are absolutely intertwined; and it will be up to us as we move forward to redefine what real security for this country means.

We have got to bring predictability to businesses who are waiting to go green. Many businesses are starting to act voluntarily, but many are sitting on the sidelines waiting for Federal regulations

that will provide a predictable set of standards. We have got to help revitalize our economy and keep us competitive in a global economy, and going green with the right energy policies will bring new jobs to this country.

We have got to unhook from energy produced by unfriendly countries. We need to make America number one in the world in energy efficiency, conservation, and the development of new energy technologies so that we can export goods and services to the world that help the world and earn us a respect as world leader.

Granite staters have led the Nation to action on environmental issues before. In 1983, over 100 New Hampshire towns passed a resolution calling on Congress to curb acid rain, and today we have reduced sulfur dioxide emissions from power plants by 40 percent compared to 1980 levels.

One hundred and sixty-four New Hampshire towns, including our hosts here today in Franconia, have passed a resolution urging Congress and the President to establish a national program to reduce greenhouse gas emissions and to initiate more aggressive research to develop sustainable energy technologies in ways that will strengthen our domestic economy.

But this hearing today is vital to understanding the economic implications of global warming policy in New Hampshire, New England, and the United States.

I thank you for coming to New Hampshire. I thank you for coming to the Second District, and we look forward to the testimony of our witnesses.

Thank you very much, Mr. Chairman.

The CHAIRMAN. Thank you.

And the Chair recognizes the gentlelady from New Hampshire, Carol Shea-Porter, who represents the other half of this great State.

Ms. SHEA PORTER. Thank you, Mr. Chairman; and good morning to everybody. It is a great honor to be here.

On the way up—and I have been on this car more times than I want to tell because I do get a little nervous riding up—but I saw damage to the trees. The person who brought us up told us it is from the sulfuric clouds, and that just absolutely pains me to think that we are continuing the degradation of our forests and our economy. But it is not hopeless.

I was talking to some kids from high school, 17, 18 years old. If you are here, raise your hand, because I am so proud of all of them. They hiked up here so they could have their input, and they were carrying a flag that was designed that said "patriotism is green," and that is true. And that is what I wanted to address, that patriotism is green, and we need to educate our young and ourselves to do this.

We are now at the point where Congress has to go in overtime and in overdrive if we are going to beat this back and change the warming, but we can do this. You know, we have it in our genes to succeed. We are the children and the grandchildren of that generation that fought that world war and that sent us to the moon and did all of these other great things. We need our self-confidence back, but we also need the political will to do this, and I am

pleased to say that we are now seeing in Congress a bipartisan effort to make that change.

I myself think we could go faster and that we must go faster. I think that if we go ahead and put an Apollo-like plan in—and I have spoken to a number of people, scientists who say it can be done—we could achieve independence from energy from outside energy sources that are not friendly to us; and, of course, I am speaking specifically about some countries in the Middle East. We could do this in the next decade, and we could create jobs while we do that.

And we owe it to these kids. I look at their faces, and I know they are looking at us the way we looked at our parents. I looked at my parents and their generation as just awesome people that could take on the problems of the world and succeed. They are looking at us with the same kind of hope, and we owe it to them, and we owe it to the children around the world to do this.

It is okay if not every country signs on board to do this. We still have the responsibility to be the moral leaders and the scientific leaders and we have the talent. Look who is sitting in front of us at this panel. We have everything we need as long as we pull together and believe that we can and we must and we will succeed.

So I thank all of you for coming today. I have high hopes for Congress, and I have high hopes that the President will start to move forward and that we will see the change that we owe the next generation.

Thank you.

The CHAIRMAN. Time for opening remarks from Members of Congress has expired, and we will now turn to hear from our expert witnesses.

Our first witness is Alice Chamberlin. She is testifying on behalf of Governor John Lynch who is now a recognized national leader on this issue.

We welcome you, Ms. Chamberlin. Whenever you are ready, please begin.

STATEMENT OF ALICE CHAMBERLIN, SPECIAL ASSISTANT FOR POLICY, ENERGY, ENVIRONMENT AND TRANSPORTATION, OFFICE OF GOVERNOR JOHN LYNCH

Ms. CHAMBERLIN. I don't know if my mike is on.

Mr. Chairman, Congressman Sensenbrenner, members of the committee, welcome, and particularly to our congressional delegation, welcome. On behalf of Governor Lynch, it is my privilege to welcome you here today at Cannon.

We wish the weather was better. I know that the Governor would want me to invite you back when the weather is beautiful; and if it clears behind you, I will let you know.

But we are here today because Cannon is an appropriate place that you have chosen very well to talk about global warming and the impacts of global warming.

All of the activities that we depend on as a State to bring recreation and tourism, our traditional values and lifestyles of maple sugaring, hiking, skiing, snowmobiling, they are things that we rely on; and those are the activities that are threatened by global warming.

You are going to hear a lot about the details of the impacts of global warming. But I want to focus on the Governor's behalf on a couple of things that have been very important to his administration.

In 3 years, we have had 300-year flood events in New Hampshire; and those flood events have had consequences of loss of life, tragic loss of life, and tremendous damage to the infrastructure, somewhere upwards of $35 million to roads, bridges, and private property. These are all costs that are literally borne locally by the State and by the Federal Government. FEMA has been a great assistance in helping the State recover from floods.

We are also in the process of studying our flood management regime in New Hampshire to understand if we are really doing it in the way that it is necessary in light of changed circumstances and the unpredictable effects of climate change, and that is another drain on State and Federal resources.

So these impacts are already very real in New Hampshire, and we are concerned that they will be catastrophic if the impacts that are predicted from the Northeast Climate Impacts Assessment start to come to fruition. Those predict late in the century that the Northeast will see winter snow season cut in half, sea level rise up to nearly three feet and more than 60 days of temperatures above 90 degrees in many of our cities. For New Hampshire, those consequences would be catastrophic.

You have come to Cannon Mountain. One example is the importance of our ski industry. That industry alone is about 8.6 percent of the State's total direct spending from tourists and visitors and translates into something like $420 million of indirect spending and 17,000 jobs. We can't predict global warming, but we know the asset that we have now with that industry, and New Hampshire depends on it, relies on it and promotes it and will continue to.

We need to address global warming to protect our ski industry as well as many other industries, and you will hear more about those from other witnesses.

But, you know, New Hampshire has a proud tradition for practical and bipartisan problem solving; and we approach and Governor Lynch approaches the problem of global warming with that in mind. He works with a multitude of stakeholders, multitude of opinions. He seeks consensus, and he keeps an eye on the bottom line.

And, Chairman Markey, you mentioned some of the initiatives that the Governor has undertaken to address climate change, and they have a lot of indirect benefits in terms of the economy of the State as well: reducing energy use, improving energy efficiency. It is good for the environment. It is a critical step in addressing global warming, but by reducing costs to State government, to industry, to residents, we keep an eye on the bottom line as well; and we they think, as you said, Congressman Sensenbrenner, that is really a critical part of the solution to global warming.

I want to speak particularly just to two initiatives that the Governor has undertaken, and I see that I am out of time.

The CHAIRMAN. If you could summarize. Each witness has 5 minutes.

Ms. CHAMBERLIN. The renewable energy portfolio that we just passed, passed our Senate 24 to 0, so I think bipartisan cooperation is possible on these; and we will find that support among New Hampshire residents as well as people from all across the country to address global warming.

And, finally, I just want to say that the initiative the towns and cities took across New Hampshire at their town meetings really represent the leadership that we look to in New Hampshire. So I advise all of us in our work in New Hampshire and across the country to keep in mind that citizens will lead on this issue.

Thank you very much.

The CHAIRMAN. The gentlelady's time has expired.

Our next witness is Dr. Timothy Perkins. Dr. Perkins is the Director of the Proctor Maple Research Center, a field research station of the College of Agriculture and Life Sciences at the University of Vermont. The Proctor Maple Research Center is the Nation's oldest and largest facility dedicated to the study of the maple trees.

STATEMENT OF TIMOTHY PERKINS, PH.D., DIRECTOR, PROCTOR MAPLE RESEARCH CENTER, UNIVERSITY OF VERMONT

Mr. PERKINS. Mr. Chairman, thank you for inviting me to address you today.

This location atop Cannon mountain has significance in today's discussion because nearly 75 percent of the maple syrup that is made in the U.S. is produced within about 150 miles of this location. In addition, tens of thousands of visitors from around the world converge upon New England and New York each year to witness the spectacular autumn foliage. In both cases, these gifts derive from the northern hardwood forests.

Global warming poses a threat to the maple resource and, thus, the way of life of many of the residents of the north country. It does so in two major ways:

First, because maple sap flow in trees occurs in response to free saw conditions, any change which occurs in the temperature patterns will affect the flow of sap from maple trees.

Maple producers exploit the sap-flow phenomenon by drilling a small hole in the stems of trees collecting the sap which exudes and boiling it into maple syrup. The process is very long and labor intensive. It requires nearly 40 gallons of sap to be collected and boiled to produce one gallon of pure maple syrup.

The maple sugaring season is very short, lasting only about 4 to 6 weeks each season, but it is eagerly anticipated by thousands of maple producers in New England and New York and by the many visitors to sugarhouses each spring.

Recent evidence has shown that global warming has shifted the timing and the duration of the maple sap flow season in the Northeast over the past 40 years. Although research is ongoing to project the impact of global warming over the next 50 years, we expect these trends to persist with continued warming.

It is important to recognize that it is not necessary for the proper sap flow conditions to cease entirely but merely just to diminish to the point where maple syrup yields are not high enough to justify the cost of production. We do not know yet at what point the eco-

nomics of maple production will fail, only that a continued reduction in seasonal length will have a negative impact.

If global warming continues, the existence of the U.S. maple industry beyond the next 50 to 100 years is jeopardized.

Maple producers tend to be careful stewards of the land. Sugaring is a proud tradition which is often passed from generation to generation. I am a native Vermonter. I learned about maple sugaring from my father, who learned from his father. I taught my daughter how to tap maple trees, how to boil sap into maple syrup, and I hope that some day she will be able to share that gift with her children and grandchildren.

The second way in which global warming will impact the region is by affecting the maple resource itself. Several studies predict the widespread migration of trees species northward with the current maple, beech, birch forest being eventually supplanted by oak, hickory and pine. Maple in particular is predicted to be greatly reduced in importance if not largely extubated from much of New England.

Recent and ongoing research suggests that this change may already be under way, with natural environmental stresses combined with acidic disposition hastening the change particularly in some of our high-elevation forests.

The long-term effects of forest migration will be felt most heavily by the tourist industry of New England which generates billions of dollars in economic activity in this region annually. Without maple trees contributing their bright red and orange hues to our fall landscape, the foliage season will be much less attractive to tourists.

The changes that we are seeing in our northern forest communities that I have mentioned are not merely academic what-ifs. The change in timing and duration of the springtime maple season and the longer growing seasons have already been demonstrated. Research is beginning to point toward early signs of forest migration. Climate change predictions tell us that warming and the accompanying effects will continue for some time and perhaps accelerate over the next several decades.

If we agree that the beautiful natural northern landscape that we have dominated by maples is valuable and the maple sugar industry and culture in New England is important and we wish to protect it and the way of lives of the people who live here, the time to act is now.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you, Dr. Perkins.

[The statement of Mr. Perkins follows:]

Congressional Testimony

Statement of

Timothy D. Perkins, Ph.D. -- Director

University of Vermont Proctor Maple Research Center

To the

House Select Committee on Energy Independence and Global Warming

Global Warming Mountaintop 'Summit': Economic Impacts on New England

June 4, 2007

Mr. Chairman and Members of the Committee:

Thank you for the invitation and opportunity to speak with you here today regarding the impacts of global climate change on the northern hardwood forest, and in particular, on the maple industry of the northeastern United States.

The U.S. northern hardwood forest has immense significance in the history and culture of the New England/New York region. The tremendous forests of maple, beech, and birch, along with a mixture of other forest plant and animal species, provided material for shelter, fuel, food, and the raw materials for initial commerce during settlement. The maple tree and maple syrup are strongly intertwined with the culture and spirit of New England and New York. Sugar maple is the state tree of both Vermont and New York, with red maple for Rhode Island. Maple is the State "Flavor" of Vermont.

One of the most important agricultural crops of the northern region from pre-settlement to the beginning of the 20th Century was maple sugar. Maple syrup and sugar are made by collecting the sweet sap that exudes from small wounds created in maple trees during the late-winter and spring, and concentrating it by boiling, a practice learned from the Native Americans. Maple sugar was important to the local economies during the Colonist-era and a hugely valuable export commodity from settlement times up until after the U.S. Civil War, with millions of pounds of maple sugar sent to markets throughout our expanding country. Because maple sugar was made locally by free and independent men, unlike the cane sugar imported by the British from the West Indies, it also played a role before and during our fight for independence by eliminating the need to purchase taxed imported sugar, and by helping to sustain our troops during their struggle for freedom. Maple sugar was also involved in the moral and ethical debate surrounding slavery before and during the Civil War, as it was considered to be free from the taint of forced labor.

Since those early times to present day, the maple industry has continued to thrive, largely as a supplier of a pure and natural sweetner useful in a variety of ways in cooking and by adding flavor to other products. It is still produced largely the same way it has always been, through the efforts of fiercely independent sugarmakers who, as careful stewards of the land, work long hours to collect and boil sap during the brief sugaring season each spring. It is a proud tradition, often passed from one generation to another, and represents one of the first agricultural products made in the U.S. each year.

Approximately 75% of the domestic U.S. maple syrup crop is produced in New England and New York, contributing millions of dollars to the local and regional

economies of these areas. The total economic impact of maple in Vermont alone is nearly $200 million each year.

Canada is the world's largest producer of maple syrup, with the Province of Quebec by far the dominant producing region. This was not always the case. Prior to 1900, 80% of the world crop was produced in the U.S. and 20% in Canada. Currently the situation has completely reversed, with 80% of the world syrup produced in Canada and 20% in the U.S. While much of this change has been driven by changing land-use and employment in the U.S., changes in sap collecting technology, and Canadian subsidies aimed at growing the maple industry, climate change is likely to also be partly responsible for the huge increase in Canadian production, especially in the past 30 years.

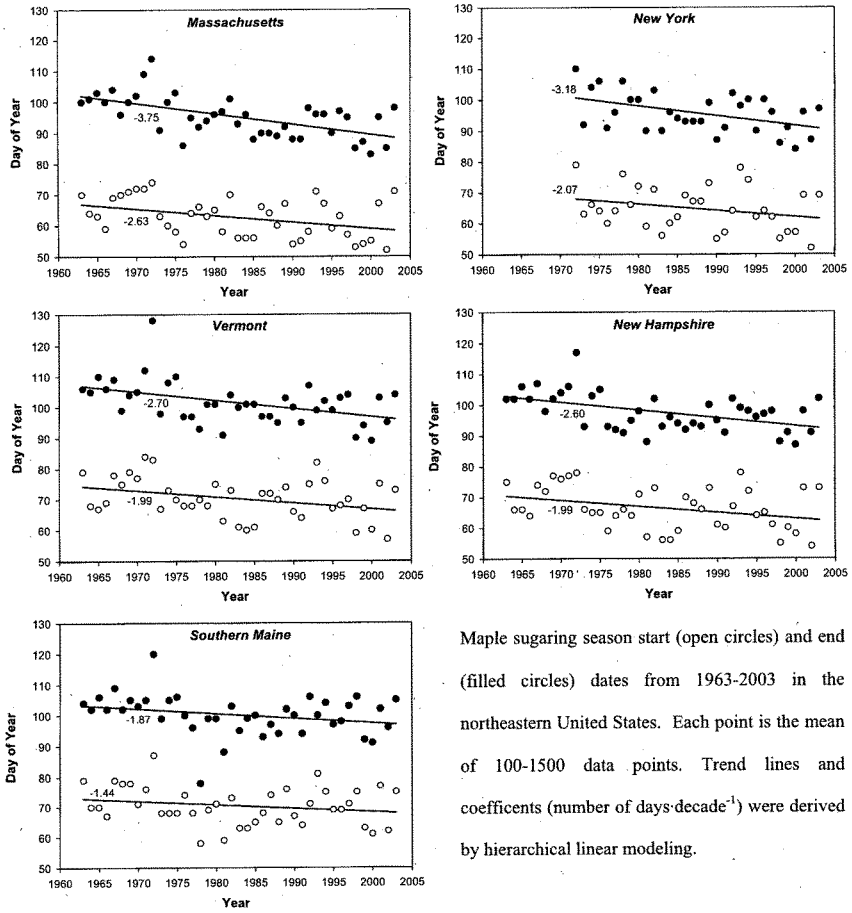
Currently, however, the U.S. maple industry and the culture of its practitioners are under threat. The flow of sap from maple trees during the spring season is controlled almost entirely by the daily fluctuation in temperature. Cold (below-freezing) nights cause contraction of air bubbles within the wood of the tree, causing a suction, and resulting in uptake of water from the soil into the vessels of the tree where it mixes with sugar and freezes. Warm (above-freezing) days result in thawing of the sap and bubble expansion, creating a pressure within the stem. Sap flows out of small wounds (tapholes) created by sugarmakers, and is collected in buckets or with tubing. The slightly sweet sap (approximately 2% sugar) is concentrated, most often by boiling, to produce pure maple syrup (66% sugar). Small changes in the day-to-day temperature pattern will have large consequences on sap flow. Climate change is therefore expected to alter the maple sugaring season in several ways. In the short-term (50-100 years), a change in climate may alter the timing of the season (making it occur earlier in the calendar year) and

reduce the duration of the collection season. In the long-term (100+ years), climate change is expected to shift forest composition, resulting in a loss of the maple-beech-birch as a dominant forest type throughout much of New England and New York.

Answers to specific committee questions follow.

1. *How has the duration and timing of the maple sugar season been changing as a result of global warming? Have these changes accelerated over time or in recent years?*

Historical evidence of the timing of the season, derived from two independent sets of survey data, show that the maple sugaring season has shifted significantly over the past several decades throughout the northeast. The season in New England and New York currently begins approximately 8.2 days earlier in the calendar year than it did 40 years ago. Similarly, the end of the season arrives, on average, approximately 11.4 days earlier than 40 years ago. The net result is that the season is currently 3.2 days shorter than it was historically, representing a loss of approximately 10% of the total season duration over the 40 year record. The observed changes do not appear to be related to changes in maple production methods or other identifiable explanations, but are consistent with observed changes in regional climate over the same time period. Although there is a great deal of variability from season-to-season, the trend is significant, and appears to be fairly consistent and linear over the time period and areas studied.



Maple sugaring season start (open circles) and end (filled circles) dates from 1963-2003 in the northeastern United States. Each point is the mean of 100-1500 data points. Trend lines and coefficents (number of days·decade^{-1}) were derived by hierarchical linear modeling.

2. *What effect has the changing duration and timing of the maple sugar season had on maple sugaring?*

To maximize yields it is important that producers tap trees immediately prior to the time in which sap begins to flow. In the past such decisions were in large part based upon historical tapping dates. A shift in the timing of the season causes uncertainly among producers as to the most appropriate time to tap. Tapping too early causes tapholes to "dry out" and yield less sap. Tapping too late results in the loss of sap during early flows with concomitant reductions in yield. Ongoing research at the University of Vermont Proctor Maple Research Center is aimed at helping producers assess the consequences of their decisions of tapping date on production.

The effect of the reduction in season duration has not, as yet, produced a discernible effect on syrup yield. This is most likely due to two factors -- the normally high year-to-year variability in yield and the more effective use of improved technology in sap collection, such as tubing systems, vacuum extraction, and overall system management. Producers not using vacuum extraction systems are reporting lower yields, especially over the past decade, although this will require more time and further study to quantify the magnitude of the effect.

3. *How do changes in climate affect maple trees and their ability to produce sugar?*

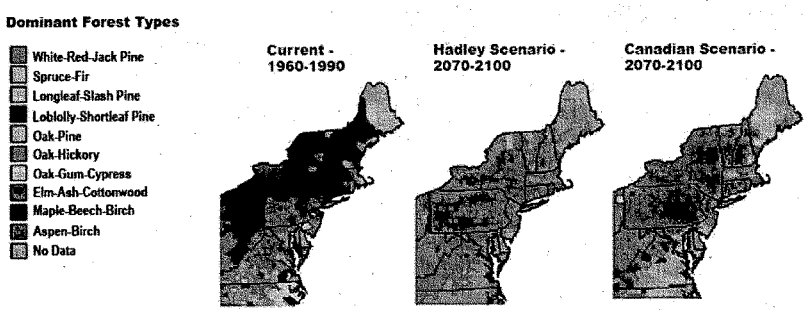
Increased CO_2 concentrations in the atmosphere often stimulate photosynthesis, resulting in a higher carbon assimilation rate and higher production of sugar. This is partially offset by higher respiration due to elevated ambient temperatures, and is also

dependant upon an adequate water supply and adequate nutrition. Many sites throughout the northeast are limited in their growth potential due to marginal soil nutrition, acidic deposition and other interacting stresses, and long-term nitrogen saturation.

4. *In general, what changes are we seeing in New England forests and in particular, on maple trees? What impacts could global warming have on the range or location of maple trees in New England in the future? How could these future changes impact the sugaring industry in the region?*

Changes to date are relatively small and subtle. The maple sap flow season is starting and ending earlier. Earlier flowering and leaf-out of tree and shrub species is reported in New England and New York. The growing season is somewhat longer. Although on the surface, these would seem like positive effects, the distribution of plants is dictated primarily by two climatic factors, temperature and precipitation, working in concert with competition. If the forecasts of models of temperature and precipitation prove to be correct, over time, vegetation will respond to these changes. Since we are interested in long-lived tree species, there will be a lag in response, and humans may try to influence or moderate the response. However given that the models forecast that New England and New York may have a climate resembling that of present-day Virginia to South Carolina, we can expect, over time, that the vegetation will respond and we will have forests resembling those of present-day Virginia to South Carolina. The results of both the Hadley and Canadian Climate models suggest that maple along with other components of the northern hardwood and boreal forests will be largely extirpated from New England and New York, and supplanted by an oak-hickory-pine dominated forest. Given that the

commercial producing regions of the maple sugar industry lie in upstate New York, northern Vermont, and upstate Maine, even a small northward shift in the distribution of maple will have a large negative impact on the domestic maple industry. More importantly, the fall foliage season, which relies on maple species for the brilliant display of red and orange colors, and which annually contributes billions to the northeast tourism-based economy, would be greatly impacted by a shift in tree species composition.



Based on the model of Neilson and Drapek (1998).

5. *How has the maple sugar industry adapted to changes in climate? Are there limits to these adaptation measures?*

There has been little investigation of adaptive strategies to reduce the impacts of global warming on the maple industry. We are currently investigating the effects of timing of tapping on syrup yield in order to provide research-based recommendations to maple producers. Further work on short-term ameliorative strategies for maple producers is necessary.

In the short term (< 50 yrs), use of high-yield maple production techniques may help to offset yield losses resulting from a reduction in season duration. Eventually, as the correct conditions for sap flow become more infrequent, commercial producers, which represent the bulk of syrup produced in the U.S., will cease investing in the maple industry. Hobby producers may continue for a somewhat longer period as they are less sensitive to the need for an income from maple production. We do not yet know the point at which the economics of commercial production will fail, however given possible future temperature regimes predicted by existing models, a loss of the maple industry in the U.S. within the next 100 years would appear to be inevitable. In the long-term, the migration of the maple resource will render even hobby maple production impossible in the U.S.

Summary

If the northeast regional climate continues to warm as projected, we expect that the maple industry in the U.S. will become economically untenable during the next 50-100 years as the conditions for sapflow become less prevalent, thereby resulting first in the loss of commercial producers, and eventually hobby producers. Over the succeeding 50-150 years we will see a continued shift in species distribution from a northern hardwood dominated forest of maple-beech-birch, to one composed primarily of oak-hickory, pine. These changes will have profound implications on the character and economy of New England and New York.

The CHAIRMAN. Our next witness is Dr. Cameron Wake, who is a Research Associate Professor at the Climate Change Research Center at the University of New Hampshire. He was a co-lead author on two papers in a series of reports detailing past and future climate change in the Northeast as part of the Northeast Climate Impacts Assessment.

Welcome, Doctor.

STATEMENT OF CAMERON WAKE, PH.D., RESEARCH ASSOCIATE PROFESSOR, CLIMATE CHANGE RESEARCH CENTER AND DEPARTMENT OF EARTH SCIENCES, UNIVERSITY OF NEW HAMPSHIRE

Mr. WAKE. I would like to thank the chairman and the committee for the opportunity to offer testimony on the impact of global warming on New Hampshire and New England.

The focus of this hearing on regional impacts of global climate change is timely and important. Changes in regional climate will affect many aspects of our lives and our communities, including our health and welfare, agriculture and natural ecosystems, water and air quality, and our economy.

In addition, much of the adaptations to ongoing climate change and the mitigation of the future of climate change will ultimately be driven by actions at the local and regional scales. This regional focus is very important.

Let me start by reiterating some of the statistics that Chairman Markey started with.

We have been looking at climate change with a group of scientists across the Northeast. Perhaps the most striking statistic is that our winters have increased over the last 30 years by 4.4 degrees Fahrenheit. To put this into perspective, that is the equivalent of taking a Boston wintertime climate and moving it south to Philadelphia. This is not climate change in the future. This has already happened, and we have seen the impacts.

Over the last three decades, there has been a decrease in snowfall on the order of 10 to 30 inches across most of New England. A larger portion of our winter precipitation is falling as rain. New England stations have also experienced a decrease of 15 to 20 days over the entire winter on which there is snow on the ground.

Extreme participation events have increased. We looked at all of the stations for which we could collect data, and we see an increase in one to four events over the course of the last 50 years in extreme precipitation events, and this doesn't include the recent four big events that we have had in 2000 and 2006 that was previously mentioned.

The timing of high spring flow has changed over the last 35 years with our spring runoff occurring much earlier. Ice thaw dates are occurring much earlier in the spring. Lilacs are blooming 4 to 5 days earlier, and sea levels continue to rise, and we see the effects of those in the most recent nor'easter with considerable flooding both in Massachusetts and New Hampshire and Maine. So our climate is changing. That is clear.

We looked at climate variability in New Hampshire over the course of the last two decades in a study, and what we found was that the dazzling uncertainty of New England weather in fact is

that we see significant differences in winter to winter. So we looked at a series of five what we call cold and snowy winters and a series of five and warm and slushy winters and we looked at the receipts from ticket sales at alpine areas and Nordic ski areas as well as snowmobile registration, and what we found was that warm slushy winters result in a decrease in revenue just from ticket sales and snowmobile sales of $13 million. And this translates, when you think of it, all of the money these people spend elsewhere, this number can be multiplied two, three, four, five, six times. Warm slushy winters have a significant impact on the economy of the north country, and those are the types of winters that we expect are going to be coming in the future.

How will climate change in the future? We looked at this as part of the Northeast Climate Impacts Assessment report; and, really, what the report shows is that the climate in the Northeast that our children and grandchildren inherit depends fundamentally on the decisions we make today and over the next few years how we in the Northeast and around the globe use and produce energy. The choice of emissions pathway we follow in the near future matter greatly and will serve to help preserve or fundamentally change the natural economic and cultural character of the Northeast.

Let me jump to the chase here.

We looked at two different emission scenarios, a high-emission scenario and a low-emission scenario. So when we look at the high-emission scenarios in which we continue to rely upon fossil fuels as our main source of energy, what we see is that our winters could warm by 8 to 12 degrees Fahrenheit and our summers by 6 to 14 degrees Fahrenheit, essentially replacing New Hampshire's current climate with that of South Carolina, except without the water.

On average, cities across the Northeast under the high-emission scenario would experience more than 60 days of temperature over 90 degrees Fahrenheit, which will not be good for tourism in this part of the country. This includes 14 to 28 days of temperatures above a hundred degrees Fahrenheit, something that we rarely experience today.

Under the high-emission scenarios, as winter temperatures rise, more precipitation will fall as rain and less as snow. By the end of the century, the winter snow season will be cut in half, with only small areas in the mountains of New England experiencing more snow.

The frequency of late summer and fall droughts is expected to increase significantly, to the point by the end of the century under the high-emission scenario where we would experience a drought every summer across much of the Northeast. The character of the seasons will also change significantly.

So although some of these changes are now unavoidable, there is some warming that we are going to experience. The extent of change and the impact of these changes on the Northeast depends to a large degree on the emissions choices we in the Northeast and the world make today.

The CHAIRMAN. Thank you, Doctor, very much.

[The statement of Mr. Wake follows:]

Global Warming Mountaintop 'Summit': Economic Impacts on New England.

Testimony of

Cameron Wake
Institute for the Study of Earth, Oceans, and Space
University of New Hampshire

To

Select Committee on Energy Independence and Global Warming
United States House of Representatives

Cannon Mountain, New Hampshire
4 June 2007

I thank the Chairman and the Committee for the opportunity to offer testimony on the impact of global warming on New England. For the past two decades I have focused my research on examining the Earth's climate system through the collection and analysis of ice cores from around the globe and, more recently, the analysis of instrumental meteorological data in the Northeast US. The focus of this hearing on the regional impacts of global climate change is timely and important. One of the greatest concerns of future climate change are the impacts at the local to regional scale. Changes in regional climate will affect many aspects of our lives and our communities, including our health and welfare, agriculture and natural ecosystems, water and air quality, and our economy. Climate change needs to be assessed at regional and seasonal scales to make the assessment relevant on a human scale.

Climate Change in the Northeast US over the Past Century

Over the past several years, I have worked with a group of scientists from across the Northeast to develop a series of indicators of how climate across the region has changed over the last 100 years. Changes in temperature and precipitation were determined using a subset of the United States Historical Climatology Network (USHCN) (Karl et al., 1990; Easterling et al., 1999; Williams et al., 2005), from which we calculate monthly, mean Northeast wide average temperature and precipitation (Keim et al., 2002; 2005; Wake and Markham, 2005; Wake et al., 2006a; Hayhoe et al., 2007; in review). USHCN station data represents the best available source for investigating changes in temperature and precipitation since 1900, as the stations are selected based on length and quality of data, which includes limiting the number of station changes. In addition, monthly data have undergone numerous quality assurances and adjustments to best characterize the actual variability in climate. These adjustments take into consideration the validity of extreme outliers, time of observation bias (Karl et al., 1986), changes in instrumentation (Quayle et al., 1991), random relocations of stations (Karl and Williams, 1987),

and urban warming biases (Karl et al.,1988).

Mean annual temperatures averaged over the Northeast over the past 101 years (1900 – 2000) have risen 1.5 °F (0.15 °F per decade) while over the period from 1970 – 2000 annual temperatures have gone up 1.4 °F (0.47 °F per decade) at a rate three times the average for the past 100 years. More strikingly, winter (December through February) average temperatures over the last 101 years have risen 2.6 °F (0.26 °F per decade), while over the last 31 years winter temperatures have gone up 4.0 °F (1.28 per decade) (Figure 1). As a result, Boston's average winter temperature today is roughly equivalent to what Philadelphia's winter climate was 35 years ago.

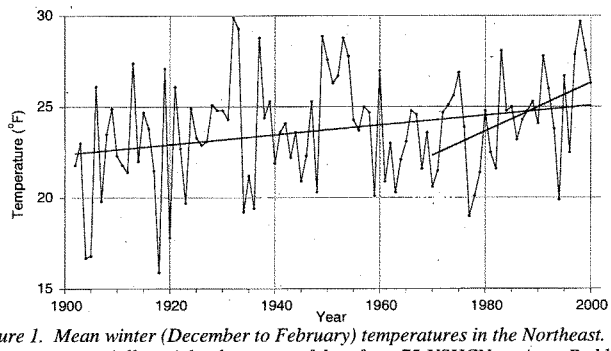


Figure 1. Mean winter (December to February) temperatures in the Northeast. Time-series represents an aerially weighted average of data from 75 USHCN stations. Red lines represent the linear trend over 101 years (1900-2000) and 31 years (1970-2000).

Overall, precipitation has increased slightly (about 10%) over the last 101 years. However, over the past 31 years (1970-2000) there has been a decrease in snowfall on the order of 10-30 inches across New England, and a larger proportion of winter precipitation is falling as rain (Huntington et al., 2004). New England stations have also experienced a decrease of 15-25 days over the entire winter in the number of days with snow on the ground. Extreme precipitation events (defined as precipitation greater than two inches in 48 hours) have increased. Ninety percent of the stations for which daily precipitation data is available for New England show an increase of 25-100% in extreme precipitation rates over the last 50 years. And this does not include the flooding rain events we experienced in May and June 2006, and April 2007.

The timing of high spring flow has also changed over the last 35 years, with spring center-of-volume flow dates (defined as the date 50% of the water has flowed passed a gauging station between 1 January and 31 May) for unregulated rivers in Maine, New Hampshire, and Vermont occurring 7-10 days earlier today compared to 30 years ago (Hodgkins et al., 2003). Ice out dates on lakes in northern New England are occurring 8 days earlier in 2005 compared to 1970 (Hodgkins et al., 2002; 2005). Lake Champlain has a 190 year record of ice-in dates. Overall, the ice forms two weeks later today compared to the early 1800s. Of the 33 times the lake has not frozen over, 80% of these events have occurred since 1950.

During the period 1965 to 2001, bloom dates for genetically identical lilac plant (*S. chinensis*, clone 'Red Rothomagensis') across the Northeast advanced abut 1 day per decade (Wolfe et al., 2005). On average lilacs now bloom 4-5 days earlier in the spring than they did in 1965.

Sea levels on the Northeast US coast continue to rise as measured at a series of tidal gauges (PSMSL, 2007). For example, in New York city, sea levels have risen 16 inches since 1850. Sea surface temperatures in the Gulf of Maine have also warmed by 1.1 °F over the past century (Smith and Reynolds, 2003).

In summary, we have investigated a wide variety of indicators of climate change for New England and the Northeast US, and all reveal that the region is warming, and that the rate of warming has increased over the last three to four decades.

Winter Recreation and Climate Variability in New Hampshire 1984 - 2006

Outdoor winter recreation is a critical economic driver for New Hampshire's four northern counties and is vital to the entire state. During the winter (December through March), almost 40% of the state's total visitor spending goes to the North Country. Almost 80% of that is spent on snow and cold dependant outdoor recreation (e.g., skiing, snowmobiling, ice fishing).

An analysis of climate variability shows that over the past two decades, there have been cold, snowy winters (1994, 1996, 2001, 2003, 2005) and warm, slushy winters (1995, 1998, 2000, 2002, 2006). Cold, snowy winters are, on average, 5 °F colder, and experience 50-60% more snowfall and 30-70% more days with snow on the ground (Wake et al., 2006b).

The difference in revenue just from ticket sales at alpine and Nordic ski areas, and from snowmobile licenses between cold, snowy winters and warm, slushy winters is striking. Warm, slushy winters result in 14% fewer alpine skiers, 30% fewer Nordic skiers, and 26% fewer snowmobile licenses. This translates into a decrease of $13 million in direct revenue from ski ticket and snowmobile registration sales, and 3,000 fewer jobs compared to cold snowy winters. Note that he $13 million is lost revenue is only for ticket sales and snowmobile licenses.

Climate Change in the Northeast over the Next Century:
The Northeast Climate Impact Assessment

How will climate across the Northeast change in the future? Results from the Northeast Climate Impacts Assessment (NECIA)(Hayhoe et al., 2007; in review; UCS, 2007) show that the climate in the Northeast that our children and grandchildren inherit depends on the decisions we make today and over the next few years about how we in the Northeast and around the globe produce and use energy. The choice of emissions pathway we follow in the near-term future matters greatly and will serve to help preserve - or fundamentally change - the natural, economic, and cultural character of the Northeast.

The Northeast Climate Impacts Assessment (NECIA) is a collaboration among team of

independent scientists and the Union of Concerned Scientists to develop and communicate a new assessment of climate change and associated impacts on key climate-sensitive sectors in the northeastern United States. This study draws on recent advances in climate modeling to assess how global warming may further affect the Northeast's climate. Using projections from three state-of-the-art global circulation models (GCMs) (IPCC, 2007) (NOAA/Geophysical Fluid Dynamics Laboratory CM2.1 [Delworth et al. 2005], United Kingdom Meteorological Office HadCM3 [Pope et al. 2000], and Department of Energy/National Center for Atmospheric Research Parallel Climate Model (PCM) [Washington et al. 2000]) we compare the types and magnitude of climate changes that will result from higher emissions (IPCC A1FI scenario) of heat-trapping gases versus lower emissions (IPCC B1 scenario) in the Northeast. The first scenario is a future where emissions to continue growing rapidly, and the second is one in which society transitions onto a pathway of economic development with substantially lower emissions.

Over the next few decades, climate change across the Northeast are expected to be similar under either emission scenario and to continue the warming trends we have already experienced. These changes have already been set in motion by our emissions over the past few decades, but it takes years or decades for the climate to respond in noticeable ways.

By the middle to the end of the century, most changes projected to occur depend strongly on the emissions choices we make in the near future and carry through the rest of the century. Under the higher-emissions scenario (IPCC A1FI scenario), in which the world relies primarily on fossil fuel as the main source of energy, GCM projections for the Northeast show that by the end of this century:

- Winters could warm by 8 to 12°F and summers by 6 to 14°F.
- Cities across the Northeast could experience more than 60 days of temperatures over 90°F each summer (up from 10-15 days per summer historically). This includes 14 to 28 days with temperatures over 100°F (compared with one or two days per year historically).
- As winter temperatures rise, more precipitation will fall as rain and less as snow. By the end of the century, the length of the winter snow season could be cut in half, with only a small area in the mountains of northern New England experiencing more that 30 days of snow on the ground for the entire winter.
- The frequency of late summer and fall droughts is projected to increase significantly, with short term droughts (lasting one to three months) becoming as frequent as once per year over much of New England by the end of the century.
- The character of the seasons will change significantly, with spring arriving three weeks earlier by the end of the century, summer lengthening by about three weeks at both its beginning and end, fall becoming warmer and drier, and winter becoming shorter and milder.
- Global sea levels will continue to rise, increasing the risk of coastal flooding and damage from storm surges along the heavily developed coast in this region.

In contrast, under the lower-emissions scenario (IPCC B1 scenario), in which the world follows a pathway toward less fossil fuel-intensive industries and introduces clean and resource-efficient technologies, emissions of heat-trapping gases would peak by about mid-century and then decline. New projections for the Northeast show that smaller climate-related changes can be expected if the world follows the lower-emissions pathway - typically, about half the change

expected under the higher-emissions scenario. In this case, projected changes for the region include:

- End-of-century temperature increases of 5 to 7.5°F in winter and 3 to 7°F in summer.
- An average of 30 rather than 60 days over 90°F for most cities in the region by the end of the century, and only a few days over 100°F.
- A 25 percent loss of the winter snow season.
- A likelihood of short-term drought only slightly higher than today.
- Arrival of spring one to two weeks earlier by century's end; summer would arrive only one week earlier and extend a week and a half longer into the fall.

Under either emissions scenario, the Northeast of the future will be a tangibly different place. Additional future changes that do not show dramatic differences between scenarios include:

- Increases in the likelihood and severity of heavy rainfall events..
- Increases in winter precipitation on the order of 20 to 30 percent, with slightly greater increases under the higher-emissions scenario.

Although some changes are now unavoidable, the extent of change and the impact of these changes on the Northeast depend to a large degree on the emissions choices we in the Northeast and the world make today. The "higher" emissions scenario described here is not a ceiling on what our future emissions might be, but neither is the "lower" scenario a floor on the lowest emissions we can achieve. While actions to reduce emissions in the Northeast alone will not stabilize the climate, the region is a center of global leadership in technology, finance, and innovation. Ranked against the nations of the world, it is also the seventh largest source of carbon dioxide emissions from energy use. As such, the Northeast is well positioned to be a technology and policy leader in reducing emissions and driving the national and international progress essential to providing our children and grandchildren with a safe and stable future climate.

Additional analyses are currently under way to assess the impact of the climate changes described here on forests and agriculture, coastal and marine resources, human health, and winter recreation across the Northeast, as well as options for mitigation and adaptation. These results will be published as a collection of thirteen peer-reviewed papers (Wake et al., final review) and will be summarized in a synthesis report that will be available in July 2007.

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The CHAIRMAN. Our next witness is Mr. Bill Koury. He has served as President of the New Hampshire Wildlife Federation.

STATEMENT OF BILL KOURY, AVID SPORTSMAN AND FORMER PRESIDENT OF THE NEW HAMPSHIRE WILDLIFE FEDERATION

Mr. KOURY. Thank you. Mr. Markey and other select committee members, thank you for allowing me to speak to you today.

I am here to tell you about the changes I have observed over the 40 years I have been hunting and fishing in the great State of New Hampshire. I am not a scientist, but from my subjective observation walking the woods and being on the rivers and lakes and ponds I feel many changes that are occurring that must affect fish, wildlife and people.

Over recent years, I find that during the hunting season in November, I have been out on many more warm days, sometimes in the high 60s and low 70s. Instead of snow, I am more concerned with rain. Recently, a whole industry has risen for water-proof hunting gear.

I have also been finding more ticks on me and my hunting buddies when those ticks should be resting for the winter; and while deer hunting, I have been swatting at mosquitoes when they, too, should have been knocked down with the first hard frost. To me this is a fairly recent phenomenon. Unfortunately, each of these insects now carries a potentially lethal danger to humans in New Hampshire, West Nile virus and Lyme disease.

Although these right now are just annoyances to me, my major concerns are the dynamics behind these changes and the effects they will have on their environment, wildlife and people. The scientists have empirical data which they can use to make that determination. I know that I have seen moose beds with blood in them due to heavy infestations of moose ticks. When the environment is right for them, these ticks can collect by the thousands on a moose and place such a heavy blood drain to be fatal.

I do know that northern wildlife can come under a lot of stress when we have longer and longer warm spells at a time when they have made necessary changes for cold weather. It is not uncommon these days to see white snowshoe hares running around in the snowless woods.

I also see that many of the ponds I hunt near are not as regularly ice covered as they were years ago. In days past, I could walk across them during the hunting season but not as much any more.

I know ice fishermen who tell me they get fewer days out due to unreliable ice conditions on the lakes. When the icing does come, it comes with winds and low temperatures in the 10s. So ice fishing as a sport along with small businesses that support it miss out.

More streams are warming. The most popular fish in New Hampshire is the native brook trout. This fish does poorly in warming water, and many more of our streams seem to be warming in the spring. Aquatic insects, which make up much of the brook trout's diet, are also negatively affected by warmer water temperatures. No insects, no brook trouts.

Back in the early to mid-'70s I, along with many others, noted we had some turkey vultures appearing around Ashland, New Hampshire, just a little south of Cannon Mountain. It was an at-

traction. These birds seldom ventured north of Connecticut. Now, while fishing or hunting, I regularly see turkey vultures over here along the New Hampshire/Canada border.

The other day a friend helped a threatened wood turtle to cross the road in New Boston. This turtle was moving from a marsh to lay eggs in sandy soil. In the past, this friend has consistently recorded such wood turtle nesting activity in mid-June.

The American Woodcock season in New Hampshire is from October 1st through October 30th and has been for years. Over the last decade, New Hampshire hunters have missed out on quality Woodcock hunting as the southerly migration of this game bird has occurred much later, from very late October to mid-November. New Hampshire fish and game biologists agree that something has moved this bird's migration to a later date.

We now have bluefish coming into New Hampshire in Maine waters. When I was a youngster, they didn't venture north of Cape Cod. It is something of a boon to anglers, but I am concerned about the secondary effects of their presence on species that developed without them and why we have the warmer water that they follow.

To me, these are observations and obvious signs of a warming of New Hampshire's climate and currents. But I think the term "global warming" doesn't do justice to the changes that are occurring. Along with the warming trend, we have more weather extremes. A popular trout river, the Piscataquog in New Boston, has experienced two consecutive years of so-called hundred-year floods.

We have had disastrous floods occur within 10 years of each other.

When Congress set its mind to it, we cleaned up the multi-colored textile rivers of the Nashua and the Merrimack, and I am looking forward to this select committee getting the ball rolling so that we can have actions similar to that to cut down on carbon emissions.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you.

[The statement of Mr. Koury follows:]

May 31, 2007

Mr. Chairman Markey, Congressman Sensenbrenner and other Select Committee Members:

I'm here to tell you about changes that I have observed over the forty years I have been hunting and fishing in the great state of New Hampshire.

I'm not a scientist, but from my subjective observations walking the woods and being on the rivers, lakes and ponds, I feel many changes are occurring that must affect fish and wildlife – and people.

Over recent years, I find that during the deer hunting season in November, I've been out on many more warm days, sometimes in the high 60's or low 70's. Instead of snow, I'm now more concerned with rain. Recently, a whole industry has risen for waterproof hunting gear. I've also been finding ticks on me and my hunting buddies when those ticks should be resting for the winter. While deer hunting, I've been swatting at mosquitoes when they too should have been knocked down with the first hard frost. To me this is a fairly recent phenomenon. Unfortunately, each of these insects now carries new, potentially lethal danger to humans in New Hampshire – West Nile Virus and Lyme Disease.

Although these right now, are annoyances to me, my major concerns are the dynamics behind these changes and the effects they will have on our environment, wildlife and people. The scientists have empirical data which they can use to make that determination. I know I have seen moose beds with blood in them due to heavy infestations of moose ticks. When the environment is right for them, these ticks can collect by the thousands on a moose and place such a heavy blood drain as to be fatal. I do know that northern wildlife can come under a lot of stress when we have longer and longer warm spells at a time when they have made necessary changes for cold weather. It's not uncommon to see white snowshoe hares running around in the snowless woods.

I also see that many of the ponds that I hunt near are not as regularly ice-covered as they were years ago. In days past I could walk across them during the hunting season, but not as much any more. I know ice fishermen who tell me they get fewer days out due to unreliable ice conditions on the lakes. When the ice-in comes, it comes with winds and temperatures in the 10's. So ice fishing as a sport, along with the small businesses that support it miss out.

More streams are warming. The most popular fish in New Hampshire is the native Brook Trout. This fish does poorly in warming water and many more of our streams seem to be warming sooner in the Spring. Aquatic insects, which make up most of the brook trout's diet, are also negatively affected by warmer water temperatures. No insects, no brook trout.

Back in the early to mid 1970's I, along with many others, noticed that we had some turkey vultures appearing around Ashland, New Hampshire, just a little south of Cannon Mountain. It was an attraction. These birds seldom ventured north of Connecticut. Now, while fishing or hunting I regularly see Turkey Vultures overhead along the New Hampshire – Canada border.

The other day, a friend helped a "threatened" Wood Turtle to cross a road in New Boston. This turtle was moving from a marsh to lay eggs in sandy soil. In the past, this friend has consistently recorded such Wood Turtle nesting activity in mid-June.

The American Woodcock season in New Hampshire is from October 1st to October 30th and has been for years. Over the last decade, New Hampshire hunters missed out on quality woodcock hunting as the southerly migration of this game bird has occurred much later, from very late October through mid-November. New Hampshire Fish & Game biologists agree that something has moved this bird's migration to a later date.

We now have Bluefish coming into New Hampshire and Maine waters. When I was a youngster, they didn't venture north of Cape Cod. It's something of a boon to anglers, but I'm concerned about the secondary effects of their presence on species that developed without them, and why we have the warmer water they follow.

To me, these are obvious signs of a warming of New Hampshire's climate and currents. But I think the term "Global Warming" doesn't do justice to the changes that are occurring. Along with a warming trend, we have more weather extremes. A popular trout river, the Piscataquog, in New Boston, has experienced two consecutive years of so-called Hundred Year Floods.

We have had disastrous floods occur within 10 years of each other along the Ashuelot and Cold Rivers in Western NH.

Again, I'm not a scientist and these are subjective observations. It's up to the many scientists and biologists to determine cause and effect. But I do know that what I see is a clear trend. I also know that carbon emissions which affect climate are a pollutant to the environment and have a negative affect on the health of all living things. I believe, we must take decisive action to dramatically reduce pollutants and that includes carbon emissions. New industries can emerge from such an effort.

When Congress set its mind to it, it cleaned up the multi-colored textile rivers, of the Merrimack and Nashua and many other rivers in America. It even cleaned up Boston Harbor(finally)! Across the country, we have reduced particulate matter in the air and the pollution in much of our running and standing water. I believe your Select Committee has the ability to start a new wave rolling to dramatically cut back on the gasses that I believe are now causing these climate changes.

Thank you for allowing me to speak to you.

Respectfully Submitted,
Bill Koury

The CHAIRMAN. Our final witness is Ms. Betsy Blaisdell, who is the Manager of the Timberland Environmental Stewardship Program. The Timberland Environmental Stewardship Program is a shining example of ways in which New Hampshire-based businesses are leading the charge in innovating in order to address global warming.

STATEMENT OF BETSY BLAISDELL, MANAGER, ENVIRONMENTAL STEWARDSHIP PROGRAM, TIMBERLAND

Ms. BLAISDELL. Thank you.

Mr. Chairman and members of the committee, thank you for your leadership on behalf of the critical issue of global warming and for convening our first hearing here in New Hampshire. I am grateful for the invitation to testify on behalf of the 6,000 men and women who design, manufacture and sell premium Timberland footwear apparel and gear in 85 countries around the world.

After 30 years, our company has been driven by dual aspirations to exceed the expectations of consumers in the marketplace and to lead as accountable corporate citizens. The ethos of our business model compels investment and strategy to strengthen our communities, increase civic participation through community service and to preserve our planet's natural resources.

Inspired by the wisdom of citizens and partners in this room, our approach is to lead as a values-based company, thoroughly integrate across our global business and throughout our supply chain from source to selling floor.

Today, it is my privilege to provide some perspective on our commitment to fighting global warming with the hope that it may encourage your further engagement of the private sector as partner, thought leader, and accountable citizen.

Timberland's passion for our planet is inspired by the natural beauty of this State, which you can't see today sadly, and our heritage is an outdoor brand. Quite simply, our gears are consumers gateway to the mountain trail, river rapid or coastal sail. We cherish these outdoor experiences and see global warming as an alarming threat to our way of life, our global enterprise and to the health of our employees and consumers.

The cost to our business includes spikes and dips in product sales, rising insurance and health care expenses and costly retrofits for adapting our facilities to extreme weather events. Of greatest concern is damage to our natural areas, where our consumers recreate and many New Hampshire citizens find jobs.

As a business that uses energy to produce more than 30 million pairs of shoes as well as power nearly 300 facilities, we contribute to this threat, yet we believe that the private sector can be a market for us for sustainability and environmental innovation as well as a source for greater consumer awareness on global warming.

Like many others in industry, Bank of America, Toyota, Aveda, GE, Stonyfield Yogurt here in New Hampshire, HSBC, we are fully dedicated to play our part. Leveraging our assets as a business and as a community of committed citizens, Timberland will achieve carbon neutrality by 2010 for our facilities and for employee travel through a clear set of measurable strategic initiatives. I will just list a couple of these.

One, we will be reducing our energy demands and investing in renewable energy with a goal of achieving nearly 50 percent reduction in our corporate greenhouse gas emissions. We will be increasing the use of sustainable materials and improving manufacturing and product take-back programs to develop footwear and apparel that have a smaller carbon footprint, a couple of examples I have brought with me.

We will be producing industry leading packaging and labeling such as eco labels such as the corporate nutritional labels that we have on our footwear boxes that talk about our corporate, social and environmental footprint and continuing to provide consumers with accurate and transparent data on our company's environmental footprint. Our intent is to promote environmental activism through consumer choice.

We will be partnering with other brands and industry associations to develop tools and resources that will help our supply chain partners improve their environmental performance and will continue to engage thousands of employees and consumers in environmental service worldwide to plant trees and protect our wild spaces.

Fortunately, we are not alone in these efforts. As I mentioned, our industry has been aggressively leading change with launch of environmentally conscious product lines and hosts of cross-brand working groups aimed at solving environmental challenges in the supply chain.

This commitment is driven by growing consumer demand for sustainable products made by environmentally responsible companies. Locally, we are grateful to Clean Up Our Planet and the New Hampshire Sustainable Energy Association, who support businesses, campuses and communities in their efforts to combat global warming. Over the past 5 years, these partners have helped reduce our region's carbon emissions by over a million tons annually.

We are humbled and encouraged by these voluntary efforts, but the scale of the challenge is too great and requires a greater level of leadership, investment and accountability. We join many in our industry and sector in respectfully asking the President and Congress to create a comprehensive national framework to address global warming, one with benchmarks, transparency and aggressive evaluation of impact.

For your consideration, we recommend the following central tenets for a national strategy: one, legislation for economy wide emission reductions; two, aggressive R&D for low-carbon technology; three, Federal planning for global warming impacts and response; four, a strategy to mobilize support and re-engage international partners; five, reallocation of budget priorities; and six, programs to enable and encourage citizens to build efficiency and conservation in their homes and communities.

Timberland is honored by the opportunity to raise our collective voice in unison with those in the room who have been leading in this effort for decades, and we want to thank you for the opportunity to speak with you today.

Thank you.

[The statement of Ms. Blaisdell follows:]

Testimony of Betsy Blaisdell
The Timberland Company
To the Select Committee of Energy Independence and Global Warming
Franconia, NH June 4, 2007

Mr. Chairman and members of Committee, thank you for convening this important field hearing in New Hampshire and for inviting my company to testify. My name is Betsy Blaisdell and I am Manager of Environmental Stewardship at The Timberland Company, which is a Stratham, NH based designer and retailer of premium outdoor gear.

At Timberland, we are committed to making it better by minimizing our environmental impact – from the way we design, package, and distribute our products to how we build and power our facilities. As a company with a passion for the outdoors, we believe that doing our best to make it better for our planet is at the core of our business.

Global warming poses an alarming threat given the magnitude and reach of its impact. The costs to our business include spikes and dips in product sales, rising insurance and health care expenses, and costly retrofits for adapting our facilities to extreme weather events. Of greatest concern is damage to our natural areas, where our consumers recreate and where many NH citizens find jobs. NH is the second most forested state in the nation and forest resources provide nearly $325 million in payroll annually to NH residents. According to a recent study commissioned by the Society for the Protection of NH Forests and Clean Air Cool Planet, our forests will lose $13 billion in value over the next century from the impacts of a changing climate.

As a business that uses energy to produce more than 30 million pairs of shoes as well as power nearly three hundred facilities, we contribute to this threat. There are economic and environmental alternatives to "business as usual" though, which is why we are reducing our energy demand, investing in renewable energy, and engaging over 6000 people in service to plant trees and protect our wild places, in an effort to become "carbon-neutral" by 2010. Our commitment is visible right here in NH where solar power provides electricity for our global headquarters, biodiesel runs our truck, and LEED green building principles are driving the design of our new retail store in the Rockingham Mall in Manchester.

Fortunately, we are not in this alone. Timberland is grateful to local NH organizations like Clean Air Cool Planet and the NH Sustainable Energy Association who are supporting our businesses, campuses, and communities in pursuing a more sustainable future. Through their partnerships we have collectively, over the past five years, reduced our region's carbon emissions by over 1 million tons annually. Additionally, NH citizens recently passed a global warming resolution in over 164 NH towns, which calls for the President and Congress to implement economy wide reductions for greenhouse gas emissions.

While voluntarily, we as a business, and we as a collective of community organizations, have begun to find and implement solutions – solutions that are having a positive economic impact -- this alone is not enough. It is time for the president and congress to create a comprehensive national framework to address global warming. Similar to any sound business plan this should include:

1) **Legislation for economy-wide emissions reduction**: As the centerpiece of a comprehensive action plan, this legislative proposal should be aggressive, economically prudent and politically feasible.

2) **Aggressive R&D for low-carbon energy technology:** The establishment of an aggressive, well-funded and staffed research and development program to stimulate the commercialization of low and zero carbon energy technology.

3) **Federal planning for climate change impacts and response:** requiring all federal agencies to consider the climate change impacts of their programs and to develop strategies to decrease exposure to climate risk in their areas of competence.

4) **Strategy to mobilize support and reengage international partners**: The plan should make provisions to mobilize public and private sector support for the climate initiative. The plan should also provide for international engagement to reassert positive U.S. leadership for global action on climate change.

5) **Reallocation of budget priorities**: A budget plan, which shifts budget priorities to reflect the climate initiative, including the reallocation of funds for the restoration and expansion of earth science programs so that understanding and maintaining earth's physical, ecological and atmospheric systems is once again paramount.

6) **Programs to enable/encourage citizens** to build efficiency and conservation in their homes and communities

At Timberland we believe the private sector should play an important role in supporting this framework. Leveraging our assets as businesses and corporate citizens we can deliver:

- Market innovation that promotes products and services which have a smaller carbon footprint.
- Consumer education and engagement, through retail driven initiatives like eco-labels, which build consumers' abilities to pick low carbon products; and service opportunities, which engage consumers in preserving the places of value to them.
- Evidence of impact. Our companies can market the economic and environmental value produced by being early adopters of global

warming action plans.

Thank you for this opportunity to testify before you today.

The CHAIRMAN. Now we will turn to the questions for the panel. Let me begin with you, Dr. Wake.

If I may, you mentioned, Dr. Wake, that you have identified an intensification in the rise in temperatures here in New England over the last 38 years, this 4.4 degree Fahrenheit increase. Mr. Larson and I, we just returned from Greenland. They are finding the same thing. The computer models have to be continually updated. The reality is outstripping what past experience was demonstrating to be the pace of the advance of this problem. Could you talk for a second about how quickly this is moving and what it might lead you to conclude in terms of predictions about the future?

Mr. WAKE. I would like to, I think, reiterate something that you have mentioned. On the broader side of the community, as we look back, the predictions that we developed over the course of the last decade, things are happening much more rapidly than we thought they would. And if you look back at those predictions, many of them were published in scientific papers. Things are happening much faster. Our predictions of figures were too low.

In terms of the Northeast, this was a real shocking development. When I first found out, I have got to tell you me and my graduate students turned over our numbers many times, because I did not believe it. But what is happening in Greenland and what is happening across the Northeast I think is the same thing.

As we have had warmer winter temperatures, temperatures driven by an increase in greenhouse gas in the atmosphere, that is trapping more heat at the surface and melting the snow more rapidly. When that snow melts, that ground becomes darker, which melts more snow, which allows more ground to be open. So this change in snow cover we think is actually driving this rapid increase in temperature; and as we look in the future, I expect this positive feedback will continue until we have lost the snow in the Northeast. I see our winter temperatures increase more rapidly.

The CHAIRMAN. So this positive feedback loop that we are talking about is a snowball effect in reverse. It accelerates the pace at which the snow melts, that the whole area becomes warmer because there is more exposed ground to absorb the heat and so, as well as being attacked from above, it is also now coming from below the snow, from the ice in a way that otherwise would not have been able to happen.

Mr. WAKE. This is a fundamental characteristic of the earth's climate system, is that we have these external changes that cause the system to change. We have these feedbacks within the system itself. So positive feedbacks cause the system to change even more rapidly, and that snow cover change that we have tracked in the Northeast is actually occurring across much of North America. So we are seeing that snow cover retreat more dramatically.

The CHAIRMAN. Well, they were talking about this whole phenomenon of the feedback effect up in Greenland as well, the very same phenomenon which accelerates, intensifies the pace, and there it is really at large. Because Mr. Larson and I were standing on top of an ice cap that was seven-tenths of a mile high, and across much of Greenland it is 1.7 miles high. In other words, Mr.

Larson and I were standing on an ice cap about the height of this mountain, about 4,000 feet; and it is melting and melting rapidly.

But that is not just something that is this size, but you have to think about it all across Greenland in terms of ultimately the consequences. That is where people start to talk about a rise of 10 to 20 feet in sea level.

If this positive feedback loop continues to accelerate at the rate at which it has, then there are really long-term catastrophic consequences for the planet.

Let me turn and recognize the gentleman from Wisconsin, Mr. Sensenbrenner.

Mr. SENSENBRENNER. Thank you, Mr. Chairman.

One of the problems that we have in Congress is to go through the mass of figures that are presented to us not only on this issue but on most of the other issues that we have to make decisions on as representatives of the people; and in this area, there has certainly been a mass of figures, and I would like to try to cut through some of them.

Dr. Wake, in your testimony you consistently used 1970 as your baseline for statistics such as the ice outdate in the lakes. Considering that 1970 was the end of a documented cooling period, how would your numbers be changed if you use 1930 as the baseline?

Mr. WAKE. If we use 1930 as a baseline, what you would actually see is there would be two different trends, as you mentioned. So from about 1940 to 1970, there was actually a global cooling trend, and we also see that trend across much of the Northeast. It has really been since 1970 that we have seen this dramatic rise in temperature that the Intergovernmental Panel on Climate Change has identified as a human influence on our climate. So when we look at the global figures, we see there really has been a shift right around 1970.

We actually did do a detailed sensitivity analysis that is in one of the papers I provided you, and we go back to 1965 and up to 1975.

So it is not our choice of one year that makes a difference in the trend. It is actually very——

Mr. SENSENBRENNER. But you concede the point that what you have done with your figures is basically used about the time when the cooling trend ended and the temperature bottomed and started climbing up; is that correct?

Mr. WAKE. Absolutely. The period which we know that has that human fingerprint of climate change.

Mr. SENSENBRENNER. There was a warming trend that was documented between 1920 and 1940, and that was before all of the CO_2 emissions caused by the post-World War II economic boom occurred. How do you account for the fact that there was rapid warming between 1920 and 1940 during half of which there was a worldwide depression and the economy slowed down?

Mr. WAKE. I think we have to think very carefully about the climate, and we have to think about the entire climate system. So we know there are lots of reasons that climate changes. It is something I tell my class all the time, is the climate changes, it always has, and it always will. What we know is that humans are causing that change today.

So, in the past, we know that climate has changed because of changes in solar output, changes in volcanic eruptions, changes in orbital parameters. Humans are not the only thing driving the climate change.

So in the early part of the century, we know that there was an increase in solar output that actually caused warming; and those models that we have, the GCM models that are detailed in the Intergovernmental Panel on Climate Change, have detailed that warming clearly.

Mr. SENSENBRENNER. I am happy that you stated that. Because a lot of the chatter that is going around both political circles and other circles is that climate change is almost exclusively caused by human activity. And there is a natural climatic cycle of warming and cooling trends which I think you stated in your testimony and in the answer to my questions.

I guess, you know, one of our problems as Representatives is to try to figure out what to do where we can make a difference in the climate without wrecking the economy. And the second part is probably the most difficult way of doing it, given some of the testimony that we heard almost 10 years ago from the Energy Information Administration which was a part of the Clinton administration.

Now I have one other observation. We have got a similar climate in Wisconsin as you do in New Hampshire. We kind of think New Hampshire is the Wisconsin of the Northeast. My State's Department of Tourism stated that the winter months account for only 18 percent of annual travel and tourism expenditures, which are significantly less than the other three seasons—21 percent for spring, 24 percent for summer and 37 percent for fall. And our leaves are beautiful in Wisconsin, too. Some of you folks ought to come and look at it, rather than going in the other direction.

If that is the case, you know, what is so wrong about having a shorter winter season when people don't like to drive on icy roads and perhaps a longer spring and fall season when people want to get out of the house and get out of doors and to enjoy the outdoors a little more?

Mr. WAKE. I think your question is a good one. It goes right to the heart of the matter.

What is at stake here is the very nature of what it means to live and work and be from New Hampshire and New England. It is central about our quality of life.

We have been brought up in this region to experience the seasons, and you can love them or you can hate them, but it is an essential aspect of the life that we have here, and our culture and our economy are grounded in it. So a much shorter winter will have significant implications not only for our economy but also for our quality of life and for our cultural heritage from this region.

One other point I would like to make just to clarify the warming we have seen over the last 30 years cannot be explained by any natural cycle in our climate system. It has the distinct fingerprint of anthropogenic warming caused by human emissions of greenhouse gasses.

The CHAIRMAN. The gentleman's time has expired.

The gentleman from Connecticut, Mr. Larson.

Mr. LARSON. Continuing on that same line of questioning, Doctor, if we could, because I think it is important because the question remains, and I think Mr. Sensenbrenner rightly points this out, so what have human beings contributed in terms of this global warming? And we are looking at specific points in history. How long does the accumulation of carbon stay within the atmosphere and in the environment, and what is the expediential ramifications of the tonnage, and can you explain how much exists and what kind of impact that has?

Mr. WAKE. Well, the carbon dioxide that we emitted as we drove up to Cannon Mountain today is going to last in the atmosphere on average for about a hundred years. Some of those molecules will be in the atmosphere for about as long as 500 years. So what that means is, even if we stop emitting carbon dioxide globally today, we would continue to see a warming over the course of the next one to two decades because of the lifetime of those greenhouse gasses in the atmosphere and because of the thermal inertia in our climate system.

Mr. LARSON. Isn't the urgency therefore then with the nations like India and China with enormous populations and on the verge of industrial takeoff whose main source of power is coal that, experientially, this amount of carbon within the atmosphere could be a near calamity? Is that what scientists believe or are we just postulating?

Mr. WAKE. I think if we continue on a business-as-usual scenario, much of the scientific community agrees that we are headed toward catastrophic climate change or, in the words of the ITCC, dangerous anthropogenic interference.

Mr. LARSON. Could you explain anthropogenic?

Mr. WAKE. Human derived.

So we are on that pathway now. So if we continue on this business-as-usual, we might expect by the end of the century we will see carbon dioxide levels in the atmosphere on the order of 600, 700, 800, 900 parts per million by volume, which is two to three times above natural background levels which in fact would lead to dangerous anthropogenic interference of the climate system and, in particular to the comments of Chairman Markey, the potential meltdown of the Greenland and west Antarctic ice sheets.

Mr. LARSON. Shifting quickly from Greenland and the scientific results and then moving to the anecdotal evidence that we heard from the Inuit Indians who were the natives that were there on the island and to look at the rapid pace at which glaciers are melting and how they have receded over time and just in the last several years, is this the same kind of experience that you are seeing, Mr. Koury, here in New Hampshire?

Mr. KOURY. The experience that I have had is that the recent years—and I say recent, probably from 1980s on—are things that you are able to observe. What I have made are observations.

Mr. LARSON. Mr. Sensenbrenner was saying what is wrong with having a warmer climate up here. You know, South Carolina is not a bad State; and there are many in my State that say, hey, that is not a bad thing. But when it is accompanied by ticks and mosquitoes and the brook trout are no longer here, what kind of qual-

ity of life do you have and how can you go out and enjoy those areas that you are accustomed to?

Ms. CHAMBERLIN. It goes right to the quality of life.

When the issues become that the trends you see, that the things that annoy you the most are growing, the things that give you the most pleasure are going away, it is a trend that I have seen over the past 20 years or so, and it does have an effect, and I know that folks are moving and changing their habits because of it. Friends of mine are now hunting up in Canada and New Brunswick to get the more traditional experience of a snow season. So it does have that effect.

Mr. LARSON. Thank you, sir.

The CHAIRMAN. The Chair intends on having two rounds of questions from the panel, if that is of any help to the members.

Now let me turn and recognize the gentleman from Oregon, Mr. Walden.

Mr. WALDEN. As you see, we are conserving on microphones today. As a radio guy, that is always difficult for me.

I fully appreciate all of your testimony. It has been most helpful as we try to find solutions to this issue. I am not here to dispute whether the planet is getting warmer. I happen to believe it is, and we have had thermometers for 300 years. I think we can measure these things. What I want to figure out is what can we do about it, what the costs are to doing something about it and what is reasonable and effective.

One of the issues that I have—perhaps we can start with Ms. Chamberlin. Your State has implemented a renewable portfolio standard. I am one of the co-Chairs of the Renewable Energy Caucus. My district is home to an enormous amount of wind energy, hydro/geothermal and we are actually developing a solar site. I am curious about your renewable energy portfolio, and 23 other States have passed them, I understand.

The Federal Government is being asked to put one in place. Would you want a national portfolio standard that perhaps preempted yours?

Ms. CHAMBERLIN. Thank you very much for the question. I have some concerns, and I would like to express them to this committee in that regard.

The negotiation of the RPS was—well, it has actually been an ongoing 6-year negotiation, but since Governor Lynch has been in place, it has been about a 2-and-a-half year negotiation. And it really did involve looking at who was going to receive the benefits and the incentives from an RPS, and it was important to include our historic renewable resources of virgin wood and hydro but also important to——

Mr. WALDEN. Did you set a date on a hydro or was it whatever was in place was included in that RPS?

Ms. CHAMBERLIN. Not everything is included. It is based on certain size and hydro. But there is potential for new hydro to come in as a new renewable.

Mr. WALDEN. Would new low-head hydro count?

Ms. CHAMBERLIN. It could count.

Mr. WALDEN. But some of the hydro that is there today, does it count?

Ms. CHAMBERLIN. Some of the hydro, it could benefit. We were very sensitive to scale when we looked at every source of renewables, and some of the larger hydro would not be eligible.

Mr. WALDEN. But the long and the short of it is you would not support a Federal preemption of what you worked out here.

Ms. CHAMBERLIN. I think that is what—in general, the statement I would like to make.

As we worked on our RPS, as we worked with the RGGI States, as we have worked on the climate change registry, we think that there is a lot of experience that the States have. We really welcome the leadership of the Federal Government on this issue and our partnership, but we do feel we have some resources to draw on and some expertise.

Mr. WALDEN. Since I only get 5 minutes, I am trying——

Ms. CHAMBERLIN. I am trying to remember that, too.

Mr. WALDEN. This region of the United States relies a lot on home heating oil to heat in the winter. I am wondering under a cap and trade system where your State might come down in terms of trying to reduce the reliance on hydrocarbons for heating, especially fuel oil for heating, which has to be a large emitter of greenhouse gasses.

Ms. CHAMBERLIN. Well, I don't think that I have an answer on that. What we have found is, as you said, that home heating is going to be a substantial issue, as is the transportation sector. And the Governor's approach on these things is to look very carefully at the economic impacts and what the trade and benefit cost and benefit is over time. And when we have to make decisions that are going to——

Mr. WALDEN. These are the issues that we ran into in Europe on a cap and trade system. You could be talking about much higher energy bills for individual consumers as we shift out of certain energy production to others that have far less greenhouse gas emitted.

Ms. CHAMBERLIN. I think we have to take the steps we can to address the issues, and we have to have measurable results. I think that would be an important part.

Mr. WALDEN. I want to go to Ms. Blaisdell.

In terms of Timberland's involvement—and I commend you for your company's involvement in this important environmental issue—is your company trading on the carbon exchange in Chicago?

Ms. BLAISDELL. No, we are not trading on the Chicago Climate Exchange. We are retiring any benefits we create through our own renewable energy systems.

Mr. WALDEN. Do you do any manufacturing offshore?

Ms. BLAISDELL. We do.

Mr. WALDEN. Do you do it in places like China?

Ms. BLAISDELL. We do.

Mr. WALDEN. How do you get containment of carbon emissions from production of electricity in China? I am curious, because we are trying to figure out how to deal with China, India, other countries.

Ms. BLAISDELL. Yeah. Certainly, what we are looking to do is create a model factory with the one factory that we do own in the Dominican Republic. So we have been installing renewable energy

systems there, putting environmental management system in place to understand what the true costs and benefits are associated with making aggressive reductions in greenhouse gas emissions at a manufacturing setting. At the same time, partnering with other brands to understand what we can do to incentivize our factory partners in China, southeast Asia, to help reduce their carbon emissions.

We think there is a great opportunity to help invest in renewable energy systems onsite for those manufacturing facilities for an increase in power reliability.

The CHAIRMAN. The gentleman's time has expired.

The Chair recognizes the gentleman from New Hampshire, Mr. Hodes.

Mr. HODES. Thank you, Mr. Chairman.

Ms. Chamberlin, in the absence of meaningful action by the Federal Government, the States have really taken the lead on the issues we are talking about today. New Hampshire has joined 34 other States, two tribes and two Canadian provinces endorsing the Climate Registry. The Governor has announced participation of a renewable portfolio standard with 23 other States, and New Hampshire is also participating in RGGI.

Why is it important for the Federal Government to work with the States and what are the potential consequences for New Hampshire and New England if the Federal Government does not act and instead forces individual States to create a patchwork of different rules regulating greenhouse gasses?

Ms. CHAMBERLIN. Let me start with an example I mentioned before.

I think the transportation sector is one where clearly the Federal Government has an important role in taking leadership on this issue. That is one that we look forward to input but really hope that there can be leadership from the Federal Government.

On RGGI, we are very proud of the work that we have accomplished, and we plan to bring RGGI before the legislature in New Hampshire. Because we can't implement it by executive order, so that will require that kind of bipartisan cooperation and consensus building that I talked about earlier. But, as a cap and trade plan, that would certainly benefit from a Federal program.

When you get into dealing with the technical issues like leakage, which there are people here much more qualified to talk about than I can, a Federal program will create consistency and fairness across the country. We hope that it won't disadvantage the work that the early States have already done, but we are confident that it would improve a cap and trade program that we intend to push forward on a regional basis in any case.

Mr. HODES. So you favor Federal action?

Ms. CHAMBERLIN. We think Federal action can be an important part of cap and trade. Absolutely.

Mr. HODES. Ms. Blaisdell, my good friend from Wisconsin expressed the concern that we needed to deal with the global climate change issues without wrecking our economy. Has going green been bad for Timberland business?

Ms. BLAISDELL. No. In fact, I would say it has offered several advantages to our business, and I believe that this is going to be a

basis for competition in the future, developing green products and green technologies.

We have also seen the savings from things like improving the energy efficiency of our building and investing in on-site renewable energy. For example, our 400kW solar ray in California is providing us with tremendous benefits currently right now.

Mr. HODES. In analyzing the risk and rewards from your program, did folks look at payback time for the technology as well as things like the good will generated for your company by going green?

Ms. BLAISDELL. Yeah. I still have a CFO that I have to report in to, and so I do have to do traditional capital expenditure reports and show competitive payback times. Harder to measure what the additional benefits are, but we found by taking a leap of faith that the payback has been much better than we ever expected from traditional measurements.

Mr. HODES. Thank you. I yield back.

The CHAIRMAN. The Chair recognizes Congresswoman Shea-Porter.

Ms. SHEA PORTER. Thank you, Mr. Chairman.

I, too, have been concerned about a lot of the phrases about wrecking our economy if we make changes, and so it is very heartening to hear what you have to say about your own company.

First, I want to speak to Ms. Chamberlin about this. Can you please tell us, without putting you too much on the spot, what the floods have cost New Hampshire's economy? What do you think we have lost because of these floods over the past couple of years, which have been absolutely devastating?

Ms. CHAMBERLIN. I think the latest figure is approximately $35 million just from three floods. I think there are costs associated with that that aren't in that figure. Certainly there are, but that would be direct costs to bridges, roads, and private property.

And I really want to remind people of the costs of displacement that people have experienced from losing their homes. We are going to be looking at, you know, the appropriate location of some of these communities in our flood plane. I think every town and city in New Hampshire is planning differently because of these floods and looking ahead differently; and, sadly, we have lost life in some of these floods.

So it is really—it is really the cost that is hard to measure.

Ms. SHEA-PORTER. You haven't even talked about the tourism, the impact on tourism. Do you have any idea on what we have lost on that?

Ms. CHAMBERLIN. Because of global warming?

Ms. SHEA-PORTER. Because of the flooding and just rainy weather, the lack of snow or for our ski industry.

Ms. CHAMBERLIN. What I can tell you, the good news, this was the first good Memorial Day we have had in 5 days. We are very excited about that. I don't know what to attribute it to. And certainly anytime that there is an increase in rain you have less tourism, and that is going to impact our economy; and, as you know, tourism is a significant part of our economy here in New Hampshire.

Ms. SHEA-PORTER. So rain instead of snow is very bad news for people, small businesses; and, of course, New Hampshire is built with small business, and we need that.

Thank you.

Ms. CHAMBERLIN. I think the snowmobile registration decreased by about 14 percent in the off-years, and that is a significant loss of revenue to the State.

Ms. SHEA-PORTER. And the restaurants and all of those who rely on people coming into our State.

Mr. Koury, I wanted to talk to you for a moment, please.

When I was growing up, I remember hugging that wood stove, wishing it could get a little warmer. I am sure that the testimony you just gave us tells me that we don't want it to be warmer.

New Hampshire gets this on a bipartisan basis, Republicans and Democrats. I wanted to ask you, what kind of support do you have in your organization among your fellow sportsmen and women? Do they acknowledge this? Are they concerned about it? And are they willing to make some sacrifices and conserve?

Mr. KOURY. I think the folks I know, the hunting folks and the hunting community and angling community, somewhat is divided. I think they all agree on the effects that we have seen and the trends that we have seen.

The majority of the people that I interact with and I know understand a connection between carbon emissions, the scientific information that we have been receiving and the impacts. There are a number of hunters and anglers who don't see that connection or don't understand or agree on that connection.

But I think it is difficult for me to say. I am not speaking for my group or my majority or anything of that nature. But the friends that I know, probably the majority of the friends that I know, do support the idea of getting action to reduce emissions, carbon emissions, because they feel there is a direct connection.

Ms. SHEA-PORTER. And they have noticed it?

Mr. KOURY. Yes. Through the same friends that I have been seeing, been relating to you, I think that is a common trend. I think you find most hunters would agree that these trends are what they are seeing.

The CHAIRMAN. The gentlelady's time has expired.

Now we will turn to the second round of questions. The Chair will recognize himself.

Let me come back to you again, Dr. Wake.

You made the stunning statement that Boston now has weather that Philadelphia had in 1970; and if it continues at the pace at which it has been in recent years, then we could consider—we could continue to move right down the eastern seaboard in terms of the weather.

What is the time period that you have identified as that where there has been an acceleration which has occurred? In Greenland, they are talking to us really in terms of just the last 6 months where this cycle has begun to spin much more rapidly. What is the time that you have identified?

Mr. WAKE. The data that we looked at has only been compiled by the National Climatic Data Center up to 2002. So when we look

at long-term trends across the century we really see this distinct change around 1970.

That said, we now know that certainly the winter of 2006 and the first half of this winter were very unique in the fact we had no snow and really warm temperatures and a decrease in snowmobile registrations.

I wanted to tell just one brief story. I have a wood lot 40 miles that direction from here. And this winter was really bad because of the forest industry, not because of any rapid species change, but because the roads haven't been frozen. And when the roads aren't frozen in the local towns, the logging trucks can't get in.

So when I have been around talking to a lot of people, what they tell me, I say winter is warming and all of the loggers go, yeah, we can't get into the forest to harvest their wood.

So while we haven't done a specific analysis on the recent years, it certainly appears that our winters have warmed even more over the last 3 or 4 years, and we will include that in our analysis as soon as that quality assured data becomes available.

The CHAIRMAN. Actually, Mr. Larson and I experienced the same thing in Greenland, where an entire industry, which is this dogsled industry across the frozen ocean that could take tourists from one part of Greenland to another, well, the ocean doesn't freeze anymore. So this entire industry has gone out of business. Because, unbelievably, the oceans in Greenland don't freeze.

And, in fact, Mr. Larson and I and Speaker Pelosi—Speaker Pelosi, she was the highest-ranking American official to ever reach Greenland when we went there this past weekend. Ever. We were on a boat, went out into the ocean where we saw flotillas of icebergs, 400, 600 feet high, that were just breaking off of the glacier and now floating, dozens of them. Which, again, is unprecedented in their experience; and it is accelerating. So this is a very significant phenomenon.

Again, like you are saying, it affects the economy up here in New Hampshire as well. Because they just don't have the conditions that historically made it possible for them to be able to conduct their profession.

Could you speak briefly about this issue of where New Hampshire saw hundred-year flooding for the third time in 3 years in this State and what that means and where do you think that is all coming from?

Mr. WAKE. I will try to.

What we have seen is this dramatic increase in extreme precipitation events just in the last 2 years. In fact, it is common now for our TV meteorologists to say we are going to have a rainstorm with 5 inches of rain without having the warning bells going on. So I would say over the course of the last 2 years our precipitation regimes have changed dramatically. When we get rain, it comes in deluges.

Can I link that to global warming? It is a tough call.

But what we are seeing is a continuation of a trend where we get more of our precipitation in fewer events. At the same time we are developing our ecosystems, we are putting down a lot of pavement, and that is increasing the rate at that time which that water

runs off. So it is a perfect storm of more rain and fewer events and fewer developments that is leading to an increase in flooding.

The CHAIRMAN. Thank you.

Mr. Sensenbrenner.

Mr. SENSENBRENNER. Let me say that, in Wisconsin, we value the seasons, too. We like to spend time outdoors here in all four seasons. Most people in Wisconsin appreciate the climate that we have. They appreciate the recreational opportunities that we have outdoors, and I don't think there is that much difference between Wisconsinites and New Hampshirites.

The one thing I think we ought to look at, however, is actually what the trends are relative to the tourism industry. Because the tourism industry is a reflection on how people like to enjoy the outdoors. And, granted, they may come from parts other than where we live; and that is why I mentioned the statistics that the Wisconsin Department of Tourism has compiled where the most popular tourist season in Wisconsin is the fall and the least popular season is the winter.

Now we do have this thing here in Wisconsin. The mountains aren't quite as good.

I am wondering, Ms. Chamberlin, what kind of statistics you have relative to the economic trends in the ski industry in New Hampshire over the last 30 to 35 years?

Ms. CHAMBERLIN. I can't give you the data off the top of my head, but I will be happy to try to find it for you in terms of the growth of the industry.

Mr. SENSENBRENNER. I am looking at that because, as the climate has warmed since 1970, one would think that the ski industry would have declined rather than grown.

Ms. CHAMBERLIN. I think one comment I would have is that our most successful ski mountains make a lot of snow, and that continues to be an important part of maintaining the recreational base.

Mr. SENSENBRENNER. It has got to be cold enough.

Ms. CHAMBERLIN. It does. Because, according to Dr. Wake's report, a lot of the warming we are seeing actually takes place at night. You have probably wanted to elaborate on this, but there is a difference in the warming temperatures in the day and the night and you make snow generally at night. So that is a concern that you don't even have the degree days, as they call it, to make snow at night, and that can affect the ability of the ski area to compete. And it also requires a large withdrawal of water. So the more water that you take out, the more higher your costs are that you have to bear in the ski industry.

Mr. SENSENBRENNER. As national legislators, we have to look for national solutions. The last winter it was warmer than usual on both coasts and colder than usual in the central part of the country.

I live on a lake. To get to my house, I have to go down a road of four rows of maple trees that were planted by my great-grandfather over 100 years ago. It is just beautiful there during the fall, as it is up here. But I kept statistics on the ice. And in the last couple of years, we have had ice cover over the lake that I live on that lasts a lot longer than what normally it does. Three months

ago was the first time I can remember where I couldn't get into my house because there was so much snow in front of the front door that I had to get in through the garage.

So given the fact that climate change affects different parts of the country in different ways, how do you suggest that we craft national legislation that takes into account of this?

Ms. CHAMBERLIN. I think you are going to have to bring your regions to the table and really look at the science and the facts and get the input from your region about whether you are seeing impacts, whether the economy is experiencing impacts. And all legislation, whether it is Statewide or regional or even, you know, international, negotiations are acts of compromise. And I am afraid to suggest it so publicly, but I think that is what it is going to take. It is not an easy task, but it is going to require the science as a base and working with all of your colleagues to achieve some reasonable balance.

The CHAIRMAN. The gentleman's time has expired.

The Chair recognizes the gentleman from Connecticut, Mr. Larson.

Mr. LARSON. Thank you, Mr. Chairman.

One of the questions that I have and want to follow up with, especially with so many young people here from New Hampshire, to get 164 communities to agree, how did that process evolve and what were the mechanics behind this obvious grassroots movement?

Ms. CHAMBERLIN. The mechanics to my knowledge were a growing understanding in communities of the climate change impacts in New Hampshire. That has been supported by tremendous educational effort on the part of our nonprofit community, and they undertook this initiative based on a similar initiative that was undertaken in the early 1980s on the acid rain issues.

Mr. LARSON. Was there any specific driving organization?

Ms. CHAMBERLIN. The Carbon Coalition and Clean Air-Cool Planet were both instrumental in achieving in getting this resolution and organizing their communities to put the resolution on their town warrants.

Mr. LARSON. Have other States begun to follow your model?

Ms. CHAMBERLIN. I am not aware of other States following the model. I did introduce a resolution in my town, and I think it was interesting to see the response because it did—when you talk to people about the economic impacts of global warming on New Hampshire, they are very willing to roll up their sleeves and act locally. And I think the most significant impact, besides the recommendation to you and as our Federal representatives and legislators, is a willingness to act locally and start up their local energy committees and see what they can do to reduce energy——

Mr. LARSON. Because of this grassroots movement, do you thing the people therefore will be more inclined if they had to sacrifice on the questions that have been asked today, whether it is cap and trade or whether it was a carbon tax, a polluter's tax? Do you think that people in New Hampshire would be, therefore, more prepared or more understanding? And, if so, should we not be doing this all over the country?

Ms. CHAMBERLIN. I think there is an understanding that individual behavior can make a difference and that people in New Hampshire are willing to undertake that.

You know, we are known in New Hampshire for taking some modest steps; and I would think that that approach to really using your data, working with all your regions and stakeholders is going to be critical nationally in the same way it has been critical locally and Statewide.

Mr. LARSON. Dr. Perkins, you said something earlier that caught my attention with respect to forest migration, particularly as it relates to New England. I never viewed the oak or the hickory as an invasive species. What is accounting for this and what are the trends that you are seeing? I know specifically, as you are looking at the maple sugar industry, what is forest migration all about? Could you further enlighten us?

Mr. PERKINS. The distribution of plants is based on a lot of factors, but primarily temperature and precipitation are the main components that determine where plant species will be found.

As the climate warms, then there will be changes in the competitiveness of various species; and oaks, hickories and pines are found more commonly in areas where it is warmer. Maples, although they will grow, tend not to be able to compete as well with those species. So they will, in effect, move northward or establish themselves and grow better in Canada then they will here.

There will be some efforts, most likely by humans, to change those patterns somewhat, but it is a very difficult thing to change.

Mr. LARSON. New Hampshire has certainly pointed to a new direction in the grassroots level that the Nation should be taking, and I don't think it is coincidental that we have two new Members to Congress who also speak so ardently of the new direction necessitated for this country and exemplified by what you are doing here in New Hampshire.

I yield back.

The CHAIRMAN. The Chair recognizes the gentleman from Oregon, Mr. Walden.

Mr. WALDEN. Thank you very much, Mr. Chairman; and I appreciate that.

Dr. Perkins, do you specialize in forestry?

Mr. PERKINS. I am a forest physiological ecologist.

Mr. WALDEN. Can you tell us what is causing the dead needles out here?

Mr. PERKINS. Dead needles in high elevation forests are caused by winter injury, and there are a number of different forms, but in red Spruce in high elevations, it is—they are predisposed to winter injury by acidic deposition.

Mr. WALDEN. So this wasn't necessarily a sulfuric cloud that caused this?

Mr. PERKINS. There would be acidic deposition of some sort, nitrogen, sulfur, which, over time, would render the plants more susceptible to cold temperatures.

Mr. WALDEN. So you think that is what happened here?

Mr. PERKINS. I haven't looked closely, but I wouldn't be surprised.

Mr. WALDEN. Okay. Because I chaired the Forests and Forest Health Subcommittee and, you know, I cover an area that you can put New Hampshire in one county in my district. I am not bragging. It is just a huge district out West. We have 70,000 square miles in my district alone. I have 10 national forests. I have seen damage like this out in the West. It was because of a winter freeze at the end of a cycle, kind of early spring that caused similar kind of degradation.

Mr. PERKINS. This actually occurs in the middle of the wintertime, and it is very well related to acidic deposition.

Mr. WALDEN. I could never go back to Oregon if I didn't take great exception from my colleague from New Hampshire's comment about rain being something that is bad. Or we would have no visitors in Oregon or Washington or up in Alaska, either. I know what she meant, though. I understand fully.

I want to talk a little bit about forest migration north. Because my understanding is that the boreal forests, you are moving these forests north; and, as a result, I believe the IPCC and others have found that actually contributes to global warming because you are losing the snow on the ground, replacing that with forests that actually absorb—in the northern environment, absorb and reflect heat or absorb the heat, I guess, where the snow would reflect it. Isn't that accurate? I think that is what the IPCC and other scientists have said.

Mr. WAKE. Correct. As we expand the boreal forest you would expect those dark trees to absorb more of the acidic radiation and especially in the winter.

Mr. WALDEN. And the converse is true if we lose the rain forests. My understanding is, as they are being wiped out, by the way, so we can import wood here and other developing countries, we are allowing the destruction of the rain forests. We are allowing the complete obliteration of the forests in China and Russia and Indonesia. They are not being replaced; and, therefore, we are losing that carbon sync. Because don't forests, in the right environment, they contribute heavily, mightily as carbon syncs, do they not?

Mr. WAKE. I would argue that all forests are carbon syncs, whether or not how much short wave radiation——

Mr. WALDEN. Right. There is a reflective capacity; and, as they change, you can have that.

So I get to an issue that I have pounded on this in committee. About 5 years ago this August, 500,000 acres burned on National Federal forest lands; and that contributed enough greenhouse gas in the State of Oregon to equal the equivalent of one-sixth of all auto emissions for a year. And, ladies and gentlemen, your Federal forests out West are horribly mismanaged, overgrown, fire-prone; and, according to the Government Accountability Office, when they do burn, there is a million acres today of Federal forest land that has never been replanted because we don't go in after—everything gets litigated, objected to, and so we don't get in there, and we haven't allocated the resources necessary to do the thinning, to do the stand management.

You are a forester. You have a wood lot, right?

Mr. WAKE. I have a wood lot.

Mr. WALDEN. Now I thought I heard the word "logging truck" come out of your mouth. Do you log?

Mr. WAKE. I don't log on a commercial scale, no.

Mr. WALDEN. But you manage your forest, I would assume. You are a responsible person.

Mr. WAKE. I allow my forest to manage itself, because I believe in the biodiversity of northern forests.

Mr. WALDEN. As do I. But does that mean in the West you would recognize that if you don't manage properly and you inhibit nature from doing the kind of fire regime that used to occur pre turn of the last century, then you end up with very unnatural forest conditions that result in catastrophic fire, greenhouse gas emissions that are abnormal and contribute to this whole problem?

Mr. WAKE. I am no expert on western forests.

Mr. WALDEN. Dr. Perkins, you are a forestry person?

Mr. PERKINS. Again, I have no experience in western forests.

Mr. WALDEN. All right. I don't know much about maple either, but I am trying to learn.

My point is, if we manage the forests better, we can accomplish two goals: carbon sequestration and less emissions due to forest fires on your Federal forest lands in the West.

With that, thank you, Mr. Chairman

The CHAIRMAN. Thank the gentleman.

The gentleman from New Hampshire, Mr. Hodes.

Mr. HODES. Thank you, Mr. Chairman.

My question is addressed to Ms. Chamberlin and Ms. Blaisdell both.

You have each been involved—Ms. Chamberlin on a State level, Ms. Blaisdell on a corporate level—in assessing many different strategies for reducing greenhouse gas emissions. In your experience, which strategies—efficiencies in buildings and transportation, increasing renewable energy use, and many others—which strategies stand to be the most economically viable for reducing greenhouse gas emissions and which ones are the most costly to implement?

Ms. CHAMBERLIN. I am glad you brought up that question, Congressman. I think we have neglected a little bit the issue of energy efficiency and conservation. It is a very important point and one that Governor Lynch has lead by example. He has asked the State government to reduce energy use by 10 percent across government, and we think that that is a good standard for the rest of the economy's private sector and businesses to look at, and indeed greater conservation than that can be achieved.

So I would say, without a doubt, that energy efficiency and conservation need to be at the top of our list for the most cost-effective way to reduce greenhouse gas emissions.

And, secondly, we focused on the development of renewable energy, and I have talked some about that in New Hampshire. We believe that that brings money into our local economy, that it is a strong step towards energy independence both for the region and the Nation. It is an important tool and one that we hope will be economic for the region and indeed bring jobs and improve the economy locally.

So those would be my top two.

Mr. HODES. Ms. Blaisdell, from the corporate perspective?

Ms. BLAISDELL. I would agree with Mrs. Chamberlin that energy efficiency is by far the most cost-effective way for us to reduce our greenhouse gas emissions. I think, on the more costly end, investing in renewable energy has been challenging for us, because there has been a patchwork of rebates and incentives over the years for renewable energy. So, because of that patchwork, there has been no consistency in cost of things like solar panels and wind turbines because those industries have had to respond to fluctuations and economic incentives.

Another opportunity for us is to come up with useful tools for evaluating the carbon footprints of our product so we can use the market to incentivize both factories and raw materials, suppliers that produce lower carbon footprints through the manufacturing processes.

Mr. HODES. So I take it from your answer that consistent, clear national regulation or incentives as it may happen for the development of renewable and alternative energies would be a big boon.

Ms. BLAISDELL. And I think it has to last over a period of longer than 2 years, which is what we have seen in the past. These things come in 2- to 3-year waves. So we really need to encourage that industry to grow and get competitive with longer-term incentives.

The CHAIRMAN. The gentlelady from New Hampshire.

Ms. SHEA-PORTER. Thank you.

I have to speak to the colleague from Wisconsin who is talking about their season, the winter season being low on tourism; and I guess we are hardier here in New England because we do have a great winter tourism. We also have a sea coast that he is welcome to come see, and we are concerned about the sea coast as well as the mountains.

Having said that, I would like to say that regions do impact one another, that we do need a Federal approach. Because, for example, New Hampshire and the Northeast is called the tailpipe of the country. We receive a lot of the nasty stuff coming from the Midwest and other areas. And I want you to address that if you would, Doctor, please, what the tailpipe is about and what the Federal Government can do and what Congress can do to help.

Mr. WAKE. The tailpipe refers to the fact that there are these emissions from the Midwest and we have prevailing westerly winds and a lot of that pollution ends up making their way here to the Northeast.

There already has been superb Federal legislation that has actually reduced the amount of sulfur dioxide that is emitted into the atmosphere and lead, but that is sort of a different issue.

But, interestingly enough, back in the 1970s and 1990s when the Clean Air Act was passed, industry did come out and say it would ruin industry. And what happened is that we had a bunch of engineers that figured out the technology, figured out the cost-effective ways to reduce that sulfur dioxide, and now you never hear about the fact that sulfur dioxide cost sort of dollars per ton as opposed to hundreds of dollars per ton.

What I think is important there, and we haven't raised a lot in our discussion today, is the cost of doing nothing. We always talk about the cost of doing something. But there is a cost to our inac-

tion. And in the case of reducing sulfur dioxide emissions, we know that fine particles and ozone, which is a secondary pollutant that gets transported into this region, ends up in the premature mortality of tens of thousands of people across the entire country. Many of those are in the Northeast.

So I think when we talk about reducing our greenhouse gas emissions, especially through energy efficiency, we can also talk about reducing those other emissions that actually significantly impact human health, and we can reduce those tens of thousands of people that die prematurely as a result of air pollution both in New England and across the rest of the country.

Ms. SHEA-PORTER. We have higher rates of asthma and cancer, and we have concerns. It shows that the Federal Government, when they work together and Congress, we can actually can pass some legislation that helps all of us. So it is good for us to think in terms of the Nation instead of just regions.

Dr. Perkins, I wanted to ask you, the impact—I know that—we read your statement—the impact economically on Vermont if we don't address this.

Mr. PERKINS. The economic impact on Vermont just directly related to the maple industry is about $20 million. However, the total economic activity related to maple discounting tourism is closer to about $200 million due to jobs, manufacturing, export of maple syrup into other areas. So it is a very large impact.

When we start to count it in tourism, it becomes much, much larger. And the two industries really work hand in hand. Many tourists who come, even in the fall, will purchase maple syrup and visit sugarhouses and contribute to that economic activity. So the loss of the maple sugaring industry, the loss of maple trees would have a tremendous impact.

Ms. SHEA-PORTER. Would you say that businesses in Vermont look forward to some kind of legislation to slow down this change?

Mr. PERKINS. I certainly can't speak for all businesses in Vermont related to maple. However, I do think if maple were to not exist in Vermont it would be a real tragedy.

Ms. SHEA-PORTER. Do most maple syrup producers look at it as a result of the change in climate?

Mr. PERKINS. Many of them are very concerned. They tend to be very forward-thinking individuals who look at their business in the very long-term sense. So they are concerned. They are unsure yet as to what they can do about it and what should be done about it.

Ms. SHEA-PORTER. So basically everybody is looking for some leadership to control this.

Mr. PERKINS. They certainly are.

The CHAIRMAN. Great.

The gentlelady's time has expired.

And the way I would like to conclude here is first ask if any of the Members have any additional questions which they would like to pose to the committee—I mean, to the panel; and I see none.

What I like to do is ask each of our witnesses if they would to give us their one-minute summary of what you want us to remember from our visit here to the summit; and we will begin with you, Ms. Blaisdell.

Ms. BLAISDELL. I hope what I have shown is that the private sector is willing to lead and partner with the Federal Government on introducing a national framework for addressing greenhouse gas emissions and just to revisit my testimony and say that we want to make sure there is a legislation for economy-wide emission reductions.

I will leave it at that.

The CHAIRMAN. Mr. Koury.

Mr. KOURY. Thank you, Mr. Chairman.

I think the one thing I would like to leave with you is that back in the early 1970s we talked also about the costs of controlling pollution, and we worried about it. But we went forward. Congress went forward and passed the Clean Air Act and the Clean Water Act, and we had some tremendous improvements in air quality, water quality. We have had new industries that have grown up around that. We have had more jobs, and our economy right now is prospering very well.

So as we look forward to this greenhouse gas emissions, it is a pollutant, we should reduce pollutants everywhere, regardless of what we think may or may not occur anyway. There are tremendous secondary benefits coming from it; and I—again, I hope this committee is the first wave to get the ball rolling.

The CHAIRMAN. Thank you.

Dr. Wake.

Mr. WAKE. I would like to talk briefly about this myth about the economy versus the environment. It is old news. It is now the economy and the environment. Our economy—our environment is the basis of our economy in this region, and we need to protect it.

I want to take 30 seconds to brag about the University of New Hampshire as an example. We have reduced our greenhouse gasses significantly because it saves us money by improving our efficiency. So we have installed a combined heat and power plant because we need a heating load and we need an electricity load. So our greenhouse gas emissions now are about what they were in 1990; and if projects in the pipeline continue, we would expect to significantly reduce those even further by becoming energy efficient and saving the university system and the State money.

I think it is a wonderful example. You can hear the ones from Timberland as well. There are lots of ways we can address this problem as well.

Mr. PERKINS. I think the important thing to recognize is that, unless you want to buy your maple syrup on your fall foliage tour of Canada, we need to have some action.

Thank you.

Ms. CHAMBERLIN. Thank you for the final opportunity to speak.

I want to again thank the committee for holding your inaugural hearing in New Hampshire on Cannon Mountain. I want to take just a second to thank our Parks service for making the facility available and all of the people who are in attendance today. I want to thank the public for coming and their continued interest and support; and, finally, with the leadership and partnership of the Federal Government, I am confident and the Governor is confident that we can address this issue, make a difference for New Hampshire and for the Nation and the world.

Thank you.

The CHAIRMAN. Thank you.

It has been a great day for us to be up here on Cannon Mountain for this summit. There is another summit which is just beginning. It is in Germany. It is the G–8. Eight large economic powers coming together, but they have invited the Chinese and the Indians and others as well.

And Chancellor Merkel told us in Germany, the select committee, when we met with her last week that she intends on putting climate change and a mandatory cap and trade system at the top of her list for resolution.

Our hope is that President Bush will respond to this challenge that is being presented by the G–8 to the United States to be the leader and not the laggard.

We were faced with a similar challenge back in the 1970s and 1980s with this threat that acid rain posed to New England's lakes. Literally, our lakes were dying, and they were dying from this sulfur dioxide that was blowing our way from the Midwest. And it seemed as though—and Canada. It seemed it was an insolvable problem.

But in 1990 we passed legislation. We conceived this idea of a cap and trade system. Silvio Conti, who was a congressman from western Massachusetts, and I introduced the first piece of legislation in 1981. It took almost a decade to see that legislation passed, but we now see that the system works. People no longer talk about the burdens to remove this sulfur dioxide as a huge economic burden, and I think we have an enormous opportunity in this area of carbon dioxide as well.

Finally, I would tell you that we had a hearing, our first hearing, actually, about 2 months ago with General Gordon Sullivan who, along with 10 other three-star generals and admirals, testified as to the danger which climate change poses to the world and made a reference to Somalia where a drought had led to famine and famine had led to international aid coming in. Ultimately, that international aid was fought over; and we sent in U.S. troops, which led to Black Hawk Down.

He then made reference to Darfur and other parts of the world where this climate change issue has tremendous effect upon our planet, and it is not these poorest of all people who are emitting this CO_2. It is the industrialized world that is doing so.

When I asked him what was the point at which he got interested in the issue, he told me that when he retired, he and his wife came up to Vermont to rekindle memories of trips that he had taken with his wife when they were younger, and it was the experience that he was having with the maple trees and this enormous change that was taking place and the conversations that he was having with people in Vermont that triggered his interest in the issue that then led to this report that these 11 three-star and four-star generals have given to Congress.

And, by the way, inside of the CIA bill now and inside of the defense bill, there is now a requirement that is out of the House of Representatives in the last few weeks, a new requirement for a national intelligence estimate to be done of the impact of climate change and its effect upon national security in the United States.

And all of that because of the General's visit to Vermont to remember the maple trees of his youth.

So we thank each of our witnesses.

Again, we thank all of the people of New Hampshire who have taken out a good part of your day to come up here on this important issue, and we thank you for your activism. We are here because you are active, because of the incredible energy which you have shown on this issue. We feel here that the thermometer, this is a thermometer in the sky which is helping us to see how global warming is affecting your economy.

With that, we thank you, and this hearing is adjourned.

[Whereupon, at 12:55 p.m., the committee was adjourned.]

September 04, 2007

Ali Brodsky, Chief Clerk
Select Committee on Energy Independence and Global Warming

Dear Ms. Brodsky,

My responses to the follow-up questions of the Committee follow. I note that several of the questions pertain to my personal opinion rather than my scientific opinion. I have tried to note this where it occurs.

1) Dr. Perkins, you focus extensively on the impact of climate change on sugar maple forests. Can you identify plants or trees that are also profitable that would flourish with a slight increase in temperature?
This has not been a research area of mine, so I respectfully decline to answer except to say that undoubtedly some plants/trees will be benefit from an altered temperature/precipitation regime in New England.

2) Would you agree that good forest management policy is an important part dealing with global warming – since forest fires produce a huge amount of carbon and also destroy a very valuable carbon sink? And do you support replanting of new trees after fires so that the new growth can ingest carbon from the atmosphere?
As I stated in my oral testimony, I am not an expert in the science or management of forest fires. Several approaches will be necessary to dealing with global warming, including sound, scientifically-based forest management practices. Practices that sequester carbon into long-term pools, such as planting of trees, must be evaluated alongside other possible approaches.

3) In your submitted testimony, when asked the question of the effect to changing duration and timing of the maple sugar season had on maple sugaring, you responded "the effect of the reduction in season duration has not, as yet, produced a discernible effect on syrup yield." You continue to explain how improved

technology in sap collection has contributed to a stable maple syrup supply. Is there any reason to doubt that technological advances in tapping and syrup gathering will slow in the next 50-100? Do you anticipate that breakthroughs in technology can and will improve the amount of syrup extracted from maple trees?
Although improved maple sap collection technology has offset the losses in yield attributable to the global warming induced reduction in maple season length over the past 40 years, and may be expected to continue to do so for the next several decades, technology improvements will NOT be able to indefinitely stave off the impact of global warming on maple production yield. Freeze-thaw conditions are a physiological requirement for maple sap flow to occur. Technology advancements have increased the yield of sap during flow periods, but cannot induce the conversion of stored starches to sugars along with the development of stem pressure necessary to cause sap flow. Without freeze-thaw conditions, or more precisely, without a sufficient number of freeze-thaw events during the spring season, commercial maple sugaring operations will not be tenable. Furthermore, the recent advances in maple sap yields are due primarily to refinements in equipment (tubing and spouts), the optimization of tubing system design and management, and the proper application and utilization of vacuum in maple operations. For most of these technologies, we are approaching the theoretical upper boundaries of use. However in other cases, such as microbial induced flow cessation in tapholes and tubing systems, further advances are likely.

4) Will the mix of tree species in New Hampshire forest likely be altered by these changes in insect and disease vectors?
If I understand the question correctly, then it is correct to assume that the mix of tree species throughout New England will be affected by insects and diseases.

5) Would proper forest management techniques reduce the threat of insects and diseases?

Proper forest management strategies can mitigate, but generally cannot eliminate these types of threats.

6) Which tree species are most likely to expand their ranges and dominance as the climate changes and is it necessarily bad?
Several tree species (pines, oaks, hickory) will expand their ranges northward. Whether a change is positive, negative, or neutral depends upon several factors. The expansion of other tree species into New England is not necessarily bad in all respects. However, if maple becomes less dominant or is eliminated from our landscape, the negative consequences on the fall foliage and maple sugaring industries in New England are quite apparent.

7) Do you support Energy Efficiency programs and what if any do you currently participate in or have you shown support for?
I do not understand the relevance of the question to my testimony, however I do support energy efficiency programs in my personal life. I recycle. I minimize driving trips when possible. I buy local goods if possible. I use energy efficient light bulbs and appliances where possible. I chose to do these things as part of my personal life, however I am not an active participant in any formal environmental organizations other than scientific societies.

8) On the issue of alternative energy, what forms do you support? Wind? (Are you concerned about birds getting killed?), Hydro (are you concerned about fish kills?) Wood waste burning? Ethanol? Methane capture from landfills?
I again wonder about the relevance of the question, however my personal views are that it is necessary to utilize a broad mix of energy sources, including wind, hydro, ethanol production, biomass burning, methane capture from landfills, and nuclear power. Each of these has serious environmental consequences which must be mitigated where possible (there are a number of strategies to reduce bird/bat kill in wind generation, and fish kill by hydro and nuclear installations), and the benefits must be weighed against the outcome. I am NOT a research

scientist specializing in alternative energies or energy policy. My research focus is limited primarily to forest health and tree physiology (primarily maple).

9) New Hampshire being a fairly rural state and auto reliant for the most part, what do you suggest the answer to the auto sector carbon output is?
Per above, the costs and benefits of a number of different activities must be considered. However, I personally believe the costs of various activities, such as driving, should factor in all costs (acid-rain and global-warming).

10) Forest management can be a real asset in dealing with global warming – first because it can prevent forest fires, which release massive amounts of carbon into the air and second, because forests can provide a carbon sink, particularly in new growth forests. That being said, do you support better forest management and replanting of burned forest? And would you support selective harvesting – perhaps to be used in a wood fired power plant – to help keep forests as a healthy part of the carbon sequestration system?
As I stated in my oral testimony, I am not an expert on forest fires, which are primarily an issue in the western U.S. I do not have any particular bias against scientifically-based forest management which is done after a proper cost-benefit analysis to ensure that the goals will be achieved while causing as little negative impact as possible to the environment.

I note that I am unsure about what is meant by a "healthy" forest. Forest health can be defined in many different ways by different people. Forest health (to me) equates to resilience (resistance to change, ability to withstand or recover from stress, self-sustaining). Most forests are perfectly healthy even without forest management activities. Although some forest management is done to promote forest health, the majority of management is done to promote other goals (timber production, watershed protection, fire suppression, wildlife management). Not all of these goals necessarily contribute to forest "health". The paradox is that many forests that appear to be unhealthy on the surface are, in fact, quite healthy. Just

because trees are not growing rapidly does not mean it the forest is not "healthy". This does not imply that forest management is bad in any way...just that not all forest management is aimed at improving or maintaining forest health.

11) Are you concerned about the amount of methane that New Hampshire cows produce as part of the global warming problem?

This is not an area I am technically able to address, however personally my sense is that this source is negligible in the overall equation of greenhouse gas emission sources.

12) With China about to surpass the US in greenhouse gas emissions, would you agree that it is important to get developing nations like China and India to the table in order to reduce overall carbon in the atmosphere?

Given that this is a global problem, my personal feeling is that it would be beneficial for all nations to be encouraged to participate in the solution.

Sincerely,

Timothy D. Perkins, Director
Proctor Maple Research Center
University of Vermont

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Select Committee on
Energy Independence and Global Warming
U.S. House of Representatives

Dear Mr. Koury,
Following your appearance in front of the Select Committee on Energy Independence and Global Warming, members of the committee submitted additional questions for your attention. I have attached the document with those questions to this email. Please respond at your earliest convenience, or within 2 weeks. Responses may be submitted in electronic form, at aliya.brodsky@mail.house.gov. Please call with any questions or concerns.

Thank you,
Ali Brodsky

Ali Brodsky
Chief Clerk
Select Committee on Energy Independence and Global Warming
(202)225-4012
Aliya.Brodsky@mail.house.gov

1) As an outdoorsman/environmentalist - are you concerned about the potential impact of wind farms on the bird population even though wind farms produce clean power?

A: **I'm very concerned about bird mortality. But a recent report of the National Academy of Sciences has found that few birds are endangered by wind power machines. And that tall buildings, power lines and domestic cats have a much, much higher ratio of kills than does wind power machines. However, wind power machines did have a higher kill rate on bats than was expected according to the report. Rotor design is thought to be one way to reduce that impact.**

2) Given your desire to reduce carbon in the atmosphere, would you support nuclear energy as a clean power producer since it emits no carbon?

A: **I worked for a few years as a support engineer in the nuclear power industry. My experience was that although most of the safety problems still need to be mitigated, the long lived and high volume of nuclear waste and relatively short life span of a nuclear plant is worrisome. Many tons of spent but radioactive nuclear fuel must be stored and guarded from terrorists for hundreds, maybe thousands of years. That is an environmental and homeland defense hazard that must be avoided if possible.**

3) Many families who want to enjoy the outdoors must drive significant distances to reach their destination of choice. Furthermore, a large portion of outdoorsmen rely on SUV's or pickup trucks to haul their hunting stands, boats, and ice shacks to the woods lakes, and streams. What impact would higher gas prices, due to taxes and regulations, have on the wallets of average hunters and fishermen?

A: **We would all have to pay more to participate in our sports. And by all, I include not only hunters and anglers, but also parents of all the players of soccer, Pop Warner football , Little League baseball, and hockey. My guess is that there are more people engaged in those activities than in the hunting and angling ones. The cost of sports (and vehicles to get to them) has always been going up, but to do nothing, would most likely dramatically reduce the ability to participate altogether.**

4) How will deer and moose hunting seasons are affected by warmer, longer summers, less snow and more rain and changing habitats? Are hunters observing changes in game patterns now? Will more ice-free days on lakes and ponds hinder access to good hunting areas?

A: **The patterns are changing today. We're having longer, warmer summers and have longer spells of warmer weather during the fall seasons. We know that warm springs and falls may also promote increased breeding of winter ticks, a species of tick that feeds on moose. The past five warm years have brought devastating tick infestations to the closely studied moose on Isle Royale in Canada. These ticks weaken moose that are then more vulnerable to predators, or die from loss of blood or succumb to disease. Some other examples of warmer winter impacts are that**

deer and moose are wearing winter coats and must find cooler air and stay still for longer periods, otherwise stress caused by predators (including hunters) is increased an order of magnitude. Snowshoe hares have changed color to their winter white and are more easily spotted by predators as they move around a snowless green forest. Ticks continue to multiply and feed on warm blooded animals for longer periods. Generally, stress levels on wildlife are increased across the board.

As far as reduced ice days, it is/was common to cross frozen lakes, ponds, and swamps to get into hunting areas, go ice fishing or even just study or photograph wildlife. Warmer weather has reduced the number of days these waters are safely frozen now.

What insects and diseases are currently significantly affecting New Hampshire forests? Which insects and diseases are likely to be reduced by such change and which ones will expand their effects?

A: **As I stated in my original submittal, it has been my experience that both ticks and mosquitoes are still active much longer into the deer hunting season than they used to be. Both insect types carry a danger to humans. Ticks carry Lyme Disease and mosquitoes carry West Nile Virus as well as Eastern Equine Encephalitis. All are potentially deadly to humans. It has been found that many birds such as the Bay-breasted Warbler and Cape May Warbler are predicted to disappear from New England entirely. These birds help to keep spruce budworm outbreaks in check by consuming millions of larvae during the breeding season. If they are pushed northwards many forests could become much more vulnerable to insect pests. A study of 35 North American warbler species showed that 20 percent of them have already shifted their range 65 miles northward.**

I am not sure which insects will be reduced, but I know that warm climate microbes with higher metabolic rates and the insects that carry them, will multiply and expand their range quickly. Therefore, we may expect tropical diseases to begin to move northward over time.

7) Do you support Energy Efficiency programs and what if any do you currently participate in or have you shown support for?

A: **I think the two most important and significant energy reductions that can be made within a reasonable time frame are the increased MPG standards (recently passed by Congress) and replacement of energy saving appliances and light**

bulbs in offices and residences. As for my participation, I have replaced my light bulbs, and replaced my washer, dryer and refrigerator with high efficiency units (saves energy and water). In the interest of full disclosure, I did that because they needed replacement anyway. When I need to purchase a new vehicle, I'll shop for one with better MPG.

8) On the issue of alternative energy, what forms do you support? Wind? (Are you concerned about birds getting killed?), Hydro (are you concerned about fish kills?) Wood waste burning? Ethanol? Methane capture from landfills?

A: **I support a more planned and varied set of alternative energy sources: wind, methane, ethanol, hydro-power, and wood. We covered bird kills by wind above (Q #1) and that's not a serious problem. I believe that hydro stations must include a realistic fish passage design, which is current state-of-the-art. But we must also understand the secondary effects of the use of these fuels. Ethanol has already raised the price of beef, corn, poultry, etc. It also has raised many problems with thousands of boaters across America because it doesn't work well in marine engines, and it is mixed in with our only plentiful source of supply; gas pumps. I believe that with more farmers clearing land to the edges of their property for corn, many conservation and wildlife habitats/benefits will be eliminated. So we need to understand these secondary effects as we implement new sources and distribution networks so that we don't trade one serious problem for another.**

9) New Hampshire being a fairly rural state and auto reliant for the most part, what do you suggest the answer to the auto sector carbon output is?

A: **We know that this is a huge contributor to the carbon issue, and the one area that won't change quickly. Hunters and anglers use their vehicles to haul boats, trailers, campers and the like. They need torque and horsepower. They won't be switching to electric autos anytime soon. But they will switch to more fuel efficient vehicles when their current one needs to be replaced. So the increased fuel efficiency standard I believe is the right answer to reducing auto emissions.**

10) Forest management can be a real asset in dealing with global warming – first because it can prevent forest fires, which release massive amounts of carbon into the air and second, because forests can provide a carbon sink, particularly in new growth forests. That being said, do you support better forest management and replanting of burned forest? And would you support selective harvesting – perhaps to be used in a wood fired power plant – to help keep forests as a healthy part of the carbon sequestration system?

A: **I have always supported better methods of forest management. That would include selective cutting and selective non-cutting, (to take into consideration wildlife use such as deer wintering yards, moose swamps, etc.), roadless wilderness areas, and non-vehicle road access into uncut areas. Unlike the West, in New England we are blessed with the gift of natural re-forestation. When an area is cut over or burned, it isn't more than a couple of years until poplars and birch are standing a foot tall. These areas re-forest in a short time with native species. I don't think replanting a burned or cut area in the northeast is necessary or economical.**

11) Are you concerned about the amount of methane that New Hampshire cows produce as part of the global warming problem?

A: **I don't have numbers, but I think that problem for New Hampshire is minimal. There are many fewer NH cows now than when I was young, or since the Federal dairy buy-out in the 80's. The way milk production keeps improving, there'll be fewer cows in the future making as much or more milk as we get now. No, I don't worry about the quantity of methane from NH cows. I don't know the figures that would show the magnitude of the problem being contributed by cows, sheep, deer, or moose, but my guess is that it isn't significant compared to the output from fossil fuel power plants in NH.**

12) With China about to surpass the US in greenhouse gas emissions, would you agree that it is important to get developing nations like China and India to the table in order to reduce overall carbon in the atmosphere?

A: **I do agree that it is important to have China and India working with the other industrial nations to reduce their carbon emissions. They are growing their fossil fuel generation at a much more rapid rate than we. Bringing some control**

to the emissions from those plants will have a significant and ongoing reduction around the world. However, their slow response should not stop us from setting the example and benefiting by becoming independent of foreign domination of our energy supply. By working to reduce carbon emissions, we win in so many ways: energy independence, cost reductions, new industry, new jobs, and obviously, an environment in which we all can live.

TESTIMONY GOVERNOR JOHN LYNCH

The Honorable Edward Markey, Chairman
Select Committee on Energy Independence and Global Warming
H2-250 Ford House Office Building
Washington, DC 20515

Re: Testimony at Global Warming Mountaintop Summit

Dear Chairman Markey and Members of the Committee:

Thank you for holding the inaugural meeting of the Select Committee on Energy Independence and Global Warming on the Summit of Cannon Mountain. I am pleased to testify regarding the significant impact of global warming on New Hampshire's economy and quality of life. New Hampshire continues to be a leader in addressing global warming by taking numerous actions at the state level as well as participating in regional efforts like the Regional Greenhouse Gas Initiative and formation of the "The Climate Registry". Foremost, I urge the Select Committee on Energy Independence and Global Warming to recognize the leadership the States have taken on this issue and to work as partners with them on compatible federal legislation that will achieve reductions in greenhouse gases from multiple sectors.

Research by the University of New Hampshire shows that New Hampshire is already experiencing impacts from global warming such as increased average summer and winter temperatures, less snow cover, earlier river ice-out and spring high flow, and greater frequency of intense rain events. In fact, New Hampshire has experienced three 100-year flood events in two years resulting in over $35 million damage to roads, bridges, and private property.

The 2006 Northeast Climate Impacts Assessment has predicted that the Northeast, by late in the century, will see the winter snow season cut in half, sea-level rise up to nearly three feet, and more than 60 days with temperatures over 90°F in most cities, including 14 to 28 days with temperatures over 100°F (compared with one or two days per year historically). These predicted impacts will affect many aspects of our economy including our forest industry and tourism, and additional significant infrastructure costs for our cities and towns. Increased summer high temperatures exacerbate air pollution and create health concerns for our citizens especially children, the elderly, and those with respiratory ailments.

New Hampshire was an early leader in assessing the risks of climate change and in taking proactive steps to identify and implement strategies to reduce greenhouse gas emissions including: establishing state-wide energy efficiency programs, helping to develop the 2001 New England Governors/Eastern Canadian Premiers Climate Change Action Plan, implementing a first-in-the- nation state voluntary Greenhouse Gas Registry program, publishing a greenhouse gas inventory in 1997, issuing a climate change action plan in 2001, and adopting the 2002 New Hampshire Clean Power Act (RSA 125-O) which capped carbon dioxide emissions from the then existing fossil-fuel fired power plants to 1990 levels.

New Hampshire has continued to take actions at many levels including my Lead-by-Example Energy Efficiency initiative to improve the energy efficiency of state government operations by retrofitting existing buildings, setting higher energy efficiency standards for new buildings, improving the energy efficiency of the state vehicle fleet, and setting reduction goals for energy use in state operations. However, I would like to highlight three areas that are particularly relevant to future federal legislation: quantification of greenhouse gas emissions; expanding renewable energy; and regulation of greenhouse gas emissions through cap and trade mechanisms.

New Hampshire has joined 34 other states, two tribes, and two Canadian provinces in endorsing "*The Climate Registry*", which establishes a common platform for states and tribes to measure and report emissions of greenhouse gases in an accurate, transparent manner consistent across borders and industry sectors. It further builds on existing internationally-recognized measurement standards and reporting structures such as: "*The Greenhouse Gas Protocol*" of the World Resources Institute and the World Business Council for Sustainable Development; and the reporting protocols of the California Climate Action Registry. It will be designed to support various state actions such as voluntary greenhouse gas reporting, mandatory reporting, and regulatory programs such as cap and trade. Federal action to establish a similar national registry should recognize the standards and principles used to develop *The Climate Registry* and build on the extensive work that has already been conducted by these states.

In August 2006, I joined governors of both parties and business leaders from across the nation in endorsing the 25x25 Initiative, a national effort aimed at producing 25 percent of the energy consumed in the United States from clean, renewable power by 2025. To help meet this goal, I worked with a bipartisan group of legislators to develop and pass the Renewable Energy Act on May 11, 2007 requiring electric utilities in New Hampshire to meet renewable energy standards. A federal renewable energy standard needs to recognize New Hampshire's unique program as well as the renewable portfolio standards in the other 23 states that have moved forward with this type of initiative. Developing more renewable energy addresses global warming, energy security, and economic interests by encouraging cleaner home-grown energy resources. Increasing the percentages of all forms of renewable energy in an environmentally friendly way should be a top priority for future federal legislation.

New Hampshire has participated in the Regional Greenhouse Gas Initiative (RGGI) to develop a multi-state cap and trade program covering greenhouse gas emissions. RGGI is aimed at developing a program to reduce carbon dioxide emissions from fossil-fuel fired power plants in ten eastern states, while maintaining energy affordability and reliability and accommodating, to the extent feasible, the diversity in policies and programs in individual states. I have signed a Memorandum of Understanding to bring this initiative before the legislature for consideration in the 2008 session. Any federal program should be compatible with RGGI and be careful not to disadvantage those states that have taken such a bold leadership role in developing the first cap and trade program for greenhouse gases in the country.

Finally, I would like to emphasize that federal legislation is needed to address the transportation sector which is the second largest source of greenhouse gases in the United States.

The transportation sector is one of the more difficult areas for States to take action unilaterally. Congress is well positioned to work with the automotive industry to develop more stringent and economically beneficial Corporate Average Fuel Economy standards for passenger vehicles and trucks. Federal legislation should also include measures to reduce the carbon content of fuels and promote the development of biofuels that, over their life cycle, produce lower carbon emissions. Legislation should also promote transportation planning that encourages compact, transit-friendly development and alternatives to single occupancy vehicles.

I applaud the work this Committee is doing and thank you for taking the time to visit New Hampshire to directly seek our input. I offer New Hampshire's assistance and expertise in helping to craft any federal legislation that addresses this urgent and critical issue. It is imperative that federal legislation recognizes past and existing state actions and builds on the leadership that States have already demonstrated. For further information or assistance from the Department of Environmental Resources, please feel free to contact my Air Director, Robert R. Scott, Air Resources Division (271-1088, rscott@des.state.nh.us).

Sincerely,

John Lynch
Governor