AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
GPO

S. HRG. 111–82

ADDRESSING GLOBAL CLIMATE CHANGE: THE ROAD TO COPENHAGEN

HEARING

BEFORE THE

COMMITTEE ON FOREIGN RELATIONS UNITED STATES SENATE

ONE HUNDRED ELEVENTH CONGRESS

FIRST SESSION

JANUARY 28, 2009

Printed for the use of the Committee on Foreign Relations

Available via the World Wide Web:
http://www.gpoaccess.gov/congress/index.html

U.S. GOVERNMENT PRINTING OFFICE

51–737 PDF WASHINGTON : 2009

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2104 Mail: Stop IDCC, Washington, DC 20402–0001

COMMITTEE ON FOREIGN RELATIONS

JOHN F. KERRY, Massachusetts, *Chairman*

CHRISTOPHER J. DODD, Connecticut
RUSSELL D. FEINGOLD, Wisconsin
BARBARA BOXER, California
ROBERT MENENDEZ, New Jersey
BENJAMIN L. CARDIN, Maryland
ROBERT P. CASEY, JR., Pennsylvania
JIM WEBB, Virginia
JEANNE SHAHEEN, New Hampshire
EDWARD E. KAUFMAN, Delaware
KIRSTEN E. GILLIBRAND, New York

RICHARD G. LUGAR, Indiana
Republican Leader designee
BOB CORKER, Tennessee
JOHNNY ISAKSON, Georgia
JAMES E. RISCH, Idaho
JIM DEMINT, South Carolina
JOHN BARRASSO, Wyoming
ROGER F. WICKER, Mississippi

DAVID MCKEAN, *Staff Director*
KENNETH A. MYERS, JR., *Republican Staff Director*

CONTENTS

	Page
Gore, Hon. Albert A., Jr., former Vice President of the United States, Nashville, TN	7
Prepared statement	14
Kerry, Hon. John F., U.S. Senator From Massachusetts	1
Lugar, Hon. Richard G., U.S. Senator From Indiana	4

ADDITIONAL MATERIAL SUBMITTED FOR THE RECORD

Responses to additional questions submitted for the record by members of the committee	54

ADDRESSING GLOBAL CLIMATE CHANGE: THE ROAD TO COPENHAGEN

WEDNESDAY, JANUARY 28, 2009

U.S. SENATE,
COMMITTEE ON FOREIGN RELATIONS,
Washington, DC.

The committee met, pursuant to notice, at 10:07 a.m., in room SD–419, Dirksen Senate Office Building, Hon. John F. Kerry (chairman of the committee) presiding.

Present: Senators Kerry, Dodd, Feingold, Boxer, Menendez, Cardin, Casey, Kaufman, Gillibrand, Lugar, Corker, Risch, and Barrasso.

OPENING STATEMENT OF HON. JOHN F. KERRY, U.S. SENATOR FROM MASSACHUSETTS

The CHAIRMAN. The hearing will come to order.

Good morning to all. We're delighted to welcome folks here. We're particularly grateful and happy today to be able to welcome back to this committee not only a visionary leader, but an old friend and Senate classmate of mine, former Vice President and Nobel Prizewinner, Al Gore. It's well known that Al and I have a certain political experience in common. [Laughter.]

The CHAIRMAN. What is less well known is that we also teamed up on the first-ever Senate hearing on climate change for the Commerce Committee back in 1988. On a sweltering June day, some Senate staff opened up the windows and drove home the point with everyone sweating in their seats during Dr. James Hansen's historic and tragically prescient testimony. We're obviously not going to repeat that gesture today, but I speak for everyone on this committee when I tell you how much we appreciate you being here today, Mr. Vice President, particularly on a day in what passes down here as "tough winter weather." To the naysayers and the deniers out there, let me make it clear that a little snow in Washington does nothing to diminish the reality of the crisis we face. This is the first substantive hearing of this committee in this Congress, and we're here because 10 months from now we will be negotiating the follow-up to the Kyoto Protocol, and the world has appropriately high expectations for the United States of America.

Delegates will be meeting in March and again in June of this year to prepare negotiating language to be finalized at the conference of the parties in Copenhagen this December, and we need to join them in crafting a new global treaty. That means there is no time to waste. We must learn from the mistakes of Kyoto, and we must make Copenhagen a success.

Regrettably, and despite committed efforts from Al Gore and many, many others in this country and across the globe, today we are on the brink of an acute crisis that is gathering momentum daily. The demand for action is more urgent than ever.

It's no accident that we've asked Vice President Gore to testify at this first hearing of this committee. Climate change will be increasingly central to our foreign policy and our national security, and it will be a focal point of this committee's efforts, as well.

We're here today for the same reason our top military leaders and intelligence officials have been sounding the alarms. They describe climate change as a threat multiplier, and they're warning that the cost of ignoring this issue will be more famine, more drought, more widespread pandemics, more natural disasters, more resource scarcity, and human displacement on a massive scale. In other words, our military leaders predict more of the very drivers that exacerbate conflict worldwide and create failed states, which, as we all know too well, present glaring targets of opportunity for the worst actors in our international system. That endangers all of us.

Marine Corps Gen. Anthony Zinni, former commander of our forces in the Middle East, says that, "Without action," and I quote, "we will pay the price later in military terms, and that will involve human lives. There will be a human toll." More immediately, as the new administration sets a new tone with the global community, this issue will be an early test of our capability to exert thoughtful, forceful diplomatic and moral leadership on any future challenge that the world faces.

We have willing partners in this endeavor. Mexico, South Africa, Brazil, Australia, the European Union, and others, have made meaningful domestic climate-change policy commitments in recent months. But, all of us are still falling far short of what the science tells us must be done.

A partnership, led by the University of Pennsylvania, MIT, and the Heinz Center, recently aggregated the impact of the domestic policy proposals that every country currently talking about doing something has laid out—including President Obama's aggressive goal of 80-percent reductions by 2050. What they found was sobering. If every nation were to make good on its existing promises—if they were able to, and there's no indication yet that we are—we would still see atmospheric carbon-dioxide levels well above 600 parts per million, 50 percent above where we are today. This translates into global temperatures at least 4 degrees Celsius above pre-industrial levels, and no one in the scientific community disputes that this would be catastrophic.

That is why we need more than just a policy shift; we need a transformation in public-policy thinking to embrace the reality of what science is telling us. We must accept its implications and then act in accordance with the full scope and urgency of this problem.

The science is screaming at us. Right now, the most critical trends and facts all point in the wrong direction. CO_2 emissions grew at a rate four times faster during the Bush administration than they did in the 1990s. Two years ago, the U.N.'s Intergovernmental Panel on Climate Change (IPCC), that shared the Nobel Prize with our witness today, issued a series of projections for glob-

al emissions based on likely energy- and land-use patterns. Today, our emissions have actually moved beyond all of the worst-case scenarios predicted by the models of the IPCC. Meanwhile, our oceans and forests, which act as natural repositories of CO_2, are losing their ability to absorb carbon dioxide. This is a stronger climate-forcing signal than expected, arriving sooner than expected. Translated into simple terms, it means that all of the predictions of the scientists are coming back faster and to a greater degree than they had predicted.

The result will be a major foreign-policy and national-security challenge. In the Middle East, more than 6 percent of the world's population today fights over less than 2 percent of the world's renewable fresh water. As the region experiences a demographic explosion, the last thing we need is for climate change to shrink an already tight water supply. The Himalayan glaciers, which supply water to almost a billion people, could disappear completely by 2035. The British Government issued a report estimating that 200 million people may become permanently-displaced climate migrants, which is ten times the total number of refugees and internally displaced people in the world today. A recent study in *Science* predicts that as much as half the world's population could face serious food shortages by the end of this century.

Perversely, Africa, the continent that has done the least to contribute to climate change, will be the worst affected. Quite simply, these conditions would result in a world we don't recognize and a ravaged planet in which all of us would be less secure.

Vice President Gore and I recently returned from the climate-change negotiations in Poznan, Poland. There we met with leaders and dozens of delegations, ranging from the European community to China to the small island states. The Vice President will speak for himself, but one clear message emanated from every corner of the globe, from every meeting that I had; they said to us, "This challenge cannot be solved without the active commitment and leadership of the United States."

We need to begin by putting in place a domestic cap-and-trade program here at home. This will give us leverage to influence other countries' behavior. As we move towards Copenhagen, we must not repeat the mistakes of Kyoto. Going forward, the most important initiative that will determine the success of our climate diplomacy is how we give life to the words agreed to in 1992 in Rio, and reiterated in Bali and Poznan. Those words are "shared, but differentiated, responsibilities" among nations in solving this problem.

In Kyoto, people stiff-armed that discussion; they were unwilling to have it. And in many ways, an earlier decision made in Berlin simply made it impossible to have that discussion. But the landscape has shifted over the past decade. Now, China is the world's largest emitter. Developing countries will account for three-quarters of the increase in global energy use over the next two decades.

A global problem demands a global effort and a global solution. Today we are working toward a solution, with a role for developed and developing countries alike. It is absolutely vital that we achieve that in order to work to build a consensus here at home.

Finally, some may argue that we cannot afford to address this issue in the midst of an economic crisis. Walking down to this hear-

ing room, that was the first question put to the Vice President in the hall. Vice President Gore will speak to that in his testimony, and, I'm confident, in the questions. But the fact is that those who pose that question have it fundamentally wrong. This is a moment of enormous opportunity for new technology, new jobs, for the greening and transformation of our economy. We simply can't afford not to act, because it will be far more expensive and far more damaging to our economy in the long run not to.

The question is not whether or not we pay for climate change. Listen to General Zinni: If there were a cost-free way forward, of course we'd take it. But, there isn't one, and we haven't.

The real question is whether we pay now in a way that also helps to break our addiction to oil, strengthens our global system and global standing, and catapults us into the 21st-century economy with millions of new jobs and a jolt of economic stimulus, or we can pay for it later, on a massive, unpredictable scale, in the currency of environmental devastation, military commitments, human misery, and reduced economic growth for decades to come. And while I am aware of the unique perils of this economic moment, I believe that the choice we can't afford is the latter one.

This political season has celebrated the legacy of a new President and the legacy of a great President that he admires enormously, a President who called this country, not only "the last best hope of Earth," but helped to make it so. After years of being the last place on Earth to get serious about our climate, this is our moment and an issue that offers us a real chance to live up to the full meaning of that phrase.

Again, I thank Vice President Gore for joining us today. We look forward to hearing his insights and ideas about how this Nation can finally lead the world in crafting a solution to this enormous challenge.

Senator Lugar.

OPENING STATEMENT OF HON. RICHARD G. LUGAR, U.S. SENATOR FROM INDIANA

Senator LUGAR. Well, I thank the chairman for calling this hearing, for his remarkable opening statement, and I join him in a warm welcome to the Vice President. We welcome you back to the Senate.

In President Obama's inaugural speech last week, he declared his intention to restore science to its rightful place in the operation of our Government. He's demonstrated his commitment to scientific excellence by appointing respected scientists, like Steven Chu to be Energy Secretary, John Holdren to be Assistant to the President for Science and Technology, Jane Lubchenco to be the Administrator of the National Oceanic and Atmosphere Administration. Now, this is an excellent start that hopefully will facilitate an emphasis on science and technology in addressing the threat of climate change and global energy demand.

We should recognize that energy issues are at the core of most foreign policy, economic, and environmental issues today. Technological breakthroughs that expand clean energy supplies for billions of people worldwide will be necessary for sustained economic growth.

In the absence of revolutionary changes in energy policy that are focused on these technological advancements we'll be risking multiple hazards for our country that could constrain our living standards, undermine our foreign policy goals, and leave us highly vulnerable to economic, political, and environmental disasters, with an almost existential impact.

The United States should recognize the steps to address climate change involve economic opportunities and not just constraints. Thanks to new technology, we can control many greenhouse gases with proactive, pro growth solutions. Such technology represents an enormous opportunity for United States exports. But, we have to have the will to develop, test, and implement these technologies on a truly urgent basis. President Obama must demand that research projects related to battery technology, cellulosic ethanol, carbon capture and storage, solar and wind power, dozens of other technologies, receive the highest priority within his administration.

I'm concerned that, even as we discuss ways to limit carbon emissions, too little is being done in the area of adaptation to climatic changes that have already started, and will continue, even with successful mitigation programs. We should not wait to implement adaptive policies out of fear that embracing such policies will be an admission of defeat or undermine support for mitigation measures.

I'm especially concerned, and want to highlight in this hearing, that even as prevailing science is accepted as the essential reference point for the debate on climate change, too many governments and climate-change activists reject scientific advancements in the area of biotechnology that are necessary to address dire projections of declining food production due to climate change.

The important report by Sir Nicolas Stern estimated that a 2 degree Celsius increase in global temperature will cut agricultural yields in Africa by as much as 35 percent. This would be a catastrophic outcome that would lead to massive starvation, migration, and conflict on a continent already suffering from severe hunger.

Genetically modified (GM) crops have the potential to improve agricultural production in the poorest regions of the world and to help poor farmers contend with increased drought, new pests, and other consequences of a changing climate. Yet, many developing countries, especially in Africa, worry that if they adopt GM crops, they will not be able to export to markets in Europe. And they also are deeply influenced by the direct advocacy of European government agencies and NGOs that are hostile to biotechnology.

As Robert Paarlberg documents in his book "Starved for Science," many European development agencies and NGOs campaign overtly against the use of GM crops in Africa and elsewhere, and they've done so even as global investment in African agriculture has declined significantly in recent decades. The ironic result has been that African nations have developed stifling European-inspired regulations on GM technology, even as they continue to struggle to ensure adequate food supplies, and they rightly worry about the coming impact of climate change on their agricultural productivity.

The governments and people of Europe must understand that their unrelenting opposition to cutting-edge biotechnology has consequences far beyond their own countries. Opposition to safe GM

technology contributes to hunger in Africa, in the short run, and virtually ensures that these poor countries will lack the tools, in the long run, to adapt their agriculture to changing climatic conditions.

As a wealthy continent with a relatively secure food supply, Europe has the luxury to reject the benefits of GM technology without fear that its domestic populations will suffer intensifying hunger, but most African countries have no such luxury. And if Nicolas Stern's estimates are correct, Africa is looking at a very bleak future. We must not allow an aversion to modern agricultural technology to doom a part of the world's population to chronic hunger and poverty.

Overcoming these agricultural deficiencies in Africa requires refocused attention on the increasing investments in better seeds and fertilizers, improved and sustainable farming techniques, and farmer access to small loans and extension support. But, even if donor countries expand conventional agricultural assistance, as I have advocated, African nations are likely to fall short of satisfying long-term food demands without sensible GM regulatory framework that facilitates the use of safe biotechnology.

When committee staff has raised this issue during international climate change conferences, European negotiators have responded that GM technology cannot be on the agenda. But, the depression of global food production is potentially one of the most deadly and disruptive consequences of climate change. An international fund for climate change adaptation that does not include cutting-edge advances in biotechnology will be unnecessarily limited. If we are rejecting scientific methods for preventing a food catastrophe, without even allowing them to be on the agenda, it is difficult to project much optimism on other climate change proceedings. Yet, when it comes to these issues, we cannot succumb to exasperation or despair, and I'm heartened by President Obama's forthright inaugural pledge to work with poor nations to, "make your farms flourish and let clean waters flow to nourish starved bodies and feed hungry minds.".

I'm also heartened by the excellence of research at United States universities and other research facilities that are using plant genetics to increase farm yields, adapt seed to challenging conditions, and decrease pesticide use.

Addressing climate change will require extraordinary leadership by the Obama administration. The President's team must consistently promote good science to address both the causes and effects of climate change.

And I appreciate the work that our committee has done under Chairman Biden on this issue. I look forward to the leadership of Chairman Kerry for continuing these examinations, and to our discussion, especially today, with Vice President Gore.

I thank the Chair.

The CHAIRMAN. Thank you, Senator Lugar, for a thoughtful opening comment as always. We appreciate it enormously.

Vice President Gore, I know you'll join me in—if I can just take a moment, we want to welcome to the committee our newest member. We're delighted to have Senator Kirsten Gillibrand from New York as a new member of this committee. I happen to know

Kirsten well from the campaign trail, and I know what a hard worker and thoughtful, smart person she is. I think she's a terrific addition to this committee, and we're delighted to have you there. If you're despairing sitting down there, Senator Dodd and I will tell you that it wasn't so long ago that both of us remember being way down there, and with just a little patience and a strong heartbeat——

[Laughter.]

The CHAIRMAN [continuing]. So, anyway—And, by the way, Senator Obama sat somewhere over here, and——

[Laughter.]

The CHAIRMAN [continuing]. Senator Biden, sat up here for a while. So, this committee is a great place to be.

Vice President Gore, thank you. I cannot express enough the committee's admiration for the work you've done. Not a lot of people leave public life and go on to have quite the varied and extraordinary career that you've had. But most important, I know personally how much you travel, how many different people in different parts of the world you have shown your slide show to and educated, and brought along in this effort. We all owe you a great debt of gratitude, and this morning we look forward to you lifting it up to the next level of engagement. Thank you for being here.

STATEMENT OF HON. ALBERT A. GORE, JR., FORMER VICE PRESIDENT OF THE UNITED STATES, NASHVILLE, TN

Vice President GORE. Well, thank you very much, Mr. Chairman, Senator Lugar—am I supposed to press that? Been too long. [Laughter.]

Thank you very much, Mr. Chairman, Senator Lugar, members of the committee. Indeed, I do join in welcoming your newest member, and also acknowledging my fellow Tennessean, Senator Corker, and the many friends that I have on this committee.

It—and may I also acknowledge, in the audience, Theresa Hines Kerry, who is a long-time activist on the issue that we're discussing here today.

It is truly a great honor and personal privilege to be invited to appear before this committee. Mr. Chairman, I want to compliment you on your long-time leadership on this issue, and thank you and Senator Lugar for the prominence you're bringing to this issue by making it the subject of the very first substantive hearing of the Senate Foreign Relations Committee in 2009.

We are here today, of course, to talk about how we as Americans, and how the United States of America as part of the global community, should address the dangerous and growing threat of the climate crisis.

We have arrived at a moment of decision. Our home—Earth—is in danger. What is at risk of being destroyed is not the planet itself, of course, but the conditions that have made it hospitable for human beings. Moreover, we must face up to this urgent and unprecedented threat to the existence of our civilization at a time when our Nation must simultaneously solve two other worsening crises. Our economy is in its deepest recession since the 1930s, and our national security is endangered by a vicious terrorist network

and the complex challenge of ending the war in Iraq honorably while winning the military and political struggle in Afghanistan.

As we search for solutions to all three of these challenges, it is becoming ever clearer that they are linked by a common thread: Our dangerous over-reliance on carbon-based fuels. If you grab a hold of that thread and pull it, all three of these crises yield a solution—and you hold in your hand the answer—and that is a shift from carbon-based fuels to renewable energy.

As long as we continue to send hundreds of billions of dollars for foreign oil, year after year, to the most dangerous and unstable regions of the world, our national security will continue to be at risk. As long as we continue to allow our economy to remain shackled to the OPEC roller-coaster of rising and falling oil prices, our jobs and our way of life will remain at risk. Moreover, as the demand for oil worldwide grows rapidly over the longer term, even as the rate of new discoveries is falling, it is increasingly obvious that this roller coaster is headed for a crash, and we're in the front car.

Most important, as long as we continue to depend on dirty fossil fuels, like coal and oil, to meet our energy needs and dump 70 million tons of global warming pollution into the thin shell of atmosphere surrounding our planet, we move closer and closer to several dangerous tipping points which scientists have repeatedly warned—again, just yesterday—threaten to make it impossible for us to avoid irretrievable destruction of the conditions that make human civilization possible on this planet.

We're borrowing money from China to buy oil from the Persian Gulf, and burning it in ways that destroy the planet. Every bit of that has to change.

For years, our efforts to address the growing climate crisis have been undermined by the idea that we must choose between our planet and our way of life, between our moral duty and our economic well-being. These are false choices. In fact, the solutions to the climate crisis are the very same solutions that will address our economic and national security crises, as well.

In order to repower our economy, restore American economic and moral leadership in the world, and regain control of our own destiny, we must take bold action now. The first step is already before us. I urge this Congress to quickly pass the entirety of President Obama's recovery package. The plan's unprecedented and critical investments in four key areas—energy efficiency, renewables, a unified national energy smart grid, and the move to clean cars—represent an important down payment and are long overdue. These crucial investments will create millions of new jobs and hasten our economic recovery, while strengthening our national security and beginning to solve the climate crisis.

Quickly building our capacity to generate clean electricity will lay the groundwork for the next major step needed: Placing a price on carbon. If Congress acts right away to pass President Obama's recovery package, and then takes decisive action this year to institute a cap-and-trade system for CO_2 emissions, as many of our States and many other countries have already done, and as many of the leading Fortune 500 corporations in America are pleading with the Congress to do so they'll have predictability and the basis to become more competitive in world commerce, then the United

States will regain its credibility and enter the Copenhagen treaty talks with a renewed authority to lead the world in shaping a fair and effective treaty. And this treaty must be negotiated this year. Not next year. This year.

A fair, effective, and balanced treaty will put in place the global architecture that will place the world, at long last and in the nick of time, on a path toward solving the climate crisis and securing the future of human civilization. I am hopeful that this can be achieved.

Let me outline for you the basis for the hope and optimism that I feel.

The Obama administration has already signaled a strong willingness to regain U.S. leadership on the global stage in the treaty talks, reversing years of inaction. This is critical to success in Copenhagen, and is clearly a top priority of the administration.

Developing countries, as you said, Mr. Chairman, that were once reluctant to join in the first phases of a global response to the climate crisis, have, themselves, now become leaders in demanding action and in taking bold steps on their own initiatives.

Brazil has proposed a very impressive new plan to halt the destructive deforestation in that nation. Indonesia has emerged as a new constructive force in the talks. And China's leaders have gained a strong understanding of the need for action, and have already begun important new initiatives. Heads of state from around the world have begun to personally engage on this issue, and forward-thinking corporate leaders have made this a top priority.

More and more Americans are paying attention to the new evidence and fresh warnings from scientists. There is a much broader consensus on the need for action than there was when President George H.W. Bush negotiated, and the Senate ratified, the Framework Convention on Climate Change in 1992, and there is much stronger support for action than when we completed the Kyoto Protocol in 1997.

The elements that I believe are key to a successful agreement in Copenhagen include:

> First, strong targets and timetables from industrialized countries and differentiated, but binding, commitments from developing bystander that put the entire world under a system with one commitment: to reduce missions of carbon dioxide and other global warming pollutants that are the cause of the climate crisis.
>
> Second, the inclusion of deforestation, which, alone, accounts for more than 20 percent of the emissions that cause global warming.
>
> Third, the addition of so-called carbon sinks, including those from soils, principally from farmlands and grazing lands, with appropriate methodologies and accounting. Farmers, such as Senator Lugar, and ranchers in the U.S. and around the world need to know that they can be a part of the solution.
>
> Fourth, the assurance that developing countries will have access to mechanisms and resources that will help

them adapt to the worst impacts of the climate crisis, and technologies to solve the problem.

And finally, a strong compliance and verification regime.

The road to Copenhagen is not easy, but we have traversed this ground before. We negotiated the Montreal Protocol, more than 20 years ago, to protect the ozone layer, and then strengthened it to the point where we've now banned most of the major substances that created the ozone hole over Antarctica, and that is now healing. And we did it with bipartisan support. President Ronald Reagan and Speaker of the House Tip O'Neill joined hands to lead the way.

With your permission, Mr. Chairman, and with the permission of the committee, I would like to discuss in more detail some of the reasons why I believe this is so serious, and, with your permission, show just a few new pictures that illustrate the basics of the problem.[1]

The CHAIRMAN. Yes, we'd be delighted. Thank you.

Vice President GORE. I know it's hard to see——

The CHAIRMAN. Do you need the lights to go down a little bit?

Vice President GORE. That would be great, if you could put the lights down. And I know it's hard to see on these monitors, but——

To start with the broadest overview, the scientific community—and, most recently, the European Space Agency—has pointed out that Earth and Venus are exactly the same size, with exactly the same amount of carbon. No more than 400 kilometers difference in circumference, and the carbon quantity is identical. The difference is that on Earth most of the carbon has been sequestered in the soil, pulled out of the atmosphere by the miracle of life and by the unique geology on Earth, while most of the carbon on Venus is still in the atmosphere.

The difference is that the average annual temperature on Earth is 59 degrees, and on Venus it's 855 degrees, and it rains sulfuric acid. Not the kind of weather forecast you'd like to wake up to. And it's not because Venus is closer to the sun it's three times hotter than Mercury, which is right next to the sun. It is, in fact, the CO_2. And this is a stark difference that illustrates why it's a problem to follow a global strategy of pulling as much carbon out of the Earth as we possibly can, as quickly as possible, and burning it in ways that leave it in the atmosphere.

The basics of this are well known to everyone. As we thicken the layer of greenhouse gases, more of the outgoing heat is trapped, and the temperature increases. In the last 5 years, a very short period of time, the concentrations of tropospheric CO_2 have increased measurably. It is now at a level of slightly more than 386 parts per million, comparing to roughly 280 parts per million at the beginning of the Industrial Revolution.

The 10 hottest years in the recorded record—and this is an atmospheric record that only goes back 160 years—but, the 10 hottest years have been in the last 11 years. If we stopped global greenhouse gas emissions today, according to some scientists—and you referred to this, Mr. Chairman—we would see an increase in

[1] The pictures and video shown at this point in the hearing could not be reproduced due to technical limitations.

temperatures that many scientists believe would be extremely challenging for civilization. If we continued at today's levels, some scientists have said it can be an increase of up to 11 degrees Fahrenheit. This would bring a screeching halt to human civilization and threaten the fabric of life everywhere on the Earth. And this is within this century if we don't change.

Let me briefly discuss a couple of important early indicators:

The North Polar Ice Cap, for most of the last 3 million years, has been roughly the size of the lower 48 States. In 1980, just 28 years ago, it appeared this way in the summertime; last year, it had shrunk to this size. To put this in perspective, the early part of that graph to the left, up to the 1970s, the fluctuation stayed within a fairly predictable range; but, in the 1970s, the decline began, and a new record was set in 2005.

To illustrate how much of the North Polar Ice Cap that represents—again, I said it's roughly the size of the lower 48 States; the scientists say if you take out an area roughly the size of Arizona, it's precise—but, the amount that melted in 2005 is equal to every State east of the Mississippi River.

In 2007, something fairly dramatic happened that startled the scientists. In 1 year, the drop was really quite pronounced, as you can see from this slide. And again, to put that in perspective, the additional melting represented another whole row and a half of States west of the Mississippi River.

The next slide I'm going to show you illustrates that, in 2008, just—when the measurements were taken a few years ago—it shrank even further. But, Mr. Chairman, it was not a change in the surface area, it was a change in the thickness. And please bear with me on this slide; I don't normally include this, and it's a little complex, but I want you to see it. This is 30 years in less than 30 seconds, and what you will see is like the beating of a heart. In winter, the North Polar Ice Cap expands, and you'll see a dark blue margin, the annual ice that's only a foot thick. But, keep your eye on the multiyear ice, what they call the "permanent ice." It's colored in red. And it has been spilling out along the coast of Greenland. And here, you'll see 30 years very quickly. The permanent ice—you see it expanding year by year, like a beating heart, and the permanent ice looks almost like blood spilling out of a body along the eastern coast of Greenland. This, up to the mid-1990s, and it's continuing.

What is left now, when last measured, a few months ago, is really a very pale shadow of what it used to be. Professor Wieslaw Maslowski, at the Naval Postgraduate School in Monterey, has calculated that there is an 80-percent chance that the entire North Polar Ice Cap will be completely and totally gone, in summer months, in less than 5 years. Again, 28 years ago it looked like this, and now it looks like this.

Now, the reason this is important is not because it affects sea level. As you know, the North Polar Ice Cap is a floating ice cap. Its mass has already been displaced; so when it melts, it does not change sea level, unlike Greenland and Antarctica. But, what it does do is reflect 90 percent of the incoming solar energy, as if it were a giant mirror. And as it disappears, the Arctic Ocean begins

to absorb enormous quantities of heat, and that causes a series of dramatic changes.

I just want to talk about two of them. Not the polar bears. We've heard plenty about them; they are an early indicator. But, I want to focus your attention on the frozen ground around the Arctic Ocean. It contains a lot of carbon. The current amount, in the atmosphere, of CO_2 is roughly 730 gigatons, or trillion tons. But, in that frozen soil around the Arctic, there is roughly an equal quantity. If it thaws and is allowed to release the methane into the atmosphere, then the amount in the atmosphere doubles over a relatively short period of time. And the microbes turn the methane—turn the carbon into methane as it thaws, and methane is even more powerful than CO_2, but, over 12 to 15 years, it breaks down into CO_2, so it's very similar.

Now, here is—here are two short images from the University of Fairbanks in Alaska. Dr. Katey Walter went out to a shallow lake in Alaska and documented methane bubbling up from the bottom of this lake. And indeed, the scientific community worldwide is very concerned about the amount of methane increases that appear to be already starting there. Dr. Wheeler and her team went out last winter to another site.

[Video presentation.]

Vice President GORE. She's OK. The question is——

[Laughter.]

Vice President GORE [continuing]. The question is, Are we?

When the heat builds up in the Arctic Ocean, it puts pressure on Greenland. And Greenland has land-based ice, which, if it melted, has the potential to raise sea level worldwide by 20 feet. The melting pattern for the seasonal ice in—the seasonal melting pattern in Greenland has steadily increased, and it is now accelerating.

This famous picture from the University of Manchester, you see the scientists at the top show one of the new larger moulins, as they call them, draining water down through the ice pack.

Now, when sea level increases, it erodes coastlines and threatens to displace people who live in low-lying areas. That's why this home in Alaska fell into the sea, and why this home in Canada fell into the sea. The nation of the Maldives has just put a new budget in its budget to relocate the entire country. They're searching to buy territory to move 100 percent of their population.

You mentioned the issue of climate refugees, Mr. Chairman. The authorities—the scientists indicate that, for each 1 meter of sea-level rise, there are roughly 100 million climate refugees. This committee, with its distinguished tradition and expertise, knows full well the destabilizing and tragic impacts of very large flows of refugees.

Now, Greenland is roughly the same size as West Antarctica. West Antarctica would also lead to a sea-level rise of roughly 20 feet if it melted. Until recently, many scientists had hoped that the continent of Antarctica would remain relatively stable over a long period of time. But, a study, just in the past 2 weeks, showed that the melting is now accelerating in Antarctica, and confirmed that it is warming, along with the rest of the world.

In 2005, the areas of snowmelt in West Antarctica roughly equaled, in aggregate, the size of the State of California. The recent

study showing the overall warming of Antarctica focused on West Antarctica, which is pinned up on top of undersea islands, which makes it different from East Antarctica. The ocean comes in under that ice. Its mass is resting on land, so if it melts, it raises sea level; but, the warming ocean is now beginning to degrade the structure of the West Antarctic Ice Shelf.

You have, in the audience, Bob Corell, one of the leading polar scientific researchers, who's nodding as I present this, and giving me a little confidence to go forward. [Laughter.]

Now, just a brief word on glaciers, and only one aspect of the melting of glaciers.

This glacier in South America is the source of water for this city. The flows of water are increasing. But, when the glaciers disappear, the source of the water will also disappear.

West of the Andes, west of the Rockies—in fact, our own water resources are threatened by the diminishing snowpack in our mountains; and in every mountain range in the world, this is happening. But, as you said, Mr. Chairman, most importantly, in the Himalayas. The great rivers of Asia, the Indus and the Ganges and the Brahmaputra and the Salween or the Irawadi, the Mekong, the Yangtze, and the Yellow, all originate in the same ice field, and 40 percent of the population on Earth gets 50 percent or more of its drinking water from this melting pattern.

This is a recent satellite picture of one small ridge in the Himalayas, and you will see, at the top of this image, what used to be glaciers and are now lakes. In this region of the world, they worry about the sudden bursting of these lakes flooding the villages down the slope, but the larger and longer term concern is what happens when that source of water disappears in Asia.

I would say to my fellow Tennessean Senator Corker, and to you, Senator Isakson, you are on either side of the Georgia/Tennessee border, and you know full well—in fact, there was a little conflict between our two States when, for some inexplicable reason, Georgia wanted to change the line down there to capture one of our reservoirs. But—we'll take that up later. [Laughter.]

But, the droughts in the Southeast and in the West are getting longer and deeper, and are related to global warming.

The tree death, particularly in the West, is becoming a very serious concern. And drier vegetable and vulnerability to beetles that are no longer held back by the frost are causing dramatic changes.

The fires—again, Senator Isakson, in Georgia, and also in Florida, the largest fires in the history of either States—repeatedly in California, hundreds of thousands of people have had to be evacuated. And these are not following a normal pattern, as Senator Boxer knows full well. The increase in fires on every continent has been quite dramatic. This, from last fall, a satellite image of the fires from January to September. And the Government of Greece almost was brought down by the unprecedented fires there.

I won't spend time on hurricanes, except to say, this fall we saw more destruction, and we almost didn't pay close attention, when 1 million people were, once again, evacuated from New Orleans. Is that the new normal?

This—and I only have two more—this is a chart from the Center for Research on the Epidemiology of Disasters. And you see, on the

left-hand slide, worldwide major weather-related disasters during the first part of the century. What's been going on more recently is quite a different pattern.

In the last 30 years, there have been four times more annual weather-related disasters than in the previous 75, and the trend is continuing. The reinsurance companies are quite disturbed, as you would expect, by this. But, if you put this in perspective, and you look at the predictions, that floods, droughts, hurricane damage, fires, and other climate-related disasters will increase even more dramatically the longer we delay action on this, the cost is quite serious.

This is the final image, Mr. Chairman. It's from a new study that shows the impact on the global ocean. I mentioned we're putting 70 million tons of global warming pollution into the atmosphere each day. Twenty-five million tons are going into the oceans each day. The oceans are growing more acidic, and the entire ecology of the world ocean is being disrupted. Scientists are still grappling to understand what this—what all of the phenomena related to this result might be, but this was published in Nature magazine in November.

The legend shows that the dark pink represents severe oxygen depletion in the oceans. Look at the size of the area in the eastern Pacific off of the coast of California, Central America, and northern South America, and look at the Bay of Bengal and the Arabian Sea on either side of the Indian subcontinent. This is a catastrophe in the making. Even if it did not produce warming of the world, the killing of the oceans would be yet another reason to address this crisis.

Thank you for giving me the chance to show a few images, and I am eager and, again, honored to respond to any questions or comments that you and Senator Lugar and members of the committee might have.

[The prepared statement of Vice President Gore follows:]

PREPARED STATEMENT OF HON. AL GORE, FORMER VICE PRESIDENT OF THE UNITED STATES, NASHVILLE, TN

We are here today to talk about how we as Americans and how the United States of America as part of the global community should address the dangerous and growing threat of the climate crisis.

We have arrived at a moment of decision. Our home—Earth—is in grave danger. What is at risk of being destroyed is not the planet itself, of course, but the conditions that have made it hospitable for human beings.

Moreover, we must face up to this urgent and unprecedented threat to the existence of our civilization at a time when our country must simultaneously solve two other worsening crises. Our economy is in its deepest recession since the 1930s. And our national security is endangered by a vicious terrorist network and the complex challenge of ending the war in Iraq honorably while winning the military and political struggle in Afghanistan.

As we search for solutions to all three of these challenges, it is becoming clearer that they are linked by a common thread—our dangerous over reliance on carbon-based fuels.

As long as we continue to send hundreds of billions of dollars for foreign oil—year after year—to the most dangerous and unstable regions of the world, our national security will continue to be at risk.

As long as we continue to allow our economy to remain shackled to the OPEC roller coaster of rising and falling oil prices, our jobs and our way of life will remain at risk. Moreover, as the demand for oil worldwide grows rapidly over the longer term, even as the rate of new discoveries is falling, it is increasingly obvious that the roller coaster is headed for a crash. And we're in the front car.

Most importantly, as long as we continue to depend on dirty fossil fuels like coal and oil to meet our energy needs, and dump 70 million tons of global warming pollution into the thin shell of atmosphere surrounding our planet, we move closer and closer to several dangerous tipping points which scientists have repeatedly warned—again just yesterday—will threaten to make it impossible for us to avoid irretrievable destruction of the conditions that make human civilization possible on this planet.

We're borrowing money from China to buy oil from the Persian Gulf to burn it in ways that destroy the planet. Every bit of that's got to change.

For years our efforts to address the growing climate crisis have been undermined by the idea that we must choose between our planet and our way of life; between our moral duty and our economic well-being. These are false choices. In fact, the solutions to the climate crisis are the very same solutions that will address our economic and national security crises as well.

In order to repower our economy, restore American economic and moral leadership in the world and regain control of our destiny, we must take bold action now.

The first step is already before us. I urge this Congress to quickly pass the entirety of President Obama's Recovery package. The plan's unprecedented and critical investments in four key areas—energy efficiency, renewables, a unified national energy grid, and the move to clean cars—represent an important down payment and are long overdue. These crucial investments will create millions of new jobs and hasten our economic recovery—while strengthening our national security and beginning to solve the climate crisis.

Quickly building our capacity to generate clean electricity will lay the groundwork for the next major step needed: Placing a price on carbon. If Congress acts right away to pass President Obama's Recovery package and then takes decisive action this year to institute a cap-and-trade system for CO_2 emissions—as many of our States and many other countries have already done—the United States will regain its credibility and enter the Copenhagen treaty talks with a renewed authority to lead the world in shaping a fair and effective treaty. And this treaty must be negotiated this year.

Not next year. This year.

A fair, effective, and balanced treaty will put in place the global architecture that will place the world—at long last and in the nick of time—on a path toward solving the climate crisis and securing the future of human civilization.

I am hopeful that this can be achieved. Let me outline for you the basis for the hope and optimism that I feel.

The Obama administration has already signaled a strong willingness to regain U.S. leadership on the global stage in the treaty talks, reversing years of inaction. This is critical to success in Copenhagen and is clearly a top priority of the administration.

Developing countries that were once reluctant to join in the first phases of a global response to the climate crisis have themselves now become leaders in demanding action and in taking bold steps on their own initiatives. Brazil has proposed an impressive new plan to halt the destructive deforestation in that nation. Indonesia has emerged as a new constructive force in the talks. And China's leaders have gained a strong understanding of the need for action and have already begun important new initiatives.

Heads of state from around the world have begun to personally engage on this issue and forward-thinking corporate leaders have made this a top priority.

More and more Americans are paying attention to the new evidence and fresh warnings from scientists. There is a much broader consensus on the need for action than there was when President George H.W. Bush negotiated—and the Senate ratified—the Framework Convention on Climate Change in 1992 and much stronger support for action than when we completed the Kyoto Protocol in 1997.

The elements that I believe are key to a successful agreement in Copenhagen include:

- Strong targets and timetables from industrialized countries and differentiated but binding commitments from developing countries that put the entire world under a system with one commitment: To reduce emissions of carbon dioxide and other global warming pollutants that cause the climate crisis;
- The inclusion of deforestation, which alone accounts for 20 percent of the emissions that cause global warming;
- The addition of sinks including those from soils, principally from farmlands and grazing lands with appropriate methodologies and accounting. Farmers and ranchers in the U.S. and around the world need to know that they can be part of the solution;

- The assurance that developing countries will have access to mechanisms and resources that will help them adapt to the worst impacts of the climate crisis and technologies to solve the problem; and
- A strong compliance and verification regime.

The road to Copenhagen is not easy, but we have traversed this ground before. We have negotiated the Montreal Protocol, a treaty to protect the ozone layer, and strengthened it to the point where we have banned most of the major substances that create the ozone hole over Antarctica. And we did it with bipartisan support. President Ronald Reagan and Speaker of the House Tip O'Neill joined hands to lead the way.

Let me now briefly discuss in more detail why we must do all of this within the next year, and with your permission, Mr. Chairman, I would like to show a few new pictures that illustrate the unprecedented need for bold and speedy action this year.

Thank you Mr. Chairman. I am eager to respond to any questions that you and the members of the committee have.

The CHAIRMAN. Well, Mr. Vice President, that's dramatic and frankly a remarkable testimony. I'm going to order the full printing, if we can, of this testimony and the following questions, and I'm going to distribute it to every single one of our members in the Senate. I will find some way, if possible—maybe you could cooperate with us; I know you can't get the motion in the slides—to get some of those accompanying slides as a separate entry. I think Bob Corell is nodding; we can try and get some of those from him. That would be really helpful.

If ever there was an underscoring of the urgency, I think you've given it to us in a very important, significant way. And this is a significant hearing for that reason.

One of the things that struck me as you were talking about methane being released and instant doubling, is the fact that many people are not aware that CO_2 in the atmosphere has a half-life around 80 to 100 years if I'm correct.

Let me ask you, if I can, sort of, to—one of the things that just struck me, as you were talking about the methane being released and the instant doubling, is the fact, that many people are not aware of, that CO_2 in the atmosphere has a half-life of something like 80 to 100 years, if I'm correct.

Vice President GORE. I think the scientists will say that, 100 years from now, 50 percent of it will fall out of the atmosphere; however, 1,000 years from now, 20 percent of what we put up this year will still be there. So, it's, as one would expect, a more complex picture. But, basically, if we can get half of it out over 100 years, that's a hopeful sign. If a lot of it remains, after 1,000 years, it's a sobering warning that the quicker we reduce, the better.

The CHAIRMAN. But that which is already up there continues—absent of it being somehow extracted—to do the damage it's doing now.

Vice President GORE. Yes. Yes.

The CHAIRMAN. Which means that if the temperature has already increased about .8 degrees Centigrade, with the amounts that we're adding to what's already up there and the span of time we're now looking at for reductions we will automatically see, without anything else interfering, an increase in temperature up to 1.6/1.7 degrees Centigrade.

Vice President GORE. Roughly .7/.8 degrees Centigrade has already occurred. Another .7/.8 is already stored in the oceans and will be re-released. But, the continuing potential for the CO_2 that

remains in the atmosphere, as you've pointed out, will continue to produce further increases, yes.

The CHAIRMAN. Our cushion between the tipping point that scientists have warned us of is 2 degrees Centigrade. And as you said, we have to achieve 350 parts per million, which is the goal that most scientists now believe will result in stability, is that correct?

Vice President GORE. That is the goal that I support, and that is my reading of the best—what I believe is the best science. I think that an accurate picture of the science is that leading researchers, like Professor Jim Hansen—like Dr. Jim Hansen, at NASA, have now begun to coalesce around the very strong feeling that 350 is the appropriate goal.

After years of debate within a—an international political framework, other scientists have despaired about the ability of the political system to do what the science mandates, and have coalesced around 450; some, even 550. But, the more the evidence comes in, the more it becomes increasingly apparent that 350 is the appropriate goal.

If we're at 386 now, and the entire North Polar Ice Cap is completely melting in 5 years, and both Greenland and West Antarctica are now clearly at risk, obviously we need to be below the level that we're at now.

The CHAIRMAN. Now, to get there—that is sort of the key question. We still have naysayers here, though I think there are less than there used to be. But obviously the politics of getting through this are complicated, as we all understand. I know you've been giving a lot of thought to this, and you've had a lot of meetings—one of them recently up at Harvard. Share with us, if you would, what do you say to somebody from a coal state? There was an article in the New York Times yesterday about a group within the caucus, even in the Democratic Party, who are reluctant to move rapidly, because they have a coal industry or interests in their states, and they think they're going to lose competitiveness or lose jobs. What's the direct answer to them about the options here and the opportunities here?

Vice President GORE. Well, I think it's quite responsible to support robust research into whether or not it might, in the future, become possible to safely capture and sequester CO_2 from coal plants. But, we should not delude ourselves about the likelihood that that's going to occur in the near term, or even the mid-term. It is extremely expensive. There is not a single large-scale demonstration plant anywhere in the United States. The one plant was canceled by the Bush-Cheney administration.

And the research is one thing. But, we must avoid becoming vulnerable to the illusion that this is near at hand. It is not. And, as a result, I believe that we must not have any more conventional dirty coal plants that do not capture and sequester CO_2.

I proposed, as a member of this body many years ago, a full employment alternative for any coal miners and workers in the coal industry that are displaced by the need to protect the environment of this planet. Just to keep on doing this incredible damage and harm, in the name of their jobs, when we can much more effectively create even better jobs for them, that, I believe, must be the

response, even as we aggressively research the possibility that it might be possible to capture and sequester carbon.

The CHAIRMAN. That's a very direct and honest answer, and I appreciate it.

You're currently doing a lot of work with technologies and looking at the energy-sector transformation. Share with us, if you would, the immediate vision that you see in this transformative process as we move to this new economy and new base of power.

Vice President GORE. Well, Mr. Chairman, the Energy Information——

The CHAIRMAN. Let me just share with you, the reason—you know this full well——

Vice President GORE. Yeah.

The CHAIRMAN [continuing]. But we have a vote going on, which is why members are getting up and moving out. They're coming back. We'll try to rotate through and keep the hearing going. Thanks.

Vice President GORE. Well, thank you very much. Indeed, I am familiar with this.

The Energy Information Administration, in its report from 2007 on the electric power industry, reported that, for the first time, renewable energy sources represented, by far, the largest new increment of electricity generation in the United States of America. We are beginning to see this shift take place already.

Wind power is now mature and fully competitive. It can accelerate its role, with the appropriate tax credits and grants, to make them usable. And a technology called "concentrating solar thermal" is now becoming very competitive. Many plants are under construction in the Southwest. And this, of course, uses mirrors to concentrate the solar energy to boil water, just as a nuclear plant or a coal-fired plant does, to drive steam turbines and generate electricity.

Scientific American pointed out that, if we took an area of the Southwestern desert, 100 miles on a side, that would be enough, in and of itself, to provide 100 percent of all the electricity needs for the United States of America in a full year. And, interestingly, this technology matches the peak load exactly, throughout the day, to the peak-load use. So, concentrating solar thermal is a very important new source, along with wind. And most scientists and engineers expect that the new advances on photovoltaic energy—of course, the kind that directly translate photons into an electrical current—will intersect with concentrating solar thermal midway through this decade. And widely distributed uses of photovoltaics and small wind will also play an increasing role.

In all of this, efficiency and conservation must be the No. 1 priority. It gives us the quickest and most cost-effective new sources of energy; indeed, a lot of it is not only cheap, it actually makes money. And giving the right incentives to use these approaches is very important.

I would mention one final source, which is geothermal energy. There are new approaches that fracture the deeper parts of the Shelf and create the new—new sources of geothermal energy that have—this has great potential. It is not very far off.

The CHAIRMAN. I sometimes hear people say, "Oh, gosh, those are terrific things," when I'm trying to describe some of things you have and they'll say, "Well, yeah, but you can't meet the demand fast enough," or, "Those technologies aren't adequately developed yet," or, "They're not really cost-competitive." In each case you've articulated today that that's not true. You can meet it that fast, they are, in fact, competitive, and they're here now.

Vice President GORE. We——

The CHAIRMAN. Is that accurate or——

Vice President GORE. I chair the Alliance for Climate Protection, and we conducted extensive work with energy modelers and policy experts to prove this case, that if we set our minds to it, we could, in this country, produce 100 percent of our electricity from renewable and carbon-free sources within 10 years. That is possible, if we set our minds to it.

It requires the construction of a National Unified Smart Grid, which gives us two new tools: The ability to transfer large amounts of renewable electricity from the solar areas of the Southwest to the cities where it's used, from the wind corridor in the mountain States, east and west of the cities, where it's used, and from the geothermal areas. It would require a decision to move aggressively to give the incentives to quickly build the new concentrating solar thermal and wind facilities that are ready to go right now.

The CHAIRMAN. Can you describe those incentives and what amount of money you think ought to be put on the table to support them?

Vice President GORE. Well, first of all, I think—and I say this to Members of the Senate, particularly—the conditionality on the pending block grants to States for efficiency represents one of the single most important measures that can be taken. I know those sounds like buzzwords and terms of art. Basically, what it applies to is decoupling the current set of incentives that utilities have to just build more dirty coal plants, and instead, given them a way to make money from, not only building new coal plants, but from driving conservation and efficiency and renewable sources.

California, on its own initiative, passed a measure like this that has already resulted in an explosion of new construction for renewable electricity sources in California and for a sharp decrease in the use of energy per unit of economic output. So, the California system is what should be included in the stimulus bill, and the House of Representatives has already put it in there. It will be decided in conference if it's not changed on the floor, when the Senate bill is considered.

The second provision that I would highlight is the renewable tax credits that have to be coupled with what the administration has proposed, small grants to make those tax credits economically usable in an environment in which some of the—those that would use them don't have any profits and taxes to pay, so they have to be able to, in some way, shape, or form, transfer them, get them refunded in ways that give them market value and provide an immediate incentive to start construction.

The CHAIRMAN. California, which has seen its economy grow—I forget what the percentage is—has actually seen its energy use per capita go down——

Vice President GORE. Correct.

The CHAIRMAN [continuing]. Even as the population has grown. That is the perfect model, in a sense.

Vice President GORE. And it's a result of the policy changes that they made that have helped California's economy. We could get tremendous job creation and other benefits if we adopt this, nationwide.

The CHAIRMAN. Is there any way to capture these significant pockets of methane as they become exposed?

Vice President GORE. In the Arctic? I don't know. I have not heard of any proposal to do that. I'm sure there's research, but it covers such a broad area, it would not seem to be feasible. But, if—you know, scientists come up with new ideas all the time. I have not heard any way of doing that.

The CHAIRMAN. Mr. Vice President, share with us also—perhaps addressing some of the concerns of Senators here and House members—about the local economic competitive dislocation and/or cost of doing some of this. The quick hit you hear repeatedly right now because of the economic downturn is, "How are we going to afford to do this?" Do you want to speak to that?

Vice President GORE. Well, it may be a classic turn of phrase, but I think the better question is, How can we afford not to do this?—not only because it's a question of urgency for civilization, but also because making this transition is one of the best and most effective ways to create good, new, sustainable jobs quickly.

There is a tremendous growth in these new renewable industries. And the world is beginning to shift dramatically in this direction. If the United States once again takes its customary role as the leader of this new trend, then we will create the most jobs and gain the most economic benefit.

The CHAIRMAN. Speak to me for a minute, if you will, or to all of us, about Copenhagen. You were at Kyoto, you helped lead that effort, and, indeed, signed that agreement. What is the key to making Copenhagen a success? You've articulated that we need to pass a cap-and-trade. But can you give us a sense of what your thoughts are about the shape of Copenhagen and how to get there?

Vice President GORE. Yes. I think, for our country, the road to Copenhagen is to pass the green stimulus measures now pending, pass the cap-and-trade legislation this year; and those two measures, combined, will give us not only the moral authority to lead, but also give us the ability to prospectively book impressive CO_2 reductions in the years ahead that will make it far easier to meet the goals that will be negotiated in the Copenhagen treaty.

In the treaty itself, I think we have to have strong targets and timetables, and binding commitments from industrial and developing countries. The developing countries, of course, will have differentiated, but still binding, commitments. And I think the single goal should be CO_2 reduction.

Second element is the inclusion of deforestation. And, as you know, Mr. Chairman, in the conference in Bali, a year ago December, there was a successful result in arriving at a formula that does allow the inclusion of avoided deforestation. Again, 20 percent of global emissions each year come from deforestation.

Third——

The CHAIRMAN. Mr. Vice President, can I interrupt——

Vice President GORE. Yeah, sure.

The CHAIRMAN [continuing]. You for a minute? I've just been informed I only have 2 minutes to get over there to the vote. Senator Shaheen is going to benefit enormously by the cycle here. Oh, Senator Lugar is back. I—you had a moment there. I apologize. [Laughter.]

Vice President GORE. Congratulations, Chairman Shaheen. [Laughter.]

The CHAIRMAN. Did you see the excitement on her face? [Laughter.]

The CHAIRMAN. Senator Lugar? Thank you. And then, Senator Shaheen. Thanks.

Senator LUGAR. Thank you, Mr. Chairman. Thank you, Senator Shaheen.

Mr. Vice President, in my opening statement—I had a narrow part of the picture, admittedly, but you acknowledged my farming situation, and I am interested in this. Norman Borlaud has testified for many years before the Agriculture Committee, occasionally this committee, on the Green Revolution. He was not alone in this respect. But, he and many others, including Bill and Melinda Gates and their work in Africa, have really had obstacles. They've not struck out, but, nevertheless, the situation you presented has already led to difficulties with regard to soil and water conditions, and difficulties for people in Africa to produce.

Now, as Bob Paarlberg has pointed out in his book, this is reinforced by prejudices against genetically modified organisms and biotechnology in agriculture. This is a total disaster already, and headed toward worse, on the data that you have shown.

This is why my plea is that this become a part of the agenda of the picture. Our staff members, at the conference that you just attended, struck out again in working with this. And I appreciate, within the green or environmental community, there are differences on these issues. I've spent some time with European-community people in Brussels, and they have differences, although some are now moving in the direction, at least that I would advocate. But, do you have any further comment on this that would be helpful today as to how this might become a part of this important agenda? And some recognition, as a practical matter, that people in Africa need to be fed now, quite apart from——

Vice President GORE. Yeah.

Senator LUGAR. [continuing]. Catastrophes of 5 or 10 years from now?

Vice President GORE. Yeah. Well, Senator Lugar, thank you for your thoughtful comments. Before addressing, specifically, genetically modified organisms, I'd like to enthusiastically agree with your overall point, that the impact on agriculture in developing countries is going to be quite harsh.

If I could briefly illustrate this with a couple of slides, this is from the United Nations Environment Program, and it's just an illustrative example. This shows the nation of Uganda, and the green areas show the areas that are suitable for coffee-growing, and the yellow shows less suitable, but still suitable, areas. A 2-

degree increase in temperature does this to the areas for coffee growing.

So, the effort to combat global poverty and to feed those who are hungry is harshly impacted by the impact of global warming, and we have to figure out a way to respond.

Developing—responses to climate change in the developing world can help reduce this poverty, because renewable energy is the best way to bring electricity to the places that don't have it. The emissions trading system does help them economically. And reforestation programs can support rural livelihoods. And many in this chamber and elsewhere—I'm not proselytizing; this was a slide in this deck that is out of my own faith tradition—but, experience suggests that the best way to do this is to integrate it into the planning.

Now, on genetically modified organisms, the treaty is not a commercial mechanism, it actually remains up to individual nation-states to decide, on their own, if they want genetically modified crops. I do believe the treaty, as you have said, should have funds for adaptation for Africa and poor countries in other regions, and that should include money for help in agriculture.

My own view of the scientific controversy on GMOs is that most GMOs turn out to be no different in their impact on the environment than the long, slow process of seed selection that occurred during the Stone Ages and produced today's main food crops. However, Mr. Chairman, we have had several—I would say, too many—examples—a small fraction among the many GMO crops, but we have had some—that turn out to have had some unanticipated, dangerous consequences. I, myself, have not yet seen an adequately sensitive and reliable screening mechanism to make sure that we catch those few that actually do cause problems. But, where we find ones that have been cleared, with long experience, then I, myself, am not opposed to their use.

Senator LUGAR. Well, I thank you for that testimony. I would just say, from the practical use on my own farm through, now, three generations, the yields we've been able to obtain, which have been a part of my lifetime, are dramatic. And I would say, with regard to our own soil, trees, and the environment, that we've used GMO very satisfactorily. I think this is possible. But, the point you're making, about certain elements being screened, is clearly important.

On the farm situation, likewise, the need for building support in the public is obvious. The Pew Foundation's recent report, that's often cited, listed global warming or climate change as number 20 out of 20 issues that were important to the public now. There may be other months in which the poll does better, when we're not in an economic crisis. But, I'm impressed with the fact that the Chicago Climate Exchange—and maybe as a prelude to some type of cap-and-trade or carbon pricing system in our country—has at least established a price for carbon.

Vice President GORE. Yes.

Senator LUGAR. I've become—our farm has become—a member of the Exchange. We are a potential seller of carbon. It is sequestered in our hardwood trees, which have been measured as we planted them, so that this is a new situation. And we get a reading on a

Web site every day. Carbon is now $2.05 in Chicago, as of yesterday.

This is a very small beginning, but it's an important one. And people from that Exchange have been very active in the European markets.

I mention all of this because we'll have debates about it again, when we get back to the fact that—does anybody really understand how to price, how the exchange occurs, who the suppliers are. Are these valid suppliers? Is the carbon in my hardwood trees really carbon that is sequestered? Well, I think that it is, and we think about no-till planting, likewise, in this respect. The National Farmers Union came together for a press conference in which I participated last year. They were interested in the sequestering of carbon in the soil and how not to disturb it. How can we go about doing this?

But, to the extent that this becomes an income source——

Vice President GORE. Right.

Senator LUGAR [continuing]. For farmers, in addition to a scientific experiment, then that whole difference in American public opinion, at least with one large community, occurs in practical ways.

Now, and I cite this because you've worked with public opinion for years. These situations are not easy sells.

Vice President GORE. Right.

Senator LUGAR. But, to the extent there are practical measures, with even portions of our population, there may be the kind of support. Which leads to my overall question.

Kyoto did not do well on the Senate floor when it came. And if we have a treaty this year—and I hope that we will—this one needs to do better. How will we come about, in a bipartisan stance, with the support of the country, to get either 60 or 67 votes, or whatever is required at that point? Can you give any thought to that, just as a practical politician, as well as one who——

Vice President GORE. Yeah.

Senator LUGAR [continuing]. Has made a presentation today which is exemplary?

Vice President GORE. Well, thank you, Senator Lugar. I am a recovering politician. I'm on about step nine. [Laughter.]

Vice President GORE. I'd like to, first of all, address your comments, if I may, on soil carbon, because I think it's an important question that should be addressed.

As a rule of thumb, the amount of carbon now sequestered in trees and forests around the world is roughly equal to twice the amount that is in the atmosphere. The amount of carbon sequestered in soils around the world is up to four times as much as the amount in trees.

I grew up during the summers on a farm in Tennessee, and learned from my dad how to recognize the dark, black, rich soil in the bottomlands. And not until recently did somebody clue me in that what makes that rich soil black is the carbon. And there's eight times as much carbon in the soils as in the atmosphere, though the flux in and out is much lower than from trees. However, that flux out can increase dramatically from the thawing of those frozen soils, and the flux in the other direction, more rapid

sequestration of carbon in the soils, can also be increased—not necessarily with no-till, although I see that as an improvement, but with new techniques that help farmers increase yields and rapidly sequester carbon in soils. They do not yet have the mechanisms to adequately monitor and measure soil carbon sequestration, though they are close to developing them.

The two areas of the world that have most wanted soil carbon included in the treaty are U.S. farmers and the Continent of Africa. Quite a coalition. And if the monitoring can be established, then I think it's a very useful measure to begin that addition to the process in Copenhagen so that it can be included.

Now, on the prospects for the treaty, as compared to Kyoto. The general expectation and acceptance, in the developing world, that they will have binding commitments in the first phase, makes this a very different kind of outlook than was the case with Kyoto. The very fact that developing countries, like Brazil and Indonesia, China, which is in its own category, have now begun to take initiatives—I think that makes it a very different situation.

And, of course, the strength of the scientific consensus worldwide is now far beyond what it was 10 years ago. The scientists are practically screaming from the rooftops. This is, properly understood, a planetary emergency. It is out of the boundaries of scale that we're used to dealing with. And one of my personal challenges for the last 30 years has been to understand how to talk about it in a way that breaks through that denial and resistance. And though some progress has been made, more work needs to be done.

I think that President Obama's leadership, which has already been manifested in his statement, just 2 days ago, can, itself, be an important new element in firming support for what needs to be done.

Senator LUGAR. Thank you very much.

Senator Dodd.

Senator DODD. I think I'm acting chairman——

Senator LUGAR. Yes.

Senator DODD [continuing]. So I'll recognize myself, here. [Laughter.]

Senator DODD. First of all, Mr. Vice President, let me thank you for your 30 years of effort in this regard. You were a lonely voice, as I recall, in the House of Representatives, some 30 years ago, talking about this issue. And occasionally history provides leadership like that. Not often enough, in my view, but I thank you for it.

Vice President GORE. Thank you.

Senator DODD. And I'd be remiss if I didn't also thank the chairman, Senator Kerry, who's also worked very hard on this issue, and did a great job yesterday; in fact, in our caucus lunch, gave a very eloquent exposition about what we needed to be doing in this coming Congress, in preparation for Copenhagen.

Senator Boxer has been terrific on this issue, as well. Jeff Bingaman, my colleague from Connecticut, Joe Lieberman, and others, have been stalwarts in the efforts to try and make this issue more prominent.

I have just two or three quick questions. One, you just alluded to, that I think is so important. I think the public perception too

often in this debate has been that if we, in fact, go this route, that our lifestyles, and our economic growth and opportunity are going to be severely hampered. We're going to have to make a choice, in a sense. Maybe the political equivalency or the economic equivalency of wearing a hair shirt if we give up this economic path or dependence on fossil fuels that we've been on for so long. Changing that mentality, convincing the public-at-large, both here and elsewhere, that, in fact, quite the opposite is the case. That's number one.

Number two, I appreciate your emphasis on Brazil, and talking about Brazil. And obviously they've done some remarkable things. I was noting that about 50 percent of our importation of fossil fuels comes from the western hemisphere, from Venezuela, Mexico, Canada; that about 80 percent of the renewable energy resources come out of Brazil, with the use of ethanol coming out of sugar cane. But, renewable energy poses some issues, as well, in that the deforestation efforts, the Amazon Basin being that drain that you've talked about, is at risk if, in fact, we find an expansion of sugar cane to develop more ethanol for foreign markets, which we encourage, to some degree, but obviously there are ancillary and related issues associated with those efforts. And I'd like to hear you comment on these issues, although I was encouraged by the comments you made, that Brazil seems to be entering into a stricter regime when it comes to deforestation programs.

And then, thirdly, is the approach. Obviously, Copenhagen's coming up. We've had the meetings in Bali and other venues. What are your thoughts about more regional approaches to this, tying in the economic issues? I think you made a very strong point, to begin with, that Iraq, Afghanistan, and our economic situation are tied very intimately, as a result of our dependence on fossil fuels, particularly coming out of a very precarious part of the world. But, does it make some sense maybe to look more regionally at this, in terms of economic ties—not to supplement that from the global effort, but could we potentially have more success on a regional basis, rather than on the U.N. or global kind of approach to this?

Vice President GORE. Well, thank you for a thoughtful question, Senator Dodd. I do believe the treaty must be global in nature. And I think that the efficacy of a cap-and-trade system goes way up when it is truly global. It becomes much more efficient, it's not a bucket with a hole in it, it's actually a complete system.

But, in the introduction of renewable sources of electricity, it does—it can make a lot of sense to look at regional tieups. I'll show you one quick example that was published in Nature magazine last—just a year and a half ago, that illustrates the proposed super grid in Europe, that links northern Africa with Western Europe. Just as one of the arguments for helping Mexico's economy was that it's more effective to stem illegal immigration by creating more opportunities for jobs south of the border, one way to deal with the flows of immigration into Europe from northern Africa, and through northern Africa, that have generated unfortunate outbursts of xenophobia in Europe, is to create more economic opportunity there.

In the Sahara, the sun resource is astonishing. And those pink dots there represent concentrating solar thermal plants, the tech-

nology that I was talking with the chairman about, linked in a—what they call a super grid, similar to the Unified National Smart Grid that President Obama has proposed for the United States. The yellow triangles are wind installations on the west coast of Africa. Spain, of course, and Germany, are already the leading proponents and installers of solar and wind. And by linking Western Europe to northern Africa, they can accomplish a shift to renewable electricity.

There are other regional linkages in Asia. For example, in the western part of India, in Rajasthan, in the areas of desert where there is a similar very impressive solar resource, there can be supplies of renewable electricity that supply the entire region. Similarly, in China—China's already building a lot of solar plans.

So, this is just one illustration of how a regional approach can be an effective way to shift to renewable electricity.

Senator DODD. . I appreciate that very much. Any comment on the Brazilian effort, with the possibility of expanding into that Amazon River Basin with further deforestation to produce more ethanol out of sugar cane? Is it a worry, apparently, you're not as concerned about that, because——

Vice President GORE. No, no, I am. Thank you forgiving—I didn't answer it, and I thank you for giving me another chance. I simply forgot.

President Lula has recently proposed, on the eve of the Poznan negotiation last December, a truly impressive large short-term goal of avoiding the deforestation pattern that has been so prominent in the Amazon.

What's been going on there is really very troubling, and, with your permission, I'll show you a very quick example of it, from the western Amazon basis, over a period of 25 years.

[Video presentation.]

Vice President GORE. President Lula's proposal is to stop thoughtless destruction of valuable areas of rainforest. And it's important to note that the exploitation of the sugar-cane growing areas in Brazil, which gives a highly efficient source of ethanol that's efficient economically and in terms of energy balance, does not have to inevitably have the knock-on consequence of causing destruction in the Amazon. It's a different area of Brazil, and, with the kind of policy innovation that President Lula has proposed, I believe they can, if they enforce it—that's been one of the problems with past initiatives—if they enforce it, I think that they can continue to provide global leadership on ethanol production and avoid deforestation. Of course, everyone hopes—and Senator Lugar mentioned this—that we will soon be able to move quickly to the next-generation cellulosic——

Senator DODD. Right.

Vice President GORE [continuing]. Ethanol that won't compete with food crops and will give us better options.

Senator DODD. Yeah. Thank you very much.

Thank you, Mr. Chairman.

[The prepared statement of Senator Dodd follows:]

PREPARED STATEMENT OF HON. CHRISTOPHER J. DODD,
U.S. SENATOR FROM CONNECTICUT

Thank you, Mr. Chairman. I would like to join my colleagues in welcoming my good friend, Vice President Gore, this morning, and thank him for the tremendous work he has done over the years. He has not only raised awareness of the dangers of global climate change; he has transformed the debate and brought it into the public consciousness. I would also like to recognize our distinguished chairman's own work in confronting global climate change, most recently during his trip to Poland in December as the leader of the U.S. delegation to the U.N. Conference on Global Warming.

In spite of the doubts still voiced by some, the debate over whether human-related activities are contributing to global climate change is over. The most reliable scientific data we have is crystal clear on this issue. According to a November 2007 report by the Intergovernmental Panel on Climate Change (IPCC), an international panel of some of the most respected scientists in the world, the earth's average temperature has increased between 1.1 to 1.6 °F since the Industrial Revolution, and if nothing is done to curb greenhouse emissions, the 21st century could see global temperatures rise another 3.2 to 7.2 degrees. While this warming trend may seem minor to the casual observer, even relatively small fluctuations in global temperatures could have potentially devastating impacts on numerous species of plants and wildlife, reduce global agricultural yields, increase the frequency and severity of storms and hurricanes, and contribute to the spread of disease. These dangers represent a global threat, and any real solution to climate change must be a global effort in which all nations are involved.

Global action is urgently needed to limit greenhouse gas emissions and reduce our dependence on fossil fuels in order to prevent serious environmental damage, economic turmoil and increased global conflict over resources. However, such an effort is impossible without the full support and cooperation of the United States. With only 4 percent of the world's population but responsible for nearly a quarter of all greenhouse gas emissions, the United States has a moral responsibility to lead. Nevertheless, in spite of this urgency, the Bush administration did not. Indeed, for all the treaty's flaws, it was shameful that the Bush administration abandoned the Kyoto Protocol. It is high time the United States once again become a leader in addressing the grave threat of climate change. For 8 long years, sound science has been ignored, good policy has been ridiculed, and the U.S. relegated itself to the back bench.

We must also be clear that the dimensions of this phenomenon are not solely environmental. Our planet's addiction to fossil fuels has serious ramifications for the global economy. Recent fluctuations in energy prices have impacted the price of food and other essential goods, contributing to higher food prices and food insecurity around the world. Moreover, dependency on fossil fuels has led to increased political tensions between producer and consumer states, including most recently Russia and the Ukraine, which led to shortages throughout much of Europe. The U.S. in particular has become more dependent on foreign sources of energy in recent years, and Americans have seen more and more of their hard-earned wealth transferred overseas, often to regimes hostile to the United States with poor human rights records.

With the commencement of the Copenhagen Conference later this year, the United States has an opportunity to reengage with the international community and not simply take a greater role in the global effort against climate change, but lead the world in doing so. Secretary Clinton's appointment of Todd Stern as special envoy for climate change is a welcome sign that the Obama administration plans to treat the threat of global warming with the seriousness it requires and work with the international community to find a comprehensive solution. Once again, I'd like to thank my good friend, Vice President Gore, for testifying before this committee today. I look forward to our discussion.

The CHAIRMAN. Thank you very much, Senator Dodd. Thank you for your generous comments. I appreciate it.

Senator Corker.

Senator CORKER. Mr. Chairman, thank you.

And I want to join in welcoming you here. Tennessee has a legacy of having people here in the Senate and in public service that have been of major consequence and contributed in a major way to the public debate. And you, no doubt, have helped build that legacy. And I hope, in some small way, to follow on. So, I appreciate

your being here, and I thank you for your presentation, and very much enjoyed your sense of humor, too, I might add. Thank you very much.

Vice President GORE. I benefit from low expectations. [Laughter.]

Senator CORKER. You know, my goal in this debate is to make sure that, as we move along this road to Copenhagen, that we also focus on things like energy security, and that we are transparent with the American people. And I think that actually is the very best way to build a political consensus that you're talking about today. And I really do, I appreciate your comments, on the front end, regarding our dependence on oil. I certainly appreciate the focus on deforestation. And my goal here today is actually to build more of a mutuality——

Vice President GORE. Right.

Senator CORKER [continuing]. If we can.

Jeff Bingaman and I spent a week in Europe, meeting with carbon traders and European Commission members and others. And I think what we've seen, from the initial steps that have taken place there, has been a lot of form over substance, in many ways, that we can learn from. And, on one hand, some steps were taken, but, with free allocations and offsets and all kinds of things, there really wasn't the transparency and purity there that I think would be most beneficial.

We're now firing with real bullets. I mean, I think——

Vice President GORE. That's right.

Senator CORKER [continuing]. The stars have lined up. And my sense is that, this year, something may really occur. And I hope to sort of be like BASF; they don't make the product, but they make the product better. And that's my goal in this debate, as I've mentioned.

You've said some interesting things that I think actually could have the result of bringing people together. For instance, you have talked, in the past, about a carbon tax——

Vice President GORE. Right.

Senator CORKER [continuing]. And the fact that, if that is implemented, then it ought to be 100 percent returned to people——

Vice President GORE. Right.

Senator CORKER [continuing]. Through a payroll tax, which, by the way, I agree with and actually had an amendment on the floor, this last year, to that effect, in some degree. Do you agree that if—at the end of the day, we're talking—the bottom-line result for—on the road to Copenhagen, for those who are on the roads in Carthage, around your family farm, is—we're really talking about increasing the price of carbon—on oil, of natural gas, of ethanol, of all those things. And I think you've talked about returning that increase in price to people——

Vice President GORE. Right.

Senator CORKER [continuing]. As I have. Should that same thing—well, let me just mention one other precursor.

USCAP was here last week. A lot of well-respected companies, CEOs that I've followed throughout my life. They made a presentation. And unlike—or, like most things that happen around here, the presentation centered on transference of wealth from our taxpayers, in most cases, to their companies. OK? Or, in some ways

making their companies more competitive to others. So, it was obviously put together to create a competitive advantage for them.

I think we can build consensus around transparency. And if we were to have a cap-and-trade program—and I think, candidly, we will, this year—is it your sense that revenues generated from that, like you had mentioned on carbon tax, should be returned to the American people?

Vice President GORE. Well, there have been a lot of people claiming part of those prospective revenues, and that will be for the Senate to determine.

I think that Senator Lugar's advocacy of funds for adaptation to those unavoidable consequences already programmed into the climate system represents one destination for the global cap-and-trade system; not all of it, by any means, but some portion of it.

Senator CORKER. Yeah.

Vice President GORE. I think that research into the new, more rapidly deployable renewable technologies is another.

But, I certainly believe that the simplest and easiest way to solve this problem would be a CO_2 tax that is 100 percent refundable. The theoretical architect of President Reagan's economic plan, Arthur Laffer, who now lives in our home State, has publicly endorsed this—Billy Crystal, others—and that sometimes worries me, but——

[Laughter.]

Vice President GORE [continuing]. I think that would be the most direct way to do it.

But, a cap-and-trade system has—they're not inconsistent, by the way; I think we need both a cap-and-trade system can be implemented globally. And I do think that, in implementing a system here in the United States, we should do it in a way that pays very close attention to any economic impacts on the American people, and we should rapidly create the jobs in the building of the Smart Grid and efficiency and conservation measures, and renewable energy, and put people to work, and make sure that we get a net increase in jobs.

Senator CORKER. Well, look, I want to tell you that I wish we would just talk about a carbon tax, 100 percent of which would be returned to the American people, so there's no net dollars that would——

Vice President GORE. Right.

Senator CORKER [continuing]. Come out of the American people's pockets, and therefore, they're making a value decision about carbon. And those who use less, benefit; those who use more obviously do not benefit. But, no money is taken out of the people's pockets. And actually, I hope that, if we do a cap-and-trade program, we can implement those same elements.

Let me talk to you—we talk about a global system, and obviously the markets in each area, based on the amount of decreases in the economy and all of that, actually affect the carbon price. And we've seen—carbon, last year, was at $40 a ton, and in Europe today it's much less. And obviously, you know, a good recession takes care of a lot of that, right?—I mean, just because of energy output. But, the fact is that allowances play a major role in distorting the markets.

One of the things, if you talk——

Vice President GORE. Right.

Senator CORKER [continuing]. To traders in Europe, they wish that they really would have auctioned 100 percent of the——

Vice President GORE. Right.

Senator CORKER [continuing]. Allowances. We have companies here—and much of the public doesn't understand that these allowances——

Vice President GORE. Very valuable.

Senator CORKER [continuing]. Are marketable securities. And, I mean, this——

Vice President GORE. Right.

Senator CORKER [continuing]. Is cash, OK——

Vice President GORE. Right.

Senator CORKER [continuing]. That you can sell, the very next day.

Do you agree with me, and, I think, President Obama, that almost all of the allowances ought to be auctioned, and not freely given out to companies, that, in essence, again, it's a huge transference of wealth?

Vice President GORE. Personally, I do agree with you, Senator Corker. Now, there are people who—for whom I have great respect, who have studied this for many years, who believe that a 100-percent auction will be practically—in practice, very difficult to implement, and that a high percentage should be auctioned. I believe, with you, that it should be 100 percent auctioned.

And I appreciate the time you've taken to learn about the European system. When they implemented their system, they calculated their base year in a very flawed way. But, over the recent years, they have modified and changed their system, to the point where it's much tighter and working much more effectively.

The fact that they were operating within a global economy, most of which did not have cap-and-trade, made their challenge very difficult. And, as I said earlier, if it's a truly global system, then you'll get the liquidity and the effectiveness that will really drive it toward higher levels of efficiency.

But, I think the best way to start is with an auction.

Senator CORKER. You know, we talk about the ways that we should lead. And I think a way that we might also lead is to actually set up a system that is transparent, that is pure, where the plumbing actually works, because, you know, I think we'd all have to say, what's happened in Europe has met with mixed reviews because of all these distortions. One of those, again, being offsets.

You know, we've—as of November 1, 2008, International Rivers has calculated that most of these offsets, that are called clean development mechanisms, that I think hugely distort the market—hugely distort the market—most of the projects, three-quarters of them, were already under construction and were going to happen anyway. And so, the whole issue of additionality is a pretty big deal.

And I actually think we have to figure out a way to deal with deforestation in parts of the world. I really believe that. But, I think that offsets are another one of those things that hugely distort the market, because, instead of actually reducing carbon emis-

sions, you're doing things that are highly questionable and actually outside the market that you're in. I'd love any comments you might have in that regard.

Vice President GORE. Yeah. Well, another thoughtful question. I think there's a general agreement that, in Copenhagen, significant reforms of the CDM, as—collective development mechanism—has to be—cooperative development mechanism—have to be implemented. And I think there's general acceptance of that idea, and there's been a lot of work on how to reform it and make sure that it's targeted on what it needs to be focused on, instead of some of these peripheral areas. I agree with you.

Senator CORKER. And if I could just—one last question, Mr. Chairman—thank you for the succinct responses.

I agree with you that carbon capture and sequestration is a long ways off. I have a hard time understanding how, on a commercial scale, we're going to be doing it. One CEO that's highly involved in coal has said that, "When donkeys fly," OK, "we will be dealing with that."

I just have to ask—so, as we look at that, and we look at energy production in this country—nuclear—one would have to believe that, as we deal with the issue of carbon, that nuclear would have to play a huge role in that. And I just wonder what comments you might have in that regard.

Vice President GORE. Well, first of all, just a brief comment on your statement about carbon capture.

The one place that—well, one of the places that actually has sequestered carbon is in Norway. And it refers back to your earlier comment, because, if you ask them the secret to it, they say, "Well, we imposed a CO_2 tax, and we told the gas producers out in the North Sea that"—it has particularly high CO_2 content—"that if they could capture it and sequester it safely, then they wouldn't have to pay the tax." So, they said, "OK." And they went, and they've done it fairly successfully. Now, it's a unique set of conditions. There's a demonstration project in Algeria. It's not impossible, it's just implausible that it can be done on a widespread scale.

Now, on nuclear, I used to represent Oak Ridge, as you do now, where my constituents were, at that—in those years, immune to the impacts of radiation. So, I was very enthusiastic about nuclear power. And I came to the Congress, in 1976, as a very strong supporter of nuclear power.

I have grown skeptical about the degree to which it will expand. I'm not opposed to it, but there is now, in the industry, absolutely zero ability to predict, with any confidence, what the cost of construction is. The nuclear waste storage problem will undoubtedly be solved, but there are other problems. They only come in one size: Extra large. And when utilities have a limited construction budget and an uncertain demand projection, because, with the price of oil going up and down, and new conservation measures coming in, they think—they fear we might face the kind of situation that we faced in the Tennessee Valley area in the 1970s and 1980s, where TVA started all these new nuclear plants, on an assumption that there was going to be a 7-percent annual increase in electricity usage, and then the energy crisis dropped it down to

1 percent, so they canceled all those plants, and the ratepayers are still paying for the unbuilt plants.

The utility executives become allergic to placing large bets on large increments with uncertain construction costs over a long period of time into the future. And that's why you've had, in—last year, by far, the largest new construction of electricity generation was with renewables. Coal has actually gone down, renewables have gone up, and nuclear has been at kind of a standstill.

Now, I think there will be some new nuclear plants, but the proliferation consequences will limit its spread as a worldwide option. If it did expand dramatically, we would run out of fuel in relatively short order, unless we went to reprocessing. And reprocessing makes it hugely more expensive and actually expands the quantity of high-level waste that has to be safely sequestered. That's counterintuitive. I used to think that reprocessing would cut down on the waste; it actually increases the amount of waste. And so—and the costs.

So, for all those reasons, I think that it'll play a small extra role. I don't think it's a silver bullet, and I don't think it'll play a large role.

Senator CORKER. Mr. Chairman, I want to thank you. And if I could just say one thing, I think this has been an excellent meeting.

I hope that we, in the Senate, will, instead of concocting some Rube Goldberg mechanism that basically disguises what we're doing from the American public, will do exactly the kind of thing that Vice President Gore has advocated, and that is, be transparent, be direct, let people fully understand what it is we're doing, return those monies to the American people, put a tax on carbon. I think the American people are intelligent, I think they get it, if we just explain it to them.

Again, I want to thank you for bringing one of Tennessee's great public leaders here today, and thank you for having this hearing.

The CHAIRMAN. Well, thank you very much——

Vice President GORE. Thank you.

The CHAIRMAN [continuing]. Senator. Let me just say to you that we're putting a working group together, which will include Senator Bingaman, Senator Boxer, Senator Lieberman, and others, and we need it to be on a bipartisan basis. We need your involvement and others so that we piece this thing together differently from the way we did last year and try to solve a lot of the problems of transparency and understanding of it up front and early. Our hope is to do that so we can advance Copenhagen, as well as our own efforts here in the country. We need you to be part of that.

With respect to the future plants, a new solar power plant in California began operating last fall. It used to operate under old technology, but new technology has empowered it to come back online. The solar thermal factory for the mirrors is in Las Vegas. Over the next years—Ausra is the company that's doing it—they're going to build two gigawatts of solar power plants, generating 4,000 construction jobs, 1,000 operational jobs, and clean, green power for over 300,000 American homes. I think that's what Vice President Gore is talking about. That's the future. Sempra Generation put together the largest thin-film solar power plant in North

America. It's located in Nevada, and analysts estimate that it can produce power for less than the cost of traditional electricity.

That's what's staring us in the face if we will get the grant money and the incentive money and other efforts out there.

You've been very patient, thank you.

Senator Feingold.

Senator FEINGOLD. Thank you, Mr. Chairman.

And, of course, Vice President Gore, thank you for coming before the committee to testify, and for your longstanding leadership on this issue. It's been incredible. And as your testimony has made clear, climate change is a pressing issue for the United States, for our environment and economic stability, our energy security and independence, and ultimately our national security. We can't afford to continue dragging our feet on this issue. And you know of my involvement on Africa issues and chairing the Africa Subcommittee. You've already referred to it several times. I'm concerned that the impacts of climate change will be the harshest on those countries least responsible for and least able to escape its effects.

In many of these countries, rampant environmental changes are exacerbating droughts, intensifying famine, even contributing to conflict over scarce resources. Addressing the capabilities of the poorest countries to adapt to the impacts of climate change must be a central focus of the upcoming United Nations negotiations, and I would like to actually pursue your thoughts on some of that.

Mr. Chairman, I'd like to put my full statement in the record, if I could.

The CHAIRMAN. Without objection.

[The prepared statement of Senator Feingold follows:]

PREPARED STATEMENT OF HON. RUSSELL D. FEINGOLD,
U.S. SENATOR FROM WISCONSIN

Vice President Gore, thank you for coming before the committee to testify today and for your longstanding leadership on the issue of climate change. As your testimony has made clear, climate change is a pressing issue for the United States—for our environmental and economic stability; our energy security and independence; and ultimately our national security. We cannot afford to continue dragging our feet on global action to address this multifaceted problem. I am confident that the Obama administration knows the importance of playing a leadership role in the run up to Copenhagen, and, equally important, intends to collaborate closely with our friends and allies. I have been deeply impressed by the increasing number of Americans, including many in my home State of Wisconsin, who are not only calling attention to this problem in their communities and beyond, but also working to be part of the solution.

As chairman of the Africa Subcommittee, I am concerned that the impacts of climate change will be the harshest on those countries least responsible for and least able to escape its effects. In many of these countries, rapid environmental changes are exacerbating droughts, intensifying famine, and even contributing to conflict over scarce resources. Addressing the capabilities of the poorest countries to adapt to the impacts of climate change must be a central focus of the upcoming United Nations negotiations and I look forward to hearing your thoughts today on how to ensure that is the case.

Finally, I believe that we here in Congress also have an important role to play. In conjunction with the decisions to be made in Copenhagen at the end of the year, we must act immediately to require mandatory reductions in greenhouse gas emissions. Though climate change presents one of the most complicated domestic and international policy challenges of our time, it also brings with it tremendous opportunity for a new and brighter future. This includes the potential to create millions of new jobs, revitalize the economy both here at home and abroad, and forge strong partnerships across the globe.

Senator FEINGOLD. Mr. Vice President, I'd like to hear your general thoughts on the importance of the United States participating in international negotiations on climate change. Specifically, what does it mean for global climate-change efforts if the United States does not ratify a post-2012 agreement? To assist with U.S. ratification, do you think it's necessary to establish different obligations for highly-emitting developing countries, such as China and India, and then the more low-emitting countries, such as those in Africa?

Vice President GORE. Well, Senator Feingold, thank you for your kind words and for your leadership on this issue.

I guess all of us here are vulnerable to chauvinism in our pride in the United States of America, but, that having been said, I do think it's objectively true that our country is the only country in the world that can really lead the global community. Some have speculated that, sometime in the future, if European Union actually unifies, to a much higher degree, and has a president and an effective legislative body that has real power, they might somehow emerge as—with potential for global leadership. I'm not going to hold my breath. And I don't know of any other contender that's even on the scene.

And again, I don't want to be too proud, you know, to be just sort of chest-beating about that, but I just think that the United States is the only nation that can lead the world. And this is the most serious challenge the world has ever faced. Alongside the potential for some nuclear exchange, which is a possibility that, thankfully, has been receding over the last couple of decades, this is the one challenge that could completely end human civilization. And it is rushing at us with such speed and force, it's completely unprecedented.

And as one strategic analyst in the Pentagon wrote in a landmark study of why Pearl Harbor wasn't prevented, he said, "We, as human beings, have a tendency to confuse the unprecedented with the improbable." If something's never happened before, we tend to think, "Well, that's not going to happen."

The problem is, the exceptions can kill you, and this is one of them. And if the world's going to respond, theUnited States has to lead the world. And that's one of many reasons why I'm so grateful for President Obama's bipartisan outreach and bold leadership to say the United States has to lead on this issue.

Senator FEINGOLD. Meaning that we would need to ratify a post-

---

Vice President GORE. Absolutely. Absolutely.

Senator FEINGOLD. And what about the distinction between highly emitting developing countries, such as China and India, versus low-emitting countries, creating different obligations? Is that something you think would be appropriate?

Vice President GORE. Well, you know, the binary categories of developed and developing were established before the Treaty of Rio de Janeiro, in 1992, at the so-called Earth Summit. Senator Kerry and I were there, and I believe some others on this committee were. And President Bush—President George H.W. Bush signed that. The Senate ratified it. We are legally obligated, under that treaty, by the way, to keep the world below—to keep emissions below dangerous levels. And since that time, the scientific commu-

nity has fleshed out, with abundant clarity, what that means. We are already above dangerous levels. So, we have a legal obligation, under that treaty, to do it. But, when those categories were established, China wasn't what it is today.

In an ideal world, we would change those categories, and we would not have just A and B, we would have different categories. But, trying to get that done at the same time when we're negotiating one of the most complex treaties the world has ever attempted, I fear is almost certainly impossible, because those who feel that their equities are damaged by being transferred from one category to another are going to—are going to fight the change, and there are enough of them that it would be very difficult.

I think that the more effective way to do it, Senator Feingold, is to modify the obligations that are expected of those in category A and category B, and you can have some gradations in those expectations to take——

Senator FEINGOLD. As opposed——

Vice President GORE [continuing]. Into account individual——

Senator FEINGOLD [continuing]. To changing the categories.

Vice President GORE. Correct.

Senator FEINGOLD. OK.

Vice President GORE. I'd prefer to change the categories. I just don't——

Senator FEINGOLD. Yeah.

Vice President GORE [continuing]. Think it's doable.

Senator FEINGOLD. Let me quickly go to another subject. I already said a little bit about it. According to a study, by the Intergovernmental Panel on Climate, entitled "Impacts, Adaptation, Vulnerability," Africa is one of the most vulnerable continents to climate change and climate variability. And the report goes on to note that the continent has already started to experience the impacts of climate change in a manner disproportionate to its emission contributions. So, looking forward to these negotiations, again, what steps need to be taken to ensure that the needs and voices of poor, developing nations, including those in Africa, are fairly represented? And whole—specific role does the United States have in helping to achieve this?

Vice President GORE. Well, I agree with comments, earlier from Senator Lugar, that a large and adequate adaptation fund should be a part of this treaty, to help areas like Africa that are already beginning to experience the harshest impacts. Thirteen countries in Africa experienced all-time record flooding, just a year and a half ago, and some of them are still recovering. The epicenter was Ghana. We're seeing, really, very difficult drought conditions in many of—and linked to these long-term climate—the rapidly-emerging climate trends.

But, the other side of that coin, Senator Feingold, is that the solutions to the climate crisis are, in many cases, more easily and readily deployable in regions like African than they are in developed countries. Just as these nations leapfrogged the old, fixed-line telephone service and went straight to cell service, they can leapfrog the old, central generating station electricity and go straight to widely distributed solar and wind. You're seeing a massive intro-

duction of solar electric panels in Kenya, for example, and in many other countries.

The reforestation programs, that will be a part of the solution in Copenhagen, can provide large numbers of new jobs for employment programs in Africa. Wangari Maathai has demonstrated this already with her Green Belt program. So, the solutions to the climate crisis can flip this around and accelerate the entrance of Africa into the world economy to lift standards of living there.

Senator FEINGOLD. Thank you so much, Mr. Vice President.

The CHAIRMAN. Thank you very much, Senator Feingold.

Senator Isakson.

Senator ISAKSON. Mr. Vice President, it's a pleasure. I find your presentations always very informative. And I don't think I've missed a one since you've been here. And I'm going to take advantage of your being here now. I'd like——

Bertie, would you do me a favor? Would you make sure the Vice President gets this?

I want to commend you on the talk about open space and green space and reforestation. For 10 years, I have promoted a piece of legislation called America's Open-Space Environmental Infrastructure Act, which deals with creating conservation easements to protect natural resources, rivers, streams, things of that nature, open space, green space in forests, where an individual can still have the quiet enjoyment of their land and the government can be ensured of the protection for migratory habitat, for carbon production, which—Mother Nature does it best by sequestering it, and we both know that. So, I hope you'll take it and read it. I would—and I have no pride of authorship. You want to take it and promote it, you're welcome to do so, because I think it is a key component in what we're talking about here today.

Second, on the—I want to return to nuclear. Senator Corker brought it up, and I've—you and I have engaged on this before. A couple of things. From 2000 to 2006, the leading country in the world in carbon reduction was France, 6 percent; the United States, 3 percent. The primary difference, that I can see, is that they generate almost all of their electric energy from nuclear.

You—a couple of things you've said, I want to just talk about for a second. One is, I had always understood—and I stand to be corrected, and I defer to your position, and you're probably right and I'm probably wrong—but, I'd always been led to believe that the reprocessing of nuclear fuel—spent fuels for a second use reduced, by 90 percent, the storage problem. Now, you said it was a greater storage problem. So, I'm not questioning you, I'm questioning myself, but the—that's what I've been told.

Vice President GORE. Well, that was my impression, also, Senator Isakson, until fairly recently. And it is my understanding that it—that the volume of waste that has to be stored safely actually does increase with reprocessing. The industry has even called it "recycling," and it does give the impression that it cuts down on the volume, but the information that I believe is correct, and I—like you, I am always open to being corrected on these things, but I believe it actually increases the amount of waste.

Senator ISAKSON. I don't know if it's appropriate to ask a Vice President to do this, but if you could ask some of your staff——

Vice President GORE [continuing]. I——

Senator ISAKSON [continuing]. To research it and get that answer to me, I'd——

Vice President GORE. If it's permitted——

Senator ISAKSON [continuing]. Really like to know——

The CHAIRMAN. Absolutely, we'll leave the record open.

Senator ISAKSON. Anytime we can get facts right, I'm always—because I—we're—as politicians, we sometimes run off with a bad idea.

Vice President GORE. Better than the alternative.

The CHAIRMAN. We'll get the committee staff also to——

Senator ISAKSON. Thank you very much.

[The information referred to above was not available when this hearing went to press.]

Senator ISAKSON. Second—now, this I think I am right about, because I went through it in the 1970s; I was in the State legislature. The WPPSS bonds collapsed in Washington State. They stopped building the nuclear plants. TVA had their difficulty. But, I don't think it's a correct assumption that they made a misassumption on the growth of demand. What, in fact, happened was that the formation of capital, and the cost of servicing it, went so great that the cost of the plants went through the roof. Washington State Public Power was paying 15¾ percent, tax-free, on those bonds, because that's what happened to that marketplace at that time.

Which brings me to a suggestion. I am an advocate of nuclear. I do not think, if you accept every dire circumstance of climate change—and I'm not saying I don't, I'm just saying if you accept every dire circumstance, and you take a clean, reliable source of energy, that we know works, off the table, or you make it so difficult to do it that you can't do it, I don't think—I don't think you can ever get to the solution you're seeking.

But, I will tell you this, the construction, while in progress, is a mechanism of financing a powerplant by putting it in the rate base and paying cash as you go for a significant part of it, that removes the debt service interest component from the cost of a plant and gives you are liable way to deal with the cost of building those plants. So, one of the problems we've had in this country, from the standpoint of nuclear, since the 1970s, was, one, the adverse reaction to Three Mile Island, first of all—I recognize that; second of all, was the cost that blew through the roof in the 1970s, which you mentioned. But—Bob is a much better businessman than I am, but there are a lot of ways to skin a cat. And if we have the dire circumstances we're facing, we need to find every way to skin every cat. And I think creative mechanisms of financing and a more open mindset, on our part, to using safe, reliable, renewable nuclear energy makes a lot of sense.

So, I apologize for making a little speech, there.

Vice President GORE. No, no, I—I also have appreciated your—the exchanges that we have had. And, as a prelude to providing information for the record, one of the experts on this reprocessing issue is Allison MacFarlane, at George Mason University, who is one of the sources of my information, that reprocessing increases

the overall volume of the waste, but I'll provide her study for the record, and any other relevant information.

[The information referred to above was not available when this hearing went to press.]

Senator ISAKSON. Thank you.

Vice President GORE. On your comment about what happened to TVA in the 1970s, I think both things are true. No doubt, the construction costs went through the roof. In the fall of 1973, the Arab OPEC oil embargo shot energy prices up. And coal shouldn't be tied to oil, you would think, but it is, and coal prices went up, electricity prices went up, and so, conservation kicked in, and the cost of construction, as you said, went very high. But, it's also true that, when they launched their massive program, 21 new reactors, they were projecting a 7-percent annual increase in electricity demand, and it fell rapidly to 1 percent per year. And it—they talked about the decoupling. It used to be one-for-one increases in energy use and economic output, and that was decoupled during that period in the 1970s.

I don't take nuclear off the table. I'm not a reflexive opponent of nuclear. I just don't see any at-risk private dollars going into it, because they—you know, France—Arriva, they're a big company there; it's 92-percent owned by the French Government, and 95 percent of its output goes to the French Government. So, again, the private at-risk dollars, that's what is one indicator of whether the market is really betting on this or not. If it does, fine. We need to solve these problems. But, I just don't think it's going to play that much of a bigger role.

Senator ISAKSON. Well, I appreciated the response, and I would just—I know I don't have any more time, I'd just respond a little bit on that.

What we—the parameters that the government allows, vis-à-vis finance, has a lot of difference in whether private capital will chase that type of investment or not. And the lack of belief, right now by most private investment, that nuclear will be sanctioned by this country in any form, or would not be subject to a reaction, keeps those dollars from following it, so it's in our interest, both from a financing mechanism, as well as from the regulatory side, to develop some level of confidence. The cost of that capital will go down, and the formation will expand. But, again, thank you very much——

Vice President GORE. Thank you.

Senator ISAKSON [continuing]. For your testimony today.

Vice President GORE. Thank you.

The CHAIRMAN. Thank you, Senator Isakson.

Senator Cardin.

Senator CARDIN. Mr. Chairman, thank you very much.

Vice President Gore, it's really a pleasure to have you here. I thank you on behalf of the people of Maryland, but more importantly the people of the world for your extraordinary leadership in bringing attention to this issue so that, politically, we can get something done.

Vice President GORE. Thank you.

Senator CARDIN We all know there's a problem, but to get the political will has been difficult. I think you've made progress for us. So, we thank you for that.

The United States must exercise leadership, there's no question about it. The bill we had last year that started to move through committee, it accomplished a specific goal on carbon emission reductions. Internationally, it put the United States in the leadership role on dealing with global climate change, and it provided the tools in order to accomplish it. I agree with the Chairman and other comments that have been made. We have to put together a broader coalition and we're going to have look for modifications to last year's bill. But, I thought it was the right message and I hope a bill at least as strong will move through this Congress and be signed by President Obama.

I want to mention one issue that's been mentioned; about whether the United States can lead without other countries joining us from the onset. What do we do about India and China? If the United States adopts strict standards, does that put our manufacturers at a disadvantage or put our economy at a disadvantage?

I want to tell you up front, I believe that we should lead, we should pass legislation, and we shouldn't make a precondition that China or India or any other country agree to the standards. But I do think we need to be able to have an international regime that recognizes the responsibility of every nation to reduce carbon emissions.

One vehicle could be the World Trade Organization, in looking for a legitimate way to put a price on products that enter the international marketplace that have not met acceptable international standards on carbon reduction. Perhaps there are other ways to achieve those goals. It seems to me that the United States needs to exercise international leadership beyond just the specific bills or treaties that deal with carbon reductions in the global climate change issue, but also making sure that the international community carries out its responsibilities. I will welcome your thoughts as to whether you believe this is realistic or how we should go about making sure that other countries follow our leadership, assuming we get the job done.

Vice President GORE. Well, Thank you, Senator Cardin, and thank you for your leadership.

One of the differences between today and 2007, when Kyoto was negotiated, is that there is now a widespread acceptance, in the developing countries, that they have to have differentiated, but binding, commitments in the first phases of a treaty. And back 11 years ago, they were nowhere close to being willing to join in, in the first phase. They were willing to be brought in, in the second phase. But, now they are, and some of them have taken leadership on their own. And I think it'll make our task, in this country, of getting support for a treaty much easier.

Senator CARDIN. Do you think it's realistic that we could use an organization such as the WTO to enforce obligations, if other countries do not? Our bill last year, provided for a trade remedy. It had a significant enough timeframe so that we could get international action before any penalties took place. But, it's also probably prob-

lematic right now whether that would be permitted under the WTO.

Vice President GORE. That is correct, Senator. And one of the most interesting frontiers in international law is the intersection of the solution to the climate crisis and the world trading system.

If the WTO could be modified to allow the inclusion of a carbon-avoidance component at the border, I personally would enthusiastically endorse that. If it cannot be negotiated as part of the WTO, then it becomes very difficult for countries to do it on their own.

But, I would add one other point. And Senator Kerry and I were talking about this, this morning at breakfast. And Senator Lugar and I were talking about soil carbon, earlier. The Doha round broke down mainly on the issue of agriculture, and the different viewpoints toward agriculture from developed and developing nations. If we had soil carbon sequestered in a way that allowed credits for soil carbon, and a modification of WTO provisions, this could fill the gap that could restart the Doha round and integrate the solutions to the climate crisis with forward progress on a fair and reciprocal trading system reform.

Senator CARDIN. I thank you for those comments.

Let me just mention one additional issue. We've all talked about making decisions based upon science. And you've mentioned that many times, and I agree with you. The difficulty is that there are different views on the scientific information. I think the conclusion is pretty obvious.

I would just hope that, as we look for our legislation here in the United States, but also international treaties, that there be some support for uniform scientific information so that we all are operating with the same set of facts in what we're trying to achieve. And I would just like to get that on the radar screen as you're our ambassador on this issue.

Vice President GORE. Well, thank you, Senator Cardin. And I would like to associate myself with the remarks Senator Lugar made in his opening statement about are affirmation of the importance of science in policymaking. And I share his commendation of Dr. Jane Lubchenco and Dr. John Holdren and Dr. Steven Chu, all of whom have now been appointed and confirmed to important policymaking positions and are outstanding international leaders in science. I couldn't agree with you more.

Senator CARDIN. Thank you very much.

Mr. Chairman, I'll put the rest of my comments in the record, if that would be permitted.

[The prepared statement of Senator Cardin follows:]

PREPARED STATEMENT OF HON. BENJAMIN L. CARDIN,
U.S. SENATOR FROM MARYLAND

We all know the problem: The U.S. imports over 65 percent of our oil from foreign countries—many of them openly hostile to our country. American consumers are literally financing extreme anti-American groups that we fund through our oil dollars. We have a petroleum habit that creates national and international security risks, causes long-term energy price instability for consumers worldwide, and puts our planet and individual health at risk.

As a member of the Senate Foreign Relations Committee and the Senate Environment and Public Works Committee, I recognize that this is a global problem that requires aggressive, coordinated action on the part of the U.S. and the world community. We must develop a balanced energy strategy so that our national security,

economy, and environment are no longer held hostage by those who might do us harm. We also must work with all nations to break our addiction to oil and rebuild our economy around alternative, renewable energy sources that are friendly to our environment. The longer we wait to act, the harder these problems will be to solve.

Scientists from around the world agree: We must address the critical buildup of dangerous greenhouse gases in the atmosphere or risk catastrophic results around the world. Rising sea levels could swamp low-lying areas, displacing millions of people and causing billions of dollars in damage to property. Weather extremes are likely to bring extended droughts from areas ranging from central Africa to America's Midwest. Loss of life, the rising risk of civil unrest, and the specter of coastal communities underwater by the end of the century are all clarion calls for immediate action.

This December world diplomats will convene in Copenhagen, Denmark, to finalize the United Nations Framework Convention on Climate Change (UNFCCC). The world community will be called on to set tough greenhouse gas reduction requirements. This global agreement will have to strike a balance that spreads the costs and benefits fairly between developed and developing economies. The task is daunting, but the price of failure is unimaginably high.

For 8 years the U.S. failed to constructively engage the world community in this unprecedented challenge. That all changed last week with the inauguration of Barack Obama as President of the United States. In his inaugural address and in statements from the White House, our new President has made it clear that America intends to take leadership on this critical challenge to our safety, our economy, and our environment. Our government's actions will be guided by sound science, not wishful thinking. And we will approach this challenge with a renewed sense of international cooperation.

America will not try to dictate the terms of a treaty to a skeptical world. Instead, as President Obama has promised, we will follow the lead of our international scientific community, which forged a powerful consensus based on facts and mutual respect. That same respect, and a willingness to listen, learn, and compromise, will be the hallmarks of the Obama administration's international diplomacy. The challenge of Copenhagen is formidable, but with a healthy respect for other nations and an abiding trust in science, this administration is prepared to rise to that challenge.

I applaud President Obama's efforts to ensure that the U.S. is more involved and open to legitimate negotiations. America will no longer sit on the sidelines as the world formulates the next round of commitments by countries to address climate change after the expiration of the Kyoto Protocol, which runs through 2012. Already, progress has been made at the early working group meetings in Bali, Indonesia, and most recently in Poznan, Poland.

I cannot overstate the need for urgent action. My home State of Maryland already has been hit with the effects of climate change. Global warming pollution in Maryland has increased 55 percent since 1960. According to the Maryland Emergency Management Agency, Maryland is the 3rd most vulnerable State to flooding, and has the 5th longest evacuation times during a tropical storm. About a third of the Blackwater Wildlife Refuge on the Eastern Shore has been lost in the past 70 years. Smith Island, situated in the Chesapeake Bay, has lost 30 percent of its land to rising sea levels since 1850. Finally, Allstate Insurance Corp. has stopped writing new homeowners' policies in coastal areas of Maryland, citing concerns about a warmer Atlantic Ocean and the possibility of stronger and more frequent hurricanes hitting the area.

There is some good news. I am pleased to report that international companies like BP Solar in Frederick, Maryland, already a leading solar energy operator, are ready to grow their businesses and they will have the trained workforce to build, install, and operate a new generation of electricity-generating equipment.

Maryland is in the forefront of hybrid technology development too. In Hagerstown, Volvo and Mack truck are designing and building hybrid truck engines for military use but with great potential for crossover to the commercial market. And in Baltimore, Allison Transmissions is building hybrid engines for General Motors for use in buses. The vehicles being produced in Maryland have significantly greater fuel efficiency and will dramatically reduce their need for oil. Many also are being tooled to handle a wide variety of bio-fuels. In the future, we envision fuel-efficient vehicles powered by home-grown bio-fuels. Maryland is helping lead our Nation closer to energy independence.

The problems of global warming will manifest itself at the local level in places like the Chesapeake Bay. And the new jobs of the future will be found in places like Hagerstown, Maryland. But to address this problem, we need to act on the international stage.

For the sake of our security, economy, and environment the U.S. and vulnerable populations around the world, in Copenhagen and beyond, we must fully engage the international community in a concerted effort to address global climate change.

Senator LUGAR. I thank the Senator.

The chairman has asked me to recognize, now, Senator Risch.

Senator RISCH. Thank you very much.

Mr. Vice President, very briefly, because we all have to go vote——

Thank you, I did.

Mr. Vice President, you've obviously studied this and have produced a lot of information for us today. And what does your modeling tell us we will do, as a species, if we don't do what you're suggesting—or, if America does what you're suggesting, but other countries don't follow? We—you know, we've been around a couple of hundred-thousand years, expanded over the last 60,000 years only. What does your modeling tell you about how long we're going to be around as a species?

Vice President GORE. Well, I don't—I don't claim the expertise to answer a question like that, Senator, but there—there are some distinguished scientists who have expressed grave concern that, along with all of the catastrophes that they've predicted over the nearer term if we don't rein in these emissions, we could cross a point of no return, beyond which the damage could be irretrievable and would grow worse.

Professor Jim Hansen, in his most recent paper, wrote about the "Venus syndrome," which basically means that if we set off catastrophic warming, it could become unstoppable.

Just 2 days ago, Professor Susan Solomon, at NOAA, produced a—an important study about how these large-scale changes could become irreversible; indeed, some of the—not the most serious ones, but some—have already become irreversible; the worst can still be avoided.

Professor James Lovelock, the originator—cooriginator of the Gaia hypothesis, has perhaps the darkest view, that human civilization would be almost completely disrupted if we don't deal with this challenge.

And these kinds of apocalyptic predictions can, unfortunately, paralyze action, because people just hear that and they think, "Oh, well, you know, there's no hope anymore." But, the scientists tell us that if we act boldly and in the near term, we can avoid the worst consequences. And I choose to put the emphasis on that part of it.

Senator RISCH. And what—you said, "They predict what will happen if we do act." Has anybody predicted what will happen if we don't, if we just stay on the course that we're on? Has anybody predicted how long we're going to be around?

Vice President GORE. Well, I don't know that anybody has predicted how long the human species would survive if we don't act. I think the scenario that those scientists warn us about is not for any, you know, extinction of the human species, but, rather, of the risk of the collapse of the basis for civilization, as we know it.

For example, a sea-level rise that produced hundreds of millions of climate refugees would certainly destabilize countries around the world. We've already seen what the influx of refugees from Chad

into the Darfur region of Sudan has done in complicating the tensions and violence there. There are other causes, but the head of the U.N. says that's one of the principal causes. We've seen climate refugees in other parts of the world. We have seen, also, the migration of tropical diseases into temperate zones where we don't have the immunities and habituation to those diseases, and grave risks from that.

There—the number of threats that are catalogued by these scientists is—it's a really daunting list. So, prudence alone would dictate that we take action to avoid 'em.

Senator RISCH. Thank you, Mr. Vice President.

Thank you, Mr. Chairman.

Vice President GORE. Thank you, Senator.

Senator LUGAR. Well, thank you very much, Senator.

Vice President Gore, the Chair will call for a temporary recess, pending the return of the chairman. He is voting, as you know, and——

Vice President GORE. I'm familiar with the exercise, Senator. Thank you. I'll be here when you all get back.

Senator LUGAR [continuing]. So, we'd ask for your patience, and that of those who are witnessing the hearing.

Vice President GORE. Thank you.

[Recess.]

The CHAIRMAN. Thank you all very much for helping us out with the schedule.

Senator Menendez, I think you're up.

Senator MENENDEZ. Thank you, Mr. Chairman. And I appreciate your leadership in this context, in using the committee's jurisdiction to move this issue along.

And, Mr. Vice President, welcome, again.

Vice President GORE. Thank you.

Senator MENENDEZ. Thank you for your incredible leadership. You make this crystalline for those who don't either understand it or want to understand it.

Vice President GORE. Thank you.

Senator MENENDEZ. And I appreciate your incredible advocacy in this respect.

As you've well noted, the situation is grim. The challenge presents us with equally great opportunities for action. And I believe there are three things we need to do to get past the old rhetoric and get moving to address climate change. We've got to work through the fears that addressing climate change will hurt American competitiveness. We need to gather all the stakeholders, including business, labor, and the environmental community, and figure out the real data on how a carbon price will impact carbon-intensive industries. And once we have that data, we can address those impacts. And it's time to get past the rhetoric and get to a set of numbers we can all agree on. And there are several of us who are working on that.

Second, if costs are a key concern, let's determine what the true costs of lowering greenhouse gas emissions are, versus the costs of climate-change impacts from unfettered emissions. And I think, in Great Britain, they produced that Stern review, which stated, if we don't act, the overall costs and risks of climate change will be

equivalent to losing at least 5 percent of global GDP each year, now and forever. I think that's pretty dramatic.

And third, we need the President and other leaders to prioritize climate change and raise awareness about the inevitable effects we will all feel as the climate continues to warm.

So, I want to join my voice to the chorus of voices that you have brought people to in this respect, as well as the Chair.

I have a couple of questions.

First, particularly close to my heart is the devastation that will result from rising sea levels. In a report released just 2 days ago, the National Oceanic and Atmospheric Administration noted that even conservative estimates could mean that, "many coastal and island features would ultimately become submerged." Mr. Vice President, "submerged" is a frightening word to States, such as New Jersey, that have 127 miles of incredibly important coastline that supports very complex ecosystems and are an integral part of so many people's lives. It is also a great part and driver of our economy, as well, second largest driver of New Jersey's economy, and I'm sure many coastal States would find themselves in the same set of circumstances.

So, no one is better at raising awareness of climate impacts than you are, so, first of all, I have an invitation. Will you join me, this summer, at the Jersey Shore so that, in fact, we can see, firsthand, the challenge that we have and the resources that would be put at risk if, in fact, we don't act, and act quickly, on global climate change?

Vice President GORE. Well, I love the Jersey Shore——

[Laughter.]

Senator MENENDEZ. I figured it was an easy one, you know.

Vice President GORE. Well, thank you for the invitation. We'll try to work that out.

Senator MENENDEZ. Last September you spoke, along with fellow Nobel Peace Laureate Wangari Maathai about the importance of including forest preservation efforts in a carbon market. And a report by the Union of Concerned Scientists stated that, "If the international community invested a total of $5 billion annually, we would reduce emissions caused by clearing tropical forests by 20 percent in the year 2020, which would be the equivalent of taking 100 million cars off the road."

Do you support the idea of addressing international deforestation and degradation through market mechanisms?

Vice President GORE. Yes. I definitely think that the problem of deforestation should be included in the treaty negotiated at Copenhagen, because more than 20 percent of the world's global warming pollution each year comes from deforestation.

It used to be extremely difficult to put that in the same conversation with industrial emissions, but, starting in the conference in Bali, a year ago in December, the formula was pretty much agreed to, and I think everybody now has a high degree of confidence that this new treaty will include this element, and will be included in the market mechanisms.

Senator MENENDEZ. And do you think we can create the regulatory and enforcement capability to make such a market work effectively?

Vice President GORE. Yes, I do. And a lot of work's been done over the last several years, to make that possible, and I think there's now a high degree of confidence in it.

Senator MENENDEZ. Mr. Vice President, because of the recent financial scandals and the economic downturn, there has been, by some, an increasing distrust of market mechanisms. And I understand the skepticism of some, but I also believe that properly constructed markets, such as a cap-and-trade system, can be a powerful tool to lower emissions in an efficient manner.

How would you respond to those who express doubt about creating a carbon market? And if we do create a cap-and-trade system, is there anything wrong with taking some of the auction revenues and using them for green energy research—making homes, for example, more energy efficient—and training workers for a green economy?

Vice President GORE. Well, I certainly agree with the last part of your comment, and I think your question is a very important and interesting one, Senator Menendez.

Capitalism itself has been under attack in the wake of the synchronized global recession and the credit crisis that has now gripped the global economy. But, we know, from long experience, that capitalism unlocks a higher fraction of the human potential than any other system. And when properly pursued, with adequate and appropriate regulation to protect the public interest, it is, by far, the best way to proceed.

Now, the most serious defect in the way capitalism has addressed this climate crisis, up until now, has been what the economic theorists call "externalities." And—meaning, of course, that the horrible consequences of dumping 70 million tons of CO_2 into the Earth's atmosphere every 24 hours are not anywhere included in the market's calculation of the costs and benefits of energy choices and economic choices.

If an individual or a business can simply dump the pollution on others, and not have to reflect the cost of dealing with it adequately in the economics of what they're doing, then obviously, if that's a free way to evade the responsibility for that cost, they're going to do it. And CO_2 has been a particular challenge, because, unlike most other forms of pollution, it's invisible, tasteless, and odorless, and it's evenly distributed, globally. So, the old aphorism, "out of sight, out of mind," certainly applies.

With the new recognition that this is, by far, the most serious challenge we've ever faced, the efforts to internalize those environmental costs so that they're not externalities is the prime challenge to remedy the problems that capitalism has experienced there. Rejecting a market mechanism as a part of the solution because one is—whoever it is—skeptical about the market, is shortsighted if it doesn't take into account the dire problem with markets that has to be remedied by including it.

Senator MENENDEZ. Well, thank you very much. I agree with you wholeheartedly. Again, I appreciate your leadership.

Mr. Chairman, I've had the privilege, in the last Congress, of chairing our subcommittee that deals with international environmental agreements, and any way we can complement your work at the full committee, we're looking forward to doing that.

The CHAIRMAN. Well——

Senator MENENDEZ. Thank you, again.

The CHAIRMAN [continuing]. Senator, you've been a terrific leader on it, and we obviously need your continued input and look forward to working with you very, very closely.

Senator Shaheen. Finally. [Laughter.]

Senator SHAHEEN. Thank you.

Mr. Vice President, thank you so much for being here, and for everything that you've done to raise awareness about the challenges of global warming.

Vice President GORE. Thank you. I can't tell you how glad I am to say that phrase, "Senator Shaheen."

Senator SHAHEEN. Sounds good to me, too. [Laughter.]

Senator SHAHEEN. In 2007, people in New Hampshire—164 New Hampshire towns—passed a resolution calling on Congress and the President to act on climate change in ways to protect the U.S. economy and environment. It was a very impressive showing for New Hampshire, as I'm sure you appreciate.

And, as you have pointed out, and others have echoed here, it's critical that the United States be a leader in the world. And it seems essential that, if we're going to do that with the kind of credibility that we need, that we need to act domestically to address global warming here in the United States. And, as you pointed out, President Obama has said that we need to do this, and he's indicated his support for a cap-and-trade approach.

And Senator Corker talked about a carbon tax and returning the carbon tax to the people of the country, but—do you have any comment—one of the proposals about a cap-and-trade approach which would have the funds raised through the auction go back to taxpayers in some form, through the payroll tax or other means?

Vice President GORE. Yes. I think that it is important to mitigate the impact of any such measure by returning revenues. I think that, as I said in response to earlier questions, there are many claimants for that potential pool of revenue, and the Senate and the House will have to sort that out.

I do believe that a revenue-neutral CO_2 tax is the simplest and best way to proceed. I've proposed it for 20 years, and wasn't even attacked on it, because it was seen as so implausible.

I think it's more plausible now. I think there is somewhat more support for it. But, I think it's still widely recognized as in the highest degree of political difficulty; and therefore, there's a risk of making the best the enemy of the better.

And I think—you know, it's not an accident that most every climate bill that's been introduced is based on cap-and-trade. Almost every national approach that has been undertaken is the same, although nations like Norway and Sweden, New Zealand, and others, have adopted a CO_2 tax, part of which is rebated. The provinces of Quebec and British Columbia have also enacted it, and others are actively considering it.

So, I don't think it should be ruled out just because it's politically difficult, and it could be coupled with cap-and-trade. But, in the real world of the political pressures that this body faces today, I think it's more likely to expect that a cap-and-trade system will be the instrument of first choice.

Senator SHAHEEN. Well, maybe I wasn't clear enough. What I'm suggesting is that the revenues generated from the auction in a cap-and-trade could—rather than all of them going to promote other renewable alternative——

Vice President GORE. Yes.

Senator SHAHEEN [continuing]. Energy sources, to have either all, or some percentage of them, come back to——

Vice President GORE. I agree.

Senator SHAHEEN [continuing]. Taxpayers in some way, as a way to help make the cap-and-trade——

Vice President GORE. Absolutely.

Senator SHAHEEN [continuing]. More palatable for those opponents.

Vice President GORE. Absolutely. I agree with you.

Senator SHAHEEN. My other question has to do with transmission. And obviously one of the things we're going to have to do in this country if we're really going to get where we need to go, in terms of alternative and renewable energies, is to change our transmission system.

Vice President GORE. Right.

Senator SHAHEEN. And one huge issue with respect to transmission is how the siting gets done and who has responsibility for that. Obviously, States have tended to hold on to that responsibility very jealously. Do you have thoughts about whether there should be a Federal entity that takes responsibility for transmission siting, or whether there's a way to address the matter of each State wanting to have control in a way that makes it so difficult to get any changes to the transmission system done?

Vice President GORE. I believe that our country needs a Unified National Smart Grid, with a large Federal role, not to the complete elimination of State and regional roles. But, we now have a Balkanized system, with three interconnected grids—one in the East, one in the West, one in Texas—and lots of smaller systems within each of the three.

And, you know, utility economics is to economics roughly as quantum physics is to physics. The normal rules don't appear to apply. And so, for example, in many regions of the country, no matter the available of—availability of renewables or conservation options, the utility is rewarded far greater for the dirtiest electrons that they can possibly provide. And if, within that system, they are given the authority to bring in new dirty coal-fired electricity to replace some of the renewables that are coming online, that would be a tragic result.

So, I think we need a Unified National Smart Grid that places a priority on renewable electricity. And the new grid has roughly two components. One is the ability to transmit the power over long distances, with low losses from the solar energies of the Southwest and the wind corridor in the mountain States, for example, to Manchester, New Hampshire, and other places where it's burned.

Second, it has the ability to give consumers—homeowners and business owners—a much greater, more sophisticated degree of control over how they can eliminate the wasteful use of energy and save money at the same time they're reducing pollution.

Senator SHAHEEN. Thank you.

Vice President GORE. Thank you.

The CHAIRMAN. Thanks a lot, Senator Shaheen.

Senator Kaufman.

Senator KAUFMAN. Mr. Vice President, I'm very glad to see you here.

Vice President GORE. I like that phrase, also, "Senator Kaufman." [Laughter.]

And I'm happy that we've had a chance to work together for so many years.

Senator KAUFMAN. We haven't had a chance to talk recently, but I'd just tell you how impressed I am with——

Vice President GORE. Thank you.

Senator KAUFMAN [continuing]. What you've been doing on this issue.

And do you really feel the economic recovery bill is a step forward, in terms of climate change?

Vice President GORE. I think that the House version of the bill, H.R. 1, is an excellent bill. There are a few minor changes, of course, that I think could usefully be made; but, overall, I think that the President's proposal, and the House iteration of the bill, is really outstanding.

Since you asked my opinion, I have not gotten the results of the late-night session on the Senate Finance Committee last night, because I was coming here to testify, but I'm very concerned that the committee version would result in a complete screeching halt to any construction of solar facilities or wind facilities on a significant scale anywhere in the United States. And that would be a perverse outcome, if that provision wasn't changed in the middle of the night, or isn't changed on the Senate floor, if it's still in the bill.

Second, I think that the Senate legislation, as it currently stands coming out of committee, is—has a serious problem, compared to the House bill, in not applying the right conditionality to the State efficiency grants, particularly on this issue of decoupling.

And we talked about this a little bit earlier, but, you know, California came up with a way to give the utilities a profit making incentive to give the right priority to conservation and efficiency and renewable energy, and not just sell more dirty electrons.

And the House bill, as it came out of the House Commerce Committee and to the floor, has a terrific provision on this. And special interests are opposed to it, naturally. And I don't know the reasons why that has been eliminated, thus far, in the Senate draft. But, again, I know there are many people in the Senate who will be eager to get the right kind of provision when that bill comes to the floor and that it comes out of the conference committee.

Senator KAUFMAN. You know, you've been incredibly articulate, both on the scientific and the economic implications of climate change, but I also know in there lies a very good political mind, and I'm just trying to just tap into that for a second. Can you just talk a little bit about how we get the votes in the Senate to make all this happen, kind of how you put that together?

Vice President GORE. Well, I think that the road to Copenhagen is—has three steps to it.

First of all, pass the green stimulus provisions of President Obama's recovery plan, and book the CO_2 reductions that can come from that plan.

Second, pass a cap-and-trade bill here in the Senate. Having laid the groundwork for the CO_2 reductions that will come with the green recovery program and the Unified National Smart Grid and the renewables and efficiency and conservation, then the degree of difficulty in implementing a cap-and-trade system that's intelligently designed, I think, is far less.

And then, the third step is to go to Copenhagen, behind President Obama's leadership, and get a treaty that's ratified and allows the U.S. to lead the world again.

Senator KAUFMAN. Can you tell us a little bit about how you build that coalition at Copenhagen, how the President should build that coalition at Copenhagen?

Vice President GORE. Well, I think that one of the real keys is firming up the willingness of the developing countries to undertake, the phrase is, "differentiated, but binding, obligations" in the first phase. If they were not subject to some binding obligations in the first phase, then we would, once again, face a political challenge here in the U.S., particularly when IT-empowered outsourcing creates new competitors in the developing world. So, I think that their new willingness to accept differentiated, but binding, obligations is really one of the real keys to building that coalition, and those countries ought to understand that the ability of the United States, and therefore the world community, to deal with this crisis expeditiously and effectively really does depend on the willingness—well, it depends on a lot of things, but one of them is the willingness of these developing countries to accept differentiated, but binding, obligations in the first phase.

Senator KAUFMAN. And how do you think the present recession is affecting our ability to convince them to sign on to this.

Vice President GORE. Well, again, I believe that—you know, the old cliche is, "Crisis is both danger and opportunity"—I believe this is a tremendous opportunity to put a lot of people to work, quickly, in sustainable, high-paying jobs. And in the developing countries, you have certain opportunities there that don't exist here. Just as some of those countries leapfrogged over the old fixed-line telephone service and went straight to cell phones, some of them are going to skip over the old dirty coal-fired generating plants and go straight to solar and wind. And if you don't have all that existing legacy infrastructure, the economic advantages of renewables are even more pronounced.

Also, tree-planting programs, which, along with avoided deforestation, can result in the sequestering of a lot of CO_2 from the atmosphere; that creates a lot of jobs in the developing countries.

And one final point. We talked, earlier in the committee, about including, prospectively, soil carbon in the calculations. That can't happen in Copenhagen, because the spadework hasn't been done to do the monitoring and compliance to a degree of reliability and satisfaction that will make it possible to do it this December. But, we can start that process going, just as the avoided deforestation was, in previous meetings.

And if we can include it, then, in these poor countries that need better agricultural techniques and more income, soil carbon sequestration can be a very important new element, prospectively, in getting them integrated into the global economy.

Senator KAUFMAN. Thank you very much.

Thank you, Mr. Chairman.

The CHAIRMAN. Well, thank you very much, Senator Kaufman.

Mr. Vice President, just picking up quickly on a couple of those thoughts, if indeed we can leapfrog,—and I absolutely agree with you that this is a wonderful opportunity for people to avoid making the mistakes we made—there's been a lot of talk about the technology transfer, technical assistance, and adaptation and other components of this. Do you have a sense of how much we ought to be putting on the table in order to advance this conversation as rapidly as possible and to show our bona fides? It was my impression that if we put multiple billions on the table as a mark of America's commitment to helping other countries to be able to do this in a way that doesn't repeat our mistakes, but at the same time doesn't handicap their economies in growth, we advance this discussion much more rapidly.

Vice President GORE. Yeah. Well, I think we should, for a number of reasons.

First of all, because a shared technology program and a large adaptation fund, both are keys to gluing together a truly global agreement.

But, second, if we can kick-start a massive global shift from an energy infrastructure that depends on dirty and expensive carbon-based fuels to an infrastructure that is based on fuels that are free forever—the sun and the wind, geothermal—then there will be so many opportunities for business and sustainable growth and jobs creation for Americans companies, marketing these new technologies all around the world, everybody that's—that is making these new systems will have all that they can handle, and more. The supply-chain bottlenecks will be the constrains, and then there'll be innovation to get around those.

But, just as the United States led the world in the economic—post-World War II economic boom, we can lead the world with our own job creation and higher living standards by leading this transition to a low-carbon economy. And technology-sharing and adaptation support, those are two of the keys to kick-starting this revolution.

The CHAIRMAN. I couldn't agree with you more. And as I look at the imperative that you so brilliantly laid out today and that the science is telling us requires quick action, as you measure that, the inclination is to—at least for those of us who have hook, line, and sinker, bought into that science—say, "Why aren't we moving more rapidly with respect to that 100-mile zone that you've described?" If you've got 100 square miles——

Vice President GORE. Yeah.

The CHAIRMAN [continuing]. And we properly developed it, we could be completely fossil fuel free in the production of our electricity for the United States, and then move our automobiles more into the electric grid—

Vice President GORE. Right.

The CHAIRMAN [continuing]. Where they're plugged in at night when you're producing the same amount of electricity. That's a revolution——

Vice President GORE. Right.

The CHAIRMAN [continuing]. In and of itself, with respect to America's national security, the environment, our global climate change, our health, almost every obligation. So, you say to yourself, "Why aren't we doing that?"

Vice President GORE. Well, I think one reason is, we don't presently have the infrastructure that makes it possible. That's why the first order of business is the approval and construction of this Unified National SmartGrid.

The CHAIRMAN. But the question was raised earlier about the state restraints we have. The Obama administration has already met its own level of frustration as they've sought to try to accelerate the deployment of that grid, and we find, "Oh, gosh, you know, you can't actually get the lines in here," or, "You can't do this." Does that require preemption? Is that the first order of business here, to create the national structure that facilitates the deployment of that?

Vice President GORE. Yes. I think we need a national unified system, with a large Federal role, with preemption being used very carefully, and in support, primarily, of the renewable electricity options. But, yes, that's what we need.

You know, the introduction of the Internet kicked off a huge surge of economic growth and job creation. And people talk about the "bubble and bust." Well, actually, the sustained, long-term creation of jobs and income and economic activity as a result of the Internet, and the software explosion that accompanied it, and the personal computer explosion, and all of the applications, it has been phenomenal.

Similarly, the construction of the railroads in the 1800s, the building of the Interstate Highway System in the 1950s, 1960s, and 1970s, these national unifying infrastructure projects were each accompanied by a wave of sustained economic growth and higher standards of living.

The next wave will follow the building of the Unified National Smart Grid. And yes, that, in some cases, will be the careful and judicious use of preemption, with a careful eye toward not having it facilitate more dirty electrons, but put a priority on renewable electricity.

The CHAIRMAN. I agree with you. The reason I asked the question is that it strikes me that there has to be a greater level of urgency and focus on that central infrastructure component——

Vice President GORE. Yeah.

The CHAIRMAN [continuing]. From which so many other things will evolve.

With respect to China, it also strikes me that we're staring at a unique opportunity. And I wonder if you agree that if the United States were to rapidly reach out to China and try to establish a joint-venture effort on research, on some of the technology transfer, and even on some of the technical assistance, and ahead of Copenhagen at a bilateral level we were to try to reach an understanding about our joint leadership role here—we're number one and two

emitters in the world; together, about 40-plus percent, I believe, of all the greenhouse gas emissions—and we came to that agreement, it seems to me that would do an enormous amount to leverage what happens towards Copenhagen.

Vice President GORE. I couldn't agree with you more. And recent statements by Chinese leaders have made it very clear that they are changing, and changing rapidly. Resistance, at the regional level, has been moderating, somewhat. They do have a somewhat different approach; instead of cap-and-trade, they have cap-and-imprison. And I don't necessarily endorse that approach, but it seems to be of some effectiveness in some regions, and they are beginning to shift.

I put just one illustrative statement by one of the policy leaders in China, saying, "It's in China's own interest to accept greenhouse gas emissions goals, not just in the international interest. Unless we become one of the biggest green contributors, we will be one of the biggest victims of global warming."

And, of course, President Hu and Premier Win have, themselves, repeated made bold, and even visionary, statements on why China has to move quickly to limit the damage from global warming and to introduce renewable energy.

Now, implementing that, executing those policies, that's a different story. But, I think the basis for United States-Chinese cooperation in leading the world on this issue is certainly there, and I endorse your idea.

The CHAIRMAN. Last question, and then I'd like to make one observation. With respect to India and China, our mutual friend, Vinod Khosla, has talked about the electric solution being something that we can talk about here in the United States, but that there's no electric solution in much of Africa India, and China, because they just don't have it, and they're not going to have it in the near term. So, as they bring their combustion engines online—which they will as more and more Chinese, Indians, and others want to drive cars—what's your thought about how we approach the transportation sector in those countries with respect to global-climate-change standards?

Vice President GORE. Well, I wouldn't give up on electric vehicles in those areas, because central—concentrated solar thermal generating systems actually can be introduced quickly and profitably in India, in the desert regions of the West, and connected by their own smart grid to areas where the electricity can be used.

In Africa—I showed the slide, earlier, of the supergrid connecting northern Africa to Western Europe—that can also provide electricity from the Sahel down into sub-Saharan Africa, as well, as demand grows; a line from the heavily insulated areas to Lagos, for example, to Nairobi. The potential is certainly there.

Now, low-emission internal-combustion vehicles will be introduced. But, advanced biofuels made with cellulosic ethanol and some of the new technologies that sound like gobbledygook—enzymatic hydrolysis—some of the new approaches that really do offer the promise of making liquid biofuels from weedy plants that don't compete with food in ways that recycle the CO_2 through the next year's crop, absent the processing costs, that does offer the hope for

a more renewable, low-emitting advance in transportation infrastructure in these small countries.

The CHAIRMAN. I thank you for that. It's your belief, then, that the solar can, in fact, be deployed rapidly enough in those countries?

Vice President GORE. I have no question about it at all.

The CHAIRMAN. I would just observe that many people in their reluctance to believe that we can embrace these goals as rapidly as many of us think we have to need to recognize that the states are, on their own, way ahead of the Federal Government. And, in fact, over half of the American economy is already voluntarily under mandatorily-accepted reduction schemes.

Specifically, in the Northeast you have the RGGI agreement where they've actually promulgated regulations and are, on an interstate basis, engaged in mutual reductions.

In the Midwest, there are ten states—Wisconsin, Minnesota, Illinois, Indiana, Iowa, Michigan, Kansas, Ohio, and South Dakota—together with Manitoba, Canada—who have joined together in an effort to reduce—they still have to put out the regulations, but the important thing is that they've agreed this has to be done and have been able to come to an agreement.

In the West as well, you have five states—Oregon, California, Washington, New Mexico, and Arizona.

So, more than half of the American economy has already done what Washington, DC, and the Federal Government have been unwilling to do, which is to say, "We recognize this problem, and we need to do something."

I see you've put up a—you've come prepared for every component of this.

Vice President GORE. The latest count—this is as of a couple of weeks ago, and they may have added a few—but, it's impressive that 884 cities have voluntarily adopted the central principles of the Kyoto Protocol. And even more impressive, what you cited, the State programs that actually start putting this into effect. And California's been leading the way, of course.

The CHAIRMAN. Right.

Well, Mr. Vice President, I have to tell you, in the years I've been here, I've been to a lot of hearings, and this is—and not because I'm chairing it—one of the most substantive and important messages that we've received in that time. I've heard that already from my colleagues who are here. They are enormously appreciative of your presentation—

Vice President GORE. Thank you.

The CHAIRMAN [continuing]. Today. This is going to be a tough slug, but we're going to try to do it. We're going to do everything in our power to keep the pressure on and keep the focus on.

But we are forever grateful to you for the power of your advocacy in this effort. We have nothing but enormous admiration and respect and gratitude for it.

So, thank you for sharing it with us today. We look forward to working with you in the days to come.

Vice President GORE. Well, Senator Kerry, it's been my privilege to work as your partner for so many years on this. And thank you,

again, and thanks to the members of the committee, for inviting me today.

The CHAIRMAN. We're delighted. Thank you.

We stand adjourned.

[Whereupon, at 1:05 p.m., the hearing was adjourned.]

ADDITIONAL MATERIAL SUBMITTED FOR THE RECORD

STATEMENT SUBMITTED BY SENATOR ROBERT P. CASEY, JR., U.S. SENATOR FROM PENNSYLVANIA

Mr. Chairman, thank you for calling today's hearing on a very important issue facing our Nation and the world today. The threat of catastrophic global warming may seem to be a second priority after fixing our current economic crisis, but I believe that if we do not address both simultaneously we are setting ourselves up for another crisis in the future that will have untold consequences on the world's economy and population. We must work aggressively to fix our immediate problems while ensuring our long-term security and prosperity.

The solution to global warming is a puzzle with two interlocking pieces. One is our role as part of a global solution. The other is our domestic policy that will reduce our greenhouse gas emissions so that we meet our global commitment. We made a good start last year with the first major debate on global warming legislation. But while we continue to work on legislation that will make mandatory reductions in our greenhouse gas emissions, we must keep our eye on the international aspect of this debate.

Just 11 months from now, we are scheduled to sign off on an agreement to address global warming under the U.N. Framework Convention of Climate Change. We have a lot of work to do between now and then to reestablish ourselves as a world leader and back that commitment up with the domestic policy that will achieve the greenhouse gas reductions we need to make to fulfill our global commitment.

As it stands today, I would characterize the U.S. as being behind the power curve when it comes to addressing global warming. We spent much of the last 8 years thinking up reasons that we couldn't act and excuses for ignoring our role in a global crisis. While we have made progress, we are still at the beginning of the process of piecing together a domestic program that will work for all of the different regions of this country. Embracing the goal of reducing carbon emissions by 80 percent by 2050 is easier than the actual mechanics that will achieve the reductions. We have a lot of work to do to answer some very tough questions. For example, I believe that we must have a plan for coal. That is, the status quo will obviously not get us the reductions we need when a full one-third of all of our greenhouse gases come from generating electricity. But coal is an important domestic resource that we cannot simply ignore for the sake of expediency. Furthermore, the impact of the coal industry on Pennsylvania and other States in our region is such that we cannot simply go on faith alone. We must have a commonsense future for coal based on science and investments in technology that will bridge the gap between today and a carbon-controlled future.

Much of the progress we have made on global warming has been done by the States, including the most recent petition of States like California and Pennsylvania to be allowed to regulate automobile emissions. The States are certainly working hard to keep up their end of the bargain, and now it's time for us to do our work both internationally and with a national program to slow, stop, and reverse global warming.

RESPONSES TO ADDITIONAL QUESTIONS SUBMITTED FOR THE RECORD BY MEMBERS OF THE COMMITTEE

RESPONSES TO QUESTIONS SUBMITTED TO FORMER VICE PRESIDENT AL GORE BY SENATOR CASEY

Question. You have worked through the We Campaign to establish an aggressive goal of repowering America with 100% renewable electricity in 10 years. How would

you propose to transition away from the large amount of base-load coal electricity we have today? Does development of new coal technologies fit into the plan?

Answer. In our projections, we can meet the goal either with or without technologies that include the 100 percent capture and sequestration of the carbon dioxide from coal. It is my hope that CCS technology will be developed and that we will see the success of full-scale demonstrations. That will require government help, including putting a price on carbon, because the coal industry has no incentive to spend the considerable sums of money that will be needed to test this new technology. I strongly support the new initiatives to help explore CCS so that it can become a solution to the climate crisis.

Question. Coal is also a major part of the tension that is brewing with China. There is the famous statement now that China builds two new coal power plants every week, although that has slowed with the economic crisis. Do you think we should be investing in clean coal research so that we can sell future technologies to countries like China who have already committed themselves to a long future with coal?

Answer. Yes, I do believe that we should be investing in CCS research, but not to the exclusion of aggressive research and development in other areas such as advanced solar technologies, storage/battery technologies, enhanced geothermal systems, wind, and a unified national smart grid.

Question. I have heard concerns that the current economic crisis and lack of ready credit will make it harder to invest in the technologies that we need to put on-the-ground in order to reduce greenhouse gas emissions and repower the country. Do you think these concerns are warranted? Do you have recommendations for actions we can take that will allow us to remain aggressive in pursuit of our goals in the midst of this economic downturn?

Answer. I believe that the President and his team of advisers took some very important steps in the stimulus package to help unfreeze the credit markets, and I supported those actions. I believe that we must continue to monitor these markets closely to ensure that they function properly and take corrective measures quickly if they do not. In addition to the credit crisis, the recession is also an ongoing threat to the economy and one of the best ways to address it is the development of green jobs and the building of green infrastructure.

Question. There is cautious optimism about the potential for green jobs to revive America's manufacturing economy. My main concern is that we need to train workers so that we are transitioning the workforce as we are transitioning the economy. Have you developed any recommendations on ways we can provide a safety net to workers, while retraining them for new green jobs? Has there been any analysis on the net effect of a fossil fuel-free policy on jobs lost in sectors like the coal industry versus the jobs gained in alternative energy?

Answer. I believe that most of the robust analysis in this area has focused either upon green jobs over the past decade or upon the near-term effects of President Obama's policies. I have seen studies from the NGO community and elsewhere that have attempted to both define "green jobs" and look at the gross and net effects of job growth. If you would like for us to compile some of those for you, please do not hesitate to ask and my staff will get back to you.

Question. What about our exporting domestic coal resources to growing economies like China and India? Should the U.S. adopt a "coal free" approach when our coal no longer has a market in the U.S.?This is an interesting question. Carbon dioxide, the most prevalent greenhouse gas, is a threat no matter where it is emitted because its heat-trapping potential is the same regardless of its point of origin. This is why it is so important that if it is to be used, the CO_2 must be safely captured and stored. This is as true in the U.S. as it is in China.

Question. From a broader economic security perspective, what are your thoughts on the criticism that a fossil fuel-free energy policy in the U.S. makes us anti-competitive on the global market, when China and India are projected to increase their reliance on low-cost coal power generation?

Answer. I believe that the world's 21st century economy will be dominated by the nations that will transition as quickly as possible to renewable sources of energy. The nation that develops and commercializes these technologies first will have a lasting advantage in the new economy.

Question. Do you think there is a role for carbon capture and storage technologies in allowing the U.S. to continue to use vast domestic coal resources while addressing climate change?

Answer. I do, although the coal industry would have us believe that large-scale applications for CCS are just around the corner. However, top experts have indicated that it could be 15–20 years before it is in widespread use, and that difficult questions must still be answered before that can happen. This information tells me that CCS is not a silver bullet and that we must take steps now to ensure that a range of renewable energy solutions are in place.

Question. Have you consulted Parties to the UN Framework Convention on Climate Change on your recommendations for a post-Kyoto accord?

Answer. I have and I would be happy to brief you about my conversations at your convenience.

RESPONSES TO QUESTIONS SUBMITTED TO FORMER VICE PRESIDENT AL GORE BY SENATOR CORKER

Question. Mr. Vice President, during Wednesday's hearing we agreed that if a carbon tax were implemented, 100% of the revenues should be returned to the American people. When we talked about how to spend the revenue under a cap-and-trade system, you said that some of the revenue could go for adaptation and some for research and technology. Would you support 100% of cap-and-trade revenue being returned to consumers? If not, what percentage should be returned and what percentage would you dedicate each for adaptation and for R&D?

Answer. The House of Representatives has completed its work on a comprehensive piece of climate legislation that includes energy efficiency measures, a renewable energy standard, and cap-and-trade provisions. Some of the permits will be auctioned. With regards to how such proceeds might be allocated in legislation, I believe that we must protect against a regressive program that disproportionately affects the poor. We also must evaluate the bill's impact on the budget and on household energy prices. To date, I believe that the leadership of the House of Representatives has tried to take these principles into account.

RESPONSES TO QUESTIONS SUBMITTED TO FORMER VICE PRESIDENT AL GORE BY SENATOR DEMINT

Question. Because the availability of renewable energy sources—especially wind, solar, and geothermal energy are heavily dependent on certain regions of the United States, a major concern is the ability to transmit energy from parts of the country with high resource potential to parts of the country where the demand actually exists.

Do you support federal preemption of state and local laws when determining the rights of way necessary to build the transmission grid?

Answer. I support the development of a more integrated, unified, national smart grid that will allow us to better transmit electricity across the country with low losses. Right now, we have three separate systems that cannot communicate or interconnect effectively with one another. In developing a national smart grid, the Congress should consider the best ways to resolve conflicts between national and state authorities in granting rights of way for new transmission lines to relieve congestion and enhance our national security from potentially crippling blackouts.

Question. You have advocated renewable energies as a solution to reducing dependence on fossil fuels and greenhouse gas emission.

First, is it not true that because of the unpredictable nature of renewable energy—renewable utility companies still rely on fossil fuels to provide backup energy generation?

Answer. During the transition, we will rely on a mix of renewable and fossil fuels. However, geothermal power is baseload energy and wind and solar complement one another in that when one is not available the other generally is. New energy storage with concentrating solar thermal will also help address the backup issue.

Question. Currently in the U.S. energy portfolio, coal is among the cheapest forms of energy followed by nuclear and then the more expensive natural gas. If the U.S. were to adopt all of your proposed subsidies for renewable energy, won't the utilities first replace their most expensive energy source—natural gas—and continue to rely on cheaper forms of energy such as coal?

Answer. Coal remains inexpensive in part because its true costs are not calculated—for example—the clean up costs for the massive spill of coal ash in my home state of Tennessee is not calculated in the statistics you are citing. Even with those costs excluded, wind power is cost competitive with coal.

Question. Do you believe at a time of deep recession and job losses we should be increasing taxpayers' energy bills and the cost of doing business or should we keep the cost of electricity lower so companies can afford to keep or hire more workers?

Answer. Fortunately, this is a false choice. A well-constructed, comprehensive climate and energy bill will include provisions for energy efficiency, renewable energy, and cap and trade that I believe will not have the impacts that you describe.

Question. According to the Nashville Electric Service, your home in Nashville Tennessee consumes more energy in a single month than the average American household uses in an entire year. In your documentary, you call on Americans to conserve energy by reducing electricity consumption at home.

Answer. Those figures are inaccurate and/or outdated. I live in a Gold LEED certified home that uses geothermal power, solar power and Energy Star appliances. I also purchase electricity from the green power program offered by my electricity supplier—which comes from non-CO_2 producing sources.

Question. You have asked Americans to sacrifice; yet you have been unwilling to make sacrifices yourself. In addition, just using your travel schedule last year your carbon footprint was more than 1500 tons of CO_2—roughly the equivalent of driving a Hummer H3 9 million miles.

Answer. Those figures are inaccurate.

Question. How much did you spend in carbon offsets last year? Do you still purchase carbon offsets through Generation Investment Management? Are you still Chairman of the Generation Investment Management?

Answer. I am the chairman of Generation Investment Management. My family and I offset our emissions through my personal office. Generation Investment Management operates as a carbon neutral company and manages its own programs. We do not release the cost of administering these programs.

Question. In your testimony you stated that "as long as we continue to send hundreds of billions of dollars for foreign oil—year after year—to the most dangerous and unstable regions of the world, our national security will continue to be at risk."

While American families curbed their consumption of foreign oil last year, your personal air travel sent over $500,000 to those countries. If the United States were to build more nuclear plants and, through the Fischer-Tropsch process, use our domestic coal resources we could end this dependence you believe is so dangerous. Do you support this strategy?

Answer. This is simply inaccurate. I drive a hybrid vehicle and actively conserve energy in a variety of ways, see above. Additionally, I fly commercially the vast majority of time.

With regards to nuclear power, as I testified, I am not reflexively opposed to nuclear power. I believe that my testimony fully explained my views.

Question. Thirty years ago, U.S. politicians enacted policies that ended the growth of the American nuclear energy industry. As a result, we haven't seen a new construction license issued since the late 1970's and energy companies switched from pursuing clean non-polluting nuclear energy and were forced to rely more and more on coal. Now, politicians condemn the energy industry for pursuing a path they were forced to follow.

Europe on the other hand has embraced nuclear energy. Today, Europeans have almost twice as many nuclear reactors than the United States and have used nuclear energy to help reduce their dependence on coal by more than 30 percent, while the U.S. increased our use of coal by more than 60 percent.

While the United States abandoned already built facilities to recycle nuclear waste, the Europeans took American technology, improved it, and control the entire nuclear fuel cycle. Now, European countries are proposing even more nuclear reactors in order to meet their pollution reduction commitments under their Kyoto agreements.

Do you support increasing the use of nuclear energy as a way to create base load energy generation in the United States?

Answer. I addressed this in my testimony. Again, I believe that nuclear power is not likely to be a large part of the solution here in the U.S. or around the world, but I do not oppose efforts to explore its use.

Question. Next to labor costs, energy is the biggest cost of doing business. In a global market place the United States currently enjoys a considerable competitive advantage when it comes to the cost and supply of energy vis-à-vis other nations.

A carbon tax would raise American energy prices on taxpayers and businesses to a level more commensurate with European energy prices and undermine one of America's strongest advantages. Do you support policies that would raise the cost of doing business in America—especially at a time when businesses are laying workers off?

Answer. I have supported a carbon tax that is completely rebated to the American people—so there would be no increase in the costs to Americans, so I respectfully disagree with the premise of your question. I also support the ACES Act that just passed the U.S. House of Representatives.

Question. You said on July 17, 2008: "The leading experts predict that we have less than 10 years to make dramatic changes in our global warming pollution lest we lose our ability to ever recover from this environmental crisis."

You have been warning of a 10 year tipping point for several years now, but are you aware that the United Nations started a 10-year tipping point countdown—in 1989? [1]

Answer. I am citing research from Dr. James Hansen of NASA-GISS.

Question. Given that the first 10-year tipping point warning was issued 20 years ago, should the public really be concerned about so-called "tipping points?"

Answer. Yes, I do, and I would particularly refer them to some new research that has updated the latest findings from the IPCC—particularly related to the state of the arctic ice cap, the Greenland ice sheet, and new studies related to the impacts of climate change on precipitation

Question. If we should be worried about "tipping points," what should we use as the starting date?

Answer. I believe that you should consult Dr. Hansen.

Question. In the past month or two there have been several new research findings that suggest the recent speed-up of many of Greenland's outlet glaciers is temporary and is now slowing. In making your projections of rapid sea level rise in the coming century, you rely on a large contribution from Greenland. Yet these new papers greatly play down that possibility. In this week's Science magazine, science writer Richard Kerr sums up the current state-of-knowledge about Greenland in an article titled "Galloping Glaciers of Greenland Have Reined Themselves In":

> Things were looking bad around southeast Greenland a few years ago. There, the streams of ice flowing from the great ice sheet into the sea had begun speeding up in the late 1990s. Then, two of the biggest Greenland outlet glaciers really took off, and losses from the ice to the sea eventually doubled. Some climatologists speculated that global warming might have pushed Greenland past a tipping point into a scary new regime of wildly heightened ice loss and an ever-faster rise in sea level.

The article continues:

> So much for Greenland ice's Armageddon. "It has come to an end," glaciologist Tavi Murray of Swansea University in the United Kingdom said . . . "There seems to have been a synchronous switch-off" of the speed-up. Nearly everywhere around southeast Greenland, outlet glacier flows have returned to the levels of 2000 . . . no one should be extrapolating the ice's recent wild behavior into the future.

Have the opinions of scientists like Tavi Murray and colleagues—scientists directly working on gaining a better understanding into the processes of glacial behavior in Greenland—tempered your beliefs about the amount of sea level rise that we should expect this century? If not, how is it that you have come to arrive at different conclusions that those from the scientists directly engaged in studying this specific issue? [2]

---

[1] According to the July 5, 1989, article in the Miami Herald, the then-director of the New York office of the United Nations Environmental Program (UNEP), Noel Brown, warned of a "10-year window of opportunity to solve" global warming. According tot he 1989 article, "A senior U.N. environmental official says entire nations could be wiped off the face of the Earth by rising sea levels if the global warming trend is not reversed by the year 2000. Coastal flooding and crop failures would create an exodus of 'eco-refugees,' threatening political chaos."

[2] References:

Answer. I would refer you to two major papers: "The risks of climate change: A synthesis of new scientific knowledge since the finalization of the IPCC Fourth Assessment Report (AR4)," 15 December 2008; and "Assessing Dangerous Climate Change Through an Update of the IPCC 'Reasons for Concern' Proceedings of the National Academy of Sciences," February 23, 2009.

I think you'll find them both very helpful on this and other questions.

Question. A U.S. Senate Minority Report released in December details over 650 international scientists who are dissenting from man-made global warming fears[3] promoted by the UN and yourself. Many of the scientists profiled are former UN IPCC scientists and former believers in man-made climate change that have reversed their views in recent years. (i.e. French scientist Claude Allegre, Israeli astrophysicist Nir Shaviv, UK scientist David Bellamy)

Given the outpouring of scientists declaring themselves skeptical of man-made warming fears, do you expect the American public to believe that there is "no debate" on this matter?

Answer. I disagree with your characterization of the U.S. Senate Minority report. All of the top scientific research agencies in the world, including the National Academy of Sciences, acknowledge that global warming is real and it is caused by human activities.

Question. The prestigious International Geological Congress, dubbed the geologists' equivalent of the Olympic Games, was held in Norway in August 2008 and prominently featured the voices of scientists skeptical of man-made global warming fears. Reports from the conference found that skeptical scientists overwhelmed the meeting, with about two thirds of presenters and question-askers hostile to, even dismissive of, the UN IPCC. In addition, a canvass of more than 51,000 Canadian scientists revealed 68 percent disagree that global warming science is "settled."[4]

Isn't the fact that prominent scientists at this meeting were publicly voicing dissent evidence that the claim that the "debate is over" rhetoric may not be an accurate description?

Answer. The Intergovernmental Panel on Climate Change and the National Academy of Sciences in over 20 countries have long ago determined that global warming is real and caused by humans. There is no debate on these points. Scientists are certainly working to understand complex issues such as how global warming effects certain regional and local phenomena, but the basics are settled.

Question. Further, a November 25, 2008, article in Politico noted that a "growing accumulation" of science is challenging warming fears, and added that the "science behind global warming may still be too shaky to warrant cap-and-trade legislation." In addition, Russian scientists "rejected the very idea that carbon dioxide may be responsible for global warming,"[5] an American Physical Society editor conceded that a "considerable presence" of scientific skeptics exists,[6] an International team of scientists countered the UN IPCC, declaring: "Nature, Not Human Activity, Rules the Climate,"[7] India issued a report challenging global warming fears,[8] and International Scientists demanded the UN IPCC "be called to account and cease its deceptive practices."[9]

—Joughin, I., et al., 2008. Seasonal speedup along the western flank of the Greenland Ice Sheet. *Science,* 320, 781–783.

—Kerr, R. A., 2009. Galloping glaciers of Greenland have reined themselves in. *Science,* 323, 458.

—Murray, T., et al., 2008. Has dynamic thinning switched off in southeast Greenland? Presentation to the Fall 2008 meeting of the American Geophysical Union, C32B-08.

—Nick, F. M., et al., 2009. Large-scale changes in Greenland outlet glacier dynamics triggered at the terminus. Nature Geoscience, DOI:10.1038, published on-line January 11, 2009.

—van de Wal, R. S. W., et al., 2008. Large and rapid melt-induced velocity changes in the ablation zone of the Greenland ice sheet. *Science,* 321, 111–113.

[3] http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore—id=83947f5d-d84a-4a84-ad5d-6e2d71db52d9

[4] http://epw.senate.gov/public/index.cfm?FuseAction=Minority.Blogs&ContentRecord—id=865DBE39-802A-23AD-4949-EE9098538277

[5] http://www.hindu.com/2008/07/10/stories/2008071055521000.htm

[6] http://blogs.news.com.au/heraldsun/andrewbolt/index.php/heraldsun/comments/no_consensus_and_no_warming_either

[7] http://heartland.temp.siteexecutive.com/pdf/22835.pdf

[8] http://epw.senate.gov/public/index.cfm?FuseAction=PressRoom.Facts&ContentRecord—id=09DF614E-802A-23AD-46C9-8A90FCB5569A

[9] http://www.tech-know.eu/uploads/Letter_UN_Sec_Gen_Ban_Ki-moon.pdf

Do you believe the above developments are the key reasons that the U.S. public has grown so skeptical of man-made climate doom predictions?[10] [11] And if not, despite all the efforts including your own film, what do you believe accounts for why the American people do not rate this as an issue of high importance to them?

Answer. I do not believe that the U.S. public is skeptical and, in fact, I believe that the emerging consensus for action on Capitol Hill is a reflection that the country is prepared to grapple with this serious problem.

Question. While you testified that the 10 hottest years on record have occurred within the last couple decades. NASA's James Hansen has noted that "the U.S. has warmed during the past century, but the warming hardly exceeds year-to-year variability. Indeed, in the U.S. the warmest decade was the 1930s and the warmest year was 1934."

If global warming is an imminent crisis, why do NASA satellite instruments show global temperatures have been falling for most of the past decade?

Answer. NASA instruments show a solid warming trend for the past 30 years. I would urge you to receive a briefing from scientists from either NASA GISS or the National Oceanographic and Atmospheric Administration (NOAA). I feel confident that they will be able to ensure that you have absolute clarity about the data.

Question. Why are we to believe we are in some sort of global warming crisis when scientists report global temperatures for most of the past 10,000 years have been significantly higher than current temperatures?

Answer. The global warming pollution we emit, 70 million tons a day, is threatening to cause carbon dioxide concentrations to rise to levels higher than at any time since humans have existed on the earth. The resulting temperature changes are projected to cause huge changes in the earth's climate that will alter the relative climatic stability that has enabled us to develop civilization as we know it.

Question. If you are confident in your global warming information and predictions, are you willing to publicly debate this issue with people from the scientific community that are just as passionate as you? Perhaps a few of the scientists who will be presenting material at the March 2009 International Conference on Climate Change in New York City?

Answer. It is time for us to acknowledge the reality of the climate crisis and shift the debate to how we can solve it.

○

[10] http://people-press.org/report/485/economy-top-policy-priority

[11] http://network.nationalpost.com/np/blogs/fpcomment/archive/2009/01/20/lawrence-solomon-obama-s-america-a-denier-nation.aspx