

# INTERNATIONAL ASPECTS OF CLIMATE CHANGE

---

HEARING  
BEFORE THE  
COMMITTEE ON  
ENERGY AND NATURAL RESOURCES  
UNITED STATES SENATE  
ONE HUNDRED ELEVENTH CONGRESS  
FIRST SESSION  
TO  
EXPLORE INTERNATIONAL ASPECTS OF GLOBAL CLIMATE CHANGE

---

NOVEMBER 17, 2009



Printed for the use of the  
Committee on Energy and Natural Resources

---

U.S. GOVERNMENT PRINTING OFFICE

55-049 PDF

WASHINGTON : 2010

---

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

COMMITTEE ON ENERGY AND NATURAL RESOURCES

JEFF BINGAMAN, New Mexico, *Chairman*

BYRON L. DORGAN, North Dakota	LISA MURKOWSKI, Alaska
RON WYDEN, Oregon	RICHARD BURR, North Carolina
TIM JOHNSON, South Dakota	JOHN BARRASSO, Wyoming
MARY L. LANDRIEU, Louisiana	SAM BROWNBACK, Kansas
MARIA CANTWELL, Washington	JAMES E. RISCH, Idaho
ROBERT MENENDEZ, New Jersey	JOHN MCCAIN, Arizona
BLANCHE L. LINCOLN, Arkansas	ROBERT F. BENNETT, Utah
BERNARD SANDERS, Vermont	JIM BUNNING, Kentucky
EVAN BAYH, Indiana	JEFF SESSIONS, Alabama
DEBBIE STABENOW, Michigan	BOB CORKER, Tennessee
MARK UDALL, Colorado	
JEANNE SHAHEEN, New Hampshire	

ROBERT M. SIMON, *Staff Director*  
SAM E. FOWLER, *Chief Counsel*  
MCKIE CAMPBELL, *Republican Staff Director*  
KAREN K. BILLUPS, *Republican Chief Counsel*

# CONTENTS

## STATEMENTS

	Page
Bingaman, Hon. Jeff U.S. Senator From New Mexico .....	1
Colvin, Jake, Vice President, Global Trade Issues, National Foreign Trade Council .....	36
Harbert, Karen, President and CEO, Institute for 21st Century Energy, Chamber of Commerce .....	22
Levi, Michael A., Ph.D., David M. Rubenstein Senior Fellow For Energy and the Environment, Council on Foreign Relations .....	4
Murkowski, Hon. Lisa U.S. Senator From Alaska .....	2
Purvis, Nigel, President, Climate Advisers .....	9
Smith, Taiya, Senior Associate, Energy and Climate Program, Carnegie En- dowment for International Peace .....	16

## APPENDIX

Responses to additional questions .....	57
---	----



## **INTERNATIONAL ASPECTS OF CLIMATE CHANGE**

---

**TUESDAY, NOVEMBER 17, 2009**

U.S. SENATE,  
COMMITTEE ON ENERGY AND NATURAL RESOURCES,  
*Washington, DC.*

The Committee met, pursuant to notice, at 10:03 a.m. in room SD-366, Dirksen Senate Office Building, Hon. Jeff Bingaman, presiding.

### **OPENING STATEMENT OF HON. JEFF BINGAMAN, U.S. SENATOR FROM NEW MEXICO**

The CHAIRMAN. OK, why don't we get started. Thank you all for coming today. The committee is having a hearing on the international aspects of global climate change. The committee has held several hearings to learn about the implications of domestic climate change legislation on the energy sector and on consumers, and today's hearing is to learn how United States domestic efforts would fit in with global efforts to reduce greenhouse gas emissions.

Much of the discussion of international climate policy revolves around the United Nations and negotiations to reach an international agreement to reduce emissions. This weekend at the Asia Pacific Economic Cooperation Summit, President Obama and other world leaders decided to delay the goal of reaching a climate change agreement at the next global climate conference in Copenhagen.

Today we'll hear from witnesses on this issue and explore the realms of possibility for an international agreement. We'll also hear about specific countries and their efforts to deal with climate change policy. Major emitters such as the United States and the European Union and China and India, and tropical rain forest countries as well, are at the core of climate discussions. It's important for the committee to understand the unique differences and challenges that each of these countries face.

I was glad to see that there's an announcement today that the U.S. and China have made a series of announcements with regard to this set of issues. The United States and China clearly share many of the same energy and climate challenges, and a strong bilateral partnership on clean energy and renewables and efficiency could benefit both countries.

Let me also just mention that we hear a lot about United States clean technology development and deployment. Effective programs to spur the development and deployment of clean energy technologies abroad are vital to our national goals of mitigating climate

change and also to promoting U.S. competitiveness in future energy technologies.

U.S. international clean energy technology research, development, and deployment programs are spread across six agencies at the current time. Each program does valuable work, but they lack a unified national strategy to guide their efforts. I think there are structural and budgetary problems that we need to look at. The result is a duplication of capacity across agencies, underresourcing of programs where they do exist, and less than optimal outcomes from the Nation's international energy technology portfolio. I hope we can develop a better approach to international energy cooperation than simply creating more interagency coordinating groups. So this is an important issue and a follow-on to the other hearings we've had.

Let me defer to Senator Murkowski for her comments and then we'll introduce the panel.

**STATEMENT OF HON. LISA MURKOWSKI, U.S. SENATOR  
FROM ALASKA**

Senator MURKOWSKI. Thank you, Mr. Chairman. I'd like to thank the witnesses for joining us here this morning. You mentioned the other hearings that we have held, the four hearings on the domestic climate legislation. We have looked at cost containment, cost estimates, price volatility, allowance allocations, the role of natural gas. Of course, we have the hearing which is being rescheduled that will look more broadly at our climate policy options.

Today, as we discuss the international aspects of climate change, it's like Paul Harvey's "And now we're going to hear the rest of the story," ranging from actions in other countries to the replacement of the Kyoto Protocol.

We recognize that these are incredibly important subjects because climate change is clearly a global challenge that requires nothing short of a global solution. Our committee has been focused on the nuts and bolts of the domestic policy, but we can't forget that our actions will make little difference unless the rest of the world is working with us as partners in that effort. I think we recognize the global emissions trends make this apparent.

While we recognize that climate change mitigation must be a global effort, progress on the international front has been slow and difficult. The U.N. process is well behind the time line that was set just a couple years ago, and less than 3 weeks before the start of the Copenhagen conference almost everyone involved in that effort has pivoted to managing the expectations for what can be accomplished. Instead of a legally binding treaty, it appears that the goal now for Copenhagen is to broker a political agreement.

Those that would insist that America must act first assume that others will always follow our example, but I think we know that our history shows that this isn't always the case. The United States has made great strides in civil rights, worker protections, environmental stewardship, but no amount of domestic leadership can guarantee similar progress abroad, and it's difficult in my opinion to see how climate change is going to be any different.

This line of thinking, that domestic actions will make an international difference, also diverts our attention away from the stick-

ing points that negotiators have been unable to resolve. It's difficult to see how an American climate policy would ease the deep divisions over the level of emissions cuts that are necessary, not to mention who should make those cuts and who should pay for them.

It's also tough to imagine that this Congress, while we grapple with record deficits and high unemployment, would pass a bill that freely transfers the amount of money and technology that other nations appear to be seeking.

Now, I want to be clear. None of these observations are meant to suggest that we should halt the development of domestic climate policies or retreat from the international process. But instead of trying to pass any bill that somehow would convince the world that we're serious about climate change, I think that we need to go back to the drawing board, work on a policy that the rest of the world may actually want to follow.

It's fair to say that we haven't developed that policy yet. For better or for worse, I'm not convinced that there are countries that want to copy either the House or the Senate bills. From a broader perspective, until we show the world that it's possible to reduce emissions and maintain economic growth, I believe it's going to remain difficult to secure the international commitments that will matter the most.

By examining the nations around the world and what they are doing, what they might need help with, the status of international negotiations, I do hope that this hearing will assist in our efforts to develop an effective climate policy that positions the United States as the leader that others will want to follow.

With that, Mr. Chairman, I again thank you for this series of hearings and look forward to the comments from the witnesses.

The CHAIRMAN. Very good.

Let me introduce our witnesses. Dr. Michael Levi is the Senior Fellow for Energy and the Environment with the Council on Foreign Relations. Thank you for being here.

Mr. Nigel Purvis is President of Climate Advisers. Thank you for testifying today.

Ms. Taiya Smith—Is "TIE-yah" correct?

Ms. SMITH. That's right, "TIE-yah."

The CHAIRMAN. She is Senior Associate with the Carnegie Endowment for International Peace.

Ms. Karen Harbert is here from the—she's President and CEO of the Institute for 21st Century Energy with the U.S. Chamber of Commerce.

Mr. Jake Colvin is Vice President of Global Trade Issues with the National Foreign Trade Council.

Thank you all very much for being here, if each of you could take about 6 minutes and give us the main points that you think we need to understand. We are advised by the Majority Leader that there's going to be three votes beginning about 11:15. So we want to hear from all of you and then hopefully get some good questions asked, and we'll see if we need to reconvene after those votes.

But Dr. Levi, why don't you go right ahead.

**STATEMENT OF MICHAEL A. LEVI, PH.D., DAVID M. RUBENSTEIN SENIOR FELLOW FOR ENERGY AND THE ENVIRONMENT, COUNCIL ON FOREIGN RELATIONS**

Mr. LEVI. Good morning, Chairman Bingaman, Senator Murkowski, members of the committee. Thank you for inviting me to speak with you about the state of global efforts to combat climate change, about prospects for the ongoing U.N. negotiations, and about climate policy in Europe and India.

What will matter most to meeting the climate challenge is the introduction of effective domestic policies in the biggest economies. International agreements and initiatives are essential, but they are not a substitute. International efforts should be judged on whether they help facilitate smart domestic actions around the world.

The U.S. should focus its UN-based efforts on things that that forum can do well, rather than on solving the entire climate problem alone. Our efforts should in particular promote transparency and accountability in each country's emissions-cutting efforts through regular measurement, reporting, and verification, and by creating a mandatory review process for states to scrutinize each other's efforts.

Agreement in the U.S.-China joint statement released a few hours ago in Beijing on the need for full transparency is an important step in that direction.

Legally binding commitments to robust targets or emissions-cutting policies would be a valuable additional outcome and we should try hard to obtain them. But those commitments may not be forthcoming in the near future and they do not guarantee that countries will actually deliver on their promises.

It is also essential to remember that the U.S. negotiations exist within a broader universe of climate initiatives, many of which may be much better at advancing international cooperation. That wider context includes bilateral efforts with key countries like China and India, gatherings of small but pivotal groups like the G-20 and the Major Economies Forum, and institutions like the World Bank that work on the ground to actually implement big energy projects.

I said at the outset that what matters most is what individual countries actually do. With that in mind, let me turn to Europe. The EU has adopted an aggressive stance toward climate policy. They've agreed on a set of ambitious domestic efforts through 2020 aiming to cut emissions to 20 percent below 1990 levels by then and to boost renewables to 20 percent of primary energy. Their cuts will be achieved through a mix of cap and trade for big sources, like power plants and factories, efficiency standards and gasoline taxes for transportation, purchases of international offsets, and a host of other smaller domestic initiatives. What's most important to note is that Europe will use a wide range of tools in order to achieve its goals, rather than relying on a single instrument.

Europe and the United States do differ considerably in their international approaches. The Europeans have demanded binding targets from the developed world, but only voluntary actions from developing countries. Some European leaders have recently begun to move considerably closer to the U.S. position, which correctly in-

sists on real commitments from all countries. But there's still real possibility that Europe would accept a lopsided deal.

Europe has also been more aggressive in offering money to developing countries. It's not clear whether they can deliver on those proposals, but it's fairly clear that the United States will not match their numbers. We need to be careful that we are not blamed for the failure of international negotiations when we don't meet that bar.

Let me underline this introduction to Europe by saying that U.S. climate diplomacy is far more effective when we can align it with our partners across the Atlantic. It's very important that U.S. Senators make clear their bottom lines to their European counterparts.

The last thing I'd like to do is give you a brief tour of where India stands. Indian domestic climate strategy is extremely uneven. It includes so-called "missions" on solar energy, energy efficient, urban economy use, and forest cover, but most of the details are still being fleshed out. We're going to need to watch over the coming months and, frankly, over the coming years to see where they're actually heading. They are going to engage in a much more bottom-up process, along the lines of what we do here, than in a top-down process that takes us from high-level goals to specific policies like we're used to seeing from Europe.

India has at least a couple problems delivering on its goals. The first is money. Renewables and nuclear cost more than the alternatives. They also cost more up front. Efficiency can save India money over time, but it also requires more initial investment.

The second problem is regulatory capacity. The Indian system is still riddled with holes. For example, India just announced its intent to create an EPA a few months ago. This is a critical problem in many developing countries and inhibits their ability to enter international agreements with confidence.

India has taken a hard line in the international negotiations, in part for that reason and in part for ideological reasons. But it is important to also know that Indian climate policy is in flux. The Indian environment minister recently suggested a much more flexible approach than India's negotiators have been taking. He's faced a lot of political push-back, but my sense in talking to people in India is that a significant slice of the political establishment is with him. It's a minority, but it's serious.

We need to empower those who will take a more constructive role in working with us. It's important to keep that in mind in particular when we talk about carbon tariffs in the U.S. system. Indians are very upset about that threat. The tariffs reflect legitimate concerns by U.S. lawmakers, but they're more likely to alienate our potential allies in India than they are to provoke positive action. I'd encourage the Senate to focus on other tools for addressing competitiveness.

Let me make one final note on the Indian foreign policy. India has taken a much more positive role outside the formal U.N. negotiations. This stresses the importance of engagement outside the U.N. process. Even a small amount of flexible funding for DOE and EPA to help them take advantage of emerging opportunities for concrete cooperation would be invaluable.

I thank you for your time and attention and I look forward to any questions that you have.

[The prepared statement of Mr. Levi follows:]

PREPARED STATEMENT OF MICHAEL A. LEVI, PH.D., DAVID M. RUBENSTEIN SENIOR FELLOW FOR ENERGY AND THE ENVIRONMENT, COUNCIL ON FOREIGN RELATIONS

Chairman Bingaman, Senator Murkowski, members of the committee, thank you for inviting me to speak with you about the state of global efforts to combat climate change, about prospects for the ongoing United Nations climate negotiations, and about climate policy in Europe and India.

There is an emerging international political consensus that global emissions should be cut at least in half by midcentury. The International Energy Agency estimates that the United States, Europe, China, and India will each need to cut their energy-related emissions by 12-15% below business as usual by 2020 and by 34-42% below business as usual by 2030 to get the world on this path. What will matter most to meeting this extraordinary challenge is the introduction of strong and effective domestic policies in the biggest economies. International agreements and initiatives, while essential, are no substitute. International efforts should be judged by whether they make it easier for countries to implement smart domestic policies and to ensure that those succeed.

#### THE GLOBAL CLIMATE LANDSCAPE

The international climate regime is often conflated with the UN climate negotiations or the Kyoto protocol. This is wrong and distorting. The UN talks are an important part of global climate efforts. But a meaningful appraisal of the global scene must go well beyond that. Three other elements are particularly important: bilateral engagement with countries like China; highlevel coordination through groups like the G-20 and Major Economies Forum (MEF); and institutions like the World Bank that can help countries develop in climate-friendly ways.

Bilateral engagement provides opportunities to address the unique incentives, opportunities, and challenges that each country faces in confronting climate change. These cannot be adequately exploited in large global settings like the UN negotiations, which seek common approaches that work for all. I will discuss U.S. opportunities for engaging India later; another panelist will address China. Others—notably Europe and Japan—also have their own programs of bilateral climate engagement, which are often deeper and more developed than U.S. efforts. The United States should coordinate with and learn from those other initiatives.

The G-20 and MEF are playing increasingly important roles in high-level efforts to improve climate policy. Each involves fewer than twenty countries that together are responsible for about 80% of global emissions. They are essential to watch. The G-20 has recently become the premier political forum for coordinating global economic policy. It is wading slowly but determinedly into energy issues. Its first victory was a decision in September to phase out inefficient fossil fuel subsidies. The decision does not create legally binding commitments, but it has generated muchneeded domestic efforts in major countries to reexamine subsidy policies. This sort of interplay between global discussion and domestic action is the future of climate cooperation.

The MEF, meanwhile, has helped advance global climate discussions by allowing a small but critical group of countries to focus on climate policy on a regular basis in a relatively informal setting. It should continue indefinitely. One particularly promising area of MEF discussion has centered around energy technology innovation. The world must drive down the cost of existing low-carbon technologies while developing their next-generation replacements. Governments will need to promote private investment in order to do this. Coordinating those actions internationally will help save money and minimize the odds that gaps are left unaddressed. The new MEF-based Global Partnership for low-carbon technology aims to do this. It is still in its infancy, and much remains to be fleshed out, but with the right resources, it could play an important future role.

Institutions that can help developing countries implement low-carbon technologies will also play a critical role. Chief among these are the World Bank and the regional development banks. Transforming energy systems will require efficient use of public funds to unlock private investment on a massive scale. While many developing countries are wary of institutions like the World Bank, the reality is stark: no existing institutions other than the multilateral development banks are capable of handling the sums of money and the complex energy projects that will be needed. In particular, the Bank's climate funds, including the U.S.-sponsored Clean Technology

Fund, are providing important experience, and a model for moving forward, in international public finance. Congress is poised to approve Clean Technology Fund funding for FY10. This will be important—both as practical progress and as a political signal—heading to Copenhagen.

#### THE UN NEGOTIATIONS

The UN negotiations are making considerably less progress than many had hoped for not long ago, and the bulk of the blame for the current state has been directed at the United States. Many analysts and negotiators argue that the world could seal a deal at Copenhagen if only the United States passed climate legislation before then. I disagree. Let me be clear: robust U.S. climate legislation is essential to effective international action on climate change. But it is not enough alone. The world must still bridge difficult disagreements on what developing countries will do under a global agreement and what financial assistance developed countries will provide them. U.S. action on domestic legislation would help remove the United States as an excuse for inaction and as a distraction from these critical issues. But it will not be determinative alone.

The UN process occupies a special place in the foreign policy of many U.S. allies, friends, and partners. For that reason alone, the United States should take it seriously. But the UN process is severely limited. It involves a large and unwieldy number of participants. This makes proceedings inefficient and tailored deals for the most important countries difficult to include.

The United States should focus its UN-based efforts on things that the UN process can do well rather than on solving the entire climate problem alone. This points to three areas for near-term focus where real and important progress is possible. First, negotiators should agree on a longterm global goal for cutting emissions. This will provide an agreed benchmark against which to measure efforts in all forums. Second, negotiators should promote transparency in national emissions-cutting efforts. They should create a scheme for measurement, reporting, and verification of whether states are implementing promised domestic emissions-cutting efforts and delivering pledged emissions-cutting assistance, and create a regular review process through which states would scrutinize each others' climate policies. This would help replace the current climate of distrust with a virtuous cycle of stronger policies. Third, the UN process should help mobilize funds to help the most vulnerable countries adapt to the unavoidable consequences of climate change. The UN is a useful forum for addressing this issue given the large number of countries affected. There may also be opportunities for targeted mini-deals, including on avoided deforestation and on reform of international offsets, with the latter being more difficult.

Legally binding commitments to robust targets or emissions-cutting policies would be a valuable additional outcome. The United States should be engaged in a long-term effort to obtain them and should not make its own binding UN commitments unless other major emitters do. But such commitments may not be forthcoming in the near future. Nor should we confuse the legal character of states' commitments with their seriousness. Canada took a binding commitment at Kyoto but will fail to meet it because it did not put the necessary policies in place to achieve it. Russia will meet its legally binding Kyoto target with zero effort because that target was set too high. It is much more important to elicit ambitious, credible, and transparent domestic policies than it is to obtain legally binding promises that may amount to little in practice.

#### EUROPE

The states of the European Union (EU) have adopted an aggressive stance, both domestically and in international negotiations, toward climate change policy. The United States need not worry much about European greenhouse gas emissions. The United States needs, however, to be careful to coordinate its foreign policy approach with Europe if it wants to succeed.

Europe has agreed on an ambitious set of domestic efforts through 2020. Its core "20-20-20 by 2020" plan aims to cut European emissions to 20% below 1990 levels by 2020 while boosting renewables to 20% of primary energy and increasing efficiency by 20% too.<sup>1</sup> Emissions cuts are to be achieved by the EU Emissions Trading System (ETS), which covers large stationary emissions sources (about half of EU emissions) through a cap-and-trade system; by emissions standards for transportation (about one-fifth of EU emissions); through purchases of international offsets; and through complementary measures pursued by member states in areas like efficiency and renewables. Efforts to reach the renewables and efficiency targets are es-

<sup>1</sup>The EU emissions target will be increased to 30% if there is a strong global climate deal.

essentially a matter for individual countries. All this is done against the challenging backdrop of east-west divisions over costs and other internal tensions stemming from varying dependence on Russian natural gas. Experts agree that Europe will be able to deliver on its goal of cutting economy-wide emissions for 2020—though they believe that it will need to use international offsets to deliver part of that. There is less agreement on whether Europe will be able to deliver on its renewables goals.

Many have claimed that there is an “ambition gap” between what the United States is considering and what the EU plans to do. This is incorrect by almost any meaningful measure. Indeed the European target amounts to cutting EU emissions to 17% below 2005 levels—slightly less than the 20% cut below 1990 levels envisioned in the Kerry-Boxer legislation. That said, if the United States continues on its current course, it will fall well short of Europe.

Europe and the United States differ more in their international approaches. The European Commission has demanded that any new climate deal include binding emissions targets for all developed countries but has only called for voluntary actions from the developing world. This is clearly unworkable for the United States. But there are signs of evolution from key European countries. German Chancellor Angela Merkel recently appeared to assert that China and India would need to take on commitments as part of a deal.<sup>2</sup> Other reports suggest that the UK is also taking a firmer stand. Still, there is a real possibility that Europe would accept a deal that required binding commitments of developed countries and only voluntary actions from others.

Europe has also been more aggressive than the United States in offering money to developing countries. The EU has indicated that \$33-\$74 billion of public funds will be needed each year by 2020. It has not declared the share that it would be willing to contribute, and there is debate over who in Europe would pay, making it unclear whether the EU can deliver. The United States is highly unlikely to support a similar sum, but it may be blamed for the failure of international negotiations if it does not meet the European bar.

Ultimately, the United States is far more effective in its climate diplomacy when it stands shoulder-to-shoulder with Europe. It is extremely important that U.S. Senators make their bottom-lines clear directly to their European counterparts and work with them to close any gaps.

#### INDIA

India has been wrongly lumped together with China in climate discussions. Total Indian emissions were, as of 2005, about one quarter of total Chinese emissions. Indian GDP is about 30% of Chinese GDP, and its foreign exchange reserves are barely 10% of those held by China. About 40% of Indians have no access to electricity; almost all Chinese have at least some. And while both countries are vulnerably to climate change, the danger to India is particularly acute.

Indian domestic energy and climate policy contains some important elements but currently lacks strategic breadth and coherence. It is driven primarily by a desire to improve air quality, energy security, access to energy, and economic efficiency. This is to be commended: such aims are a more sustainable foundation for Indian energy policy than climate change. The 2008 National Action Plan on Climate Change was the first Indian attempt at developing a comprehensive climate strategy, and included “missions” on solar energy, energy efficiency, urban energy use (including vehicle fuel economy), and forest cover. Details mostly remain to be fleshed out. We will learn much more about Indian policy over the coming months and years.

Some highlights of existing policy are still worth noting. India aims to have more than 20 GW of nuclear capacity (equivalent to twenty large plants) installed by 2020, enabled in part by the recent U.S.-India nuclear deal, though the IEA estimates that it is on course to have only 11 GW by then. It appears prepared to set a goal of installing 20 GW of solar power by 2022—more than double the amount of solar currently installed worldwide. India has a robust wind industry, led by Suzlon, the fifth-largest turbine producer in the world. It is also attempting to move toward cleaner coal-fired power, though its plants are still far less efficient than those in China.

End-use efficiency, however, will be the greatest near-and mid-term opportunity in India. This may strain Indian finances, since efficiency requires larger investments up front even it pays off in lower energy bills over time. Others, including

<sup>2</sup>Developing countries would be asked to commit to policies, not to targets. This tracks the U.S. position.

the United States, will need to step in to help where appropriate. The need to target efficiency will also stress Indian regulatory capacity. India often lacks the capacity to effectively regulate emissions even when it wants to. Indeed it was only three months ago that India announced plans to create an Environmental Protection Agency. This lack of implementation capacity is a critical problem in many developing countries—but one that is often overlooked by analysts. A global agreement to curb emissions will be of little value if the countries involved lack the capacity to deliver on their promises. This points again to the importance of technical cooperation in building capacity and of transparency and review to ensure that promises are being carried out and that policies are effective.

India has, historically, taken a hard line in international climate negotiations. It has refused to accept commitments, either to emissions targets or to emissions-cutting policies and measures. It has joined other developing countries in demanding transfers of several hundred billion dollars each year to pay for mitigation and adaptation while asking for developed countries to weaken intellectual property protections on low-carbon technology too. It would be surprising if India adopted a substantially different position at the upcoming negotiations in Copenhagen.

Yet, under the surface, Indian foreign policy on climate is in flux. The environment minister, who is close to Prime Minister Singh, recently suggested a much more flexible approach to international engagement, arguing that India should take strong unilateral emissions-cutting actions and submit those to international scrutiny. He has run into strong political opposition and has had to retract some of the positions. Yet my own discussions suggest that this more forward-leaning position has support among a significant faction, if still a minority, of Indian elites. They believe that Indian foreign policy will gain if the country takes a positive approach to climate. U.S. foreign policy should aim to empower those who are ready to adopt this constructive stance.

Indian policymakers across the political spectrum have reacted with alarm to U.S. threats of carbon tariffs. Those tariffs reflect legitimate concerns by U.S. lawmakers about the impacts of climate legislation on U.S. competitiveness. Yet those Indian lawmakers who are most interested in climate cooperation often happen to be those who care most about free trade too; they are internationalists. Tariffs are more likely to alienate potential U.S. allies in India than they are to provoke positive action on climate. The Senate should focus strongly on other tools for addressing competitiveness, including rebates to energy-intensive trade-exposed industries.

India has also taken a more positive role outside formal UN negotiations. This stresses the importance of non-UN engagement. Reports suggest that U.S.-India discussions on technology cooperation in advance of Prime Minister Singh's planned November 24 visit to Washington have been very productive. Secretary of Energy Steven Chu visited New Delhi last week.

In sum, the United States should be focused primarily on what India does at home—and on working with India, bilaterally and through international forums and institutions outside the UN process, to make strong domestic action more likely. Congress should ensure that appropriate financial support is available to empower joint efforts. Cooperation in the UN negotiations is a longer-term prospect. The United States should aim for it while keeping its expectations modest.

The CHAIRMAN. Thank you very much.  
Mr. Purvis, go right ahead.

**STATEMENT OF NIGEL PURVIS, PRESIDENT,  
CLIMATE ADVISERS**

Mr. PURVIS. Mr. Chairman, Senator Murkowski, other distinguished members of the committee:

Thank you for the opportunity to testify.

Mr. Chairman, in requesting my participation at this hearing you asked me to address two specific issues. The first is the state of play of global climate negotiations. The second is the status of international efforts to reduce tropical deforestation.

Let me begin with global climate talks. With the Copenhagen conference just a few weeks away, it is now possible to see the contours of a possible political agreement. Copenhagen promises to be a major step forward from Kyoto if nations can reach agreement. Kyoto was premised on a single and somewhat scientifically arbi-

trary 5-year goal. Copenhagen is likely to be grounded in a shared science-based vision of what needs to happen by 2050 in order to protect the climate for future generations.

Whereas Kyoto created mitigation obligations for developed nations only, the Copenhagen outcome is likely to mandate nationally appropriate mitigation actions by all major emitters. Kyoto sought to dictate domestic policy through top-down, globally negotiated emissions targets. Copenhagen is likely to pursue a bottom-up approach that is anchored in the diverse domestic laws and programs of each nation.

Kyoto demanded international commitments only from nations, whereas Copenhagen will ask nations to show that their international commitments are supported by domestically enforceable laws and programs.

Kyoto provided little opportunity to verify in real time whether nation were honoring their commitments, whereas Copenhagen is expected to enable a stronger system for measuring, reporting, and verifying progress, with the details of that system to come in the months ahead.

This progress in Copenhagen is striking and encouraging if an agreement can be reached. In these negotiations, the American people have been well served by the U.S. negotiating team. Importantly, reaching agreement in Copenhagen may not be possible without some progress on the 2020 mitigation goals by major economies and on some level of financial assistance the developed nations could provide to developing nations in the near term. Most developed nations are ready to commit. Most developing nations appear on the verge of pledging new mitigation actions. In fact, in the last few days we have the announcement this morning from China, we have an ambitious announcement from Brazil, as well as a new mitigation target from South Korea. So there is evidence that the major emerging developing countries are in fact gearing up to promise new mitigation actions in Copenhagen.

The Obama Administration therefore faces a significant challenge. It needs to be forthcoming enough to keep international negotiations moving forward, while at the same time not getting too far ahead of the Senate and the Congress as a whole, which needs more time to consider energy and climate legislation.

Success in Copenhagen is far from guaranteed. Climate negotiations aren't always predictable. A failure in Copenhagen, if it occurs, should not be read by the Congress as an absence of political will in other nations, but rather as a sign that major emerging economies need greater certainty and clarity about the shape of U.S. commitments and action in the years ahead.

If Copenhagen does succeed, as I suspect it shall, further success may not be possible in 2010, however, without that increased clarity about the new direction of U.S. policy. Either way, therefore, in my view it is time for the Senate to craft a durable, bipartisan approach, one that protects our economy, national security, and environment.

As you requested, Mr. Chairman, I will conclude with some observations about the important question of what can be done to reduce emissions from tropical deforestation. This is perhaps the area where the prospects for progress in Copenhagen are strongest.

Over the last year I have had the privilege of serving as the executive director of the Independent Commission on Climate and Tropical Forests. That commission is chaired by former Senator Lincoln Chafee and Center for Environmental Progress CEO John Podesta, and includes former Senator Chuck Hagel and other prominent leaders.

Last month the commission released a detailed report\* with concrete recommendations for U.S. policymakers, which I have here, and with your permission, Mr. Chairman, if I could ask that that be submitted for the record.

The CHAIRMAN. It will be included.

Mr. PURVIS. Thank you.

The commission found that including strong tropical forest protections in domestic climate legislation is in the vital economic, national security, and environmental interests of the United States. The commission recommended that, in partnership with developing countries, the United States should lead a global effort to halve emissions from deforestation by 2020 and achieve zero net emissions from forests by 2030.

Solving the climate problem will not be possible without urgent efforts to stem tropical deforestation, which accounts for 17 percent of global greenhouse gas emissions, more than the entire global transport sector. By moving aggressively to reduce emissions, the world can buy time and achieve a more smooth transition to a clean energy economy of tomorrow. No new technologies are needed to stop cutting trees.

Including tropical forests in U.S. climate legislation, moreover, would dramatically lower the cost of U.S. action. According to analysis done by EPA, the price of emissions permits under a cap-and-trade program in the climate bill approved by the House of Representatives would be 89 percent higher if U.S. companies were not allowed to meet part of their domestic regulatory burden by financing international emissions reductions. EPA's analysis shows that the majority of these international offsets, as they are known, would come from tropical forests. McKinsey and Company suggest that the percentage could be over 80 percent of the expected international offsets between now and 2020 could come from tropical forests.

So the total savings to the U.S. economy net of investments needed to achieve—to slow deforestation, would be about \$50 billion, the commission found, by 2020—a \$50 billion savings by including forests in U.S. domestic climate legislation if the House bill were enacted into law.

Thank you, Mr. Chairman. Thank you for the opportunity to testify. I'd be happy to answer your questions.

[The prepared statement of Mr. Purvis follows:]

PREPARED STATEMENT OF PREPARED STATEMENT OF NIGEL PURVIS, PRESIDENT,  
CLIMATE ADVISERS

1Mr. Chairman, Senator Murkowski, and other distinguished members of the Committee, thank you for the opportunity to testify on international climate change policy. My name is Nigel Purvis, and I am president of Climate Advisers, a consulting firm that specializes in U.S. and international climate policy. From 1998 to

\*Document has been retained in committee files.

2002, I was a U.S. climate change negotiator, serving most recently as deputy assistant secretary of state for oceans, environment and science. Currently, I am also a scholar at Resources for the Future, the German Marshall Fund of the United States, and The Brookings Institution. These organizations neither lobby nor take positions on specific proposals. The views I present today are my own.

Mr. Chairman, in requesting my participation at this hearing, you asked me to address two specific issues and their implications for U.S. climate policy. The first is the state of play of global climate negotiations. The second is the status of international efforts to reduce emissions from tropical deforestation.

#### COPENHAGEN

Let me begin with global climate talks. Two years ago, the international community set the goal of concluding next month in Copenhagen, Denmark, new global arrangements that would define the terms for international climate cooperation after 2012, when the Kyoto Protocol expires. Negotiations have proceeded under the United Nations Framework Convention on Climate Change, the leading global climate agreement to which almost all nations, including the United States, are parties.

#### *Status of Global Climate Negotiations*

With the Copenhagen conference just weeks away, most governments and experts now believe that it will prove impossible to finalize a new legal instrument this year. There are several reasons why.

First, nations remain divided on important and contentious issues, including:

- The legal form of a new agreement—whether it should be legally binding and, if so, on what categories of countries.
- The emissions mitigation responsibilities of developed and developing nations.
- The financial responsibilities of developed nations to assist developing nations adapt to climate change and pursue low-carbon economic growth.
- The mechanisms and institutional arrangements needed to verify emissions reductions and manage any new financial resources intended to assist developing nations.

Resolving these issues would be difficult and time consuming under the best of circumstances. Climate agreements are every bit as complex as trade agreements and, like trade negotiations, climate negotiations sometimes defy political deadlines. The Kyoto negotiations took a decade from start to finish. The Copenhagen process will not require that long, but it will take some months or possibly years more.

Second, the negotiations have been affected by significant uncertainty surrounding the shape of future U.S. climate and energy policies. The world learned from the Kyoto negotiations that the United States cannot deliver on new climate commitments unless the president and Congress see eye-to-eye. In 2008, the international community waited for a new American president. In 2009, nations have been waiting for the Obama administration and Congress to find common ground on climate and energy legislation. The United States is the world's largest economy and, historically speaking, the world's largest greenhouse gas emitter. In 1992 our nation pledged to return emissions to 1990 levels by 2000, and yet our emissions are far above that level today. Because we have the most innovative economy in the world, other nations reason that if we cannot reduce our emissions, perhaps few can. Understandably, other nations are reluctant to commit to ambitious climate policies until they see the United States reduce its emissions.

#### *Copenhagen Political Agreement*

Despite these significant challenges, there are many hopeful signs internationally. Several key nations—both developed and developing—are taking robust climate action at home. Increasingly, the world's major economies believe that sound climate policies advance other important national interests, including energy security, economic growth, and public health. Internationally, countries are finding common ground on principles that could guide global cooperation. The Copenhagen conference presents an opportunity for nations to agree upon the architecture underpinning a new climate agreement even if reaching a full agreement is not yet possible.

Progress made in Copenhagen on the structure for the next phase of global climate cooperation would initially be captured by nations in the form of a written political agreement rather than a legal instrument. Although political agreements do not create legally binding obligations under international law, by definition, a high-profile outcome from Copenhagen would be politically binding in the sense that nations would commit publicly to specific outcomes. A solid political agreement would send a clear signal about where the international community is heading while also

providing concrete guidance to negotiators as they continue the work of crafting a complete international agreement.

*Architecture for a Copenhagen Agreement*

What could be included in such a political agreement coming out of Copenhagen? Here are a few specific examples where progress may be possible next month.

**Shared Long-Term Goals.**—Nations could agree in Copenhagen to limit global warming to 2 degrees Celsius (3.6 degrees Fahrenheit) above pre-industrial levels and to reduce global emissions 50 percent by 2050. Developed countries could commit to reducing their emissions 80 percent, with developing nations committing that their emissions should decline significantly compared to business as usual by 2020 and peak by a certain date. Some of these goals were embraced earlier this year by key regional and economic groups, such as the G8, Major Economies Forum, and Asia Pacific Economic Cooperation (APEC), but Copenhagen presents an opportunity to elevate these long-term goals to the global level.

**Low-Carbon Growth Plans.**—Consensus has been building for each country to create a low-carbon growth plan that describes in detail its long-term strategies for climate-friendly economic growth. The experience of countries that have created such plans shows that, done well, the process strengthens domestic political consensus for action and increases international transparency.

**International Registration of Domestic Actions.**—There is also growing agreement that global action on climate needs to be built on a foundation of domestic action, backed by domestic law, and that these domestic actions should be registered with the international community. Such registration of domestic programs would provide recognition for what each country is doing, help build trust, facilitate discussions of comparability, and enable a global assessment of the overall environmental adequacy of actions. Whereas low-carbon growth plans would show what nations plan to do, an international registry would record what nations are actually doing. Developed countries would commit to actions that achieved substantial reductions in national emissions from a base year. Developing nations would commit to nationally appropriate mitigation actions that would result in significant deviations from projected emissions trajectories. These actions would be supported by technical and financial assistance from developed nations.

**Measurement, Reporting, and Verification.**—Any agreement will require robust measurement, reporting, and verification to ensure commitments are met. Nations in Copenhagen can lay out the general framework for such a system by establishing the principle that all major emitters need to strengthen their international reporting and also participate in a credible verification system.

*Targets for 2020*

Importantly, reaching agreement in Copenhagen on the architecture of the next global climate agreement may not be possible without some progress on targets and timetables for action. Developing nations are looking for clearer evidence that developed nations really will lead, as they agreed to do when adopting the U.N. Framework Convention on Climate Change. More specifically, developing nations are asking developed nations to commit in Copenhagen to firm emissions reduction targets for the year 2020. They are also asking developed nations to be specific about how much financing they will provide to the developing world to help nations adapt to climate change and pursue low-carbon economic growth.

Most developed nations are ready to commit to 2020 mitigation and financing targets in Copenhagen. The European Union and Japan have already announced their emissions mitigation targets for 2020—30 percent<sup>1</sup> and 25 percent below 1990 levels, respectively. European leaders recently proposed a global funding package of \$150 billion annually by 2020 for climate change mitigation and adaptation in developing nations, with \$33 billion to \$75 billion in public funding per year from developed nations, and a fast-start fund of \$7.5 billion to \$10.5 billion total from 2010 through 2012. The Obama administration, therefore, faces a significant challenge. It needs to be forthcoming enough on U.S. mitigation and financing targets to keep international negotiations moving forward and avoid attempts to blame the United States, while at the same time not getting too far ahead of the Senate, which needs more time to consider climate and energy legislation.

<sup>1</sup>The European Union has pledged to reduce emissions 30 percent below 1990 levels by 2020 if other nations take comparable action, or 20 percent below 1990 levels by 2020 if other nations do not take comparable actions.

*Major Step Forward from Kyoto*

Assuming the administration is able to strike the right balance, a political agreement in Copenhagen along the lines presented previously would be a major step forward from Kyoto.

- Whereas Kyoto created mitigation obligations for developed nations only, the Copenhagen outcome is likely to mandate nationally appropriate mitigation actions by all major emitters.
- Kyoto provided little opportunity to verify in real time whether nations were honoring their commitments, whereas Copenhagen is expected to enable a stronger system for measuring, reporting, and verifying progress.
- Kyoto sought to dictate domestic policy through top-down, globally negotiated emissions targets; Copenhagen will take a bottom-up approach that is anchored in domestic laws and programs.
- Kyoto demanded international commitments only, whereas Copenhagen will ask nations to show that their international commitments are backed by domestically enforceable laws and programs.
- Kyoto was premised on a single and somewhat scientifically arbitrary five-year goal; Copenhagen is likely to be grounded in a shared, science-based vision of what needs to happen by 2050 to protect the climate for future generations.

This potential for progress is striking and encouraging. In these negotiations, the president, Congress, and the American people have been well-served by the U.S. negotiating team.

*All Eyes on the Senate*

Copenhagen provides an opportunity for a historic political agreement that could structure continuing climate negotiations in ways that advance U.S. national interests. Success in Copenhagen, however, is far from guaranteed. Even the less controversial architectural issues I have described remain unresolved and climate negotiations are always unpredictable. If Copenhagen fails to deliver, the international community will blame the United States for not completing its work in time. A failure in Copenhagen should not be read by Congress as an absence of political will in other nations but rather a sign that major emerging economies need greater certainty about U.S. policy before they make new commitments.

If Copenhagen succeeds in creating a new political agreement, as I suspect it will, the conference will prove to be an important but not final step on the road toward a new global structure for climate cooperation. Even with a successful outcome, further progress in 2010 would be unlikely without greater clarity about the shape, timing, and ambition of new U.S. climate and energy legislation. The time has come for the Senate to craft a durable, bipartisan approach—one that protects our economy, national security, and environment. The Senate must show the American people and the world that they are not waiting for Godot.

## TROPICAL FORESTS

As you requested, Mr. Chairman, I will conclude with observations on the important question of what can be done to reduce emissions from tropical deforestation. This is perhaps the area where the prospects for progress in Copenhagen are strongest.

Over the past six months I have had the privilege of serving as executive director of the Commission on Climate and Tropical Forests.\* The Commission is an independent group chaired by Senator Lincoln Chafee (R-RI) and Center for American Progress CEO John Podesta. It includes in its membership Senator Chuck Hagel (R-NE); Mike Morris, CEO of American Electric Power; Sam Allen, CEO of Deere & Co.; and other prominent political, foreign policy, national security, business, labor, and environmental leaders. Last month, the Commission released a consensus report with concrete findings and policy recommendations for the United States, which I shall summarize now. These recommendations were based on extensive research and due diligence by the Commission, including meetings with leaders of tropical forest nations, field visits in Brazil, and discussions with leading climate and tropical forest experts.

---

\*For further information and to download the commission's report, visit [www.climateforestscommission.org](http://www.climateforestscommission.org).

### *U.S. National Interests and Tropical Deforestation*

The Commission found that including strong tropical forest provisions in ambitious domestic climate policies is in the vital environmental, economic, and national security interests of the United States.

Solving the climate crisis will be nearly impossible without urgent efforts to stem tropical deforestation, which accounts for approximately 17 percent of global greenhouse gas emissions—more than all the cars, trucks, planes, trains, ships, and buses in the world. By moving aggressively to reduce deforestation, the world can buy time and more smoothly transition to the clean energy economy of tomorrow.

Including tropical forests in U.S. climate legislation, moreover, would dramatically lower the cost of ambitious U.S. action. According to analysis done by the Environmental Protection Agency (EPA), the price of emissions permits under the cap-and-trade program in the climate bill approved by the House of Representatives would be 89 percent higher if U.S. companies were not allowed to meet part of their domestic emissions-reduction obligation by financing international emissions reductions. EPA's analysis suggests that the majority of these international "offsets", as they are known, would come from tropical forests. The total cost savings for the U.S. economy, net of investments needed to reduce deforestation, would be \$50 billion by 2020 compared to domestic action alone.

Incentives to halt tropical deforestation also provide a dual benefit for U.S. national security—both by reducing the adverse impacts of climate change, which act as a "threat multiplier," and protecting natural resources that are a key source of corruption, political instability, and conflict in strategically important nations around the world.

Well-designed forest conservation policies would also help alleviate poverty, as 90 percent of those living in extreme poverty depend on forests for some part of their livelihood. Forest conservation, furthermore, would protect priceless biodiversity because the majority of known terrestrial species live in forests.

### *Ambitious Action by Developing Nations*

Importantly, developing nations are eager to reduce deforestation. Brazil, for example, has pledged to reduce deforestation in the Amazon region an astonishing 80 percent by 2020, a potential annual reduction greater than the total yearly emissions from Canada. Impressively, Brazil is already making substantial progress toward this goal, with deforestation down 50 percent from its peak in 2004. Indonesia, for its part, has pledged to reduce its national emissions 26 percent below business-as-usual levels by 2020, and 41 percent below if the international community provides financial support. Brazil and Indonesia account for half of global deforestation and are two of the world's five largest emitters.

While tropical forest nations are showing they have the political will to reduce their emissions, many of these countries face significant obstacles. The primary drivers of deforestation are the economic opportunities provided by agriculture, ranching, and timber. Strong and reliable financial incentives are needed to change the economic calculus facing local landowners and forest-dwelling communities. In many nations, technical assistance is needed to strengthen forest sector governance and increase the capacity of nations to verify emissions reductions.

### *Opportunity for U.S. Leadership*

In view of the many vital national interests at stake, as well as the opportunities for immediate progress and constructive partnerships with developing nations, the Commission concluded that the United States should help lead a global effort to halve emissions from deforestation by 2020 and achieve zero net emissions from forests by 2030. These are ambitious but achievable goals with the right policies in place.

The Commission believes that a well-designed cap-and-trade program would provide an effective mechanism for mobilizing financing from U.S. sources, finding that by 2020, U.S. carbon markets could mobilize roughly \$9 billion annually for tropical forest conservation. Furthermore, public sector investments should increase gradually to \$5 billion annually by 2020 to help prepare developing nations to participate in U.S. carbon markets and to reduce deforestation in nations that cannot attract private capital. The climate bills passed by the House of Representatives and the Senate Environment and Public Works Committee would both generate funding for international forest conservation on this scale.

Senators, as you weigh the many important national priorities involved in climate and energy legislation, I urge you to consider maintaining this strong emphasis on reducing tropical deforestation. These provisions are essential to solving the climate crisis, making climate action affordable for the United States, encouraging action by developing nations, and establishing U.S. leadership.

I commend the Committee for organizing this hearing and thank you for the opportunity to present my views. I would be happy to answer your questions.

The CHAIRMAN. Thank you very much.

Ms. Smith, why don't you go right ahead.

**STATEMENT OF TAIYA SMITH, SENIOR ASSOCIATE, ENERGY AND CLIMATE PROGRAM, CARNEGIE ENDOWMENT FOR INTERNATIONAL PEACE**

Ms. SMITH. Thank you. Thank you, Mr. Chairman, Senator Murkowski, and members of the committee.

You've asked me to focus on China and its role in managing climate change. On August 12, Chinese Premier Wen Jiabao announced that the State council had decided to incorporate climate change into its economic and social planning process. That's important and it includes China's climate change goals, which are, notably:

Reducing its energy intensity by 20 percent between 2005 and 2010. China announced in 2008 it had already reduced carbon intensity by 10 percent and analysts predict that if current rates continue it will reach this 2010 goal.

Obtaining 15 percent of the Nation's energy supply from non-fossil fuels by 2020. They're already on great progress to also reach this goal.

Increasing forest coverage by 20 percent from 2005 levels, which has been one of China's most successful goals so far.

China's stated targets and objectives are impressive, but they leave us with questions: How can we validate what they're doing and what's the impact on us?

Our ability to trust China's data is very important. The Chinese climate change negotiators have stated that China will not accept a carbon cap because they see it as limiting their economic growth. If the 2010 target of reducing carbon intensity by 20 percent is met, China's carbon dioxide emissions will be reduced by 1.5 billion tons, which is larger than was pledged by all the other countries who ratified the Kyoto Protocol.

We know that China will only make commitments if it's in its national interest. National stability is paramount in China. After decades of strife, China now enjoys relative peace for the last 30 years, but nearly all the Chinese over the age of 50 still remember what it was like before the current era.

Since 1978, China has achieved nearly double-digit GDP growth and brought more than 3 million rural Chinese out of poverty. Much of its current stability rests on the promise that economic growth will continue and its citizens will achieve prosperity. I like to think of this as the Chinese dream, which is like the American dream, but it's on steroids.

This miraculous growth that has achieved the first round of poverty alleviation has become harder and harder to achieve as China moves up the industrialization scale and deals with its legacy of previous growth. So now in addition there are approximately 25 protests a day in China due to environmental issues, such as contamination, polluted air, and rivers that no longer support fish. The government has seen this. They recognize the risk to their sta-

bility and also that environmental degradation is sapping their GDP.

At the same time, they've been studying climate change. Severe winter storms brought home the reality that dependence on foreign supplies of oil and coal for energy production are not viable for long-term logistics as well as political reasons.

The impact of all of this is that China has come firmly to the conclusion it has to deal with climate change, in addition to energy security and environmental degradation, in order to maintain its economic growth and thereby national stability. At the same time, top Chinese officials have come to the conclusion there are simply not enough resources in the world to support another billion people living the energy-intensive western lifestyle. They're looking for a new, uniquely Chinese model of sustainable economic growth that will allow their population to achieve long-term prosperity.

Then at the same time we have to think about how they achieve this. The Chinese government battles every day to enforce national policy, and incentivize local governments, enterprises and individuals to support its goal of the sustainable model of economic growth. U.S. EPA, U.S. Department of Energy, many State governments, and many American companies and NGO's work closely with the Chinese government to improve China's oversight, policies and processes. We must continue to support this work.

There are still accounts of powerplant scrubbers sitting idle, but there are also some positive stories. China has two projects, the Program on Large Substituting for Small, which shuts down small, inefficient coal-fired powerplants, and the Top 1,000 Energy Consumer Enterprise program, which sets energy targets for China's 1,000 highest energy-consuming enterprises. As part of this, China has now shut down 54 gigawatts worth of small, inefficient coal plants and plans to close a further 31 gigawatts over the next 3 years.

As we think about how we can help work with China on reaching its goals, we want to remember that, as Dr. Levi was saying, we need to encourage China to actually be able to be transparent and improve its verification process. Also we need to remember that China will resist allowing international inspectors into China to verify its emissions. Reciprocity is a very powerful tool in China and if the U.S. and other key powers were to allow inspectors in, China would have a harder time holding out against them.

Short of that, though, we need to remember that China is very sensitive in its international reputation. So establishing an international body that would allow countries to monitor each other through a dispute reconciliation mechanism, such as the WTO, could turn out to be one of the most effective ways to ensure both China develops a strong internal system and that the international community has a way to engage with China on the data that it issues.

I think the last important thing for us to remember is that, while we know China has a strong domestic motivation, this has a big impact for the U.S. and for our companies here. What it means is that the market for clean technology has expanded exponentially. We need to keep pressure on China to keep its markets open. The most powerful tool we have to drive the development and deploy-

ment of technology is the combined U.S.-China market. Bringing a single standard U.S.-China market for these goods and services provides market-based incentives that no government policy or funding source could ever supply. Conversely, if we do not engage with them on developing the standard marketplace, it is our economy and our industry that will likely lose out.

The Chinese are moving forward to develop these goods and services. Only through cooperative development of common standards will we also be able to benefit from their growing market. So I would encourage us to press the Chinese very hard on jointly developing standards with us.

Thank you for this opportunity. I look forward to your questions.  
[The prepared statement of Ms. Smith follows:]

PREPARED STATEMENT OF TAIYA SMITH, SENIOR ASSOCIATE, ENERGY AND CLIMATE PROGRAM, CARNEGIE ENDOWMENT FOR INTERNATIONAL PEACE

Mr. Chairman and Members of the Energy and Natural Resources Committee. Thank you for giving me the opportunity to comment on the global dynamics of climate change. I am going to focus my remarks on China and its role in managing climate change. The Climate and Energy program at Carnegie has focused much of its work on China and especially U.S.-China cooperation. Carnegie also has a significant China program, including an office in Beijing.

On August 12, 2009, Chinese Premier Wen Jiabao announced that the State Council had decided to incorporate climate change into its economic and social planning process. "Controlling greenhouse gas emissions and adapting to climate change," he said, would become "an important basis for setting the medium and long-term development strategies and plans of government at every level." This decision by the State Council was the result of years of internal debate, study, and discussions with international and domestic climate change and economic experts. It was followed shortly after by China's top legislative chamber adopting a resolution calling for active engagement in global climate negotiations, and by new domestic initiatives to "make carbon reduction a new source of economic growth."

In order to achieve these objectives, in September this year at the United Nations General Assembly, President Hu announced to the world China's climate change goals, notably:

- Reducing energy intensity by 20% between 2005 and 2010.<sup>1</sup> China has reduced its energy used per unit of GDP by 1.8% in 2006, 4% in 2007, and 4.6% in 2008. In the first half of 2009, China reduced energy intensity by 3.35%. Analysts predict that if China is able to continue at this pace, it will reach its 2010 goal.
- Obtaining 15% of the nation's energy supply from non-fossil fuels by 2020. China's internal goal is to have 15% of its energy from renewable sources by 2020.<sup>2</sup> Expectations are that it will reach the internal goal. For example, by 2008, China had 12 GW of installed wind capacity and anticipates having 20 GW by the end of 2009. In addition, China has the largest surface area for solar water heating in the world and the most nuclear power capacity under construction.
- Increasing forest coverage by 40 million hectares and forest stock volume by 1.3 billion cubic meters by 2020 from 2005 levels (which is a 20% increase). China's reforestation effort is one of its most successful programs, and the State Forestry Administration believes that they are on target to reach this goal. China's stated targets and objectives are impressive and, according to official data, it appears to be on target to reach them. To an American audience, two questions logically follow. First, how can we validate the carbon emissions data coming from China, and, second, what impact will China's addressing climate change have on us?

<sup>1</sup>"The Energy Development Plan for the 11th Five-Year Period," the National Development and Reform Council (NDRC), Government of the People's Republic of China, April 2007. Available at: <http://www.ccchina.gov.cn/WebSite/CCChina/UpFile/File186.pdf>

<sup>2</sup>"The Medium and Long-Term Development Plan for Renewable Energy," the National Development and Reform Council (NDRC), Government of the Peoples' Republic of China, August 2007. Available at: <http://www.ccchina.gov.cn/WebSite/CCChina/UpFile/2007/20079583745145.pdf>.

The question of how to evaluate the data provided by the Chinese government especially in light of the Chinese climate change negotiators clearly stating that China will not accept a carbon cap (which they see as limiting their economic growth potential) and instead will focus on carbon intensity targets. Carbon intensity refers to the amount of carbon used to produce a unit of gross domestic product. The key difference between a carbon cap and carbon intensity targets is that under the latter, carbon emissions would likely continue to grow as the economy continues to expand. However, given accurate predictions of economic growth, an intensity target can be translated into an escalating carbon cap which meets both the Chinese need to continue growing and the U.S. requirement that China not be allowed unlimited green house gas emissions.

On its face, China has made remarkable progress towards its energy intensity goals. Under the current Five-Year Plan, China pledged to reduce its energy intensity by 20% between 2006 and 2010. According to Chinese authorities, by 2008, China had reduced its carbon intensity by 10%. If the Five-Year Plan is fully implemented, addressing carbon intensity alone will reduce China's carbon dioxide emissions by 1.5 billion tons, which is larger than that pledged in total by all of the other countries who ratified the Kyoto Protocol.

To understand how serious China is about its climate change, we first need to understand its internal motivations. National stability is paramount in China. After decades of strife, China has now enjoyed relative peace for the last 30 years. But nearly all Chinese over the age of 50 still remember what it was like before the current era. Since 1978, China has achieved near double digit GDP growth for over two decades and brought more than 300 million rural Chinese out of poverty. Much of the current stability rests on the promise that economic growth will continue and all citizens will achieve prosperity. Yet, as Beijing is aware, the prospects of this are tenuous. First, the miraculous growth that achieved the first round of growth has become harder and harder to achieve as China both moves up the industrialization scale and deals with the legacy of previous growth. Among the challenges it must face are a myriad of environmental degradation and public health hazards. In addition to the daily realities and domestic unrest brought by contamination, polluted air, and rivers that can no longer support fish (there are approximately 25 protests a day in China due to environmental issues), the government recognizes that environmental degradation is sapping GDP growth.

At the same time, Beijing has been studying climate change and the potential effects it could have on China. The results of this study are worrying. China is in the part of the world that will be hardest hit by climate change, and will be managing rising sea levels, increasingly intense storms and desertification simultaneously. Severe winter storms two winters ago brought home the reality that dependence on foreign supplies of oil and coal for energy production is not viable long term for logistical as well as political reasons. China had long ago come to the conclusion that reliance on foreign oil creates difficulties politically and has focused efforts on trying to lock in oil and gas supplies (often from controversial countries like Sudan, Iraq, and Iran) to ensure supply.

The impact of all these factors is that China has come firmly to the conclusion that it has to deal with climate change, in addition to energy security and environmental degradation, in order to maintain economic growth and thereby national stability. After years of research, top Chinese officials have come to the conclusion that there simply are not enough resources in the world to support another billion people living the energy-intensive lifestyle of the West. As a result, they are looking for a new, uniquely Chinese model of sustainable economic growth that will allow their population to achieve long term prosperity. With the State Council supporting the President and Premier, we are seeing the Chinese government taking an increasingly large role in international climate change activities. In the last six weeks, China has signed a climate change agreement with India, offered assistance with adaptation to Africa, and further strengthened its agreements with Japan on climate change and technology transfer.

While the power of the central government in Beijing is essential to catalyze change in China, it is not necessarily enough to ensure that change does occur throughout the country. A popular saying in China explains that "the mountains are high and Beijing is far away" and therefore it is hard for the central government to ensure that policies and actions are taken in the manner prescribed. The Chinese government battles daily to enforce national policy and incentivize local governments, enterprises and individuals to support its goal of a sustainable model of economic growth. Along with the U.S. EPA, the U.S. Department of Energy, and U.S. state government officials, many American companies and NGOs are working close-

ly with the Chinese government to improve China's oversight policies and processes. While there are still stories of power plant scrubbers sitting idle, there are an increasing number of positive stories.

China has launched a series of programs to reach the goal of reducing energy intensity by 20%. Two of the most noteworthy programs are the "Program of Large Substituting for Small," which shuts down small, inefficient coal fired powers plants, and the "Top 1000 Energy-Consuming Enterprises" program, which set energy-saving targets for China's 1000 highest energy-consuming enterprises (themselves responsible for a staggering one-third of China's energy consumption). Since 2006, China has shut down 54 GW worth of small, inefficient coal plants and plans to close a further 31 GW in the next three years. As a result, many of the world's cleanest and most efficient coal-fired power plants are now located in China: the Chinese coal-fired power plant fleet is now more efficient on average than the U.S. fleet.<sup>3</sup> The Top 1000 program began in 2006. That year, the program alone accounted for two-thirds of China's efficiency improvements and by 2007, when the country was making improvements, the Top 1000 still represented half of all the efficiency improvements in the country. If the trend continues, by 2010 it could prevent 450 million tons of carbon dioxide from being released into the atmosphere from a business as usual scenario.<sup>4</sup>

While we have ways to monitor and evaluate actions on a project basis, we still have to rely on the central government for national statistics. For example, the metric by which the energy intensity target is measured is energy intensity of GDP. President Hu announced in September that China would decrease its energy intensity per dollar of GDP by a "notable margin". Looking past the withholding of an exact number (certainly done for negotiating purposes as this and monitoring and evaluation mechanisms are the two most significant issues China has to trade with developing countries in the COP negotiations), China has an established process for evaluating each province's energy intensity. Two ministries, the National Development and Reform Commission (NDRC) and the National Bureau of Statistics (NBS) jointly set standards and implement a comprehensive system reviewing progress made on the goals defined through the Five-Year Plan. While some have questioned the exact figures produced (some of which is explained by differing assessments of China's economic growth each year), the process is rigorous and has produced interesting results. We must continue to support the work being done through U.S. agencies to help China develop its internal monitoring and verification regime.

The alternatives to depending on China's internal processes are limited. Many in China will resist allowing international inspectors into China to verify its emissions, in much the same way as many in the United States will resist allowing foreign inspectors to check heavy industry and power plants. Reciprocity, however, is a powerful tool. If the U.S. and the other key powers were to allow international inspectors, China would have a harder time holding out against them. Additionally, China is very sensitive to its international reputation. Establishing an international body that would allow countries to monitor each other through a dispute reconciliation mechanism, such as the way the WTO operates, could turn out to be one of the most effective ways to ensure both that China develops a strong internal system and that the international community has the ability to engage with China on the data that it issues. For such a system to work, China would have to be willing to report all its data to the management organization, not just those figures associated with internationally funded projects.

#### IMPACT ON THE UNITED STATES

Knowing that China has the strong domestic motivation to address climate change and has now taken the political decision to make climate change part of its planning process, we can plan on there being a market in China for new and existing products and services oriented to cleaning up China's energy sector and addressing climate change, as well as other environmental impacts such as dirty water. The biggest impact for the U.S., outside of the climate change negotiations and global carbon emissions, is that the market for clean technology has expanded exponentially. The decisiveness of Chinese decision makers has made its market attractive to businesses searching for certainty. For example:

- China's total installed wind capacity doubled for the 4th year in a row in 2008. At 12.2 GW capacity, China has the fourth largest installed capacity in the

<sup>3</sup>"Cleaner Coal in China." 2009. International Energy Agency/OPEC report

<sup>4</sup>Price, L., Wang, X. and Jiang, Y. (2008). "China's Top-1000 Energy-Consuming Enterprises Program: Reducing Energy Consumption of the 1000 Largest Industrial Enterprises in China." Lawrence Berkeley National Laboratory Report (LBNL-519E)

world behind the U.S., Germany, and Spain and plans to expand to 100GW by 2020. By the end of 2008, 61.8% of China's market share came from domestic and Sino-foreign joint venture turbine makers. In 2004, foreign-made equipment accounted for 75%.<sup>5</sup>

- China has recently announced increased spending on research and development and new subsidies to foster a stronger domestic market in the solar field as well. The "Golden Sun" program announced in July 2009 offers up to 70% of the cost of installing PV generation and transmission systems for projects selected by provincial governments.<sup>6</sup>

In the last five years, Chinese renewable energy firms have capitalized on domestic incentives and binding renewable energy targets to grow the wind industry in China. At first it appeared that the government incentives were not available to foreign participants. However, following the meeting of the U.S.-China Joint Commission on Commerce and Trade (JCCT) in which China agreed to drop its "Buy Chinese" policy that required local governments to source more than 70% of products and technologies from domestic sources, we may see a resurgence of foreign companies investing in this sector.

We will need to keep the pressure on China to keep its markets open. The most powerful tool that we have to drive the development and deployment of technology is the combined U.S.-China market. Bringing together a single, standard U.S. and China market for these goods and services provides market-based incentives that no policy or government funding source could ever supply.

Conversely, if we do not engage with them on developing this standard market-place, it is our economy, and our industry, which will likely lose out. The Chinese are going to move forward to develop these goods and services; only through cooperative development of common standards will we also be able to benefit from their growing market. Several steps can help us reach that goal, including to:

- Work with China to create policies that encourage competition in clean technology.
- Emphasize the importance of dropping barriers, from policy to political, to market access and investment in each other's country. As in the discussion on monitoring and verification, reciprocity is a strong tool. "Buy American" clauses are often met with "Buy Chinese" clauses. At the same time, we need to educate Chinese investors that developing American jobs is part of the cost of investing in the U.S.
- Press China hard to jointly develop new standards with us. A single standard for new technology, such as electric vehicle batteries, will ensure that American companies are able to compete in the Chinese markets.

#### SUMMARY

In summary, China is making many of the right steps towards managing climate change. Its policies and actions are aligned to achieve substantial cuts in the country's carbon emissions in the short, medium and long term. China needs to find a new model of sustainable economic growth in order to ensure stability, energy independence, and environmental health. Managing climate change is a critical part of that mix. The U.S. can have confidence that China is going to do what it says it is going to do because its motivations are internal. And, China is continually improving its ability to enforce its own policies. Improving the process by which Beijing monitors how well it reaches its national goals requires continued technical support. While it is unlikely that China will allow international inspectors, a process that puts its reputation at stake could be helpful. Most important is the recognition of reciprocity. China will push back hard against any policy or initiative that appears to set it in a special category.

Finally, for the United States, China represents a critical market. Access to the joint American-Chinese market will be a critical motivator for the development and dissemination of clean technology. We need to work with the Chinese to ensure that we keep our markets open to each other. Specifically, we need to develop shared standards, drop barriers to access and investment in each other's markets, and implement the right set of incentives to encourage competition in this rapidly expanding sector.

Thank you for this opportunity to appear before you. I look forward to your questions. Thank you.

<sup>5</sup> Global Wind Energy Council (2008). "GWEC: China." Retrieved at: <http://www.gwec.net/>

<sup>6</sup> China People's Daily. (July 22, 2009) Retrieve at: <http://english.people.com.cn/90001/90778/90857/90860/6707179.html>

The CHAIRMAN. Thank you very much.  
Ms. Harbert, why don't you go right ahead.

**STATEMENT OF KAREN HARBERT, PRESIDENT AND CEO, INSTITUTE FOR 21ST CENTURY ENERGY, CHAMBER OF COMMERCE**

Ms. HARBERT. Thank you, Chairman Bingaman and Ranking Member Murkowski and members of the committee, for holding this hearing and inviting me to participate. My testimony today will focus on what I believe are some of the major components and challenges to an international agreement and where I believe the business community can play a constructive role.

Trying to get over 190 countries to agree on a new treaty would be tough enough even in the best of economic circumstances, and these today are not the best of economic times. It's important to keep in mind the global context in which these negotiations are occurring. The world has changed considerably since the U.N. framework convention was launched in 1992, with the vast majority of future energy demand and greenhouse gas emissions coming now from the developing world.

Our energy institute has cautioned for some time about unrealistic expectations surrounding technology readiness and commercial adoption, short-term commitments by developed countries, burden-sharing by developing countries, capital requirements, expectations for wealth transfers, technology transfer, and intellectual property. The complexity of these issues has yielded confrontation and finger-pointing and not much progress.

I think it would be a mistake to draw from these developments the conclusion that all would be well if only the U.S. had domestic legislation in hand. These issues go well beyond what we can expect to see addressed in domestic legislation and they will be no less contentious even when we have it. We need to put to rest the idea if the U.S. goes first China, India, and other large emerging countries will fall in line into binding commitments of their own when they currently have no legal obligation to do so. This remains an unjustified article of faith and carries with it considerable risk.

We have seen with the Kyoto Protocol that a top-down approach does not work. We need in a new agreement a bottom-up approach that accommodates a wide range of national circumstances and should be as simple as possible to implement.

Climate change risks need to be addressed as part of an integrated agenda that proceeds from a very clear understanding that for many countries energy security is still a greater concern than climate change. At its most fundamental level, reducing carbon dioxide emissions from energy is a technology challenge that, as an article in Science once famously noted, "cannot simply be regulated away." It can't be negotiated away, either. It has to be innovated.

An agreement that focuses on technology offers a path forward that developed and developing nations can embrace together. How rapidly advanced energy technologies develop and are adopted commercially will be the most important factor in determining how quickly and at what cost greenhouse gas emissions can be reduced. Existing technologies surely can make an important contribution,

but they alone are not capable of significantly reducing greenhouse gas emissions on the global scale at an affordable cost.

New and in some case revolutionary energy technologies, many still years, if not decades, over the horizon, will have to be developed, invested in, adopted commercially, and we need the infrastructure to go along with them. That's why it's so critical that there not be a weakening of intellectual property rights in any agreement, which would only serve to stymie the development of the very technologies we need to make progress.

With a clear stake in the process, developing country governments can be convinced that intellectual property protections are in their interests as well as ours. Their businesses already know this. From less than 5 percent of patents in 1998, emerging economies now account for roughly 20 percent of patents worldwide.

Improving the performance and lowering the cost of advanced alternative technologies can, if successful, broaden the range of economically and politically viable policy options available to decision-makers. However, in order to have these technologies more quickly penetrate both developed and developing nations' markets, we should seriously undertake efforts to reduce global tariff and non-tariff barriers on clean energy goods and services.

In addition, to be credible and effective in reducing greenhouse gas emissions a new arrangement must include realistically ambitious commitments by all countries. Large developing countries like China, India, and Brazil must be part of any new international accord for it to actually reduce greenhouse gas emissions.

Finally, we believe there needs to be a greater role for the international business community in these negotiations. When all is said and done, after all, it's largely going to fall on the business community to implement whatever's in the treaty. Given the right environment, business is prepared to do what it does best: innovate to find solutions. But we need a seat at the table.

In September the U.S. Chamber hosted the first meeting of the major economies business forum on energy security and climate change. Over 2 days, high-level representatives from 13 business organizations spanning 6 continents and representing more than 25 million businesses exchanged views, identifying common ground on many of the issues being considered in the international negotiations.

Maybe surprising to policymakers, but not to businesses, there was a significant amount of agreement on the importance of practically addressing energy security, finance, technology, and economic competitiveness issues. I would ask that the formal declaration\* endorsed by all those business organizations be included in the record of this hearing.

The CHAIRMAN. It will be included.

Ms. HARBERT. Our organizations will continue to meet regularly to provide valuable and practical input to the international negotiations. But the bottom line is this: International business and the business community would welcome a more formal role in the U.N. framework convention and the major economies forum, and we should be allowed to do so. We are the solution.

---

\*Document has been retained in committee files.

In closing, let me say that business needs a predictable environment in which to operate and plan and remain competitive, and it would welcome an ambitious international climate change agreement. But that ambition needs to be tempered with a healthy dose of pragmatism. A realistic vision, focused on technology, that encourages cooperation, not confrontation, would be a good place to start.

Thank you, and I'll be happy to answer any of your questions. [The prepared statement of Ms. Harbert follows:]

PREPARED STATEMENT OF KAREN HARBERT, PRESIDENT AND CEO, INSTITUTE FOR  
21ST CENTURY ENERGY, CHAMBER OF COMMERCE

EXECUTIVE SUMMARY

As this year's negotiations wind their way to a conclusion in Copenhagen, Denmark, the prospect of a new international deal is not very bright, and it is not hard to see why.

Consider that the starting point for discussion is a 50% reduction in global greenhouse gas emissions by 2050. Endorsed by G8 leaders, this "50-by-50" goal is among the most aggressive of the 177 emissions reduction scenarios examined by the Intergovernmental Panel on Climate Change.

Meeting such a goal would require large and expensive emissions reductions and avoidances, most of which would have to occur in developing countries. Though ultimately non-binding and unenforceable, the long-term vision nonetheless drives expectations about technology readiness and commercial adoption, short-term goals, burden sharing by developing countries, finance and wealth transfers, and technology transfer, issues that are among the most contentious in the international negotiations. A 2008 report from the International Energy Agency (IEA) describes the scale of the technology breakthroughs that would be needed over the next 40 years to transform the energy sector and halve global carbon dioxide emissions from their 2005 level.

In the power sector, IEA estimates that carbon-free sources would have to boost their output over 550% and provide 95% of the electricity generated worldwide in 2050. To realize a shift of this magnitude, nuclear capacity would have to be added at an annual rate half again as large the historical high every year from 2010 to 2050. Renewable energy sources (excluding hydropower) also would have to be installed at a breakneck pace and grab 34% of an electricity market well more than twice the size it was in 2005, when these renewables claimed a meager 2% market share. Additionally, all coal plants and most natural gas plants would have to be fitted with carbon capture technology, which is not yet commercially available and may not be for many years.

The world's transportation sector, now dominated by oilbased fuels, would have to undergo similarly sweeping changes. For example, from virtually none today, IEA estimates that by 2050 nearly 1 billion electric and fuel cell cars would have to be on the world's roads.

Developing countries contend that as developed countries are responsible for most of the build-up of atmospheric carbon dioxide (a debatable claim), they should go first with emissions cuts of at least 40% to 45% below the 1990 level by 2020 and 80% to 95% below by 2050.

These targets are an extraordinary leap for developed countries; no developed country has proposed such reduction schemes to date. Even if developed countries could achieve these deep cuts, without meaningful commitments by developing countries, prospects for meaningful reductions in greenhouse gases remain dim. That is because about 80% or more of the expected growth in global carbon dioxide emissions to 2050 is expected to occur in developing countries, with China and India leading the way. As challenging as it is for developed countries to rein in emissions, the challenges for developing countries, which need cheap, reliable energy to raise living standards, are greater still.

Let us assume that developed countries succeeded in cutting emissions by 80% in 2050. To meet a 50% global target, total emissions from developing countries, after rising for decades, would have to return to or slightly below their 2000 level in 2050. What is more, because developing countries will have much larger populations 40 years hence, their per capita emissions, now about 2.5 tons, would have to be lower, too—and that would be the case even if developed countries slashed their emissions to zero.

With billions of people still lacking access to electricity, developing countries are unlikely to cap emissions if it hampers their economic development. Many sit on large reserves of fossil fuels and see no reason why they should forgo their use. They've made it plain that their cooperation will come only with significant financial contributions from other countries.

Developing countries are pressing the United States and other developed countries to transfer anywhere from 0.5% to 2.0% of their gross domestic product each year to bankroll climate change programs in developing countries. At that rate, in 2008 the cost to American taxpayers alone would have been \$72 billion to \$289 billion.

But even that might not be enough. A Massachusetts Institute of Technology report warns that if developing countries are fully compensated for their efforts, implied financial transfers from developed countries could amount to over \$400 billion annually in 2020 and about \$3 trillion in 2050.

Developing countries also are trying to use the negotiations to weaken intellectual property protections through compulsory licensing of advanced energy technologies, ostensibly to remove barriers to "technology transfer." Without intellectual property rights, there is very little incentive for companies to invest in costly research and development that will lead to the technology breakthroughs required to meet reduction targets.

Just as worrisome are threats by some governments to impose carbon tariffs on goods coming from nations that don't take on comparable commitments, which would inevitably lead to a green trade war.

Every delegation at the U.N. negotiating table understands these numbers, so it is little wonder the Parties remain so far apart. Many countries are coming to realize that it is one thing to achieve 50-by-50 in a computer model, quite another in the real world.

How rapidly advanced energy technologies develop and are adopted commercially will be the most important factor in determining how quickly and at what cost greenhouse gas emissions can be reduced. An accelerated program to improve the performance and lower the costs of advanced alternate energy technologies can, if successful, broaden the range of economically and politically viable options available to policymakers. National and international climate policy should concentrate on supporting greater energy efficiency and commercialization of low-carbon technologies for energy supply. In addition, developed and large developing countries alike must make a larger commitment to technology development worldwide.

A new agreement should be flexible; recognize growing energy needs; set realistic goals; ensure global participation, including major developing countries; promote the development of and trade in clean energy technologies; protect intellectual property; and maintain U.S. competitiveness.

At the end of the day, all the "modalities" and "frameworks" erected in these negotiations cannot ward off failure if the goal itself is not practicable.

Business needs a predictable environment in which to operate and plan, and it would welcome an ambitious agreement. But that ambition needs to be tempered with a healthy dose of pragmatism. A realistic vision that encourages co-operation would be a good place to start.

This paper explores some of the fault lines among the Parties in the negotiations, primarily the rift between developed and developing countries. It discusses the scale and scope of the technology challenge—which often gets overlooked in the public discussion—and some of the dynamics at work that hinder an agreement. And it offers the broad outlines of a technology-centered approach that could form the basis of a workable agreement.

#### STATE OF PLAY

Climate change is among the most complex issues facing the international community. Negotiations are currently taking place under both the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol with a goal of completing a new arrangement to address climate change in Copenhagen, Denmark at the end of 2009. However, despite the urgency governments attach to an agreement, the prospects for a comprehensive deal remain dim.

The ultimate long-term objective of the Convention, which was adopted in 1992 and entered into force in 1994, is the stabilization of greenhouse gas concentrations in the atmosphere at a level [undefined in the text] that would prevent dangerous anthropogenic interference with the climate system. This goal should be achieved within a time frame that would allow ecosystems to adapt and in a manner that ensures food production is not threatened and that would promote sustainable eco-

nomic development (UNFCCC 1992). Meeting these complementary objectives will require a sustained, long-term commitment by all nations over many generations.

The Kyoto Protocol completed in 1997 sets binding greenhouse gas emissions targets for 37 developed countries and the European Community that combined would reduce emissions for these countries as a whole 5% below the 1990 level over the period 2008 to 2012. Developing countries have no obligations to slow or reduce emissions under the Protocol. To date, 187 UNFCCC Parties have acceded to the Protocol, excluding the United States.

The Bali Action Plan agreed to at the 13th Conference of the Parties in Indonesia in December 2007 launched a twoyear negotiations process to strengthen the international response to climate change through the “full, effective and sustained implementation of the Convention through longterm cooperative action, now, up to and beyond 2012, in order to reach an agreed outcome and adopt a decision” at Copenhagen in 2009.

The Bali Action Plan set up two parallel negotiating tracks: (1) a Kyoto Protocol track, which is looking at a second commitment period under that treaty; and (2) a “Long-Term Cooperative Action” track under the UNFCCC. The U.S. observes in the former and participates in the latter. If or how these two tracks merge is the topic of considerable speculation. For procedural reasons it could only occur in Copenhagen at the earliest.

The negotiations revolve around a shared vision for longterm co-operation—including a global emissions goal—and four actions areas covering mitigation, adaptation, technology, and finance (UNFCCC 2007).

The success of these negotiations will depend in large part on the ability of the developed countries to entice large developing countries such as China, India, and Brazil into a binding agreement, but that will be easier said than done. The rift between developed and developing countries is wide, and it is difficult to see how it can be bridged in the remaining negotiating sessions. Just how far apart the Parties remain can be seen in the leaders’ statements on climate change emerging from the G8,<sup>1</sup> Major Economies Forum on Energy and Climate (MEF),<sup>2</sup> and G5<sup>3</sup> meetings in Italy last July. The matrix in table 1 breaks down the emissions targets each group of countries was able to agree on in Italy.

Matrix of Climate Change Declarations for the G8, MEF & G5

Issue	G8	MEF	G5
Average Global Temperature Limit	2° above pre-industrial	2° above pre-industrial	—
Peak Global Emissions	As soon as possible	As soon as possible, with developed countries peaking before developing countries	—
Short-Term Target (2020):			
Global	—	—	—
Developed Countries	“Robust” aggregate and individual reductions	“Robust” aggregate and individual reductions	-40% from 1990 baseline
Developing Countries	Reduce emissions below “business-as-usual” projections	“Meaningful” deviation from [Note: not “below”] business-as-usual	
Long-Term Goal (2050):			

<sup>1</sup>The Group of Eight includes the United States, Canada, France, Germany, Italy, Japan, Russia, and the United Kingdom.

<sup>2</sup>The MEF includes the United States, Australia, Brazil, Canada, China, the European Union, France, Germany, India, Indonesia, Italy, Japan, the Republic of Korea, Mexico, Russia, South Africa, and the United Kingdom.

<sup>3</sup>The Group of Five includes Brazil, China, India, Mexico and South Africa.

Matrix of Climate Change Declarations for the G8, MEF &amp; G5—Continued

Issue	G8	MEF	G5
Global	-50% (no baseline provided)	—	—
Developed Countries	-80% from 1990 baseline	—	—
Developing Countries	—	—	—

Much has been made of the reference in the G8 and MEF declarations to limit the average global surface temperature to no more than a 2°C increase above the pre-industrial level.<sup>4</sup> Using the “best estimate” provided by the Intergovernmental Panel on Climate Change’s Fourth Assessment Report (IPCC 2007), a 2°C target translates into an atmospheric carbon dioxide concentration in the range of 350 ppm to 400 ppm.<sup>5</sup> (To put this in perspective, the current atmospheric concentration of carbon dioxide is a little under 390 ppm, roughly 120 ppm above the preindustrial level.) To get global emissions on a trajectory to stabilize atmospheric carbon dioxide concentrations within this range, IPCC estimates that global emissions would have to peak no later than 2015 and would have to be about 50% to 85% below their 2000 level in 2050.<sup>6</sup>

The G8 also reiterated its support specifically for a 50% reduction in global emissions by 2050 (with no baseline supplied), and it called on developed countries to commit to an 80% reduction from a 1990 baseline over the same period.

The G5 statement is noteworthy more for what it leaves unsaid. Developing countries as a group clearly are not interested in moving the discussion beyond midterm commitments for developed countries. As long as the discussion focuses on 2020, developing countries really see no reason to do much of anything. That is not the case when the discussion turns to a 2050 global goal.

In the U.N. negotiations, the idea of a 50% reduction in global emissions (from base years ranging from 1990 to 2005) by 2050—with developed countries pitching in at least 80%—has become the starting point of discussion of the long-term emissions goal.<sup>7</sup> The general view is that, as part of the shared vision, this “50-by-50” long-term goal will not be considered operational, but rather aspirational.

Though ultimately non-binding and unenforceable, the long-term vision nonetheless drives expectations about technology readiness and commercial adoption, short-term goals, burden sharing by developing countries, finance and wealth transfers, and technology transfer, issues that are among the most contentious in the international negotiations.

#### TECHNOLOGY SCALE AND SCOPE

As we consider the international negotiations, it is important to take stock of the technology challenge to achieve deep reductions in carbon dioxide emissions. A 50-by-50 global goal is among the most aggressive of the 177 emissions reduction scenarios examined by the Intergovernmental Panel on Climate Change. Meeting it

<sup>4</sup>Both the G8 and the MEF declarations state that it is the “scientific view” that the average global temperature “ought not” exceed 2°C above the pre-industrial level. The IPCC is barred, however, from offering policy recommendations in its reports. The IPCC presents a range of possible emissions pathways to stabilize the atmospheric carbon dioxide concentration.

<sup>5</sup>This is based on a best estimate of climate sensitivity whereby a doubling of the atmospheric concentration of carbon dioxide would lead to a 3°C average global temperature rise from the preindustrial average (IPCC 2007, WGIII SPM Table SPM.5). IPCC, however, gives a range of climate sensitivities from about 2.0°C to 4.5°C. Thus, there is a range of possible atmospheric carbon dioxide concentrations, roughly from about 300 ppm to 550 ppm, corresponding to a 2°C average rise. The emissions trajectories needed to meet either end of this range are very different.

<sup>6</sup>A 50% cut in carbon dioxide emissions by 2050 would not stabilize atmospheric carbon dioxide concentrations in the 350ppm to 400ppm range. Further cuts and avoidances would be needed after 2050. In fact, IPCC notes that many scenarios aimed at meeting the most aggressive carbon dioxide stabilization targets—440 ppm and lower—call for net negative global emissions sometime before 2100 (IPCC 2007).

<sup>7</sup>Draft U.N. negotiating text in the Ad Hoc Working Group on Long-Term Cooperative Action has a number of different proposals—stabilizing greenhouse gases (in carbon dioxide equivalents) from 350 ppm to 450 ppm, limiting the temperature rise from 1.5°C to 2°C, and reducing global emissions anywhere from 50% to 95% below the 1990 level by 2050 (UNFCCC 2009a)—all of which imply a minimum global reduction of 50% by 2050.

would demand the almost complete transformation of the global energy system in just 40 years. It would require extremely large and expensive emissions reductions and avoidances, most of which would have to occur in developing countries, from where the lion's share of future emissions are expected to come.

#### A NOTE ABOUT THE DATA

For simplicity, most of the 50-by-50 scenario data cited in this paper stem from IEA 2008 unless noted otherwise. The IEA's scenario results are consistent with those of other groups, such as the U.S. Climate Change Science Program's report on stabilization scenarios (CCSP 2007), which included scenario results from three different models. The IEA figures should be seen as an indication of the scale and scope of the changes in energy systems and reductions and avoidances in emissions that would be needed to meet a 50-by-50 target for energy-related carbon dioxide only (it does not consider emissions of carbon dioxide from land use change or industrial processes or emissions of other greenhouse gases). While mitigation scenarios from other groups yield somewhat different results, they are generally all of the same magnitude and tell essentially the same story.

In addition, the definitions of "developed" and "developing" countries in the IEA report align with OECD and non-OECD countries, not the more familiar Annex I and Non-Annex I designation used in the UNFCCC. This does not impact the data in any meaningful way.

The scale of the changes required to meet a goal of this magnitude is not well appreciated. A 2008 report from the International Energy Agency (IEA) describes in detail the technology breakthroughs—in fossil fuel power generation; carbon capture and storage; nuclear energy; biomass, wind, solar, and other renewable energy; transportation fuels; batteries; electricity systems; and other technologies—that would be needed over the next 40 years to transform the energy sector and halve global energy-related carbon dioxide emissions from their 2005 level (IEA 2008).<sup>8</sup>

There is always a large element of uncertainty when peering into the future, and as IEA notes, many of the technologies demanded by a 50-by-50 scenario are still under development, and their progress is highly uncertain. Even under the most optimistic circumstances, however, 50-by-50 would be extraordinarily difficult to achieve.

In 2005, global emissions of carbon dioxide were around 26.6 gigatons.<sup>9</sup> IEA estimates that, assuming no additional climate policies and some "business as usual" technology and energy efficiency improvements, global carbon dioxide emissions could rise to 61.7 gigatons by 2050. To halve energy-related carbon dioxide emissions in 2050 relative to 2005—i.e., 13.3 gigatons—implies reductions and avoidances in excess of 48 gigatons, an amount about equal to 8 times current U.S. carbon dioxide emissions (figure 1).<sup>\*</sup>

Energy efficiency is the biggest source of emissions reductions in IEA's scenario. Immediately following the oil price shock of the 1970s, energy efficiency in developed countries improved at a rate of about 2.5% per year. More recently, however, yearly efficiency improvements have been lagging at well less than half that rate. To achieve 50-by-50, IEA requires energy efficiency to improve at a sustained rate of 1.7% from 2010 to 2050 compared to 0.9% in its baseline scenario. This represents an increase in rate of annual efficiency gains of 85% to 90% and would be very challenging to maintain. Under its 50-by-50 scenario, total global energy demand is one-third less than in the reference case.

In the power sector, IEA estimates that electricity production will more than double from 2005 to 2050. In 2005, non-emitting sources of power accounted for about one-third of electricity generated worldwide, and just about all of that was from either nuclear or hydropower sources. To meet rising electricity demand and reduce carbon dioxide emissions, carbon-free sources would have to boost their output from 6 to 40 petawatt hours,<sup>10</sup> a jump of more than 550%, and provide 96% of the electricity generated worldwide in 2050 (figure 2).

To realize a shift of this magnitude, low-emission sources of power would have to be added at an unprecedented rate (figure 3). Nuclear capacity would have to

<sup>8</sup> Using IEA's "BLUE Map" scenario. The IEA "50-by-50" scenario described is compared to a no-policy "reference case." This reference scenario assumes that some technology and efficiency improvements will occur even in the absence of any additional climate change policies. Thus projected emissions are lower than they would be under a scenario where technology and efficiency were "frozen" over the next 40 years. The 50-by-50 mitigation scenario focuses on determining the amount of additional emissions reductions needed beyond the reference scenario.

<sup>9</sup> A gigaton equals 1 billion metric tons.

<sup>\*</sup> Figures 1-7 have been retained in committee files.

<sup>10</sup> A petawatt hour equals one quadrillion watt hours.

be added at an annual rate half again as large the historical high every year from 2010 to 2050. Renewable energy sources, excluding hydropower, would have to be installed at a breakneck pace—rising about 3,500%—and grab 34% of an electricity market well more than twice the size it was in 2005, when non-hydro renewables claimed a meager 2% market share. (For example, nearly 18,000 4-megawatt wind turbines would have to be installed each year from 2010 to 2050.<sup>11</sup>) By 2050, all coal plants and most natural gas plants would have to be fitted with carbon capture technology, which is not yet commercially available and may not be for many years.

The world's transportation sector, now dominated by oilbased fuels, would have to undergo similarly sweeping changes. Batteries and fuel cells are expected to be the main alternatives to the internal combustion engine in automobiles. Because these alternatives are too expensive and impractical for trucks, ships, and planes, biofuels are expected to play a greater role in these transport modes.

On average, something on the order of 85% to 90% of all the cars and light trucks sold annually from 2010 to 2050 would have to be some sort of alternate vehicle, and by 2050, new conventional gasoline and diesel vehicles essentially would be unavailable. Figure 4 shows the dramatic change in global new car sales in 2050 under IEA's business as usual baseline and 50-by-50 scenarios. From virtually none today, IEA estimates that 40 years from now nearly 1 billion electric and fuel cell cars would have to be on the world's roads.

A 50-by-50 goal would demand, then, an unprecedented global transformation of existing and future energy systems away from fossil fuels—which in 2005 supplied nearly 90% of energy demand—on a massive scale and at a breathtaking pace.<sup>12</sup> IEA pegs the additional investment for all this at \$45 trillion, a yearly average, it notes, equivalent to the (GDP) national product of Italy.<sup>13</sup> By 2050, the marginal costs for a ton of carbon dioxide would be \$200. Under a more pessimistic technology outlook, the cost of carbon dioxide could climb to \$500 to \$800 a ton.

#### SHARING THE BURDEN—AFTER YOU

Studies on global emissions trends demonstrate that emissions reductions by the developed world alone cannot reduce global emissions appreciably. There is, however, a huge and perhaps unbridgeable divide between the developed countries and the developing countries. The UNFCCC did not create these divisions, but it does reflect and sustain them.

The blame game is played with great aplomb within the Convention. Developing countries assert that as developed countries bear "historical responsibility" for most of the build-up of atmospheric carbon dioxide,<sup>14</sup> they bear a responsibility to reduce emissions in their own countries and finance reductions in others. This notion of historical responsibility pervades much of the negotiations.

In addition, the Convention's preamble expresses the view that "the share of global emissions originating in developing countries will grow to meet their social and development needs" (UNFCCC 1992). The link between industrialization and increasing greenhouse gas emissions is strong, so it is expected that as these countries develop economically, they will emit more.

Parties to the UNFCCC also agreed in the treaty text that, as a matter of principle, protecting climate system should be "on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof" (UNFCCC 1992). In other words, developing countries are not expected to do as much as developed countries, which have

<sup>11</sup>Most wind turbines in service and available today are rated well below 4 megawatts.

<sup>12</sup>The technology challenge may be even greater than many models suggest. An analysis of the IPCC's mitigation scenarios appearing in *Nature* found that two-thirds or more of the emissions reductions from technology change and efficiency improvements are built in to the no-policy reference cases. The amounts of "spontaneous decarbonization" assumed in the IPCC reference cases, the authors argue, are "optimistic at best and unachievable at worst, potentially seriously underestimating the scale of the technological challenge." They conclude that "if most decarbonization does not occur automatically, then the challenge to stabilization could in fact be much larger than presented by the IPCC" (Pielke Jr. et al. 2008). Recent trends in global emissions lend credence to this view. IPCC, for example, reports that, "The long-term trend of a declining carbon intensity of energy supply reversed after 2000" (IPCC WGIII 2007).

<sup>13</sup>IEA did not measure global GDP impacts, noting that, "The expenditure represents a redirection of economic activity and employment, and not necessarily a reduction in GDP" (IEA 2008).

<sup>14</sup>This is a debatable claim. An analysis commissioned by the UNFCCC and presented at the COP-14 in Bali, Indonesia suggests that when land use change is factored in, total emissions from large developing countries have contributed appreciably to the stock of atmospheric carbon dioxide (though their per capita contribution would still be relatively low) (MATCH 2007).

greater economic and technological capabilities to curb emissions. This principle of common but differentiated responsibilities is on full display in the Kyoto Protocol, where only developed countries have binding obligations to reduce emissions, a state of affairs developing countries have no incentive to see changed.

While the gradation between developed and developing countries has always been murky, the Convention, nonetheless, established and maintains clear lines of differentiation among its Parties. The Convention divides Parties into three main categories, and it is through these designations that the commitments and responsibilities of the Parties largely have been determined.

Annex I includes countries that made up the Organization for Economic Co-operation and Development (OECD) in 1992 and countries with “economies in transition” (Russia, the Baltic states, and most Central and Eastern Europe states). In general, the Convention places a heavier burden on Annex I countries to report and reduce greenhouse gas emissions. The OECD countries listed in Annex I comprise Annex II. This subset of countries is obliged to provide financial support to developing countries for reporting, mitigation, and adaptation activities. All other countries—almost all of which can be viewed as developing—are designated Non-Annex I.

The world has changed considerably since the UNFCCC was launched in 1992. Mexico and South Korea, both Non-Annex I Parties, are OECD members. Singapore, another Non-Annex I party, has one of the highest levels of per capita income in the world. Major emitting countries like China, India, Brazil and other large and emerging economies are rapidly industrializing and becoming major players in the world’s economies and its energy markets.

There are, however, no criteria or instruments in the Convention that would automatically move Parties, as they advance economically, from Non-Annex I to Annex I, or even to an intermediate status. The Convention does allow for changes to occur either voluntarily or through a treaty amendment, an arduous process requiring consensus of the Parties or, if that cannot be achieved, a three-fourths majority vote.<sup>15</sup>

Obviously, developed countries have a strong interest in supporting such a change, and Australia, for one has been pushing to introduce such a mechanism into the Kyoto Protocol. Just as obvious, developing countries have no incentive to agree to a more systematic and dynamic approach not only because of what this may mean for them in the UNFCCC, but in other U.N. and international venues as well. None of this alters the fact that to reduce global emissions appreciably, any new international arrangement addressing climate change must include active participation from developing countries, especially large economies like China and India. In this regard, the Bali Roadmap that emerged from the UNFCCC talks in Indonesia in 2007 was promising in that developing countries agreed to consider “nationally appropriate mitigation actions” that are “measurable, reportable, and verifiable”. Such actions would be “supported and enabled by technology, financing and capacity-building” from developed countries (UNFCCC 2007).

It is within these broad parameters that the negotiations should be viewed, particularly the discussions about burden sharing to achieve a global emissions goal.

Developed countries have proposed a global goal of a 50-by-50 reduction, with developed countries kicking in an aggregate reduction of 80% through “comparable” reductions by individual states. Consistent with the concept of common but differentiated responsibilities and respective capabilities, more advanced developing countries (e.g., South Korea, Singapore, Mexico) would undertake significant mitigation commitments, and major emitting developing and emerging economies (e.g., China, India, Brazil, South Africa) would reduce their emissions growth below a business-as-usual baseline.

For their part, developing countries contend that because human-induced climate change has global impacts, the “carbon space” should be shared more equitably. This carbon space represents the historical and future amount of greenhouse gas emissions that would be consistent with a specific (and presumably agreed upon) concentration of carbon dioxide in the atmosphere. Citing historical responsibility, developing countries argue that developed countries have exceeded their fair share of the carbon space. Thus, developed countries have an obligation to go first with emissions cuts below their 1990 level of at least 40% to 45% by 2020 and 80% to 95% below by 2050.

The scale and transformation necessary to achieve a 40% to 45% reduction by 2020 has received far less evaluation than the targets themselves. In the United States, for example, no administration or congressional proposal under serious con-

<sup>15</sup> Provision was made in the UNFCCC to consider additions to Annex I by 1998, and six European countries were added.

sideration comes anywhere near a 40% reduction by 2020. An 80% cut by 2050 would shrink the country's "carbon footprint," relative to its economy and population, to levels today seen only in countries like Haiti and North Korea.<sup>16</sup>

No other developed country is aiming for midterm targets approaching a 40% to 45% reduction, either. The European Union has pledged cuts of 20% by 2020 below a 1990 baseline (and allowing international off sets) and would be willing to go as high as 30% if other developed countries take on similar goals. Japan's new government announced its intention of reducing emissions 25% below from the 1990 level in 2020, contingent on an international deal. Australia has set a 2020 goal of 5% to 15% below its 2000 level and would be prepared to accept 25% if certain conditions are met as part of an international agreement. Canada is looking at a 20% reduction from its 2006 level by 2020. New Zealand announced its intention to limit emissions 10% to 20% below 1990 levels by provided certain conditions are met. And Russia said it would commit to 2020 goal of a 10% to 15% reduction from the 1990 level.<sup>17</sup>

Even if developed countries could deliver steep cuts in emissions, absent meaningful commitments by developing countries, it will be nearly impossible to achieve significant reductions in global emissions. That is because about 80% or more of the expected growth in global carbon dioxide emissions to 2050 is expected to occur in developing countries, with China, India, and Southeast Asia leading the way (figure 5).<sup>18</sup>

Brisk economic and population growth can be expected to increase greatly the demand for energy, primarily from fossil fuels, in developing countries. Between 2005 and 2050, IEA expects that GDP in China and India will grow nearly 900% and in Brazil nearly 300%.<sup>19</sup> Over the same period, the world's population is expected to soar from 6.5 billion to 9.2 billion, a rise of more than 40%, with most of the growth coming in Asia and Africa and almost none from developed countries. Out of a projected 2050 global population of over 9 billion people, only about 1 billion will be in OECD countries (IEA 2008).

These trends are expected to lead to a huge appetite for energy that could see global demand more than double over the period, again with the vast majority of the increase occurring in developing countries.

To have any impact on greenhouse gas concentrations, therefore, the developing world also must act. So what would developing countries have to contribute to meet a 50-by-50 goal?

Let us assume that developed countries succeeded in cutting emissions by 80% in 2050. To meet a 50% global target, total emissions from developing countries, after rising for decades, would have to peak and subsequently return to or slightly below their 2000 level (figure 6).<sup>20</sup> What is more, because developing countries will have much larger populations 40 years hence, their combined per capita emissions also would have to be lower than today's—and that would be the case even if developed countries eliminated their emissions entirely (figure 7).

Developing countries are unwilling to accept restrictions on their development and energy use. Providing modern energy services to lift their people out of poverty is a much more pressing need than addressing climate change. With billions of people still lacking electricity, developing countries are understandably loath to cap emissions if it hampers their economic development and energy security. Much of the energy needed to power economic growth will likely be supplied by fossil fuels. Many developing countries sit atop large reserves of coal, oil, and gas, and it would be

<sup>16</sup>Based on data from the Energy Information Administration, World Carbon Intensity—World Carbon Dioxide Emissions from the Consumption and Flaring of Fossil Fuels Using Purchasing Power Parities, 1980—2006 (available at: <http://www.eia.doe.gov/pub/international/iealf/tableh1pco2.xls>) and World Per Capita Carbon Dioxide Emissions from the Consumption and Flaring of Fossil Fuels, 1980—2006 (available at: <http://www.eia.doe.gov/pub/international/iealf/tableh1cco2.xls>).

<sup>17</sup>Russia's emissions in 2007 were roughly a third below 1990's level, so its goal actually represents an increase in emissions of 29% to 36% from 2007's level.

<sup>18</sup>While much of the focus is on large emerging economies such as China, India, and Brazil, we should not lose sight of the fact that a great deal of emissions growth is expected to occur in other regions of the world. Non-MEF countries, for example, could see their carbon dioxide emissions rise by 6 gigatons between 2005 and 2050. That is roughly equivalent to total gross carbon dioxide emissions from the United States in 2007, a not insignificant amount.

<sup>19</sup>Per capita GDP of developing and emerging economies, however, will remain well below those of OECD countries.

<sup>20</sup>Nationally appropriate mitigation actions that reduce emissions below a business as usual baseline have been proposed for developing countries. However, even if these were successful in slowing emissions growth, at some point carbon dioxide emissions from these countries still would have to peak and decline sharply for a 50% global reduction to be realized.

naive to expect them to forego their use in favor of more costly and less reliable energy options.

Developing countries routinely point out that their per capita emissions, now at approximately 2.5 tons, are generally much lower than those in developed countries, now in the neighborhood of 11 to 12 tons. There is a wide range of per capita carbon dioxide emissions exhibited among developing countries. Some small developing states with large energy intensive industries, such as refining, have per capita emissions that are very high (greater than 30 tons), but for the vast majority of these countries, they are under 3 tons.

At about 4 tons, China's per capita emissions from energy, like its emissions as a whole, have experienced tremendous growth over the last decade in step with that country's rapid industrialization. Nevertheless, its emissions per person are still only about a third as much as that of the average person living in a developed country.

India's emissions per capita are quite low, and it is a major emitter largely by virtue of its sizeable population, not because its people consume an inordinate amount of fossil fuels. Carbon dioxide emissions for each Indian hover just over 1 ton, less than a tenth of the developed country average.

China and India, and other developing countries, have stated unequivocally that they are not in a position to take on legally binding emissions reductions, especially given their low per capita emissions. The Indian government, in particular, has said repeatedly that as a matter of equity it will not allow its per capita emissions to exceed the average for the developed world (Government of India 2009). Other countries have embraced this idea of a "fair sharing" of the carbon space and the "convergence" of per capita emissions between developed and developing countries.

But again, let us suppose that developed countries managed to slash their dioxide emissions 80% by 2050, which would place their combined per capita emissions at just about 2 tons per person. If every country in the world somehow matched this remarkably low level,<sup>21</sup> last seen globally on the eve of World War II, global carbon dioxide emissions from energy would decline to about 18.4 gigatons, an amount that is still well above the level needed to reach a 50% global reduction target.<sup>22</sup>

#### MONEY TALKS

Although many developing countries, including China, India, Mexico, and South Africa, have issued or plan to issue national climate action plans, implementing a national plan is a different undertaking than accepting a binding commitment as part of an international treaty. Whereas developed countries are willing to offer their national plans as a basis for a binding international obligation, the position of the developing countries is that they are not prepared to do so.

Developing countries have been forthright in saying that their cooperation, in addition to being nonbinding, will only come with financial strings attached. The Convention directs Annex II Parties to provide financial resources, including transferring technologies, to cover the "agreed full incremental costs" to developing countries of complying with various articles implementing the treaty.<sup>23</sup>

In the Bali Roadmap,<sup>24</sup> developing countries agreed 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" (UNFCCC 2007). This language has been interpreted in various ways, but in general, the phrase "measurable, reportable, and verifiable" refers both to the nationally appropriate mitigation actions of developing countries and the support for "technology, financing and capacity-building" that developed countries are expected to provide. The G77 China group, for example, has stressed that nationally appropriate mitigation actions undertaken by developing countries would be voluntary and dependent upon adequate provision of financing.

These provisions have become fodder for all manner of demands by developing countries on the economies of developed countries. Developing countries are counting on huge direct transfers of wealth to support their efforts to mitigate emissions

<sup>21</sup> Estimates vary, but developing country per capita emissions are expected to exceed 4 and possibly 5 tons by 2050 under various business as usual scenarios.

<sup>22</sup> Using IEA's global population projection of 9.2 billion (IEA 2008, Table B.1, Population Projections, 2005–2050). At 9.3 billion, the U.S. Census Bureau's forecast for global population is about the same as IEA's (see: <http://www.census.gov/ipc/www/idb/worldpop.php>). With global per capita emissions at 2 tons per person, to meet a 50-by-50 emissions target, the world's population would have to be a little above its level in 2005 (6.5 billion people), a completely unrealistic scenario given current population projections.

<sup>23</sup> UNFCCC Article 4.3.

<sup>24</sup> Paragraph (1)(b)(ii).

and fund adaptation efforts, and it is perhaps the case that developed countries have not done enough to temper these expectations.

China, India, South Africa, Bolivia, Colombia, among others, are pushing developed countries to transfer anywhere from 0.5% to 2.0% of their GDP each year to support climate change programs in developing countries. At that rate, the contribution from American taxpayers alone would have been \$72 billion to \$289 billion in 2008. Yet even that may not be enough. A report out of the Massachusetts Institute of Technology estimates that if developing countries are fully compensated for their mitigation activities<sup>25</sup> through a global emissions trading scheme, the implied financial transfers from developed countries to meet a 50-by-50 goal could amount to over \$400 billion annually in 2020 and about \$3 trillion in 2050 (Jacoby et al. 2008). The U.N.'s World Economic and Social Survey 2009 suggests developing countries will need international support to the tune of 1% of global GDP a year, currently about \$500 to \$600 billion (UN 2009).

It was always very unlikely that developed country governments would agree to such vast sums in the best of times, much less in the midst of a severe crisis in world financial markets. In any event, most of this financing would have to come from the private sector, with government financing serving to spur and bolster these investments. There is a real concern that these financial flows could be used to underwrite the modernization and competitiveness of often state-run firms in developing countries, putting private firms at a distinct disadvantage.

#### INTELLECTUAL PROPERTY PROTECTIONS UNDER ASSAULT

The Convention also states that Annex II Parties "shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other Parties, particularly developing country Parties, to enable them to implement the provisions of the Convention" (UNFCCC 1992).

Developing countries have used this provision deftly to justify their attempts to weaken intellectual property protections, ostensibly to remove barriers to technology transfer. Compulsory licensing and a fund supported by developed countries to buy down intellectual property are two of many proposals being bruited.

There is, however, no justification for the view that intellectual property protections hinder technology diffusion. A review of the relevant literature by researchers at Colorado College found that intellectual property rights "do not constitute as significant a barrier as claimed since a variety of technologies exist for reducing emissions." The study also found that, "In many cases, IPR protected technologies are not necessarily more costly than those not covered" (Johnson and Lybecker 2009).

All the same, developing countries continue to call for weakened intellectual property regimes. The China/G77 group proposed treaty text that reads: "All necessary steps shall be immediately taken in all relevant fora to mandatorily exclude from patenting climate friendly technologies held by Annex II countries which can be used to adapt to or mitigate climate change." The Philippines put forward the following: "All necessary measures and actions shall be immediately taken to facilitate technology pools that include associated trade secrets and know-how on environmentally sound technologies and enable them to be accessed, including on royalty-free terms for developing countries." Bolivia offered similar language, suggesting that "nothing in any international agreement on intellectual property shall be interpreted or implemented in a manner that limits or prevents any Party from taking any measures to address adaptation or mitigation of climate change, in particular the development and transfer of and access to technologies" (UNFCCC 2009b).

If provisions such as these are included in a final climate change agreement, developing countries could claim the legal right to seize the "green" technologies developed by American and other companies. Without intellectual property rights, there is precious little incentive for companies to invest in advanced technologies if after years of research and development and millions or even billions of dollars invested, their inventions could be expropriated outright by companies in developing countries and manufactured and sold around the world at reduced cost.

If their incentives are removed through what would amount to legalized theft of their intellectual property, some of the most innovative companies in the developed world would simply abandon the development of clean energy technologies. U.S. negotiators were joined by their colleagues from Europe, Japan, and other developed countries in declaring that any weakening of intellectual property would be a deal-breaker.

<sup>25</sup>The MIT study did not consider transfers for adaptation.

Just as worrisome as the assault on intellectual property rights are threats by some developed country governments to engage in protectionist practices to avoid “carbon leakage”—that is, the movement of energy-intensive industries, and thus their carbon dioxide emissions, to other countries. Many developed country governments, including the United States and the European Union, are considering imposing border adjustments on goods coming from nations that do not take on comparable commitments. (Remember, under the principle of common but differentiated responsibilities, developing countries are not expected to take on similar commitments.)

H.R. 2454, The American Clean Energy and Security Act of 2009, includes border adjustment measures that would impose carbon tariffs on goods imported from countries that, as determined by the government, have not adopted restrictions on emissions similar to those in the United States. The tariff would take effect in 2020 and fall on imports of carbon-intensive products, such as cement and steel.

These kinds of proposals are counterproductive. They do little to raise the level of trust between the developing and developed countries, and they are unnecessary if an international agreement eventually is reached. The U.S. proposal earned swift rebukes from China and India, both of whom object to putting up trade barriers under the guise of protecting the climate, and they have proposed treaty text that would prohibit the use of carbon tariffs.

One expects a little gamesmanship as the negotiations progress, but threats of trade sanctions set a dangerous precedent and—*notwithstanding* a recent World Trade Organization (WTO) and U.N. Environment Programme report (WTO/ UNEP 2009)—could violate WTO rules if put into practice.<sup>26</sup> At the very least, border adjustments would inevitably invite retaliation and incite a green trade war, and because no one wins a trade war, warnings of carbon tariffs have little value as negotiating leverage. Moreover, these types of proposals stand in stark contrast to the commitment made by the G20 countries in April 2009 to “refrain from raising new barriers to investment or to trade in goods and services” (Wenk & Westerman 2009).

It is important that the international climate negotiations not be used as an excuse to erect barriers to free and open trade, or as a way to gain competitive advantage or redistribute wealth. The WTO, not the UNFCCC, is the appropriate forum for intellectual property and trade discussions. Instead of raising barriers, governments should be pursuing the elimination of tariff and nontariff barriers to environmental goods and services to lower their costs and increase global access of clean energy technologies.

In a more constructive vein, developed countries have proposed the idea of sectoral approaches focused on specific industries (e.g., steel, refining, and cement) as a way to ease competitiveness concerns, motivate action in developing countries, and bring them into international carbon markets (other than the market for offsets).

There are many different sectoral proposals being considered. Under sectoral crediting, a developing country could set a specific improvement in emissions intensity for a sector that if exceeded would generate internationally-tradable credits. If the sector failed to meet the target, no penalty would apply. Under sectoral trading, a developing country would commit a sector to an emissions cap for which it would receive tradable credits.

While promising, sectoral approaches are not without their detractors, and as with many other proposals, the devil is in the details. There is, for example, a real concern that sectoral agreements could be structured in such a way that the primary beneficiaries would wind up being inefficient state-run enterprises that dominate many industrial sectors in developing countries.

Sectoral agreements could be very difficult to reach given both the number of Parties involved and the almost complete lack of any mention of sectors in either the Convention or the Kyoto Protocol, both of which emphasize country-wide engagement.<sup>27</sup>

<sup>26</sup>The WTO/UNEP report states: “The general approach under WTO rules has been to acknowledge that some degree of trade restriction may be necessary to achieve certain policy objectives, as long as a number of carefully crafted conditions are respected.” However, the report also includes a disclaimer that “opinions reflected in this publication are the sole responsibility of the World Trade Organization (WTO) Secretariat. They do not purport to reflect the opinions or views of Members of the WTO.” The 153 Members of the WTO have varied views on the relationship between trade rules and climate change, as seen in recent warnings by China and India.

<sup>27</sup>The exceptions being forestry, shipping, and aviation.

Moreover, with but a few exceptions—notably South Korea and Mexico—developing countries have shown little interest in sectoral approaches, especially if doing so would involve binding commitments.

#### WHITHER NOW?

Every delegation sitting around the U.N. negotiating table understands these numbers and their implications, so it is little wonder that the Parties are so far apart. It is one thing to achieve 50-by-50 in a computer model, quite another in the real world. The focus on an unenforceable target and timetable has made an already difficult negotiation that much more difficult by creating expectations that both developed and developing Parties are seemingly unprepared to fulfill.

As a practical matter, any long-range numeric goal makes assumptions about the pace of technology development and diffusion, an inherently unpredictable process. At its most fundamental level, reducing carbon dioxide emissions from energy is a technology challenge that, as a 2002 article in *Science* famously noted, “cannot be simply regulated away” (Hoffert et al. 2002). Neither can it be negotiated away.

A 50-by-50 vision also takes for granted a degree of burden sharing that developing countries are not willing to accept, and that in turn compels unreasonable demands for assistance from developing countries. Even under the rosier scenarios that include deep emissions cuts in developed countries, 50-by-50 still implies large emissions cuts by developing countries at some time in the future that in their view poses a threat to their industrial development. Right now, there is little reason for them to accept any sort of reduction commitment, binding or otherwise, without wealth and technology transfers worth hundreds of billions, and perhaps rising to trillions, of dollars each year.

The top-down approach embodied in the Kyoto Protocol is seriously flawed, and it is unlikely to supply the vehicle for a new, comprehensive international agreement. What is needed instead is a long-term vision that motivates and provides direction for national and regional co-operative activities, takes into account emerging science and technology development and turnover, recognizes growing energy needs, ensures the broadest participation, and does not undermine economic growth.<sup>28</sup>

An agreement that focuses on technology offers a path forward that developed and developing countries can embrace. How rapidly advanced energy technologies develop and are adopted commercially will be the most important factor in determining how quickly and at what cost greenhouse gas emissions can be reduced. Existing technologies can make an important contribution, but they alone are not capable of significantly reducing greenhouse gas emissions on a global scale and at an acceptable cost. New and in some cases revolutionary energy technologies, many still years if not decades over the horizon, will have to be developed and adopted commercially along with the infrastructure to support them. But there is a great deal of uncertainty about how fast, or even if, these technologies will progress.

An accelerated program to improve the performance and lower the costs of advanced alternate energy technologies can, if successful, broaden the range of economically and politically viable policy options available to decision makers. National and international climate policy should concentrate on supporting greater energy efficiency and commercialization of all low-emitting technologies for energy supply, including nuclear power.

Developed and developing countries alike must make a larger commitment to technology development worldwide. Together, the United States and Japan account for an estimated 80% of all energy research and development spending by national governments. That has to change. Research and development into the next generation of potentially transformational energy technologies needs a substantial boost in funding, and the Energy Institute has recommended doubling the federal budget for advanced energy technologies.

A successful new agreement, then, should promote new partnerships involving developed, emerging, and developing countries and the private sector that create opportunities for technology co-operation, public-private partnerships, innovative financing, and capacity building.

With a clear stake in the process, developing country governments can be convinced that intellectual property protections are in their interests as well as ours. Their businesses already know this—from less than 5% of patents in 1998, emerging economies now account for roughly 20% of patents worldwide (Copenhagen Economics 2009).

<sup>28</sup>For more on the Energy Institute’s principles for a sound international agreement, see Harbert, K. 2009.

To be effective in reducing greenhouse gas emissions, a new arrangement should include realistically ambitious commitments by all countries in keeping with the principle of “common but differentiated responsibilities and respective capabilities.” Large developing economies, like China, India, and Brazil, must be a part of any new international accord for it to be credible. This is not to say that we should expect developing countries to take on commitments similar in scope to developed countries. While the character of the commitments in developing countries should be similar to those in developed countries in terms of ambition, the content of those commitments could be quite different depending on national circumstances.

The emphasis, therefore, should be on co-operation to assess the mitigation potential of different countries and develop cost-effective action plans that are “measurable, reportable, and verifiable.” A bottom-up approach that recognizes the results of domestic, bilateral, and multilateral activities and incorporates sufficient leeway to permit new ideas and approaches to be introduced as they emerge is one that could garner a broad support. It is also important that these commitments evolve as economic circumstances change.

Governments also should be taking steps outside of the Framework Convention to overcome barriers to technology transfer and commerce. Eliminating tariff and non-tariff barriers to environmental goods and services should be pursued vigorously to lower costs and increase global access of clean energy technologies. Although WTO, not UNFCCC, is the appropriate forum for these discussions, it is an example of how the international discussion on climate change can catalyze action in other areas.

In addition, the energy supply sectors in many countries suffer from extensive and lengthy regulations that delay new energy projects. National governments also can ensure that energy projects move ahead with greater predictability by streamlining siting, permitting, and other regulatory requirements. It is inexplicable that governments have not taken these relatively simple but extremely effective steps.

Finally, the range of voices in the negotiations needs to be expanded. To get a workable agreement, the energy, industry, and finance ministries must get fully engaged. It is these ministries, after all, that will be responsible for implementing key aspects of any agreement. Governments also should recognize and embrace business engagement so the international process can take better advantage of the range of technical expertise that business can provide.

At the end of the day, all the “modalities” and “frameworks” erected in these negotiations cannot ward off failure if the vision is not realistic—unreasonable expectations only breed unreasonable demands and finger-pointing. Business needs a predictable environment in which to operate and plan, and it would welcome an ambitious international climate change agreement. But that ambition needs to be tempered with a healthy dose of pragmatism. A realistic vision focused on technology that encourages cooperation, not confrontation, would be a good place to start.

The CHAIRMAN. Thank you very much.  
Mr. Colvin.

#### **STATEMENT OF JAKE COLVIN, VICE PRESIDENT FOR GLOBAL TRADE**

Mr. COLVIN. Thank you very much, Mr. Chairman. Thank you, Senator Murkowski. I’m honored to be here today and we welcome the commitment of Congress and the administration to address the urgent problem of climate change. We particularly welcome the attention of this committee to the international aspects of climate policies.

The National Foreign Trade Council is the country’s oldest trade association devoted specifically to international trade and tax policies. I’m proud to say that a number of our member companies have been leaders in addressing climate change through their business practices, partnerships, and advocacy efforts.

NFTC broadly supports efforts to reduce U.S. emissions, as well as an international framework agreement. But the council does not take a position on comprehensive climate legislation, which addresses issues beyond our mandate and expertise. We focus only on the aspects of climate policies which are likely to impact the global

economy. I would like to concentrate on two of those issues here today. First is the importance of a robust green trade component of U.S. climate policies and the second is to put a finer point on some of the things that my fellow panelists have said, the danger of imposing new carbon tariffs.

Efforts to expand overseas markets for U.S. climate technologies will be critical for creating new green collar jobs. While the United States is the largest consumer, one of the largest consumers, of green goods and services today, demand growth has slowed in recent years. Overseas markets offer significant potential for U.S. businesses. U.S. exporters face high tariffs and other obstacles to green exports. Reducing these hurdles would allow U.S. companies to capture a larger share of the \$600 billion environmental goods and services market. In addition, the World Bank notes that it is widely accepted that trade liberalization would benefit the environment.

But thus far green trade has not received a great deal of attention in the international climate discussions. Given its environmental importance, we hope that the administration and Congress can work together to advance cooperation on these issues, not only in economic forums but in relevant international climate forums, including the U.N. FCCC and the Major Economies Forum.

Two issues that have received a great deal of attention in international climate discussions are intellectual property rights and financing. My colleague Karen has noted, IP rights are important to the U.S. economy as well as to the development of new energy solutions and environmental technologies. This is why proposals at the U.N. FCCC that would weaken the value of intellectual property assets are so troubling. We commend the administration and Congress for their continued strong support of global intellectual property rights protection and we would urge your continued vigilance as the negotiations progress.

I think it's equally important, though, to note that the United States should support robust financing mechanisms, and getting this pillar right is critical to the success of international climate negotiations. It will also create new markets for U.S. exports. Overall, an aggressive strategy to promote green exports and innovation would complement the administration's goal of rebalancing the global economy.

I think green trade also presents a unique opportunity for Congress and the President to work together toward objectives that ought to attract strong bipartisan support.

Given the increasing reliance on exports to grow the U.S. economy, it is essential to avoid measures which could make it more difficult for American businesses to succeed in the global economy. We are particularly concerned about the potential for carbon tariffs in U.S. cap-and-trade legislation to encourage retaliation from U.S. trading partners and the potential to ignite a global green trade war.

This concern is shared by a number of U.S. industries, including some of the sectors which are most likely to be affected by U.S. climate policies. For example, the Farm Bureau has testified that carbon tariffs are in serious jeopardy of being found to be noncompliant with our WTO obligations and that they could very likely lead

to retaliation. The American Forest and Paper Association has written that a border tax is highly imperfect and should be avoided. The U.S. chemical and aluminum industries have expressed similar concerns.

Increasingly, other countries are also raising the possibility of using green tariffs against the United States. If Congress legitimizes carbon tariffs through U.S. legislation, it will become more difficult to argue against their use by others.

Imposing green tariffs also threatens to cause diplomatic tensions which will make it more likely to cooperate on environmental initiatives with developing countries, I think as already mentioned.

For all of these reasons, we share the skepticism expressed by President Obama to border measures. At the same time, we appreciate the need to address legitimate political and economic concerns and ensure the passage of U.S. climate legislation. So if a border adjustment mechanism is to be contemplated in U.S. legislation, we believe it is essential that any provision provide complete authority and discretion to the President to determine if and when such a measure should apply. We think it will also be important to design a measure in a way that recognizes steps that other countries, and even overseas individual firms, are taking to reduce their carbon footprint.

To conclude, an aggressive and innovative green trade policy can assist efforts to advance U.S. economic priorities as well as environmental goals, but attempts to impose new green tariffs could harm both.

Thank you very much for the opportunity to share our views.  
[The prepared statement of Mr. Colvin follows:]

PREPARED STATEMENT OF JAKE COLVIN, VICE PRESIDENT FOR GLOBAL TRADE

Mr. Chairman, Thank you for the opportunity to testify before the Committee. We welcome the commitment of Congress and the Administration to address the real and urgent problem of climate change. We particularly appreciate your efforts to highlight the international aspects of climate policies.

The National Foreign Trade Council (NFTC) is the country's oldest and largest trade association devoted specifically to international trade and tax policies. Our members are global companies doing business in virtually every country on earth. The NFTC supports an open, rules-based trading system, promotes international tax policies that contribute to economic growth and job creation, and opposes unilateral economic sanctions.

Given our focus on international economic issues, the Council does not take a position on specific legislative approaches to climate change. While we broadly support targets to reduce U.S. emissions and an international framework agreement to put countries on low emissions pathways, comprehensive climate legislation addresses issues beyond our mandate and expertise.

I am proud to say that a number of NFTC's member companies have been leaders in addressing climate change through their business practices, partnerships and advocacy. For example,

- ExxonMobil is a leader in the development and use of component technologies essential for carbon capture and storage (CCS), which represents an important opportunity for reducing global emissions.
- GE is on track to double its R&D in its ecomagination products to \$1.5 billion by 2010 and has reduced the intensity of its greenhouse gas by 41 percent since 2004—surpassing its own goal of a 30 percent reduction.
- Procter & Gamble has doubled its 2012 reduction targets for greenhouse gas emissions, waste generation and water and energy consumption and recently unveiled the activation of a 1.1 megawatt photovoltaic solar system at its paper products manufacturing plant in Oxnard, California.

- Wal-Mart has outlined a series of aggressive goals and expectations with leading suppliers, officials and NGOs in China to improve energy efficiency, use of natural resources, transparency and compliance with environmental laws.

In addition, a number of NFTC's member companies have partnered with organizations such as Conservation International and the World Wildlife Fund on projects to reduce voluntarily their carbon footprint and conserve resources. Others have expressed views about U.S. climate policies on their own or through organizations such as the Business Roundtable, which just released a report outlining its views on a sustainable climate and energy policy, and the United States Climate Action Partnership (USCAP), in which nine of the Council's board companies participate.

The Council focuses only on the aspects of climate policies which are likely to impact the global economy, relations with U.S. trading partners, and the international competitiveness of our member companies. I would like to concentrate today on two issues related to international economic aspects of climate change:

- First, the United States has an opportunity to further U.S. economic growth and global environmental goals by more fully incorporating a green trade component into the U.S. climate agenda.
- Second, addressing competitiveness concerns in U.S. climate legislation presents a serious challenge for policymakers. There is a danger that well-intentioned and politically popular measures such as carbon tariffs could threaten U.S. export markets and undermine global environmental cooperation.

#### PROMOTING U.S. GREEN JOBS AND CLEAN TECHNOLOGY DEVELOPMENT AND DEPLOYMENT

The Administration and Congress can promote green jobs at home and advance global environmental objectives by incorporating a more robust green trade component into the international climate agenda.

##### *Expanding overseas markets through green trade*

In particular, efforts to expand overseas markets for U.S. climate technologies by reducing trade barriers is critical for creating new green collar jobs in the United States and can aid global climate goals.

Future growth of the U.S. clean energy economy will depend on access to foreign markets. While the United States is among the largest producers and consumers of green goods and services today, demand growth has slowed in recent years. Demand for environmental goods and services is growing rapidly in developing countries, which offer significant opportunities for U.S. companies.

U.S. exporters face disproportionately high tariffs and other obstacles to selling environmental goods and services like wind turbines and solar panels abroad. In fast-growing developing countries such as China and India, tariffs can be as high as 40 percent. In some instances, non-tariff measures such as preferential government procurement policies and foreign investment restrictions present even larger obstacles for U.S. businesses. Reducing these impediments would allow U.S. companies to capture a larger share of the more than \$600 billion environmental goods and services market, which is growing at twice the rate of all trade.

Removing green trade barriers can also help the environment. The World Bank notes that, "it is widely accepted that trade liberalization of [environmental goods and services] would benefit the environment by contributing to lowering the costs of goods and services necessary for environmental protection, including those beneficial for climate change." Research also suggests a link between more green trade and improved environmental quality.

Thus far, green trade has not received a great deal of attention in international climate negotiations despite the clear environmental benefits. While the United States has proposed an Environmental Goods and Services Agreement as part of the Doha Development Round of trade negotiations under the World Trade Organization (WTO), progress has been slow.

Given the economic and environmental importance of green trade, we hope that the Administration and Congress can work together to identify additional channels to advance cooperation on these issues, including through the Major Economies Forum and the United Nations Framework Convention on Climate Change (UNFCCC).

Earlier this year, NFTC partnered with eight other leading U.S. business associations to call on the President to elevate the priority of lowering green trade barriers and to pursue a green trade agreement "through all appropriate international economic and environmental forums." A copy of the letter is attached to this testimony.

*Improving global frameworks to encourage the development and deployment of U.S. clean technologies*

Two issues that have received a great deal of attention in international climate discussions are intellectual property rights and financing. Ensuring the global protection of intellectual property rights and addressing funding and capacity needs in developing countries will promote investment environments abroad that are better able to adopt and develop clean technologies.

The intellectual property rights system—and predictable enforcement of those rights overseas—helps spur innovation and economic growth across all sectors of the U.S. economy. Importantly, the system promotes the development of new energy solutions and environmental technologies needed by communities around the world to address global warming. Given the importance of IP protection for promoting innovation and developing clean technologies, proposals in the UNFCCC negotiations that seek to weaken the value of intellectual property assets are troubling. We commend the Administration and Congress for their strong and continued support for global intellectual property rights protection.

While it is essential to protect and reward U.S. innovation, it is equally important for the United States to support robust financing and assistance mechanisms to ensure that developing countries can develop the capacity to address climate change and adopt clean technologies. Financing is an important pillar on which success of the UNFCCC negotiations will hinge, and can help secure strong actions from developing countries. Getting it right—in terms of adequate public funding, proper mechanisms and reporting requirements, and targeting public funds to create enabling environments that will attract private capital and investment—is critical. Investing in the development of overseas capacity for clean energy technology will help accelerate the reduction of global emissions and create new markets for U.S. products and services.

*Promoting sustainable economic policies*

An aggressive strategy to promote green trade and innovation would complement the goal of rebalancing the global economy that President Obama and other world leaders established at recent G-20 forums. As President Obama said prior to his recent trip to Asia, a new global growth strategy will be “one in which prosperity around the world is no longer as dependent on American consumption and borrowing, but rather more on American innovation and products.” Future U.S. job growth will rely increasingly on tapping higher demand from overseas markets, particularly from China and other advanced developing countries.

Green trade also presents a unique opportunity for the President and Congress to work together on a bipartisan basis and restore a common purpose to U.S. trade policy. Policies aimed at opening markets for U.S. clean technologies, protecting and promoting innovation, and providing high-quality financial assistance to developing countries ought to attract strong bipartisan support.

ADDRESSING COMPETITIVENESS CONCERNS

As Congress seeks to address competitiveness and carbon leakage concerns from implementing an emissions reduction program, one popular option—the use of border adjustment measures—could damage the ability of American companies to compete in key markets and global environmental cooperation. Given the increasing reliance on exports to grow the U.S. economy and create new jobs, it is essential to avoid introducing measures which could cause unnecessary friction with U.S. trading partners.

*Avoiding a green trade war*

One concern is the compatibility of border adjustment measures with global trade rules. Although border measures are not inherently incompatible with trade rules, the WTO notes that, “a connection must be established between the stated goal of the climate change policy and the border measure at issue” and “the measure must not constitute a “means of arbitrary or unjustifiable discrimination” or a “disguised restriction on international trade.” As a result, according to Jeffrey Frankel of Harvard University, “border measures to address leakage need not necessarily violate the WTO or sensible trade principles, but there is a very great danger that in practice they will.”

The House-passed American Clean Energy and Security Act is particularly troublesome in this regard. By establishing a mandatory international reserve allowance program and requiring Congress to approve a joint resolution to turn it off, the House of Representatives introduced a political element into the decision-making process. U.S. trading partners will argue that such a program is as likely to be

fueled by a desire to protect domestic industry as by an interest in protecting the environment.

While NFTC believes that the free allowances contained in current legislative proposals could also be scrutinized for their compatibility with global trade rules, the reality is that these allocations are less likely to disrupt the global trading system or cause conflict with U.S. trading partners. One reason is that most countries contemplating emissions reduction programs include free allowances in their plans and will be reluctant to challenge similar efforts by others. Trade expert Gary Horlick also pointed out earlier this year in testimony before the Senate Finance Committee that, “import restrictions are much more likely to be challenged in the WTO than is financial assistance to producers, such as offsetting costs or giving away permits.” In practice, countries are bothered more by tariffs than financial assistance.

Regardless of whether it is possible to design a provision that complies with global trade rules, it is not in the economic or environmental interest of the United States to rely on border adjustment measures. They have already been met with fierce resistance by developing countries such as China and India. Border measures are likely to encourage retaliation from U.S. trading partners and will make it more difficult for American businesses to succeed in the global economy.

Concerns about the impact of border measures on the global competitiveness of U.S. businesses and workers have led many industries to oppose them, including some of the sectors projected to be most heavily affected by climate legislation. Associations representing the forest, chemical and aluminum industries, along with the American Farm Bureau Federation, have all expressed skepticism about their utility. For example:

- The American Chemistry Council said in a September statement that, it “does not support policies that aim to address emissions leakage by imposing border taxes or some other trade-related cost adjustments.”
- The American Farm Bureau Federation has testified that, “Provisions such as those contained in the House bill effectively imposing border tariffs on goods from countries that do not have similar GHG restrictions will almost certainly be challenged in the WTO and are in serious jeopardy of being found to be non-compliant with our obligations. Moreover, such actions could very likely lead to retaliation.”
- In August, the American Forest & Paper Association wrote in a statement to the Senate Finance Committee that, “a border tax or other border measures are highly imperfect, will have their own negative repercussions, and should be avoided.”
- Stephen Larkin, President of the U.S.-based Aluminum Association, observed recently that, “We believe that border adjustments are not useful.”

Increasingly, other countries are also raising the possibility of using a border tariff against the United States if Washington fails to pass climate legislation or U.S. targets are seen as too weak. If Congress legitimizes carbon tariffs through U.S. legislation, it will become more difficult to argue against their use by U.S. trading partners.

In short, border measures threaten to ignite a green trade war and diminish the President’s authority and ability to rebalance the global economy.

#### *Balancing U.S. political interests with international environmental goals*

Imposing a cost on certain imports into the United States through a border adjustment measure or carbon tariff is also unlikely to advance U.S. environmental goals. Doing so could have a negative effect on relations with key developing countries whose participation in an international agreement is essential to addressing global climate change.

One problem is that a carbon tariff is a blunt instrument, at least as it has been conceived in U.S. legislation thus far. Carbon tariffs would likely apply equally to imports from energy-efficient facilities and carbon-intensive producers from a target country. This blanket application does not provide the kind of incentive to foreign producers to become more energy efficient that would encourage a reduction in carbon emissions.

More broadly, imposing green tariffs would likely cause diplomatic tensions that will make it more difficult to cooperate on important environmental initiatives with key developing countries.

For all of these reasons, we share the skepticism expressed by President Obama to border measures in June. In order to create a level playing field for manufacturers, the President said that, “there may be other ways of doing it than with a tariff approach.”

Although we are skeptical about the utility or necessity of including carbon tariffs in U.S. climate legislation, we appreciate the need to address legitimate political and economic concerns to ensure the passage of climate legislation in the United States.

If a border adjustment mechanism is to be included in U.S. climate change legislation, it is essential that any provision provides complete authority and discretion to the President to determine if and when it should apply. It will also be important to design a measure in a way that recognizes steps that other countries are taking to green their economies, particularly in the context of an international framework agreement on climate change. We would also encourage Congress to consider whether it is feasible to design a measure in such a way that provides incentives for foreign companies to green their production. Carbon tariffs should not be applied either to countries which are taking nationally-appropriate steps to combat climate change or to imports of goods from overseas facilities, wherever located, if those individual facilities haven't taken steps to lower their greenhouse gas emissions on their own.

#### CONCLUSION

Aggressive and innovative green trade policies can assist efforts to advance U.S. economic priorities and environmental goals, but attempts to impose new tariffs could harm both. As General Electric's CEO Jeffrey Immelt wrote earlier this year, "Renewing American competitiveness will not be accomplished through protectionism, but by rebuilding American technology, manufacturing and exports." Efforts to open markets abroad for U.S. businesses and workers in the clean technology arena will be essential to rebalance the global economy and create the next generation of green manufacturing jobs in the United States. Thank you for the opportunity to share our views.

ATTACHMENT.—LETTER TO THE PRESIDENT

*Washington, DC, July 30, 2009.*

Hon. PRESIDENT OF THE UNITED STATES,  
*The White House, 1600 Pennsylvania Avenue, NW, Washington, DC.*

DEAR MR. PRESIDENT: We write to express our appreciation for your commitment to lower trade barriers to environmentally-friendly goods and services, which would result in important benefits for the U.S. economy and to global climate change efforts. We strongly urge you to pursue a swift conclusion of a comprehensive Environmental Goods and Services Agreement through all appropriate international economic and environmental forums.

Lowering trade barriers on green goods and services would be good for the environment and the U.S. economy. The World Bank notes that, "it is widely accepted that trade liberalization of [environmental goods and services] would benefit the environment by contributing to lowering the costs of goods and services necessary for environmental protection, including those beneficial for climate change." U.S. businesses and workers would also benefit from the removal of disproportionately high tariffs and non-tariff barriers that U.S. exporters face on green goods and services in a large and rapidly growing export market. Lowering trade barriers would help create the green jobs that will accelerate recovery of the U.S. economy.

We urge you to use all possible channels to pursue an agreement to reduce or eliminate trade barriers on environmental goods and services. While the Doha Development Round of trade negotiations under the World Trade Organization (WTO) is one appropriate forum, we believe the combined economic and environmental benefits of an agreement warrant the exploration of alternative or complementary efforts. We hope you will investigate the feasibility of either a plurilateral agreement at the WTO or the initiation of negotiations via another forum, balancing the need to capture a significant portion of environmental trade and an ability to enforce commitments with a framework that is flexible enough to permit the rapid conclusion of a deal. We believe that either the Forum on Asia Pacific Economic Cooperation (APEC) or the Organization for Economic Cooperation and Development (OECD), which have initiated important work on reducing barriers to green goods and services, could serve as the basis for interim commitments in advance of an agreement at the WTO.

We also encourage you to introduce the consideration of avoiding and eliminating barriers to green trade into international climate change discussions. While an environmental forum is not the appropriate venue for negotiating a trade agreement, international climate discussions—for example at the United Nations, in the Major Economies Forum and in bilateral and regional forums—should reflect the importance of lower trade barriers in delivering clean technologies to developing coun-

tries. As international climate change negotiators seek to agree upon a range of policies to help developing countries finance and adopt clean technologies, promoting the utility of lowering trade barriers on green goods and services should be a key component of a U.S. approach. This approach should also facilitate the deployment of technology while preserving in full the incentives for U.S. companies to invest in the development of new solutions. Promoting trade and protecting Intellectual Property rights in green technologies are of paramount importance if we are to enable the creation of new solutions to climate change and green jobs in the United States.

It is equally vital for domestic efforts to recognize the importance of lowering trade barriers. Thus far, congressional efforts to provide a framework for exporting clean technology, for example through the American Clean Energy and Security Act of 2009, have failed to include any mention of global trade in environmentally-friendly goods and services. Emphasizing the importance of an international environmental goods and services agreement in domestic legislation would enhance legislative efforts to deliver clean technologies to the developing world. We hope that you and your Administration will work with Congress to generate clear signals of support for lower trade barriers, which can help to reinforce a positive message on lowering green tariffs to the international community.

We look forward to working with you to amplify and support your efforts to achieve an Environmental Goods and Services Agreement in the coming months. Thank you for your consideration of these comments.

Sincerely,

Business Council for Sustainable Energy, Coalition of Service Industries, Emergency Committee for American Trade, Information Technology Industry Council, National Association of Manufacturers, National Foreign Trade Council, Organization for International Investment, Retail Industry Leaders Association, United States Chamber of Commerce.

The CHAIRMAN. Thank you and thank you all for your testimony. Let me ask a few questions.

Ms. Smith, one of the talking points that we hear a lot here in the Congress is that it doesn't matter what we do about climate change, the Chinese are building another couple of coal-fired powerplants every week and that's sort of the way things are going. Sometimes the talking point says they're building one a week, sometimes the talking point says they're building two.

You testify—in your testimony you indicate that they're shutting down coal-fired powerplants. Could you maybe give us your best opinion or advice or expertise on what are the facts? Are they adding to the production of electricity from coal-fired plants? Are they moving away from that? What's happening?

Ms. SMITH. Thank you, Senator. They're doing both. So China's share of world coal use is about over 40 percent and it's continuing to rise. Coal now provides 70 percent of China's energy and almost 80 percent of its electricity. They have the project which shuts down dirty smaller coal-fired powerplants while they're building new, more innovative ones. So China's coal fleet right now is actually more efficient than the U.S. coal fleet when you look at it overall.

The idea is that—

The CHAIRMAN. On a net basis, is there a way to say that they are increasing or decreasing emissions from coal-fired powerplants as we move ahead?

Ms. SMITH. On a net basis, I think right now you would say that they are increasing. But at the same time, they've also taken some significant steps to really clean up their projects. So right now China has the most advanced coal-fired powerplant projects in the world, including GreenGen, which is the most forward-leaning CCS project in the world.

The CHAIRMAN. Mr. Colvin, let me ask you a question about—you talked about green trade and green tariffs, the advantages of not having these kinds of tariffs or barriers to trade. This latest—this announcement a week or two ago that a Chinese firm is going to build a very large wind-fired—wind-powered farm there in West Texas, I believe, my understanding of that is that they are doing that as a joint venture with some U.S. companies and they are insisting that all of the turbines that would be used at that wind farm would be Chinese manufactured.

Is that something that should concern us, if you have financing coming in to underscore or underwrite the costs of projects in this country with restrictions on what kinds of—where the manufactured equipment that is going into those projects needs to come from?

Mr. COLVIN. Thank you, Senator. I'm unfamiliar with the example that you've just provided, but I think as you described it it should certainly concern us. I think it underscores the difficulty, but also the opportunity, to work with China.

I think as Taiya explained in her testimony, our markets are relatively open to foreign investments. The Chinese market is not necessarily. So while China has embarked on clean energy policies as a national strategy, we haven't done much on the trade side and on the investment side in terms of collaboration with China and other countries of late to open up markets for our technologies, for our goods, for our services.

So I think there are a couple of components here. The first is a robust offensive, aggressive U.S. trade policy. When we enter into a negotiation with China, with other countries, for example to lower or eliminate barriers on environmental goods and services, we get to lower barriers in China. Since our barriers are already low, we get to enter into a negotiation and help to remove barriers in their countries.

I think another thing that's important is something that Taiya alluded to, which is that we need to set up standards that are transparent, that are nondiscriminatory, that do not advantage one particular country's products or firms or technologies versus another. When American firms can compete on a level playing field and the process is transparent, I think that's better for all of us.

The CHAIRMAN. Let me ask one more question here in my remaining 6 seconds. Mr. Purvis, could you just briefly describe what Europe is doing in recognizing this deforestation as a legitimate offset? To what extent does it figure into their ETS, emissions trading scheme?

Mr. PURVIS. Senator, as you may know, Europe was one of the more skeptical parties in the Kyoto negotiations about the idea of including forests in climate agreements and in their domestic or regional climate policy. So in the early phases of the European emissions trading system there's a very limited role for forests. In fact, it's largely squeezed out.

But Europe has made it clear, the European Union has made it clear, that if there is an agreement, a global agreement that includes forests, they will allow those forests into the next phase of the European emissions trading system and that they will adopt the rules that are negotiated internationally. So they've turned the

corner. I think they have much greater confidence that these emissions reductions can be measured and verified, and they are willing to allow them in on the basis of a global agreement.

Some European countries are leading—Norway is an example. Norway has pledged over a billion dollars of funding to help countries like Brazil and Indonesia, even countries where deforestation is not currently a problem, but where the threat of deforestation exists, such as Guyana; and it is really showing what can be done by engaging with these countries. Brazil's deforestation is now down remarkably, well over 50 percent from its high in 2005. Brazil has pledged to reduce deforestation in the Amazon region 80 percent by 2020 compared to its high water mark, and has now in just this last couple of days put forward a national economy-wide emission reduction goal that is over 30 percent.

In Indonesia, the president of Indonesia recently in the margins of the recent General Assembly summit in New York pledged that Indonesia's emissions, most of which come from deforestation, would be reduced over 20 percent by 2020, and with international financial assistance 40 percent.

So Europe is encouraging this leadership by developing countries.

The CHAIRMAN. Thank you very much.

Senator MURKOWSKI.

Senator MURKOWSKI. Thank you, Mr. Chairman.

This handful of countries, notably China, France, and Japan, have expressed some degree of support, or at least had discussion about, a carbon tax. As we listen to all of you this morning, you raise the issues of trade certainty within the business community. I throw this out to any of you to discuss the merits of a possible carbon tax as opposed to a cap-and-trade type of a system and just how it interrelates at the international level.

Ms. HARBERT. Thank you, Senator.

Senator MURKOWSKI. Ms. Harbert, if you could lead off.

Ms. HARBERT. I'll address what I think are the characteristics that might differentiate the two. If you employ a carbon tax, you reduce the volatility associated with cap-and-trade. There's a sure price, obviously, on carbon. It's a more transparent system and I think that that bears a lot of value in today's very uncertain market, that there's a very transparent way of doing it.

We have to look at how you could actually include offsets, because in any scheme, whether it's cap-and-trade or a carbon tax, as noted by I think Dr. Levi, that EPA itself said that without offsets the price for reductions would be 89 percent higher. So we're clearly going to have to think a lot more creatively than we currently are so that we can actually demonstrate the leadership that you referenced in your opening remarks, which is to show the developed and developing world that you can grow your economy and be good stewards of the environment at the same time. By emphasizing other approaches and different suites of technologies and different financial incentives and reducing tariff barriers around the world, there's a way to do this that's not disruptive.

I think all options should be on the table, whether it's cap-and-trade or a carbon tax. They each have different merits and they shouldn't be just immediately written off the table.

Senator MURKOWSKI. Mr. Purvis, then Mr. Levi.

Mr. PURVIS. Senator, I agree that a number of policy options should be considered by the Senate. Internationally, the momentum is toward cap-and-trade and away from taxes. So what we see in the European Union is that they've extended their cap-and-trade system through 2050 and they've also expanded the share of the European economy that is covered by that cap-and-trade system.

The new government in Japan has reversed course and the long opposition to a cap-and-trade system there is now over and the official policy is that they're moving rapidly toward cap-and-trade. In Australia there is before the senate a bill to establish a cap-and-trade program. There are many countries that have not gone this route that are moving rapidly toward that.

So I think there are still opportunities for the U.S. to affect the mix of international policies, but cap-and-trade is gathering momentum.

Senator MURKOWSKI. Dr. Levi.

Mr. LEVI. A carbon tax is perfectly fine in principle. Let me make a few points that I think are important to consider when thinking about it. First, a carbon tax is not simple. Once you run a carbon tax through a real political process, it will look very complicated. It can quite easily include things like offsets through tax credits. It can include a lot of other measures that we have in the cap-and-trade legislation that's been put before the Senate.

The second is the numbers matter a lot. So the level of the tax is fundamentally important to its impact.

The third is verification. We can verify quite straightforwardly in other countries whether a carbon tax is being imposed, but we need to be able to look at that in a broader context. If a carbon tax is imposed and the revenue is used to subsidize dirty industries in other parts of the economy, that doesn't necessarily give us a net gain on emissions. So we need to look at this within a broader context of what countries are doing.

Let me put, though, one recommendation for something to look at. We're talking about—it's come up in several people's testimony, the possibility of carbon tariffs on imports into the United States. One option to preempt that would be for countries like China to levy their own fees on exports heading out of their countries, essentially a carbon tax, but restricted to exports from their countries. There have been signals from China in the past of heading in that direction. It would level the playing field when we compete abroad in energy-intensive industries and would avoid some of the diplomatic complications involved in imposing a tariff here.

Senator MURKOWSKI. Let me ask very quickly. As you know, we have the EPA that has a stick over the head of Congress here in terms of rolling out any climate change policy as they begin to regulate domestic greenhouse emissions sooner than later. Can any of you discuss whether or not we have any other countries that are in a similar situation, considering this type of a command and control type of regulation as their principal climate policy, because that may be where we end up next year, the EPA setting that policy?

Ms. SMITH. Certainly when you talk about command and control the Chinese government comes to mind. Their policy has very

much been a top-down, where they are defining for the rest of the country how they shall be working on climate change. What they found is that the mountains are high and Beijing is far away, which means that it's very difficult to enforce that throughout the provinces, even in an authoritarian government like they have in China.

So were this to happen, there would be plenty of people within similar company, but you're finding that you have to do the same things throughout the country to ensure that the policies are actually followed through on.

Ms. HARBERT. I would just add one reason why I think other countries are not considering this, and it goes back to competitiveness. Countries are very concerned about their ability to compete in an increasingly competitive global marketplace, and command and control tends to penalize certain industries and inhibit their ability to compete on a level playing field internationally. So I think that's why we see most countries shy away from that.

The CHAIRMAN. Senator Cantwell.

Senator CANTWELL. Thank you, Mr. Chairman. Thank you for this important hearing.

I thank the witnesses for their testimony and their expertise. I want to say that I'm glad that President Obama and President Hu have signed an agreement today on clean energy cooperation. Myself and Senator Murkowski sent a letter to the administration in February asking them to pursue that, and several members of this committee, Senator Shaheen and Senator Bayh and many others, signed that letter. So we're glad that they're making some progress on that. I think we called for accelerated development of clean energy for an economic value that we could see in the United States.

Ms. Smith, again I want to thank you for your leadership in the last administration on getting a 10-year memorandum of understanding of cooperation between the U.S. and China on clean energy, because that was also mentioned in the President's statement from the White House today, a part of the framework moving forward.

But both you and Ms. Harbert mentioned this notion of kind of the concept of a single market, of the United States and China being able to accelerate the deployment of clean energy solutions if we were working more cooperatively together. One of the things that we have been pushing up here on the Hill is the notion of reducing tariffs between China and the United States in a cooperative fashion. Right now there is anywhere from—let me say it differently. The United States and China should take the lead in trying to zero out tariffs on clean energy solutions, and if we did that as a joint cooperative we would be very successful in convincing the rest of the world, but we would have created a market in China for U.S. products and services that would be much more affordable than they are today.

Any thoughts about that? I think right now some of the tariffs on U.S. products going into China are as much as 25 percent, so very high tariffs.

Ms. SMITH. Thank you, Senator. There are up to 26 percent tariffs on goods going into China, environmental goods and services. This issue has obviously been debated throughout the Doha Round

of trade negotiations as well. Right now I understand they are pushing it forward to be considered at Copenhagen, and one of the hopes is that if we can rally enough political pressure to have the political agreement include countries getting together to reduce these tariffs, that this could be a real positive feat.

The Chinese government is reluctant, and we've had many conversations with them at the highest levels of their government about this, and expressing that the Chinese people are actually suffering because of these extra costs on environmental goods and services going into China. So it's something that we need to continue to explain and certainly more discussion of it and making sure that more people understand the impact is going to be a key part of that.

Ms. HARBERT. The challenge is not just limited to China. If you look at Brazil or India, there are very high tariffs there on solar technology, on wind technology, that they could be greatly taking advantage of, and it would create new American jobs, new American industries.

I think the European Union strongly believes that we should be doing this as well, and if we had the U.S., the EU, and some of the leaders in the developing world, it would be really a win-win. That's where we are in the negotiations. We need to start looking for some win-wins and this strikes us and the business community as something that would generate growth and certainly be a win for the environment.

So I hope you continue to push it forward, and we will, too.

Senator CANTWELL. We have S. Res. 76 and we are going to.

But I'm interested, Ms. Harbert. What do you think—I've had many conversations with Chinese business and academics who are part of clean energy forums and discussions. They seem to be very supportive. Obviously, doing that and the government doing that are two different things. But how would we go about expressing the level of cooperation that this might garner between the United States and China? Considering they have so many products currently that are coming to the United States, this is about helping the trade imbalance with a solution that they actually need, and making it more cost affordable for their citizens.

Ms. HARBERT. You've hit the nail right on the head. This is an economic growth issue and, as we all know, the primary objective for the Chinese government for its people is economic growth, and then things come way after that, probably similar to what it is right now in the United States as well.

However, that means preserving at all cost their ability to develop technologies, to develop things that they will actually not just use for the domestic market, frankly, but to export. That's what this is about. It is about competition, and they want to be seen and be able to grow their domestic market for export in this. I think that we need to be able to convince them that this is actually an opportunity for them to exhibit leadership. They care very much about leadership. If we were to take a leadership role together, we could actually make a huge difference and they could claim a very respectable contribution to reducing greenhouse gas emissions.

Senator CANTWELL. Thank you very much.

The CHAIRMAN. Senator Barrasso.

Senator BARRASSO. Thank you very much, Mr. Chairman. I really appreciate you holding this hearing. I also want to thank you for partnering with me on introducing new legislation aimed at technological challenges that we face in addressing global climate change. As you know, 2 weeks ago we introduced legislation called the Carbon Dioxide Capture Technology Act of 2009. In the Senate we've discussed various proposals to regulate the output of carbon dioxide through a cap-and-trade approach. Some have advocated a carbon tax.

But as we've discussed, overlooked in the debate is the carbon dioxide already in the atmosphere, that is the carbon dioxide contributing to the warming of the planet. The best scientists tell us it's a factor. To what extent, there is disagreement. We're not exactly sure. But it seems to me a worthy approach to find a way to remove existing carbon dioxide from the atmosphere and then permanently sequester it.

This is the other end of the problem and it's sometimes referred to as "air capture." To accomplish this, we're going to need to invest the money to develop the technology. The technology can then be used worldwide. So the approach of our bill is to address it through a series of financial prizes, where we set technological goals and outcomes. The first to meet each criteria would receive Federal funds and international acclaim. Prizes would be determined by an advisory board under the Department of Energy. The board would be comprised of climate scientists, physicists, chemists, engineers, business manager, economists. They'd be appointed by the President and with the advice and consent of the Senate. The awards would go to those both public and private who could achieve milestones in developing and then applying the technology.

This is technology that could significantly help to slow or reverse the accumulation of carbon dioxide in the atmosphere. The carbon dioxide would have to be permanently sequestered in a manner that would be without significant harmful effects.

I believe that prizes can be a unique tool in creating technological developments. It only seems natural that if we can get all the best scientific minds thinking about the same problem we will significantly enhance our chances of solving it. I think that nations around the world would then want to use this technology.

The United States currently offers prizes through NASA's Centennial Challenge program. The Economist a couple of weeks ago reported on NASA's competition to create a new Moon Lander for future Moon exploration. The article states that NASA's system of prizes, quote, "spur technological development using the twin lures of hard cash and the kudos of being officially recognized," as the Economist says, "as cleverer than your peers."

So I want to thank you, Mr. Chairman, for working across the aisle on this important legislation when we talk about new technology which will not just benefit us in the United States, but will have global implications.

If I could, Ms. Harbert. There was an op-ed column in the Washington Post last week, November 13, "Cooling the Planet Without Chilling Trade." The authors say: "We agree that it's politically unrealistic and unwise to try and enact a cap-and-trade system that puts manufacturers in the United States at a competitive disadvan-

tage with those operating overseas that don't produce under comparable requirements."

In my home State of Wyoming, I'm concerned about the impact cap-and-trade would have on our soda ash industry. Our main competitor is China. If China's not bound by the same rules our industry is under, then American jobs are going to go overseas.

So I'd just like to ask for you to comment on that and what we should do in the case that, realistically, China is not going to go with hard caps?

Ms. HARBERT. I think that's why we have to have—we have to hit the reset button and have some new discussions on finding a way to bring the developing world and the developed world together on a reasonable and achievable path. If we embark on this alone, we certainly are not going to gain the accolades of our business community because they're going to be moving with their feet and moving to other countries that don't have the same environmental regulation.

That's not just bad for the American economy and bad for American jobs. That's bad for the environment, because they're going to places that will not have the same environmental regulation. So we need to be very clear about the objective. We want to remain competitive and we want to do good things for the environment and we want to have affordable energy. You can achieve all three if we're very creative and we invest in technology solutions like you have proposed or Senator Bingaman, if we get serious about innovative financing like this committee has approved in the Clean Energy Development Authority.

If we marry up technology, innovation, and financing, we can actually show countries like India and Brazil and Malaysia that there's a way to do this that invests in our future, brings technology to the forefront, and actually allows us to remain competitive, because I don't think anybody is going to sign onto something that imperils their future ability to grow their economy. That's just a fundamental reality.

So that's why we have continued to call for a little more realism in this approach. Let's go forward, let's go forward smartly, because then it will be achievable.

Senator BARRASSO. Thank you.

Thank you, Mr. Chairman.

Mr. LEVI. Senator, may I add a quick remark on that? The concerns are very important, but it's also important to look at the level of ambition in different countries, not just whether they have the same form of legislation or policy. Different countries have different circumstances, can approach the problem in different ways. Whether or not China has a hard cap or not doesn't matter as much as whether its rules, its regulations, its incentives are strong enough.

They can have a cap that's very high and very meaningless. They can have regulations that are tight and significant. That's where we need to focus in eliciting ambition from them.

The CHAIRMAN. Senator Shaheen.

Senator SHAHEEN. Thank you, Mr. Chairman, and thank you all for appearing here today.

Mr. Purvis, you talked about the importance of addressing deforestation as part of any kind of a global agreement. Can you—com-

ing from a State where we are very heavily forested, the second most heavily forested in the country, and where timber is a big interest in our economy, there is concern about how in fact any agreements, any global agreements, would actually hold those developing countries accountable for reducing deforestation.

Can you speak to how you think we can reassure people who are concerned about that, that in fact any efforts to address deforestation are going to be verifiable and that we can measure those and people can be confident that that's actually happening

Mr. PURVIS. Senator, thank you very much for the question and for your interest in this issue.

Of course, our forests in this country are growing, and the problem of deforestation is largely in developing countries. In fact, half of the deforestation globally is occurring in just two countries, Brazil and Indonesia. So the challenge is to work in partnership with these developing countries who are increasingly showing a real interest in curbing their deforestation, which they see as a threat to their long-term economic viability and to their security and to the welfare of their people, how we can do that in partnership with them.

Fortunately, satellite technology and other systems are allowing us to have a very clear sense of what's actually happening on the ground. We're able to use remote sensing to accurately establish not only the forest cover, but also the health of the forests, and determine through some good science the actual carbon content in those forests.

As a result of that ability, it gives us an opportunity to work with developing countries on a pay-for-performance system, where after some initial capacity-building assistance to make sure that they have the right plans in place and the right systems to be able to go forward, we can then reward them when in fact they do reduce their deforestation and achieve emission reductions.

That pay-for-performance approach is absolutely essential, I think, to set the incentives right in those countries, but also to assure the American people that the partnerships that they could have with developing countries would be achieving real outcomes, outcomes that would be reducing the cost of our climate action as well as achieving a real environmental benefit.

Senator SHAHEEN. Do you have estimates on what the cost of that kind of a pay-for-performance program would be?

Mr. PURVIS. Sure. We know from Brazil, as an example, that in their current Amazon Fund, where as I said they have pledged to reduce their emissions 80 percent by 2020, that they are asking for a \$5 a ton payment. That's a quarter of the expected cost of emission reductions under the bill that was approved by the House or by the Senate Environment and Public Works Committee. So significant cost savings are possible based on what developing countries themselves are asking for.

We also know from experience in the voluntary carbon markets that the cost of reducing deforestation, even on a relatively small scale, where it's less efficient than doing it on a large scale, are roughly in that range. So I think it's reasonable for the Senate to conclude that there would be very substantial cost savings, with

the average cost being well under \$10 a ton, probably closer to \$5 a ton in the next decade.

Senator SHAHEEN. Thank you.

Mr. Colvin, you talked about your concern about tariffs and the barriers that would be to global competitiveness, I think is the way I would translate what you said. I certainly share that. I think it's very important, particularly as we come out of this recession, that we have strong measures in place to help American businesses trade overseas and get their products into overseas markets, and appreciate the dynamic that we might set up by putting tariffs on imports is going to affect our exports.

But, having said that, what is the alternative for companies who feel like they're going to be negatively affected by our failure to address cheaper imports coming into the country?

Mr. COLVIN. Thank you very much. I think it's important to recognize that, as President Obama said in June after the passage of the American Clean Energy and Security Act, that there are other ways to address the problem. One of them is through free allocation of allowances through a cap-and-trade system. So if you are looking just at the current framework, free allowances are a way to make whole companies that are disproportionately affected by energy legislation.

I would also make the point that those companies are a small segment of the U.S. business community. It's important and it's important to get it right, there's no doubt. But I think it's important to take—it's also important to take a broader view of competitiveness. All of our firms, whether or not they are substantially affected by climate legislation, operate globally. So when you operate globally, it's important to make sure that markets are open and that other countries are not taking steps against your company for totally unrelated reasons, for example to retaliate against carbon tariffs.

Senator SHAHEEN. Thank you.

My time is up.

The CHAIRMAN. Senator Murkowski, did you have additional questions? Go right ahead.

Senator MURKOWSKI. I just have one more question. Thank you, Mr. Chairman.

This relates to the Kyoto Protocol. There's a group of professors, including Steve Rainer of Oxford and Gwen Prinz of the London School of Economics, and they have argued that it is in the world's best interest to abandon the construct behind the Kyoto Protocol, and have noted that Kyoto has failed to reduce the emissions of participating nations. They wrote recently that "It was always the wrong tool for the nature of the job," and instead have advocated a massive investment in the technological innovation and adaptation.

I would like to know your opinions on this assessment. Is the Kyoto Protocol a failure? Should we rethink this international framework?

Mr. Purvis, I believe it was you that mentioned if we succeed in Copenhagen or if we fail. I'm curious to know how you might define what success in Copenhagen is or, on the other hand, what failure might be?

Mr. PURVIS. Thank you, Senator. I think Kyoto is a Rorschach test. It's one of those things where you can see what you want. But there are a few things that I think are important to note. One, as a matter of fact it expires in 2012. Currently, the discussions are moving so that there is little interest among the developed countries who have obligations under Kyoto to continue Kyoto per se. So the outcome of the Copenhagen process, whenever it culminates, will be a legal instrument that is different from Kyoto, that will be under the framework convention on climate change, but will not be an heir to Kyoto.

I tried to highlight in my testimony a number of ways in which that process is moving in a much more beneficial manner to U.S. interests, where it's bottom-up, it's driven on the basis of action. We're not just taking countries' word that they're going to act. We're actually looking to see what they're doing. We're judging outcomes based on actual results rather than on promises. There's a greater diversity of actions that nations are allowed to put forward.

The formal proposals that are being considered envision that every country would have a schedule that it fills out that explains to the world what it's doing. The U.S. President working with the Congress would be able to determine the actions that the U.S. would submit to the international community and then there would be a process of reporting and monitoring and verifying what's been done in each country and a political process that would be, building on Dr. Levi's point about the importance of transparency, a political process to judge whether the sum of these different actions that are listed on each of these national schedules is in fact environmentally adequate, whether it's comparable, whether there's equity in terms of different countries taking action based on their different level of development.

That kind of approach strikes me as much—as politically realistic and well suited to the moment that we're in. It allows the President to work with the Congress to define an approach that works for this country. It gives that same flexibility to other countries to really figure out what's nationally appropriate for them, but then encourages a real exchange of information so we know what's happening in real time and we can intervene politically to make sure that countries are doing what they say that they are going to do.

Senator MURKOWSKI. Some have suggested, however and they are backing away from this now, that in order for Copenhagen to be successful that the Congress in the United States needed to adopt some form of climate policy. Obviously this is not going to occur prior to Copenhagen. Do we walk into Copenhagen with this label of "the U.S. has failed"?

Mr. PURVIS. I think that if Copenhagen fails there'll be an effort to blame the U.S. The President in his remarks, in his agreement with the Chinese president, suggested that the United States would be going to Copenhagen with some numbers. I suspect that what the administration is likely to do is to consult with the Congress and to leave some flexibility for the political process to work in this country after Copenhagen.

But the window to influence what the U.S. puts on the table will be relatively small, and at some point the international community

would like a clear answer about what the U.S. is able to offer. So at most, I think we have maybe 6 months or a year for the Congress and the President to find common ground and to establish a new set of agreements or a new set of actions for the U.S. that will be offered to the international community.

So I think Copenhagen can succeed in creating an architecture that allows for that additional political process in this country.

Senator MURKOWSKI. That would be a success in your opinion then, if it established that framework?

Mr. PURVIS. That architecture that is bottom-up, that allows for real verification of actions, allows for a political process about whether countries are doing enough, to me that would be a very positive outcome. Ultimately, countries will have to be definitive about what they're prepared to do. I don't think that the window for that ends in Copenhagen, but it's a limited window and I think there's an appreciation internationally of how the midterm elections and the political process in this country maybe mean that really the beginning of next year is the time for the Congress to consider what additional actions, if any, the United States would be prepared to put on the table.

Mr. LEVI. Senator, let me reinforce something that Nigel has said. If we get the right kind of architecture at Copenhagen, it steers all countries in the direction that is, frankly, that is discussed in the paper that you mentioned, one where we focus more on bottom-up efforts and one where we focus on political engagement and on implementation in countries, as well as transparency.

On the question of the interaction between U.S. legislation and international action, we've had a really polarized debate. There's been one side that basically says once we act everything will follow. There's another that says we won't make any difference at all. The reality lies in between those.

Unfortunately, as long as we don't have a comprehensive policy in place here the bulk of the international discussions will be focused on what the United States is or isn't doing. In particular, our European friends will spend a very large fraction of their time focusing on what the United States is or isn't doing.

Once we act at home, we can start to move beyond that. We've seen that when the United States and the Europeans line up in their positions toward the developing countries, we can make considerably more progress. To get to that point, though, we're going to have to remove this as a debating point across the Atlantic.

Senator MURKOWSKI. Thank you, Mr. Chairman.

The CHAIRMAN. Senator Sessions, did you wish to ask some questions of the panel?

Senator SESSIONS. Thank you, Mr. Chairman. I would. I don't want to repeat what has occurred. I had to be at a briefing, a closed briefing on the shooting at Fort Hood, so I apologize for not being here. It remains a matter of interest to me.

One of my concerns is that the last panel we had, I asked the question about whether or not the EPW bill would actually create jobs. Nobody agreed that it would create jobs. The experience in Spain was that, a study there, as I understand it, that it cost jobs. When you drive up the cost of energy, you definitely lose some jobs. The idea that they'll be more than made up by some sort of green

jobs is, at least to the panelists that I asked, about as many as here today, including top government agencies, concluded it's a net loss; as I would interpret their testimony, that it would be a loss.

One of the things that worries me is our unemployment as surging is, what about international offsets? Perhaps you talked about that some, but I would like to ask any of you to comment on it if you would like. What about the danger of transfer of American wealth to competitive economies, economies that are competing against us very day, in many cases winning that competition, because Americans get laid off and then two things occur. No. 1, we raise the cost of our energy, so our plant then becomes even less competitive; and No. 2, we take American—we buy offsets, for example, that I think could occur under the EPW bill, that we would pay money to a steel mill, let's say in China, to make efficiencies in their production that they might not otherwise make.

So am I missing something here, and is there a danger in international offsets that we would enhance the competitiveness of our global competitors and transfer American wealth and indeed could help us lose jobs here? Mr. Purvis?

Mr. PURVIS. Senator, thank you for the question. The idea of offsets is not that attractive to American business and to, I would imagine, the American political establishment, in the context of our not yet having made a decision to dramatically reduce our emissions. But once we're on the path toward ambitious climate action, then offsets are what allow us to achieve those actions in an affordable manner.

The Environmental Protection Agency has said that the price of emissions permits would be 89 percent higher under the bill that you cited if international offsets were not made available.

Senator SESSIONS. That's a good point. So it's cheaper to reduce CO<sub>2</sub> by giving money to China because their plants already are far less efficient and they use more energy to melt steel and create steel than we do, I would agree. But if that's not your only goal and your goal is the health of the American economy, how do you weigh that?

Mr. PURVIS. The other point I would make on competitiveness is that the EPA analysis shows that the majority of the international offsets over the next decade are likely to be in the forest sector. When we are purchasing offsets from Brazil or Indonesia or other tropical forest countries, what we're doing is protecting their forests and making sure that those forests are not harvested for their timber, which competes with U.S. timber, that those forests are not converted into agricultural lands, which then grow commodities which compete with U.S. agricultural commodities.

So in the early years the money in the large program is likely to not really go to China as much as it is to these other countries where there are very substantial co-benefits for allowing those offsets. So I think there are the initial cost savings as well as the opportunity to support other aspects of the U.S. economy.

Senator SESSIONS. There are studies that raise some question about the legitimacy of those offsets, since these countries may well have been replanting anyway, or they have an economic interest in doing so.

Would anybody else like to comment?

Ms. HARBERT. The availability of offsets is central to the affordability of any scheme. So the first question is are they going to be available? If we're successful in having an international agreement, those offsets might very likely be used by the countries themselves, thereby raising the price of compliance here in the United States. So we either are going to be transferring it to other countries or in an international format we actually may be increasing the price of—we are going to be increasing the price of electricity and gas, but it may be even higher than that if these offsets end up not being available for use.

I think the real issue for competitiveness and for the American business community is to find out how to do this without having to sacrifice jobs and move them overseas or transfer wealth, because at the end of the day if we are subject to some U.N. body that's going to determine whether this offset is real or not, American businesses all over the country are going to not be able to make business decisions in real time and capital investments, because they're going to be subject to a higher level of review by U.N. panels or whoever to determine whether these offsets are available to them or not. That's not really a real-time recipe for competitiveness in today's fast-moving economy.

Mr. LEVI. Senator, I think it's important to think about offsets in a broader context. If all we do is take steps at home and pay for emissions reductions below business as usual in a country like China, that's insufficient. But if we can include offsets in a system where we extract other commitments from those countries, where they take steps on their own in order to become eligible for offsets beyond those steps, where they take perhaps steps to reduce some of the tariff and non-tariff barriers to our selling clean technology into their countries in order to meet their regulatory requirements, then we can find win-wins.

But we need to broaden the discussion of what it is we're after if we want to get those win-win outcomes.

Senator SESSIONS. But if we pass the House or the Senate bill, we don't have any guarantee that that would happen. In fact, maybe we would have given it up because we had already declared that we were going to buy offsets from abroad. So I think the net of it is that it will not create jobs. I'll just leave it at that.

Thank you, Mr. Chairman.

The CHAIRMAN. Senator Shaheen, did you have another question? Senator SHAHEEN. No.

The CHAIRMAN. Senator Murkowski, did you have other questions?

Senator MURKOWSKI. No, thank you.

The CHAIRMAN. Let me just thank this panel very much for all your good testimony. I think this has been a useful hearing and we appreciate your efforts to educate us on these issues.

Thank you very much.

[Whereupon, at 11:28 a.m., the hearing was adjourned.]

## APPENDIX

### RESPONSES TO ADDITIONAL QUESTIONS

---

#### RESPONSES OF JAKE COLVIN TO QUESTIONS FROM SENATOR MURKOWSKI

*Question 1a.* Many argue that the United States must implement a robust climate policy in order to re-take the lead in the development of clean energy technologies. Key to this effort will be the protection of intellectual property rights, which can help companies recoup their investments and encourage them to keep working on new technologies.

Can you discuss some of the opportunities to secure intellectual property rights in both domestic legislation and an international treaty?

Answer. Internationally, the World Trade Organization Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) establishes the worldwide baseline for intellectual property rights and enforcement. Beyond TRIPS, many countries have extended IP rights and enhanced enforcement efforts through numerous regional and bilateral agreements. United States free trade agreements, for example, contain commitments from trading partners to extend IP rights and enhance enforcement efforts beyond TRIPS. Developing deeper economic relationships with U.S. trading partners—for example by concluding trade agreements—would provide additional avenues to strengthen protection of IP assets abroad.

Domestically, Congress should be commended for its attention in climate legislation and recent letters to the importance of intellectual property protection for promoting innovation and delivering clean technologies to developing countries. NFTC strongly supports the inclusion of the language in the American Clean Energy and Security Act at Section 441 and agrees that, “Intellectual property rights are a key driver of investment and research and development in, and the global deployment of, clean technologies.”

It is important for Congress to continue to make clear the priority it attaches to resisting attempts in global climate negotiations to distort trade and weaken global rules on intellectual property, as recent letters to the Administration from Members of both the Senate and House have done.

Congress should use future climate and energy legislation as opportunities to urge the Administration to resist the range of trade-distorting or IP-weakening mechanisms that governments have proposed and to target capacity-building assistance and funding to efforts to improve environments in developing countries for protecting IP rights.

*Question 1b.* If the United States demands that strong intellectual property rights be included in a post-Kyoto framework, how do you think the rest of the world will react?

Answer. Any country that seeks to promote the production of innovation should support a predictable market for intellectual property rights. These markets will stimulate investment in new technology and provide the legal framework for deployment. Ultimately, we believe that the world—particularly advanced developing countries like China and India, which are developing clean technology industries of their own, will support strong IP protection. And given the scientific consensus that time is short and we must invest heavily in new technologies to meet mitigation targets, the only IP conversation that should be happening at the UN is whether IP rights are strong enough.

Yet numerous proposals submitted to the United Nations Framework Convention on Climate Change (UNFCCC) draft negotiating text seek to weaken the value and global protection of IP rights. These efforts are based on the false premise that IP protection will slow technology deployment efforts, particularly in developing countries.

One of the worst things we can do is chill investment by giving any credibility to arguments which seek to weaken the assets underlying clean tech investments. It is our experience that such proposals are not supported by companies, environ-

mentalists—or by most member states. Weakening IP rights is not in the interest of any country which seeks to contribute to innovating and deploying new technology solutions.

We believe the best approach to international climate negotiations is to emphasize the importance of strong IP protection and make clear that global climate negotiations must exist within the established intellectual property regime. The system of rules that have been established under the WTO should not be altered by another body. Ultimately, the real issues in the international negotiations are funding and capacity-building, not IP. The United States and other developed countries will need to get creative to establish policies and incentivize adequate funding to help countries transition to low-carbon pathways.

*Question 2.* Like many academics and economists, you testified that border adjustment mechanisms in climate policy could prove highly problematic. Would it be easier to protect our nation's balance of trade under a carbon tax, a sectoral approach, greater investment on technological innovation, or another strong climate policy, as opposed to cap-and-trade?

Answer. While a carbon tax may make a border adjustment measure easier and more transparent to administer, the imposition of a “carbon tariff” under such a system could cause some of the same concerns among U.S. trading partners. Countries are bothered by the idea of new tariffs, however straightforward or fair they may be from an implementation perspective.

Regardless of the type of carbon-pricing policy Congress may implement, it would be useful to consider how to help workers in energy-intensive industries who may be harmed by the transition to a clean energy economy. As Joe Aldy and Billy Pizer concluded in a report prepared for the Pew Center on Global Climate Change, “most of the effect on domestic production arises from a shift in consumption away from carbon-intensive goods—rather than a shift in production to unregulated foreign imports.”

It is important to remember that certain energy-intensive manufacturing sectors are likely to face transition costs under a cap-and-trade program from a shift in consumer demand towards less energy-intensive products. While I believe that transitioning to a clean energy economy will ultimately create jobs, it is important to be honest about the costs too.

Congress might consider whether to provide transition assistance to American workers in energy-intensive industries who may face new competition from U.S. energy-efficient industries, which will become relatively more competitive if the United States puts a price on carbon. It might be especially useful to think about ways to target such assistance to more experienced workers who may be less willing or able to transition to green industries.

The United States may wish to look to how other countries are handling similar issues. Germany, for instance, is providing payments to older workers who have lost jobs in their domestic coal industry, and economic development programs to help coal towns transition to new industries.

Finally, there are numerous other trade-related incentives under consideration in the United States and other countries which have the potential to create jobs and help the environment. Eco-labeling schemes, clean technology funds, government procurement policies favoring climate-friendly goods, and incentives for research, development and production of clean technologies have all been discussed in various contexts. In general, policies are less likely to violate global trade rules to the extent that they are transparent, apply the same rules to foreign and domestic entities, do not needlessly restrict trade and are not designed to impact the export performance of domestic industry.

---

RESPONSES OF KAREN A. HARBERT TO QUESTIONS FROM SENATOR MURKOWSKI

*Question 1.* While the United States has focused almost exclusively on cap-and-trade, can you comment on other nations' ability and interest in implementing that type of system? Are other nations, developed and developing, capable of implementing economy-wide caps on emissions, creating a new carbon market, and properly administering cap-and-trade?

Answer. No nation that I am aware of has relied, or plans to rely, exclusively on cap & trade. The European Emissions Trading System, for example, covers the power generation and industrial sectors—sectors that constitute about 45% of total European greenhouse gas emissions. Nations, including the U.S., rely on many different policy options to achieve emissions reductions, including energy efficiency standards, lighting standards, building efficiency codes, renewable electricity requirements, renewable fuel requirements, vehicle fuel efficiency standards, and oth-

ers. Indeed, many of these other policy mandates require actions that might, because they are more costly, not be pursued under a true economy-wide cap & trade scheme.

For a cap & trade system to function properly, carbon traders have to be assured of the integrity of the emissions credits being sold on the market. Ensuring market transparency as well as an offset verification process is paramount for the private sector. It will be even more challenging to establish such a system in a developing country, many of whose power generation sectors are not as well established (for example, it is not uncommon for households to pirate power from the grid in many developing countries, which then weakens price signals we take for granted here in a well-functioning market). Moreover, developing countries have been clear that they will not accept binding emissions targets, which would be a prerequisite for a carbon market. It is very unlikely that a global emissions market on the scale as foreseen by the UN could be set in place with the requisite governance structure to ensure transparency and verifiability anytime soon.

Policy leaders and negotiators alike should be less focused on dictating the mechanism for countries to adopt and instead should ensure that existing mechanisms are utilized to the fullest extent possible. For example, we should be pursuing the removal of tariff and non-tariff barriers on clean energy goods and services through the Doha round, which would reduce the cost of clean energy and stimulate jobs here and around the world. That is the type of win-win approach negotiators should embrace.

Some countries may trend toward a sectoral approach focused on specific industries (e.g., steel, refining, and cement) as a way to ease competitiveness concerns, motivate action in developing countries, and bring them into international carbon markets (other than the market for offsets). Under sectoral trading, a developing country would commit a sector to an emissions cap for which it would receive tradable credits. While promising, sectoral approaches are not without their detractors, and as with many other proposals, the devil is in the details. There is, for example, a real concern that sectoral agreements could be structured in such a way that the primary beneficiaries would wind up being inefficient state-run enterprises that dominate many industrial sectors in developing countries which would disadvantage our private sector.

*Question 2.* In my opening statement, I expressed skepticism that an American climate policy would prompt the international cooperation that's needed to truly address this challenge. After all, while our nation has made significant progress on a host of issues here—from worker protections to environmental stewardship—those achievements have not always been matched by progress throughout the rest of the world.

Assuming the United States does pass a climate policy, can you comment on how that would affect the issues that have made international negotiations so tough, including who should be required to make emissions cuts, how steep those cuts should be, and who should pay for the costs associated with them?

*Answer.* I agree that it would be a mistake to conclude that all would be well if only the U.S. had domestic legislation in hand. While the U.S. Chamber supports Federal climate legislation, we also recognize that the most contentious issues in the international negotiations go well beyond what we can expect to see addressed in domestic legislation. These contentious issues include short-term emissions reduction commitments by developed countries, burden sharing by developing countries, finance, wealth transfers, technology transfer, and intellectual property concerns. It is not likely that these issues will be less contentious if a bill is signed into law. One need look no farther than the European Union, which has firm commitments and now finds itself in an unenviable position competitively. I would also note that very few other developed countries have comprehensive economy-wide climate laws on the books at present.

The position of developing countries is that developed countries should go first with deep and binding emissions reductions. Developing countries are not prepared to accept internationally binding commitments and they have been up front that their cooperation, in addition to being nonbinding, will only come with significant financial contribution. They are pressing for the developed countries to transfer anywhere from 0.5% to 2.0% of their gross domestic product each year to bankroll climate change programs in developing countries. At that rate, in 2008 the cost to American taxpayers alone would have been \$72 billion to \$289 billion. Developing countries also are trying to use the negotiations to weaken intellectual property protections through compulsory licensing of advanced energy technologies, ostensibly to remove barriers to “technology transfer.” It is unlikely that a domestic climate bill would change these dynamics in any meaningful way.

It is important to recognize that how rapidly advanced energy technologies develop and are adopted commercially will be the most important factor in determining how quickly and at what cost greenhouse gas emissions can be reduced. Existing technologies can make an important contribution, but they alone are not capable of significantly reducing greenhouse gas emissions on a global scale and at an acceptable cost.

To address global climate change and promote economic growth, we must promote a long-term vision that motivates and provides direction for national and regional cooperative activities, takes into account emerging science and technology development and turnover, recognizes growing energy needs, ensures the broadest participation from developed and developing nations, and does not undermine economic growth.

*Question 3.* To meet the 50-by-50 goals outlined in your written testimony, you indicated that emission-free electricity, most of which comes from nuclear and hydro sources, would have to increase by over 500% by 2050 from today's levels. Many developing countries and those with small electric grids would be challenged to increase their use of these resources, from both a technology and regulatory point of view.

Do you think a concerted international effort should be made to develop and promote small- and medium-size nuclear reactors for the developing world, along with the technical and regulatory capabilities those countries would need?

Answer. An agreement that focuses on technology offers a path forward that developed and developing countries can embrace. We believe all energy sources should be on the table, but it is difficult to see how deep global emission reductions could be achieved absent a large role for nuclear power. As we consider the scale and scope of the technology challenge, we have to move beyond the current discussions and ask ourselves if the world is prepared to undertake the transition in energy systems that would be needed to cut global emissions significantly. Is the world prepared and able to deploy nuclear power and other advanced technologies (e.g., carbon capture and storage and second generation biofuels, to name two) at the scale and within the timelines required to meet the UN's targets?

A successful new agreement should promote new partnerships involving developed, emerging, and developing countries and the private sector that create opportunities for technology cooperation, public-private partnerships, innovative financing, and capacity building. A concerted and cooperative effort along these lines focusing on nuclear power could be very effective in making nuclear power a reliable and safe technology option.

*Question 4.* There is an unprecedented effort to create millions of new jobs—"green jobs"—in America's energy sector. Is this same emphasis present in other countries, or are other concerns, such as keeping energy affordable or simply transitioning to non-fossil resources, given higher priority?

Answer. Only where there is national interest to do so. Developing countries are unwilling to accept restrictions on their development and energy use. Providing modern energy services to lift their people out of poverty is a much more pressing need than addressing climate change.

With billions of people still lacking electricity, developing countries are understandably loath to cap emissions if it hampers their economic development and energy security. Much of the energy needed to power economic growth will likely be supplied by fossil fuels. Many developing countries sit atop large reserves of coal, oil, and gas, and it would be naive to expect them to forego their use in favor of more costly and less reliable energy options.

To the extent that developing countries can use their comparative advantages in labor to attract green manufacturing jobs, it is likely they will do so. Many developing countries are home to manufacturing plants that produce solar panels and wind turbines, for example, but the products of these facilities are largely focused on an export market. Further, some firms are thinking of moving manufacturing facilities from developed to developing countries to take advantage of lower labor costs.

As we consider the implications the negotiations will have on job creation, we shouldn't lose sight of the fact that a bad agreement—and bad domestic legislation, too—would ship existing U.S. jobs overseas, especially those from energy intensive industries. To avoid this, we need an agreement that doesn't tilt the competitive playing field against U.S. industry. And to do that, large developing economies, like China, India, and Brazil, must signal their willingness to commit to realistically ambitious and binding goals. That will be one of the real tests coming out of Copenhagen that will have tremendous implications for U.S. policy.

## RESPONSES OF MICHAEL A. LEVI TO QUESTIONS FROM SENATOR MURKOWSKI

*Question 1.* While the U.S. has focused almost exclusively on cap-and-trade, can you comment on other nations' ability and interest in implementing that type of system? Are other nations, developed and developing, capable of implementing economy-wide caps on emissions, creating a new carbon market, and properly administering cap-and-trade?

Answer. Cap-and-trade appears to be the most popular emissions-cutting tool for large emissions sources in the developed world. It has been the central element of European Union emissions-cutting efforts. New Zealand passed a cap-and-trade bill last year; Australia has been debating one for some time. Japan, after resisting the approach, is aggressively exploring it now. Canada also appears to favor cap-and-trade over other tools. All of these nations are capable of implementing economy-wide caps as well as creating and administering carbon markets. That said, in each case, cap-and-trade has been complemented by other policy tools, and in most cases, it has been limited to power plants and factories.

Developing countries differ in their abilities to implement economy-wide emissions caps, create carbon markets, and properly administer economy-wide cap-and-trade systems. Advanced developing countries like South Korea are currently capable of implementing such systems. Intermediate developing countries like China and India are not. They lack the means to monitor economy-wide emissions and to enforce the rules of an economy-wide cap-and-trade system. There are, however, likely to be subsectors of both countries' economies that could administer and enforce cap-and-trade systems successfully.

*Question 2a.* Many argue that the United States must implement a robust climate policy in order to re-take the lead in the development of clean energy technologies. Key to this effort will be the protection of intellectual property rights, which can help companies recoup their investments and encourage them to keep working on new technologies.

Can you discuss some of the opportunities to secure intellectual property rights in both domestic legislation and an international treaty?

Answer. The greatest opportunities to secure intellectual property rights are through bilateral engagement with key countries like China and India, rather than in domestic legislation or a global climate treaty. The most that domestic legislation can do is limit U.S. negotiators' flexibility. It is important that Congress provide clear direction to negotiators, but it could be counterproductive to overly constrain negotiators' options, as they try to negotiate agreements that expand markets for U.S. clean technologies. A global treaty is also unlikely to provide a solution to intellectual property rights, since the most important concerns are specific to only a handful of countries (such as China). That said, the United States should avoid allowing any international agreement to permit compulsory licensing of low-carbon technologies, which would undermine incentives for innovation while possibly also inhibiting the diffusion of critical clean energy solutions.

U.S. negotiators must remember that when it comes to U.S. exports of clean technologies, their goal should not be to simply protect IPR—it should be to grow opportunities for U.S. businesses to profit as the world transitions to a low-carbon economy. That can be done both by protecting IPR and by expanding demand and markets for new clean technologies. If U.S. negotiators can make small compromises on IPR in exchange for developing-country actions that massively expand demand and markets for U.S. products, that may produce a win-win outcome. While the United States should be careful, it should not foreclose such opportunities.

*Question 2b.* If the United States demands that strong intellectual property rights be included in a post-Kyoto framework, how do you think the rest of the world will react?

Answer. The United States will have strong support from other developed countries if it demands that strong intellectual property rights be reaffirmed in a post-Kyoto framework. It will likely face opposition from major developing countries, but that opposition is unlikely to derail a deal.

*Question 3.* In 2005, the Bush Administration started the Asian Pacific Partnership on Clean Development and Climate to foster international cooperation and technology development. That program brought together the governments and private sectors of seven nations—Australia, Canada, China, India, Japan, Korea, and the United States—to reduce pollution while maintaining economic strength.

From your viewpoint, is this program achieving its goals? Is it a successful model that could be incorporated into other climate change programs?

Answer. The APP has made important contributions to the development of policies and technologies that will help reduce global emissions. Its informal nature and its focus on specific initiatives (rather than on high-level promises) can unlock action

where diplomatic efforts are deadlocked. That said, it could benefit from substantial increases in both high-level attention and financial support.

The APP provides a useful model for future programs, though it is not a substitute for high-level engagement or for enactment of strong incentives (whether financial or regulatory) that steer businesses toward low-carbon investments. In 2008, a Council on Foreign Relations sponsored Independent Task Force Report, *Confronting Climate Change: A Strategy for Foreign Policy*, a bipartisan group of over two dozen senior leaders from business, policy, finance, labor, academia, and environmental groups called for the creation of a “Partnership for Climate Cooperation”, which would combine an intensified APP-type focus on bottom-up efforts with high-level engagement among national leaders. Such an approach, which could be facilitated through the Major Economies Forum or possibly the G-20, remains attractive.

*Question 4.* The levels of pollution we’re seeing in Alaska are at least partially a function of pollution coming over the pole from Europe and Russia. We’re seeing firsthand how pollution travels—it does not recognize political borders. Because what happens in places like China or India will affect the U.S., I’m interested to hear your perspective on the level of urgency that economically-developing nations are showing with regard to reducing their emissions.

In looking at China and India’s recent actions, it appears they are more interested in economic development, in order to maintain stability, rather than putting controls on their economies that will reduce emissions. Do you agree with that assessment, or have you seen a shift in the approach that developing nations like China and India are taking to climate change?

Answer. China and India have been taking significant steps that reduce their emissions—but they are not taking those steps because of concerns about climate change. They are taking those steps because of concerns about dependence on imports of oil and gas, because of concerns about local air pollution (and, in the case of China, the implications of that for political stability), and because of concerns about inefficient consumption of energy. So long as those steps are sufficiently strong, they should be acceptable to the United States. The problem with current Chinese and Indian policies is not that they are not aimed at dealing with climate change—it is that they do not yet appear to be strong enough to sufficiently curb energy use and associated emissions.

*Question 5.* There is an unprecedented effort to create millions of new jobs—“green jobs”—in America’s energy sector. Is this same emphasis present in other countries, or are other concerns, such as keeping energy affordable or simply transitioning to non-fossil resources, given higher priority?

Answer. The focus on “green jobs” has been dominated by the United States. Other countries have pursued policies with different emphases. In most developed countries, and in Europe in particular, the emphasis has been on climate benefits. Japan has emphasized the importance of both climate and energy efficiency. China has been concerned with reliance on imported oil, as well as on the local environmental impacts of the inefficient burning of coal. The different priorities lead to somewhat different policy approaches. Ultimately, employment in the United States will be determined primarily by economic policies that have nothing to do with climate change. Good climate policy, including well-designed cap-and-trade efforts, can and should avoid doing significant harm to employment, but those efforts should not be expected to substantially increase U.S. employment either.

---

#### RESPONSES OF NIGEL PURVIS TO QUESTIONS FROM SENATOR MURKOWSKI

*Question 1a.* Many argue that the United States must implement a robust climate policy in order to re-take the lead in the development of clean energy technologies. Key to this effort will be the protection of intellectual property rights, which can help companies recoup their investments and encourage them to keep working on new technologies.

Can you discuss some of the opportunities to secure intellectual property rights in both domestic legislation and an international treaty?

Answer. A strong system to protect intellectual property rights (IPR) is absolutely essential to spur innovation to address climate change and to foster U.S. economic growth. Domestic legislation can strengthen international protections for IPR by promoting the right kind of international clean technology partnerships. New funding for international technology cooperation, including funding provided under a cap-and-trade program, could be conditioned on new commitments from other countries to better implement existing IPR standards and protections. This approach would create stronger incentives for improved IPR compliance and enforcement in

other nations while also encouraging dissemination of new technologies developed jointly through bilateral clean energy programs.

*Question 1b.* If the United States demands that strong intellectual property rights be included in a post-Kyoto framework, how do you think the rest of the world will react?

Answer. It is probably not feasible to include new IPR protections in a new global climate change agreement in the Copenhagen process under the United Nations. In these negotiations, developing countries are pushing to weaken, not strengthen, IPR protections. The most likely compromise outcome, therefore, is that the next global agreement will leave international IPR protections unchanged and possibly unaddressed. The more productive path forward would be for the United States to include provisions relating to IPR in bilateral climate and trade agreements that the United States negotiates with key countries, including its major trading partners in the developing world. In exchange for the opportunity to cooperate with the United States on the development and dissemination of clean energy technologies, as well as opportunities for enhanced access to U.S. carbon markets, major emerging economies might agree to significantly strengthen their enforcement of existing IPR standards.

*Question 2.* It is commonly agreed that financing for clean energy technologies is critical to agreement on a new international climate framework. Some countries believe this could ultimately cost more than \$1 trillion per year.

Given our nation's struggling economy and record deficits, how much do you think the U.S. is capable of pledging for these efforts, and where can that money come from?

Answer. The European Union estimates that developing countries will need approximately \$150 billion by 2020 to mitigate their emissions and adapt to climate change. Their estimate includes financing from all countries and all sources, both public and private sectors and developed and developing countries. This estimate seems realistic and in line with estimates prepared by the World Bank. A substantial portion of the needed funding is likely to come from the private sector. Developing nations would also be expected to self-finance a significant portion of their efforts.

At the same time, it is in the interest of the United States to invest in clean energy and emissions reduction partnerships with developing nations. The cost of reducing emissions in the United States exceeds the cost of emissions reductions in developing nations. We can strengthen our economy and enhance our security by achieving part of our emissions reduction responsibility in developing nations rather than at home. Well-designed foreign investments and partnerships would advance other U.S. foreign policy goals as well, including poverty alleviation, energy security, international stability, and biodiversity conservation. Importantly, these investments should not be viewed by Congress and the American people as foreign aid. On the contrary, reducing the cost of U.S. climate policy is a strong self-interested goal.

*Question 3.* In 2005, the Bush Administration started the Asian Pacific Partnership on Clean Development and Climate to foster international cooperation and technology development. That program brought together the governments and private sectors of seven nations—Australia, Canada, China, India, Japan, Korea, and the United States—to reduce pollution while maintaining economic strength.

From your viewpoint, is this program achieving its goals? Is it a successful model that could be incorporated into other climate change programs?

Answer. The Asia Pacific Partnership (APP) should be extended and expanded. Bringing together key nations and industries to share best practices and develop common standards is a sound approach. However, the APP has never been funded adequately and thus its results have been modest. The United States should increase funding for the APP and consider expanding its membership to include other willing countries that could contribute resources and expertise, such as nations in Europe.

*Question 4.* As you are aware, wildland fires in the United States and Canada have been increasing over the last 20 years. Several different studies have shown that significant amounts of carbon dioxide are released while these fires burn, and then again as the trees killed in the fires decompose. One study in California found the fires between 2001 and 2007 released as much carbon dioxide as half of the registered cars in that state over the same period.

If tropical forests are going to be considered for credit for sequestering carbon, shouldn't the carbon saved by preventing domestic fires, as well as insect and disease outbreaks that kill trees, be eligible as well?

Answer. U.S. climate policies should create incentives to reduce emissions and increase carbon sequestration across all sectors of the economy, including our nation's

forests. Of course, proposals to suppress forest fires also need to consider ecological impacts beyond climate change. U.S. climate policy should also reflect that tropical forests and North American forests are somewhat different. Tropical forests tend to hold more carbon and can be less expensive to protect than North American forests. In addition, some scientists believe that northern forests may contribute to climate change (by absorbing the sun's heat) in ways that are quite different than in the tropics.

*Question 5.* Studies have shown that fires in the northern latitudes, such as Alaska and Northern Canada, release more carbon dioxide than fires in the continental United States because of the organic duff that persists in tundra and taiga forests. History also shows that we tend to allow those fires to burn until the weather puts them out.

Should we be more concerned about these fires, not least because of the high emission rates associated with them, and try to put them out more quickly compared to fires in other areas, such as southwestern deserts?

*Answer.* U.S. climate policies should create incentives to reduce emissions and increase carbon sequestration across all sectors of the economy, including our nation's forests. The role of forests in the northern latitudes should receive special attention and consideration given the potential for deforestation in those latitudes to release higher levels of greenhouse gases, including from tundra and taiga soils. Proposals to suppress forest fires in northern latitudes also need to consider ecological impacts beyond climate change.

---

RESPONSES OF TAIYA SMITH TO QUESTIONS FROM SENATOR MURKOWSKI

*Question 1.* While the United States has focused almost exclusively on the creation of a cap-and-trade system, can you comment on China's interest in that type of policy? Is China capable of successfully implementing an economy-wide cap, creating a carbon market, and administering such a program?

*Answer.* Initially skeptical about the carbon trading market, China worried that a cap-and-trade system will sap its GDP growth and will allow richer nations to pay their way out of obligations to reduce greenhouse gas emissions. However, China now has come to embrace it as an opportunity to attract foreign investment in promoting energy efficiency and renewable energy projects. Jiang Weixin, a senior official of the National Development and Reform Commission (NDRC) has stated, "The cap-and-trade system create opportunities for developed countries to emit greenhouse gases at a relatively low economic cost and achieve their emission reduction targets, while developing countries obtain benefits such as funding and technology transfer, which will boost their efforts to pursue sustainable development." The Chinese now see cap-and-trade as a win-win for them.

Further, after a decade of small-scale experiments in using emissions trading to reduce pollution, China is taking steps to set up a nationwide system. Three cities—Shanghai, Beijing and Tianjin—have begun creating emissions exchanges modeled on carbon trading markets in the U.S. and Europe.<sup>1</sup> China currently accounts for 60 percent of carbon credits trading under the Clean Development Mechanism (CDM). This is a significant increase from its initial role in CDM, which was just five percent of the contracted volume.

Implementing a national program of carbon trading will take more time. The national sulfur trading program is due to roll out in 2011, with significant support from the U.S. Environmental Protection Agency (EPA). Expanding this to include other gases will take longer, potentially up to a decade, while this first program is established. Already many in Beijing are already thinking seriously about what a national program could look like, including consideration of the necessary legislative and legal bodies. Critical to a successful establishment of a trading program in China will be economic incentives and expert support. EPA had been working with China for 15 years before they had the technical capability and political willingness to attempt to expand the program nationally.

*Question 2.* In 2005, the Bush Administration started the Asian Pacific Partnership on Clean Development and Climate to foster international cooperation and technology development. That program brought together the governments and private sectors of seven nations—Australia, Canada, China, India, Japan, Korea, and

---

<sup>1</sup> China National Petroleum Corp. (CNPC) has joined with the Chicago Climate Exchange and the European Climate Exchange to set up the Tianjin Climate Exchange. BlueNext has partnered with the Beijing Environment Exchange to establish the Beijing exchange, and the Shanghai United Assets and Equity Exchange is backing the Shanghai Environment Energy Exchange.

the United States—to reduce pollution while maintaining economic strength. From your viewpoint, is this program achieving its goals? Is it a successful model that could be incorporated into other climate change programs?

Answer. The U.S. works with China to accelerate the deployment and development of clean energy technologies through two different forums, the bilateral U.S.-China Ten Year Cooperative Framework on Energy and the Environment (TYF) and the multilateral Asia-Pacific Partnership on Clean Development and Climate (APP). The TYF was established in June 2008, and expanded through a memorandum of understanding signed at the Strategic and Economic Dialogue in July 2009 and again at the Presidential Summit in November 2009. It focuses on ten strategic areas ranging from cleaner uses of coal to natural resource conservation with the aim of achieving concrete progress in each of these areas. The APP brings together seven countries to focus regionally on five key areas (climate change mitigation, energy security, air pollution, economic development, reduction of poverty) and has twenty projects. Both initiatives coordinate and utilize the private sector to help implement their projects.

The APP has had some success; most importantly it has regularly brought together an important group of countries to discuss the practicalities of managing climate change and encouraged the use of market-based mechanisms under the Kyoto Protocol. Through its programs, it has had a number of achievements, but funding shortages, insufficient communications, technical barriers, and so forth have prevented APP and its projects from making any breakthrough. Moreover, national strategy and interests differ amongst participating nations and this has resulted in limiting the work that the partnership can achieve. In contrast, the bilateral TYF is more nimble and able to respond at a higher level more rapidly. Further, the TYF is able to incorporate ongoing efforts and funding streams into its work and can easily raise awareness and support to the Presidential level as it was established with agreement at the highest levels of the U.S. and Chinese governments.

Both programs have advantages and core constituents. The APP model will likely prove to be useful as we expand regional relationships to manage and bring down the costs of climate change, though it will never replace bilateral relationships. To improve the effectiveness of the APP, stricter project management should be implemented for scope, schedule, budget, and accountability as well as discussions around how intellectual property should be managed.

*Question 3.* In your written testimony, you note that China is pursuing “new domestic initiatives to ‘make carbon reduction a new source of economic growth.’” Do you believe China would ever implement policies to reduce emissions that are seen as hampering, rather than promoting, economic growth?

Answer. China is in a difficult place; it has to maintain economic growth and it has to reduce its dependency on unsustainable energy sources. For the government in Beijing, there is no choice between the two in the long term. However, over the short term, continuing economic growth will trump carbon reduction. As new technologies are developed and introduced into the market place, this will adjust and they will decrease carbon emissions.

There will be certain instances where the government will institute policies that will slow growth or redirect growth, but I believe that they will be confined to scenarios that can be controlled or that have proven in the long term to result in the successful creation of a sustainable economic system. Another instance where this could occur is if the environmental degradation is so bad that it must become a priority over economic growth. On the national scale, China has decided to seize climate change as an opportunity and hopes to use it to propel its economy into cleaner, sustainable growth while managing both environmental degradation and energy security. The decision to announce its own target ahead of Copenhagen was a move to both lock in its ability to continue to grow the economy, and also to assure the world that China is participating. What it also means however, is that China will be under increasing international pressure to ensure that it is able to meet its own targets. This pressure will be particularly important in helping manage the political factions within China as it becomes increasingly difficult for the government to reach its economic growth and climate change targets at the same time.

*Question 4.* What do you think of this week’s bilateral clean technology agreement between the United States and China? What progress might it lead to in the years ahead?

Answer. The agreements reached at the Presidential Summit are substantive and important. The challenge now will be to ensure that the U.S. is able to dedicate the necessary resources toward their implementation.

As China continues to devote more resources to developing clean energy, it will become increasingly competitive in the international market. However, it will not be able to do this fast enough to slow its emissions without considerable support.

The combination of Americans and Chinese working together has proven to be effective and profitable for both sides. The agreements signed on November 17 expanded the Ten Year Framework as an instrument to manage our cooperation and also launched cooperation on coal, electric vehicles, and reached out to the private sector for assistance in building joint R&D centers. The results anticipated will range from improvements in technology (such as battery) to larger scale policy changes in China. The development of new applications for technology and standards so that companies can market their products in both the U.S. and China is also an important potential result. The Chinese are fully committed to participate in them and are providing the necessary staff to be able to make the most of the agreements.

However, as the scope, depth, and complexity of U.S.-China cooperation on clean energy rapidly expands, there is a risk on both sides that it will become more difficult to coordinate this cooperation effectively. On the U.S. side, the coordination efforts will take considerable human power, dedication, determination, and hours of work each day. The Obama administration will need to seriously consider appointing a high-level official to manage the clean energy cooperation relationship with China. One purpose this person would serve is to better coordinate the various parts of the U.S. government effort as we deal with constituencies from scientists to public policy specialists to corporate executives. A second important objective would be to encourage the Chinese side to appoint a counterpart who could help overcome the bureaucratic disconnects within the Chinese system.

○