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GLOBAL CLIMATE CHANGE: U.S. LEADERSHIP FOR A NEW GLOBAL AGREEMENT

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BEFORE THE

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CONTENTS

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GLOBAL CLIMATE CHANGE: U.S. LEADERSHIP FOR A NEW GLOBAL AGREEMENT

WEDNESDAY, APRIL 22, 2009

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

The committee met, pursuant to notice, at 9:39 a.m., in room SD–419, Dirksen Senate Office Building, Hon. John F. Kerry (chairman of the committee) presiding.

Present: Senators Kerry, Menendez, Casey, Webb, Shaheen, Lugar, and Corker.

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

The CHAIRMAN. The hearing will come to order. Good morning, everybody. I apologize for starting a few moments late. Washington seems to get paralyzed when there's a tiny bit of moisture on the road. It's bizarre.

Happy Earth Day to all, and I think it is an appropriate topic, obviously, for us to be grappling with today.

And we're delighted to have Todd Stern come before the committee. As everybody knows, he is the designated hitter for the President of the United States and the Secretary of State and the State Department on the subject of Copenhagen and the climate control negotiations. And I appreciate the closeness with which he is working with us, and the cooperation of the administration on this topic.

I would just mention; Senator Boxer, who is a member of this committee and also chairs the Environment and Public Works Committee and is more than a full partner, a leader, and really a very key part of our efforts up here in the Senate, is not able to stay, because she is chairing her own committee shortly, but we'll put her full statement in the record, and I thank her for being here at the beginning of this.

Today's hearing comes at a really critical juncture in our global effort to address climate change. The clock is literally ticking on the best chance that countries of the world will have to marshal an effective global response. And I think all policymakers need to remember, all of those who are involved in this process need to realize, that if we aim too low, America and the global community will fail to do what is necessary to meet this challenge. It is that simple.

Russian officials, as I've been meeting with them, have promised me that their per capita emissions will never exceed those of the

United States and I think they've probably suggested this to the administration too. Now, whether that's going to meet the test or not, because per capita is obviously not the full measurement, is yet to be determined. But, in fact, Russia could become the site of disastrous new greenhouse gas emissions.

Many people are not aware of this, and I just want to put this out. Methane is 20 times more powerful than carbon dioxide. Experts say that the total amount of methane beneath the Arctic is greater than the total amount of carbon stored in the world's coal. Today, methane is beneath a lid of permafrost, on land and under water, but that lid, folks, is disappearing. It's melting.

Last year, the International Siberian Shelf Study measured the highest ever levels of methane in the Arctic Ocean and found methane bubbles coming out of chimneys on the sea floor. There are places on land and at sea where lighting a match in the open air actually causes an explosion from free-floating methane.

Alongside any thought of economic gain from climate change that Russia is going to have, consider the reality that these changes will bring with them dramatic changes, but they are dramatic for all of us, because, as we—Lisa Murkowski, Senator from Alaska, and Mark Begich will tell you, "Just go to Alaska and walk around and see what's happening to the permafrost there." And both of them have suggested that Senators ought to come and visit Alaska if they want to see a living laboratory with respect to climate change.

So, our challenge is, obviously, enormous. And today we're less than 9 months from the 15th Conference of Parties in Copenhagen; a summit to negotiate a successor treaty to the Kyoto Protocol. Within this make-or-break year, this week is a crucial, but little noticed, turning point. This is the deadline for countries to submit their input to the draft treaty that will be circulated by early June. So, while the Copenhagen meeting is in December, the standards that we're going to take to Copenhagen are being defined now—this week, next week, and in the next months. And I know that our team, under Todd Stern's leadership, is hard at work crafting our input. Our submission this week represents a crucial opportunity to ensure that America's perspective on financing, on the structure of mitigation commitments, and countless other issues, is maintained and reflected in the draft document.

Our essential challenge in crafting a global deal is, how do we give life to a couple of phrases? One phrase is "common, but differentiated, responsibilities." That phrase was codified by the United Nations and ratified by the U.S. Senate in 1992. And under that phrase, we all agree, all the nations participating, to accept common, but, on the other hand, differentiated, responsibilities. And this will be the key to bringing the G77—China and other countries—to the table.

This largely, in fact, boils down to a debate over how much action is required from the United States and how much from China, because what we decide to do will set the tone for the Copenhagen discussions.

While much has changed in the past 17 years, we're still struggling to answer that fundamental question. Now, Senator Lugar and I, and Senator Gregg, Senator Voinovich, Senator Bayh, were all at a 4-day conference, sponsored by the Aspen Institute, on cli-

mate change, and we heard a lot of very useful information regarding this. But, one of the things that is clear is, China is moving. China is moving, in many ways, more rapidly than the United States. And again, many people are not aware of that. The debate is sort of stuck in "several years ago." The fact is that, in a few years, China is going to surpass us, and they're going to be grabbing the technologies and creating the jobs, because they understand the greening of their economy is the future. And it's critical for us to understand that, too.

China is implementing policies to address its energy use—in some cases, as I said, more ambitious than ours. They will actually exceed their goal of a 20-percent reduction in energy intensity, and they will have done it faster than they thought they could, and, in fact, they weren't even sure they could meet the goal. But, they're putting into practice what many of us have said, which is, once you set a goal and begin to move down the road, the technology begins to take over, and then the marketplace begins to take over, and things happen faster than you think.

So, we have to reconcile two imperatives. On the one hand, China requires a treaty that gives it room to develop, and, on the other hand, unless we convince the world's most populous nation to pursue a sustainable low-carbon development path, none of us can hope to solve the problem of climate change.

So, these two constraints define the scope and the structure of any viable agreement. That's the reality, and that's why the Copenhagen agreement must both secure aggressive emission cuts from developed countries and also support verifiable low-carbon-growth pathways that will allow developing nations to begin reducing emissions within the next 10 and 15 years. This will only be possible if we develop financing mechanisms and structures to facilitate technology transfer and to energize global markets in clean energy technologies.

The agreement must also help countries adapt to a changing environment. I just came from Darfur, and I can't tell you what an impact coming back here and just seeing trees and green had on me; in contrast to the desertification that is taking place in parts of the world, is stunning. The agreement needs to understand these dire impacts are going to be felt by people who did the least to bring this about and who are the least capable of managing its impacts. All over the world, millions of people are going to be affected by the practices that the developed industrial nations put into place over 150 years.

A study in science warned that climate change may exacerbate megadroughts in West Africa, and we have to agree on a global mechanism to support poor countries as they struggle to relocate their citizens and reorient their agriculture patterns and resource use in response to a warming planet.

Let me remind everybody, just a few years ago the Pentagon and the Joint Chiefs of Staff, all concurred that climate change is not an environmental issue alone, not an economic issue alone, it's a national security issue. And the fact is that if you have 200,000,000-plus climate refugees, 10 times the numbers we have today, you're going to have an extraordinary challenge, in terms of

failed states, the burden of—the humanitarian burden, and conflict resolution.

The time has come for the United States to reclaim our rightful role as a diplomatic leader within the U.N. framework on climate change.

I'm pleased that the State Department will be convening a major economies forum here in Washington next week. While any agreements reached in these meetings should be reflected and formalized in the official U.N. negotiating process, I believe next week's forum can strengthen the final deal by offering the 17 largest emitters a venue to explore areas of agreement in a smaller, more focused setting.

We, here in Washington, need to understand that the world is really—and I don't say this is any form of arrogance; it's a matter of the reality that I found when I went to Poznan and met with countless environment ministers, and, likewise, Foreign Ministers and environment ministers who have been coming to Washington in the last months—they're all looking to the United States, they're looking to Washington, to take its cue from us. In the meetings that I've had over the past months, with ministers from Germany, China, Bangladesh, all across the globe, I've been struck by the extent to which the eyes of the world are focused on the United States Congress and our domestic policy process.

Without a clear signal from Congress on the scope, format, and ambition of our domestic program, our negotiators are going to lack the leverage to secure the participation of all the major contributors to climate change. And ultimately, the strength of our domestic policy will be a critical factor to galvanizing the world to enter into a global agreement in Copenhagen.

This particular challenge is one that America cannot meet alone, and we should not try to. Not when the developing world is going to be responsible for three-quarters of the projected increase in energy use worldwide over the next two decades. Even if we cut our emissions to zero tomorrow, those increases will more than nullify our progress. So, we are in this globally, and we all have responsibilities.

Also, by structuring a global deal that steers developing economies into low-carbon pathways, we actually have an opportunity, folks, to invigorate global markets and to revitalize all of our economies around energy products and services that are sustainable and that make a longer term difference to the quality of jobs and the quality of our economies, and that will give America a chance to lead economically once again, because of the power of our research and development. Remember, we developed solar and wind. But, because, in the 1980s, we drew back from our commitment and support to it, Japan and Germany and others, took the lead, with respect to photovoltaics and alternative renewable fuel. We lost hundreds of thousands of jobs by turning our back on that market. We can't repeat that mistake.

And so, the fact is that this country needs to understand that today the top 30 companies in the world, in solar, wind, and advanced batteries—of the top 30, only 6 are based in the United States. So, if we do this right, I believe that the next four or five

Googles equivalents will emerge in the energy sector, and I want them to be based here in the United States of America.

We also need to take a risk-based approach to climate change policy. Surveying the existing models, Harvard economist Martin Weitzman found that there is approximately a 5-percent chance that world temperatures will rise by more than 10 degrees Celsius, or 18 degrees Fahrenheit. I wonder how many people in this room would board an airplane if you were told there's 5-percent chance it's going to crash. I don't think we can afford to take that 5-percent risk with our planet, where there are irreversible—irreversible—consequences to what is happening.

We're running out of time. Earlier this month, a 25-mile-wide ice bridge connecting the Wilkins Shelf to the Antarctic land mass shattered, disconnecting a shelf the size of Connecticut from the Antarctic Continent, and it's the first time in measured history that this has happened. We are seeing our world change in realtime in ways that ought to trouble all of us and mobilize the world to take quick and decisive action. Frankly, the greatest risk that we face is that we will trim our sails and do too little now, and face enormous consequences later that cost us an awful lot more in order to mitigate and remediate.

If we fail to confront the full scale of this threat, today's global challenge is poised to become a global catastrophe.

Our first witness, Todd Stern, Special Envoy for Climate Change at the State Department, is on the front lines of these efforts. I've known him for many years. We worked closely together in the leadup to the Kyoto negotiations. He has deep background and knowledge in this area, and I'm confident in his ability to be able to help get us where we have to go. So, I'm pleased to welcome him before the committee today.

And, Senator Lugar, look forward to your comments.

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

Senator LUGAR. Well, thank you very much, Mr. Chairman. I join you in welcoming Todd Stern and our other distinguished witnesses. This hearing offers an opportunity for the Obama administration to provide details on its intentions with regard to climate change policy and negotiations.

At the recent climate talks in Bonn, it was announced that four or more additional negotiating sessions are planned before the Copenhagen Conference of Parties. It's my understanding that the deadline for nations to submit negotiating text for Copenhagen, as you've just pointed out, Mr. Chairman, is April 24, just 2 days from now. The United States may be able to delay its submission for a short period of time, I'm advised, but, under the rules of the Framework Convention, the negotiating text must be agreed on by June 8. I'm hopeful that Mr. Stern will shed light on when the administration will make its submissions, and what it will contain. I also hope we will receive clear answers concerning the nature of the agreement we're negotiating.

There is a great deal of discussion about a negotiated architecture in which various nations make new commitments to reduce emissions. Under this architecture, various funds are contemplated

to help developing countries adapt to climate change and to obtain clean technologies. It's not apparent, however, how nations would be bound to these new commitments or what type of ratification would be required.

I also understand that China and India have already declared they will not make binding emissions reductions. Clearly, the absence of credible commitments from China, India, and other major developing countries would constitute a severe obstacle to climate change legislation in the United States and elsewhere.

More generally, the challenge for the Obama administration is that the American political debate on this issue has not progressed on the same timetable as international negotiations. Although there is a growing opinion in the United States that climate change is a problem that requires a response, most Americans don't fully appreciate what this means or how such a response would affect their daily lives.

Results of opinion surveys indicating concern about climate change may bear little resemblance to public reaction to the specific steps required to implement an international agreement. Public response to sudden utility rate increases stemming from a cap-and-trade agreement, for example, would likely be severely negative without an extraordinary education effort led, first of all, by the President.

Even with such an effort, the American people and their representatives in Congress will be skeptical of any agreement that is perceived as overly burdensome or unfair to the United States or even to the region of the country in which they live. If the administration intends to gain support this year for an international arrangement on climate change, which almost certainly will have far-reaching implications for the American people, it must vastly expand its efforts to explain what it is attempting to accomplish and how this will affect Americans. It must also recognize the steps that exacerbate the current recession or significantly expand the deficit will likely cause an erosion of support among many in the American public.

I'm hopeful that the United States climate change response can be centered on steps that simultaneously reduce our reliance on foreign oil, promote soil and water conservation, contribute to rural development, leverage new energy technologies, and create jobs. Public support will be strongest for emission-cutting measures that are seen as contributing to additional United States economic or national security priorities.

I applaud the Obama administration for continuing the Bush administration's initiative to hold forums on climate and energy with a smaller group of economic powers. These forums strike me as the best way to engage China and India, and I look forward to monitoring those discussions.

I also look forward to working with the administration on how the United States can better assist developing countries to adopt low-carbon economic growth strategies and improve agricultural production. Senator Casey and I have authored legislation to elevate the priority of global food security in American foreign policy. Climate change will surely impact the most vulnerable regions of

Africa and Asia, and biotechnology will have to play a role in developing seeds resistant to the effects of climate change.

I thank the witnesses for being with us today. I look forward to their testimony.

I thank you, Mr. Chairman, for calling this hearing.

The CHAIRMAN. Thank you very much, Senator Lugar. I appreciate your comments.

Let me just mention, everybody, we do have a second panel, so we're going to try and proceed through expeditiously, if we can. The three expert witnesses on the second panel are, Ned Helme, the president of the Center for Clean Air Policy, Paul Camuti, president and chief executive officer of Siemens Global Research, and Helene Gayle, president and chief executive officer of CARE. And we also welcome them here.

Todd, thank you for being here with us, and we look forward to your testimony. If you could summarize and then leave us the time to get as many questions in, I think that would be helpful, and your full testimony will be placed in the record as if read in full.

STATEMENT OF TODD STERN, SPECIAL ENVOY FOR CLIMATE CHANGE, DEPARTMENT OF STATE, WASHINGTON, DC

Mr. STERN. Sure. Thank you very much, Mr. Chairman, for inviting me to testify today. I want to commend, first of all, you and——

The CHAIRMAN. Is the mike on?

Mr. STERN. [continuing]. Senator Lugar.

The CHAIRMAN. Is the mike on? I think you have to press a button there. Is it on?

Mr. STERN. Take it from the top.

The CHAIRMAN. There you go.

Mr. STERN. Thank you very much for inviting me today to testify, Mr. Chairman. I want to commend you and Senator Lugar for the outstanding leadership you've shown over the years on the issues of climate change and clean energy, and I look forward to working with you and other members of your committee as we move forward on this issue.

That we must meet this challenge is absolutely clear. The basic science of climate change is no longer in doubt, and what is perhaps most disturbing is that the more we learn about the issue, the more urgent the situation becomes, as you described in your testimony. Emissions are rising far more quickly than expected. Sea-level projections are being revised upward. The summer ice cover in the Arctic is disappearing much more rapidly than was projected even a few years ago. And, as a result, we are at risk of creating a world where climate change disasters will drive millions of people to migrate across borders, droughts and wildfires will threaten homes and ecosystems, more frequent extreme weather events will threaten communities, and conflicts are likely to arise over scarce natural resources. In addition, the diplomatic cost of inaction is becoming increasingly severe. Our Nation's pursuit of a range of foreign policy and national security objectives has surely been compromised by our failure, to date, to meet the energy and climate change crisis head on.

The United States thus has an interest, as well as a responsibility, in leading on this issue. We are the world's largest historic

carbon polluter, and our emissions, on a per capita basis, are much higher than those of China and more than double those of even the EU and Japan. But, just as importantly, we are unique in our capacity to meet this challenge. Our scientists, engineers, and entrepreneurs can and must develop innovative solutions and technologies that will lead America forward, and they're waiting to do so. If they get the right signals, there is enormous pent-up energy and excitement among, in particular, the next generation. We can set it loose if we take the right steps.

The Obama administration and Congress have already taken a number of important steps in this direction. For example, the stimulus package provided tens of billions of dollars in clean energy investment and loan guarantees. This truly was a historic downpayment on our clean energy transformation. And now, in order to create millions of clean energy jobs, become a global leader in the clean energy industry, reduce our oil dependence, and combat climate change, we must also pass legislation that caps carbon pollution and allows market forces to drive innovation in the clean energy sector.

And let me be clear, unless we stand and deliver by enacting strong, mandatory, nationwide climate and energy legislation, the effort to negotiate a new international agreement will come up short. There will be no new global deal if the United States is not part of it, and we won't be part of it unless we are at least on track toward enacting our own domestic plan.

Of course, it is also absolutely essential that others do their part. Eighty percent of greenhouse gas emissions are produced outside the United States. And that number, by the way, is growing. And that's why we need a new international agreement that will include significant commitments from all major countries.

I'm heartened by the fact that the thinking of our country and others around the world has evolved since the time of the Kyoto negotiations. Developing countries, such as Mexico and South Africa, have charted low carbon-development pathways that are quite impressive. And it is now, I think, much more widely understood that clean energy can become a catalyst rather than a burden on the economy.

And yet, there is no question that the challenges we confront in seeking to negotiate a viable new accord are quite real. If you spent much time in Bonn in the recent negotiating session—and I know, Mr. Chairman and Mr. Ranking Member, that you had staff there—you would have been treated to a lot of old-style North-South rhetoric of the kind that doesn't do much for finding common ground.

At present, we are actively pursuing our strategy on three related fronts:

First, we are fully engaged in the Framework Convention negotiating process itself. I went to Bonn to speak on behalf of the United States at the beginning of the meeting, and our reengagement and the President's clear commitment cannot conjure away substantive differences, but they do dramatically change the negotiating environment that we inherited.

Second, we are intensifying the dialogue among 17 of the largest economies in the world, including China, India, Brazil, Mexico,

South Africa, and Indonesia, through the Major Economies Forum that the chairman alluded to. This forum can help to build both the requisite political consensus for a strong agreement in Copenhagen and a commitment for cooperation on clean energy technologies and policies.

We plan to convene three preparatory sessions for the Major Economies Forum during the next 3 months, and the first will be held on the 27th and 28th of this month in Washington. There will be a leaders meeting in Italy immediately following the G8 in July.

Third, we're focusing on key bilateral relationships. In the past 2 months, I have met, probably, with more than 30 different countries. Relationships with developing countries, the majors, are going to be particularly crucial. And, of course, none is more important in this regard than China. China has demonstrated a growing commitment to clean energy in the past several years. Their current 5-year plan includes a goal of reducing energy intensity by 20 percent by 2010, a goal to increase the share of renewables in their economy to 15 percent by 2020, and many other initiatives. At the same time, China must do significantly more if we are to have a chance to solve the problem. And I expect to be going to China soon to pursue discussions on that subject.

Before concluding, let me just summarize the principles that guide our thinking. First, the United States must lead with a strong commitment to reduce our own emissions, in a nationwide program. Second, we will need to ensure that the agreement is truly global, as I just indicated. Third, we must work to promote research, development, and the wide-scale deployment of clean energy technologies. Fourth, we cannot meet ambitious reduction goals without concerted efforts to conserve the world's tropical forests. Fifth, Americans must understand that, as difficult and challenging as this may be for us, it will be still a greater challenge for countries that are still developing, particularly the poorer ones. Developed countries will have to work together to provide financial assistance and technology assistance to developing countries as part of our international agreement, and we will need to do work on the issue of adaptation as well.

I believe these general principles can guide us toward a pragmatic international agreement. It will be difficult, but I think, with the administration, Congress, and the American public committed to doing this, we can succeed.

Thank you, Mr. Chairman, members of the committee, and I look forward to answering your questions.

[The prepared statement of Mr. Stern follows:]

PREPARED STATEMENT OF TODD STERN, SPECIAL ENVOY FOR CLIMATE CHANGE, DEPARTMENT OF STATE, WASHINGTON, DC

Mr. Chairman, thank you very much for inviting me to testify today. I want to commend you and Senator Lugar for the outstanding leadership you have shown on the issues of climate change and clean energy, and I look forward to working closely with you and the other members of this committee in the days and months to come.

That we must meet this challenge is clear. The basic science of climate change is no longer in doubt. Greenhouse gas concentrations in the atmosphere now stand at approximately 387 parts per million of CO_2 as compared to about 280 ppm in preindustrial times. The global average temperature has increased by 1.4 °F above preindustrial levels.

This amount of warming has already been associated with significant global impacts, including: The acceleration of glacier melt, putting the water security of hundreds of millions of people at risk; the rapid death of coral reefs due to heat and acidity; an increase in the frequency of forest fires; and the dramatic reduction—some 39 percent—in Arctic Sea ice levels from just a decade or two ago.

What is perhaps most disturbing is that the more that we learn, the more urgent the situation becomes. Emissions are rising far more quickly than expected, sea level projections are being revised upward, and predictions of the disappearance of summer ice cover in the Arctic have been moved forward by many decades.

As a result, the effects that climate change will have on our economy, our security, and our environment will become increasingly severe. We are at risk of creating a world where climate change related disasters will drive millions of people across borders, deadly droughts and wildfire will threaten our homes as well as local ecosystems, increasingly frequent extreme weather events will wreak havoc on communities, and more frequent conflicts over scarce natural resources will have major geopolitical ramifications.

In addition, the diplomatic costs of inaction are increasingly severe. When President Obama and Secretary Clinton travel abroad, they are invariably asked whether America will be part of the solution after 8 years of inaction. It is no exaggeration to say that America has paid dearly in the diplomatic arena for our approach, and that our ability to pursue a range of foreign policy and national security objectives has been fundamentally compromised by our refusal to meet the energy and climate change crisis head on.

The United States thus has an interest as well as a responsibility in leading on this issue. We are the world's largest historic carbon polluter and our current emissions on a per capita basis are very high, four times that of China, nearly 14 times that of India, and more than double both the EU and Japan. But, just as importantly, we are unique in our capacity to meet this challenge. Our scientists, our engineers, and our entrepreneurs can and must develop the innovative solutions and technologies that will lead America and the world toward a clean energy path.

It is a path that will generate millions of clean energy jobs for Americans, break our dependence on foreign oil, and enable us to meet the challenge of climate change.

The Obama administration and Congress have already taken a number of critical steps in this direction. Most notably, the American Recovery and Reinvestment Act provided many billions of dollars of clean energy investment. With targeted investments in key areas ranging from our transmission capacity to our transportation sector, from weatherization to research, this truly was a historic downpayment on our clean energy transformation.

However, this is not enough. We must also pass legislation that caps carbon pollution and allows market forces to drive innovation and entrepreneurship in the clean energy sector.

Let me be clear about this: Unless we all stand and deliver by enacting a strong, mandatory, nationwide climate and energy plan, the effort to negotiate a new international agreement will come up short. There will be no new global deal if the United States is not part of it, and we won't be part of it unless we are at least on track to enact our own robust domestic plan.

Of course, it is also essential that others do their part as well. Eighty percent of greenhouse gas emissions are produced outside of the United States, and a rapidly growing percentage is produced in emerging market countries. According to the International Energy Agency, 97 percent of the projected increase in emissions between now and 2030 will come from developing countries—with three quarters of those from the emerging economies of Asia and the Middle East.

This is why it is imperative to negotiate a strong new international agreement that will include significant commitments from all countries. I am heartened by the fact that the thinking of our country and the world has evolved since the time of the Kyoto negotiations. Today, many more countries recognize that the path to long-term, sustainable economic growth and prosperity is a low-carbon one. Developing countries such as Mexico and South Africa have charted low-carbon development pathways for themselves, and it is now much more widely understood that clean energy can be an economic catalyst rather than an economic burden.

And yet there is no question that the challenges we confront in seeking to negotiate a viable new international accord are very real. If you spent much time in Bonn at the recent negotiating session—and I know the chairman and ranking member both had staff there for the meeting—you would have been treated to a lot of old style, north-south rhetoric of the kind that isn't much designed to find common ground. And the differences on issues are often large. The toughest issues involve what reductions the major developing countries will commit to, as well as the

closely related questions of the financial and technology support they are seeking. We must also focus on the important issue of adaptation, which requires providing support to the most vulnerable and often poorest countries to help them cope with the impacts of climate change that they will face even if we all do everything right from here on out.

Broadly speaking, we are pursuing our strategy on three related fronts. First, we are fully engaged now in the Framework Convention negotiating process itself. I traveled to Bonn last month to make the initial statement on behalf of the United States at the opening plenary session, and the reception was warm and enthusiastic. Countries are genuinely pleased—indeed relieved—that the United States is back in the game, committed to making rapid progress, and, as I said in Bonn, seized by the urgency of the task at hand. Our reengagement and the President's clear commitment cannot conjure away substantive differences, but they do dramatically change the negotiating environment.

Second, we are intensifying the dialogue among 17 of the largest economies—including China, India, Brazil, Mexico, South Africa, and Indonesia—through our Major Economies Forum on Energy and Climate, which will meet in July in Italy immediately after the G8 meeting there. In fact, I called for the creation of such a forum in an article in the American Interest in early 2007. I thought it essential then, as I do now, that the core countries have an opportunity to get together at the leader level once a year—outside of the very large, noisy environs of the Framework Convention process—both to build the political consensus among key developed and developing countries that will be necessary to a successful outcome in Copenhagen and to build a strong commitment among these countries for concrete cooperation on technologies and policies that will allow us to move collectively onto a low-carbon path.

So I was delighted when the Bush administration launched this process a couple of years ago and we are keen to invigorate the process and infuse it with real content and a real mission. The forum is not a substitute for the Framework Convention process; it is—in part—a means to facilitate success in that process.

We plan to convene three preparatory sessions during the next 3 months, the first to be held at the State Department next week, to be followed by a leaders meeting in Italy shortly after the G8.

Third, we are focusing on key bilateral relationships. In the past 2 months, I have personally had discussions with representatives from more than 30 countries, and members of my team have consulted many more. Relationships with major developing countries are going to be crucial for us, and, of course, none is more important than China, now the largest emitter of CO_2 in the world and on track to increase that lead significantly in the years to come.

As you may know, I accompanied Secretary Clinton on her inaugural trip to Asia, and I can assure you that energy and climate issues were discussed at every stop. She has elevated energy and climate to a top-tier issue in our overall bilateral relations with China, and we are working vigorously to make it a strong and stable pillar of our relationship.

Notably, China has demonstrated a growing commitment to clean energy in the past several years. China's current 5-year plan includes the goal of reducing the energy intensity of the economy by 20 perecent by 2010, and the aim of increasing the share of renewable energy in the primary energy supply to 15 percent by 2020.

China has implemented increasingly stringent auto emissions standards, stronger than our own, and its domestic stimulus package contained substantial clean energy investments. And there are many other initiatives underway.

However, China must do significantly more if we are to have a chance to solve the problem and to arrive at an international agreement that achieves what science tells us we must. We will be engaged in very active discussions with the Chinese on the related issues of climate change and clean energy in order to make that happen. I expect to be going to China to pursue these discussions quite soon—I hope next month.

Before concluding, let me say a few words about some of the principles that guide our thinking and will inform our further refinement of policy positions.

First, as noted, the United States must lead with a strong commitment to reduce our own emissions, as embodied in a nationwide program to cap greenhouse gas pollution. EPA has taken a bold first step by proposing that carbon pollution is a danger to our health and welfare. It is time to face facts squarely and take action.

Second, we will need to ensure that the agreement is truly global and includes significant actions by all major economies. The simple math of accumulating emissions shows that there is no other way to make the kinds of reductions that science indicates are necessary. We will need to ensure that these actions are robust, quan-

tifiable, and verifiable, and that they are measured against a broad scientific understanding of what needs to be done to stabilize greenhouse gas concentrations.

Third, we must work to promote research, development, and wide-scale deployment of clean energy technologies. We will need to ensure that we are leveraging the capacities of the international community in this process, and that intellectual property rights are respected.

Fourth, the science dictates that we cannot meet ambitious reduction goals without efforts to conserve the world's tropical forests. Deforestation currently accounts for approximately 20 percent of emissions. Therefore, a viable international agreement must include incentives to promote more climate-friendly land-use practices and reduce deforestation in a manner that protect the interests of local communities.

Fifth, Americans must understand that, as challenging as addressing climate change will be for us, it will be a greater challenge for countries that are still developing. Let me give you one illustrative number: More than 100 million Bangladeshis, approximately two-thirds of the country's population, livewithout access to the electrical grid. This is the scope of the challenge. Developed countries will have to work together to provide financial assistance and technology to developing countries as part of our ultimate international agreement. To that end, we are working on how to establish a financing structure that is well balanced and guarantees the necessary resources, transparency, sound governance, and incentives to establish enabling environments that can promote private investment and unleash innovation both in developing countries and around the world. Related work will need to be done on technology and adaptation as well.

It is our moral responsibility to help the most vulnerable people to adapt to the effects of climate change and it is necessary from a global emissions standpoint that these developing countries have the capacity to leap over the fossil fuel stage of development straight to the clean energy stage. Such jumps are not unprecedented. As recently as 2002, India, with a billion people, had only 55 million telephones. But rather than insisting on getting the same kind of wired service that developed countries had, they simply leapfrogged straight to cell phones. Now, 350 million Indians have phones, and universal wired service is unnecessary. This is the same kind of dynamic approach that needs to be brought to the world of energy.

I believe these principles can guide us toward a pragmatic international climate agreement that will put the world on the path that the science tells us we must be on. It will not be easy, but if the administration, Congress, and the American people are committed to this, we can generate millions of clean energy jobs, break our dependence on foreign oil, and meet the climate change crisis.

Thank you, Mr. Chairman. I look forward to answering any questions that you and the members of the committee might have.

The CHAIRMAN. Thank you very much, Mr. Stern. I appreciate it very much.

Let me pick up, really, off of Senator Lugar's question, or even—statement, essentially, about the global participation and the concern that he expressed a moment ago about China having said they're not going to accept a "mandatory," reduction target. I think it's important that we all begin from a point where we understand, sort of, why we're where we are in that state of play, but, more importantly, would you talk a little bit about the accountability that will exist. Let me be very specific, Senator Lugar.

At Bali, and in Poznan, further, the countries accepted a concept called MRV—measurable, reportable, and verifiable. So, while they may not sign up, as was agreed in Berlin, in one of the COPs before they even went to Kyoto and because of their less-developed status and because of that original agreement, they are agreeing to accept differentiated responsibilities that are measurable, verifiable, and reportable. So, it is possible to proceed forward, for a few years, whatever number, while we synchronize where the lines come together and allow the space for the melding of activity under a joint-developed/less-developed agreement that is mandatory. Ultimately, it has to be.

So, maybe, Mr. Stern, you could share some thoughts about that because, in my judgment, if we were to get an agreement in Copenhagen, where you have the developed world agreeing to certain levels of reductions, as we agreed to, may I say, in 1991 and ratified by the Senate under George Herbert Walker Bush—if you get that, and you get the less-developed countries joining together in major reductions that are reportable, measurable, and verifiable—if those levels that we're trying to get meet an acceptable standard, we can actually all get moving in the same direction and wind up in the same place at an appropriate moment. Is that a fair statement of what the expectations are from the developing countries?

Mr. STERN. Well, I entirely agree with the way you just framed that, Senator. I think that there are different expectations from different developing countries. Let me just explain the way I kind of look at this, at the moment.

I think that there's no question that developed countries, including the United States, are going to have to make major, significant commitments, which I think are, for us, with respect to the issue of mitigation of how much we're going to reduce emissions, will be very significantly framed by what is done in our domestic legislative debate.

I think, at the same time, there's the broad range of developing countries, but there are obviously significant differences within the group of developing countries. I think, among the major developing countries, the kind of countries that are coming to our Major Economies Forum, for example, and some others, it's going to be very important that they make significant commitments to reducing their emissions.

You cited the kind of foundation principle that is often relied upon by developing countries, "common but differentiated responsibilities." We think that's a perfectly appropriate phrase. The responsibilities are differentiated, but they're common. It does not mean that the developing countries can have a free pass—the more developed ones among them can have a free pass, going forward. We will never solve the problem that way.

I mean, in a speech I gave a while ago, I said, "Do the math. Add it up. Add up the emissions." As you said, 75 percent of the growth is going to come from developing countries, going forward. We cannot get anywhere near where the science tells us we have to get without significant commitments from developing countries. At the same time, differentiated. Both halves of that phrase are important, and we can expect the major developing countries to do a lot. We should not hang up the whole—shouldn't stop the show on the basis that they don't do exactly the same thing that we're doing now. But the important thing is that they take real commitments, that they are consistent with where the science tells us we need to go, and that we get started. We have been on the sidelines; we have been debating this thing for too long now. We have got to get going. Five more years of talking about it, rather than doing it, is just going to set us back.

The CHAIRMAN. So, the bottom line is that the developed countries will, in fact, not be outside of the treaty or outside of an agreement, but there will be differentiated expectations, with an ultimate melding of everybody in a sufficient level to meet the task.

Mr. STERN. That is the way we see it. Now, I also don't want to mislead anybody. This is a difficult negotiation, and we have to see whether the developing countries will come along on that basis. But they need to and we need to work with them to make that happen.

The CHAIRMAN. But, is there any question in your mind—there certainly isn't in mine, from the meetings that I've had with everybody—that if the United States doesn't take a lead and do something, having done nothing and actually stiff-armed the entire process for the last 10 years, it's a nonstarter?

Mr. STERN. There is absolutely no question in my mind that that's true. The core—the foundation stone of our strategy has to be domestic action. I mean, there is a lot more that we have to do. That's not the endpoint of our strategy.

The CHAIRMAN. Right.

Mr. STERN. But, that is absolutely the core piece of it. And, as I said in my testimony, we have to be absolutely clear about this—if the United States is not on a real, evident track to enact its own domestic plan, you know, the cards drop out of our hand. We will not get anywhere without them.

The CHAIRMAN. Senator Lugar.

Senator LUGAR. Thank you, Mr. Chairman.

Mr. Stern, in my opening comments, I asked that the administration explain what it's attempting to accomplish and how this will affect Americans. And I don't mean that in a broad-scale way. I'm really thinking specifically—and some legislation now points in this direction—that there be, literally, diagrams, maps, text in which, first of all, Members of Congress could understand what, usually the first two sentences of testimony namely, is incontrovertible, and science knows, and so forth. Now, many scientists may know—and you may know, and our negotiators may know—but, I can testify my constituents claim they don't know, and they would like for me to explain what this is all about.

This is so fundamental that I hate to be a skeptic at the party, but I would just say that we're coming down to a point where the administration, at least in 2 days or in a few days, is going to have to put on paper at least some thoughts with regard to Copenhagen. This may be delayed, for a variety of reasons, and it may be fairly general, and it may, as the chairman says, be sort of in the right direction. We all are sort of headed down the trail.

But, I would just say, specifically, it's important, first of all, for the administration—and this ought not to be entirely your burden; ought to be our burden, in the Congress, other people who are taking leadership as Governors—to explain specifically what is the science, what are these measurements, why are we so certain that, by 2020, 2050, whatever the target is, that something beyond remedy might occur, or percentages of that something of that sort occurring? Because, fundamentally, whatever happens at Copenhagen or other locations will require ratification by the United States Senate in the form of treaties, two-thirds of the Senate, Republicans and Democrats, two-thirds of the States, in essence. And we're not close to that. We're really in the opening stages of our debate in Congress.

Now, this is a problem for you, as our negotiator. And the President has made this point. Going to Copenhagen without congressional action or without at least some sentiment expressed is going to be very debilitating to your efforts, or at least be very hazardous. This is why this has got to be a pretty concentrated effort, not only for the preparation for Copenhagen, but the preparation of the Congress and the public in this particular period.

Now, let me just make an example of—yesterday, outside this building, we had a car that was created by a company called BrightCar Company. I was there, and other Senators were there, because the car was produced in Indiana and research was done at the Anderson Discovery Park on hybrid engines. It was not really a car, it was a van. It was something that could be used commercially. It's claimed to get 100 miles per gallon. But, furthermore, someone else that produced a solar tower out here, just outside the building, pointing out that, given the hours that are involved, you can produce all of the energy for those vans with solar energy, so you don't even get into the CO_2 problem that sometimes you get into even with 100 miles per gallon deal.

The dilemma here is that, although the Congress has appropriated money for projects like this, the money has not been forthcoming. Now, I hope it will be, because I would say, once again, trying to help solve the problem—if I could make the case, as I tried to, to the television stations, going back to Anderson, IN, yesterday, that this is a new automobile company, these are jobs, these are vans that could be used commercially throughout the United States. More particularly, they're vans that could be used by the U.S. Government. And while we're busy in the climate change business, if we're serious about the transportation side of it, which we all claim is 40 percent of the problem of CO_2, we have a lot of possibilities in purchase in the U.S. Government, or in suggestions to the State governments.

Now, I go through all of this, because it seems to me that the credibility of whatever you're doing with Copenhagen, or at least our situation, has to run right along with credibility with the American people, with Members of Congress, with the support that you will need.

Now, I remembered, in a different venue, President Reagan appointed an arms control observer group in 1986, and it was for the purpose of having the leadership of the Senate, Republican and Democrat, go to Geneva, look over the shoulder of the negotiators. Nothing happened for 3 years, but we did finally have a treaty, and it passed, and it had no chance of passing, vis-a-vis the Soviet Union, at that point, without there being people like ourselves who were meddlesome, who were always hovering over the shoulder, who were trying to make a case to the American people of why this was important, why we were not giving away the store, why nuclear weapons were not going to rain down on the United States.

So, this is sort of a heavy message, but give me at least some thoughts as to, What are you preparing, actually, in the next 2 days or the next weeks or so, in recognition of the April 24 deadline?

Mr. STERN. Senator, a number of points in response to what you've just said, I'll take the last one first.

With respect to submissions, there are submissions on a number of subjects that we are preparing now, and that we'll be getting—that we'll be sending forth in the course of the next several days. I might say that you are right that the deadline can extend by a little bit—not by much, but by a little bit. I think it is also true that people, including the people in the international negotiating bureaucracy, if you will, the leaders, do recognize that the world gave itself 2 years, and the United States 9 months, for this process, in effect, in Bali. The agreement was made in Bali in December 2007, but, for a new administration coming in—by the way, this would have been true whether it was a Democratic or a Republican administration—you basically have about 9 months by the time people get in. And many of the people who will be involved in this issue, by the way, in the administration, aren't even there yet. So, I think there is some understanding of a little bit of flexibility in the deadlines, but not a great amount. So, we will be making submissions on a number of subjects in a few days.

Let me talk to your broader point, though. I couldn't agree more with your underlying comment about the American people. I used to say, back when I was doing this in the White House in the late 1990s, when people would ask, "What's the most important thing we can do in our international negotiations?" I would say, "Educate the American public," because if the American public feels this issue the way they started to worry about skin cancer coming from the ozone hole in the early 1990s—that's what got the Montreal Protocol done, and so, the appreciation and concern about this issue among the public in a way that would radiate out to their representatives is enormously important.

And I think it's a two-part message, fundamentally. It's a message of both danger and opportunity. I think that the danger is very, very real. Senator Kerry talked about it quite eloquently in his testimony—in his opening statement, rather. And the opportunity is enormous. I mean, the Green Revolution really is going to lead the economic development of the 21st century, and we need to be leaders.

I mean, I have said to people, in recent days, we're going to spend the next few years probably trying to push China, and 5 years from now we're going to be chasing them, because the Chinese are moving, and they are going to move rapidly, and they are going to conclude, they are concluding, that this is going to be a critical economic driver going forward. I was in Germany, in Berlin before I went to Bonn, meeting with the various leaders in the German Government. They told me, by 2020, green technology will be the No. 1 source of employment—the No. 1 sector in the German economy. So, I think it's both messages. And I could not agree more that we need to drive that message forward.

I also would welcome participation, and we will work with Senator Kerry and you and others, in terms of having Senate participation at the member level, the staff level, and whatever makes sense in your minds to have participation in what we do going forward, because I completely agree with you, I think that's quite important.

Senator LUGAR. Thank you very much.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you, Senator Lugar.

If I could just ask that we—I will put into the record the New York Times of April 2, 2009. It was a right-hand front-page column article, "Chinese leaders have adopted a plan aimed at turning the country into one of the leading producers of hybrid and all-electric vehicles within 3 years, and making it the world's leader in electric cars and buses after that. The goal, which radiates from the very top of the Chinese government, suggests that Detroit's Big Three, already struggling to stay alive, will face even stiffer foreign competition," and so on it goes.

So, I'd put this in the record, and I think it underscores what Todd just said about the economic opportunity.

[The New York Times article previously referred to follows:]

[From the New York Times, Apr. 2, 2009]

CHINA VIES TO BE WORLD'S LEADER IN ELECTRIC CARS

(By Keith Bradsher)

TIANJIN, CHINA.—Chinese leaders have adopted a plan aimed at turning the country into one of the leading producers of hybrid and all-electric vehicles within three years, and making it the world leader in electric cars and buses after that.

The goal, which radiates from the very top of the Chinese government, suggests that Detroit's Big Three, already struggling to stay alive, will face even stiffer foreign competition on the next field of automotive technology than they do today.

"China is well positioned to lead in this," said David Tulauskas, director of China government policy at General Motors.

To some extent, China is making a virtue of a liability. It is behind the United States, Japan and other countries when it comes to making gas-powered vehicles, but by skipping the current technology, China hopes to get a jump on the next.

Japan is the market leader in hybrids today, which run on both electricity and gasoline, with cars like the Toyota Prius and Honda Insight. The United States has been a laggard in alternative vehicles. G.M.'s plug-in hybrid Chevrolet Volt is scheduled to go on sale next year, and will be assembled in Michigan using rechargeable batteries imported from LG in South Korea.

China's intention, in addition to creating a world-leading industry that will produce jobs and exports, is to reduce urban pollution and decrease its dependence on oil, which comes from the Mideast and travels over sea routes controlled by the United States Navy.

But electric vehicles may do little to clear the country's smog-darkened sky or curb its rapidly rising emissions of global warming gases China gets three-fourths of its electricity from coal, which produces more soot and more greenhouse gases than other fuels.

A report by McKinsey & Company last autumn estimated that replacing a gasoline-powered car with a similar-size electric car in China would reduce greenhouse emissions by only 19 percent. It would reduce urban pollution, however, by shifting the source of smog from car exhaust pipes to power plants, which are often located outside cities.

Beyond manufacturing, subsidies of up to $8,800 are being offered to taxi fleets and local government agencies in 13 Chinese cities for each hybrid or all-electric vehicle they purchase. The state electricity grid has been ordered to set up electric car charging stations in Beijing, Shanghai and Tianjin.

Government research subsidies for electric car designs are increasing rapidly. And an interagency panel is planning tax credits for consumers who buy alternative energy vehicles.

China wants to raise its annual production capacity to 500,000 hybrid or all-electric cars and buses by the end of 2011, from 2,100 last year, government officials and Chinese auto executives said. By comparison, CSM Worldwide, a consulting firm that does forecasts for automakers, predicts that Japan and South Korea together will be producing 1.1 million hybrid or all-electric light vehicles by then and North America will be making 267,000.

The United States Department of Energy has its own $25 billion program to develop electric-powered cars and improve battery technology, and will receive another $2 billion for battery development as part of the economic stimulus program enacted by Congress.

Premier Wen Jiabao highlighted the importance of electric cars two years ago with his unlikely choice to become minister of science and technology: Wan Gang, a Shanghai-born former Audi auto engineer in Germany who later became the chief scientist for the Chinese government's research panel on electric vehicles.

Mr. Wan is the first minister in at least three decades who is not a member of the Communist Party.

And Premier Wen has his own connection to the electric car industry. He was born and grew up here in Tianjin, the longtime capital of China's battery industry, 70 miles southeast of Beijing.

Tianjin has thrived in the six years since Mr. Wen became premier. It now has China's first bullet train service (to Beijing), a new Airbus factory and an immaculate new airport. Tianjin has also received a surge of research subsidies for enterprise's like the Tianjin-Qingyuan Electric Vehicle Company.

Electric cars have several practical advantages in China. Intercity driving is rare. Commutes are fairly short and frequently at low speeds because of traffic jams. So the limitations of all-electric cars—the latest models in China have a top speed of 60 miles an hour and a range of 120 miles between charges—are less of a problem.

First-time car buyers also make up four-fifths of the Chinese market, and these buyers have not yet grown accustomed to the greater power and range of gasoline-powered cars.

But the electric car industry faces several obstacles here too. Most urban Chinese live in apartments, and cannot install recharging devices in driveways, so more public charging centers need to be set up.

Rechargeable lithium-ion batteries also have a poor reputation in China. Counterfeit lithium-ion batteries in cellphones occasionally explode, causing injuries. And Sony had to recall genuine lithium-ion batteries in laptops in 2006 and 2008 after some overheated and caught fire or exploded.

These safety problems have been associated with lithium-ion cobalt batteries, however, not the more chemically stable lithium-ion phosphate batteries now being adapted to automotive use.

The tougher challenge is that all lithium-ion batteries are expensive, whether made with cobalt or phosphate. That will be a hurdle for thrifty Chinese consumers, especially if gas prices stay relatively low compared to their highs last summer

China is tackling the challenges with the same tools that helped it speed industrialization and put on the Olympics: Immense amounts of energy, money and people.

BYD has 5,000 auto engineers and an equal number of battery engineers, most of them living at its headquarters in Shenzhen in a cluster of 15 yellow apartment buildings, each 18 stories high. Young engineers earn less than $600 a month, including benefits.

When Tianjin-Qingyuan puts its entirely battery-powered Saibao midsize sedan on sale this autumn, the body will come from a sedan that normally sells for $14,600 when equipped with a gasoline engine. But the engine and gas tank will be replaced with a $14,000 battery pack and electric motor, said Wu Zhixin, the company's general manager.

That means the retail price will nearly double, to almost $30,000. Even if the government awards the maximum subsidy of $8,800 to buyers, that is a hefty premium.

Large-scale production could drive down the cost of the battery pack and electric motor by 30 or 40 percent, still leaving electric cars more expensive than gasoline-powered ones, Mr. Wu said.

But Mr. Wu has plenty of money to pursue improvements. He interrupted an interview at his company's headquarters on Thursday to take a call on his cellphone, politely declined an offer from the caller, and hung up.

The general manager of a state-controlled bank had called to ask if he needed a loan, he explained.

The CHAIRMAN. Senator Menendez.

Senator MENENDEZ. Thank you, Mr. Chairman.

Mr. Stern, you've been quoted as saying that our international negotiation strategy will largely be set by domestic legislation that the Congress and the President are able to enact. So, if that is the case, what role does that leave for you in international negotiations before we enact such legislation? And what do you see, in terms of the administration pushing forward on a domestic cap-and-trade bill as the foundation for your negotiating position abroad?

Mr. STERN. Thank you, Senator.

As I have said this morning, I think that getting domestic legislation is a cornerstone for our strategy. I think it's enormously important. It's going to establish U.S. credibility, and I think we have made effectively, the point, and I think the point's been taken on board internationally, that the United States is back in the game and engaging. But, the world also wants to see what the United States actually does, not just what the United States says.

I do not mean to say that our overall strategy is set by what's passed in Congress. That's an important piece of it. But, we already know, in broad strokes, what kind of reductions we're talking about. I mean, the President has announced—now, this goes back to his campaign, the kind of numbers that he's talking about, which is about a 15-percent cut from where we are now by 2020, and an 80-plus-percent cut by 2050. Congressman Waxman has put in a bill, on the House side, which is a little bit more than that, but kind of in the same general range.

Plus or minus, that's the range of what we're talking about, so I don't think that that needs to be in great suspense. So, there's that piece.

There's a piece that involves what we expect from developing countries, and in what form we think they need to take their action, to make their commitments.

There are important issues that have to do with financing. Developing countries are looking for financial support for the mitigation efforts, as well as for adaptation. Frankly, they are talking about numbers that are often not fully tethered to reality, but nevertheless there is a very real need to put together funding packages, and there are important questions about how to structure that——

Senator MENENDEZ. Yes. Well, let me——

Mr. STERN. [continuing]. Et cetera.

Senator MENENDEZ. I've let you go on 3 minutes.

Mr. STERN. OK.

Senator MENENDEZ. I want to figure out, though, the answer——

Mr. STERN. OK.

Senator MENENDEZ. [continuing]. To my question.

Mr. STERN. OK.

Senator MENENDEZ. And that is, If you—your previous comments have been focused on, "Our ability to negotiate successfully abroad is more than what we say, but what we do." And, while those are parameters of goals to be achieved, they have to have actual legislation in order to achieve them. Is that a fair statement?

Mr. STERN. I think that we have to have actual legislation as soon as possible. I would absolutely agree with that.

Senator MENENDEZ. And so, to some extent, your ability to succeed in promoting U.S. interests abroad, as it relates to global warming, is going to be dictated by what the Congress does or doesn't do with the President.

Mr. STERN. I think our capacity to get legislation is going to be a core part—yes. I mean, I think that's largely right. I think that there is a timing question which is related to that, but if you said to me, "We're not going to get any legislation done, we're not going to be able to enact a plan," is that going to be devastating to our capacity to negotiate an international treaty? I would say yes.

Senator MENENDEZ. OK. Let me ask you one other line of questioning that I have a great interest in, and that's deforestation, as part of our broader issues.

Today is Earth Day. You know, literally so many people are marking the occasion by going ahead and planting a tree, which is not an insignificant long-term, profound consequence. The question is—tropical deforestation, stopping it is essential if we're going to stabilize our climate. I am pleased to hear you acknowledged the problem in your testimony, given, as you said, that deforestation accounts for approximately 20 percent of the worldwide greenhouse gas emissions.

The question is, How do we successfully pursue working with countries to stop that deforestation? If you look at the Union of Concerned Scientists, they have estimates that are pretty significant, in dollars. They talk about raising $50 billion annually to reduce tropical deforestation by 66 percent in 2020. If those were the numbers, and then you look at what U.S. contributions have been to those types of initiatives in a similar set, that's a very significant number.

The question is, Do you think we can marry our need to reduce compliant costs at home with the need for resources abroad, and address international deforestation and degradation by creating a system of international offsets?

Mr. STERN. The short answer is "Yes." I think there are different proposals that people are talking about and that countries prefer. There's the carbon-markets approach, which is what you just asked me about. And there are some that—some who prefer the creation of a fund. I think—for reasons that are implicit in your question, I think that there is a lot to recommend the notion of using the carbon markets. And I think that it will be important. It is a challenge, but, I think, a challenge that can be met, to do that in a way that has environmental integrity, where you're measuring and monitoring and all of that.

Senator MENENDEZ. And that's my next question. Do you think that the international community can create the regulatory and enforcement capacity possible to make such a market work?

Mr. STERN. I think that the answer to that is "Yes," but it's also going to depend country by country. In other words, the capacity is going to have to be built up in Indonesia, in Brazil, in other countries that are the core countries for tropical forests. So, they've got to be able to measure and monitor. You've got to deal with the problem of what's called "permanence," whether you get the credits and then next year you cut the forest down, and the problem of leakage, which is, you preserve the forest here and then cut them down someplace else. I think there are ideas for managing those things. There are discussions that are going on actively. We are intensely engaged in those discussions, and we are committed to the notion that forests have to be part of this. And I think, fundamentally, again, for just the raw financial reasons that you were suggesting in your question, that, in my mind, the carbon markets almost certainly will have to be the way to go.

Senator MENENDEZ. Thank you, Mr. Chairman.

The CHAIRMAN. Thank you very much, Senator Menendez.

Senator Corker.

Senator CORKER. Mr. Stern, appreciate you coming today. And this is an issue that I've tried to make myself informed of, because I think it's important, it's going to be a big part of our debate in—spent a week or so in Europe, meeting with carbon traders and European Commission members and cement manufacturers and steel manufacturers and utilities. I've been to Greenland, and, just a few weeks ago, was in the Amazon, in Brazil, looking at deforestation issues and the U.N. RED program and other things. And I look forward to working with you.

I have to tell you that, other than this hearing happening to time with Earth Day, this is sort of a nothing-burger presentation today. I have no idea, no earthly idea, what you're planning to submit. And I was hoping that today we'd get some details, because I think, as has been mentioned by others, understanding where the administration is going very much relates to domestic policies that we might put in place here. And I have absolutely no idea. And yet, the submission is due in 48 years as to what the administration plans to do. And without going into that, I guess I'd like to understand, Is that because you don't know or the administration is not willing to share that yet?

Mr. STERN. No, Senator, we will certainly be working very closely with you and others in this committee, among others in Congress. We are working——

Senator CORKER. The submissions are due—you know, OK. So, I know you're going to be working with it——

Mr. STERN. No, no, I understand. But, we will be——

Senator CORKER. OK.

Mr. STERN. [continuing]. Making submissions on certain issues. We will be continuing to work on other issues. Look, the reality is that, as I said, I think it's something that is, you know, important to bear in mind, that we came in, about 2 months ago, and the world had 2 years, and we have a lot shorter time than that. We are very much on the schedule that I would have anticipated.

Senator CORKER. OK. So, let just ask you this. When you submit—I've only got limited time, here.

Mr. STERN. Yes.

Senator CORKER. Apparently, the answer is, you don't know, because you've only been in office for 2 months. So, I'm just—let me just—if you'd just give me a specific answer—and I want to ask you some more things—When is it that the administration will have a firm policy in—or a firm guideline, as to what they hope to accomplish in Copenhagen, that they can submit to us to look at? Because——

Mr. STERN. Well——

Senator CORKER. [continuing]. I think that very much needs to be understood as we look at some of these other policies.

Mr. STERN. Well, I—Senator, as I said, I don't think that there's a lot of suspense with respect to the main outlines of what we're talking about.

Senator CORKER. No, but let me say—let me—OK. I think we're getting, probably, nowhere. Let me just—you made a comment that somewhat I've found prevalent in the climate debate, and that is "just doing it." OK? Earlier, talking about, "We just need to do it." What I have—and talked with other members of the committee

about—the details of how we do it are pretty important. OK? And so, I'd like to have an understanding of a lot of things, like international offsets. There's been all kinds of, you know—and your sense about international offsets and their role, because it will affect us as it relates to the domestic things that we do here. Personally, I've been very concerned about clean development mechanisms. International Rivers——

Mr. STERN. Right.

Senator CORKER. [continuing]. Has said that 70–76 percent of them actually had no effect whatsoever.

Mr. STERN. Right.

Senator CORKER. The bill—you know, Stanford has written papers about it—the bill—the Waxman-Markey bill that just came out said that, without international offsets in their bill, carbon prices in America would actually be 96 percent higher.

Mr. STERN. Right.

Senator CORKER. Well, that's something that we all need to understand. Candidly—Senator Menendez and I seem to always be back to back, whether it's here or in other committees. I appreciate his focus on deforestation. Personally, if we're going to look at international offsets, deforestation, to me, is a much more prudent way of looking at it and verifying it, and actually making multiple good things happen at one time, versus dealing with the fraud, the huge amount of fraud, that has allowed people to make hundreds of millions of dollars off fraudulent CDMs.

So, I'd like to just get a sense of international—well, let's just focus on that one issue and how you plan to approach that as you go ahead, because it'll affect us greatly in this country.

Mr. STERN. Two issues, Senator. First of all, I would say, within the space of the next week to 2 weeks, we can come up and talk with you, if you'd like—or with your staff—on details of a number of these issues. We'd be happy to do that——

Senator CORKER. We will book that.

Mr. STERN. [continuing]. In more specifics. On the specific issue of offsets and CDM, I kind of look at it two ways. I think that—first of all, as I said to Senator Menendez, I think the forest piece is a very important part of it. I think, with CDM, the clean development mechanism, more broadly, I think that there is a need probably both to narrow and broaden. Narrow, in the sense that there has been a lot of—there have been a lot of CDM credits that don't have environmental integrity, that are, as you have——

Senator CORKECR. The vast majority of them.

Mr. STERN. Well, I don't know what the exact——

Senator CORKER. Yes, OK.

Mr. STERN. [continuing]. Numbers are, but I'm not disputing that issue at all. I think there's a lot that are not good enough. By the same token, it may well make sense to have an offset mechanism that can work in connection with actions that are taken at a broader-than-project level, at a sectoral-type level, if they're the right kinds of policies to move whole sectors to a low-carbon path. So, I think both a narrowing and potentially a broadening are what we're thinking about right now.

Again, we are not trying to hide any ball. Believe me. We will be very happy to come, talk with you, talk with your staff, and, on a number of these issues, quite, quite soon.

Senator CORKER. Well, Mr. Stern, I very much appreciate, first of all, the importance of the role that you're going to play. And I hope that we will be in constant contact. We also plan to play a major role in the domestic debate here as it relates to climate change. And I do think that one of the things we can all do is to be more honest about the issue.

I think the comment that Senator Lugar made regarding informing the public, I—in the budget amendment discussion, which I realize is mostly silly and mostly demeaning for most of us to participate in; it's mostly messaging votes—but, only two Senators—I was one of those—was willing to acknowledge that, if we deal with cap and trade, we're going to be talking about increased prices on all energy that's generated from fossil fuel here.

So, I find it amazing that we're in the year 2009 and people are still trying to move around that topic. I mean, the purpose of cap and trade is to drive up energy prices from things—from energy that's generated from fossil fuels. That's the purpose of it.

And so, I do hope that we'll have an open and honest dialogue. I want to be constructive in this. And I look forward, also, to talking to you, when you come to our office, about the deforestation issue. I think it's one that is important.

And, candidly, I think many citizens in this country, even if they don't care about the issue of climate change, could find themselves toward caring greatly about the Amazon and other places being desecrated the way they are.

Thank you very much, and I look forward to talking——

Mr. STERN. I agree with you completely, and I look forward to working with you, Senator.

The CHAIRMAN. Senator Corker, thank you for the line of questioning. Thanks for the work you're doing. Can I just comment on two things, quickly?

The purpose of cap and trade is not specifically to put an increase on it; it's to put a price on it. The price could be lower, or the price could be higher. Now, it will be higher, to begin with. Absolutely acknowledged.

Senator CORKER. Which will increase prices, initially.

The CHAIRMAN. But, you'll have a marketplace with vast revenues coming in to some entity; we had this discussion at the Aspen Institute. There is a formula by which you can redistribute that to citizens, and reduce the impact, so that you have a mitigation——

Senator CORKER. And I'm very supportive of that, and offered that amendment last summer. So——

The CHAIRMAN. So, I think, you know, it's important to put it in its perspective.

Also, the EPA just did a preliminary analysis of the Waxman bill—yesterday it came out—and it said, to a lot of people's surprise, that it would only have a 0.1 to 0.2 impact on economic growth.

Senator CORKER. One of the reasons is, it had clean development mechanisms in it that lowered—that didn't affect carbon prices

by—if it didn't have the mechanisms in place, carbon prices would be 96 percent higher. Again, that's the reason, Senator——

The CHAIRMAN. Well, that's——

Senator CORKER. [continuing]. Chairman, that this is such an important part of our discussion.

The CHAIRMAN. That's an important part of the discussion.

And the final comment I'll make is, Europe realizes that, first of all, when I was in Kyoto—and Todd Stern will remember this—the Europeans were dead-set against cap and trade in a marketplace. They didn't believe in it. They accepted it. But, they implemented it with that mindset of really not liking it, understanding it, et cetera. So, there were games played in the beginning. We all understand that. Now they like it, and now it's working, and now the price is stabilized, and they've reformed the CDMs, and they're moving on that. Every discussion we've had with them, they have acknowledged, "You've got to have CDM reform." So, we're learning from their lesson, and I think that's one way we could approach it.

Senator Webb.

Senator WEBB. Thank you, Mr. Chairman.

Mr. Stern, actually I would like to begin by following on a little bit about what Senator Corker said. And I'd like to associate myself with a great deal of the remarks that Senator Lugar also put before us. You are aware of the votes that took place during the budget process, are you not?

Mr. STERN. Yes, sure.

Senator WEBB. That was a pretty clear indicator, I think, from the perspective at least of the Senate, that there are a great number of concerns about whether this issue has become clearly defined as it relates to specific legislation that might be proposed. There are a lot of unanswered questions as they relate to technology—something that Senator Corker and I have discussed many times—the business model, the bureaucratic implications of legislation, perhaps unintended consequences, and also the international competitiveness of the United States. Many of us feel a strong commitment to improving environmental conditions, but that doesn't mean that the mail has been answered on a lot of these other questions. And I, like Senator Corker, have been spending a great deal of time over the last 2 years trying to sort out the technological capabilities with respect to carbon dioxide emissions and trying to examine the business model. Actually, the more I read about cap and trade, the less comfortable I am with it. I think that there are a lot of people who made a lot of money in the middle. I think we just went through that sort of an experience with our economy. So, there are going to be a lot of questions that are going to be coming out of both sides of the aisle here as this issue moves forward.

I would like to ask you to, in—we don't have much time, but in precise terms, if you would, to explain the different categories, the annexes on the UNFCCC.

Mr. STERN. Sure. The traditional breakdown is between developed countries, and there's a list of—essentially, the OECD. And that's Annex 1—and then, non-Annex 1 are countries that, at the time, were not OECD. There are two countries that weren't, and now are—Mexico and South Korea—and they're sort of in a nether

zone between developed and developing in the world of the Framework Convention. But——

Senator WEBB. And the developed countries in Annex 1 have specific obligations.

Mr. STERN. The developed countries under the Kyoto Protocol have specific obligations. There are obviously some countries, including the United States, that did not end up——

Senator WEBB. Right.

Mr. STERN. [continuing]. Joining Kyoto.

Senator WEBB. But are assumed to have specific obligations——

Mr. STERN. Exactly.

Senator WEBB. [continuing]. If we were to——

Mr. STERN. That's right.

Senator WEBB. [continuing]. Join in this. And then there is an Annex 2, which is a subset of Annex 1?

Mr. STERN. Yes, there are countries from the former—essentially, the former Soviet group of countries. But, the fundamental—the fundamental division is between Annex—the Annex 1 and the non-Annex 1——

Senator WEBB. Right. And so, the major polluters in the world today—China and India—are not Annex 1.

Mr. STERN. Correct.

Senator WEBB. So, they have——

Mr. STERN. Well, they're—they——

Senator WEBB. They do not have——

Mr. STERN. [continuing]. They are major——

Senator WEBB. [continuing]. Specific obligations.

Mr. STERN. Absolutely right.

Senator WEBB. Right. And one of the justifications in this exclusion for them was that the developed nations have greater financial resources in order to deal with specific obligations, according to what I'm reading here.

Mr. STERN. Well, that's partly right. I mean, let me just make one slight exception to what you said. They are major polluters. I would not describe them as "the" major polluters.

Senator WEBB. Well, in terms of carbon dioxide emissions, are they not now the highest——

Mr. STERN. No.

Senator WEBB. [continuing]. Emitters?

Mr. STERN. No. No, no. The United States is around 20 percent. China is slightly more. India is around 4 percent of the world total. So, India is important——

Senator WEBB. Well—OK, so——

Mr. STERN. I'm not——

Senator WEBB. [continuing]. China is——

Mr. STERN. China's No. 1.

Senator WEBB. [continuing]. A greater polluter than we are.

Mr. STERN. China's No. 1 right now. We're No. 2. The EU, broadly, is—I don't remember the exact percentage, but probably 14, or something like that. But——

Senator WEBB. So, here's the——

Mr. STERN. [continuing]. It is about——

Senator WEBB. [continuing]. Here's the dilemma for a legislator who is attempting to be fair to the situation, but also to America's

place in the world economy. We have a situation where it is assumed that we have greater financial resources to deal with this problem, when China is a greater emitter and they're sitting on a $2 trillion surplus——

Mr. STERN. Right.

Senator WEBB. [continuing]. While our economy has gone down the tubes in the last 8 or 9 months. Would you comment on that?

Mr. STERN. Sure. Look, I am absolutely not taking the position that I think that China or other major developing countries should stay on the sidelines and not have obligations. I understand that that's what the original division set up, and I understand that's the way Kyoto was. That's not what our position is. So, I hear you. That's——

Senator WEBB. Your position would be that China would also have to have a specific obligation?

Mr. STERN. Yes.

Senator WEBB. OK.

Mr. STERN. Yes. Now, that doesn't mean the same obligation. That's what I was saying earlier, in response to something that Senator Kerry said. But, the——

Senator WEBB. Why wouldn't they have the same obligation?

Mr. STERN. There has been a historical division which is kind of represented in the phrase "common but differentiated responsibilities." And developing countries, based on their level of development, based on their per capita income and so forth, have had different expectations. That's narrowing for a country like China. It's narrowing quite considerably. China, right now, is a developed country and a developing country. There's probably 300 or 400 million people who still live in poverty in the countryside. It's basically a developed country in the cities and a developing country in the countryside. Right?

Senator WEBB. [continuing]. Would agree with you on that.

Mr. STERN. Right. And so——

Senator WEBB. But, at the same time, they're sitting on $2 trillion——

Mr. STERN. There's no question about that.

Senator WEBB. [continuing]. Which is going to affect what's going on in their country——

Mr. STERN. There's no question about that. And I think that our policy is that the Chinese and other major developing countries are going to have to take on real obligations, but that does not necessarily mean, to me, that that needs to be, at this point, an economy-wide target, the way the United States might take on. I think it has to be robust action. We think it needs to be quantified, that they need to commit to it, and that the commitment needs to be transparent. We need to be able to see what it is and make a determination about whether it's enough——

Senator WEBB. Right, I understand.

Mr. STERN. [continuing]. To start.

Senator WEBB. I'm over my time, but I do want to reinforce that there are a lot of questions on this side with respect to the capability of technology to protect our energy production in all sectors. The business models that are being used, there's going to be a lot of questions about cap and trade. The bureaucracy that would come

out of this—the bureaucracy that was going to come out of last year's bill was—it looked like something you would get out of the old Soviet Union. It would have bogged down our governmental system and also our ability to compete internationally. So, those are the questions.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you, Senator Webb. Let me just assure you that we are prepared, those of us who have been advocating to move forward on this, to sit down with you at any time, work through each and every one of these issues. There are answers. A lot was learned through last year's effort. There is a very different approach being taken this year to try to deal with those things up front and inclusively. And we look forward to working with you.

Senator WEBB. Well, thank you, Mr. Chairman. We're trying to talk to as many different people as we can.

The CHAIRMAN. Good. Thank you.

Senator Shaheen—Senator Casey.

Senator CASEY. Mr. Chairman, thank you very much for calling the hearing. I think it's further evidence of the chairman's commitment to these issues for so many decades.

And I do want to commend our witness, Mr. Stern, for being here not just to testify and respond to questions, but speaking with a sense of urgency on this issue that's critically important.

I believe this issue is as important as any we'll face in this Congress. It's not just an esoteric issue that's far into the future. I really believe it involves, not just the kind of world we're going to have, but—in essence—human life and the protection of human life.

I wanted to try to focus on two areas, one from the perspective of Pennsylvania. I live in and represent a State that's No. 3 in terms of carbon emissions. And I guess that adds up to about 1 percent of the world's carbon. So, we have a significant challenge ahead of us.

There are particular industries where there's a real concern about so-called "carbon leakage," meaning high-paying, high-skilled jobs going to countries that haven't set forth or put in place restrictions on carbon.

I wanted to ask you—for example, in the steel industry in Pennsylvania, a real concern is that jobs will be going to another country that isn't doing their part, so to speak. What's your feeling about this challenge, and has the administration arrived at a conclusion about, so-called "sectoral agreements," meaning economic sectors that would take into account that concern about what's known, in common parlance, "carbon leakage," as it relates to jobs?

Mr. STERN. Thanks, Senator. Two comments.

First of all, I think that, both in terms of the legislation that's been introduced in the House and in terms of discussions that are going on inside the administration, I think there is a lot of focus on what to do and how to respond to the concerns of energy-intensive industries like steel. The Waxman legislation includes two different ways to deal with that. One would, in effect, provide a certain amount of resources from the sale of allowances to energy-intensive industries, and tie that to their production so that the

more you produce, the more you get in order to offset the higher energy costs that might ensue. That's one idea.

The other idea, which has also appeared in legislation in previous years, has to do with, in effect, a border tax adjustment. We don't have a position on that, at this point, and, any way that would be done would have to be done with some sensitivity to WTO concerns. But, that is another idea that's embedded in that bill.

Sectoral agreements, I think that there is potential for those. I'm not sure that those—it's conceivable that those could be part of the Copenhagen agreement, or there is also the potential that they could happen independent of Copenhagen.

I think it's important to say, in this context, Copenhagen is not the whole show. It is very important, and it, at this point, has a great deal of our focus, but it will be vitally important to have major technology agreements among the key countries around the world. It could be very important to have agreements on standards, and that could include things like steel or other kinds of products or appliances that could be global. So, Copenhagen is an enormously important framework, but if we get a Copenhagen deal done, in my mind that's the start, that's not the finish. I mean, that would set the broad framework within which we would operate and would set targets for where people need to go. But then you've actually got to take the action that could make the reductions. And sectoral agreements could be part of that.

Senator CASEY. Thank you.

I want to ask you about financing and the U.S. role in financing any kind of adaptation or climate initiatives in developing countries. How do you see that working? And has the administration arrived at a position on what our role would be in financing those adaptations or new initiatives?

Mr. STERN. Yes. We're in the middle of a lot of work on that subject right now, both internal to the administration and in consultations with our colleagues in other donor countries. I think that financing, whether it applies to adaptation or to mitigation, is something that needs to be looked at, in essence, in terms of different potential sources of funding. Carbon markets themselves can provide a lot of funding. Some funding probably—this is probably more true in the context of adaptation, even—is going to need to come from public sources, public government sources. And so, there's—what the total amount of potential funding can—what amount can be put together among the donor countries. There are also very important related questions that have to do with what sort of institutional arrangements would be set up, what the governance structure would be as between developed and developing—probably a blended structure—not exactly what the developing countries are going to want, and not exactly what the developed countries are going to want, but a blend—so that we can have both a flow of funds, but accountability over the funds. The last thing we want is for money to go, and not get used well.

So, I think that we are right in the middle of working on that. We have been meeting with our friends from the U.K. and Germany and many other countries to work on both the amounts that could be provided and the structure.

Senator CASEY. Thank you very much.

The CHAIRMAN. Thank you, Senator.

Senator Shaheen. I'm sorry. I didn't have the mike on.

Senator SHAHEEN. Good, thank you.

I would like to just go back to the comments of Senator Corker and Kerry relative to the purpose of cap and trade, to begin. And I would take it one step further even than Senator Kerry did in talking about the purpose. It's not just to put a price on fossil fuels, but it's really to try and put a price on carbon. And I appreciate, Senator Corker, you think that can be done more efficiently with a tax, but—I think the—neither of those are really the purpose of what we're talking about. It's really how we deal with the greenhouse gases that cause global warming. And I think sometimes we all understand that, but we get so into the weeds of what's involved here that we've got to stay focused on the point you made, Mr. Stern—and thank you for being here—and the point that a number of people here have so eloquently made, and that is that we have to deal with climate change, that we are experiencing now in New Hampshire. And the farther north we go, the more we can see the impacts of that. And we—there are a number of ways for us to deal with this issue, but the important thing is for us to get a commitment to deal with this issue, and to do it expeditiously.

And I would point out that we have a number of States in the United States that already have cap-and-trade programs underway. New Hampshire is one of those, with the Regional Greenhouse Gas Initiatives. And so far it's working well, and it hasn't—we haven't seen a negative impact on our industry, beyond the impacts that we're all feeling with the economic downturn.

So, I just think it's important for all of us to stay focused on the need to get something done, because of the challenge that's facing us, and, with that said, to recognize that there are significant areas of disagreement among us about how to get that done.

And one of the things you pointed out was that it's going to be very important to have a position that Congress and the United States have taken to go to Copenhagen, that we will be in a much better negotiating position.

So, I guess what I would say to you is, recognizing the challenges that we're facing to do that, what do we need to take to Copenhagen, short of legislation, that will demonstrate our commitment to addressing this issue?

Mr. STERN. Thank you very much, Senator.

I think that there are—first of all, there are a number of things that have happened already which are certainly very helpful. As I noted in my testimony, the stimulus package included a very large amount—it gets described in different precise numbers, but—whether it's $80 billion or $70 or $90, it's a large number and, really, a historic downpayment.

I think that, though—on the issue of the major cap-and-trade and energy legislation, for purposes of Copenhagen, real serious progress has to be made on that. I would love to see the bill done. I think that would be—that would be——

Senator SHAHEEN. Wouldn't we all?

Mr. STERN. Yes, that would be in everybody's interest. But, short of that, I think demonstrable progress that—a sense that it is rolling—with determination and decisiveness, down a track, is at least

what we're going to need. If, by contrast, the sense is, as I said earlier, that the bill is dead and it didn't go anywhere, and we've got nothing going on, it's going to be very, very difficult. I mean, it's going to be more than difficult. So, I think that we need to be making demonstrable progress, at the very least.

Senator SHAHEEN. Thank you. And, as I'm sure you are aware, one of the debates that's going on as we think about our internal legislation is how we—revenue recycling and what happens——

Mr. STERN. Yes.

Senator SHAHEEN. [continuing]. To dollars. Do they get sent back to consumers? How do those get used? Does that debate here have implications, as you're thinking about dealing with developing countries? And——

Mr. STERN. I guess my answer to that would be—I'm not sure that it has direct implications with respect to developing countries. One thing that would have some implications with respect to developing countries is whether there's any capacity within the bill to have some very small part of the proceeds available for adaptation uses for the poorest countries, for example. And I think that actually would be important. Probably a contentious debate, but I think it would be very useful, in the international context, if that were true.

Beyond that, I think the precise debate—and it is a very active debate, I think, on the Hill and even, obviously, a subject of a lot of discussion and consideration within the administration—on whether the funds get sliced up exactly this way or that way, in general, matters less on the international side than that the choice gets made that is most productive to getting the legislation completed, and the legislation stays strong. I mean, you don't want it to be sliced up in a way that guts——

Senator SHAHEEN. Right.

Mr. STERN. [continuing]. The legislation. Let's just say it's got to be real and strong. But, getting it done, I think, is the fundamental, internationally.

Senator SHAHEEN. Thank you.

The CHAIRMAN. Mr. Stern, thank you.

Are there any further—Senator Corker?

Senator CORKER. Again, I look forward to seeing you in a week or so and talking through some of these things.

I guess I'd just close—and I won't take, certainly, 7 minutes to do this, but—the reason that I think this is such an important issue is the relationship between addressing climate and energy security, in general, and our economic security. OK? And I see some of the upsides that people talk about on the economic side. I also see some of the downsides. And thus, the amendment last year to make sure all the proceeds come back to people, which I know is—that was the great line of questioning, I thought—which does put in place the rub between us and the developing countries if we don't want our citizens transferring wealth. Right? Pretty important issue.

But, I guess I would just ask how much time you're spending on the energy side, in that climate change legislation or treaties done in a vacuum can leave us in a very bad place as it relates to our own energy security, and it doesn't take but just one trip to

Ukraine or Russia and the tendency of Russia to turn the valve off when, sometime, things aren't going exactly the way they wish, and to see the huge amount of fuel switching that took place in Europe after cap-and-trade legislation was put in place in the European Union.

So, I hope that this is not being done in a vacuum. And I know Jeanne and I serve together on the Energy Committee, and this is all very related, and I would just say, Mr. Chairman, I actually think it would be helpful—I know you talked to Senator Webb about sitting down, but this and energy really tie together in a very, very important way, and I hope that, as we're moving through this, we will make sure that we address the complexities that are so important to our country as it relates to energy security, which is very relevant to our national security and our economic security, when we're talking about climate.

So, I look forward to those meetings, and certainly, Mr. Chairman, I appreciate you having the hearing today.

The CHAIRMAN. Well, thank you, Senator Corker.

Let me just say we're going to have a lot of meetings. We're ready to work to move this forward. In fact, one of the reasons Leader Harry Reid has decided to keep the energy bill and the cap-and-trade bill linked in the Senate, as they are in the House, is because of the interconnectedness. We understand that. We have a huge investment that is taking place through the stimulus package, some $80 billion going into alternative energy, renewable energy, so forth. Senator Lugar raised a question with me and—publicly—about why some of this money isn't getting out there into these companies, in terms of technology. And, indeed, there was about $40 billion just bottled up at the Energy Department in the last administration. No grants were being made. Secretary Chu is committed now to moving that money out into our private sector, and that's going to make an enormous difference for colleges and universities and technology advances as we go forward.

But, one thing that a lot of the opponents and/or questioners—I don't want to say "opponents"—people who are sort of still sitting on, or have serious reservations, I think, aren't focused on the fact that cap and trade, as it is currently defined in the Waxman bill and in our current conceptualization here, is not economy-wide. The transportation sector is not in it. The agriculture sector is not in it. The small-business community is not in it. It applies to utilities, power generation, and it applies to heavy industry.

Effectively, you're talking about a universe of about 2,000 entities in the United States. That's it. That's what you're talking about. And our economy, you know, is big enough, No. 1, to consume that.

Second, the McKinsey Company, which is one of the most reputable, well-thought-of consulting companies, business consulting, in—advising companies—in the country, spent a number of millions of dollars doing an analysis and putting together a carbon-cost abatement curve. And they have a chart—and I'm going to get it for you; you should read the study—that shows that the first 30, 35, whatever—I forget the exact percentage—it's about 30, 35 percent of this reduction—is completely paid for by your doing it. The companies that do it actually get money back. They wind up net-

positive in doing it. And then you have a midsection cost that's very minimal, and it's at the far outside end of it, where you're grabbing a much greater amount, that you actually went into the higher cost.

So, for the first few years, this is going to be money back to companies. This is the most energy-inefficient nation in the planet, folks. I'm sure our next panel will probably address some of this. Energy efficiency, according to the McKinsey study, can grab anywhere from 40 to 75 percent; 70 percent of the total grab we need to get out of greenhouse gas emissions. So, we become more competitive because we are, in effect, becoming more efficient.

So, these are all the things that we need to get at as we go at this over these next months. And I look forward to sitting down.

Now, Mr. Stern, as we terminate your part of this panel, let me just say to you, what has leapt out from this—and Senator Lugar mentioned the Arms Control Observer Group—we've been planning. Two years ago, I ran that by then-Chairman Biden, and we decided, sort of, to do that within the framework of this committee, which has jurisdiction over the treaty. And the Senate is going to have to, hopefully, be able to pass whatever it is that we work. So, my commendation to you here is that we've got to be talking more. And I think you've got to sort of be up here dealing with both sides of the aisle. And we'll convene that, Senator Lugar and I, so we have an ongoing effort to be working at these issues. I think it will help you, it'll help us, and, in the end, hopefully helps the final product significantly.

Now, in fairness—I said this to Senator Corker—Todd Stern made it clear to me, prior to coming up here, that not all of the t's were crossed and i's dotted with respect to where they're going in the next few days. And I——

Senator CORKER. I would add "paragraphs written," but——

The CHAIRMAN. Well, no, I think that's unfair. But, I think that, for a lot of reasons, they're trying to get all of that—and they've got the major emitters meeting next week. I think we've got to allow them that leeway to be able to complete that task. This is a major effort. And, as he said, not all those folks are even on board yet.

So, I knew he was coming here today without the ability to fully flesh out every single component of it. I still think it was important, and I think it's contributed significantly to people's understanding of the process and of where we're heading and of how we're going to get from here to there.

So, I thank you for taking the time to be up here today. We look forward to continuing this work with you in the next weeks. And you wanted to make one comment, I think.

Mr. STERN. Well, thank you very much, Senator Kerry. I welcome the very full engagement with this committee. I can talk to Senator Corker separately, but I do want to say that we are in anything but a vacuum, in terms of the energy issue. We have worked closely with the White House and the Department of Energy on energy partnerships with Canada, with Mexico, an initiative in the Summit of the Americas. And when I went with Mrs. Clinton to China, back in February, the leading thing that we focused on was establishing an energy partnership with the Chinese. They agreed

on that, in principle, and we are working very hard right now. I hope to go, later in the month of May, to China, as soon as I possibly can, with people from DOE and probably the Office of Science and Technology Policy, specifically to work on energy issues and climate change issues.

I think that these things are absolutely, completely, intimately linked, and that the energy security issue is fundamentally linked, as well. So, we're not approaching it in a vacuum at all. Just the opposite.

The CHAIRMAN. Thank you very much, Mr. Stern. We appreciate it.

Mr. STERN. Thank you so much.

The CHAIRMAN. Could we invite the second panel to move right in and have a seamless transition here, hopefully?

Thank you.

[Pause.]

The CHAIRMAN. I'm delighted again to welcome Ned Helme, president of the Center for Clean Air Policy; Paul Camuti, president and chief executive officer of Siemens Global Research; and Helene Gayle.

And, Helene—do you want to lead off, Helene?

STATEMENT OF HELENE GAYLE, PRESIDENT AND CHIEF EXECUTIVE OFFICER, CARE, ATLANTA, GA

Ms. GAYLE. Yes, thank you.

The CHAIRMAN. And I'd ask that you each summarize, if you would, please. Your full testimony will be placed in the record, and we'd really enjoy the chance to explore questions with you.

Ms. GAYLE. Great. And thank you very much, to you, Chairman Kerry, to Senator Lugar, for this session and also for your longstanding commitment on this issue. We also would like to acknowledge the administration's pledge to prioritize climate change and to really reengage in the global negotiations, as was mentioned in the first panel.

My goal today is to provide input on this important discussion, from the perspective of CARE, an international development and relief organization that's been working in partnership with the poorest communities around the world for 60 years, fighting poverty, and to try to represent the interests of poor communities on two aspects of the Bali Action Plan, forestry and the issue of deforestation that's already been raised, and adaptation.

And I would just say that my overall message is that, beyond our part to preserve the planet which has been talked about already, in our U.S. climate policy and legislation, we must also respond to the impact that climate change will have on people in the world's poorest communities. And so, in that context, I will make my remarks.

This obviously growing body of evidence shows that the cost of doing business as usual with energy and the environment is going to pull the rug out from underneath the progress that the world is making on important Millennium Development Goals. As has already been mentioned, people in extreme poverty, who are already living on the edge of crisis, are going to have climate change push them over that edge, whether it's from reduced agri-

cultural productivity, increased water stress, health risks, or the increasing frequency, severity, and intensity of weather-related hazards. And as has already been mentioned, in addition, unmitigated climate change is likely to have an impact on global security and global instability, contributing to mass migration, refugee crises, increased scarcity of natural resources.

And I would just take a moment to thank the Chair for the work on Sudan. And, I think, as you mentioned, if you go to Darfur, if you go to Sudan, you see what that impact is already, in some places.

Ultimately, climate change is going to have its greatest impact on the poorest communities and most marginalized groups, including women and girls, which is a major focus of our organization.

Now, to avoid this scenario, I want to just touch briefly on three recommendations related to deforestation and adaptation that we believe can make an impact, understanding that the United States has to act aggressively to put in place policies to effect deep and immediate reductions in domestic greenhouse gas emissions, that people have already touched on.

So, my three recommendations relate to protecting rights within the context of the reduction of emissions from deforestation and forest degradation in developing countries, or so-called REDD; funding adaptation, making sure that there are set-asides of substantial revenues, new and additional to our official development assistance, to support adaptation in developing countries that are vulnerable to climate change; and, three, to reach the poorest and the most vulnerable with these funds to ensure that adaptation funding actually reaches and responds to the priorities of the poorest populations, who are most vulnerable.

Let me just give a bit of detail about each of those, very quickly.

First of all, the issue of protecting rights under REDD. Clearly, to reach mitigation goals, we need to make sure that we reduce emissions from deforestation and degradation in U.S. climate change legislation, because it does account for about 20 percent of human-induced greenhouse gas emissions. But, REDD activities must include pro-poor social standards and safeguards. We know, from our experience, that conservation efforts are going to be much more effective if they also recognize communities' central role in forest conservation, and protect their rights, and ensure that they have a livelihood in the context of reducing degradation and deforestation.

So, an example—and we cite several examples in our written testimony—CARE worked in Nepal with Weyerhaeuser Company, USAID, and World Wildlife Fund to have a three-pronged approach that promoted conservation and biodiversity, strengthened economic development, and also worked on changing government policies, forest policies in Nepal, to make sure that they were responsive to the needs of the poor. We're going to continue to do projects like this, working in partnership with environmental groups, to use these models to demonstrate the ability to conserve natural resources, but also to make sure that livelihoods are maintained and that policies are changed, in the meantime, to meet the needs of the poor.

Second recommendation, new funds for adaptation in developing countries. And people have mentioned this and touched on this, but I think it's important to recognize that this is going to be key. Past emissions have already set in motion the changes that we've talked about, and it's important that we recognize the need for adaptation on the ground.

The estimates are large for this, so this is not something that can be done on the cheap. The estimates of international adaptation needs are as high as $86 billion a year by the year 2015. Now, there's a range of estimates here, but it's clear that we're talking about tens of billions of dollars if we want to meet adaptation needs. But, we also know that investing in adaptation today is going to save dollars tomorrow, perhaps in the range of $1.00 of prevention today for the $7.00 that it would cost us in the future. It's going to save lives, and it also is going to build resiliency in communities to be able to withstand ongoing climate changes that have already occurred.

Funding international adaptation is also the right thing to do. The world's poor are the least responsible for climate change and are the most severely impacted. So, understanding all the issues about our own domestic concerns, clearly it's the right thing to do. We have been most responsible for the climate change that others are suffering from.

And finally, No. 3 point, assuring that adaptation funds reach those with the greatest needs. And, as I've mentioned before, the best way to do that is to make sure that local communities are empowered to facilitate ownership of adaptation strategies. And I would just again point out—we've included several examples in our written testimony—but, the good news is that we already know how to do that.

In Tajikistan, for instance, we're working with women to develop greenhouses to be able to grow more food, because the winter season has already lengthened and decreased agricultural productivity.

In Kenya, communities are building sand dams in freshwater rivers to capture and store water for use during longer dry seasons.

In Bangladesh, women have identified duck rearing as an adaptation option, as opposed to chickens, which is oftentimes their livelihood, because ducks float during these more frequently occurring floods.

So, there are simple ways which communities have already found to adapt to climate change, and we want to be able to help support them in their ability to do some of the very simple things that can make a difference in saving lives and providing livelihoods.

Finally, in conclusion, I would just say, as everyone has said before, the opportunity to make a difference is extraordinary. Clearly, it is vital that the United States pass domestic legislation that does reduce U.S. greenhouse gas emissions, but also that protects the rights and interests of forest-dependent communities around the world, funds international adaptation, and guides those funds so that they reach the people in poor countries most vulnerable to climate change. This is the time to act. As everybody says, this is urgent, not only for us, but for others around the world.

So, again, I thank you, and we have full written testimony that's already been submitted.

[The prepared statement of Ms. Gayle follows:]

PREPARED STATEMENT OF HELENE D. GAYLE, MD, MPH, PRESIDENT AND CHIEF EXECUTIVE OFFICER, CARE USA, ATLANTA, GA

Mr. Chairman, Senator Lugar, members of the committee, thank you for the opportunity to join this important discussion about climate change, especially as the Senate considers U.S. climate change legislation and a post-2012 global climate agreement.

I congratulate the new administration and Congress for your renewed engagement in the U.N. Framework Convention on Climate Change and welcome the positive tone that the U.S. delegation brought to the recent meeting in Bonn. I also applaud President Obama's pledge to prioritize climate change, even as the country and the world face other major challenges, and the strong start on U.S. climate policy in the U.S. Congress made by House Energy and Commerce Committee Chairman Henry Waxman and Congressman Edward Markey. Finally, I want to acknowledge the importance of the work of Senator Barbara Boxer and the Subcommittee on International Operations and Organizations, Human Rights, Democracy, and Global Women's Issues.

I speak today on behalf of CARE, an international development and relief organization that has worked for more than 60 years in some of the poorest communities in the world. In addressing two elements of the Bali Action Plan—forestry and adaptation—my goal this morning is to represent the interests of poor, marginalized people in the developing world and to shine a light on how they are likely to be affected by climate change—a phenomenon they bear little responsibility for, yet are forced to confront—and by its global response.

My overall message is that, above and beyond doing our part to preserve the planet, U.S. climate policy and legislation must respond to the impact that climate change will have on people in some of the world's poorest communities.

THE HUMAN IMPERATIVE

The exponential increase in climate change research in the past decade demonstrates overwhelming scientific agreement that climate change is already happening and has been triggered by human activities. In fact, according to the U.N., climate change is happening with greater speed and intensity than initially predicted, and we may be closer to an irreversible tipping point than first thought.

In the United States, economic arguments for addressing climate change have gained some traction among businesses and policymakers. Business coalitions, such as Business for Innovative Climate and Energy Policy and the U.S. Climate Action Partnership, have called for U.S. legislation to help stimulate the development of a low-carbon economy. Last fall, during the Presidential elections, both John McCain and Barack Obama argued that U.S. climate policy would be more of an opportunity for, rather than a hindrance to, the U.S economy.

National energy security arguments have also gained traction. Last year, the U.S. Center for Naval Analysis released a report stating that climate change poses a serious threat for U.S. national security; the report argued that climate change will threaten some of the most volatile regions of the world and add tensions even in stable regions. In addition, when oil prices skyrocketed last summer, there was a push from policymakers and the American public for reduced U.S. reliance on foreign oil in the interest of national energy security.

While we at CARE would not argue against these economic and national energy security rationales, we support strong action on climate policy for another reason. That reason is based on our mission and more than 60 years of experience working alongside poor, marginalized communities, where people already struggle to live with dignity even without climate change. Our policy position is firmly and explicitly underpinned by our commitment to reducing poverty.

The projections are stark. Economist Sir Nicholas Stern estimates that, if economic models took into account three crucial factors—the direct nonmarket impacts on the environment and human health, the risk of catastrophic weather events, and the disproportionate burden of climate change impacts on poor regions of the world—the total cost of business as usual emissions would be equal to an average reduction in global per capita GDP of 20 percent.[1]

[1] Stern, N. 2007. "The Economics of Climate Change: The Stern Review." Cambridge University Press, U.K.

In other words, unmitigated climate change will pull the rug out from under progress the world is making on the Millennium Development Goals (to which the G20 in its most recent meeting reaffirmed its historic commitment). In fact, it threatens to wipe out decades of development gains, and it is likely to contribute to mass migration, refugee crises, and increased conflict over scarce natural resources, undermining global stability and security.

There is no doubt that everyone will be affected by the consequences of climate change; in the U.S., for example, storms will likely become more severe and coastal communities along the gulf and Atlantic coasts will be especially stressed.[2]

However, while climate change will affect us all, the world's poorest people will be hardest hit. Today, more than 1 billion people survive on less than $1.25 a day and already live on the edge of crisis.[3] If left unchecked, climate change may push them off that edge. Major projected impacts include:

- *Agriculture.* The negative impact of unmitigated climate change on agricultural production will likely be more adverse in tropical areas and the poorest developing countries, particularly in sub-Saharan Africa.[4] Agricultural production in many African countries is likely to be severely compromised by climate change and climate variability, with yields declining by as much as 50 percent by 2020.[5]
- *Freshwater resources.* Climate change will intensify the water cycle, resulting in billions of people gaining or losing water. Areas likely to gain water, like South and East Asia, will face more flood disasters. Arid and semiarid regions, like southern Africa, will become even drier and be at dire risk of increased water stress, while current water management practices will likely be inadequate. In addition, as temperatures increase and glaciers retreat, river flows, particularly in the Hindu Kush-Himalaya and the South American Andes, will increase in the short term; but as glaciers melt, river flows will gradually decrease over the next few decades.[6]
- *Human health.* Climate change will likely increase health risks. Projected trends include increased malnutrition, increased morbidity and mortality in heat waves and weather-related disasters, and changes in the geographic range of some infectious disease vectors, such as malaria. These health risks will be heavily concentrated in poorer populations at low latitudes, particularly in sub-Saharan Africa.[7]
- *Disasters.* According to a CARE/UNOCHA report, people in extreme poverty, especially in Africa, Central and South Asia, and Southeast Asia, will face even greater risk of disaster as the frequency, intensity and duration of weather-related hazards, such as floods, cyclones and droughts, increases as a result of climate change.[8] By late century, millions more people than today, particularly

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[2] Field, C.B., L.D. Mortsch, M. Brklacich, D.L. Forbes, P. Kovacs, J.A. Patz, S.W. Running and M.J. Scott, 2007: North America. "Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change," M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, U.K., 617–652.

[3] Chen, S. and Ravallion, M. 2008. "The Developing World Is Poorer Than We Thought, But No Less Successful in the Fight against Poverty." World Bank Policy Research Working Paper 4703.

[4] FAO, 2003. "World Agriculture: Towards 2015/2030. An FAO Perspective." Available online at: http://www.fao.org/docrep/005/y4252e/y4252e00.htm.

[5] Boko, M., I. Niang, A. Nyong, C. Vogel, A. Githeko, M. Medany, B. Osman-Elasha, R. Tabo and P. Yanda, 2007: Africa. "Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change," M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge U.K., 433–467.

[6] Kundzewicz, Z.W., L.J. Mata, N.W. Arnell, P. Döll, P. Kabat, B. Jiménez, K.A. Miller, T. Oki, Z. Sen and I.A. Shiklomanov, 2007: Freshwater resources and their management. "Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change," M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, U.K., 173–210.

[7] Confalonieri, U., B. Menne, R. Akhtar, K.L. Ebi, M. Hauengue, R.S. Kovats, B. Revich and A. Woodward, 2007: Human health. "Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change," M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, U.K., 391–431.

[8] CARE and UNOCHA, 2008. "Humanitarian Implications of Climate Change: Mapping Emerging Trends and Risk Hotspots." Available online at: www.careclimatechange.org.

in low-lying coastal regions, such as the mega-deltas of Asia and Africa and small islands, will likely experience floods every year due to sea-level rise.[9]

The severity of the consequences of climate change described above and the effort required to adapt to the consequences depend on what we do now. The IPCC recommends that global greenhouse gas emissions be reduced 25–40 percent from 1990 levels by 2020 in order to improve the odds of avoiding dangerous warming of more than 2 °C in average global temperatures.[10] The longer we wait to stabilize the atmosphere, the greater the probability that the world will exceed the 2 °C threshold. Adverse impacts on ecosystems, agricultural production, freshwater resources, human health, and the risks from extreme climate events are projected to increase significantly when the increase in average global temperature from preindustrial levels exceeds 2 °C.

The UNFCCC is grounded in the principles of equity and "common but differentiated responsibilities" (Article 3.1)—principles which were reaffirmed by the G20 in its most recent meeting. Developed countries, including the U.S., have the largest historical responsibility for climate change, as well as the most resources to address the problem. Developed countries must, therefore, lead efforts to combat climate change and its impacts.

At the same time, it will be impossible to keep the global temperature rise as far below 2 °C as possible unless the largest emitters among the developing countries do their part. Many have already expressed willingness to do so. At the 14th Conference of Parties (COP) of the UNFCCC in December 2008, key developing countries, such as Brazil, China, Mexico and South Africa, came forward with plans to reduce their own greenhouse gas emissions, demonstrating their willingness to engage at the global level.

Successful global climate negotiations, culminating this December in Copenhagen, may well hang on concrete U.S. action and the impact it will have in bringing all countries together around shared goals and responsibilities.

RECOMMENDATIONS FOR INTERNATIONAL ADAPTATION AND FORESTRY

A global solution to climate change begins but does not end with deep and immediate reductions in domestic greenhouse gas emissions. Based on our extensive field experience, CARE believes that it is also vital for the U.S. administration and Congress to commit to passage of domestic legislation that:

1. Protects rights. Supports the reduction of emissions from deforestation and forest degradation in developing countries (REDD) in a manner that protects the rights and interests of indigenous peoples and other forest-dependent communities;

2. Funds adaptation. Sets aside substantial revenues—new and additional to official development assistance and reflecting U.S. commitment to funding its fair share—to support adaptation in developing countries vulnerable to climate change; and

3. Reaches the poorest and most vulnerable. Ensures that adaptation funding reaches and responds to the priorities of the poorest populations most vulnerable to climate change.

I will address each of these three recommendations in further detail, grounding my observations in CARE's field experiences.

1. Social Standards and Safeguards Essential for Successful REDD

The inclusion of Reduced Emissions from Deforestation and Degradation (REDD) in U.S. climate legislation is crucial if we are to avoid dangerous global warming. Deforestation accounts for some 20 percent of human-induced greenhouse gas emissions.

However, CARE believes that REDD must be accompanied by adequate social standards and safeguards from the outset. While investments in REDD have the potential to offer significant benefits for indigenous peoples and other forest-dependent communities in developing countries, they can also do substantial harm. Past experience with forest conservation worldwide tells us that, without appropriate standards and safeguards, forest-dependent communities face numerous social and eco-

[9] IPCC, 2007: Synthesis Report. "Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change" [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp.

[10] IPCC, 2001. "Climate Change: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change." Cambridge University Press, Cambridge, U.K.

nomic risks to their livelihoods, their access to resources and land, and their ability to share in the benefits of REDD activities.

Take the case of Uganda, a country with one of the highest deforestation rates in the world. In 2002, the Ugandan Government took forested land away from local populations in the Butamira Forest Reserve and gave it to large commercial sugar companies. Forests were mowed down and cleared for profit. Natural resources from the forest were no longer available to forest-dependent communities. Pig, cattle, and goat rearing projects were forced to close due to lack of access to water and grazing land. Crafts and household goods, which women used to sell at local markets, ceased to be produced because women no longer had access to raw materials. As a result of the loss of income, parents had to pull their children out of school. Women were forced to use leftover sugarcane waste, instead of fuelwood, for cooking, which meant that they could only make food that could be cooked quickly. Sugarcane leftovers burn fast, making preparation of nutritious beans impossible.

In 2006, CARE worked with women from the former Butamira Forest Reserve to stop rampant deforestation and change national policies. Their protest led to a reversal in government attitude in February 2007. Unfortunately, within a month of winning that policy change, there was another reversal and the Cabinet re-endorsed the giveaway.[11]

What is happening in the Butamira Forest Reserve underscores the kinds of risks that forest-dependent communities face without proper safeguards in place. What is happening in the Butamira Forest Reserve also underscores the importance of standards to ensure that such communities can exercise their rights and participate in the management of forests that directly affect their well-being.

Forests provide a range of environmental services and livelihood opportunities, serving as a safety net for poor, forest-dependent communities. This becomes particularly important in light of projections that climate change will reduce agricultural yields in certain parts of the world. We need to help developing nations find alternatives to cutting away that safety net. We also need to find alternatives that respect affected communities' rights and strengthen their stake in, and rewards from, conservation efforts.

We know this is possible because for years, CARE has been working with poor, forest-dependent communities to conserve forests and forest ecosystems as part of a strategy to promote sustainable development. From 2002–2009, for example, in collaboration with the Weyerhaeuser Company Foundation, USAID, World Wildlife Fund (WWF), and local partners, CARE worked with poor, forest dependent communities throughout Nepal to promote biodiversity and forest conversation as well as the democratic management of forests, the equitable distribution of benefits derived from forest management, and livelihood security for the poorest and most marginalized, including women and dalits (the so-called "untouchable caste").

Today, poor and marginalized groups are no longer excluded from community forests, as they once were. There are now more women and dalits on the executive committees of forest user groups. Forest user groups are holding public hearings and public audits on a regular basis to promote transparency and accountability in financial and management decisions. Moreover, the poorest and most marginalized have improved their incomes, and therefore their livelihood security, by rearing pigs, keeping honey bees, cultivating high market value medicinal herbs and high market value vegetables and fruits for sale in local and regional markets.

CARE's program was also the first of its kind in Nepal to ensure access to and control over natural resources exclusively by landless and marginalized households. This practice has gradually spread throughout Nepal. Furthermore, because of the program, CARE succeeded in influencing the formulation of the government of Nepal's Three Year Interim Plan (2008–2010), particularly the chapter on pro-poor forestry policy, as well as the government's 2008 Community Forestry Operational Guidelines. These policy changes have benefited more than 14,500 community forest user groups, which account for about one-third of the total population of Nepal.

From our field experience, we know that social standards and safeguards for REDD must include measures to ensure participation by indigenous peoples and other forest-dependent communities in forestry management; prevent human rights violations; and guarantee free, prior and informed consent, equitable benefit sharing, the right to access and use resources, and access to legal recourse and fair compensation for damages. These standards are essential not only to guard against risks but also to ensure environmental success, i.e., the sustainability and permanence of emission reductions.

CARE is now working with partners, such as FIELD and the Climate, Community and Biodiversity Alliance, to map out, in concrete terms, what social standards and

[11] CARE, 2004. "Reclaiming Rights and Resources: Women, Poverty and Environment."

safeguards for REDD would look like within the UNFCCC framework as well as under voluntary carbon markets. We are also looking, specifically, at the potential opportunities and threats that REDD poses for poor and marginalized women within forest-dependent communities in developing countries. This is new and cutting edge policy research. It will help identify the kinds of social standards and safeguards that need to be in place to ensure that REDD contributes to climate change mitigation in a way that protects the rights and interests of indigenous peoples and other forest-dependent communities.

CARE has also joined strategic forces with WWF to improve the livelihoods of the world's most vulnerable people, to transform their abilities to control their own destinies and natural resources, and to establish sustainable patterns of resource use. Through the alliance, CARE and WWF will create pro-poor, sustainable development models on the ground that can reach significant scale and to drive policy change both in the countries where we work and in the United States.

2. New, Additional Funding for Adaptation in Developing Countries Necessary for Long-Term Success

We need to reduce domestic greenhouse gas emissions as well as emissions from deforestation and degradation in developing countries. We need to do this because if we don't, it will erode decades of development gains and make the struggle to survive even harder for the world's poorest people.

At the same time, we must also help developing countries—and the communities and groups most vulnerable within them—adapt to new conditions. Even if we stopped all greenhouse gas emissions today, a certain degree of climate change is inevitable. Past emissions have set in motion longer term changes to which people in extreme poverty will need to adapt.

While no single weather event can be directly attributed to climate change, numerous examples from all over the world testify to a pattern of new climate conditions much different from what we have seen or experienced before. In Tajikistan, for example, CARE conducted climate vulnerability and capacity assessments to determine how climate-related risks were affecting the lives of people in three villages at different altitudes within the same watershed. What we heard is that the snow pack is increasing, winter is shifting and getting longer, and rainfall is becoming increasingly erratic. All of these local observations are consistent with the meteorological data for the region. In assessing the consequences of these changes for local livelihoods, communities focused on the sensitivity of livestock, gardens and orchards to climate risks.

The communities CARE supports are doing the best they can to adapt to new conditions with limited resources. The amount of funding available to help communities in developing countries adapt is, however, severely insufficient. A number of analyses have been conducted on how much money is needed for adaptation in developing countries. The World Bank suggests that costs will run between $9–$41 billion per year (the low figure assumes no investment in community-based adaptation)[12] while Oxfam puts the price tag at more than $50 billion per year by 2015[13], the UNFCCC estimates that costs will range between $28 billion and $67 billion per year by 2030[14], and the UNDP projects annual costs of $86 billion per year by 2015[15]. While the range varies, consensus is growing that the need, annually, is on the order of tens of billions of dollars and will be significantly higher if greenhouse gas emissions are not reduced substantially in the near term.

Unfortunately, few public financing options exist to help developing countries reduce their vulnerability and adapt to climate variability and change. There are three adaptation funding mechanisms under the UNFCCC. However, as of December 2008, pledged commitments to the Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF) total only $262.3 million. The UNFCCC estimates that the third fund, the Adaptation Fund, has the potential to raise between $25 to $130 million through 2012 and between $30 million to $2.25 billion

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[12] World Bank, 2006. "Clean Energy and Development: Towards an Investment Framework." DC2006–0002. Available online at: http://siteresources.worldbank.org/DEVCOMMINT/Documentation/20890696/DC2006-0002(E)-CleanEnergy.pdf.

[13] Oxfam, 2007. Financing adaptation: Why the UN's Bali Climate Conference must mandate the search for new funds. Available online at: http://www.oxfamamerica.org/newsandpublications/publications/briefing__papers/financing-adaptation/Financing-Adaptation-120407.pdf.

[14] UNFCCC, 2007. "Climate Change: Impacts, Vulnerabilities and Adaptation in Developing Countries." Available online at: http://unfccc.int/files/essential__background/background__publications__htmlpdf/application/txt/pub__07__impacts.pdf.

[15] U.N. Human Development Report 2007/2008. "Fighting Climate Change: Human Solidarity in a Divided World."

by 2030.[16] There is a huge gap between what is needed and what has been pledged or can be raised through the UNFCCC mechanisms.

Poor countries bear the least responsibility, are the most severely impacted, and have the least capacity to cope with climatic changes. If international adaptation continues to be inadequately resourced, climate change is projected to contribute to increased conflict over scarce natural resources, mass migration, and refugee crises.

The good news is that we know that investments in prevention and preparedness work. We can draw this lesson from our experience with natural disasters. The number of disaster-affected people grew from 1.6 billion in 1984–1993 to 2.6 billion in 1994–2003. Material losses also grew from $38 billion in the 1950s to $652 billion in the 1990s.[17] These rising numbers are due to several factors, including population growth and changing habitation patterns. One number, however, has gone down. Fewer people are dying as a result of natural disasters as a result of investments in disaster risk reduction. We can apply this lesson to climate change. Investing now in adaptation will help save money down the road. More importantly, it will help save lives and build people's resilience.

The United States must do its fair share and provide substantial new and additional funding, above and beyond official development assistance, to support adaptation in developing countries vulnerable to climate change. New and innovative mechanisms that can raise significant funds for adaptation and create incentives for mitigation should be pursued, such as the auctioning of emission allowances and levying the use of international maritime and aviation transport (so called "bunker") fuels.

Some policymakers may argue that this will be a tough sell. But I disagree. Deputy Special Envoy for Climate Change Jonathan Pershing made a statement in Bonn earlier this month about the American people. He said that the United States has a tradition of supporting people, not "buying" people. I believe he is referring to the American sentiment that, with a little help and the right enabling environment, people can lift themselves up from hardship. I agree with Deputy Special Envoy Pershing. I, too, believe that most Americans understand and support the U.S. doing its fair share to help people in developing countries adapt to new conditions. People in poor communities vulnerable to climate change are doing the best they can. With some external assistance, they can contribute their fullest potential to social and economic development.

3. Pro-Poor Adaptation Funding to Safeguard Development Progress and Global Stability

Robust funding for international adaptation is crucial. So, too, is guiding those funds so that they reach the people who need them most. Vulnerability is more than exposure to climate shocks and other stresses. CARE's experience has shown that vulnerability varies within countries, within communities, and even within households. It is, in large part, determined by the economic, social, and political systems and structures that govern people's lives.

Climate change will have the greatest impact on the poorest communities and most marginalized groups. Women and other marginalized groups are particularly at risk. Women tend to rely more than men on natural resources. They are the primary food and health care providers in their families and are responsible for tasks that will likely be made more difficult by climate change. They are less mobile then men, confined to their homes save for trips to gather water, fodder, and fuel. They have more limited access than men to vital information about climate change mitigation or adaptation strategies. And they are less likely to be reached by government extension agents.

Women and girls tend to lack access to information and opportunity to feed their own knowledge into community or national-level adaptation and mitigation strategies. This jeopardizes larger processes of reducing climate change and its impacts. It also means that women are more likely than men to be injured or killed during hurricanes, floods, and cyclones. They are less likely to hear official warnings and to be able to swim or to escape quickly, especially if carrying young children.

Well designed, top-down, scenario-driven approaches to adaptation can play a role in reducing vulnerability to climate change; yet they may fail to address the particular needs and concerns of the most vulnerable communities. CARE believes that the most effective approach is to empower local communities and facilitate their

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[16] "Developed Country Climate Financing Initiatives Weaken the UNFCCC." South Center. Analytical Note SC/GGDP/AN/ENV/7 January 2009. Available online at: http://www.southcentre.org/index.php?option=com_content&task=view&id=909&Itemid=1.

[17] World Bank. 2006. "Hazards of Nature, Risks to Development: An IEG Evaluation of World Bank Assistance for Natural Disasters." Available online at: http://www.worldbank.org.

ownership of adaptation strategies. Through community-based adaption, we can foster more resilient livelihoods, link people to basic services, strengthen local capacity, and support social and policy change to address underlying causes of poverty and vulnerability.

Again, the good news is that we know how to do this. I want to share with you an example from Bangladesh, a country that will likely face more frequent and severe floods as well as sea-level rise as a result of climate change. In southwest Bangladesh, CARE worked closely with local organizations to help communities, especially the women within them, decide how best to adapt to more frequent and severe floods. We recruited female staff, gave gender training to all staff, and prioritized female-headed households in the project. We also organized community meetings at times that fit women's daily work schedules. We engaged women in all steps—from conducting climate-related vulnerability and capacity assessments to the design, implementation and evaluation of adaptation strategies.

By doing so, I believe that we got better and more effective results. We discovered that men and women come to different conclusions about what aspects of their lives are most vulnerable to climate variability and change and how to build their resilience. Women prioritized health, housing, and water (citing increasing salinity), while men focused on income and food security. Women also prioritized adaptation strategies that they could implement close to home. When given a choice of options to diversify their incomes, for example, many women chose to rear ducks. They can do so right near their homes. The start-up costs are low, and therefore the risks in investing in duck rearing are also low. The activity does not create a heavy workload in terms of time or labor. Ducks produce eggs and meat for food or cash. And unlike chickens, they can swim, so they can survive floods.

Women also participated in the evaluation of the project. They told us that before the project, they coped during the lean season by skipping meals or eating nontraditional foods, like water hyacinth, in order to ensure that the rest of the family had enough food. After the project, they reported that they no longer skipped meals during lean seasons, and that, by bringing cash into the home, they had more say in household decisions. In the end, the project helped tackle gender inequities as well as build community resilience to more frequent and severe floods. The next step is to scale up our local experiences and incorporate women's interests and knowledge into national-level adaptation strategies and plans.

The United States can provide leadership in ensuring that adaptation funds reach the people who need them most by ensuring systematic identification of the most vulnerable groups; inclusive, transparent, and participatory decisionmaking on the design and in the monitoring and evaluation of adaptation activities; and mechanisms to support community-based adaptation.

Mr. Chairman, members of the committee, you have an opportunity to make an extraordinary difference throughout the world by reducing U.S. greenhouse gas emissions, protecting the rights and interests of forest dependent communities, funding international adaptation and guiding those funds so that they reach people in poor countries most vulnerable to climate change.

As Special Envoy Todd Stern put it in Bonn, we cannot have a global solution to climate change with U.S. action alone; nor can we have a global solution without the United States.

The time to act is now. The world is waiting for the United States to show leadership by setting the example of what must be done and why it must be done now. The cost of further delay or an inadequate response will be too high—in dollar and human terms.

I would be pleased to answer any questions.

The CHAIRMAN. Thank you very much.

Mr. Camuti.

STATEMENT OF PAUL CAMUTI, PRESIDENT AND CHIEF EXECUTIVE OFFICER, SIEMENS CORPORATE RESEARCH, PRINCETON, NJ

Mr. CAMUTI. Mr. Chairman, Senator Lugar, and members of the committee, thank you for the opportunity to share Siemens' perspective on technology development, transfer, and deployment. We, at Siemens, believe this is a critical part of the conversation with regard to climate change.

Again, I'm Paul Camuti. I'm the chief executive officer of Siemens Corporate Research. This is our central technology development organization, based in Princeton, NJ. We have a team of over 350 scientists and engineers working on cutting-edge technologies for energy, health care, and for industrial competitiveness.

One of the most valuable contributions that we're making in our business is what you had already mentioned, which is energy-saving technologies. Of particular interest is also the area of energy solutions. And Siemens, in a number of our lines of businesses, is involved every day in transferring and developing technology on a global basis.

One quick example is, we've invested in our wind turbine business. We've built a wind turbine blade manufacturing factory in Iowa, a gearing factory in Illinois. We've established an R&D center in Colorado. And we have a large and growing services team for our wind business headquartered in Texas.

Our business, not only works through public/private partnerships, but we enable technology transfer through trade and direct investment.

I wanted to just briefly hit on the technologies that we're talking about. I think, when we're talking about technology transfer, it's somewhat important to get our arms around the scope of the technology, because there's literally thousands and thousands of technologies that apply and can help to mitigate climate change.

We group these into four basic areas. One is in the area of power generation. This is the one that gets the most focus. These are renewable sources, like wind, solar, hydro, wave power. Important in the equation is high-efficiency gas and steam turbines, increasingly running plants fueled by a diverse set of fuels, like coal, oil, gas, and nuclear. There's also a set of technologies in the power generation area for carbon capture, both pre- and post-combustion. These are all areas that we're currently working on.

The second grouping of technologies that we look into are the electrical transmission systems. This has been much talked about in the area of Smart Grid, but also important for us is high-voltage D.C. transmission. And this is a set of technology that flexibly links power from distant areas, where renewable energy is generated, to the points of use in cities. And we have a really good example, actually, of linking large hydro sources in China to the main cities. There's also an aspect of energy storage and a whole range of technologies around energy storage.

We're also involved heavily in technologies for transportation. These are light-rail vehicles, electrification, automation, hybrid electric vehicles, all-electric vehicles, and intelligent transportation systems. And also, and very important, because they're probably the set of technologies that are the most readily deployed, are a set of technologies around the demand side of the energy efficiency. And this is technology like new lighting technologies or high-efficiency motors and drives for industrial processes, industrial automation, energy-efficient computing, and another area that we're very focused on—advanced building controls.

I'd like to just make a couple of comments on the state of technology around the globe, from our opinion. A lot of the industrialized countries, like the United States, Europe, Japan, have tradi-

tionally led in the development of these technologies. Increasingly, China, India, Brazil, and other emerging economies are also investing heavily in R&D as a source of their nations' competitiveness. And a lot of the investments are dedicated today to clean technology.

There are significant variances to the state of the readiness and availability of the technology on a global basis, and critical to the conversation on climate change is how we move the technology around the globe.

And so there are differences in how the technologies will be moved, so the commercially available off-the-shelf technologies often—that we take for granted, actually, here in the United States—might not be sufficient where basic infrastructure, skilled labor, and on-the-ground operational knowhow is lacking in the least-developed countries. So, there is a need for adaptation of the technology. And this becomes even more problematic the higher the level of technology, so some of the most advanced technologies create some significant barriers to deployment in emerging countries.

We have some experience with the CDM—Clean Development Mechanism. Our lighting business has done a project in India that I'd like to just share a few of the details with you on. This was a project which we did in conjunction with a German utility, RWE. And the idea here was that, in rural parts of India, the access to compact fluorescent lighting CFLs, which are about 80 percent more efficient way of lighting than a standard incandescent bulb, is greatly restricted. There's unique requirements, in terms of the technology and the robustness of the technology, but also the affordability of the technology. So, we conceived this project to actually give away, or at a very low cost, equivalent to incandescent bulb, supply light bulbs in rural India. With the corresponding carbon offsets being valued under an agreement with RWE, the utility would take over these offsets at a stipulated price.

So, we're not talking about the value of the mechanisms, but we're focusing on the process. This process took us over 5 years to get through an approval process, with the verification being the critical thing. We went through two iterations of a methodology in order to get the project off the ground.

Now that the methodology exists, it's reusable for other projects of this nature, and we believe that through the verification methodology that's in here, that it's actually replicable and could be used as a model for how to set up processes like this for future agreements.

But, the point would be that the significant amount of administrative time and initial investment on our part in order to be able to pull this project together, and it would be helpful to take the lessons that have been learned around CDM projects to dramatically improve the way that we're doing those types of projects.

Private capital also is very critical. I think, Senator Kerry, you had stated earlier, "How do we find the next Google?" The level of investment that happens in clean-tech technologies is, far and away, dominated by the private players. And so, we believe strongly that we need to facilitate the market in a way that actually attracts increasing amount of private investment. Much of this private investment actually is done on a global basis, in conjunc-

tion with local partners. So, when we work in a local market, it usually is in an ecosystem of other stakeholders and local workers. And so, this private investment actually results in quite a bit larger investment.

By way of example, we're spending about $6 billion annually just on R&D. We're teaming with universities, with government labs, with suppliers. And the projects that we're implementing are actually quite a bit larger than our own investment.

I'd like to point out just one project in this area, again, to hit the high-performance building topic. It's already been stated. I think you're all aware. The building infrastructure in the world is responsible for about 38 percent of the greenhouse gas emissions. The Intergovernmental Panel on Climate Change estimated that 30 percent of the baseline carbon dioxide emissions from buildings can be mitigated with today's technology. And my team has had an ongoing project, partnered with partners in Switzerland, the University of California at Berkeley, Tshingua University, and several labs, in order to be able to develop a concept to dramatically increase the energy efficiency of buildings. The stages that we go through have us, right now, at a point of commercial proof of principle. And here, multinational public funding for demonstration projects in different parts of the world would really help to move this ball along.

And so, part of the technology transfer and the work that we're doing in climate change will require substantial government and multilateral funding in order to be able to have an impact.

Last, I wanted to just mention the processes by which this technology transfer happens. So, we work, at the earliest stages, with research institutions, like universities. We build those into pilots. It's deployed and transferred through, usually, pilot, and then large-scale deployments.

The idea of having a price signal for carbon in the market is actually important for us in order to be able to justify the deployment parts of these projects. That happens through IP protection and the investments that we make. We would like to have a robust environment of IP law, on a global basis, in order to protect and expand on this investment.

So, the conclusion that I'd like to make is that technology transfer related to climate change is a critical aspect. There's a lot of technologies involved. The environmental focus on products, services, and technology, in our experience in the United States and with the academic community here, we fully believe that America can and does have a technology leadership position, but we're in global competition. There are emerging high-growth economies. They're also focused on the same technology. And spurring this investment in technology deployment and development is what's going to help to grow new businesses here in the United States.

So, again, thank you for the opportunity to share my views. I'd be interested in addressing any of the questions.

[The prepared statement of Mr. Camuti follows:]

PREPARED STATEMENT OF PAUL CAMUTI, PRESIDENT AND CHIEF EXECUTIVE OFFICER, SIEMENS CORPORATE RESEARCH, PRINCETON, NJ

Good morning, Mr. Chairman and members of the commmittee, thank you for the opportunity to share Siemens' perspective. On technology transfer and deployment as it relates to the challenges of climate change.

I am Paul Camuti, president and chief executive officer of Siemens Corporate Research. I am based at our principal U.S. R&D facility in Princeton, NJ, where more than 350 employees work on leading edge technologies for the energy, health care and industrial sectors. Siemens' U.S. revenues exceeded $22 billion in FY 2008. We employ approximately 68,000 people across all 50 States, boosting America's economy with over $5 billion in payroll to our United States employees, and over $6.5 billion in exports last year. We hold almost 12,000 patents in the United States, and our U.S. R&D spend is $1.6 billion annually.

One of the most valuable contributions we can make in the fight against global warming is providing innovative, energy-saving solutions. Of particular interest to the hearing today, Siemens' energy solutions help to meet one-third of America's total electric power generation needs every day. This includes power from renewable wind technologies, where Siemens has invested in blade manufacturing in Iowa, gear manufacturing in Illinois, an R&D Center in Colorado, and a service team headquartered in Texas. We are also the No. 1 provider of light rail vehicles in North America, we are an industry leader in Smart Grid technology, and we are an innovator of emerging clean coal technologies, including carbon capture and sequestration. We have applied strict criteria to our worldwide product offerings to identify a $25 billion environmental portfolio that will help our customers reduce their impacts on the environment. Audited, independently certified results show that Siemens' environmental portfolio helped our customers save approximately 148 million tons of carbon dioxide emissions in 2008 alone.

My testimony will focus primarily on two areas I believe are of critical importance to America's position in the upcoming global climate negotiations. These include some of the impediments to the diffusion and deployment of existing climate change technologies as well as mechanisms needed to foster future innovation and its diffusion. I will emphasize the importance of ensuring intellectual property protection, and establishing clear pricing signals via a carbon market—elements that are key to both innovation and diffusion.

As is evident from my opening comments, there are many technologies available around the world today at various stages of commercialization which can be deployed to reduce the emissions of greenhouse gases. Industrialized countries and increasingly high-growth emerging economies have invested heavily in clean technologies. The United States, Europe, Japan, and other industrialized countries have led the field in investing in climate change technologies. But, China, India, Brazil, and other emerging economies also invest heavily in R&D, much of which is dedicated to clean technology. Yet there is a significant variance around the globe in the commercial availability of technologies across sectors such as power generation, building technologies and transportation. To succeed, technology transfer policy must actively facilitate the diffusion of technologies across geographies and economies with widely varying needs and absorptive capabilities, a particular challenge in the least developed countries. The success of any innovation and deployment strategy depends on how well it responds to the needs of the target market or locale. Transfer of existing, commercially available off-the-shelf technologies may be insufficient where basic infrastructure, skilled labor and on-the-ground operational know-how is lacking. Transfer of more advanced technologies will be even more problematic for the same reasons. In order to match a variety of available technologies to local conditions, detailed needs assessments can be valuable tools for identifying targeted, case-by-case solutions to unique or unanticipated problems in technology dissemination.

Mechanisms to stimulate market-based climate change projects and technology deployment and dissemination must be improved and expanded. For example, the Clean Development Mechanism (CDM), under the aegis of the United Nations Framework Convention on Climate Change (UNFCCC), offers promise as a conduit of finance and technology. The experience of the Siemens lighting company OSRAM with the CDM highlights its potential and challenges. OSRAM is currently implementing three CDM projects in India together with the German utility company RWE aimed at supplying high-quality, energy-efficient lighting that responds to low-market penetration of energy-saving compact fluorescent lamps (CFLs) in the region. In this 10-year project, RWE and OSRAM share upfront costs and RWE is contractually bound to purchase the credits eventually earned through the project at a stipulated price. Conceived in 2004, the first 2½ years of the project were devoted

to establishing a (large-scale) methodology that proved impractical due to amendments requested by the UNFCCC and a further 1½ years on a small-scale methodology required by the UNFCCC. At the end of 2008, OSRAM began distributing CFLs to householders in exchange for their inefficient incandescent bulbs. The project participants, Indian citizens mainly in rural areas, pay only a small fee comparable to the price of a conventional incandescent lamp. A sample population will have meters installed in their homes so that the energy savings can be measured, verified by an independent auditor, and reported to the UNFCCC. Credits will be calculated using this data. CDM credits can be earned once the lamps and meters are installed and the project is officially registered with the UNFCCC. In the first three projects, up to 2 million lamps will be distributed in India.

Significant administrative time and initial financial investment were required for this CDM project. One of the most time-intensive aspects of the project was development and approval of the methodology, the cost of which was borne by SRAM and RWE. Now, any subsequent projects may use this approved methodology. To avoid delay and reduce initial investment, others may choose to deploy technology for which there is an approved CDM methodology rather than navigating the time-consuming process of creating a new methodology for new innovation. Our experience shows that a more streamlined administrative process and a full-time CDM staff will be critical to the success of the CDM process.

Private capital plays a critical role. It is crucial to put into place a framework that will stimulate the private investment required to continue to pioneer new technologies. The private sector accounts for the majority of green research and development expenditures today and remains the most cost-effective source of new technology development. Private trade and investment, typically involves local partners, local stakeholders and local workers. Private investment can help to train local workers and facilitate development of local supply chains.

Siemens, for example, makes this investment on a global scale, investing some $6 billion annually on new technology R&D as well as some $900 million in venture investments. Our corporate technology teams operate in open innovation networks with universities, government labs and supplier resources in diverse, collaborative teams that are located in technology hotspots around the world including Germany, Austria, Russia, India, China, Japan, and multiple locations here in the United States. This global approach gives us access to world class talent and, additionally, a firsthand look into the regional needs of our customers. We identify promising new technologies through a technology road-mapping process. We then incubate these technologies and develop proof of principles, prototypes, followed by scale-up and deployment strategies which are essential to moving innovation from the lab to the commercial market.

A good example of the process in action is our Technology To Business (TTB) center in Berkeley, CA. Since TTB's founding in 1999, we have worked with many new technologies, hired innovators and transferred new ideas to our businesses. The work of TTB has led to the founding of 12 new companies in which Siemens maintains a minority investment. As an example, Sensys Networks, Inc., is a leader in wireless vehicle detection technology. Working closely with innovators at the University of California at Berkeley, our team developed wireless sensor technology to simplify the detection of vehicles. These sensors, now deployed in 30 States and 20 countries, are a key element in intelligent transportation systems, resulting in reduced congestion, travel times and greenhouse gas emissions.

The deployment and lifecycle of many of these technologies is often 20 to 30 years or more. Policy measures that create clear, predictable, long-term economic incentives are critical to stimulating private investment and to enabling the provision of capital and technology in both the developed and developing world. Public policy can help manage the technical risks through large-scale demonstration projects and loan guarantees.

An example of Siemens' cross-border R&D collaboration is in the area of high performance, low-energy buildings. It is estimated that buildings account for some 38 percent of greenhouse gas emissions. Research conducted by the Intergovernmental Panel on Climate Change (IPCC) estimated that approximately 30 percent of the baseline of carbon dioxide emissions in buildings could be mitigated in a cost effective way. (See "Sectoral Trends in Global Energy Use and Greenhouse Gas Emissions," Price, L., et al, Lawrence Berkeley National Lab 2006, and IPCC 2007 Assessment Report, Working Group 3, Mitigation.) Building performance currently varies by more than 50 percent from best in class to average. At Siemens, we have been involved in a substantial research project with partners in Switzerland, the University of California, at Berkeley, Tshingua University (China) and our own labs on several continents. This global project team has developed a high performance building concept. The challenge now is to prove the concept and make it commer-

cially viable. Here, multinational public funding could provide the necessary resources for a demonstration project and ultimately widespread implementation.

While we strongly believe in the role of the private sector in the development and deployment of technologies related to climate change, it is clear that the role of the public sector is also extremely important, particularly in providing substantial government and multilateral funding. The transfer, development and deployment of technology is not painless, automatic, nor without cost. From Siemens' perspective, technology deployment is based on the cost attractiveness of the technology in relation to the alternatives as well as mitigating the risks. The Stern Review has concluded that funding toward deployment alone should increase two to five times globally from current levels of around $33 billion per year. ("The Economics of Climate Change: The Stern Review," Nicholas Herbert Stern, 2007).

To this must be added substantial funding increases necessary to support basic research and innovation at the speed required to meet goals for reduction in greenhouse gas emissions and to make sure that research takes place even in those situations where a particular technology may not be commercially viable. Public-private partnerships, technology cooperation, and funding for joint research institutes can all contribute to meeting the demand for technology innovation, deployment and transfer. Major infrastructure investments must be made, for instance, to facilitate the deployment of renewable electricity and Smart Grid technology. Price signals in the market need to be stable and predictable over the long term in order to spur investment in these and other clean technologies. Fiscal incentives also play an important role, but need the same long-term focus to enable transfer of technologies with 20- to 30-year lifecycles to the developed and developing world.

I would also like to direct the committee's attention to the fundamental role of intellectual property (IP) rights as they relate to technology transfer and deployment as this has become an area of increasing discussion lately. IP is a proven means of incentivizing the R&D needed to generate not only technological breakthroughs but also the continuous stream of innovation that builds upon and improves existing ideas. By allowing innovators to realize the value of their R&D investments, IP stimulates investment in innovation that otherwise might not occur. Importantly, IP provides a legal framework coupled with economic incentives that encourages companies and individual innovators to share and exchange their technology and know-how, rather than guarding their inventions and innovations closely as trade secrets for fear of the risk of misappropriation via compulsory licensing or unauthorized use. Intellectual property protection has helped foster not only technology development, but robust competition, in deploying climate change solutions in developed and developing countries. There is no better system to incentivize innovation globally than the guarantee provided by robust IP protection.

Finally, I would like to emphasize the role of a well-designed carbon market. Such a market will play a crucial role in providing incentives for all businesses and households to become energy efficient. The United States, and in fact the world, needs a framework that includes a mix of short-term goals and incentives for immediate action, as well as mid and long-term goals and incentives to provide certainty for investment. Innovation is driven not only by smart ideas but also by a market hungry for technology.

Siemens joined the United States Climate Action Partnership (USCAP), a coalition comprised of our business competitors, customers in various sectors and friends in the environmental community to develop recommendations for a carbon market framework. Within the recommendations contained in USCAP's "Blueprint for Legislative Action" released in January of this year is a set of International Principles relevant to the hearing today.

First, USCAP believes that the United States demonstrating its leadership by adopting mandatory U.S. climate policy is essential for establishing an equitable and effective international policy framework for action by all emitting countries. In addition, the mechanisms that Congress establishes as part of domestic legislation can play a crucial role in encouraging broad international action, and thus, creating markets for technology. For instance, provisions and criteria for linkage of U.S. systems to other cap-and-trade systems can facilitate a strong incentive for emerging economies to adopt measurable and verifiable commitments to cap and reduce their emissions in order to gain access to the U.S. greenhouse gas market.

In conclusion, I would like to underscore that the establishment of technology transfer provisions related to climate change are critical to addressing these challenges. Siemens' focus on our environmental portfolio of products, services and technologies and our experience as part of the U.S. scientific and engineering community also makes us believe strongly that America can enhance its technology leadership by supporting the innovation engine here at home. We are in a global competition; the emerging, high-growth economies have been and are continuing to

invest aggressively in their technological infrastructure. In addition to a global agreement on climate change, spurring investment in—and reducing the risk of—technology development, as well as the deployment of existing environmentally friendly technologies, will help new businesses to grow and thrive here in the United States.

The CHAIRMAN. Thank you, Mr. Camuti.

Mr. Helme.

STATEMENT OF NED HELME, PRESIDENT, CENTER FOR CLEAN AIR POLICY, WASHINGTON, DC

Mr. HELME. Thank you, Mr. Chairman. It's a pleasure to have a chance to testify before you this morning.

I'm Ned Helme. I'm the president of the Center for Clean Air Policy, and we're an environmental think tank based here in Washington and in Brussels, and we work extensively in China, Brazil, Mexico, India, and California, working with governments to design carbon programs, climate programs. In addition, we bring together, several times a year, 30 heads of delegation to the UNFCC negotiations for off-the-record discussions about the key issues that are pending in the negotiations. So, we have a good sense of the pulse of where things are.

I want to make four points today. First, I want to talk about the Bali Action Plan and distinguish that from Kyoto, to make clear to you that this is a major departure. We're talking about an opportunity now where developing countries are going to take significant action, which, of course, wasn't part of Kyoto.

Second, I want to build on your point earlier, Mr. Chairman, that developing countries are, indeed, taking a lot of action already, and it's not just action that is being generated to sell credits in a CDM market. They are taking action on their own as a contribution to the protection of the atmosphere—a very important point.

Third, I want to talk a little bit about the Copenhagen agreement. I think it'll have two key parts. One will be targets for the Annex 1 countries, a next set of goals; and the other will be an architecture for these developing countries to deal with the "common, but differentiated" responsibilities we talked about earlier in this first panel, that sets a process for developing countries to set these mitigation actions and to receive the financing to make them go.

Finally, I want to talk about the role for the United States and Annex 1 developed countries. Two key questions: What target do we take? How do we handle the finance?—as Senator Lugar was talking about earlier.

OK, let me go right to the point about Bali. This package in Bali has two tracks. It basically says developing countries will take nationally appropriate mitigation actions that'll be verifiable and contingent on receiving financial support for technology and for capacity-building. That's the quid pro quo. And that financial support is also verifiable. That's the heart of the deal.

In terms of the story on emissions, as you pointed out, Mr. Chairman, China is already very active. The program that you talked about, the 20-percent energy-intensity program that they have underway, that they'll reach in 2010, would produce 1½ billion tons of reductions. To give you some context, that's 20 percent of our national emissions, so it's a very significant reduction.

Couple that with what Mexico and what Brazil are doing. If you look on page six of my testimony, you can see that those three developing countries are doing as much in reductions by 2010 as the EU would do with its new target for 2020 and as we would do under the Lieberman-Warner bill, and probably under the Waxman-Markey—though we haven't seen the final numbers on Waxman-Markey. But, the bottom line here is that these reductions are unilateral reductions by these countries, not reductions they're being paid for by the CDM, and they're also of a size comparable to what we're talking about from Europe and from the United States. So, it's a very significant program.

And to build on what you all were saying earlier. China, the No. 1 investor in renewable energy last year. They will displace Germany as the highest spender, in terms of percentage GDP, on renewables of any country in the world next year. So, very significant. On cars, they are 10 years ahead of us. Our new CAFE standards are 35 miles to the gallon; they're doing that now. And they, last year, put in an $8,000 vehicle tax on SUVs. Obviously, there's some advantage to the command-and-control system; you can move tax a lot faster than we can. But, it sends you—it tells you how significant this effort is.

Brazil, similarly, reduced several hundred million tons of emissions in the reduced deforestation in the last 2 years. They have the best program in the world today, with a satellite monitoring of the entire forest area of Brazil. They have a national number, which we don't have in the United States, for how much is happening, in terms of net flows from the carbon and the other agricultural activities in Brazil. And they follow it up. Every 2 weeks, they get a satellite survey. The police are out there arresting people when there's big deforestation. Very effective program. So, there's some real stuff on the ground that often goes missed here in this country when we talk about these issues.

So, building on that, this Bali plan is basically saying, "We're going to create nationally appropriate mitigation actions," NAMAs, that's the new rhetoric. When you hear people say "NAMAs," that's the new acronym, a new lingo of the international negotiations. NAMAs probably take three forms. One is the unilateral actions I was just talking about. The second is conditional actions, where I say—I'm a developing country, I'll go further if I see the financing. And that's the heart of this Bali negotiation, this Copenhagen negotiation. And then, the type is for crediting? Can I set a target, above a baseline that, if I exceed—by doing a program that's strong enough, I then can generate carbon credits.

So, no more CDM in the future for a lot of these big countries; it's now more about "let's get the whole sector in." Today, if a developing country has a good plant and it does good deeds, they get some credits, even if you've got three plants over here, polluting out the wazoo.

In this new world of sectoral agreements, that Mr. Casey was talking about, you will be required to look at what happens in the entire sector, all the plants, just like we do in the United States. So, very promising, in terms of the potential direction.

Let me give you one more example. Mexico, in Poznan in December, announced what this means in real terms. And we need some

delegates talking about these concepts—NAMAs and so on. What does it mean on the ground? Mexico said, "All right, we'll make it clear. Four sectors: cement, steel, oil refining, electricity. We will set intensity targets in every one of those sectors. We will make them more stringent if you send us some money in the form of loans to help us. And we exceed that level, we'll generate credits, and we'll do it through cap and trade." So, a very strong program in Mexico, and it gives you a concrete example of what's possible in this negotiation.

Let me pivot to the second half of this issue, which is, What about the Annex 1 countries? What about the developed nations and the targets? I was encouraged by Todd Stern's comments about the U.S. target, because, frankly, the U.S. target in 1990 levels is not going to cut it. If we look at the numbers we need, in terms of reductions, to get to stay on track for 2 degrees Centigrade by 2050, we've got to do better than that, because everybody else is watching. As you said, Mr. Chairman, all eyes are on the United States. We had a great honeymoon 2 weeks ago in Bonn. Everybody was really happy. The President was making speeches, a number of countries. Great stuff. I mean, everybody was very excited about it. Now we get to the real game. What is our target? Mr. Corker's questions.

And I think—I was also encouraged by Todd Stern's comments that he sees the Waxman target as in the same ballpark as what the administration has been talking about. I see it as very significantly stronger and a much better card to play in the international negotiations, because they're talking about a deeper target for the United States and, in addition, a significant supplemental reduction by investing in deforestation programs in places like Brazil and Bolivia and Indonesia.

And this is new ground. This is an innovative idea that I think really is deserving of a lot of attention. What they're basically saying is, "We'll do our target in the United States. We'll get our reduction. We'll have some offsets. But, we'll also take a chunk of allowances, 5 percent of the allowances, we'll turn that into cash, and we'll invest that in Brazil, in these countries, in programs to reduce deforestation. And now we'll produce additional reductions that are not offsets." This is not about what Mr. Menendez was talking about, "I need more offsets." This is about net reductions to protect the atmosphere, in addition to the U.S. target. And I think that's the right way to go with forestry.

I mean, I heard Mr. Menendez and Mr. Corker saying they felt offsets were a better way to go. Our personal view is, this program is not the same thing as putting scrubbers on powerplants. This is a social program. This is about convincing little landowners in the Amazon to not chop down the trees to raise three or four cattle—three or four cows. Basically, we're talking about a social program, where we're investing in paying them for environmental services so they stop cutting down the forest. And that's not the same thing as putting widgets on smokestacks, so that's not something I want in the carbon market at the start. I want to be sure that this thing works, that the numbers add up, and so on, before I put this in the carbon market. And the Waxman-Markey bill puts that out there; it says we're going to have this separate goal, we're going to put

some investment directly in deforestation that's not about offsets, that gets us more toward the environmental goal we need.

And it helps us in terms of cost. Because you can say, well—take Mr. Menendez's point, let's make this a tougher U.S. target, take the U.S. target down another 10 percent, and say that much more of this forestry can be scored in the U.S. game. Sounds good at first glance, but remember, if that program doesn't materialize in Brazil, I've got a 10-percent tougher target on all those United States companies, and I've got no place to go to get those reductions. So, I don't want to bet the store on setting that tougher target and coming up with those reductions. I'd much rather put the money in Brazil, in the countries that know what they're doing, develop a program, prove it works, then we can come back and look at the carbon market in 2020 and say, "All right, at this point we'll bring it in."

But, I think there's a really important piece here of taking some allowances, putting that revenue on the table, spending it on deforestation programs in these countries, and making something happen.

That takes me to the last point, which is the finance question. And Mr. Lugar said, you know, the key is, How do we incentivize low-carbon strategies? He's right on the money. That's our No. 1 issue here. And, I think, again, there's a real opportunity here to do it with technology. We can, again, take a chunk of the allowances, use that revenue to invest in advanced technologies. When Mr. Xia was here—I think he met with you, Chairman—a few weeks ago from China. He was very clear. He said, "Look, we're ready to go further. We've done a billion and a half tons in energy efficiency. We'll do more in the next round. We'll do more on renewables. We're committed to renewables. And we don't need your money for that. What we want your money for is, those very expensive technologies we can't do today, those advanced wind technologies, carbon capture and storage. That's what we want the money for. We want help to write down the cost—we don't want free technology, we want affordable technology, and we want to see it developed."

In the past, we would have said, "We'll build that in the United States. Twenty-five years later, we'll build it in China and India. We can't afford that. We're building a coal plant a week in China. If we're going to turn this around, we've got to build that technology, that CCS, here in Ohio, and all—and Indiana—and also in China, at the same time. We can't afford to wait 25 years to have this work." And I think that's the place to go.

And I think, you know, when we talk about financing—Todd said, "Well"—he said, "You know, these developing countries are calling for huge amounts of—1 percent of GDP." I think that's ridiculous. When you get down to the bottom line, Minister Xia puts it on the table. He's saying, "I don't need buckets of money. I need some help with really expensive technology that's very promising that I can't build commercially today in China." That's not big handouts.

Mexico's program, they're asking for loans; they're not asking for any grants.

So, I think we've got to be careful of the rhetoric of the UNFCC and the reality of what we really need, here. And I think it's very promising.

So, I'm very encouraged. I think the administration's off to a great start, and I certainly commend the committee for your leadership in the past on this issue of finance. I mean, you guys are the ones who understand this international game the best, and you can really help, as you know, sell this idea. We're not talking about paying for technologies that improve our competitors' ability to beat us. We're not talking about that. We're talking about carbon capture and storage, which makes the plants less efficient, but helps us, from the carbon perspective. So, we're not talking about putting money in the hands of the steel industry to beat Mr. Casey's companies in Pennsylvania. We're talking about the advanced stuff.

So, let me stop there. Thank you.

The CHAIRMAN. Thank you very much.

Mr. HELME. And I'd like to include, for the record a paper on financing, which I couldn't cover in my testimony, if I could.

The CHAIRMAN. It will be included in the record, and we appreciate it very much.

Mr. HELME. Thank you.

The prepared statement of Mr. Helme follows:]

PREPARED STATEMENT OF NED HELME, PRESIDENT, CENTER FOR CLEAN AIR POLICY (CCAP), WASHINGTON, DC

Mr. Chairman, Ranking Member Lugar, and members of the committee, I would like to thank you for the opportunity to testify before you today. My name is Ned Helme and I am the President of the Center for Clean Air Policy (CCAP), a Washington, DC, and Brussels-based environmental think tank with on-the-ground programs in New York, San Francisco, Mexico City, Beijing, Jakarta, and many other places.

Since 1985, CCAP has been a recognized world leader in climate and air quality policy and is the only independent, nonprofit think tank working exclusively on those issues at the local, national, and international levels. We are committed to advancing pragmatic and market-based climate solutions that balance both environmental and economic interests.

CCAP is actively working on national legislation in the United States (U.S.) and is advising European governments as well as developing countries such as China, Brazil, and Mexico on climate and energy policy. Our behind-the-scenes dialogues educate policymakers and help them find economically and politically workable solutions. Our Future Action Dialogue provides in-depth analyses and a "shadow process" for climate negotiators from 30 nations around the world to help them develop the post-2012 international response to climate change. It has produced important agreements among key nations on emissions trading, the design of the United Nations' Clean Development Mechanism, and key features of the Bali Action Plan.

In our work with the developing countries, nationally appropriate mitigation actions in key sectors (focusing on major industrial sectors and forestry) have emerged as the most promising approach to the post-2012 international climate change agreement because they both raise the bar on developing countries' performance and fit well with how developing countries view their role in an international agreement.

In December of this year, all eyes will be on Copenhagen, Denmark, where we have the first opportunity to reach a truly global accord on climate change mitigation and adaptation.

In my time today, I would like to emphasize a few key points:

- The Bali roadmap is the breakthrough developed countries have been waiting for that makes the agreement in Copenhagen most likely very different from the agreement in Kyoto in 1997 and will bring meaningful developing country actions into the agreement.
- Developing countries are taking action already and are prepared to take additional measurable, reportable and verifiable actions contingent on receiving support from developed nations for capacity-building, technology, and finance.

- The objective in Copenhagen is to agree on new green house gas (GHG) reduction goals along with a new architecture to govern developing country action in the post-2012 framework, and
- The willingness of the U.S. and other developed countries to propose and enact meaningful domestic national emissions reduction targets and provide financing to support additional developing country action are the linchpins for a successful outcome in Copenhagen.

1. A HISTORIC OPPORTUNITY: THE BALI ACTION PLAN RAISES THE BAR FOR DEVELOPING COUNTRY PARTICIPATION IN A GLOBAL CLIMATE PACT

The U.S., as almost all other countries of the world, is a signatory to the 1992 United Nations Framework Convention on Climate Change (UNFCCC). The U.S. Senate ratified the treaty in 1994. The UNFCCC calls for international climate policy "to prevent dangerous anthropogenic [human] interference with the climate system" (UNFCCC, Art. 2). To prevent dangerous climate change, the Intergovernmental Panel on Climate Change calls for keeping worldwide temperature increase below 2 °C (3.6 °F) during the course of this century.

The Bali Action Plan, which the U.S. and other developed and developing countries agreed upon in December 2007, makes the negotiations going into Copenhagen notably different than those in 1997 in Kyoto. The Bali Action Plan builds on the key principle in Article 3 of the United Nations Framework Convention on Climate Change (UNFCCC), "The Parties should protect the climate system . . . on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities."

However, it goes much further and establishes for the first time that the negotiation process will cover both developed and developing country actions to mitigate climate change. It also importantly sets up much stronger accountability by calling for developing countries to consider: "Nationally appropriate mitigation actions in the context of sustainable development, supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner." In effect, both the actions and the support are to be measured, reported, and verified. It is important that we understand this link as the basis of the Copenhagen deal.

The U.N. talks earlier this month in Bonn, Germany, were the first in a series of meetings this year scheduled in the runup to Copenhagen. The next round of negotiations will be held in Bonn, Germany, on June 1–12, followed by several other 85 meetings before December. In June, the first drafts of negotiating texts for the Copenhagen agreement will need to be on the table, as UNFCCC rules require.

The accord in Copenhagen is likely to be an agreement on the basic policy architecture for both developed and developing countries for action beginning in 2013. Many of the details of the accord will be worked out during 2010 and 2011 (the same way the Marrakech Accords were for the Kyoto Protocol). The agreement can be expected to have three critical components:

- Developed country absolute emission reduction commitments for 2020 and possibly 2030;
- A new architecture for developing country actions and their finance and verification; and
- Developed country financing commitments for clean technology, deforestation, and adaptation to help developing countries go beyond their voluntary/unilateral reduction commitments.

The process will also need to have produced a strong sense of the overall scope of likely developing country actions and of the aggregate emissions reductions that can be expected from those actions.

The Chinese Minister and Vice Chairman of the National Development and Reform Commission (the most powerful Chinese Agency), Mr. XIE Zhenhua, in his recent visit to Washington, DC, referred to this basic new agreement framework by describing that China would toughen and extend to 2020 their already bold goal of improving energy intensity by 20 percent across the economy by 2010 and increase their 15-percent renewable energy 2020 target in return for financial assistance to develop advanced innovative technologies.

2. DEVELOPING COUNTRIES' ACTIONS AND ELEMENTS OF A GLOBALLY ACCEPTABLE CLIMATE DEAL

CCAP's extensive policy work in key developing countries has shown that developing countries are doing more to reduce the growth in their emissions than conventional wisdom here in the United States would suggest. China, Brazil, and Mexico have already put in place national laws that collectively, if fully implemented, will reduce the projected growth in emissions by more aggregate tons in 2010 than the

reductions the Lieberman-Warner bill (S. 2191 of the 110th Congress) was projected to achieve by 2015 and by almost as many tons as the European Union's 30 percent reduction pledge for 2020 (Figure 1).

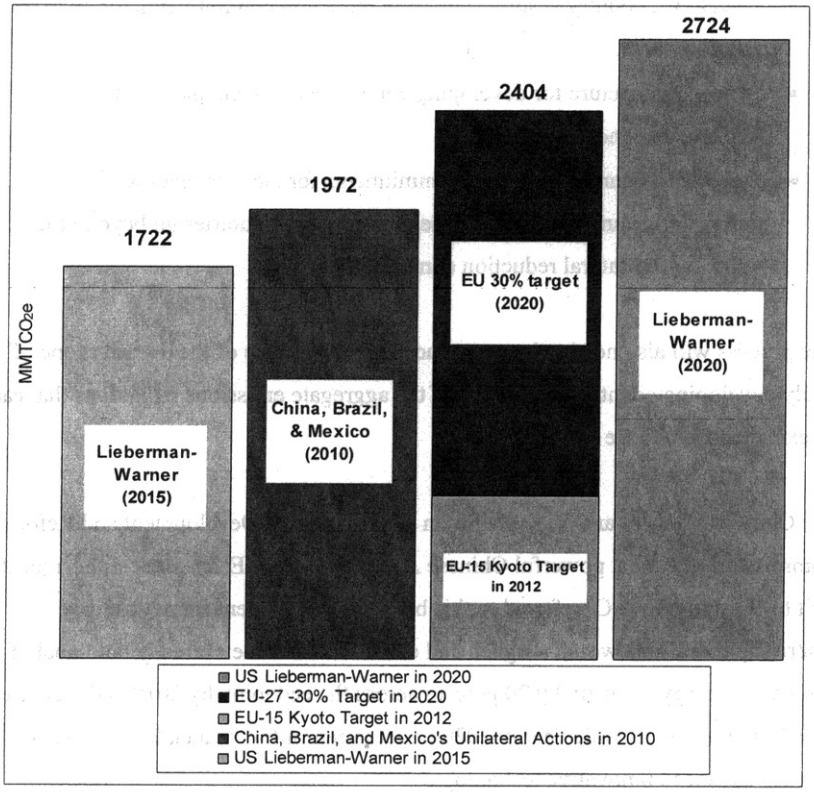

Figure 1. Emissions reductions from BAU for full implementation of proposed measures (CCAP, 2009).

Nevertheless, the outlook for developing country CO_2 emissions growth remains substantial in the aggregate and as a percentage of global emissions (Figure 2). In 2000, developing country emissions from fossil fuels and industrial processes were roughly 40 percent of global emissions. By 2050, developing country emissions are expected to grow to 64 percent of global emissions. If we want to keep global warming below 2 °C (3.6 °F), we cannot allow this to happen but need substantial cuts in these parts of the world as well.

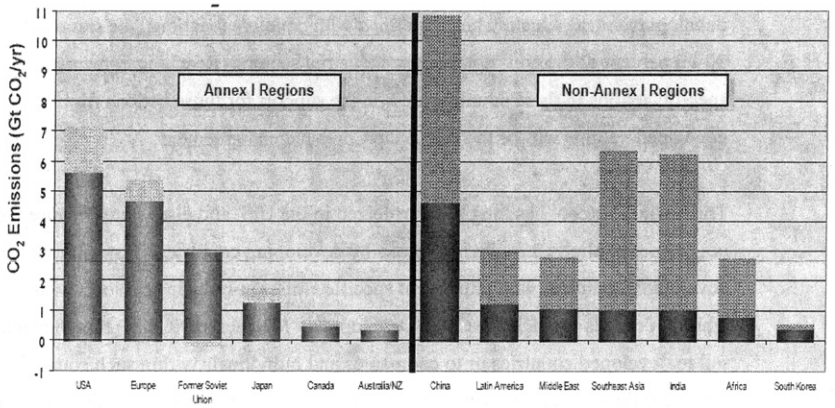

Figure 2. Fossil Fuel and Industrial Process CO_2 Emissions by Region in 2000 (solid bars) and 2050 (checkered bars). (U.S. Climate Change Science Program. 2007. "Scenarios of Greenhouse Gas Emissions and Atmospheric Concentrations; MINICAM Results.")

The Bali Action Plan's concept of "Nationally Appropriate Mitigation Actions" (NAMAs) provides needed incentives to encourage developing countries to make those reductions. Discussions since Bali have begun to define a menu of options for what actions will constitute NAMAs. It is expected that each developing country will choose those actions that make the most sense for its own circumstances, just as we will do in the U.S.

South Korea and South Africa have suggested there could be three types of NAMAs: Unilateral actions that developing countries will take on their own without any assistance; conditional actions they will take conditioned on receiving financial and technology assistance from developed countries; and emission credit generating policies—where credits may be earned and sold in the international market if the country exceeds the goal it has set.

Although all developing countries will be encouraged to implement NAMAs, the main focus appropriately will be on the 6 to 10 largest emitting economies in the developing world which, when combined with developed nations, are responsible for 80–90 percent of the emissions in key industrial sectors. Reaching agreement on specific actions in these countries and on the support for those actions from developed nations will be the key to the Copenhagen agreement.

The Kyoto Protocol has long been criticized in the U.S. and elsewhere because it does not require explicit emission reductions by developing countries. Instead, it rewards developing countries who implement specific emission-reducing projects with emission credits through the Clean Development Mechanism (CDM) that they may sell to developed countries or to companies and individuals within such countries. These credits in effect substitute for or "offset" required domestic carbon reductions in developed nations. By purchasing these credits, developed nations are paying the full market cost of these emission reductions. This reduces the cost of compliance with Kyoto targets, but it does not increase the net reduction in emissions beyond the level that would otherwise be achieved by compliance in developed nations.

The Kyoto Protocol does not contain any explicit system for recognizing actions taken by developing countries to reduce GHG emissions outside the CDM. One of the tests of any agreement in Copenhagen will be whether it creates a system for recognizing unilateral actions by developing nations to reduce their emissions that constitute their contribution toward protecting the climate. A large portion of the nearly 2 billion tons of projected reductions in emissions growth by China, Brazil, and Mexico that I detailed for you earlier in Figure 1 of my testimony are unilateral reductions that contribute to protection of the climate, not reductions that generate credits for sale to developed nations under the CDM. These unilateral actions are one form of a NAMA. Negotiators have proposed creating a formal registry in the UNFCCC that will record these and other NAMAs proposed by developing nations.

Recent actions by key developing countries give us a sense of what some of these actions or NAMAs might look like. For example, in Poznan, Poland, in December 2008, Mexico took a significant step, announcing its plans to set a national aspirational goal to reduce absolute emissions by 50 percent below 2000 levels by 2050. It also announced plans to set emission goals for four key industrial sectors—

cement, steel, aluminum, and electricity—and to achieve these goals through a domestic cap and trade program. It suggested an initial reduction target that it would undertake unilaterally in each sector and suggested that each sectoral target could be made more stringent if developed nations provided focused loan support (to overcome domestic financing barriers) in the post-2012 agreement. Mexico has also created and financed its own Energy Transition Fund of three billion Mexican pesos a year for 3 years (about $210 million annually) to provide incentives for more aggressive emissions reduction activities.

There are two key elements here that distinguish the Mexican proposal from today's CDM approach:

—First, the support for a more stringent sectorwide policy involves loans, not full payment for the incremental emissions reductions, and

—Second, it does not involve any generation of offset credits for developed nations in meeting the new more stringent target. All of these reductions will help reduce global aggregate emissions to safe levels rather than replacing or offsetting required reductions by developed nations. Offset credits would be generated only if the sector (e.g. Mexican oil refining) reduces its emissions in aggregate below the sectoral cap level. The heart of this program is then to generate a Mexican net contribution to the protection of the climate.

China also has taken bold action to reduce emissions. The government released its climate plan in 2007 and has set an aggressive goal to reduce its energy use per unit of GDP by 20 percent between 2006 and 2010. In the plan's first year in 2006, China fell short of its 4-percent per year goal, but in 2007 and 2008 it has reached the aggregate 8-percent reduction for those 2 years. If fully achieved, this goal alone would reduce GHG emissions by more than 1.5 billion metric tons of CO_2 from business as usual annually by 2010. The plan also includes measures to: Increase the use of renewable and nuclear energy; recover and use methane from coal beds, coal mines and landfills; increase the development and use of bioenergy; utilize clean coal technologies; improve agricultural practices; and plant forests. China led the world in renewables investment in 2007 with over $10.8 billion; it is projected to displace Germany as the world leader in investment in renewables as a percentage of GNP in 2010 and has already exceeded its 2010 goals for additions of wind generation capacity. Its vehicle efficiency standards are 10 years ahead of the new U.S. standard already and excise taxes on SUVs were recently doubled to more than $8,000 per vehicle. It has retired scores of inefficient coal powerplants, cement kilns, and steel mills in the last several years.

South Africa has analyzed a number of long-term mitigation scenarios. It has announced its intent to peak its emissions no later than 2025 and expects to have a final domestic climate policy adopted by the end of 2010. South Africa also continues to implement sustainable development policies and measures that will reduce GHG emissions. These policies and measures include moving from traditional coal-fired electricity production to renewables, nuclear power and clean coal technologies, improving energy efficiency and improving the efficiency of the transportation system.

Brazil has released a climate plan that emphasizes energy efficiency and reducing emissions from deforestation, including a goal to reduce the average deforestation rate by 70 percent over the period 2006–2017. It would lower CO_2 emissions by about 413 million metric tons CO_2 in 2010 (roughly one quarter of the emissions reduction expected in the Lieberman-Warner bill by 2015) and by a total of 4.8 billion metric tons CO_2 over the 12-year life of the program. In the last 2 years, Brazil has reduced deforestation by more than 250 million tons of CO_2 equivalent through incentives for landowners and aggressive enforcement against those who deforest illegally.

South Korea intends to announce a long-term, economywide target for emissions reductions later this year. South Korea is already a global leader in the efficiency of its production in the major heavy industrial sectors, so its new effort will focus on domestic energy use and transportation-related emissions.

Each of these efforts by key developing countries can fall into one of the three categories (unilateral, conditional, and credit-generating) of nationally appropriate mitigation actions (NAMAs) which are now the central focus of the international climate negotiations. The new policy architecture will likely create a U.N. registry where these NAMAs will be recorded.

The purposes of such a registry could include:

—Providing recognition of developing countries' unilateral actions—in the current UNFCCC there is no such place;

—Listing developing countries proposals for more aggressive actions along with requests for developed country assistance to incentivize that action;

—Listing completed agreements on which NAMAs will be supported, by whom, for what, and at what level; and
—Recording decisions for crediting baselines for NAMAs that are authorized to generate carbon credits.

The next critical steps in the negotiations will be to decide on the governance for the matching of developing countries NAMAS and developed countries assistance funds, and on the process for establishing NAMA crediting baselines.

As widely agreed in the negotiations, the basic characteristics of the governance process should be:

—Effective, efficient, equitable, and transparent;
—Objective criteria for evaluation of conditional NAMAs (as opposed to a project by project approval process); and
—Effective matching of conditional NAMAs financing needs and available funds.

The debate on these key issues is just beginning, and a variety of existing and new governance entities and processes are under consideration including the Global Environment Facility (GEF), the World Bank, the CDM Executive Board, the Montreal Protocol's Multilateral Fund, and the new UNFCCC Adaptation Fund.

Some countries including developing nations prefer to decide separately (i.e., outside the NAMA-fund matching body) where to set a sectoral crediting baseline for a NAMA. They favor an approach of having one entity comprised of donors and developing countries to handle the matching and a separate "Super CDM Executive Board" to decide the sectoral crediting baselines. Developing countries through the G77 have proposed having separate entities to handle capacity-building, technology, and mitigation respectively.

In addition, the Bali Action Plan calls for monitoring, reporting, and verification of both the NAMAs and the provision of finance by developed nations. However, little detail is provided in the action plan regarding the forms that potential financial assistance could take, or on how private investment can be stimulated to assist in this effort.

In short, many key issues remain to be settled between now and Copenhagen. An attractive idea proposed by CCAP is to give the process a "fast start" after Copenhagen (by getting agreements on key NAMAs and their finance) so that countries can have some sense by late 2010 or early 2011 what the size of the major developing countries' actions are likely to be in aggregate. This will be a key to the success of the ratification process.

3. U.S. AND DEVELOPED COUNTRIES' EMISSIONS AND FINANCING COMMITMENTS ARE CRITICAL TO AN AGREEMENT IN COPENHAGEN

Strong commitments and actions from developed countries on their emissions targets and on financing for developing countries are needed to reach an agreement in Copenhagen. Developed countries, including the U.S., are expected to agree to national, quantified GHG emission reduction targets in Copenhagen. The stronger the proposed U.S. target, the greater the likelihood of stronger developing country actions. Although it would be ideal if the U.S. could pass domestic legislation setting out its emissions reduction targets before Copenhagen, in my view that is not necessary to reach a deal in Copenhagen. What is needed is sufficient action in both the House and Senate to give our negotiators a good sense of where our national cap is likely to be set.

One only needs to look at the impact of the United States recent decision to reverse its position and support the development of a new international agreement to reduce mercury emissions [1] to understand the implications of U.S. engagement. Almost immediately after the U.S. decided to support the development of a new agreement, China and then India supported the process as well.

For developing nations, participation in a global accord is contingent on developed nations' providing meaningful financing assistance as was agreed to most recently in the Bali Action Plan. If done well, developed country financing will support the sectoral NAMAs discussed earlier and not only bring developing countries into a global accord for the first time, but do so in a way that raises the bar on their performance and accelerates the pace of deployment of advanced carbon reducing technologies.

What targets are other developed countries proposing?

The European Union has already committed to reduce emissions 20 percent below 1990 levels in 2020 on its own, and increase its target to 30 percent below 1990 lev-

[1] "Final Omnibus Decision on Chemicals Management" (UNEP/GC/25/CW/L.4) adopted by 25th session of the Governing Council/Global Ministerial Environment Forum.

els if other countries join. Australia also announced a national target in its recent submission to the UNFCCC. The Australian Government committed to reduce Australia's emissions by 5 percent below 2000 levels by 2020. Accordingly, emissions will peak in 2010 and fall thereafter, with a long-term goal of national emissions reductions by 60 percent of 2000 levels by 2050. Like the EU, Australia is willing to commit to more stringent emission reductions (15 percent below 2000 levels by 2020) as part of an international agreement.

Japan is expected to announce a 2020 target by June, but has committed to 80 percent reduction below 1990 levels by 2050. Canada has adopted a 20-percent reduction below 2006 levels by 2020 and a 60–70 percent reduction below by 2050. The decisions of both these countries on their final target level could be strongly influenced by the U.S. choice of cap level, much as developing country action will be affected.

Other industrialized countries have set more ambitious industrialized targets: Norway, for example, intends to cut its emissions 30 percent below 1990 levels by 2020 and to become a totally carbon-neutral nation by 2030. It currently has in place a substantial carbon tax as well as a cap-and-trade program for CO_2, while maintaining its major role in international oil and gas production.

What target should the U.S. adopt?

The Bali Action Plan calls for comparable actions across developed countries. Parties are still analyzing various indicators of comparability. Australia proposes the economic costs of mitigation as one of the relevant indicators for comparable effort. The EU is proposing a different system of comparability using four separate criteria, including: The capability to pay for domestic emission reductions and to purchase emission reduction credits from developing countries; the GHG emission reduction potential; domestic early action to reduce GHG emissions; and national circumstances such as population trends.

Based on a modeling study by Michel den Elzen of the Netherlands Environmental Assessment Agency that compared developed countries on the basis of six different comparability metrics, if developed countries collectively agree to reduce emissions by 20 percent below 1990 levels by 2020, based on the metrics evaluated, the U.S. share would come to roughly 1990 levels—as President Obama has suggested—while an equivalent reduction for the EU, for example, would range from 20 to 25 percent below 1990 levels.

This, however, will not be enough to avoid the worst effects of climate change. Mainstream science suggests that global emissions would have to peak by 2020, and some scientists believe that this means that developed countries collectively would have to reduce their GHG emissions by 25–40 percent by 2020. According to the den Elzen analysis, if Annex I countries collectively agree to reduce emissions by 30 percent below 1990 levels by 2020, comparable effort across the range of metrics evaluated will require the U.S. to reduce to between 10 and 20 percent below 1990 emission levels, and the EU to reduce by 30 to more than 40 percent below 1990 levels.[2]

In short, while the Obama administration deserves great credit for putting the U.S. back on the proverbial map with its proposal for reducing emissions to 1990 levels by 2020, we will need to do a bit more. As the den Elzen analysis suggests, the U.S. does not need to take the same percentage reduction target as Europe or Norway, but we do need to make a comparable effort in terms of the economic effort we put forward if we are to keep the globe on track to hold temperature increases in the 2 degrees Centigrade range most scientists recommend. That means reducing emissions below 1990 levels by 2020 in the U.S.

Before Senators despair of the potential cost of going well below 1990 levels, I want to call your attention to an innovative approach championed by Representatives Waxman (D–CA) and Markey (D–MA) in their recently introduced discussion draft. Simply put, the emission reduction target does not need to be confined solely to what a country proposes to achieve within its own borders. They suggest additional reductions should be achieved in developing countries by supporting efforts to reduce the rate of deforestation. These reductions would not be a substitute or offset for domestic emission reductions. Instead, these additional reductions would mean the U.S. would be making an additional contribution toward protecting the climate in collaboration with key developing countries.

Their proposal sets a goal to reduce emissions the equivalent of an additional 10 percent below 2005 emission levels via investments in programs to reduce deforestation in developing countries. It allocates about 5 percent of emission allowances over a number of years to programs and efforts in developing countries. This

[2] Source: den Elzen, Michel, "Exploring Comparable Post-2012 Reduction Efforts for Annex I Countries," CCAP Future Action Dialogue, Wellington, New Zealand, 2–4 February 2009.

approach has several advantages: It avoids potentially flooding the allowance market with new forestry-based credits; it allows this new program for reducing forestry emissions to develop in a stable and orderly fashion; and it also helps meet developed countries' commitments to helping developing country with financial assistance.

Other countries, most notably Norway and Germany, have embarked on similar, more broad-based efforts using revenue from auctioning of emission allowances not only to reduce deforestation but also to finance technology development and climate adaptation efforts in developing countries.

We believe funding deforestation through these approaches could be cheaper and less risky than simply tightening the U.S. domestic target to 30 percent below 2005 levels (16 percent below 1990 levels) and allowing more international offsets from reduced deforestation to meet the tighter cap. It would be cheaper because such a program may be able to purchase reductions for less than the full market price for carbon. It would be a less risky path for the U.S. because if developing country programs to reduce deforestation fail to materialize or are ineffective, U.S. companies would not be stuck with much more stringent targets and strict compliance penalties when there were no readily available alternative sources of required emission reductions.

Financing for developing countries

As described earlier, the U.S. and developed countries will be judged in Copenhagen by whether they provide meaningful financing, technology, and capacity-building assistance to developing countries as they agreed to consider in the Bali Action Plan?

The level of developed countries' financial and technological support has become one of the most critical issues in the negotiations. The concept of committing to financing supplemental reductions in deforestation in developing countries as part of the U.S. domestic climate legislation would certainly qualify as providing meaningful support per the Bali Action Plan.

Whether financing is for deforestation or clean technology deployment, some observers incorrectly assume that any financing agreement in the Bali Action Plan must mean large unrestricted amounts of funding. However, the behind the scenes negotiations are more likely to focus on specific and tailored financial mechanisms like support to "write down" the cost of advanced but not yet commercial technologies like carbon capture and storage, and financing for special purpose entities that can help overcome resistance from banks in developing countries to make financing available for energy efficiency. As we have seen with Mexico's recent proposals in Poznan for caps in key internationally competitive industrial sectors, the financing element comes down to targeted loans that help overcome domestic policy barriers. The European Commission has proposed the creation of a "facilitative mechanism" by which developing country proposals for action and specific requests for assistance can be evaluated based on objective criteria. The idea of "block grants" and the like are not under serious consideration.

One framework for providing financial incentives in the industrial arena that has been garnering support internationally would rely on establishing the NAMAs discussed earlier in my testimony in key internationally competitive industrial sectors. This concept is included in the Bali Action Plan as "cooperative sectoral approaches and sector-specific actions" which are part of the actions suggested for mitigation of climate change. Under such sectoral approaches, developing countries would be asked to take a new commitment to reduce GHG emissions in a given industry sector beyond any recent unilateral actions they may have already adopted. They could receive up-front financial and/or technology incentives from developed countries in return. Mexico's announcement in Poznan of sectoral targets for key industrial sectors coupled with a 4-sector cap-and-trade program is the first concrete example of how such an effort might proceed.

Technology and finance assistance could be provided to developing countries by developed countries for a number of purposes. For example, assistance could be dedicated to build first-of-a-kind advanced technologies, such as carbon capture and storage, which are not yet cost effective, to accelerate technology deployment by bringing down the cost of advanced technologies, and as an incentive for participating developing countries to establish more aggressive "performance goals." This approach also creates opportunities for leading U.S. companies to gain access to growing new markets (creating jobs at home) and moves toward leveling the playing field for carbon in internationally competitive sectors.

This committee in the past has been very effective in trying to develop a technology assistance fund that can provide incentives for more aggressive developing country action while not stirring fears of "subsidizing our competitors." Your

thoughtful contribution to the coming U.S. discussion of financing international technology deployment and of the possibility of adding an international emission reduction target not based on generating domestic offsets will be a key element in making a historic global climate deal between the developing and developed world in Copenhagen possible.

The CHAIRMAN. Let me just say that Senator Lugar had to go to a meeting with some of our friends from South Korea, and I have a 12 noon meeting I've got to leave for momentarily, so I'm going to leave the gavel in the able hands of Senator Shaheen. But, I do want to ask just a few things before we go, and then we'll submit some questions for the record, if we can, to answer a few more things.

But, let me just go back quickly to what you just said, Mr. Helme. Senator Webb's concern. You know, China's sitting on $2 trillion surplus, blah, blah, blah. We're borrowing—they're our banker. Why are we talking about any kind of money with respect to even the high-end technology? Why—I mean, a lot of people are going to have trouble understanding that.

Mr. HELME. I think we're talking about technology that's 30 percent more expensive, and it's——

The CHAIRMAN. Well, no matter how——

Mr. HELME. [continuing]. The kind of thing that we want to share——

The CHAIRMAN. [continuing]. Much more expensive it is——

Mr. HELME. [continuing]. We want to——

The CHAIRMAN. No matter how much more expensive it is, I mean, there's a sense—I mean, I can understand joint venturing, and that's——

Mr. HELME. That's where I was going.

The CHAIRMAN. OK. Because that's—in my conversations with Xia, I think he's more sensitive to this notion—you know, we're not—this is not going to work, in terms of the balance of payments and other——

Mr. HELME. Absolutely.

The CHAIRMAN. [continuing]. Kinds of things.

Mr. HELME. Absolutely.

The CHAIRMAN. I would agree with you.

Mr. HELME. I agree with you.

The CHAIRMAN. So, we're talking straight-out——

Mr. HELME. [continuing]. Joint ventures and——

The CHAIRMAN. [continuing]. Lay out the——

Mr. HELME. [continuing]. You know——

The CHAIRMAN. [continuing]. Lay out the——

Mr. HELME. Exactly.

The CHAIRMAN. [continuing]. Lay out that——

Mr. HELME. Exactly.

The CHAIRMAN. [continuing]. Kind of——

Mr. HELME. And that's what he's saying. He's saying, "I'll pay my share. I'm not saying I won't pay." But, this is a tricky, uncertain technology, from his perspective. I don't——

The CHAIRMAN. Right.

Mr. HELME. [continuing]. Tend to share that view, but——

The CHAIRMAN. And——

Mr. HELME. [continuing]. I think it's doable.

The CHAIRMAN. So, they're really looking at, where we are more advanced, we need to be able to be helpful——

Mr. HELME. Yes.

The CHAIRMAN. [continuing]. In order to help them do some of these things.

Mr. Camuti, you talked about the reductions—about the incentive. And I just wanted to follow up on with you on that. What—in your judgment, what is the best incentive here for the private investment that you're talking about? I mean, you're doing $6 billion in R&D, you mentioned, and obviously a lot of companies are already engaged in that, but you say it's not enough. There's not a sufficient incentive at this point?

Mr. CAMUTI. Yes, I think with regard to technologies that we're discussing there are two aspects. One is predictability of the return. So, the investments that we make in energy technologies are large investments, and we have to have certainty of a market, that extends beyond a year or two. And so, from—the level of investment that we make, and how we need to predict that, goes over 20- or 30-year of the plant, and you obviously have to build more than one or two of these types of plants in order to be recouping the R&D investment.

So one of the main issues that we deal with is predicting which technologies to work on with which intensity, which is driven by our assessment of where the market is. And so, something as simple as that—and we design and develop at the highest level to what the requirements of the market are, if there's not a price on carbon, that's not put into the calculation; and if there is going to be a price signal on carbon, that needs to be predictable, stable, and available over a longer period of time in order for us to recoup the investment that we're making in technology.

The CHAIRMAN. That certainly happens under a cap-and-trade——

Mr. CAMUTI. That's right.

The CHAIRMAN. [continuing]. Regime. I know your chairman and chief executive officer has been very involved and engaged, and we're appreciative for his support and help in that endeavor. But, do you believe there are sufficient levels of private capital now moving into this sector?

Mr. CAMUTI. There's a lot of early-stage capital, and there's been a boom prior to the current economic circumstances, in early-stage technology, under the hope, actually, that the market's going to develop for those. The big challenge that we have with energy-related technology—and I think it gets lost in some of the conversation, is the scale with which you have to do pilot plants. It's not like the Internet, where a couple of people and a computer can do the first proof of concept. To capture the amount of carbon that would come out of an average-size coal-fired powerplant is a very large investment to start. And so, the order of magnitudes that you have to have a market of that——

The CHAIRMAN. I agree with that. Senator——

Mr. CAMUTI. [continuing]. Is totally different. And so, there is private investment at the early stages of technology, but we still have a gap in how you're going to field the technologies and then improve the technologies over their lifetime.

The CHAIRMAN. Former Senator Stevens and I actually, through the Commerce Committee, introduced legislation to create some immediate 10 demonstration projects, at commercial scale, in sequestration, and 10 in capture, so that we could allow the marketplace to go out and rapidly decide what's the best technology that works, and that doesn't work. And we should be doing it.

I'm not sure—I think, under the stimulus package, we actually have some money, if I recall correctly.

Mr. HELME. Like, $3 billion, I think.

The CHAIRMAN. Right—that's directed toward that. So, the key is to get it out there as fast as we can, needless to say.

Dr. Gayle, thank you for the extraordinary work that CARE does and for caring about these issues from the perspective that you do. A lot of the countries are supporting a centralized fund under the Framework Convention. Do you think that's the best, most effective mechanism for channeling these funds, or is there some other existing entity, or should it be divided—what's your approach to it?

Ms. GAYLE. Yes, thank you. And this is obviously a complicated and, in some ways, contentious issue: What's the best way to make sure that there are funds available for adaptation? We think that some sort of Adaptation Fund could be incredibly useful, and I think there are other mechanisms, other innovations, taxes that people have proposed, similar to the kind on air travel that is now raising resources to combat AIDS and other diseases. I think there are also taxes on use of maritime shipping, et cetera. So, I think there are a variety of different ways, and it really is going to most likely be some combination of that, but it is going to take the kinds of resources that are in the billions of dollars, probably tens of billions of dollars, if we want to make sure that we prevent, as opposed to having to clean up even more, later on. But, I think it—the Adaptation Fund—is a good central idea, along with some of the other innovations.

Just one other comment I want to make, to make sure that this committee is not left with what could be interpreted from Mr. Helme's comments. And I'm sure it wasn't meant intentionally. But, it isn't because of poor people intentionally cutting down forests that a lot of deforestation is occurring. In fact, it's often large logging companies that come in, that use poor communities, who have no other livelihood, so, it's not the people in the communities themselves. But, I just want to make that point, that oftentimes it's large companies that come in that lead to that kind of impact. I'm sure that you weren't putting it on the backs of poor people, but I just wanted to make that——

Mr. HELME. No, but I would—I would say that, in terms of deforestation in Brazil, the vast majority is for small-scale ranching and agriculture rather than big lumber companies. In Indonesia, you're absolutely right.

Ms. GAYLE. Yes.

The CHAIRMAN. Well, thank you very much. I appreciate it. I regret that I'm not able to go into a little greater depth with you, but we're going to submit some questions.

Senator Shaheen, if you could conclude this, I'd appreciate it very much.

Thank you very much for being with us.

Senator SHAHEEN [presiding]. Well, thank you, Mr. Chairman.

I would now like to ask Ms. Gayle if she would be willing to go ahead and give her testimony.

Ms. GAYLE. Actually, sorry, in the brief moment that you were——

Senator SHAHEEN. I missed it.

Ms. GAYLE. [continuing]. Away, I—yes, right. I'm happy to do it again, but——

[Laughter.]

Senator SHAHEEN. No, no. Well——

Ms. GAYLE. We have——

Senator SHAHEEN. [continuing]. Thank you.

Ms. GAYLE. [continuing]. Submitted a written—a full written statement, and I just did a brief summary of that and stated our three primary recommendations. So, thank you.

Senator SHAHEEN. Good. Well, I actually don't have any question, because I have another commitment, as well, but would just like to thank all of you for taking the time to be here. And appreciate that, as this debate continues toward legislation, that we will continue to call on you for your expertise.

Thank you all very much. And thank you for being here, everyone.

[Whereupon, at 11:57 a.m., the hearing was adjourned.]

ADDITIONAL MATERIAL AND QUESTIONS AND ANSWERS SUBMITTED FOR THE RECORD

PREPARED STATEMENT OF HON. BARBARA BOXER, U.S. SENATOR FROM CALIFORNIA

Thank you, Mr. Chairman, for holding this hearing on the importance of U.S. leadership in the international effort to forge a new global climate change agreement.

Global warming presents a grave threat to our planet. This is a problem that will affect not only us, but people all around the world now and for generations to come. It is imperative that we develop a new global agreement to address this serious issue.

Fortunately, the days of U.S. inaction—and leadership failure—on climate change have ended. Our States and cities are forging ahead with their own climate change policies, and now the Obama administration has begun meaningful action on climate change at home.

Just last week, the EPA issued a proposed finding under the Clean Air Act that global warming is a threat to public health and welfare. This is a step that is long overdue. The Clean Air Act provides EPA with an effective toolbox for cutting greenhouse gas emissions. However, the best and most flexible way to deal with this serious problem is to enact a market-based cap-and-trade system which will help us make the transition to a clean energy economy, while also bringing us innovation and strong economic growth.

The Obama administration has also announced that the EPA will review the Bush administration's denial of California's waiver request to cut automobile greenhouse gas emissions. I am confident that the requirements of the law and the dictates of science will lead to strong greenhouse gas-cutting standards for tailpipe emissions.

The economic stimulus bill included billions of dollars for renewable energy, smart grid technology, and energy efficiency programs along with tax incentives for manufacturers of renewable energy technologies.

The President has made it clear that enacting a market-based cap on carbon pollution is one of his top priorities because it is the most effective way to address global warming pollution. Working with leaders like the chairman of this committee, I remain committed to ensuring that we enact effective climate change legislation—and lead the global effort to reach an international climate agreement. The United States must take action on global warming at home to be a leader in the world effort to combat global warming.

PAPER ON FINANCING SUBMITTED FOR THE RECORD BY NED HELME, CENTER FOR CLEAN AIR POLICY

A FINANCING MECHANISM OF A POST-2012 AGREEMENT ON CLIMATE CHANGE: GOVERNANCE AND FUNDS DISTRIBUTION

The financial component of a post-2012 international climate change agreement is outlined in the Bali Action Plan, but it is not clearly defined there. The Bali Action Plan calls for enhanced nationally appropriate mitigation actions (NAMAs) by developing countries to be supported and enabled by technology, financing and capacity-building in a measurable, reportable, and verifiable manner. There is now a need to identify and describe the key features of a mechanism that would support mitigation actions in developing countries by channeling capacity-building, technology and financial assistance.

There are several key questions that need to be answered that also define the four key components of a financing mechanism:

- What mechanism can be used to streamline requests for assistance by developing countries for GHG mitigation actions?
- How will these requests for up-front financing be evaluated?
- Where will the money come from to finance selected requests?
- How will a monitoring, reporting and verification (MRV) component of mitigation actions in developing countries and delivered assistance for these actions be organized?

The effectiveness of a financing mechanism will depend on the effectiveness of each of these components.

A Mechanism to Request Assistance for GHG Mitigation Actions in Developing Countries

National appropriate mitigation actions (NAMAs) established by the Bali Action Plan could be the basis for assistance requests. They should be formulated and submitted to the UNFCCC in a way to facilitate the process of assistance granting and delivery. There are still differences in views on what NAMAs mean, what they may include, and how they may be recognized in the international framework. In addition, it has been proposed by some parties that developing countries describe their GHG mitigation actions in national climate change action plans or low-carbon development strategies. In this case, there is a need to find a clear link between NAMAs (formally established by the Bali Action Plan) and national low-carbon development strategies.

In the absence of agreement on what NAMAs are and what role they will play in a post-2012 financing mechanism, this briefing note follows the South Korean proposal of three types of NAMAs and assumes that a registry of NAMAs will be instrumental in recognizing developing countries actions and directing support to them for the implementation of NAMAs.

For the NAMA component of a financing mechanism to be an effective and robust tool of requesting assistance, the following principles need to be applied:

- All identified NAMAs are tied together into a comprehensive low-carbon development strategy or a climate mitigation plan to demonstrate coherence;
- NAMAs and climate mitigation action plans or low-carbon development strategies are nationally driven;
- The development of NAMAs and climate mitigation plans and/or low-carbon development strategies is based on a multi-stakeholder national consultative process;
- These plans and/or strategies and specific NAMAs have proven legitimacy at the national level (e.g., created under inter-ministerial guidance, approved by the president or incorporated into national laws);
- Mitigation actions requiring assistance (programs, policies, projects) are clearly defined and presented in the context of current and future place of the sector(s) (where an action takes place) in the national economy; GHG profile and expected GHG emission reductions from BAU or net reductions; timeframe of proposed actions; total estimated cost of proposed actions, and cost per ton of CO_2-eq. reduced; and MRV provisions;

It would be important to build enough flexibility into the financing mechanism to allow developing countries to tailor requests for financing to their national sustainable development strategies. However, it does not mean that certain criteria cannot be agreed on to guide the selection and prioritization process.

Support for NAMAs: Financial Resources Made Available by Developed Countries

The financial side of the equation can also be designed in a way that maximizes its effectiveness. Here, several options/issues should be considered:

- A multichannel financing mechanism that includes both existing funds and mechanisms directed at GHG mitigation and new funds that would be committed by the Annex I parties according to an agreement;
- An inclusive structure of financing tools (grants, loans, international partnerships, creation of special purpose financing entities);
- A virtual multilateral fund, in which the money is kept in the country of origin, while the multilateral facilitative financing mechanism keeps records of all available resources (together with their location and eligibility criteria, if applied) and directs resources to approved NAMAs; Some portions of new funds could be pulled together into a multilateral fund with specific objectives (e.g., for establishing MRV systems);
- Existing funds already have certain rules attached to them, so a system/registry needs to be created that will track all available funds and their priority areas; and
- New funds—contributions from Annex I parties should be additional to already ongoing assistance programs, created specifically in compliance with a post-2012 agreement, and should have minimal eligibility requirements, but could still identify preferred priority areas or countries;
- A registry of financial resources and their disbursement will also be needed in addition to the registry of NAMAs.

Below are several examples of existing funds and available resources for climate change mitigation to illustrate the importance of developing a new mechanism that is inclusive and incorporates existing as well as new funds and programs:

- The EGTT interim report estimates that about $140–$230 billion is available annually for the development of mitigation technologies (90 percent of it is outside the Convention);
- Government funding provides about $10 billion for RD&D per year;
- GEF funds (Trust Fund, Special Climate Change Fund and Least Developed Countries Fund) contribute about $0.22–$0.32 billion annually for the deployment and diffusion of low-carbon technologies.
- About $1 billion of public finance (through various national and multilateral vehicles) is available to address REDD.

Multilateral Facilitative Financing Mechanism as a Process to Match NAMAs With Financing

It is clear that there is a need for a mechanism that would match requests for financing from developing countries with available funding sources. A Multilateral Facilitative Financing Mechanism (operating under authority of Parties to the UNFCCC) could be charged with matching NAMAs with support. This Mechanism could carry out the following governance functions (which could likely be divided between different entities):

- Facilitate financial assistance to developing countries by approving NAMAs for funding; identifying potential sources of funding for particular NAMAs, and pairing NAMAs with funding sources, stopping just short of negotiating specifics (this would be done bilaterally between the developing country and the funding sources);
- Facilitate technology cooperation, especially new technology commercialization, by writing down (a portion of) incremental cost;
- Facilitate R&D partnerships;
- Finance clearinghouse functions to help specific developing countries identify needs for cooperation, etc.;
- Finance the Facilitative Financing Mechanism support costs; and
- Possibly approve crediting baselines—the Multilateral Facilitative Financing Mechanism could be charged with approving crediting baselines, based upon agreed criteria, or another structure could be created to deal with baselines and determining their stringency.

Disbursement Criteria

To guide the NAMA evaluation process, a set of criteria for national prioritization could be agreed on multilaterally. Possible criteria could include: Cost per ton of CO_2; Mitigation potential (per year or aggregate)—total GHG emission reduction expected from proposed NAMA; Leveraged domestic resources; Role (current and expected in 2020) of this activity/NAMA in the overall economy of this country; Sustainable development benefit.

Decisions need to be made whether all NAMAs will be evaluated by one system or separate pools/windows on NAMAs will be created separating for example, REDD NAMAs, capacity-building NAMAs, policy NAMAs, and technology NAMAs into distinct tracks. If latter option is chosen, another question is whether available funds will have to be divided and designated for NAMAs from specific tracks, (e.g., 30 percent—for REDD NAMAs, 20 percent—policy NAMAs in other sectors, 10 percent—capacity-building, 20 percent—technology deployment, 20 percent—R&D). There are also some proposals for limiting the amount of funding that any single party could access (Mexico calls for setting an upper limit at 15 percent of the total amount in its proposed fund on withdrawals by any single developing country).

Governance and Institutional Structure

Parties are looking for a mechanism with streamlined decisionmaking and limited bureaucracy. It is also clear that parties would like to move away from the traditional donor-recipient relationship that has prevailed in the past, thus calling for a multilateral governance of the financial mechanism that will be created for the post-2012 climate regime. While a new multilateral approach to governance has a risk of complicating the decisionmaking process and creating bureaucratic structures that would diminish efficiency, it also offers some clear advantages, such as mutual accountability, fairness, equity, and transparency.

One of the governance challenges for a new NAMA/registry/finance structure is establishing the types and number of bodies needed to make the key decisions. The decisionmaking body could be separated from the technical/evaluating body. Two types of decisions will need to be made about NAMAs: (1) which conditional NAMAs receive support, how much and from whom?, and (2) where should a crediting baseline be set for a NAMA or group of NAMAs in a particular sector? Two decisionmaking bodies could be established to answer these two sets of questions. Each of them could be supported by a technical body. Existing institutions could be involved in technical evaluation processes through entering into special agreements with the Multilateral Facilitative Financing Mechanism.

Monitoring, Reporting and Verification (MRV)

The Bali Action Plan puts a strong emphasis on monitoring, reporting and verification (MRV). MRV of NAMAs, MRV of support and annual national inventories of GHG emissions in developing countries will be critical for demonstrating compliance and building confidence in the financing mechanism. Decisions are yet to be made on these elements and their links with the financing mechanism.

National GHG inventories would also play an important role in evaluating an overall national progress in addressing GHG mitigation in developing countries. A question could be asked whether national inventories could eventually replace an MRV system that focuses on specific actions. If developing countries establish strong national policies with GHG objectives and stringent enforcement provisions, their international accountability could be provided for by national inventories. In this case international financing could be delivered on the basis of national inventories that would demonstrate sectoral and/or national performances and progress made from year to year.

RESPONSES OF SPECIAL ENVOY TODD STERN TO QUESTIONS SUBMITTED BY SENATOR RUSSELL FEINGOLD

The adoption of a new energy strategy is critical in order to effectively address climate change domestically and internationally. We have seen, for example, calls to construct a large solar power installation in the Sahara Desert to power both North Africa and Europe—this solution would require a huge infrastructure investment reaching across many countries.

Question A. Are there any incentives offered by the U.S. Government to encourage investment in renewable and clean energy in developing nations? Are there particular areas where demonstration projects have been attempted, unsuccessfully or successfully?

Answer A. I wholeheartedly agree with the premise of your question. A new energy strategy is inextricably connected to, and in certain respects the antecedent condition, of a successful climate change strategy, both domestically and internationally. That is why the State Department is forging better linkages to and cooperation with Federal agencies such as the Departments of Energy, Commerce and Treasury, the Environmental Protection Agency and the U.S. Agency for International Development, as well as the trade and export promotion agencies such as the Trade and Development Agency, Export-Import Bank, and the Overseas Private

Investment Corporation, that will play significant roles in the energy-climate nexus and the attendant development of a new energy strategy.

The short answer to your question of the availability of incentives for overseas investment and successful and unsuccessful demonstration projects is "yes" to both. The U.S. Government offers a range of incentives to U.S. companies to invest in renewable and clean energy programs in developing nations. These range from the large portfolio of trade and export services provided by various Department of Commerce programs to specific project focused financial incentives from our export promotion agencies. For example, the Export-Import Bank (EXIM Bank) provides preexport working capital, short-term financing, and medium- to long-term loans and guarantees for renewable energy and clean energy projects in developing countries. Similarly, the Overseas Private Investment Corporation (OPIC) supports renewable energy investment through a $1.6 billion fund that provides political risk insurance for projects in developing countries.

However, before these and any other financial export assistance incentives can realize the full promise of their intention—i.e., the dramatic increase in the export and adoption of U.S. renewable and energy efficient products and services—changes need to occur in the policy and regulatory frameworks within developing countries to accommodate and facilitate private sector investment. This is where the work of the State Department, often times in partnership with USAID, is of great value.

Our work in China and India specifically, both through regional and bilateral programs, has been to introduce best practices in policy and regulatory measures required by the technological requirements of renewables and energy efficiency. We have launched a wide range of projects and activities that serve to build the capabilities of public policymakers, utility operators, building and facility managers, and the local financial community to better understand the economic, financial, and technical complexities surrounding these new technologies and the capacity to adopt those policies and practices necessary to lead to widespread deployment of the technologies. We have over the past 2 years launched a wide range of activities in green buildings, appliance standards, renewable energy, distributed generation, utility demand-side management, and manufacturing efficiency practices in these countries.

Question B. Specifically, what measures are being taken to evaluate and implement small-scale energy generating technologies that can be used onsite or very close to the end user, like solar photovoltaic or fuel cells, as a viable alternative for producing power in developing nations? Are there particular areas where demonstration projects have been attempted, unsuccessfully or successfully?

Answer B. The Department of State regional and bilateral programs are implementing a number of projects designed specifically to lead to massive scale-up in the dissemination and deployment of small-scale energy technologies. These distributed, modular renewable energy technologies are essential to the objective of increasing access to modern energy services to the millions of men, women, and children throughout the developing world currently suffering from energy poverty. For many of the 2 billion in the world without access to modern energy services, reliance on grid-connected electricity is not a viable option given the demographic patterns and economic conditions of these rural and periurban populations.

We, along with USAID, are therefore working on a number of fronts to expedite the delivery of electricity and other services provided by decentralized solar, wind, biomass and hydro. For example, in India, we are funding a local solar entrepreneur who has developed a compelling business model of company franchises to expand his network of solar stores throughout the state of Karnataka. In each bilateral energy and climate partnerships, one major goal is to promote the massive scale-up in the adoption of renewable energy and energy efficiency technologies and practices. The scaled-up adoption of these technologies will not only have a dramatic impact on reducing greenhouse gasses, but will also lead to improved air quality while catalyzing sustainable economic growth.

Question C. How effectively would the deployment of these small-scale technologies in developing nations contribute to global energy security?

Answer C. The deployment of small-scale technologies in developing countries results in a number of corresponding benefits, including energy security. Renewable energy and energy efficiency offer rich potential to maximize any country's energy security. However, particularly in developing countries, there is a strong need for capacity-building in order to realize the multiple benefits of a clean energy path. Public funds, from both the United States and the host country, will be required to transform these markets to the point where investment climates are ready for larger private sector investment.

Question. Climate change threatens global food, ecosystem stability, and water availability and can contribute to overall political instability, among other problems. According to the United Nations "Human Development Report from 2007/2008," it is estimated that up to $86 billion will be necessary annually to support adaptation in developing countries by 2015 to (1) protect the existing development investments that could be impacted by climate change; (2) adapt existing poverty-reduction programs to climate change, potentially creating green jobs in developing nations; and (3) strengthen the anticipated need for disaster response associated with climate change. The current financing mechanism through the United Nations to support adaptation to climate change in developing nations has, to this point, been underfunded.

- Looking toward a new international agreement, what strategies and options need to be pursued in order to support adaptation in developing nations?

Answer. Climate change is at once an environmental, economic, energy and national security issue with serious implications for America's and the world's future. We are in the process of considering how we can enhance our effectiveness in helping countries to respond to climate change, both within the multilateral process and in our bilateral assistance programs, in order to address the needs of the most vulnerable.

Adaptation is an immense challenge for all countries, especially for poor developing countries, which are particularly vulnerable to climate change. Our objectives in the U.N. Framework Convention on Climate Change (UNFCCC) negotiations are to: bring together the range of institutions and actors involved in adaption efforts; help Parties, in particular the most vulnerable, build a long-term adaptation approach; galvanize national and international support for adaptation priorities in a range of sectors; and promote climate resilient development in a manner that is practical, informed by the best science, and promotes on-the-ground results.

The administration is requesting a tenfold increase in adaptation funding this year. The administration's FY 2010 State and AID Budget Request includes $232 million for adaptation (base funding plus $202M increase; $60M State, $172M AID). This significant, new $202 million funding request will be used to support UNFCCC adaptation funds and launch a major program for developing countries most vulnerable to effects of climate change (flooding, fresh water scarcity, food shortages, and population displacement from coastal zones).

Funds will also be used to climate proof AID's development portfolio. Most development sectors are vulnerable in some way to climate change—the goal is to add a substantial climate change adaptation component to USAID mission activities in relevant areas. We want to maximize the impacts of our overall assistance by ensuring that projects are as resilient as possible to climate variability and change.

We have requested specific funds for adaptation in order to ensure that activities for adaptation do not take away from other development projects and programs, which themselves contribute to adaptation by enhancing the overall resilience of countries and communities.

Additional to this over $200 million increase, Treasury is requesting a new $80 million for FY 2010 from its Climate Investment Funds request to support this adaptation initiative by contributing to the World Bank's Pilot Program on Climate Resilience. In supporting integration of adaptation into development programs and project, this program will provide valuable lessons on how to enhance adaptation and institutional capacity in developing countries.

However, even with these important increases in U.S. Government funding and recognizing that much of the costs of adaptation will be borne by developing countries themselves, funding will still fall far short of what will be required to help developing countries adapt to the effects of climate change.

Estimates of the cost of adaptation in developing countries range from $10 to $50 billion per year.[1] The broad range of cost estimates reflects uncertainty in how rapidly greenhouse gas emissions may be reduced, how climate change impacts manifest themselves, and the speed and success of development efforts that will reduce or adapt to those impacts.

Over time, we will need to increase our share of support for adaptation in developing countries. Funding support for bilateral and multilateral assistance and creative approaches like adaptation set-asides, as laid out in the Waxman-Markey proposed legislation, H.R. 2454, are crucial to our success internationally. It is very important these kinds of provisions stay in whatever legislation moves forward. We

[1] "Adapting to Climate Change," Oxfam Briefing Paper, May 2007. Note the report does not provide a timeframe for the funding requirement.

will need to look at multiple avenues of funding to even begin to address expected need.

We will also work to mobilize other donors to significantly leverage increased funding for adaptation, coordinate donor funding, and collaborate in identifying key countries and areas of opportunity.

Question. As we know, effectively tackling climate change will require a cooperative effort and the involvement of a broad array of entities.

- What is the status of industry/NGO efforts to promote clean and renewable technologies?

Answer. Industry and NGOs are working vigorously to develop clean and renewable technologies, inform governments about policies that create enabling environments for these technologies, dissolve barriers to market entry and expansion, disseminate clean technology internationally, and promote public awareness of technology benefits. Between 2004 and 2008, global annual investment in renewable energy has increased fourfold, to $120 billion.

USG ENGAGEMENT WITH NGOS AND PRIVATE SECTOR IN DIPLOMATIC CONTEXT

In the context of bilateral and regional diplomatic engagements that concern energy and climate, we work extensively with a range of industry firms and NGOs on issues along the commercialization continuum, from policy and regulatory issues to project financing.

- NGOs have done a tremendous amount of work—often with USG funding—throughout the developing world to help establish preconditions for market readiness that the private sector seeks. The State Department has made a concerted effort to work closely with a range of NGOs to addressed issues like carbon capture and storage guidelines and building energy efficiency codes in China, and renewable energy and energy efficiency projects in India. NGO expertise will continue to be a rich asset for the State Department energy and climate change strategy.
- Private industry is the primary driver of change in our energy and climate strategy. Private industry wants to invest in growing markets in the developing world yet needs accepted principles like sanctity of contract, protection of intellectual property, and rationalized pricing structures. State will continue to work with other Federal agencies to promote the adoption of necessary market reforms throughout the developing world to support healthy, transparent, and predicable market environments.

SPAN AND TRAJECTORY OF INDUSTRY AND NGO ACTIVITY ON CLEAN ENERGY

Work in clean and renewable energy spans a wide range of technologies from power generation (wind, solar, hydro, geothermal) to petroleum demand (biofuels, electric vehicles) to energy efficiency (green buildings, sustainable communities). In the 4 years from the end of 2004 to the end of 2008, solar photovoltaic (PV) capacity increased 600 percent, wind-power capacity increased 250 percent, and total power capacity from new renewables increased 75 percent (to 280 GW). In 2008, the United States led in new capacity investment with $24 billion, or 20 percent of global investment, and in added and total wind-power capacity.

Several examples illustrate the robust U.S. activity in promotion of clean and renewable technologies:

- The American Council for an Energy-Efficient Economy (ACEEE), promotes dissemination of new technologies for energy efficient buildings. ACEEE is also working on building energy use disclosure and building labeling, to provide energy use information at the time of transactions.
- The Durst Organization exemplifies the fast-moving activity in the private sector focused on green buildings. Durst's flagship tower at 4 Times Square was recognized as the first "green" highrise office building in the United States, and in 2004 Durst broke ground on the $1 billion Bank of America building, which it describes as the world's most environmentally responsible highrise.
- The American Solar Energy Society (ASES) advances education, research, and policy to promote solar energy. In 2008, ASES published the "Green-Collar Jobs" report that showed renewable energy and energy efficiency sectors generate more than 9 million jobs and $1 trillion in annual revenue in the United States.
- Installation by the U.S. wind energy industry—over 8,500 megawatts (MW) of new generating capacity in 2008, a record and enough to serve over 2 million homes. This addition increased the Nation's total wind-power generating capacity by 50 percent to over 25,300 MW and channeled $17 billion into the econ-

omy. The new wind projects completed in 2008 account for about 42 percent of new power-producing capacity added nationally that year, according to initial estimates.

Question. Are there any efforts within the State Department and/or USAID to promote renewable energy, energy efficiency, and sustainability in urban centers of developing nations?

Answer. Yes, this is an increasingly critical component of our energy and climate change strategy. The State Department and USAID both are responding in a significant way to two global trends: first, urbanization; we now, for the first time in human history, live at a time when more people live in urban environments than rural locations; and second, increasing decentralization and devolution of economic and political power to subnational authorities. More and more around the world, state, provincial, and local authorities are being given the responsibility to provide local infrastructure services including housing, telecommunications, water and energy.

USAID has for many years run impressive urban programs designed to build the capacities of local officials on myriad issues ranging from municipal finance, to water utility management, telecommunications policy frameworks, and electricity restructuring regulations.

The State Department is also planning to promote cooperation between United States cities and cities in China and India. We envision this cooperation having three main components:

- Mayors and city leadership will share best practices in municipal planning and development, as well as assist in expanding business relationships for companies offering clean energy technology. Involvement will give them a platform to showcase their efforts on clean energy policy and help them contribute to the growth of local businesses.
- Companies seen as green leaders in alliance cities will identify opportunities to provide their sustainable solutions to markets in these countries. While demonstrating leadership in clean energy development, they will recognize new avenues for business growth.
- Academic and Research and Development institutions will participate in peer-to-peer discussions and collaborative projects with their counterparts in partner countries. Participation will present opportunities to not only learn from fellow institutions, but to offer innovative research and technical solutions to key developing countries.

This network of municipal scale experts and practitioners could eventually be expanded to other countries and offers an invaluable series of opportunities not only for improved public policymaking but also job creation and economic prosperity for the United States and partner cities.

Responses of Helene Gayle to Questions Submitted by Senator Russell Feingold

Question. The adoption of a new energy strategy is critical in order to effectively address climate change domestically and internationally. We have seen, for example, calls to construct a large solar power installation in the Sahara Desert to power both North Africa and Europe—this solution would require a huge infrastructure investment reaching across many countries.

- Are there any incentives offered by the U.S. Government to encourage investment in renewable and clean energy in developing nations? Are there particular areas where demonstration projects have been attempted, unsuccessfully or successfully?
- Specifically, what measures are being taken to evaluate and implement small-scale energy generating technologies that can be used onsite or very close to the end user, like solar photovoltaic or fuel cells, as a viable alternative for producing power in developing nations? Are there particular areas where demonstration projects have been attempted, unsuccessfully or successfully?
- How effectively would the deployment of these small-scale technologies in developing nations contribute to global energy security?

Answer. As a development and humanitarian assistance organization, CARE is not currently conducting renewable and clean energy generating projects in developing countries and has not examined the issues of incentives, specific technologies, or current demonstration projects in these areas. We, therefore, are unable to speak directly to these matters.

However, CARE has significant experience introducing clean energy products in vulnerable communities. For example, in Darfur, Sudan, CARE introduced fuel-efficient stoves to reduce demand on the region's scant supply of firewood—a source of communal tension and violence. In Rwanda, CARE has trained women, orphans, and vulnerable children to build energy-saving stoves to reduce deforestation and provide a source of income for participants. Likewise in Peru, CARE has successfully trained families to build improved stoves to reduce acute respiratory infections among children.

CARE is now exploring the possibility of generating carbon credits through the expansion of clean energy products in poor communities. We have identified Uganda as a feasible location for this pilot. We will build on our network of well-established village savings and loan associations (VSLAs)—small, self-managed groups comprised primarily of women. CARE currently works with 100,000 VSLA members in Uganda—a number that is expected to reach half a million in the next decade. VSLAs provide both a means to finance clean energy products and to promote their wide distribution.

For this proposed initiative, CARE's role will be to identify feasible clean energy products, recruit and train local distributors, provide information necessary for earning carbon credits on sales, guarantee investor risk and local distributor trade credit, and link distributors to VSLAs. CARE will also supervise the supply chain of the VSLA networks so that products are made available to large numbers of consumers, sellers and buyers are properly informed of the nature and use of the product, there is transparency about price and after sales, consumers have access to part replacement if necessary.

By focusing on the introduction of clean energy products in vulnerable communities, and by exploring the possibility of generating carbon credits through these efforts, we are able to contribute to broader efforts to make carbon markets work for the poor. These vulnerable communities will be the hardest hit by the impacts of climate change and are often the least able to cope. It is therefore, vital that their energy needs and their potential to participate in the solution be considered in designing responses to climate change mitigation. U.S. efforts to promote clean energy development and dissemination have great potential to address the lack of energy resources among developing country populations and to enable these communities and counties to reduce their own greenhouse gas emissions.

Question. Climate change threatens global food, ecosystem stability, and water availability and can contribute to overall political instability, among other problems. According to the United Nations "Human Development Report from 2007/2008," it is estimated that up to $86 billion will be necessary annually to support adaptation in developing countries by 2015 to (1) protect the existing development investments that could be impacted by climate change; (2) adapt existing poverty-reduction programs to climate change, potentially creating green jobs in developing nations; and (3) strengthen the anticipated need for disaster response associated with climate change. The current financing mechanism through the United Nations to support adaptation to climate change in developing nations has to this point been underfunded.

- Looking toward a new international agreement, what strategies and options need to be pursued in order to support adaptation in developing nations?

Answer. The communities CARE works alongside are doing the best they can to adapt to new conditions with limited resources. However, the amount of funding available to help communities in developing countries adapt is severely insufficient. A number of analyses have been conducted on how much money is needed for adaptation in developing countries. The World Bank suggests that costs will run between $9–$41 billion per year (the low figure assumes no investment in community-based adaptation) while Oxfam puts the price tag at more than $50 billion per year by 2015, the UNFCCC estimates that costs will range between $28 billion and $67 billion per year by 2030 and the UNDP projects annual costs of $86 billion per year by 2015. While the range varies, consensus is growing that the annual need is on the order of tens of billions of dollars and will be significantly higher if greenhouse gas emissions are not reduced substantially in the near term.

Unfortunately, few public financing options exist to help developing countries reduce their vulnerability and adapt to climate variability and change. There are three adaptation funding mechanisms under the UNFCCC. However as of December 2008, pledged commitments to the Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF) total only $262.3 million. The UNFCCC estimates that the third fund, the Adaptation Fund, has the potential to raise between $25 to $130 million through 2012 and between $30 million to $2.25 billion by 2030.

There is a huge gap between what is needed and what has been pledged or can be raised through the UNFCCC mechanisms.

Economically developing countries bear the least responsibility, are the most severely impacted, and have the least capacity to cope with climatic changes. If international adaptation continues to be inadequately resourced, climate change is projected to contribute to increased conflict over scarce natural resources, mass migration, and refugee crises.

The United States must do its fair share and provide substantial new and additional funding, above and beyond official development assistance, to support adaptation in developing countries vulnerable to climate change. New and innovative mechanisms that can raise significant funds for adaptation and create incentives for mitigation should be pursued, such as the auctioning of emission allowances and levying the use of international maritime and aviation transport (so called "bunker") fuels.

Robust funding for international adaptation is crucial. So, too, is guiding those funds so that they reach the people who need them most. Vulnerability is more than exposure to climate shocks and other stresses. CARE's experience has shown that vulnerability varies within countries, within communities, and even within households. It is in large part, determined by the economic, social, and political systems and structures that govern people's lives. Climate change will have the greatest impact on the poorest communities and most marginalized groups.

Well designed, top-down, scenario-driven approaches to adaptation can play a role in reducing vulnerability to climate change; yet they may fail to address the particular needs and concerns of the most vulnerable communities. CARE believes that the most effective approach is to empower local communities and facilitate their ownership of adaptation strategies. Through community-based adaption, we can foster more resilient livelihoods, link people to basic services, strengthen local capacity, and support social and policy change to address underlying causes of poverty and vulnerability.

The United States can provide leadership in ensuring that adaptation funds reach the people who need them most by ensuring systematic identification of the most vulnerable groups; inclusive, transparent, and participatory decisionmaking on the design and in the monitoring and evaluation of adaptation activities and mechanisms to support community-based adaptation.

Question. As we know, effectively tackling climate change will require a cooperative effort and the involvement of a broad array of entities.

- What is the status of industry/NGO efforts to promote clean and renewable technologies?

Answer. While CARE cannot speak directly to the issue of clean and renewable energy, we do agree that this will require a cooperative approach. Many of our NGO partners are following discussions around the importance of clean and renewable energy technology—as it relates to the ability to achieve a successful deal in Copenhagen, the ability of developing countries to adopt clean energy development pathways, and efforts to increase access to energy among the energy poor in developing countries. CARE also believes that tackling climate change and moving to a clean energy economy provide the United States the opportunity to invest in new technologies. The innovation necessary to move to cleaner energy usage can fuel job creation at home and spur growth in exports to other markets as our global partners also work to reduce their emissions and adopt clean energy. The United States is still No. 1 in world competitiveness. We live in a country of immense ingenuity. With the right market incentives in place, the United States can leverage its openness, resilience, and entrepreneurship to lead the world in reducing greenhouse gas pollution and developing a new, low-carbon global economy.

RESPONSES OF NED HELME TO QUESTIONS SUBMITTED BY SENATOR RUSSELL FEINGOLD

The adoption of a new energy strategy is critical in order to effectively address climate change domestically and internationally. We have seen, for example, calls to construct a large solar power installation in the Sahara Desert to power both North Africa and Europe—this solution would require a huge infrastructure investment reaching across many countries.

Question A. Are there any incentives offered by the U.S. Government to encourage investment in renewable and clean energy in developing nations? Are there particular areas where demonstration projects have been attempted, unsuccessfully or successfully?

Answer A. There are a number of U.S. Government supported efforts to encourage investment in renewable and clean energy in developing nations. We have collected summaries of some programs and projects organized by the State Department, the Overseas Private Investment Corporation, the Asia-Pacific Partnership, and the U.S. Environmental Protection Agency. That information is attached as Appendix 1. There are other projects underway through the National Renewable Energy Laboratory in China, India, and Brazil. In addition, other DOE supported programs focus on technology collaboration, building codes, standards, and technology outreach. However, we would suggest contacting DOE directly for more information on these programs. We are not aware of evaluations carried out for these projects.

Question B. Specifically, what measures are being taken to evaluate and implement small-scale energy generating technologies that can be used onsite or very close to the end user, like solar photovoltaic or fuel cells, as a viable alternative for producing power in developing nations? Are there particular areas where demonstration projects have been attempted, unsuccessfully or successfully?

Answer B. The Center for Clean Air Policy is not involved in programs to implement small-scale energy generating technologies and would suggest that Senator Feingold contact the Solar Energy Industries Association (www.seia.org) and the Department of Energy for additional information on this topic.

Question C. How effectively would the deployment of these small-scale technologies in developing nations contribute to global energy security?

Answer C. Global energy security is linked to global security, a connection that will increase over time in developing nations as the pressure to develop presses against the goal of reducing carbon emissions. The need to grow energy supply in developing countries will remain high, especially for those countries with large populations still in poverty. Adequate supplies of energy are critical for addressing health, food, and water security, as well as to avoiding a growing tide of economic, environmental, and climate security threats. Large-scale deployment of small-scale technologies can leapfrog the need for enormous and dirty traditional energy infrastructure and bring prosperity to millions who need it. Displacing fossil energy with small-scale technologies will reduce demand for fossil fuels and will decouple economic development from carbon, which will strengthen global and developing country energy security.

Question. Climate change threatens global food, ecosystem stability, and water availability and can contribute to overall political instability, among other problems. According to the United Nations "Human Development Report from 2007/2008," it is estimated that up to $86 billion will be necessary annually to support adaptation in developing countries by 2015 to (1) protect the existing development investments that could be impacted by climate change; (2) adapt existing poverty-reduction programs to climate change, potentially creating green jobs in developing nations; and (3) strengthen the anticipated need for disaster response associated with climate change. The current financing mechanism through the United Nations to support adaptation to climate change in developing nations has, to this point, been underfunded.

- Looking toward a new international agreement, what strategies and options need to be pursued in order to support adaptation in developing nations?

Answer. The need for adaptation to climate change depends on the extent of climate change impacts, vulnerability of a particular location or group of people to these impacts and adaptive capacity of ecosystems and societies. Developing countries are usually more vulnerable to climate change impacts due to their geographic locations and low adaptive capacities associated with their overall stage of development. For this reason, adaptation in developing countries involves both stand alone adaptation measures and integration of adaptation concerns into development strategies. Adaptation in developing countries will also need to include infrastructure measures, such as sea walls in coastal areas, water reservoirs, irrigation systems; and soft measures such as altering agriculture practices, providing training to help people move away from subsistence agriculture, developing early warning systems, and developing new water policies that encourage efficient water use and water sharing, etc.

Decisions about infrastructure investments should include information on climate change and other environmental concerns. Ignoring these impacts will undermine long-term economic growth. International assistance can play an important role, provided that national and local needs are fully taken into account and the development agencies have enough information about the projected climate change impacts in the regions where they work.

Identifying and pursuing the wisest adaptation actions requires planning and a thorough review of local institutional, legal and regulatory frameworks in each country or region. Developed countries should assist developing countries with these efforts and provide best practice examples.

Weak governance also exacerbates vulnerability to existing extreme weather events and climate change. Therefore, strengthening the fundamental building blocks of civil society will also contribute to adaptation. Transparent governance based on the rule of law, cooperation among government agencies, and involvement of stakeholders (including local communities) in the decisionmaking process are prerequisites for effective adaptation to climate change. Schooling, basic professional training and medical care accessible to all are essential elements of community-level capacity and are indispensable for adaptation to climate variability and change.

To support adaptation in developing countries, several tools are needed:

- Ample financing from developed countries for capacity-building and adaptation projects in developing and least developing countries;
- Capacity-building and support for adaptation planning and integration of adaptation into sectoral and national planning and development strategies;
- Creation of microcrediting and small-scale grant programs that would allow direct and fast access to financing to local communities;
- Development of forecasting and early warning systems in all developing countries;
- Assistance with and development of incentives (e.g., through insurance mechanisms) for preventive measures;
- Risk-sharing mechanisms, including insurance;
- Implementation of national adaptation program of actions (NAPAs) that specify their priority adaptation actions; and have already been developed by least developed countries;
- Extension of NAPA program for all developing countries, assistance with formulating NAPAs, and substantial financial assistance for implementing them;
- Assistance to all developing countries with vulnerability assessments; and
- Assistance with down-scaling/localizing climate change forecasts.

Question. As we know, effectively tackling climate change will require a cooperative effort and the involvement of a broad array of entities.

- What is the status of industry/NGO efforts to promote clean and renewable technologies?

Answer. Significant new clean energy technology market opportunities will emerge worldwide in coming years, with tens of billions of dollars' worth of clean technology needed in developing countries. Industry and NGOs, on their own, working together and working with governments are involved in promoting this technology. Much is being done and even more remains to be done.

Examples of NGO activities include the work of the World Resources Institute (WRI) with business to develop low carbon strategies, build markets for renewable energy, and work with financial institutions to integrate consideration of climate risks and low carbon opportunities into financial decisions. (http://www.wri.org/climate/sustainable-business-and-markets) See also, Samantha Put Del Pino, et al., "Sharpening the Cutting Edge: Corporate Action for a Strong, Low-Carbon Economy" (WRI 2009) (http://www.wri.org/publication/sharpening-the-cutting-edge).

Examples of industry groups working to promote clean technology investment, deployment and exports include the International Clean Energy Alliance (www.ice-alliance.org) and The Clean Economy Network (www.cleaneconomy.net).

Based on stakeholder consultations with business, NGO and other stakeholder groups, The National Renewable Energy Laboratory prepared recommendations on Strengthening U.S. Leadership of International Clean Energy Cooperation (December 2008) (http://www.nrel.gov/applying__technologies/pdfs/44261.pdf).

As significant as these activities are, greater possibilities are now emerging. For example, the major economies of the world, including the United States, Europe, Japan, China, India, and others recently declared they will undertake "nationally appropriate mitigation actions, subject to applicable measurement, reporting, and verification, and prepare low carbon growth plans."[1] This step toward a new global climate agreement to be concluded in Copenhagen this December is a preview of the way in which confronting climate change will drive greatly increased plans and actions to deploy clean technology. These efforts will involve increased demand driven

[1] Declaration of the Leaders, The Major Economies Forum on Energy and Climate, July 2009.

by carbon markets and other forces such as high oil prices, which will mobilize trade, investment, and deployment of clean technology.

In recent years, U.S. industry has stepped up production of wind, solar, and other clean technologies, but other countries, including those of Europe and Asia have moved ahead of us in important areas. The low priority the United States placed, until recently, on addressing climate change put the United States in a less active position on clean energy than key competitors. Nevertheless, great new opportunities are in the offing if the United States is prepared to seize them by boosting public-private cooperation and providing the overall framework to address climate change and energy security that will also provide incentives for clean technology.

Many U.S. companies have impressive arrays of skills and technologies but have been left somewhat on the sidelines in the absence of clear U.S. policy to control GHG or promote new clean energy. The Cleantech Venture Capital Network represents a large number of financiers ready to invest in high-growth startups in the clean energy field. Innovative renewable energy companies are hampered by the lack of a strong domestic market but are fighting for market share in markets such as Europe and China. Even U.S. auto companies, which are now suffering as a lax regulatory regime has left their vehicles less efficient than their competitors', are now putting clean battery systems at the heart of their strategy for recovery.

APPENDIX 1

U.S. GOVERNMENT PROJECTS/INITIATIVES

(http://www.state.gov/g/oes/rls/other/2009/123185.htm)

BIOFUELS PARTNERSHIP WITH BRAZIL

In November 2008, the U.S. and Brazil announced expansion of cooperation on biofuels to advance security and promote sustainable development. The agreement expands scientific collaboration in biofuels and will work with five new countries interested in developing their domestic biofuels industries: Guatemala, Honduras, Jamaica, Guinea-Bissau, and Senegal. These new partners, along with the Dominican Republic, El Salvador, Haiti, and St. Kitts and Nevis, comprise a total of nine partner nations to benefit from U.S.-Brazil biofuels collaboration. The U.S., Brazil, and MOU partners have obligated over $4.3 million across twelve projects that are underway. All partners are working to develop local biofuels industries to reduce dependence on imported fuels and promote sustainable development.

Overseas Private Investment Corporation (OPIC) has supported renewable energy Projects in India. Several examples provided by the State Department include:

- Solar Energy: 2 MW, Grid-connected photovoltaic project; $6.2 million in financing for construction and operation.
- Hydropower: 12 MW; $10 million in financing and $6 million in political risk insurance to a U.S. small business for the rehabilitation, construction and operation of a hydropower station.
- Wind Energy: $450,000 provided in political risk insurance (+ $750,000 forthcoming) to a U.S. small business for installation and operation of turbines in Tamil Nadu and Maharashtra.
- Waste-to-Energy: Series of 20 rice-husk plants; $1 million in financing for plants in rural villages.

National Renewable Energy Laboratory International Program—Market development:

- China: Biofuels, RE law implementation, Wind development, Rural electrification.
- India: Solar analysis, biofuels.
- Brazil: biofuels.

IRENA

The International Renewable Energy Agency (IRENA) was officially established in Bonn on 26 January 2009. The U.S. is one of 136 nations to join. According to it's website, IRENA is "aspires to become the main driving force for promoting a rapid transition towards the widespread and sustainable use of renewable energy on a global scale. (http://www.irena.org/index.php?option=com__content&view=article&id=47&Itemid=28)

International Renewable Energy Agency (IRENA). Member countries will give a financial contribution according to total budget and IRENA scale of assessment (based on U.N. scale).

U.S. LED PROJECTS WITH ASIA-PACIFIC PARTNERSHIP

(http://www.app.gov/app/usled/)

According to the Asia-Pacific Partnership website, U.S. led projects under the partnership include a Renewable Energy and Distributed Generation Task Force (REDG) (http://www.app.gov/taskforces/renewable/). The first set of projects approved by the Task Force has the potential to achieve deployment of an additional 1.8GW of renewable energy and distributed generation capacity within five years. The Task Force promotes investment in these technologies and attempts to address market and technical barriers to adoption.

The Task Force is to identifying barriers to technology deployment and financing associated with the deployment of REDG technologies. Australia, South Korea, and the United States are working together to analyze regulatory barriers in Partner countries and create an enabling framework for renewable energy deployment. The Republic of Korea is examining smart grid integration of distributed generation sources, working in cooperation with China, India, and Japan. The United States is working to commercialize distributed power generation using hydrogen—fueled generators in India. This project is targeting identified rural communities in India that can benefit from stable sources of electricity and will potentially increase by 1,000 to 2,000 the number of homes or small businesses with access to clean, reliable electricity.

The Partnership is helping provide customized power solutions based on local fuel sources in rural parts of India and China by partnering industry with U.S. government. Deployment of gasified biomass-fueled engines will provide power to some of the almost 400 million rural residents who lack adequate and/or reliable power supplies, and will power schools, health clinics, small industry, and agricultural production. The United States, in public-private partnership, will deploy combined heat and power systems in China that use petroleum coke oven gas for electricity and thermal energy. Australia is facilitating investment in a Mega Solar Project in South Korea that will both broaden the visibility of solar photovoltaic technology and contribute added capacity to help with peak load reduction.

Projects:

- Grid connected renewables energy (RE) and distributed generation (DG) partnerships (U.S. Dept. of State, U.S. Energy Association): project facilitating deployment of RE and DG technology in India by identifying enabling environments including but not limited to finances, regulations and policies.
- Rural Entrepreneurship Zones—Bridging the Economic Divide through Renewable Energy Based Empowerment (U.S. Dept. of State, Society for Development Alternatives): This project is resulting in the increased deployment of green power in India by establishing Rural Entrepreneurship Zones (REZ) and providing critical outreach and support services to businesses in key sectors. This project is promoting green power by developing a portfolio of connected businesses, focused on the building materials and traditional skill-based craft sectors, coupled with necessary support services such as green power. Additionally this project is demonstrating the financial and institutional viability for REZs and is building and nurturing partnerships for leveraging policy support and financial investments to accelerate the adoption and replication of REZs throughout India.
- Facilitating a 1MW Solar Photovoltaic plant Pilot Project to be integrated into North Delhi Power Ltd. (U.S. Dept. of State, Morse Associates, Inc.): This project is currently facilitating the development of a first, large-scale (1 MW), solar photovoltaic power plant for the Tata Power Company, Ltd around the city of Mumbai, India. India has a large potential solar market. Expanded use of large-scale solar PV will create a growing, but not yet quantifiable, contribution to GHG emission reductions. This project is already making a small, but significant contribution to clean, pollution- and GHG-free power production, particularly in comparison to the current dominant Indian power production based on low-quality coal resources. This project is also developing a systematic assessment of solar generating opportunities in Tata's service areas by identifying areas with additional power needs, finding suitable sites for solar generation, and assisting Tata in negotiations to obtain financing for a 1 MW SPV plant.
- Accelerate Commercialization of Renewable Energy for Distributed Generation in India (U.S. Dept. of State, Orb Energy, Ltd.): India's commercial solar PV market is mainly concentrated in the southern or middle parts of Karnataka. This project enables the grantee to conduct market-scoping activities in areas where potential customers have limited, if any, options to purchase solar power units. Currently this project is facilitating the establishment of 50 new fran-

chised branches in new markets (on top of 20 branches in existing markets in south and mid-Karnataka). This project is already well ahead of schedule and is also improve consumer finance terms for the purchase of 1 mega-watt of PV systems and is demonstrating to partner banks the merits of retaining such new terms on an on-going basis.

- Market Development for Renewable Energy (U.S. Dept. of State, U.S. Agency for International Development—India): The government of India's renewable energy policy provides the regulatory framework to facilitate the rapid market oriented growth and development of renewable energy technologies for rural electrification. This specific project advances green technologies such as biomass, solar, waste-to-energy, wind, small hydro, fuels cells, and micro turbines, in partnership with state agencies and local utilities. This project results in policy advocacy, reform and fiscal measures which enhance the share of renewable energy technologies in India's energy mix.
- Creating an Enabling Framework for Renewable Energy Deployment. (U.S. Dept. of State, U.S. Dept. of Energy—National Renewable Energy Laboratory): This project is being implemented to identify priority resource assessment and decision support tools needed in India in order to better inform renewable energy and distributed generation project planning and policy development in India. The project is strengthening and training Indian institutions in the field of incorporating current data into decision making tools and is producing a usable solar map product for Indian industry and government stakeholders. This project is providing technical collaboration to and with Indian counterparts on market relevant resource data and outreach to enhance industry access to, and awareness of, resource information tools.
- Identifying Optimal Legal Frameworks for Renewable Energy in India (U.S. Dept. of State, Renewable Energy and International Law Project): REIL and its sub-contractors are providing an overview of the regulatory and policy situation for renewable energy in the key, rapidly-developing Asia Pacific Partner country of India, using case studies, especially those that demonstrate positive steps already being taken to promote increased investment in renewable energy markets. This project is encouraging and enhancing the capacity for emission reduction efforts in India, by promoting legal and regulatory measures to help create the enabling environments for the uptake of renewable energy.
- Solar PV Standards and Testing (U.S. Dept. of Energy): U.S. DOE is collaborating with SunTech, the largest solar energy company in China, and the China General Certification Center to engage Chinese manufacturers on photovoltaic module qualification standards and methodologies currently being used in the U.S. and Japan. This project will ensure that world photovoltaic manufacturers embrace and adopt state-of-the-art reliability practices.

U.S. EPA MOU WITH CHINA

(http://epa.gov/international/air/chinaair.html)

In December of 2003, EPA and the Chinese State Environmental Protection Administration, since renamed the Ministry of Environmental Protection signed a Memorandum of Understanding (MOU) providing a forum for EPA and China to be more strategic in cooperative efforts. The MOU established the Working Group on Clean Air and Clean Energy to coordinate and facilitate the implementation of the Strategy for Clean Air and Energy Cooperation.

Renewable Energy Projects:

- Wind Technology Partnership

  The Wind Technology Partnership is a joint U.S. EPA and U.S. DOE program in China to accelerate the development and utilization of grid-connected wind power in China. The program is an extension of the Technology Cooperation Agreement Pilot Program in China, where wind power was one of four technologies selected by China as priorities. WTP is being implemented by the U.S. in partnership with China's National Development and Reform Committee, China's Energy Research Institute and China's Center for Renewable Energy Development. WTP is currently focusing on overcoming institutional and market barriers to grid-connected wind power in China, with a focus on Hebei province.

- Methane to Markets Partnership

  Under the multilateral Methane to Markets Partnership, EPA is engaging in capacity-building, and project implementation activities in China to facilitate methane capture and use projects in the Coal, Landfill and Agriculture sectors. For example:

- In the Coal Sector EPA funds the China Coalbed Methane Clearinghouse. This Clearinghouse, housed by the China Coal Information Institute. The Clearinghouse provides information and logistical support to private businesses and foreign and domestic government agencies interested in coal bed methane and coal mine methane development in China. Visit the China Coal Information Institute's website for notices about upcoming projects and activities.
- In the Landfill sector, USEPA is working with the Chinese government to develop feasibility studies for projects in Beijing where landfill gas is used as an alternative vehicle fuel. This work is being done in coordination with the EPA's Beijing Olympics Air Quality Subgroup.
- For more information the on the partnership or specific activities in China please visit www.methanetomarkets.org, or the EPA Web site for Methane to Markets.

RESPONSES OF PAUL CAMUTI TO QUESTIONS SUBMITTED BY SENATOR RUSSELL FEINGOLD

Question. The adoption of a new energy strategy is critical in order to effectively address climate change domestically and internationally. We have seen, for example, calls to construct a large solar power installation in the Sahara Desert to power both North Africa and Europe—this solution would require a huge infrastructure investment reaching across many countries.

- Are there any incentives offered by the U.S. Government to encourage investment in renewable and clean energy in developing nations? Are there particular areas where demonstration projects have been attempted, unsuccessfully or successfully?

Answer. The ability to move large amounts of power in developing nations requires large investments. Oftentimes, the power grid is inadequate, if there is a power grid. Technology like high voltage DC (HVDC) transmission is available today to address this concern. This technology has been demonstrated on a large scale. For instance, Siemens has completed projects linking hydroelectric-generated power in remote regions of China to their city centers. Siemens also completed an HVDC project from power sources in New Jersey to power customers on Long Island, NY. Similar transmission needs exist in the United States, especially to link renewable energy sources to population centers. The most effective government incentive for this and many clean energy technologies (such as carbon capture and storage) is to provide a clear and predictable market signal for carbon dioxide emissions.

Question. Specifically, what measures are being taken to evaluate and implement small-scale energy generating technologies that can be used onsite or very close to the end user, like solar photovoltaic or fuel cells, as a viable alternative for producing power in developing nations? Are there particular areas where demonstration projects have been attempted, unsuccessfully or successfully?

Answer. The application of small-scale energy generation, or distributed generation, entails trade-offs with respect to efficiencies as well as the availability of generation technology. If the generator is closely linked to the load, better demand management and more flexible deployment of renewable technologies is possible. There are many technologies at various stages of development and deployment including photovoltaic, fuel cells of varying types, and micro wind turbines. In the process of developing these technologies, many small-scale pilot projects have been completed, more as proof of concept than large-scale demonstration.

There a few concerns:

First, introducing many distributed generation sources to the grid will have an impact on the grid. More computerized and "intelligent" controls will be required to enable the technology and to protect the reliability of the power system. This is a key reason why "smart grid" solutions are sought after. The current focus on Department of Energy "smart grid" demonstration projects must include large scale demonstration of the integration of distributed generation.

Second, distributed generation, particularly utilizing solar or wind power, will require advances in energy storage. The Department of Energy should prioritize funding for energy storage research and demonstration. The Department currently is funding energy storage for transportation, which may also lead to benefits for grid-scale storage.

Siemens has completed a unique demonstration project for a special type of distributed generation called off-grid lighting. In Lake Victoria, Kenya, Siemens installed "energy hubs," or photovoltaic powered battery charging stations that are

not connected to a power grid. The charging stations are used to charge batteries for lights used for night fishing, reading, cooking, and night-time activities that were previously illuminated only by kerosene lamps. The replacement of roughly 175,000 kerosene lamps will save approximately 50,000 tons of carbon dioxide.

Question. How effectively would the deployment of these small-scale technologies in developing nations contribute to global energy security?

Answer. The deployment of small-scale technologies will have a significant impact on global energy security. Many developing countries' energy challenges are in the area of off-grid or microgrid applications (like the battery-powered lamp example) due to poor transmission (grid) development that may not be remedied in the short term. Large-scale power projects may not be affordable or practical. There is therefore a need to adapt technology for developing nations in order to make products and solutions easier to deploy, use, maintain, and repair.

Question. Climate change threatens global food, ecosystem stability, and water availability and can contribute to overall political instability, among other problems. According to the United Nations "Human Development Report from 2007/2008," it is estimated that up to $86 billion will be necessary annually to support adaptation in developing countries by 2015 to (1) protect the existing development investments that could be impacted by climate change; (2) adapt existing poverty-reduction programs to climate change, potentially creating green jobs in developing nations; and (3) strengthen the anticipated need for disaster response associated with climate change. The current financing mechanism through the United Nations to support adaptation to climate change in developing nations has, to this point, been underfunded.

- Looking toward a new international agreement, what strategies and options need to be pursued in order to support adaptation in developing nations?

Answer. Our experience shows that solutions for developing nations require a combination of technology expertise and understanding of local economic, political, and cultural conditions. We have established research and development teams in China and India in order to better understand local requirements and develop solutions for rural areas (such as the compact fluorescent lighting example in Paul Camuti's written testimony). We suggest providing the private sector incentives to establish these facilities in developing countries. The Clean Development Mechanism (CDM) has yielded positive results in technology transfer and adaptation in developing nations, but as stated in Paul Camuti's written testimony, much attention is needed to address streamlining the process of applying for CDM project status.

Question. As we know, effectively tackling climate change will require a cooperative effort and the involvement of a broad array of entities.

- What is the status of industry/NGO efforts to promote clean and renewable technologies?

Answer. As the demand for clean energy increases (through government incentives, a market price for carbon, the market's need to reduce costs through efficiency, performance standards or renewable electricity standards), industry will respond by developing solutions. Our expanding wind energy market is a good example of the market at work.

Through our work in the United States Climate Action Partnership (comprised of major industry and prominent environmental NGOs), we advocate for an economy-wide cap and trade regime, performance standards for fossil-fuel fired powerplants, and a variety of incentives for clean energy including payment for tons of carbon sequestered (see the Blueprint for Legislative Action at www.us-cap.org). Within USCAP, and with the support of major NGOs such as the Alliance to Save Energy, we advocate for energy efficiency measures including building codes. Siemens also supports a robust national renewable electricity standard, and this is supported by most of the major NGOs.

Responses of Special Envoy Todd Stern to Questions Submitted by Senator Robert P. Casey, Jr.

Question. China has a priority interest, and understandably so, of furthering their economic progress and eradicating poverty relative to committing to hard and fast reductions in greenhouse gas emissions. In light of this and the urgency to move quickly to stabilize global atmospheric concentrations of greenhouse gases, what incentives exist to "encourage" China and India to commit to reducing their emissions of CO_2 and other greenhouse gases?

Answer. China and India both do have very real development needs. In China, average incomes are just over $3,000, with more than 450 million people living on less than $2 per day. In India, the statistics are even more dire, with over 800 million people living on less than $2 per day. Sustaining rapid economic growth is necessary for both to continue to lift their citizens out of poverty and up the development ladder.

Working together to reduce greenhouse gas emissions is an important part of the overall United States-China and United States-India bilateral relationships, and there are clear incentives for these emerging economies to reduce their greenhouse gas emissions. It is not sustainable for them to ignore this problem, as climate change could cause severe damage to their own countries. The atmosphere is unforgiving, and it is both unsustainable for them and unacceptable to the world, for China or India to take a path that makes it impossible to limit greenhouse gases to a relatively safe level.

Further, the future of our global economy will belong to those who move down the low-carbon path. There are rich economic opportunities for countries that head in this direction going forward. India and China are increasingly starting to see this.

What all countries need to see—and here the United States must lead by example—is that economic growth and the growth of emissions must be separated; that is what a low-carbon development path is all about.

Question. One approach that could be used to "encourage" countries like China and India to participate in a global climate change mitigation agreement are border adjustments that would impose a tax or tariff on imported products. What are your thoughts on the efficacy of border adjustments?

Answer. At this time, the administration has not supported a border tax or any specific competitiveness measure. An effective international agreement would help make border tariffs or taxes unnecessary by ensuring that all countries are doing their part in reducing emissions. It is our aim to negotiate such an agreement with China, India, and the international community. This is the most effective way to create a level playing field for U.S. manufacturing and other energy-intensive, trade-exposed industries.

Domestic policy should provide targeted measures to address competitiveness impacts on energy-intensive, trade-sensitive industries, if they are found to be necessary. The Waxman-Markey legislation addresses this issue by taking transition measures whereby free allowances offset the cost of climate policy for vulnerable industries. In fact, Waxman-Markey covers 100 percent of both the direct and indirect costs of the bill for qualifying trade-exposed, carbon-intensive industries.

RESPONSE OF PAUL CAMUTI TO QUESTION SUBMITTED BY SENATOR ROBERT P. CASEY, JR.

Question. Coal and low-cost electricity from coal is critical to my state and many states like Ohio, Indiana, West Virginia, and Michigan. Your company is working on advanced coal technology. What is your perspective on when carbon capture and storage will be commercially available, and what the role of the Federal Government in funding clean coal research and development should be?

Answer. As a member of the United States Climate Action Partnership (USCAP), Siemens supports a national strategy to repower, retrofit, or replace existing high emitting coal plants with low emitting coal technologies to help meet current and future electricity demand in the United States.

In order to have a meaningful impact on climate change, carbon and capture and storage (CCS) technologies would need to be deployed in large scale. Some technologies like precombustion gasification are available today. But, market entry is delayed by uncertainties in carbon policies and financing difficulties, as well as the need for large-scale storage demonstration. In addition, a number of promising new post-combustion technologies have been demonstrated on a smaller scale, but full-scale demonstrations are needed to reduce the technology risks for powerplant owners and operators. The need for successful demonstrations places commercial availability in a timeframe of 2015 and beyond.

In order to increase commercial deployment of CCS while preventing excessive runup in natural gas prices due to fuel switching, USCAP recommends that Congress provide substantial financial incentives (via a dedicated and protected trust fund that is outside the appropriations process) and needed regulatory certainty to facilitate and accelerate the early deployment of CCS technology. Specifically, USCAP recommends that Congress immediately:

(1) Direct all relevant federal agencies to develop a unified strategy and by January 2010 promulgate all necessary rules to implement a strategy to address the key legislative and regulatory barriers that impede CCS deployment;

(2) Increase funding to complete a national assessment of the capacity for geologic storage of carbon dioxide by January 2013;

(3) Increase funding for early grants to fully demonstrate the viability of CCS in commercial practice. The program would establish at least 5 gigawatt of CCS-enabled coal-fueled facilities operating with an emissions rate of no more than 1,100 lbs/megawatt hour, including at least one pulverized coal retrofit by no later than 2015.

Federal incentives in the form of tax credits and loan guarantees are needed to accelerate market entry and speed early application of CCS technologies. It is essential that the Federal Government continue to sponsor clean coal research and development through early-stage research in both second and third generation capture technologies to reduce their costs and improve their performance and reliability.

The USCAP "Blueprint for Legislative Action" (available at www.us-cap.org) contains additional recommendations, which we endorse, for performance standards for new coal and other solid fueled facilities emitting more than 10,000 tons of carbon dioxide per year, as well as a CCS direct cash payment funding program for sequestering carbon dioxide from coal and other fossil-fuels in both power generation and industrial operations.

We also note that clean coal technology refers to many technologies whose goal is to reduce the environmental impact of coal energy production. Technologies to reduce sulfur dioxide emissions, nitrogen oxide emissions and particulate emissions are commercially available today, but regulatory uncertainty has affected the market for these technologies. Siemens recognizes that the uncertain status of the U.S. EPA's Clean Air Interstate Rule, the Clean Air Mercury Rule and the New Source Review provisions under the Clean Air Act has had a chilling effect on the acquisition of this emission-reducing technology.