AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
GPO

CLIMATE CHANGE: INTERNATIONAL ISSUES, ENGAGING DEVELOPING COUNTRIES

HEARING

BEFORE THE

SUBCOMMITTEE ON ENERGY AND AIR QUALITY

OF THE

COMMITTEE ON ENERGY AND COMMERCE
HOUSE OF REPRESENTATIVES

ONE HUNDRED TENTH CONGRESS

FIRST SESSION

MARCH 27, 2007

Serial No. 110–26

Printed for the use of the Committee on Energy and Commerce
energycommerce.house.gov

U.S. GOVERNMENT PRINTING OFFICE
37–453 PDF WASHINGTON : 2008

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

COMMITTEE ON ENERGY AND COMMERCE

JOHN D. DINGELL, Michigan, *Chairman*

HENRY A. WAXMAN, California
EDWARD J. MARKEY, Massachusetts
RICK BOUCHER, Virginia
EDOLPHUS TOWNS, New York
FRANK PALLONE, JR., New Jersey
BART GORDON, Tennessee
BOBBY L. RUSH, Illinois
ANNA G. ESHOO, California
BART STUPAK, Michigan
ELIOT L. ENGEL, New York
ALBERT R. WYNN, Maryland
GENE GREEN, Texas
DIANA DEGETTE, Colorado
Vice Chairman
LOIS CAPPS, California
MIKE DOYLE, Pennsylvania
JANE HARMAN, California
TOM ALLEN, Maine
JAN SCHAKOWSKY, Illinois
HILDA L. SOLIS, California
CHARLES A. GONZALEZ, Texas
JAY INSLEE, Washington
TAMMY BALDWIN, Wisconsin
MIKE ROSS, Arkansas
DARLENE HOOLEY, Oregon
ANTHONY D. WEINER, New York
JIM MATHESON, Utah
G.K. BUTTERFIELD, North Carolina
CHARLIE MELANCON, Louisiana
JOHN BARROW, Georgia
BARON P. HILL, Indiana

JOE BARTON, Texas
Ranking Member
RALPH M. HALL, Texas
J. DENNIS HASTERT, Illinois
FRED UPTON, Michigan
CLIFF STEARNS, Florida
NATHAN DEAL, Georgia
ED WHITFIELD, Kentucky
BARBARA CUBIN, Wyoming
JOHN SHIMKUS, Illinois
HEATHER WILSON, New Mexico
JOHN B. SHADEGG, Arizona
CHARLES W. "CHIP" PICKERING, Mississippi
VITO FOSSELLA, New York
STEVE BUYER, Indiana
GEORGE RADANOVICH, California
JOSEPH R. PITTS, Pennsylvania
MARY BONO, California
GREG WALDEN, Oregon
LEE TERRY, Nebraska
MIKE FERGUSON, New Jersey
MIKE ROGERS, Michigan
SUE WILKINS MYRICK, North Carolina
JOHN SULLIVAN, Oklahoma
TIM MURPHY, Pennsylvania
MICHAEL C. BURGESS, Texas
MARSHA BLACKBURN, Tennessee

PROFESSIONAL STAFF

DENNIS B. FITZGIBBONS, *Chief of Staff*
GREGG A. ROTHSCHILD, *Chief Counsel*
SHARON E. DAVIS, *Chief Clerk*
BUD ALBRIGHT, *Minority Staff Director*

Subcommittee on Energy and Air Quality

RICK BOUCHER, Virginia, *Chairman*

G.K. BUTTERFIELD, North Carolina
Vice Chairman
CHARLIE MELANCON, Louisiana
JOHN BARROW, Georgia
HENRY A. WAXMAN, California
EDWARD J. MARKEY, Massachusetts
ALBERT R. WYNN, Maryland
MIKE DOYLE, Pennsylvania
JANE HARMAN, California
TOM ALLEN, Maine
CHARLES A. GONZALEZ, Texas
JAY INSLEE, Washington
TAMMY BALDWIN, Wisconsin
MIKE ROSS, Arkansas
DARLENE HOOLEY, Oregon
ANTHONY D. WEINER, New York
JIM MATHESON, Utah
JOHN D. DINGELL, Michigan *(ex officio)*

J. DENNIS HASTERT, Illinois
Ranking Member
RALPH M. HALL, Texas
FRED UPTON, Michigan
ED WHITFIELD, Kentucky
JOHN SHIMKUS, Illinois
JOHN B. SHADEGG, Arizona
CHARLES W. "CHIP" PICKERING, Mississippi
STEVE BUYER, Indiana
MARY BONO, California
GREG WALDEN, Oregon
MIKE ROGERS, Michigan
SUE WILKINS MYRICK, North Carolina
JOHN SULLIVAN, Oklahoma
MICHAEL C. BURGESS, Texas
JOE BARTON, Texas *(ex officio)*

Professional Staff

Sue D. Sheridan, *Chief Counsel*
David J. McCarthy, *Minority Counsel*
Margaret Horn, *Legislative Clerk*

CONTENTS

	Page
Hon. Rick Boucher, a Representative in Congress from the Commonwealth of Virginia, opening statement	1
Hon. J. Dennis Hastert, a Representative in Congress from the State of Illinois, opening statement	2
Hon. Jane Harman, a Representative in Congress from the State of California, opening statement	3
Hon. John Shimkus, a Representative in Congress from the State of Illinois, opening statement	4
Hon. G. K. Butterfield, a Representative in Congress from the State of North Carolina, opening statement	5
Hon. Joe Barton, a Representative in Congress from the State of Texas, opening statement	6
Prepared statement	7
Hon. Ralph M. Hall, a Representative in Congress from the State of Texas, opening statement	8
Hon. John D. Dingell, a Representative in Congress from the State of Michigan, opening statement	9
WITNESSES	
Annie Petsonk, international counsel, Environmental Defense, Washington, DC	10
Prepared statement	89
Jeffrey Holzschuh, vice chairman, institutional securities, Morgan Stanley, New York, NY	12
Prepared statement	56
W. Thomas Stephens, chairman and chief executive officer, Boise Cascade, LLC, Boise, ID	14
Prepared statement	133
Jonathan Pershing, director, Climate Energy and Pollution Program, World Resources Institute, Washington, DC	16
Prepared statement	60
Edward S. Steinfeld, associate professor, Department of Political Science, Massachusetts Institute of Technology, Cambridge, MA	18
Prepared statement	124
Pramit Pal Chaudhuri, Bernard Schwartz Fellow, the Asia Society, New York, NY, and foreign editor, Hindustan Times, New Delhi, India	20
Prepared statement	52

CLIMATE CHANGE: INTERNATIONAL ISSUES, ENGAGING DEVELOPING COUNTRIES

TUESDAY, MARCH 27, 2007

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENERGY AND AIR QUALITY,
COMMITTEE ON ENERGY AND COMMERCE,
Washington, DC.

The subcommittee met, pursuant to call, at 10:08 a.m., in the Rayburn House Office Building, Hon. Rick Boucher, chairman, presiding.

Members present: Representatives Butterfield, Melancon, Barrow, Wynn, Harman, Gonzalez, Inslee, Baldwin, Ross, Hooley, Matheson, Dingell, Hastert, Hall, Upton, Shimkus, Shadegg, Walden, Sullivan, Burgess, and Barton.

Staff present: Sue Sheridan, Bruce Harris, Lorie Schmidt, Chris Treanor, Margaret Horn, David McCarthy, and Matt Johnson.

OPENING STATEMENT OF HON. RICK BOUCHER, A REPRESENTATIVE IN CONGRESS FROM THE COMMONWEALTH OF VIRGINIA

Mr. BOUCHER. The subcommittee will come to order. This morning, we welcome witnesses who will discuss the international component of the U.S. response to the challenge of climate change. Shortly following the negotiation of the Kyoto Climate Change treaty, the United States Senate, by the rare unanimous vote of 98 to nothing, adopted a non-binding resolution expressing opposition to the Kyoto Treaty. Consequently, that treaty was never presented to the United States Senate for ratification.

Perhaps the major reason for that broad statement of opposition in the U.S. Senate was the absence of any obligation in the treaty for leading developing nations such as China, India, and Brazil to undertake greenhouse gas emissions reductions. Why, opponents ask, should the United States assume the painful burden of reducing emissions to 1990 levels by the year 2010 if the developing world, which accounts for most of the growth in greenhouse gas emissions, is assuming no burden whatsoever?

I think a clear message that comes from that experience is that for a mandatory greenhouse gas emissions program to succeed in the United States, we must include in our legislation establishing the program a reliable means of assuring meaningful participation by developing nations. I will welcome the views of our witnesses this morning on the most appropriate way for the United States to obtain that assurance. I will also welcome their views on the role that the United States should be playing in working with both de-

veloped and developing countries to structure an international agreement relating to greenhouse gas emission control for implementation. After the time that the Kyoto Treaty expires, this would be implementation in the post–2012 environment.

The United States should play a lead role in these negotiations in my view, and suggestions from our witnesses on the best way to encourage United States participation in that multi-lateral exercise will be welcome this morning. With those comments, I will conclude my opening statement and announce that pursuant to the rules of the committee, any Member who decides to waive an opening statement will have the time allotted for that statement added to that person's question period. And I am now pleased to recognize the ranking Republican member of our subcommittee, the gentleman from Illinois, Mr. Hastert.

OPENING STATEMENT OF HON. J. DENNIS HASTERT, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

Mr. HASTERT. Thank you, Mr. Chairman. Mr. Chairman, once again let me commend you on your holding another thought-provoking hearing. An international perspective on greenhouse gas emissions is, in my view, absolutely essential to the climate change policy discussions we have been having. We have heard a significant amount of testimony over the past month on the state of the Earth's climate, causes of climate change, and potential consequences.

We have also learned the important fact that greenhouse gas emissions are a global, not a national, issue. Whatever the effect a ton of CO^2 has when it is added to the atmosphere, the impact is the same whether it is emitted in the United States or China or another part of the globe.

Today, we will begin to hear directly how other countries view the debate over climate change, what kind of international commitments that they are likely to make, and whether we can rely upon them to meet those commitments. I personally believe that one of the most important things the U.S. can do today to offset greenhouse gas emissions around the world is to share our technology and ingenuity with other nations, particularly in underdeveloped and developing countries. That includes energy-producing technology such as advanced nuclear, wind, solar, hydroelectricity, and zero-emissions coal; alternative fuel technologies such as ethanol, biodiesel, and advanced biomass; and energy efficiency breakthroughs in manufacturing processes, building designs, appliances and vehicles.

One of the best programs to jumpstart this effort is the Asian Pacific Partnership initiated in 2005 by President Bush, along with Australia, China, India, Japan, and South Korea. These six countries are critical to any effort dealing with the Earth's climate because together they count for almost half the world's population, primary energy consumption, half the world's effort or contribution to CO^2 emissions, electricity generation, and economic activity.

The Asian Pacific Partnership was created to identify and deploy cost-effective technologies that either produce energy without greenhouse gas emissions like wind, solar and nuclear, or save energy through increases in efficiency.

Let me take a second and give you an example of how this program is working. We know methane is 20 times more potent that CO^2 as a greenhouse gas. By deploying American technology to capture methane that is ordinarily vented into the atmosphere, a Chinese coal mining concern will reduce emissions by 4½ million tons. That is one entity over 20 years. Moreover, this project will pay for itself by converting the methane gas into 120-megawatts of power. Thus, this project makes sense economically and environmentally.

However, our international efforts in methane capture are not confined to the six countries in Asian Pacific Partnership. The Methane to Markets Partnership, another U.S.-lead effort includes 17 nations and more than 250 private sector organizations and projects to advance methane recovery in agriculture, landfills, coalfields, and natural gas and oil systems.

Beyond the multinational efforts, what are some of the other initiatives that we should be looking at? As a nation and global partner, we need to examine what we can do to expand the deployment of emission-free generating technologies, like advanced wind, solar, and nuclear. Furthermore, we must accelerate the research into affordable cellulosic ethanol. And finally, because coal is critical to meeting both American and global energy needs, let us do more research and development on zero-emission coal technology and carbon capture and sequestration.

All these initiatives and other like them have benefits that go beyond reducing greenhouse gas emissions. These proposals make sense for a variety of reasons, all of which are critical to our economic future. They have a demonstratively favorable environmental impact. They seek to deploy existing technologies as they become available and push new innovations. They make economic sense, and they foster long-term economic growth and security by reducing our dependence on foreign sources of energy.

Mr. Chairman, again I thank you for holding this important hearing. I look forward to the testimony of our witnesses.

Mr. BOUCHER. Thank you very much, Mr. Hastert. Calling on Members now in order of seniority on the subcommittee who were present at the time the hearing convened, the gentlelady from California, Ms. Harman, is recognized for 3 minutes.

OPENING STATEMENT OF HON. JANE HARMAN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Ms. HARMAN. Thank you, Mr. Chairman. Let me apologize in advance to you and witnesses for coming in and out of this hearing today. Sadly, I have a conflict just down the hall. I would however urge witnesses, as I did to one before we convened, to be bold, to make certain that in your 5 minutes, committee members know what is on your mind, what has worked, what hasn't worked, what you feel we might try to do because we are all trying to get this right and to move on quickly.

Climate change is the ultimate diplomatic challenge. Emissions reductions at home will make our economy more efficient. In the long run, they will also make us more prosperous and competitive, but without coordinated global action, emissions reductions at home will not solve global warming. That is no reason for us to sit

on our hands. Never have we waited for other countries to show us how to solve problems, and we shouldn't wait here. The U.S. should lead the way on climate change and exercise leadership to forge a global solution.

Our diplomatic prestige has suffered in recent years for reasons well known, but the U.S. still wields extraordinary soft power partly as a result of our robust economy. It may take years to regain what diplomatic capital we have spent since 9/11, but the economic incentives we can offer the developing world to follow our lead in reducing CO^2 emissions are still considerable.

To give just one example, the U.S. is the largest market in the world for many consumer goods. Anyone who has been inside a Wal-Mart can tell you that, and we will likely be the largest carbon market too. So let us make developing nations want to sell us carbon credits. That is just one way of making the global market work to reduce global warming.

International agreements like Kyoto are important and perhaps we can do better agreements as Al Gore suggested last week, but our means of bringing the rest of the world along are vast, and we should use our resources to solve climate change on our terms. The first step is acting boldly in this committee.

So again, Mr. Chairman, I urge our witnesses to help us be bold, be responsible, and be successful in doing our part. I yield back the balance of my time.

Mr. BOUCHER. Thank you, Ms. Harman. The gentleman from Michigan, Mr. Upton, is recognized for 3 minutes.

Mr. UPTON. I will waive.

Mr. BOUCHER. The gentleman from Michigan waives.

The gentleman from Illinois, Mr. Shimkus, is recognized for 3 minutes.

OPENING STATEMENT OF HON. JOHN SHIMKUS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

Mr. SHIMKUS. Thank you, Mr. Chairman. I want to thank you for holding this hearing today and welcome our witnesses. In order to understand the long-term ramifications of global climate change and decide the best near term course of action, we must weigh carefully all sides of the issue.

Today's hearing will add yet another uncertainty into this broad and complicated debate. Just yesterday, Reuters reported that Chinese energy data shows that China is about to surpass the United States and become the world's biggest carbon emitter. But when asked to comment, here is what the Chinese had to say. "These figures are very complicated. We don't have an estimate of carbon dioxide for such recent date. Such an official, who declined to be named, we have just set in motion our national reporting plan, but it will not be done for 2 or 3 years."

This doesn't seem like a comment that would signal that China is ready to be a partner of any global initiatives, and that would make mandatory the reduction of carbon dioxide. It is expected that China will account for more than half the global growth in coal supply in demand over the next 25 years.

At the same time, India gets over half of their energy output from coal. The two countries combined are projected to account for

nearly 70 percent of the world coal demand through 2030. I remain highly skeptical that China or India would follow the U.S. into any implementation of a cap and trade program to reduce carbon dioxide emissions that other nations would follow.

We know today that only six of the 120 Kyoto countries are meeting their agreement. We also know that China and India, as developing nations, are not part of the Kyoto Agreement or any other agreement to constrain carbon dioxide emissions. What would be the purpose of the United States investing billions in unproven scheme to reduce emissions if all projections show that the fast growing economies of China and India will surpass the U.S. with emissions output, but again show no willingness to participate in such a program?

Why not continue investment in the kinds of programs that are working and don't run the risk of burdening economies, especially developing economies? China and India are both part of the Asian Pacific Partnership on clean development climate, and both have made investments in the president's FutureGen initiative. The Earth exists in a vacuum, but the people on Earth do not. And it is dangerous to worry about one and ignore the other.

Carbon dioxide is a byproduct of jobs, growth, and opportunity for average working people. Despite impressive gains in American energy efficiency over the past few years, a basic reality is that with the technology mix deployed today, capping carbon dioxide emissions will restrain economic output, jeopardize economic growth, and eliminate people's jobs. Kyoto level caps would likely eliminate hundreds of thousands, if not millions, of American jobs.

With that, Mr. Chairman, I yield back my time.

Mr. BOUCHER. Thank you very much, Mr. Shimkus. The gentleman from Texas, Mr. Gonzalez, is recognized for 3 minutes. Mr. Gonzalez waives an opening.

Ms. Hooley from Oregon is recognized for 3 minutes. Ms. Hooley waives.

Mr. Matheson from Utah is recognized for 3 minutes. Mr. Matheson is not here. Mr. Butterfield from North Carolina is recognized for 3 minutes.

OPENING STATEMENT OF HON. G.K. BUTTERFIELD, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NORTH CAROLINA

Mr. BUTTERFIELD. Thank you, Mr. Chairman. I too want to thank you for convening this hearing today. You told us a few weeks ago that you were serious about climate change, and you are certainly demonstrating that today.

Mr. Chairman, as we continue these hearings, the fundamental question with global warming that we must consider is not whether Congress should act, but instead how soon and what is the best way for Congress to act. The scientific data and evidence demonstrates that climate change is a reality. I repeat that. It is a reality, and we must act responsibly by taking the necessary steps to curb global warming where it is possible.

Earth was created to endure, but our pollution and emissions seem to be causing our planet grave harm. No single generation of people holds possession of this Earth, and it should not put itself

in the position of overly-influencing its fate. Earth was created with enough abundance to provide for everyone who has lived and for all future generations. Our actions and our subsequent inactions could put that abundance into jeopardy.

For many years, people seemed eager to believe that it was only important to deal with emissions, pollution, and global warming to ensure that the world and our nation would be left a better place for our children and grandchildren. Unfortunately, however, we are already seeing the troubling effects of climate change, and the evidence suggests these problems will soon grow far beyond our control unless we act and act quickly.

We must be faithful and wise stewards because at this point, we all know that we have a problem, which could substantially affect the way we live our daily lives. It is my hope, Mr. Chairman, that we will soon put forward some carefully constructed and sound policy, which addresses the issue of global warming.

America is the leading nation in the world, and our actions will greatly influence the direction that the rest of the world moves on this important issue. I thank all of the panelists for being here today. I look forward to their testimony. I started reading some of the statements just a few minutes ago. All of you bring a very important message that people need to hear. I look forward to your testimony and thank each of you for being here today. I yield back.

Mr. BOUCHER. Thank you, Mr. Butterfield. The gentleman from Texas, Mr. Barton, the ranking member of the full committee, is recognized for 5 minutes.

OPENING STATEMENT OF HON. JOE BARTON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF TEXAS

Mr. BARTON. Well, Mr. Chairman, I am going to give you back some of that time. I will put my formal statement in the record. I just want to make a few general comments. It is my opinion that a citizen of the undeveloped world is not going to forgo electrification of their life for some amorphous environmental benefit that, if realized, won't be realized for far in the future.

By the same token, I don't think citizens in our country are going to willingly give up their jobs to accomplish that same amorphous environmental benefit some time in the future. When we talk about countries like China, China's coal-fired capacity, in 7 months, their additional coal-fired capacity will equal the entire coal generation capacity of the State of Texas, which has, I believe, the largest base-load coal-fired generation system of any State in the country. And in a year, China's new coal-fired capacity will equal the entire output of the State of Texas.

The Chinese, who barely pay lip service to the criteria pollutants, have stated in no uncertain terms that they have absolutely no intention of reducing their CO^2 emissions any time in the foreseeable future. To the extent that we have statistics, we know that between 2000 and 2004, China's CO^2 emissions went up 60 percent. During that same timeframe, the CO^2 emissions in the United States went up a little under 2 percent. It is expected any year now that China's overall CO^2 emissions are going to surpass the United States.

And for us to sit here and somehow think that the United States of America can do something that will morally challenge the Chinese, and to a lesser extent the Indians, to follow us, is just not common sense. In fact, I think it is the opposite of common sense. So I am very interested in what our witnesses have to say on this issue, but this issue today, Mr. Chairman, is one of the most critical in terms of common sense recognition of any proposed solutions. You cannot have a legislative package that passes the House of Representatives that does not have an enforceable, meaningful mechanism to include the developing world and especially the Chinese.

With that, I yield back.

[The prepared statement of Mr. Barton follows:]

PREPARED STATEMENT OF HON. JOE BARTON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF TEXAS

Mr. Chairman, today we begin to look beyond our own borders to examine greenhouse gas emissions in other countries.

Some witnesses today will talk about how American companies are helping other countries avoid greenhouse gas emissions. Others will recommend that the U.S. use its muscle to get other countries to cut back.

We need a clear picture of what countries are actually doing, and are likely to do, with and without our influence.

We also need to understand countries' ambitions for their own people, and how greenhouse gas emissions reduction stacks up as a priority.

Here's one thing I know already: Poor countries don't spend money on environmental causes. And here's something else I know: If China and India don't reverse their emission trends, nothing the United States can do will matter in the long run, except to the American taxpayers who have to pay the enormous costs.

Take China. The Chinese are adding coal-fired generation at an unprecedented pace. They are said to be starting up another 500 megawatts of coal-fired power plants every 4 days.

Compare that to California which made the dramatic commitment to turn away from its cheapest source of power, out-of-state coal-fired power plants. Replacing that power will certainly be expensive. Consequences may well be power shortages and retail price spikes. Will it make a lasting contribution to world reductions of greenhouse gas emissions? China will add an equivalent amount of new coal-fired capacity in a matter of weeks.

In my own State of Texas, one company has thrown State resource planning into a tailspin. The company had promised, then backed away from, construction of 6,000 megawatts of new coal generation. Those new plants would have been among the cleanest ever built, virtually eliminating emissions of criteria pollutants.

Then they were cancelled, supposedly to reduce greenhouse gas emissions. China will produce 6,000 megawatts in 2 months and never break a sweat.

According to a new study by MIT, coal output in China has doubled since 2000. Its coal output is now No. 1 in the world and more than double the United States.

Will China make and stick by commitments to reduce greenhouse gases? It is highly doubtful.

The study says that, "China's energy-related governmental bureaucracy is highly fragmented and poorly coordinated." Also, "infrastructural issues are being resolved very quickly by individuals and organizations operating well below the level of national energy corporations."

What are some of the results? One is that China doesn't even seem to do a good job of controlling criteria pollutants. Well under 5 percent of China's coal plants have any sulfur dioxide control equipment at all, and apparently for those that do have scrubbers, there is not much reason to assume that the scrubbers actually operate. Why operate them when there is no enforcement and all they do is reduce power output?

No wonder China has some of the most polluted cities in the world. And that pollution won't ease up anytime soon if more and more companies choose to move operations to China for the cheap power, especially if we in the U.S. increase our own costs with a carbon cap.

Meanwhile, India is also growing its coal consumption and expects to surpass the United States by 2020.

Mr. Chairman, this examination will not slow down our own best efforts. Pursuant to the Energy Policy Act of 2005 we are providing incentives for next generation alternative technologies, atmospheric research, and regulatory reforms that open the door for those technologies .

I think we should look first to build on those efforts in EPAct and a few others before we resort to regulating, rationing, or taxing CO^2 emissions.

Mr. Chairman, I look forward to hearing from our witnesses on some of these topics.

Mr. BOUCHER. Thank you very much, Mr. Barton. The gentleman from Louisiana, Mr. Melancon, is recognized for 3 minutes. The gentleman waives an opening statement.

The gentleman from Washington State, Mr. Inslee, is recognized for 3 minutes. Mr. Inslee waives.

Gentlelady from Wisconsin, Ms. Baldwin, is recognized for 3 minutes. The gentlelady waives.

Without objection, all of the opening statements will be received in the record. The gentleman from Arizona, Mr. Shadegg, is recognized for 3 minutes. Mr. Shadegg waives.

The gentleman from Oregon, Mr. Walden, is recognized for 3 minutes. Mr. Walden waives.

The gentleman from Oklahoma, Mr. Sullivan, is recognized. Mr. Sullivan waives.

The gentleman from Mississippi, Mr. Pickering, is recognized for 3 minutes. Mr. Pickering waives.

And the gentleman from Texas, Mr. Hall, is recognized for 3 minutes.

OPENING STATEMENT OF HON. RALPH M. HALL, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF TEXAS

Mr. HALL. Mr. Chairman, I almost waived. I just want to say that Mr. Barton is exactly right to lead into this discussion with something that all of you know is obvious from watching television, reading the paper, and listening to testimony up here. There is a war on energy today, outright war on energy. And I think the people that are waging that war need to remember that energy might keep our kids from having to fight a war, if we can solve the energy problem.

We have to be honest about this, and Mr. Shimkus was also right in talking about the vast expenditures of money that it takes or the gentleman from North Carolina addressed climate change as a reality, and certainly we all know that. And the answer is technology and money. I don't believe, as Chairman Barton said, that the American people are going to guess that $180 billion a year for almost 70 years with no known cure is the answer to it. It involves shipping all of our jobs to China, the worst polluter in the entire world.

We just need to get realistic about it. Global warming or global freezing or whatever you have without Russia, without China, without India, without Mexico, I go on down the line, it is just not a possibility. And I say to my friends on the other side it isn't going to happen. You might make it happen over here in the House, but the Senate is going to work on it. It is going to eventually get to a President over there that has some opinions about it. And we have enough votes to uphold his veto when it happens.

So let us be realistic about it, and let us tell our children that those signs that say no nukes, if we can protect nuclear power—and I am a fossil fuel guy, but I want nuclear power. I want any kind of a power. Joe Barton gave us about 15 ways to increase our energy output in the energy bill he passed a year and a half ago. That is the answer to it, and I yield back my time.

Mr. BOUCHER. Thank you very much, Mr. Hall. I thank all of the Members for their opening statements, and I particularly thank those who chose to waive an opening statement in anticipation of questions.

I want to briefly introduce the members of this panel, and then I am going to recognize the gentleman from Michigan, the chairman of the full committee, for his opening statement. So first, a word of introduction about the members of our panel today. Joining us this morning is Annie Petsonk, who is international counsel for Environmental Defense. Jeffrey Holzschuh is vice chairman of institutional securities for Morgan Stanley. Mr. Thomas Stephens is the president and chief executive officer of Boise Cascade. Jonathan Pershing is the director for Climate and Energy Pollution Program at World Resources Institute. Dr. Edward Steinfeld is associate professor of political science and co-director for China Energy Group, Industrial Performance Center at the Massachusetts Institute of Technology. And Mr. Pramit Pal Chaudhuri is a Bernard Schwartz Fellow, with the Asia Society in New York, and the foreign editor, Hindustan Times of New Delhi. I want to say welcome to each of our witnesses, and we will turn to your testimony momentarily. But it is now my pleasure to recognize the chairman of our full Energy and Commerce Committee, the gentleman from Michigan, Mr. Dingell, for 5 minutes.

OPENING STATEMENT OF HON. JOHN D. DINGELL, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MICHIGAN

Mr DINGELL. Mr. Chairman, thank you for your great courtesy. I want to commend you for this hearing and the fine way in which you are leading this subcommittee on a very difficult issue.

The issue today is a very important one. It has percolated through every other hearing that the subcommittee has held on climate change: the contribution of developing nations to the growth in greenhouse concentrations, and their potential role in mitigating this environmental threat.

It is widely understood that without commitments from both developed and developing nations to limit greenhouse emissions, this global environmental problem cannot be addressed. It is also broadly accepted that absent a major effort on the part of the United States, large developing countries such as China and India are not likely to significantly limit their own rapidly rising emission levels.

What is clear is that we don't know a whole heck of a lot about this problem. Now, what is most unclear is how to coordinate the two responsibilities we have here. Some witnesses at prior hearings have argued that the United States has a moral and practical imperative to act unilaterally to limit its emissions, whether or not developing countries act in parallel within the same time period.

A number of witnesses predicted that if the United States leads, developing countries are likely to follow suit. Other witnesses, however, have argued that it would be foolhardy of the United States to unilaterally bind itself to emission limits and that doing so could cause both jobs and emissions problems to migrate to the developing world, thereby harming our economy without securing real reductions in global emissions. My sense is that people of good conscience are looking for practical solutions to the dilemma.

I was skeptical of the Kyoto Protocol because, to my mind, it did not strike a fair or effective balance between the developed and developing nations. I hope that the current U.N. negotiations will produce a more workable approach in the post-Kyoto era. I would note that the Senate voted 95 to nothing on this particular matter, as my colleagues will remember when they passed the Byrd-Hagel resolution on this precise point.

In any event, in its legislative considerations, Congress must find ways to limit emissions from the U.S. that do not amount to shifting their origin and American jobs to other countries. The subcommittee has heard anecdotal evidence about a new openness in China and other developing nations to cleaner paths to economic growth. I hope today's hearings will help us all to gain a better understanding of what changes are underway in developing countries and how the U.S. might align its efforts with theirs to mutually address this growing environmental concern.

Again, Mr. Chairman, I thank you for holding this hearing. I look forward to the testimony of our witnesses here today, and I yield back the balance of my time.

Mr. BOUCHER. Thank you very much, Mr. Dingell.

We will now be pleased to hear from our witnesses, and I want to thank each of them for their attendance this morning. Without objection, your full opening statement will be made a part of our record, and we would welcome your oral summary of approximately 5 minutes. And I will simply call on the witnesses in the order in which I introduced them. Ms. Petsonk, we will happy to begin with you if you are ready.

STATEMENT OF ANNIE PETSONK, INTERNATIONAL COUNSEL, ENVIRONMENTAL DEFENSE, WASHINGTON, DC

Ms. PETSONK. Thank you very much, Mr. Chairman. Good morning, Chairman Boucher and distinguished members of the subcommittee. Good morning, Chairman Dingell. My name is Annie Petsonk. I am the international counsel with Environmental Defense. My organization is already known to you, so with your permission, I would like to go straight to making three points about what you can do to engage developing countries in the climate challenge.

Before I make my three points, I just want to note that if you cap America's emissions and allow those who cut emissions better, cheaper, faster to trade allowance with those who can't, you will create what is likely to become the world's largest carbon market. Europe's cap and trade market is already worth about $25 billion, and its volume is forecasted to double next year. If you design it well, America's market will draw more investment capital and

more entrepreneurial energy into the search for low-carbon solutions than any place else in the world.

My first point follows an idea that Representative Harman raised. Congress can engage developing countries by offering them the carrot of access to our carbon market if they measure, report, and reduce their emissions across the board. Currently, developing countries can only earn carbon credits for scattershot projects on a case-by-case basis. That means their slice of the carbon credit business is small. It is only about a sixth of the global total.

Access to our carbon market will be a significant incentive that you can offer them in exchange for their emission cuts. A good place for Congress to start is with tropical forest nations, and we have a slide here showing—you can see some bars showing global emissions. The bar all the way on the left-hand side is the emissions of the United States. We are the world's biggest emitter.

But the bar all the way on the right-hand side, which is even bigger, is the emissions from the destruction of rain forests around the world. Tropical deforestation emits as much carbon dioxide as all the fossil fuel consumed in America. We are the world's biggest emitter. China is No. 2. But did you know who is No. 3? It is Indonesia. And No. 4? It is Brazil. 70 percent of those countries' emissions come from deforestation, but they cannot earn any credit in the carbon market today for reducing those emissions.

If you open America's carbon market to rainforest countries that reduce their national deforestation below a historical level, you will create a powerful incentive for them to reduce what, for many of them, is their biggest source of emissions. Some rainforest countries have already indicated their interest in signing up for this approach if you create it.

That, in turn, is putting competitive pressure on other developing countries to figure out how they are going to get into our carbon market if you create it. You can heighten that pressure on developing countries.

Today, China and India participate in the carbon market to the tune of about $5 billion. In the absence of emission caps, it is all in these one off projects. You don't have to accept that framework. You can instead design our carbon market so that the sooner those countries cap their emissions, the more favorable the terms of access to our carbon market they will get. That would give them a strong incentive to open their entire economies to the kinds of emission reduction investments in new technologies, American technologies, the kind of technologies that Representative Hastert mentioned, economy-wide instead of in the individual projects to which the current carbon market is now restricted.

What if even with these carrots developing countries still refused to cut emissions? My second point is that you have sticks that Congress can deploy. For example, you can design our carbon market so that credits from these one-off projects in countries that don't cap and cut their emissions are worth less in our carbon market. If those countries want their credits to trade at par in our market, they will have to cap and reduce their total emissions.

Another stick, one I believe that you heard about last week, is a proposal put forward by American Electric Power and the International Brotherhood of Electrical Workers to require that imports

of carbon-intensive products from nations that have refused to cap and cut emissions be accompanied by emission allowances. The aim of that proposal is to prevent the kind of emission shifts and job shifts that Chairman Dingell and other members of the subcommittee have referred to. And we think that that proposal merits close consideration, and I would be happy to talk further with you about that if you have questions.

My last point is that you have the power to lead by example. If you create a durable carbon market with enforceable mechanisms, one that taps innovation in the service of a safe climate, then America can demand that where we lead, others should follow. But if you adopt a weak program, other nations will too, and that could hurt not only the climate but American industry.

Here is how. Let me give an example. If you load the program with safety valves in the form of price controls on emissions, our trade competitors will race to do likewise. If, for example, you set a price ceiling of, let us say, $15 a ton in the U.S. carbon market so that when the price of trade allowances hits the ceiling, the Government simply prints more allowances for sale at the ceiling price.

That busts the emissions cap, but let me also tell you it undercuts our industry because developing countries are going to adopt the same kinds of price controls but they are going to set them at much lower levels relative to their economies. If we cap ours at $15 a ton, they might cap theirs at $5 a ton. Then instead of investing in the kind of low-carbon technologies that have been mentioned here, emitters simply will buy up allowances in the countries with the cheapest price ceilings and emit as much as they want. Who would buy American low-carbon clean-coal technology then? I urge you not to take this route.

Let me close by saying your decisions will have an enormous influence on the choices developing countries make. I urge you to use the carrots and the sticks along with your leadership. Thank you.

[The prepared statement of Ms. Petsonk appears at the conclusion of the hearing.]

Mr. BOUCHER. Thank you very much, Ms. Petsonk. Mr. Holzschuh, we will be happy to hear from you.

STATEMENT OF JEFFREY R. HOLZSCHUH, VICE CHAIRMAN, INSTITUTIONAL SECURITIES, MORGAN STANLEY, NEW YORK, NY

Mr. HOLZSCHUH. Thank you, Mr. Chairman, and distinguished members of the subcommittee. My name is Jeff Holzschuh. I am vice chairman of our institutional securities business at Morgan Stanley, head of what we call our global power and utilities group, and also I chair the firm's environmental policy committee. So from three perspectives, I speak to you this morning. I hope I can add some useful perspectives on some of the developing countries and the steps that they have taken to think about reducing greenhouse gas and including how the U.S. and other developed nations are impacting this issue.

As developing countries, particularly China, continue their rapid growth trajectories, their energy use and demand, including their emissions, have obviously been growing. With the global warming increasingly confirmed for the U.N. and IPC reports, both the de-

veloped and developing world needs to take appropriate actions now.

Morgan Stanley is a leading, global financial firm. I think most of you probably have heard of us, but a couple of things that we have tried to do, we have committed in excess of $3 billion of our own capital to begin developing the carbon emissions credits, purchasing them, trading them, projects, other initiatives related to greenhouse gas over the next few years. In addition, we are one of the most active traders of environmental commodities, including sulfur dioxide, nitrogen oxides, biodiesel, ethanol, and weather derivatives. We also work with a variety of our industry clients to craft new and innovative approaches to the evolving greenhouse gas concerns in this country and globally.

Internationally, our commodities trading division in Europe, for example, has been actively trading EU carbon allowances in the new cap and trade regime. It works with clients to develop carbon offset projects as well. We believe the trend toward more country, regional, and international carbon trading is positive, can provide useful incentives and structures to help reduce global greenhouse gas emissions in the future.

You have heard extensive analysis on greenhouse in testimony, but from our perspective, I wanted to add a couple of points. We are very aware of China's potential impact on greenhouse gas due to its growing greenhouse emissions, its projected energy demand growth over the next 20 years. Since 1990, China's emissions have risen 77 percent compared to only 18 percent in the U.S., as recently estimated by the World Resource Institute Study.

Nearly 32 percent of future global energy demand over the next 20 years will come from China alone, as estimated by the International Energy Agency, McKinsee, and our own research. Actually, India and Latin America, in comparison, are only projected to account for 12 percent of the future global energy demand during that period. The Chinese emissions growth is due primarily to its reliance on its abundant coal reserves and satisfying those growing energy needs.

According to the EIA's world energy outlook 2006, China and India will account for 80 percent of the incremental increase in coal consumption globally between now and 2030. Today, China is opening new coal-fired generation plants every 7 to 10 days. Currently, the coal-fired plants are inefficient. They consume twice as much coal per kilowatt produced, compared to the U.S. plants. They lack the anti-pollution stack scrubbers that are found on most U.S. plants.

Other developing countries, such as India, also have inefficient plants, and we believe it is our country's best interest to enable countries like China to use the best available clean coal technologies and help reduce their greenhouse gas emissions from this key source in the coming years. China is projected to become the world's largest emitter of greenhouse gas, and is now preparing a national strategy to address climate change and reduce those greenhouse gases. Evidence suggests that the approval of this strategy make take a couple of years. I think the good news is that they are addressing it at the national level; however, we are not naive. We think it will be limited or there won't be regulatory en-

forcement mechanisms. They will lag until they can create an effective regulatory and enforcement agency.

An interesting and new twist is the emergence of the emissions trading and its potential to help countries like China. For example, China failed to meet its goal to reduce its sulfur dioxide emissions by 10 percent between 2001 and 2005. And instead, emissions increased by 27 percent over the same period.

To address this concern, in August 2006, the Chinese Academy of Environmental Planning previewed a new national emissions cap and trade program, which if similar to the existing U.S. emissions trading program for SO^2, could be very effective in reducing greenhouse gases within China. China's emissions cap and trading efforts would be made more effective if America creates its own carbon cap and trading system to foster emissions reductions.

This subcommittee has received extensive detailed testimony on how that market might be structured. I would only add that given the excellent efforts already in setting up an effective SO^2 program that we do have the collective expertise in the U.S. to develop an effective cap and trade system. Ideally, we need to build from the Europe experience as well.

We recognize this is an extremely complex subject, but encouraging effective regulatory and incentive systems, such as carbon trading both in our country and others, would be a key part of an effective global approach. Obviously, this is only one piece, however, of a comprehensive greenhouse gas emissions reduction approach with other actions that are also needed such as increasing energy efficiency, promoting the clean technologies, assisting in changing consumer behavior to adapt and change the energy use in coming years in both developed and developing countries.

For example, Australia's seemingly simple action to hand out efficient light bulbs is a small but significant signal, we believe, to their citizens to change and adapt their energy use behaviors. Ideally the U.S. needs to take a leadership position in addressing its own greenhouse gas emissions effectively and comprehensively in a large part to encourage, I think, to lead and inspire the developing countries, such as China and India, to follow our lead and to coordinate their own gas emissions.

Morgan Stanley is committed to assisting and being a part of these efforts and in helping achieve the best outcome for the U.S. and globally. And I thank you again for the opportunity to share these views.

[The prepared statement of Mr. Holzschuh appears at the conclusion of the hearing.]

Mr. BOUCHER. Thank you very much, Mr. Holzschuh. Mr. Stephens.

STATEMENT OF W. THOMAS STEPHENS, CHAIRMAN AND CHIEF EXECUTIVE OFFICER, BOISE CASCADE, L.L.C., BOISE, ID

Mr. STEPHENS. Thank you, Mr. Chairman and members of the committee. I would like to take some of my 5 minutes to zero in on some real people and some communities that are going to be significantly influenced and impacted by the actions that are being contemplated by Congress. These are people and these are commu-

nities that are going to be operating at the margin of change in terms of climate change legislation and international competition.

I do suggest that while Congress should enact rational, constructive, and timely legislation, be very careful to avoid creating unintended results. Doing it right, to me, is much more important than doing it quickly.

I don't envy you your challenge. Finding a way to put all the pieces of this puzzle together and finding solutions that really work is a tremendous task for our Government and for our society as a whole.

I have always believed that the best way to solve complex problems is to work backwards from the desired results, and very simply the results that I would hope we set our sights on is a halt to the increase in greenhouse gas emissions on a worldwide basis. The development of and the integration into our economy of new technologies that would allow us to conserve energy, rebalance our energy sources away from carbon, and, of course, sequester carbon back into the Earth.

While we are working on those outcomes, I suggest that we keep some other goals in mind. I hope that whatever steps that we take that provide for the mitigation of the inevitable inequities, imbalances, and economic dislocations that are going to be byproduct of something of this scale. The U.S. can't fix this one by ourselves, and we have to assure that there are no free riders that grow their standard of living on the backs of workers in this country. I have always been a free trader. Enhancement of fair trade and market mechanisms has to be, to me, a part of the overall design.

Finally, while we surely need to use market forces and economic systems, such as cap and trade, where they are appropriate, we have to be careful not to create markets that can be abused and can be gained so that we don't actually accomplish the results we set out for.

Today we, as a country, are debating how to take giant step, but, to me, a step in the right direction. And as the world's economic and innovation leader, I believe it is the U.S.'s responsibility to take the lead.

Now, talking about theory is the easy part. I want to get back to hard reality and talk about some of the people I work with that are going to be impacted by Congress's decisions. In my company, we have to make decisions every day based on international competition and energy cost, both of which are going to be influenced by what Congress decides in terms of climate change.

Employees at our paper mill in St. Helens, Oregon are already fighting for that bill's existence because of the high cost of energy and the availability of raw materials in the Pacific Northwest. It is ironic that in the middle of the best place in the world to grow trees the high cost of fiber and energy are threatening the existence of the mill. Our competition is no longer just the paper mill in another town, but also new ones that are being built in places like Indonesia and China.

Just to give you some perspective, we have 485 employees in that mill, and they take home $90,000 a year when you include their benefits. The town of St. Helens is 12,000 people. If that mill goes down, it is going to be very painful for those people and for that

community. I can assure you if the cost of energy goes up at St. Helens faster than the cost of energy for our competition, that mill will go down.

Now, at the same time, we are not asking for a bailout. We are just asking that Congress maintain a level playing field and don't make the hole any deeper. If we can keep our market share, if we can continue to make paper in St. Helens rather than buying it for China, our employees win, our customers are better off, and of course, the environment is too.

There are some other issues related to climate change legislation that I don't have enough time to talk about this morning, but in another form, I would like to expand on the mass confusion that exists around forest management and climate change. Suffice it to say that every year forest fires in Oregon produce enormous amounts of carbon dioxide, and, in fact, some years more carbon dioxide than all other sources combined. Letting fertile forest burn, not letting us harvest dead trees, and then not providing funding to replant new trees is just not good policy.

Finally, let me wind up by just saying it was technology that moved us into such an energy-intensive economy and created a standard of living that we enjoy in America. I have high hopes that legislation will promote and not hinder the development of technology to remediate greenhouse gas at its source as well as develop fuel alternatives.

Innovation and higher productivity are the keys to a growing economy and a higher standard of living for the U.S. and around the world. Thank you, Mr. Chairman.

[The prepared statement of Mr. Stephens appears at the conclusion of the hearing.]

Mr. BOUCHER. Thank you very much, Mr. Stephens. Mr. Pershing, we will be happy to hear from you.

STATEMENT OF JONATHAN PERSHING, DIRECTOR, CLIMATE ENERGY AND POLLUTION PROGRAM, WORLD RESOURCES INSTITUTE, WASHINGTON, DC

Mr. PERSHING. Thank you very much, Mr. Chairman and members of the committee. I very much appreciate this opportunity to discuss my views and provide some input to your important deliberations on the international component of the climate change problem. The World Resources Institute is a non-profit, non-partisan group that does research and policy analysis on a series of global issues, including climate change, ecosystems and development, and it is within that framework that I would like to offer some comments and some suggestions.

We work quite extensively internationally, and one of the things that is quite apparent is that the climate change science is perceived as real internationally. And the reason that is important is that it doesn't mean that we are not alone in what we can do; all countries are considering action. That means India and China as well as the U.S. and Japan.

The second point is that there is a consensus that we can't wait to start. At the moment, our best understanding suggests that every time we delay, every moment we delay, means we have got to do more later if we want to achieve the same level of reductions.

The scale of the problem is huge. The best science we have got says that if you would like to stabilize at any point, at any time, you will need to have massive reductions at some point in time on the order of 90 percent below current levels.

To stabilize in the near term means 60 to 80 percent reductions by 2050. That is still enough time for massive technology shift, but not a lot of time. No single country, no single sector, and no single actor is likely to be adequate to solve the problem on its own. That means the U.S. can't do it by itself, but neither could China, neither could the EU. It will require efforts from all countries, from all sectors, addressing all greenhouse gases.

Furthermore, not all countries are the same. If we think about applying a standard to all countries that would be the same for all countries, we will not make the kind of progress that we need. We have to be real and recognize that there are real differences between the way countries perform, between their national circumstances, and design a policy that is adequately flexible to manage that.

Let me point another number out. If you took the top 15 emitters in the world, you have 80 percent of global emissions. So you actually don't need 150 or 190 countries to solve the problem. You need the big countries, and that means we can have a different process, perhaps not only a different process but including a difference process that manages some of those major players. We need to think about that as part of our program.

I would note that there are a number of solutions that would take the self-interests of all countries into account as we seek to design those next steps. I would like to offer three. The first one is we think about a price, and we already have a mechanism to frame a price. That mechanism comes at the individual State level, in fact, is beginning to do it. The Europeans have begun to do it. The Japanese have begun to do it. We are seeing the capacity of prices to influence investment decisions, to influence behavior, and to influence the long term.

But in order to move that forward, we have to expand the market. And that means bringing other countries on board, and that means developing the standards and the references which would allow them to participate. I do not myself believe that those exist outside of a relatively small set of countries. We do not yet have standards in my mind, which would allow us to trade with Russia easily. I witness what goes on in the gas market, and it is not because they live by contracts that we all sign up to. That therefore suggests to me that we have to do considerable work to move Russia in the right direction. That is around all issues, including standards for carbon as well as other trade.

The second solution: capture the co-benefits. There are many, many co-benefits. There are virtually no climate change reduction opportunities that do not also involve other things that we care about. There are no countries that we are talking about here today that are not concerned with energy security. We all worry about it. If we can improve efficiency, we will improve energy security. We will also reduce greenhouse gas emissions. If we can improve rates of deforestation, we will decrease greenhouse gas emissions and improve ecosystem management as well as reduce the loss of soil.

We need to find the technologies that do that. We need to promote the opportunities that do that, but we can work with all the countries we have been talking about in that real way to influence that kind of change.

And finally, we need to think about technology. There are very few sets of technologies that will clearly be absolutely critical. Dr. Steinfeld will probably talk a little bit about the coal issue, but I want to make one point about it. It may be the only technology, capture and storage, which has no or less obviously a solution for other things besides climate. It will slightly increase our energy costs. It will change the price that we therefore put on some things that we care deeply about.

But at the end of the day, China's reliance on coal, India's reliance on coal, the U.S. reliance on coal requires that we take this step. And that with a carbon price, we could move it forward, but it will need help. It will need your investment and your considered deliberations to promote it much more rapidly than we are currently moving. That means to me that we need to have a great deal more energy, and unfortunately, we won't probably get there adequately. We will need some adaptation. We will need some funding to cope with the consequences. The climate change we can't avoid, and that has got to be part of the puzzle.

I think in conclusion, we can use the existing four that we have got, but the ones that we currently have are not enough. We need to put more money into the things that we are doing. We need to put more force into the things that we are doing. The Asia Pacific Partnership, while a very strong first start, is wholly inadequate to the scale of the problem. The Kyoto Protocol, a start, inadequate to the scale of the problem. We nee do to move all of these things forward if we can succeed. Thank you.

[The prepared statement of Mr. Pershing appears at the conclusion of the hearing.]

Mr. BOUCHER. Thank you, Dr. Pershing. Dr. Steinfeld.

STATEMENT OF EDWARD S. STEINFELD, ASSOCIATE PROFESSOR, DEPARTMENT OF POLITICAL SCIENCE, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, CAMBRIDGE, MA

Mr. STEINFELD. Mr. Chairman and members of the committee, thank you very much for the opportunity to speak today. I am Edward Steinfeld. I am a professor of political science and political economy at MIT and a specialist on Chinese industrial development. In that capacity, I served as one of the principle authors of MIT's recently released study on the future of coal in a carbon-constrained world.

The MIT study began with two premises. First that the risks of global warming are real and that carbon mitigation efforts should move forward. And second, for the foreseeable future, coal would be a critical resource for meeting global energy needs. Those two premises, taken together, as many people have noted already today, placed China dead center in the discussion of climate change.

I won't go over all of the numbers that have already been stated and stated quite accurately. China will soon pass the United States whether this year or next year, maybe the year after—will soon

surpass the United States, the world's largest emitter of CO^2. The largest coal-consuming sector China, the electric-power generating sector, as others have noted, is expanding at a torrid rate. A 500 gigawatt roughly generating capacity system in 2004 added 70 gigawatts of generating capacity roughly in 2005, and 102 gigawatts of capacity in 2006, virtually all of that is pulverized coal-fired standard power generation. That is an incredible rate of increase, one of the most rapid in human history.

The question though that I would like to address are the conditions under which, and the institutional framework under which, this very rapid expansion is happening. There are a few features of the Chinese system that I would like to point out.

First, my research suggests it is not the case that this expansion is centrally coordinated, coherently coordinated, strategically coordinated, whether progressively coordinated or regressively coordinated. Rather, the story on the ground is that this expansion is happening at a rate far faster than central officials in China can grasp and understand. And they are scrambling just to get information and to get raw data.

Second, the decisions that are made regarding this build-out and their technology decisions and design decisions and infrastructure decisions relating to power plants, these are highly localized decisions, and decentralized decisions but not decentralized institutionally through formal processes, but institutionalized in the de facto fashion. The decisions are made before the center can really recognize what is going on. In fact, power plants in China almost routinely receive approval after they are already up and operating, rather than before.

Third, in this environment of ad hoc decision making, of self-help, and making due, there are a wide variety of players who get involved. Some are commercial players. Some are regulatory players. Some are investors. Some are wearing all three hats simultaneously and are not exactly sure which role they are supposed to be playing, but the ultimately deliver the electrons. They deliver the electricity for economic development. It is a tough, chaotic environment, not only for outsiders to deal with, but for insiders to deal with and particularly to regulate.

So the question then is what does this mean for Chinese participation in carbon mitigation efforts? Well, first and obviously, to the extent China participates as a system, we have to expect that the system will not and cannot turn on a dime. It is not the kind of system that can do that. No matter what the central dictates happen to be, the system will not turn on a dime, and compliance, as it is for virtually all regulations in China, compliance will be a problem.

Second, though, there is some cause for optimism. The first point I would like to raise there is some central players in China—and, of course, there are debates within the central government, as there are in any government. Some central players do want change and want it rather desperately. They face pressures that are familiar to all of us as has been mentioned. Dependence on external energy, resources, environmental pressures from their publics, pressures to improve competitiveness of industry in their own country, they would like to get better regulatory control of the sector. One

tried and true method of doing this in China has been to outsource regulation to external global institutions. The WTO excession story in the past is really this kind of story, and there are Chinese policy makers who are looking for some kind of external agreement or binding factor that they can use to drive regulation inside the country.

The second issue related to that is that there is quite surprising to me and interesting to me a certain bottom-up pressure from some commercial players, particularly manufacturers of power generating components and technologies. We see it also on the renewable side. We see it a bit actually in the coal industry itself. There are commercial players in China who want to push their own government to move toward carbon constraints simply to create incentives for these commercial producers' own products. Or to put it somewhat differently, these producers want to be globally competitive. They want to feed products into markets in Europe and North America as well, and they feel they can't do that unless their domestic market converges in a regulatory sense, in a regulatory fashion toward the rest of the world.

So what is the conclusion? Well, first I can imagine a WTO-like excession process or a political conversion process inside China, but with respect to climate change. Had you asked me in the early 1990's would China ever exceed the WTO on the terms it did, I would have said absolutely not. Of course, it is a criticism of myself, but virtually all of my colleagues who study China would have said the same thing. Politics changed, and the government then changed its strategy and grasped this external institution to push further change in the country.

But that presumes that there will be some kind of external agreement to which these policy entrepreneurs in China can grab hold, and that——

Mr. BOUCHER. Mr. Steinfeld, if you could wrap up just a few minutes.

Mr. STEINFELD. And the last point is even if China does—and I predict that it will join and grab hold to an international agreement on carbon constraints. Even if it does, we will likely see, as we have seen with WTO excession, continuing compliance problems as China works to build domestic capacity over the long run.

[The prepared statement of Mr. Steinfeld appears at the conclusion of the hearing.]

Mr. BOUCHER. Thank you very much, Mr. Steinfeld. Mr. Chaudhuri.

STATEMENT OF PRAMIT PAL CHAUDHURI, BERNARD SCHWARTZ FELLOW, THE ASIA SOCIETY, NEW YORK, NY, AND FOREIGN EDITOR, HINDUSTAN TIMES, NEW DELHI, INDIA

Mr. CHAUDHURI. Thank you. I am a journalist in India who is presently on a 1-year fellowship at the Asia Society where I am looking at a host of issues relating to India, the United States, and India's role in the world in the coming decades.

The debate in India about global warming is curious because domestically, it barely exists. There is no dispute. Very few dispute the issue of global warming or its importance, but the debate is

minimal because there is a general view that the most controversial aspect of the debate, which is carbon emission limits, simply does not apply to India. When the U.N. Intergovernmental Panel on climate change issued its last report, my guess would be that of India's 26,000 newspapers, barely 1 or 2 percent bothered to put it on page one.

And there is a reason for this lack of debate because there is an overriding consensus within the Indian establishment, the political elite, the media, even within the environmental movement in India, that the overriding priority for the country is rapid economic growth.

And since carbon emission limits are seen as inimical to that growth, they are generally simply ruled out of the debate. The late Indian prime minister, Mrs. Indira Gandhi, famously said in the 1970's the ultimate polluter is poverty. And it is a line that is repeated again and again and again even to this day by the prime ministers and the leadership and the media and anybody in India who talks about pollution in any way.

And I suppose everybody knows how poor India is, but I will reiterate it because it is so important. India has more poor people than sub-Saharan Africa. It has as many as—the estimates differ—as many as 300 million people living on a dollar a day. If that figure is taken to $2 a day, that figure rises to almost 700 million. What we are looking in India right now, the economy boom that we have been experiencing in the past 10 years, as a recent World Bank study says, for the first time, India can actually look at the possibility of eradicating poverty, in others word bringing it down to single-digit levels within the population in a generation.

It is very difficult to explain how important this is for everybody in India, not just because of the poor but even the people at the top. To be able to look at something that we have not been able to do for centuries. So even if you were to theoretically argue that carbon emission limits might affect that growth, it is immediately ruled out because this is something that Indians cannot believe that we can possibly accomplish, and they are not prepared to threaten it in any way.

This, of course, is why India as well as China declined to accept carbon emission limits when they signed the Kyoto Protocol. They accepted the global warming was an issue, but they were not prepared to sacrifice growth, even theoretically. And this is one of the reasons why both India and China, I believe, are dragging their heels and are extremely wary of a second Kyoto agreement because there seem to be a large number of people who argue that this agreement should bring carbon emission limits and apply them to India and China.

This automatically for India and China—well, I won't speak on behalf of China, but I will say my impressions on India—means that you are trying to sacrifice our ability to eradicate poverty.

The U.N. framework convention on climate changes chief official, Evo Debower, spoke in Delhi in January, and he put his thumb right on this issue. He said I understand this perfectly. "Developing countries fear that the new round of climate negotiations would impose on them obligations that would hurt their economic growth." And because of that, they are not prepared to negotiate or they are

not prepared to be as constructive as they can be. Because of this fear that lies in the background of this entire game, the prime minister, who is an economist by training, Dr. Manuel Sing, last year in a speech on our Government's integrated energy policy, made it very clear, 8 percent growth.

And even if you assume only 8 percent growth—we have grown 9 percent in the past 2, 3 years—until 2030 would require a four to fivefold increase in our energy consumption and increase of our electricity capacity from its present 131,000 megawatts to somewhere between 800,000 to 950,000 megawatts.

But the linkage is always very clear in all of the Government's statements. Energy consumption is directly linked to our rapid economic growth. We try to curb the energy consumption, and, in fact, the prime minister has repeatedly said that is our No. 1 constraint on our future economic prospects because our energy production remains far behind the rate of the growth of the economy as a whole.

And Indians look at the figures. We generated in 2005 312 million metric tons of CO^2 emissions. We were the fifth largest producer, just a notch behind Japan. But per capita—and I should add when you measure this by per capita, of course, it falls dramatically to only two tons per person. And it was interesting that it was the Indian environmental movement that recommended to the Government back in the 1980's that you measure it by per capita because it strengthens your negotiations position and puts it in a better perspective.

So it is not that India is not prepared to do anything about carbon emissions. We do look at other things, such as we are an active player in carbon trading it has been mentioned. The clean development mechanism that work in the U.S., we have 155 registered projects as of January 2007 and 400 more in the pipeline. We are part of the FutureGen project, the hydrogen fuel initiative. And somebody mentioned the Asia Pacific Partnership on Clean Development.

So I will quickly summarize to just say that in the long term, we are prepared to do something, but again it has to be done in a manner that does not affect the economic growth rate of the country. This is a not merely political and economic issue, it is a moral issue for the Indian political leadership as a whole.

[The prepared statement of Mr. Pal Chaudhuri appears at the conclusion of the hearing.]

Mr. BOUCHER. Thank you very much, Mr. Chaudhuri. And thank you to each of our witnesses for your presentation here this morning. The testimony that you have provided is going to be extremely helpful to us as later during the course of the spring we structure a mandatory program for greenhouse gas emissions in the United States. The point was made by members of the subcommittee and by witnesses alike that if we are going to have a mandatory program here, that does not fundamentally injure the U.S. economy, it is essential that we assure participation by the larger developing nations.

I agree with that point. I think our legislation has got to make provisions for it. Not only is it a necessity from the standpoint of our economy, but I think it is also a political necessity. If we are to be successful in passing this legislation through the House and

the Senate and having President Bush sign it into law, and it is our goal to have that happen during this 2-year period.

So let me ask about the best way that we can obtain that assurance in our legislation. One approach that has been recommended is that we have something in the nature of an off-ramp so that we would put our program into law. We would announce our targets. We would announce the schedule upon which those targets would take effect and emission reductions would begin. But at the point at which those reductions are scheduled to take effect, if we do not at that time have buy-in by the developing countries and an assured participation on their part with mandatory programs in those countries as well, then our program would not take effect. That perhaps is the most direct and perhaps Draconian way in which we could assure international participation if we are to have a program.

Some would argue that that approach might be effective. We have heard comments from some developing countries that they are not willing to undertake programs of their own as long as the United States is not committing itself to greenhouse gas reductions. Perhaps if we show our good faith in the exercise that we intend to do so here, that might encourage developing countries to do the same. So I would appreciate your comments about the possibility of an off-ramp.

Now, second, we heard testimony last week from the chief executive officer of American Electric Power, Michael Morris. I think Ms. Petsonk referred in her testimony to his proposal. It is a very interesting one. It essentially says that there would be a requirement that the importation of products from developing countries that do not have mandatory greenhouse gas emission controls be accompanied by an emission credit that would be equal to the greenhouse gas emissions attributable to the manufacture of that item. And so the importer of that item would be required to go into the world market and purchase an emissions credit that would be equal to that greenhouse gas burden, that burden assigned to that particular item. It is a very interesting recommendation, somewhat similar to what I think Ms. Petsonk and Mr. Stephens had recommended but not exactly the same.

A couple of questions that I have for you, and I will turn my time over to the panel members to respond. Number 1, do you think the off-ramp is the best approach? Do you think some sort of trade-related approach to this with the requirement somewhat similar to Mr. Morris's is the best approach? If it is the latter, what about WTO compliance? Are we consistent with our WTO obligations with China in particular in the event that we have that kind of requirement go into effect? I can imagine a challenge being made. So do you think either of those approaches is recommendable? If you think that some variation of Mr. Morris's proposal is better, tell me what that is. And if you have some third way, we would be happy to hear about that too. Ms. Petsonk, maybe we could begin with you.

Ms. PETSONK. Thank you, Mr. Chairman. And I have a standard rule. If you catch me using an acronym that you don't understand, stop me. If I don't stop, throw a small object at me to get me to stop or your gavel.

Mr. BOUCHER. I have it back now.

Ms. PETSONK. OK, thanks. First with regard to the off-ramp proposal. When I was a kid, we had a saying if one kid wanted to do something and the other kids wouldn't go along, we said nobody loves me, everybody hates me, I am going to go eat worms. And the problem with eating worms is it doesn't help you solve the problem. And in particular, the off-ramp proposal could be hurtful to American industry in developing the low-carbon technologies of the future that are going to be needed because that kind of off-ramp could send enormous uncertainty into the carbon market without any clear signal for what would be the trigger for the off-ramp.

So let me not say anything further about that and go instead to the American Electric Power-International Brotherhood of Electrical Workers proposal. It is a very interesting proposal. It is attracting significant attention in the business community as well as in the labor community.

I am authorized to say I was talking with a company yesterday, which happens to be one of the world's largest manufacturers of cement. It is the Holcim Company. You may know it. It has substantial operations in North America, and 60 percent of its operations are in the developing world. And they indicated to me that quite independently they have come up with a quite similar idea that they are considering proposing in Europe. They haven't taken a final decision as to whether to propose it. But certainly is it the kind of proposal that one would want to coordinate between the United States and Europe so that together the markets of the nations that adopt emissions caps take the position that energy-intensive goods coming in from countries that refuse to cap or cut their emissions all face this requirement to submit emissions allowances.

We are looking closely at the WTO aspects of this. I do not proclaim myself to be GATTologist, but I am an alumna of the U.S. Trade Representative's office. And there is a good argument under the—sorry to get technical on you, but you asked for it—the GATT 1947 as it was incorporated into the GATT 1994 and incorporated into the WTO—that nations have the ability to take WTO-inconsistent measures if it is necessary to protect their environment if they do so in a way that is non-discriminatory and if they tried really darn hard to convince other countries to do the thing that they needed to protect their environment.

Mr. BOUCHER. Well, that is a very clear answer.

Ms. PETSONK. Thanks.

Mr. BOUCHER. Let me move on to Mr. Stephens who I am sure has some comments. And, Mr. Stephens, if you could be brief. I have expired my time unfortunately.

Mr. STEPHENS. Yes, I can be brief because the accurate answer to your question is I don't know, and I don't think most of us know the answer to that question yet. As I said in my statements, I have got this conflict that is driving me crazy between a free trade enthusiast and understanding that if we want to solve this problem, we are going to have to deal with the fact that we have markets. If we have them by their markets, their carbon sequestration will follow.

Mr. BOUCHER. Thank you very much. I would like to hear from the other witnesses on this. Perhaps we could have individual con-

versations after the hearing because I would very much welcome your views. Mr. Hastert is recognized for 5 minutes.

Mr. HASTERT. I thank the chairman, and to each and every witness, I would say that I would probably like to have an individual conversation with you because I think there are questions out there that we just have a hard time answering. For 16 years, I taught high school economics. I never fessed up to being an economist, Mr. Steinfeld, but——

Mr. STEINFELD. Doctor.

Mr. HASTERT. Dr. Steinfeld, that is right. I never fessed up to be a doctor either. I got five honorary doctorates, but anyway, I did teach economics, and I taught 16 years old economics. I had to bring it down to a level where 16 year olds could understand it. And if we are going to bring this thing down to a level, I guess it would be like all the world players sitting around this big poker table, and somebody had to ante up. And who is the first guy to ante up? And every time we had to ante up, and I just heard the testimonies of some of the questions I wrote down. And my question is do these costs get passed on to the consumer? And what is your safety level to deal with China? What if the U.S. changed the numbers, and we stepped up first? Is there any guarantee that China or India or anybody else is going to ante up too?

And the fact is when you ante up, it may cost you jobs. It may cost the ability for you to manufacture up in the Northwest where you are being challenged already. It may cost your consumers more. You go to the Dollar Store. My people go to the Dollar Store. Probably a lot of things made at the Dollar Store aren't made in this country, but the few things that are made in this country, whether it is toothpaste or soap or whatever, then all of a sudden we are challenged and our products go up to be a $1.15 so they don't qualify for the Dollar Store anymore. And foreign products are under that level.

What happens to your jobs? Our jobs go offshore. They go some place else. And how do you persuade—and this is an esoteric question—how do you persuade, as Mr. Chaudhuri was talking about—a country that has 300 million people in absolute poverty that earn a dollar a day, to all of a sudden use sophisticated technologies when they are just trying to get over the lip of existence?

And this is the real issues, and I am a market guy too, a very free market guy. Always have been. That is where my goals are. That is where my legislation has been, and I think that is where I would like to pass on a legacy. But the fact is can you do this with free-market incentives, or do you have to overlay a huge international goal?

I have dealt with the Chinese over the years and tried to talk about ideas of intellectual property. It takes a long time to get that done. Transparency. There is always a lot of good intentions, but intentions never really translate into product, and so I am just asking you how do you do this? I only have about a minute and 45 seconds left, so each of you can give me a concise, maybe 20-second answer. Mr. Steinfeld, if you can squeeze economics into that, what would you say?

Mr. STEINFELD. Thank you very much for your question.

Mr. HASTERT. That took up 5 seconds, sir.

Mr. STEINFELD. The first point I would raise is that in the last 15 years, Chinese reformers at various levels of the system have passed on a variety of costs to their populations. The populations have endured a variety of costs on the environmental side, on the social equity side, on the employment side. And some of those costs have been generated simply by growth itself. Some have been generated by China's joining things like the WTO. So the notion of China, as a system, accepting costs has a certain historical record.

Then the question is well, why would they do it on carbon? Part of the answer there has to do with the idea that China, like any economy, is a complicated one. It has producers as well as consumers, citizens as well as corporate players. And a number of the corporate players have a particularly privileged voice in the Government and some of them view carbon constraints or other market-focus regulatory interventions as a commercial opportunity, particularly if it involves exporting and global leadership.

Mr. HASTERT. Ms. Petsonk.

Ms. PETSONK. I want to pick up on that theme of commercial opportunity and give one example. In India and in a number of other very poor countries, some of the most popular carbon emission reduction projects that are being done for credit now are supplying the poorest people with more efficient cook stoves to use in their houses so they don't have to cut down as many trees. They don't have to breathe as much pollution. These stoves are very cheap. The poor people can't afford to buy them.

Microlending carbon banks are essentially loaning the money to these very poor people, allowing them to use these very efficient cook stoves. It doesn't have to be a fancy technology to get very nice emission reductions out of it. And the emission credits then can be sold to pay off the loan, maybe even with some profit back to the poor people and their village so that they can begin to climb up that economic ladder.

The carbon market, if you create it, can deliver those kinds of incentives across poor economies as well as wealthier economies very broadly.

Mr. HASTERT. Thank you. And I just want to say in conclusion—I know I am over my time—make sure the first guys that ante up aren't in the game by themselves. I guess that is the process. That is the question, and that is the challenge that we have. Thank you.

Mr. BOUCHER. Thank you very much, Mr. Hastert, for a very thought-provoking series of questions and answers. The gentleman from Michigan, the chairman of the full committee, Mr. Dingell, is recognized for 5 minutes.

Mr. DINGELL. Mr. Chairman, I thank you. This to Dr. Steinfeld. When I was a young fellow, I went to Kyoto, to the treaty signing, and we had a big meeting with the Chinese, and I said now, are you going to be bound by this? And the Chinese said no, we are not. I said well, why are you not going to be bound? They said because we are a developing country. I said how long is China going to be a developing country? They said we are always going to be a developing country. I said that means that you are not going to be bound by Kyoto, and you are not going to contribute. They said that is right.

So this again to Dr. Steinfeld. Do you agree with Ms. Petsonk and Mr. Stephens that legislation should include incentives to ensure that other countries do their fair share or suffer their consequence in terms of access to U.S. markets?

Mr. STEINFELD. I do believe incentives should be included in legislation. I will mention that in the WTO story, Chinese negotiators also, for 13 years, maintained the position that China, as a developing country, should not be held to specific standards and they——

Mr. DINGELL. I want to hear more, but I have got a bunch of questions that I have got to ask, and I do apologize. Now, Ms. Petsonk, this question. Your recommendation about what Congress should require, in carbon market access agreements with other nations, as a condition for access to our markets is intriguing. But I am not clear how this would work; although, I happen to very much favor the idea. What would induce other countries to sign such agreements? Why do you believe that placing conditions on access to U.S. carbon markets provides sufficient leverage to induce others to adopt emission caps?

Ms. PETSONK. First, the size of America's carbon market. Some people look at our economy and see very nice emission reduction opportunities in many, many places. Other countries will want access to that carbon market to try and sell us the technologies that they produce, just as we will want our technologies to come into that market.

But second, they will want to sell us emission reduction credits that they may be able to earn where it may be able cheaper to reduce emissions overseas than it is to reduce emissions at home. They will want to sign up to those agreements if Congress directs the executive branch to negotiate those agreements.

In my view, the problem with Kyoto was that the resolution that so many folks have referred to came too late. Congress needs to instruct the executive branch, here are the objectives these carbon market access agreements need to reach, and we are going to hold you to it.

Mr. DINGELL. I recall, though, the thing that was very clear to me was that we would be buying carbon credits from places like the former Soviet Union, from China, and they would just keep selling these credits to us and manufacturing new opportunities for us to buy without conferring any significant benefits in terms of reduction of carbon emissions. That is obviously something we have got to be very careful of, is it not?

Ms. PETSONK. Exactly, and it is a major flaw in the existing framework. The existing framework awards you a carbon credit if you reduce emissions below what you would have done anyway. Well, let me tell you. If you ask me, Annie, sorry, Ms. Petsonk, how many slices of cheesecake were you going to eat next week anyway because if you eat less than that, I will give you some cheesecake credits that you can sell to somebody else, I am going to tell you that I was planning to eat cheesecake every day three times a day.

Those kinds of credits don't produce a real environmental benefits, and that is why we favor Congress directing the executive branch to negotiate in these carbon market access agreements real baselines that hold countries to an absolute level of reductions.

Mr. DINGELL. Thank you, ma'am. Now, this question to Dr. Pershing. Do you agree with Ms. Petsonk and Mr. Stephens that Congress can induce other nations to limit their emissions through legislation requiring such action as a precondition for access to United States markets?

Mr. PERSHING. I think you could. I am not sure it would be so straightforward. The thing you need to focus on really quite explicitly is what the rules would look like. At the moment, if you take a look at what it would mean to, say, follow a structure such as AES's outline, it would require that we have full information about how much carbon is in every commodity. And we might want to think about where the commodity came from and its life-cycle chain.

So I have an import from aluminum that comes from alumina that was smelted in Australia that went into a can that went to Japan that went into a product that went to Russia, and then it comes back to the U.S. What share am I going to go for? The aluminum share from Australia which I am OK with, or the share from China which I am worried about. Those kinds of rule-making processes will be difficult.

Mr. DINGELL. Now, this to Mr. Holzschuh. Do you agree with Dr. Steinfeld's assertion that with respect to emission limitations, China's ability to enter into international agreements would be on a primarily aspirational basis?

Mr. HOLZSCHUH. Yes, I stated that I think their enforcement and regulatory actions would clearly lag any policy statement that they would make. I would just make one other point on this issue, which is from the private sector, and Mr. Stephens mentioned this, that there are trillions of dollars that need to be committed now for us to build the next generation of energy in this country, security, things that go with it.

The difficulty for the executives who are trying to make those decisions is the lack of rules or the perception that the rules would change midstream. So the off-ramp is particularly troubling in that regard, and that is going to be true—China has to invest now no matter what. We are trying to make business decisions based on shareholders and other things, and it is very difficult.

Mr. DINGELL. I agree with you on that point. As my own daddy used to say, trust everybody but cut the cards. Thank you, Mr. Chairman.

Mr. BOUCHER. Thank you very much, Mr. Dingell. I can't see whether Mr. Barton is here or not. He is here. The gentleman from Texas, Mr. Barton, is recognized for 5 minutes.

Mr. BARTON. If it is a climate change here now, can I not be here?

Mr. BOUCHER. I knew you were here.

Mr. BARTON. This is actually enjoyable to for me. Shows how twisted I am sometimes. I want to thank you, Mr. Chaudhuri, for your quote that the ultimate polluter is poverty. I wish we had the ability to put that up at all these hearings. Do you agree with me that where China and India and the developing world are today in terms of their electrification programs, there are many similarities to where the United States was in the 1930's when we had the

TVA Project, the Bonneville Project, and the Rural Electrification Administration?

Mr. CHAUDHURI. I think we are actually still far behind what the United States was in the 1930's. I think we would be looking more at something in the 19th century to see where exactly we are in terms of electrification.

Mr. BARTON. But what do you think our political process would have—where would Franklin Delano Roosevelt responded if the British and the French and the Germans and the Russians in the 1930's had somehow tried to co-op us and prevent us from electrifying our country in the same of some social environmental benefit in the future? How do you think our political process would have responded?

Mr. CHAUDHURI. World War II might have been fought on very different lines. I think that for an Indian politician, it would be suicidal. I should point out that in India, when we go to general elections, 50 percent of our members of Parliament are tossed out of their seats every election. Antion Compency is the single most powerful political force in India.

Mr. BARTON. We felt a little bit of that in this last election.

Mr. CHAUDHURI. Indian politicians are terrified of their voters because Indian voters are extremely unwilling to listen to politicians, especially those who argue something on the lines that you are saying that you should take a drop in your living standards or even your potential living standards at a time when I said 700 million of them are living on $2 a day.

Mr. BARTON. Dr. Steinfeld, your group has just put out a paper on coal use recently that has received quite a bit of play in the media. I think it is very thoughtful. In order for us to get the Chinese and the Indians to adopt some of our cleaner technology, I would assume you agree, since you, I believe, stated this in your work, that we have to get the cost of that down to where it is at least approximately equal to the current technology that they are using right now that is not as clean. Do you agree with that?

Mr. STEINFELD. I am not sure that is exactly the point in the study. There are tradeoffs that some players in the Chinese system seem to be prepared to make for more expensive technologies that happen to be cleaner, particularly in certain parts of China. The per capita in Shanghai is around the level of Portugal, whereas the per capita income of the whole country is obviously much lower, maybe $1000 U.S. in many parts of China. So in the wealthier areas, there is some willingness to trade off.

Mr. BARTON. But if we were to adopt some international protocol where the United States would commit itself to making our technology available at equal or less cost and subsidize in that in some way, that might encourage some of these developing nations to use the cleaner technology. If we can get an environmental benefit and make it cost effective, then there is no reason for them not to use it.

Mr. STEINFELD. It is conceivable.

Mr. BARTON. OK, Mr. Stephens, you represent the forest products industry. Do you think that some of our land use programs and carbon seek programs, reforestry programs, do you think they could be large enough to actually have an impact? Because they

certainly could be cost effective in terms of doing things to lessen the overall effect of carbon.

Mr. STEPHENS. Yes, and I tried to address that in my comments. Certainly if we can stop burning the forest down, that is a great first step to taking CO^2 out. And then if we can convert biomass into energy—and we do know how to do that—I think the science would indicate that wood is pretty much carbon neutral.

Mr. BARTON. So those are some programs that actually are cost effective and we could adopt and implement immediately?

Mr. STEPHENS. Yes, in the bill that you sponsored in 2005, I think there is a lot in that bill that would be very helpful and not in conflict with what is being discussed today.

Mr. BARTON. With that answer, Mr. Chairman, I am going to yield back.

Mr. BOUCHER. Thank you very much, Mr. Barton. The gentlelady from California, Ms. Harman, is recognized for 5 minutes.

Ms. HARMAN. Thank you, Mr. Chairman. I think this hearing is fascinating, and the witnesses have all given us some bold, clear ideas, which certainly was my exhortation at the front end. I also am impressed that Members on a bipartisan basis are very much engaged in seeing if we can figure some of this out, and I surely hope that we will be able to do that.

In my opening comments, I said that we were in a diplomacy deficit in the world at the moment. This wasn't limited to environmental or energy issues, but I said that we have considerable soft power, partly as a result of our robust economy, to re-engage the world on these issues. Obviously we need a worldwide solution. None of you would disagree with that.

I just wonder if you agree with me that we can overcome our diplomacy deficit with our soft economic power if we can figure out the right way forward. Does anyone disagree with that? Yes?

Mr. PERSHING. Thank you very much. I think you can overcome a great deal of it but not all of it. There is a formal process which I think will ultimately be needed, and we need to have the formal diplomatic channels that we also use.

Ms. HARMAN. I surely agree with that. Does anyone disagree with that? Ms. Petsonk?

Ms. PETSONK. I don't disagree with it. I think that the single most important step in this area that the United States could take to rectify the diplomacy deficit is to enact a clear, enforceable mandatory cap and trade program here.

Ms. HARMAN. I heard you on that, and I support that. I know that some members on this committee don't, but I support that. But we have to get it right. Doing something may not achieve anything. I have heard you all say that. OK, changing the subject slightly.

When Vice President Gore was before us last week, he made a number of suggestions. One of which was—and I am quoting from my notes—that carbon pollution should be priced into the economy, not be an externality. Now, obviously if there is a market base to cap and trade system, carbon gets a price. But I am wondering what you think of this suggestion that Gore made, and he was talking about the U.S. economy, but I am also wondering whether you think this has some legs for more of an international focus.

Mr. PERSHING. It seems to me the answer is yes, and you can do it in two ways. The first way is you can create the market by countries that want to have the market. The U.S., Europe already doing it. My sense is that will create an implicit market price for anyone that trades with us. You do not need all countries to be in the market to create a global price.

Ms. HARMAN. Other comments?

Mr. HOLZSCHUH. I would just say quickly that any time there is not a price on such an issue that is this complex, it seems to me that the bid and the ask from a market perspective is so wide, it is very difficult to create that market. And so when there is an assumption of price, whether it is mandated, open market, whatever the mechanism is, my guess is this debate will move much more rapidly.

Mr. STEPHENS. If I could just comment, I think capital is an integral part of solving a problem. It is going to take an enormous amount of capital on a worldwide basis to solve the problem. Capital is a coward. It runs away from uncertainty, and we need to be very clear, and there needs to be a reasonable chance to understand the consequences before capital is afforded.

Ms. HARMAN. Anyone else? Well, I am not going to take all my time, Mr. Chairman, but we have a new chairman here. But I would just conclude with this. I mean I think you have to be an optimist to serve in Congress these days. It is a hardship post in both parties. So I am an optimist. I can see huge opportunities for U.S. businesses, and some of you have been suggesting this, by getting these technologies right and then exporting to the world market under a set of standards, guidelines, treaties, agreements, that would welcome U.S. exports.

And I have seen that happen in many other industry sectors. My district is the aerospace center of California, and the export market is the critical part of the health, which we need, of our aerospace industry. So I can see this being a huge win. Does anyone disagree with that? Fine. Mr. Shadegg disagrees. Well, he will get his 5 minutes to rebut very shortly. I yield back, Mr. Chairman.

Mr. MATHESON [presiding]. Thank you. The Chair recognizes Mr. Upton for 8 minutes.

Mr. UPTON. Well, thank you, Mr. Chairman. I don't know if I will use all my 8 minutes. I just want to say that I am an optimist too. Maybe that is why I am a Cubs fan, and it is preseason, and we have already lost our two starting pitchers before the first pitch is thrown.

But I have to say the international cooperation element of this issue is certainly the most complex. That is very clear. Dr. Pershing, you made the comment in your testimony that the top 15 emitters equal 80 percent of the world's output. We know, Mr. Chaudhuri, that India by the year 2020 will equal the coal consumption in this country, in the United States. And it is headlines like this front page of yesterday's Washington Times, China on the brink as the No. 1 polluter. We knew that already as well, but there it is for everyone to see.

And when we go along with the other comments, and, Mr. Chaudhuri, you were talking to us about the level of acceptance of change by the Indian parliamentarians, by the members of Par-

liament. Dr. Steinfeld, your comment that the Chinese allow these two new coal plants to be built virtually every week without any rhyme or reason perhaps in terms of regulations in terms of emissions. We look at the hard evidence. Mr. Holzschuh, when you indicated that instead of, in China, the SO^2 emissions, instead of a reduction of by 10 percent, in fact, they went up by 27 percent, so a 37 percent swing.

And when we think about the test vote that they had on Kyoto back in the 1990's when President Clinton was in office, it was unanimous of those that were voting because China and India were not part of the agreement. And Brazil and Mexico weren't part of it either. And that is what gives us all real pause in terms of how we are going to go. And I think Chairman Boucher made the very accurate point that, in fact, if we do embark on something like this, we have got to have an exit ramp because we don't want to lose all that we have here and have it go overseas with the lack of controls that folks over there have.

Ms. Petsonk, you talked a little bit about having a WTO structure. Congressman Hastert talked a little bit about some of the problems we have had dealing with the Chinese on a host of issues, particularly on intellectual property and copyrights. Being able to see a movie the first day that you are there before it is almost even out here. I mean a whole number of different products that are built there and avoiding all of that copyright protection.

So if we in the Congress begin to look at something, a cap and trade, whatever it might be, how is it that we can craft something? What ideas do you have specifically that we can in fact not only engage these other countries, but actually see them follow through with this, what President Reagan said: trust but verify. Dr. Pershing?

Mr. PERSHING. Thanks very much. I think that is exactly the question, and I think there are not easy answers. But here are a couple of thoughts you might think about. The first one is that there is, as Annie Petsonk has noted, this issue of the price incentive. Let us put that aside for a minute. I think you are all considering that. And look at a couple of others that might be less immediately——

Mr. UPTON. Well, your example, or someone gave the example about the aluminum can. I mean how in the world do we figure something like that out?

Mr. PERSHING. There are ways you could figure it out. There is a process you could go through. It would take a little while. You could make it happen.

I want to come to two other points that you might contemplate as part of your decision-making process. The first one is that if you set a price and require countries to do it, it requires they have got a domestic commitment already. We don't see that from very many places. We are seeing it increasing. We don't yet see it adequate to make a constructor that we would like to see.

We do clearly however see very high interest in some other things that would make a lot of sense. Energy security debate, perhaps, is the paramount one. We share that interest with China. We can have a cooperative discussion with them. They are importing oil from equally insecure places. That is part of the reason that

they have driven to have a domestic program on automobile efficiency. That is why we are thinking about it. It has consistent and competent questions that we can manage jointly, which would lead to serious reductions. We should take advantage of those as well as this larger carbon price discussion.

Mr. UPTON. Mr. Holzschuh.

Mr. HOLZSCHUH. Unfortunately, I leave the politics to someone else. What I would say is markets work here. We have seen in Europe the system work. We have seen it work here in SO^2. I think if there is a trading mechanism that can have some market-based parameters for which to operate, it will stumble at times, but it will work. And I think that it is a trust to get the market started, but there is a bunch of entrepreneurs, a bunch of people who are willing to commit capital around the globe to make it work. And there will be enforcers just like the politicians.

Mr. UPTON. Ms. Petsonk.

Ms. PETSONK. I think that point of Mr. Holzschuh's is very important. By creating a cap and trade market, you create constituencies of people who want to reduce emissions because that creates more markets for their technologies, and also want to be sure that the next guy isn't cheating on their emissions report.

Mr. UPTON. But how do you do that with China building two new coal plants every week?

Ms. PETSONK. For much of the infrastructure, I believe, and I would be interested to hear Dr. Steinfeld's comments on this as well. For a lot of the power plants that are currently being built in China, the design plans for those are set. That is not to say though that there are not very good opportunities to come into those plants and improve their efficiency if it can be done cost effectively. Having a carbon market price signal would make that cost effective, and it would also give actually a price signal for innovations in other parts of China's economy.

For example, we have talked a little bit about trees and forests. Representative Barton actually asked about land use practices that can improve the growing of trees and store more carbon in the soil. Those are two things that China is very interested in. They have lost a lot of trees. They are now embarked on a major program to try to plant and protect trees because it is so important for the local environment and local communities. And the same in agriculture. They have got to improve their agricultural productivity, and they can do that by saving more carbon in the soil.

Mr. UPTON. Let me just go to the last minute to Dr. Steinfeld, knowing I want him to wear his political science hat as well. Well, no, I think he is a political scientist too, right? All right, wear them both. How do we get through to the Chinese Government? I mean what is your assumptions in terms of what may or may not happen?

Mr. STEINFELD. Over the last decade and a half, generally speaking, the way change has happened in China is that in this sort of archaic political process, political constituencies inside the country arise in a poorly regulated environment. The government generally then binds itself to some kind of external international agreement to support those constituencies, and that international agreement

is used as a club to beat away the former incumbent constituencies that are there.

I personally am also a believer in markets and in civil society, and I think both of those are viable avenues in China and probably the most likely avenues for change that will have to in some senses lead the bilateral discussion that goes on. So when I am in China, the particularly privileged voice that I see operating in that system actually is international capital, and that the Morgan Stanleys of the world, the Goldman Sachs of the world actually carry a lot of weight. And when markets are created and prices are set, I think some of those actors can play an incredibly powerful role, an influential role, as with environmental and civil society type organizations.

Mr. UPTON. Yield back. My time has expired.

Mr. MATHESON. The Chair recognizes the gentlewoman from Oregon, Ms. Hooley, for 8 minutes.

Ms. HOOLEY. Thank you, Mr. Chairman, and thanks to all of the panelists, and my apologies that I had to leave for a while. I had another committee hearing going on at the same time.

Mr. Stephens, thank you for being here and testifying today. We have had some companies come in and say this is not going to work. We don't really have global climate change. If we did a cap and trade system for greenhouse emissions, we would go broke. It is not going to work. So what, first of all, brought you to the conclusion that Boise Cascade would embrace this approach, and you think your company can remain competitive under such a system?

Mr. STEPHENS. Well, the reason is very simple. I was asked by three important stakeholders Boise Cascade, what do you stand for? What are your principles with respect to climate change? Those three stakeholders were my customers who said if we are going to buy your product, tell us about your principles. My employees say Tom, what do we stand for? And finally, my grandchildren said Papa, what do you stand for? So I decided to show up.

Ms. HOOLEY. I am going to ask you a couple other questions, then I have a question for the whole panel. Right now, we have some States enacting some provisions and other States not. I know you operate in many States. How much more difficult is it for you to deal with the different standards in different States versus having some kind of a national standard, or does that really make any difference to you?

Mr. STEPHENS. It does make a difference. As an example, the laws and regulations in Oregon are fundamentally different than Washington when it comes to biomass and using spent black liquor to generate energy in the paper business. That is very confusing, and frankly we have not made some capital decisions to use biomass and to move away from other fuels because of uncertainty about what are the rules going to be.

To build a boiler may take me 5 years from engineering to installation and startup. It is a long lead time. We are trying to anticipate, at this point, what the rules we are going to be accountable for are going to be, and they are very different across the country.

Ms. HOOLEY. And I am interested in biomass. Can you tell me what changes in regard to biomass, if any, you would recommend

to Congress as it relates to the development of the use as an energy resource?

Mr. STEPHENS. Well, first of all, don't discourage its use. As I indicated a while ago, in some States, it is not considered a renewable energy source. So clear up the science. Make sure we recognize it for what it is.

Ms. HOOLEY. OK, and then a question that I have for all the panelists. If we went with a cap and trade system, how important is it that we lead the way, or does it have to happen internationally, or can it happen with our leading the way and then trying to, as we figure out how to do this, then working with other countries to make sure that they are also doing it? I am going to start at that end.

Mr. PERSHING. Thanks very much. I think the answer is we would not be leading the way. We are already a follower. There is already a market. It is worth about $25 billion. The market is part that U.S. companies already play in. They have already seen the price in the international context of their investments. However, that market doesn't work as well as it could. We could make it better. We could make it bigger, and if we did that, we would have an enormous impact both on the problem and on the way our international systems and our international companies can play.

Ms. HOOLEY. OK.

Mr. HOLZSCHUH. I concur. Any market that we have established, and there are so many commodity markets that have been established in the last 20 years, have taken an incredible amount of innovation and technology to get started. What we are not seeing is that investment now in that technology, and if you are building a plant a week, all the technology is going over there. I am very concerned that China will beat us to clean coal technology. They will beat us to some of the things that, I think, to the extent we had an open market, those dollars would be spent here.

Ms. HOOLEY. Yes?

Ms. PETSONK. I agree with the previous speakers.

Ms. HOOLEY. OK.

Mr. STEPHENS. I agree.

Mr. STEINFELD. I would just add it is the ambition of some Chinese industrial policy makers to ensure that China geographically is the locus for introduction of new-to-the-world technologies, whether it is by foreign companies or hopefully for them, by Chinese domestic companies. And some of those policy makers see energy as an area where that is going to happen, particularly nuclear now, but also renewables and clean coal technologies.

Mr. CHAUDHURI. I can't actually speak for the Indian government, but I would say that India has no problems with carbon trading, whereas I suspect they would fight very strongly against anything that brings in a cap on India.

Ms. HOOLEY. Another question for all of the panelists. I mean we are here to try to make decisions about climate change, what are we going to do. If there was one thing you could recommend, what would it be? What is the one thing we could do that would make a difference?

Mr. PERSHING. Establish a price for greenhouse gases.

Ms. HOOLEY. OK.

Mr. HOLZSCHUH. Create a capital pool to finance the initial infrastructure investment in these clean technologies in the U.S.

Ms. HOOLEY. OK.

Ms. PETSONK. Establish our carbon market with the way that encourages other countries to dock into it and do so quickly.

Ms. HOOLEY. OK.

Mr. STEPHENS. Realize that we are not going to get it right the first time. Probably what comes out of Congress will be called the first mistake. There will be a second mistake and a third mistake. So it has got to evolve over time. It is really tough.

Ms. HOOLEY. Thank you.

Mr. STEINFELD. I will simply express the conclusion from the MIT future of coal study. One tangible first step would involve demonstration projects of carbon capture and sequestration in the United States.

Ms. HOOLEY. OK, thank you.

Mr. CHAUDHURI. Find ways and innovative ways to spread things like the clean development mechanism and clean technologies into the developing countries, but again I would say without bringing in carbon emission limits.

Ms. HOOLEY. I thank our panelists. You have done a great job. Thank you.

Mr. MATHESON. The Chair recognizes Mr. Shimkus for 5 minutes.

Mr. SHIMKUS. Thank you, Mr. Chairman. One thing I like about hearings is that you really do get a lot of good information. I would encourage those who are in the DC area normally come by, as I think Speaker Hastert said, and visit with me. I am a skeptic. I can tell you about my regional criteria, but it would give us more of a time to be able to visit, and I can tell you where my skepticism comes from.

And so I have a few questions I want to get asked, and then if I have time, I may go off on some of the great phrases today from the panel. Mr. Steinfeld, I noted in your report, or your co-author, the central government officials in China acknowledge of the 440,000 megawatt equivalents of generating capacity in place at the beginning of 2005, there was about a 110,000 megawatt of illegal power plants, which never receive construction approval by the responsible central government agency. Is this a common trend with expansion of power generation in China?

Mr. STEINFELD. Yes, it is.

Mr. SHIMKUS. So can we conclude that China has a coherent national policy for construction of new power plants?

Mr. STEINFELD. No.

Mr. SHIMKUS. No, good. What would this say to the possibility of China contributing in the carbon dioxide reduction program?

Mr. STEINFELD. That is much harder to say since the ambition of many policy makers is to move toward a more coherent policy, as is true——

Mr. SHIMKUS. But the facts of the expansion of generation, if the central government is not involved in the citing of these plants, that would make it very difficult?

Mr. STEINFELD. Yes, difficult.

Mr. SHIMKUS. At what rate is expansion of coal-fired plants happening in China to your best estimate?

Mr. STEINFELD. Well, the latest numbers released for 2006 surprised everybody. 102 gigawatts in small capacity was added.

Mr. SHIMKUS. We hear reports that a new plant goes up every week, and we have mentioned this before. And we can safely assume that then, correct? Mr. Chaudhuri, during the first hearing on climate change, we learned the German perspective of a cap and trade program. It seems coal use is coming back there mostly because imported natural gas is so expensive, and that is a concern of this nation with our high natural gas prices. Is this similar to what is going on in India? And let me just follow up. Do you see coal as remaining an inexpensive dominant source of power in India?

Mr. CHAUDHURI. Yes, we are already 50 percent coal, and it is likely that will, in fact, expand over time. India, like most countries, looking at the energy security side, wants to reduce its dependence on petrol chemicals because we import all of our gas and petrol, virtually 80 percent of it. We have large amounts of coal, which we do not tap in any really large manner because of the inefficiency of the nationalized coal sector. And so coal will almost certainly be king in India and will probably expand its role over time.

Mr. SHIMKUS. Yes, and that is great. And I want to follow up because you mentioned petrol chemicals, and one of my obviously favorite subjects is the coal-to-liquid technologies and applications. It really is part of this debate, the question is India pursuing that? I know China is.

Mr. CHAUDHURI. Yes, I think we have an agreement with South Africa, which is one of the world leaders in that technology, on working on that. The real problem in India is that, as I said, the coal industry has been nationalized for almost 40, 50 years and therefore is stuck in a rut. And privatization of that really is the first step towards it.

Mr. SHIMKUS. Great, thank you. And I know China is also, and here we are talking about electricity generation. But we are talking about fuel use, energy security, big issue here. There will be folks in Washington that will not want to accept the decrease of imported crude oil by moving to coal liquid because of this carbon dioxide issue.

And I want to read some of these quotes. I thought they came through sitting through here the whole time. "The ultimate polluter is poverty." Key. "Capital is a coward." I agree. I am going to use that. "The trillions of dollar off-ramp is particularly troubling." That is the amount of—my quote that I have been using a lot: the Federal Government always over promises and underdelivers.

So be careful how we in the authorizing committees move a bill with the promises of research and development, money being paid out, taxes raised to do that, because we won't be there in the end. And then what does that do to the capital markets? I know what it does because we are dealing with the expansion of nuclear power. We are dealing with coal-to-liquid technologies. We are dealing with all the aspects that you deal with. I do appreciate this

panel, and I would encourage you to come visit with me. Thank you, Mr. Chairman, I yield back.

Mr. BOUCHER [presiding]. OK, thank you. And the Chair will recognize himself for 5 minutes. Dr. Pershing, you propose several policy solutions in your testimony including rebates for some of the proceeds from a trading system to offset exporters who are at a competitive disadvantage or allocating allowances in a manner that reduces liability. In your opinion, what is the best way to level the playing field for various U.S. businesses or industrial sectors?

Mr. PERSHING. There are two parts to the question. The first one is if you design a domestic system, what would you do? The second is as you think about the international linkages the domestic system might create, what would you do? And there might be slightly different solutions for each of those two problems.

On the domestic side, I think you have a number of different choices. The allocation question, I think, is certainly one option. My own sense about it, however, is that you need to be very careful as you do that because when you do allocations to some, you therefore deny it to others, and that makes it enormously difficult.

Congress however is quite good at dealing with financial issues and deciding how best to allocate resources. And so if you have an auction program in which you auction out your permits, you create a set of revenues which you could then redistribute to those who are affected or to, in an equitable even way, using decision-making processes we have already got.

On the international side, it is slightly more difficult. There the question is going to be who is at risk because of competition from overseas, and how do you manage that? There are a number of different ways. There are options that could deal again with allocation. You allocate more permits to those who are at risk.

There are options that deal with how you deal with the financial flows, put it back into those. There are options that deal with additional outside the carbon mechanism, other benefits like reduced depreciation on things like technology development that could bring the long-term cost down.

So there are many different solutions you could address that would exactly solve your problem.

Mr. BOUCHER. I appreciate that. Mr. Holzschuh, in your work at Morgan Stanley, you note that your commodities trading division in Europe has been actively trading carbon allowances. If Congress were to choose to go with the trading system, how would you suggest that the system be designed in the U.S. to improve upon the experience in Europe? How would you structure it? What are your thoughts on that?

Mr. HOLZSCHUH. Well, I would put it in the same box, I think, as Mr. Stephens did, which is it was their first try. It was a pilot. They are going to revise it this go-round. It was restricted primarily to the generators of power in the European Union. I think it needs to be broader than that. Has to address some other industries.

To address one of the issues that you just asked of Dr. Pershing, it is not going to work globally if we pick industry by industry and put all of the burden, for example, on the power generators when they are only 40 percent of the emitters. We are going to have to

spread that out. I think the allocation process is difficult. I think there probably should be a mixture of allocation and auction, and there may be tax that goes with it, maybe all three.

I think the one piece that probably didn't get enough time today that I would just say to you is the investment has to be now. It takes 3 to 5 years to build a power plant. We don't even have the technology yet on clean coal. We don't have the technology on some of the bigger issues. That is something I think you could do now, to put some money forth to move those technologies, move the formation of a market, and maybe it is a test period before it goes live.

Mr. BOUCHER. Mr. Chaudhuri, you mentioned that, in response to, I think, Congresswoman Hooley, that you would like to see a trading system without a cap. Is that correct?

Mr. CHAUDHURI. For India, yes.

Mr. CHAUDHURI. I would assume India would fight for that.

Mr. BOUCHER. Can you tell me how, without a cap, how the trading system might help accomplish goals of reduction of greenhouse gas?

Mr. CHAUDHURI. Well, one of the means that could be done on a cap for a growing economy like India or China would be to link your cap to your growth rate. So in other words, if your economy is growing at 10 percent, your cap keeps rising at a certain level so that you essentially try to control that. We are part of the carbon trading, though we do it on a firm-to-firm basis, which I think is something that still should be considered as a possibility in carbon trading.

But basically I think the fundamental principle remains that if you are attempting to cap the economies of India and China, other than driving India and China closer together, which has so far been proved impossible, I would say that there will be extremely strong political resistance to the very idea that you are trying to restrain India's growth.

India is one of the few countries in the world that has actually seen pro-American sentiment rise in the past 20 years. I think in one survey, we are third most pro-American country in Asia. You will probably lose a lot of that if you attempt to or seem to be trying to restrain India's growth.

Mr. BOUCHER. OK, my time is just winding up, so I will yield back, and I next recognize Mr. Shadegg for, I believe, 8 minutes.

Mr. SHADEGG. Thank you, Mr. Chairman, and I want to thank all of our witnesses. I would join in the request that any of you that have an interest come by and see me and talk about your specific concerns in this area. I serve with Mr. Walden on the select committee, and we have a lot of work cut out. I am a little saddened that today the select committee drew an entire cadre of press and accomplished nothing. And this committee has had great testimony from you and a great dialogue, and I daresay I don't see at least a single—well, there is one reporter in the back. We got a few. All right, they are over here. OK, great. Well, that room was chock full of cameras. Maybe that is the difference.

I do appreciate all of your input on this topic, and I believe that it is at least nice that many of you acknowledged how difficult this job is because as I listen to you, I hear it as extremely difficult. I

see a contrast between Mr. Chaudhuri's testimony, which I believe is the real challenge here. How, in fact, do we deal with this issue without being seen as having imposed the burden on developing nations or more importantly on the people in those nations who have every right to expect to move forward with their economic life and do well.

I am going to focus a little bit of my questioning on that point, it is nice that we want to do the right thing. How then can you do the right thing? Mr. Chaudhuri, I heard testimony that just by having a big market, people would participate in it. Well, I am inclined to believe that prosperous nations might participate in a big market. Can you explain to me how you see India being drawn to a large market if the United States establishes a mandatory cap and trade program?

Mr. CHAUDHURI. Well, I think the crucial issue for India would be the private sector, how do the Indian corporations respond to the incentives within that market. I think that one of the key problems, and I suspect this is also true for China, is that a very large portion of our manufacturing sector is in the informal sector. In other words, it is outside the government's regulatory vein. I think almost 70 percent of our industrial labor force, and sort of a large number of companies and factories are simply just not recognized or not known to the government.

These companies cannot participate in the market that you are talking about because they will be scared to get stuck in a tax net or a regulatory mess as a consequence. And this is going to be crucial because in many ways, they are the fastest growing segments of the manufacturing site.

Another crucial problem is that 80 of our carbon emissions are linked to energy production, and I am not certain how a large number of electricity utilities and so on are going to be able to participate. In India, power is subsidized. Like kerosene, for example, is subsidized.

On the other hand, there are huge taxes on petroleum far beyond anything that exists in the United States. And how exactly a lot of these institutions will be able to participate in a global market strikes me right now off the top of my head, I really don't know how they would do it.

So a market would be good because a lot of the larger corporations—and that is good because that brings a lot of steel and coal industries into play—would be useful. And they could seen the benefits if the price incentives are strong enough.

Mr. SHADEGG. Mr. Steinfeld, hasn't he just described in similar terms the problems you described in China? That is that the government doesn't have control of what is going on even, for that matter, knowledge of what is going on with regard to a good portion of the economy that is producing greenhouse gases?

Mr. STEINFELD. There are parallels.

Mr. SHADEGG. And your answer to that is that reform groups will come along and pressure the Chinese Government to take progressive steps?

Mr. STEINFELD. Not just that, although that is going to be a key component. Reform in China has moved forward in fits and starts, by reform accelerates and the capacity of the government fails to—

initially, it lags, fails to catch up. Then it catches up. We see that with property rights provisions today, we have seen it with some intellectual property rights issues, we have seen it with ownership distinctions. Then the economy surges forward again and we lose the capacity. It is a give and take kind of process.

Mr. SHADEGG. Mr. Stephens, I think you are being extremely charitable by acknowledging that we will get it wrong the first time, the second time, and the third time. I think I would get voted out of office the first time, and the chairman gets voted out of office the second time. And I don't know who is left for the third time.

But I am worried about the employees of that mill that you discussed at the beginning of your testimony. Since 1997, 136 pulp and paper mills have closed in the United States with a loss of, I am told, 85,000 jobs. And there have been an additional 60,000 jobs lost in the wood products industry since 1997.

And we heard just a few minutes ago from Mr. Holzschuh that in Europe, well, they got it wrong. But they are going to get it better this next time. They saw a 67 percent increase in electric prices in Europe after establishing their cap and trade system. Have you done an estimate of how many more pulp plants or how many more wood industry jobs would be lost if we make a mistake of that scope?

Mr. STEPHENS. No, I haven't done that estimate, but I think it is interesting that for most of my 50 years I have been around this business, we were exporters. And today, we have become importers.

Mr. SHADEGG. And that troubles me very much as well. I have another question. I heard a great deal of frustration in your voice about not getting biomass right, not getting forest policy right, not being able to remove dead trees—big problem for us in Arizona—not being able to clean up the floor of the forest, new policies now say let forests burn because our artificially suppressing fires was a bad idea. But you point out in your testimony accurately that allowing for us to burn emits massive amounts of CO^2.

If we can't get forest policy right, I am concerned that we can't get these policies right. And I am concerned that we will lose a lot of American jobs in the interim. You have a plant in Brazil. I don't want to see more outsourcing of jobs to your Brazilian plant.

You point out in your company's climate change principles that over the past 5 years, Boise Cascade has decreased your use of purchased fossil fuel paper in your paper mills by 28 percent while increasing production by nearly 4 percent. That is a real step forward in terms of greenhouse gases. You did that voluntarily. If we had solid policy on biomass, you would be able to do better than that, I would bet, quite dramatically. Is that correct?

Mr. STEPHENS. Well, the laws of physics do put certain limitations on conservation, but yes. But the reason we were able to accomplish that is our investors gave us capital. We put that capital to work in our mills, and it was an economy incentive for us to conserve energy because our cost went down. If we ever forget that, we are toast.

Mr. SHADEGG. Well, and I noted your comment earlier when you asked give one thing, it is come up with the capital to fund the start of this, and I agree with that. Your company's principles also state that you are concerned about not pushing the jobs offshore.

Yet in your testimony, you say well, the way to deal with that is to simply stop market access. That is your written testimony says don't impose a tariff, as Vice President Gore talked about, but simply restrict access.

I have two problems with that. I am concerned that creates a global trade war, No. 1. And second, I think there are smart businessmen in India who say fine, I can't sell direct to the United States. I will sell to England who will sell to the United States. Have you thought those two issues through?

Mr. STEPHENS. As I have indicated, it is the Gordian Knot that has be to dealt with. It is a fundamental conflict in principles with me, but maybe I am just stupid. I haven't figured out an alternative.

Mr. SHADEGG. Well, fair enough. Fair answer. Thank you very much. Thank all of you.

Mr. BOUCHER. Thank you. The Chair recognizes Mr. Inslee for 8 minutes.

Mr. INSLEE. Thank you. Thanks for your help on this tough issue. Listening to you, I had two thoughts I wanted to mention before my question. First off, it seems to me if we are going to get the developing world to joint us in this quest, there is a really a fundamental fact that none of us have talked about today. We have had a good time engaging in the American sport of bashing China, which is always a good time, I suppose.

But there is really an important fact that I think we ought to at least talk about a little bit this hearing. And that is that the per capita emissions of Americans and Chinese are radically different. I am looking at charts that are before me that shows that a typical citizen of China emits about four metric tons of carbon dioxide per year per person. And that is how I break it down. We are talking about people not just countries. And the average American does about six times that much, about 24 metric tons per person. India is about two and a half, maybe to three it looks like metric tons. We are about eight times that much, or about 24 metric tons per person.

Now, the reason I note that is that when we go to China and India and chastise them for not being as morally pure as Americans, it seems to me they might say who are you to talk when you are emitting six to eight times as much per person as we are. And I think we have to think of a response to that if we are going to make any meaningful progress in this regard and how we respond to that sort of perception that they will have.

I don't feel like I am wearing totally the moral white hat here telling the Chinese to stop doing any CO^2 emissions when we are doing six times more than they are per person. It is difficult to wear the white hat in that circumstance frankly. So I think that is something we have to work through and have a strategy in that regard.

The second thing I want to note is listening to you all, what I was struck by—and one of the reasons I do not agree with this sort of doomsday scenario that if the rest of the developing world doesn't follow up to the letter within the first 24 hours of us adopting this policy that we are just going to abandon our policy. I think that is a really bad mistake, and the reason is that the more I lis-

ten to you, the more it becomes apparent to me that the real goal of our domestic policy should be to drive technological development in America so we can sell it to India and so we can sell it to China.

And that doomsday scenario would handicap and retard the development of these new technologies. I want to sell products made in Tacoma, Washington to China, one of which is a clean coal technology that allows us to compress CO^2 at 30 or 40 percent less cost and make clean coal. I want to sell that to China, and if we weaken our cap and trade system, if we shoot it in the foot by putting this sort, I will just call it the doomsday scenario that we don't play until China does, we will retard the ability of these companies to grow.

Mr. Holzschuh indicated growing a capital pool for these companies is absolutely pivotal to the development of this export economy for the United States. That is why, if we are thinking, I would much rather think about requiring emissions price to be paid if some company does not ultimately become responsible in this regard.

So first question. If we were to adopt some type of requirement at some point in the future that countries that do not do *X*, that they have to buy emissions credits to make up for the fact that their country did not participate. Let us assume that we can deal with the WTO issues, and we figure out when we should do that. What is the *X*? What should the *X* be? When we have a country that is one-sixth or one-eighth as we are per capita, what is the *X*? How should we think of that if we were to adopt that type of mechanism? That is an open question to any of you.

Ms. PETSONK. It is exactly this kind of question we think merits a closer look. One proposal that is in the process of being developed is to look at as a gradual thing. I think you are exactly right, that countries are not going to spin on a dime and simply because we cap emissions, they are going to cap emissions.

They will need time to put their caps in place. It may be that during that time period they could still do—you would let them come into our market with some carbon trading along the lines that Mr. Chaudhuri has talked about where they don't have a cap, but they do individual projects that reduce emissions. Those are useful projects, but the carbon credits from those don't trade at par in our market because the overall country doesn't have a cap.

If over the time the country still refused to either accept a cap or reduce their total emissions, then you could look at carbon intensive goods from those countries that come into our market. If they come in made with a greater amount of carbon per kilowatt hour or per barrel of oil or per ton of cement or per ton of steel greater than a standard that we set as an efficient, reasonable standard, then what they would need to purchase in order to get their products into our market would be the delta, the difference, between what our standard is on a per-ton or whatever basis and how much it took to produce those products in their countries.

Now, I am not saying that for sure that is the answer. I just want you to know that that is the kind of answer that some companies, multinationals with production facilities around the world, are thinking about. Is that helpful?

Mr. INSLEE. Yes.

Mr. PERSHING. I just want to say a couple of different things. We were responsible for the data in this particular chart, and I think it is extremely important to use this in thinking about the next steps. But I would note that this chart in some ways is a little bit misleading because what it represents is what the national average is. And the national average is not where productivity happens or emissions happen.

And if I look, for example, at the case of China, Dr. Steinfeld talked briefly about this in terms of at the high end, it is Shanghai. Shanghai does not look like western China. At the high end in India, it doesn't look like the rest of India. It looks like where the center of populations are, where the significant growth is, where enormous capital resides.

And one of the ways to think about it and what you do with these countries is not to so much think about what the average is, but think about what you are trying to control. You are trying to control the direction of future energy production. You are trying to incentivize the kind of investment that would make it lower cost and lower emissions based.

And what you have got is amazingly large pools of capital globally that could move in. And if you create it from the other end, not the penalty, but the incentive, you may actually create the kind of advantages that you want to create.

Mr. INSLEE. Well, just the way I look at this is when I am thinking about how to move forward, I am going to judge these proposals on how they incentivize and create market opportunities for United States technology because I really believe that is the way the United States is going to lead the world to solving this, as much as even international agreements.

If we can develop these technologies to sell the China and India, they will buy them even without a cap perhaps. The key is developing those technologies. And if we can come up with a solar thermal plant that a son of India, a guy named Vernard Kolsa, just who helped Sun Microsystems get started, he just bought a solar thermal company. He has renamed it Oster. It was an Australian company. He has moved it to the United States. They believe they might be able to have market-based grid competitive solar thermal energy in the next 5 to 6 years.

Now, if they can do that, if we can help that company by having a cap and trade system here in this country to drive capital into those companies, we will sell India this technology even if they don't get into this market. Yes?

Mr. PERSHING. One additional thing on that same front is that I note that India does in fact have a ministry of renewable power. It is the only country in the world that has a ministry that is focused explicitly on how you move that forward. We can cooperate with a ministry like that and do aggressively promoting the technology that we have got in that kind of a structure.

Mr. INSLEE. Well, my idea is, since I just found out yesterday that the gavel in the U.S. Senate is ivory, a gift from the vice president of India, they owe us to buy our technology.

Mr. BOUCHER. The time of the gentleman has expired. The Chair recognizes the gentleman, Mr. Walden, for 8 minutes.

Mr. WALDEN. Thank you, Mr. Chairman. Mr. Stephens, I would like to dedicate the next 5 minutes so you could read your testimony again to the committee, but I won't do that. I chaired the Subcommittee on Forest and Forest Health for a couple of years when we were in the majority. And we passed in the House bipartisan legislation to get at this issue of better managing America's forests because, as Brian Baird, my colleague from Washington, and I agreed, Americans are going to use wood, and that is not a bad thing.

It is a matter of where we get it. And today, we let forests rot and burn in the United States so we can mow down rainforests around the world where they lack environmental safeguards. And then we wonder why we have some of these environmental problems. You referenced in your testimony the amount of carbon emissions that are put into the atmosphere by forest fires. The B and B fire in central Oregon in 2003 contributed at least twice as much carbon, among other pollutants, into the atmosphere as the entire State of Oregon did for 1 year.

We have so hamstrung the Federal ability to manage our forests, to get them back in tune with nature, that when we get fire, it is of catastrophic consequences. And then we let the trees stand and decay and rot rather than replant and harvest those that have some value. And we do it in the name of the environment while we happily go and import wood at astronomical rates from these foreign countries.

Now, I guess the question I have for you is is that the way that Boise in its former iteration managed its forest lands?

Mr. STEPHENS. No, it is not. We managed it as a working forest and balanced its economic value with its environmental value. I think when we reached the point as recently as, I guess, a month ago where a Federal judge has to decide what is a dead tree and a live tree and a tree that can be harvested in the middle of a fire, that gets very frustrating to the members of the forestry service that I visited on that fire walking through that burned area. We have essentially handcuffed them as professionals from doing their job.

Now, the logic of it is so silly. If we could harvest that tree, we can convert it into a wooden I-joist in Bedford, Oregon. We can ship it to China and use it for building homes rather than using concrete.

Mr. WALDEN. Right.

Mr. STEPHENS. And we are carbon neutral. The concrete could put carbon into the atmosphere. So when you look at the whole picture, when you integrate the whole thing together, we still have a lot of problems we need to solve in managing the Federal forests. The good news, forests in the U.S. are not that much less than they were 100 years ago, and we can make them much healthier.

Mr. WALDEN. That is true, except they are far less healthy than they were 100 years ago. You have 192 million acres of Federal forestland subject to catastrophic fire, bug infestation, and disease. And we are not doing much about it to improve it.

Now, I am a big advocate of renewable energy too. My district is host to one of the only renewable energy centers in the country at Oregon Institute of Technology, OIT, down in Klamath Falls

where they are doing some remarkable work on geothermal development as well as other renewables.

We worked with the Navy to secure a site that may become home to a very substantial solar energy development. My district is home to an enormous amount of wind, not just because I reside there, but because of the winds off the coast coming up the Columbia Gorge. And as a result, we are seeing literally thousands and thousands of megawatts of new wind energy being put into place. And it works well, as you probably read in the Washington Post last week, because of the synergy that exists with hydrosystem.

Now, Ms. Petsonk, with all due respect, there is some in the environmental community that would take out the dams, that opposed us vociferously on our forest health strategies. How do we, as a country, get to where we can actually be good managers of our Federal lands, use these alternatives renewables. The efficiency rate of hydro is like 90 percent. There isn't another fuel efficiency out there that is above about 50, I think. How can you help us get there?

Ms. PETSONK. I know my organization has done some work with the Confederated Tribes of the Warm Springs Reservation, a place I dearly love. And when the Confederated Tribes began to look at if there were a price on carbon, how would it change their management of forest lands, of water, and also grazing, they came up with some very interesting results. They found that there would be incentives to restore forests along the banks of streams. They would grow carbon by letting the big trees get bigger, taking out some of the small trees like you are talking about that add to the fire——

Mr. WALDEN. And even out, yes. Ladder fuels.

Ms. PETSONK. That reduces the runoff going into the streams to improve stream quality and clarity, and it also makes hydro more efficient because there is less siltation so they get a carbon benefit out the back end because they get better low-head hydro going that can displace coal. So once you begin to look at this through that prism of carbon, and we are lucky that it is carbon. What if it were arsenic? We are lucky it is carbon. It has so much to do with so many aspects of daily life. I think we will see economic incentives that press toward forest restoration.

Mr. WALDEN. Right, but the economic incentives, frankly, are there absent carbon trading. The problem we have, and the tribe supported the legislation we passed in the House. The problem we have is that we have hamstrung the management ability of our professional forests on Federal ground to do exactly that. There are already setbacks on streams, hundreds of feet back on each side where you can't harvest, and that is understandable.

What I am talking about though is nearly every thinning project out there gets appealed. You get a burn on a Federal forest, you will be court 3 years later deciding what size tree you can cut, if any, and by then the value is gone. And you can't replant and start the sequestration process over. It is a terrible mess out there I am telling you.

And we could do a lot for the atmosphere. I am tired of going into my communities that are choked in the summer with not only carbon dioxide but also all the other pollutants that, in one fire, are

doubled, tripled. I have seen reports up to six times just in the one fire of what the entire State of Oregon emits.

And so there is a lot of good stuff we could be doing on the ground now that would help resolve some of these issues. And I just hope that we can look at those as well, how we improve nature and work with nature to reduce carbon emissions. Certainly there are positives there. And not do these things where we rip out the battery, the dams, that are the storage unit that make wind energy work and be more reliable. And yet there are people that want to do that. And that is real troubling.

And just as a final note, having been on this committee now for probably, I guess, 6 years, having gone through the Medicare Part D Program, I can't imagine setting up some of the cap and trade programs that some witnesses we have had before the committee have envisioned, just in terms of the complexity and cost and making them work.

And finally, Dr. Steinfeld, I supported giving China excession to the WTO. Do you think they are fully compliant today? And would they be under a cap and trade carbon system?

Mr. STEINFELD. Full compliance is, I think you have a point that it just hasn't—and it is an ideal level that—but I do think that China, in a few areas, has become more compliant than it was. I say that not as an advocate for China, but we have seen progress. And that intrigues me, and understanding why that progress happens, I think, is a worthwhile endeavor.

Mr. WALDEN. OK, thank you.

Mr. BOUCHER. Thank you. The Chair recognizes the gentleman from Texas, Mr. Gonzalez, for 8 minutes.

Mr. GONZALEZ. Thank you very much. Let me catch my breath and apologize to one and all. Dr. Burgess may be treating me in a minute.

Mr. BURGESS. Take your time, and then if you need to catch your breath——

Mr. GONZALEZ. You see? And that is good medical advice. Thank you very much. As a matter of fact, I just came from a meeting. My mayor is in town. My county judge is in town. My city manager is in town. My chamber of commerce is in town, and believe it or not, they really are interested in global warming.

And the reason for that is that our newly planned energy plant is—guess what it is. It is coal, and the mix we have right now is probably 50 percent coal, 10 percent wind energy. I forget what percentage is nuclear, and the rest is natural gas. But our big investment is going to be in coal, and that is what I want wanted to talk to you about. And I know that some of this may have already been covered, and I apologize to you for my absence and the fact that I might be repeating a couple of things.

I only have a question or two to the witnesses, and I will direct those questions to them in a minute. We have about 12 new coal-fired plants being built in the United States as we speak to come online very soon. We have 40 others that are planned. They will come online in the next 5 years. Then the predictions are by 2030 we will have 150 more, and that is United States alone.

In the United States, half our energy-producing plants are coal fired. China, what is it? 75 percent? I forget. Something like that.

So nothing is really going to drastically change in the immediate future, and so whatever we put in place, I am not real sure how we retrofit or what we do. So this cap and trade looms large if you know what I mean, and I think that is where a lot of our attention, a lot of our energy probably is going to be focused as we try to meet some sort of a June date or whatever to have something out there for consideration as reported of this committee. And as you well know, there is a select committee operating out there also on this same subject.

It has been described before that we should do what we are going to do as a nation because it is a moral imperative. Yet we have those individuals, and you heard from them today on this committee, that truly believe why should we do anything if the other nations aren't joining us, if the other don't do their part. And that is a good question. Why do you sacrifice it all? And I am not real sure that I have that particular answer.

But the question that I am going to pose to Ms. Petsonk and then Dr. Steinfeld. If we cannot predict control or influence to any appreciable extent, the conduct of other nations, whether it is going to be India, whether it is going to be China, Indonesia, Brazil, it doesn't matter. To what extent should we pay a price as a society in higher costs and such? Why should we go it alone? I actually think there is a reason why we should still improve on a bad situation, irrespective of what we could expect from other countries.

But you tell me based on your own experience, what do you tell the United States? Let us say worst case scenario. The other nations don't do a thing. Why should the United States move forward? Because the laws we pass will only impact that which is within our jurisdiction, the United States of America. So I will start with Ms. Petsonk.

Ms. PETSONK. Thank you, sir. When I first started in this field, the only job I could get was in the area of international environmental law, and I was a newly minted environmental lawyer. And I wasn't interested in international stuff because I said there is no global EPA. There is no global police force. There is no way to enforce any of this stuff. But my supervising attorney said to me you ought to take this job because the challenge of international environmental law is designing legal frameworks that sovereign nations will want to obey.

That is a very big challenge. You are right. What I have tried to do in my testimony is offer up some suggestions for both carrots and sticks that Congress could include in legislation that would increase the likelihood that our trading partners would want to participate. We don't have a way to force them to do it. We do have tools that can engage them, and we also have tools that can level the playing field if they don't. And so those are the tools that I have tried to suggest to you.

I do not have a tool that I can guarantee you will make them do what we do, but I can guarantee you that if we don't take the first step, they will not.

Mr. GONZALEZ. Dr. Steinfeld.

Mr. STEINFELD. Speaking personally, I tend not to be persuaded as much by the moral arguments as by the simple, rational arguments. I view measures to deal with climate change as an insur-

ance policy. Insurance policy, in part, regarding environmental issues. An insurance policy in part regarding resource availability issues or energy availability issues, and an insurance policy, in part, involving industrial competitiveness and innovation.

We have a slight advantage in the United States of not being at the absolute cutting edge of some of these measures. We are slightly following in some areas, but my concern is that if we don't play, that other countries, including developing countries, will be buying pieces of this insurance policy. And by addressing some of the climate change issues, we will be inducing innovation or providing centers for innovation in their industrial bases, which ultimately will put us in a position to buy rather than selling. And I think that is not a position we want to be in.

Mr. GONZALEZ. Did you want to add anything?

Ms. PETSONK. Yes, I would just like to add, you mentioned about wind power and coal, and I am certainly familiar with some of the decisions facing Texans going forward looking at coal and wind. I had the opportunity last year to have lunch with the head of wind power in GE, and I asked him is it really the case that GE is the largest producer of wind turbines in the world. And he said actually, no. And this may not be true, but this may not still be true, but at the time it was true. He said actually no, the largest producer of wind turbines in the world is Denmark.

I said Denmark, why Denmark? He said well, they figured out that if they let farmers generate electrons with wind and sell the surplus back to the grid, they would let farmers make money doing that. And that very quickly gave an incentive to farmers to develop really good wind turbines, and so they have gotten that market share. Now, I believe, and maybe Mr. Chaudhuri knows a little bit about this as well or maybe Dr. Pershing, that India is not far behind in developing wind turbine technology.

And so it is the case that as other nations look at the climate change problem, some of them will adopt emissions caps. Some of them will do less than that, and they will go into the carbon market with individual projects that reduce emissions. But if we don't begin to give a price signal for reducing carbon in our economy, we are going to end up buying the low-carbon technologies in the future from other nations.

Mr. GONZALEZ. I have 36 seconds. Does anybody want to add anything?

Mr. CHAUDHURI. I will just add onto what Ms. Petsonk mentioned. One of India's newest billionaires, in fact, is a wind turbine magnate, a dollar millionaire. And he has in fact bought a billion dollars overseas investment. He has been buying small companies across Europe to master the technology of wind turbines, and sure he has got as big a monopoly as he can on that.

Mr. GONZALEZ. Well, thank you very much. I yield back.

Mr. BOUCHER. Thank you. The Chair recognizes Mr. Burgess from Texas for 5 minutes.

Mr. BURGESS. Well, I do want to, following on what Mr. Inslee said when he was talking about wanting to export his technology from Washington. In Gainesville, Texas, we make some of the finest windmill blades known to man. And so we hope that the Indian billionaire will buy good, solid Texas blades that are made to exact-

ing specifications and don't pick up those cheap Brazilian blades because they are only going to break when the wind gets strong.

Dr. Steinfeld, on the MIT coal report, which evaluates 10-year lag for developing countries to join the greenhouse gas reduction regimen, how realistic is it to expect the Chinese to be able to conform to that 10-year timeframe. It seems like a relatively short amount of time.

Mr. STEINFELD. In my personal opinion, 10 years, given the pace of change in China and this give and take between regulatory capacity building and then development, I think 10 years is a reasonable time to expect the building of compliance capabilities.

Mr. BURGESS. What is likely to happen though as far as the economy and jobs in China during that 10-year lag?

Mr. STEINFELD. In my estimate, what we will see is we will see a shifting of industrial structure in China, as is already happening, increasingly toward services. To some extent, there is going to be a response, and we are seeing a bit, to the government's mandates to increase energy efficiency. So some financial incentives have already been created for internal, domestic switching in China out of energy intensive and into more valued service intensive industries.

Mr. BURGESS. Mr. Chaudhuri, did I pronounce that correctly?

Mr. CHAUDHURI. That is close enough.

Mr. BURGESS. It would seem that, and we have heard some discussion on this, and I apologize also for being late. We are doing children's dental care under S-CHIP downstairs in our health subcommittee. And I promised I would do no puns about picking on problems or flossing over problems. But focusing on the cap and trade program and your focus on the economic growth in India to alleviate poverty within this generation, so what impact will the U.S. implement an economy-wide cap and trade regimen, is that likely to have an impact on India?

Mr. CHAUDHURI. If the United States does one unilaterally or globally you mean, or imposes something as——

Mr. BURGESS. Assume unilaterally at this point.

Mr. CHAUDHURI. Well, if it is unilaterally, I don't see—it would depend on the nature of it in terms, as Ms. Petsonk mentioned, whether it allows other countries and companies in other countries to tag into that. In that case, it would be beneficial. The CDM already are looking at an estimate by the UN. The CDM mechanism by 2015 was expecting to issue certified emission CRs of about 300 million tons in India alone, which is equal to what we produce all of 2005. So if that incentivizes us to join into that, then it will be perfect because both sides win. It is a win-win situation for both sides.

If you were to issue it as a trade tariff, there was talk about issuing that, I would recommend against it because I would essentially run into severe sovereignty issues. At that point, it becomes confrontational. India has no problems participating, but if you are going to add tariffs, essentially what amounts to a tariff, on your goods coming in, outside of the fact that I am not certain how in regulatory terms it is even feasible in India to work that out, my expectation they would then treat it is as WTO is, which is that this has now become a sovereignty trade issue and be treated with hostility or treated as a difficult negotiations process.

Mr. BURGESS. Thank you. Mr. Holzschuh, on the clean development mechanism, referencing that process in regard to China, there are some anecdotal stories that there are industries in China that are occurring simply to create pollution in order to get the credits when they dismantle or deactivate those activities. Is that an issue? Is China creating a problem just to be able to correct it later on in order to sell those credits to, say, European countries?

Mr. HOLZSCHUH. I am not familiar with the statistics there, but I would say it is not just China. When a market is developed, there will be people who try to front run, take advantage of markets. And as part of that market mechanism, the constituents in that market and the regulatory bodies that sit above it are going to have to control that. So there is no doubt in my mind that people will attempt that. Hopefully the policing mechanisms work.

Mr. BURGESS. But we already heard reference of some of the difficulties with dealing in a punitive way with trade sanctions, and likely that would play a significant role in that type of activity if a country elected to go down that path. Thank you, Mr. Chairman. I appreciate. I will yield back.

Mr. BOUCHER. Thank you, Mr. Burgess. Following the subcommittee's usual practice, the hearing record will be left open to permit various members of the committee to submit additional questions to the witnesses. And we would appreciate your written responses and will include them in the record. With that, I want to thank you for your time and patience participating in the hearing today, and with that, this hearing is adjourned.

[Whereupon, at 10:52 a.m., the subcommittee was adjourned.]

[Material submitted for inclusion in the record follows:]

Testimony of Pramit Pal Chaudhuri
Bernard Schwartz Fellow
New York & Foreign Editor, Hindustan Times, New Delhi
Before the U.S. House of Representatives
Subcommittee on Energy and Air Quality, Committee on Energy and Commerce
March 27, 2007

India, like China, has been a largely passive onlooker to the debate in the Western world about the causes, likely fallout and responses to the issue of climate change. Officially, India has never disputed any of the conclusions of bodies like the United Nations Intergovernmental Panel on Climate Change. Domestically even the issue of carbon emission limits – the most controversial and most drastic solution proposed to counteract global warming – receives only academic discussion.

The reason: Such discussions are seen as largely irrelevant. What does exist is an overwhelming consensus that India's overriding priority is rapid economic growth. Any Indian contribution to international climate change policy cannot be at the cost of growth. This is perceived to largely rule out carbon emissions limits. Therefore, the scope of debate in India is extremely limited with even mainstream environmentalists arguing, as former Indian Prime Minister Indira Gandhi once said in the 1970s, "the ultimate polluter is poverty."

With more poor people than sub-Saharan Africa, the dominant national goal of India has been to lift as much of its population as possible out of poverty. At present, some 350 million Indians live on less than one dollar a day. Thanks to the strongest economic boom in its modern history, India can for once contemplate, to paraphrase a World Bank economist, eradicating poverty within the next generation. The idea that it should endanger this effort, even theoretically, by burdening its economy with carbon emission limits simply has no support within the country. This underlies the decision of India – and probably also China – to sign the

Kyoto Protocol only on the understanding that they would not be liable to carbon emission limits. The repeated calls that a second round of Kyoto negotiations should include carbon emission limits on developing countries like India and China is one reason both nations are dragging their feet about holding such a second round.

This is fully understood by the international environmental movement. The Executive Secretary of the UN Framework Convention on Climate Change and the UN's leading climate change official, Yvo de Boer, said in New Delhi in January this year, "Developing countries fear that a new round of climate negotiations would impose on them obligations that would hurt their economic growth."

The belief that there is a trade-off between carbon emission limits and economic growth – and therefore poverty alleviation – is at the heart of India's refusal to countenance carbon emission limits. The linkage is obvious. Carbon emissions are directly linked to energy consumption and almost every possible study on the Indian economy that exists indicates that India's economic growth will result in an enormous increase in energy consumption.

India's present prime minister, Manmohan Singh, said in July last year that the Indian government's Integrated Energy Policy document estimated that if India maintained a growth rate of eight per cent a year until 2030, energy requirements would increase by a factor of between four and five. Electricity generation would have to increase from our installed capacity of 131,000 MW to "between 800,000 to 950,000 MW." Most of this, on the basis of present trends, will be fueled by hydrocarbons.

India, according to the US Department of Energy, produced 312 million metric tons of carbon in 2005, making it the fifth largest carbon emitter in the world. However, measured on a per capita basis, each Indian only produces two tons of carbon a year.

India is not averse to working towards curbing carbon emissions so long as these are not in a form that is not inimical to economic growth. It is an active participant in the carbon trading market. As of January this year, it had 155 registered clean development mechanism projects with another 400 or so in the pipeline. It is a partner in a number of clean energy projects sponsored by the US government, including FutureGen – important to a country with large reserves of coal with high ash content – and the Hydrogen Fuel Initiative. When it reaches fruition, the recent Indo-US civilian nuclear agreement should allow India to expand its civilian nuclear program. India is also part of the six-nation Asia-Pacific Partnership on Clean Development and Climate that includes China and the US and seeks to address climate change without mandatory carbon emission limits.

India has not been and is unlikely to be swayed by arguments that the supposed long-terms costs of climate change will be damaging to its economic prospects. Its present record of economic growth and the millions of people this has lifted out of poverty is a clear and present reality. To argue that India should sacrifice such immediate and tangible benefits to avoid costs predicted by disputed computer models that would materialize several decades into the future would find little or no support inside India. A bird in hand is worth two in the bush.

De Boer argues that the key to the climate change problem is to provide incentives for economies to grow along a greener path. The CDM is one such incentive, he argues, and "more of these incentives are needed to have significant impact on protecting the world's climate." In his own speeches in India, he carefully avoids reference to carbon emission limits. This is almost certainly because he knows they will receive no support from India and, I would suspect, China and would only engender greater reluctance by both countries to address climate change. Both countries are driven by a far greater political and moral task, inherently tied to their own sense of nation-building, of economic growth in anyway possible. This is an incontrovertible truth.

Testimony of Jeffrey R. Holzschuh
Vice-Chairman, Institutional Securities
Morgan Stanley
Before the House Subcommittee on Energy and Air Quality
Committee on Energy and Commerce
March 27, 2007

Good morning Mr. Chairman and distinguished members of the subcommittee. My name is Jeff Holzschuh, and I am the Vice-Chairman of the Institutional Securities Group at Morgan Stanley, head of our Global Power & Utilities Group and Chairman of our Environmental Committee. I appreciate the opportunity to address the subcommittee today, and I hope that I can provide some additional useful perspectives on developing countries and their steps to reduce greenhouse gas emissions, including how the U.S. and other developed nations are impacting this issue. As developing countries, particularly China, continue their rapid growth trajectories, energy use and demand, including greenhouse gas emissions, have obviously been growing. With global warming increasingly confirmed, per the latest UN and IPCC reports, both the developed and developing world need to take appropriate actions.

Morgan Stanley is a leading global financial services firm and we have undertaken a variety of environmental initiatives recently, including plans to invest in approximately $3 billion of carbon emissions credits, projects, and other initiatives related to greenhouse gas emissions reduction over the next five years. In addition, we are also one of the most active traders of environmental commodities, including sulfur dioxide, nitrogen oxides, biodiesel, ethanol and weather derivatives. We also work with a variety of industry clients to craft new and innovative approaches to evolving greenhouse gas concerns in

this country and globally. Internationally, our commodities trading division in Europe, for example, has been actively trading EU carbon allowances in the new carbon cap-trade regime (ETS) and working with clients to develop carbon offset projects. We believe that the trend toward more country, regional and international carbon trading is positive and can provide useful incentives and structures to help reduce global greenhouse gas emissions in the future.

There are extensive analyses on greenhouse gas emissions and you have heard detailed testimony on this subject, but from our perspective, let us add a few additional points:

- Morgan Stanley is aware of China's potential impact on greenhouse gas emissions, due to its growing greenhouse emissions and its projected energy demand growth over the next twenty years. Since 1990, Chinese emissions rose 77%, compared to 18% for the U.S., as recently estimated by a World Resources Institute study. Nearly 32% of future global energy demand over the next twenty years will come from China alone, as estimated by recent reports by the International Energy Agency (IEA), McKinsey Global Institute and our own research. India and Latin America, in comparison, are only projected to account for 12% of future global energy demand during that period.
- The Chinese emissions growth is due primarily to its reliance on its abundant coal reserves to satisfy its growing energy demands. According to the IEA's World Energy Outlook 2006, China and India will account for nearly 80% of incremental increase in coal consumption globally through 2030. Today, China is opening a new coal-fired generating plant every week to ten days. Currently, its

coal-fired plants are inefficient, consuming twice as much coal per kilowatt produced compared to U.S. plants, and are lacking in anti-pollution stack scrubbers found in U.S. plants. Other developing countries, such as India, also have inefficient coal plants. We believe that it is in our country's best interest to enable countries like China to use the best available clean coal technologies and help to reduce their greenhouse gas emissions from this key source in coming years.

- China is projected to become the world's largest emitter of greenhouse gas emissions by 2009 and it is now preparing its first national strategy to address climate change and reduce greenhouse gas emissions. Recent evidence suggests that approval of this new strategy may be within the next one - two years.
- The good news is that China is now addressing this issue at a national level. However, China has limited or no regulatory or enforcement mechanisms. Implementation of the new strategy may lag creation of effective regulatory and enforcement agencies.
- An interesting and new twist is the emergence of emissions trading and its potential to assist developing countries like China. For example, China failed to meet its goal to reduce its sulphur dioxide emissions by 10% between 2001 and 2005; instead, emissions increased by 27% over this period. To address this concern, in August 2006, the Chinese Academy of Environmental Planning previewed a new national emissions cap-trade program, which, if similar to the existing U.S.'s emissions trading program for SO_2, could be effective in reducing greenhouse gas emissions within China.

- China's emissions cap-trading efforts would be made more effective if America creates its own carbon cap-trading system to foster U.S. carbon emissions reductions. This subcommittee has received extensive, detailed testimony on how such a U.S. market needs to be structured. We would only add that, given the excellent efforts already in setting up an effective SO_2 emissions market, we have the collective expertise in the U.S. to develop an effective carbon cap-trade system. Ideally, we need to build from the experience of Europe's carbon cap-trade regime (ETS).

We realize this is an extremely complex subject, but encouraging effective regulatory and incentive systems, such as carbon trading, both in our country and in others (developed and developing) would be a key part of an effective global approach. Obviously this is only one piece of a comprehensive greenhouse gas emissions reduction approach, with other actions also needed such as increasing energy efficiencies, promoting clean technologies and assisting consumer behavior to adapt and change energy-use in coming years in both developing and developed countries. For example, Australia's seemingly simple action to hand out more efficient lightbulbs is a small but significant signal to their citizens to change and adapt their energy-use behaviors. Ideally, the U.S. needs to take a leadership position in addressing its own greenhouse gas emissions effectively and comprehensively, in large part to encourage, lead and inspire developing countries, such as China and India, to follow our lead and coordinate to reduce their global greenhouse gas emissions. Morgan Stanley is committed to assisting and being a part of these efforts, and in helping you to achieve the best outcome for the U.S. and globally. Thank you again for this opportunity to share these views with you.

DR. JONATHAN PERSHING
Director, Climate Energy and pollution Program
World Resources Institute

Testimony submitted to the
US House of Representatives Subcommittee on Energy and Air Quality
Committee on Energy and Commerce

Hearing on
Climate Change – International Issues, Engaging Developing Countries
March 27, 2007

Thank you Mr. Chairman. I appreciate this opportunity to discuss my views and provide input to your deliberations related to international action on climate change.

I would like to make several points:

(1) The science is real – and it is seen as real in all countries, both developed and developing. This provides us, globally, with a common understanding of urgency and scale.

(2) We cannot afford to wait to start: every year of delay increases the magnitude and rate of future reductions required to avoid damages – and increases the overall costs.

(3) The scale of the problem is enormous; it requires that we reduce our long term emissions by 60 to 80% from our global energy system, industries, agriculture and land use.

(4) No single policy or action in any single sector will be adequate to solve the climate problem. It will require efforts in all sectors addressing all gases, with multiple policy instruments, and sustained over a long period.

(5) Not all countries are the same; they have different circumstances driving different emissions trajectories, different responsibilities and different capacities. Thus, we cannot and should not expect any future international arrangement to set the same requirements for every country.

(6) Some countries clearly matter more than others for climate mitigation: the largest 15 countries (including the EU as one) are responsible for about 80% of global emissions. We need all of these 'big' players to be at the table, working on a solution. We cannot coerce them to participate, any more than they can coerce us; we need to find solutions that speak to each country's self-interest and desire for long term sustainable growth.

(7) Fortunately, there are solutions:

- A price on greenhouse gas emissions can lead to changes in consumer choices, corporate behavior and new investment. We know how to create markets – and make them work.
- Capturing the co-benefits of climate solutions – for energy security, local air quality and community improvements – can buy us time during which new technologies can be developed and penetrate into the market.
- We have technologies today that can begin to reduce emissions, and we can and must develop new technologies that will continue the downward path in the future. The market for such technologies could be a US one – or, if we do not take advantage of this opportunity, it will be one our competitors seize.

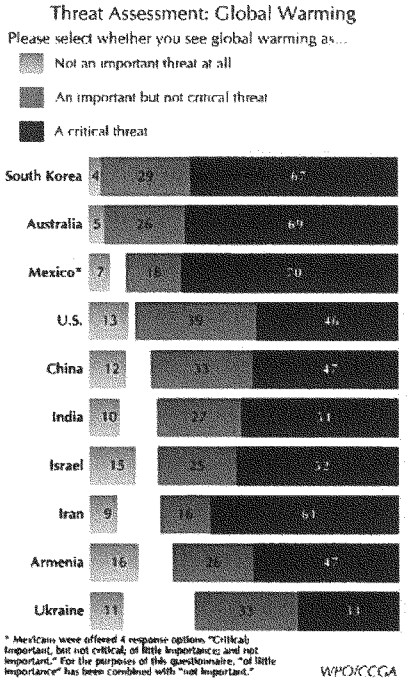
(8) We are unlikely to solve the problem before we are faced with significant, unwanted climate change. This means that part of the global effort will need to be devoted to adaptation. Unfortunately, it is the poorest and least able to cope who will be most significantly affected; we need solutions that address this reality.

(9) We will need to use all available fora for the international negotiation of these solutions. This will require the US to assume a more constructive role in the UN Climate Convention, to actively use existing (and create new) bilateral and multilateral arrangements, and to develop incentives to engage the private sector in global emission reduction opportunities.

1. The science is real

While it is unnecessary to belabor the point about the near universal consensus on the science of climate change, it is instructive to consider how the science is seen in other countries who must be our partners in the debate. The following figure is from a poll undertaken in ten countries around the world during the second half of 2006 by The Chicago Council on Global Affairs and WorldPublicOpinion.org, in cooperation with polling organizations around the world.

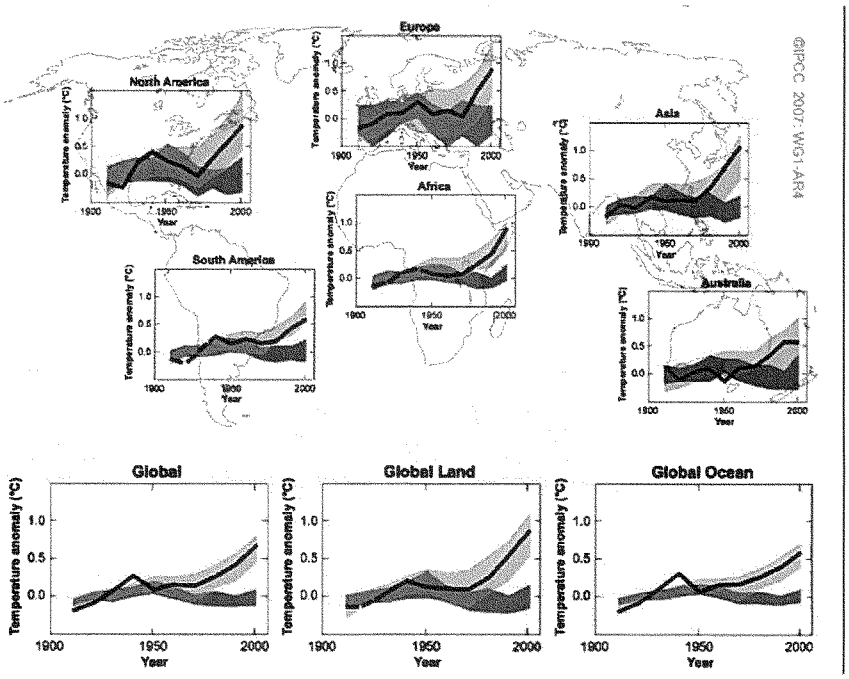
Figure 1. International Global Warming Poll



What is instructive is that in all countries where polling was undertaken, a significant majority see climate as an important or critical threat. This includes China and India, both essential partners in the global solution.

To a certain extent, global concerns about climate are mirrored by the distribution of the observed effects – and even more, the projected impacts. Thus, for example, the IPCC, in its report released in February 2007, provided disaggregated information on the already observed temperature changes. Increases have been observed in all regions of the world (see figure 2).

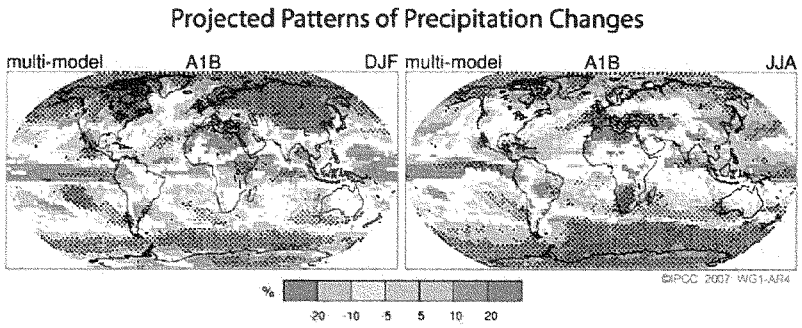
Figure 2. Comparison of observed continental- and global-scale changes in surface temperature with results simulated by climate models using natural and anthropogenic forcings. Decadal averages of observations are shown for the period 1906–2005 (black line) plotted against the centre of the decade and relative to the corresponding average for 1901–1950. Lines are dashed where spatial coverage is less than 50%. Blue shaded bands show the 5–95% range for 19 simulations from 5 climate models using only the natural forcings due to solar activity and volcanoes. Red shaded bands show the 5–95% range for 58 simulations from 14 climate models using both natural and anthropogenic forcings.



Perhaps even more significant is the set of projections released by the IPCC that consider reduced water availability (see figure 3).

The substantial majority of areas around the world that are anticipated to experience reduced water availability are in already stressed regions – sub-Saharan and southern Africa, southeast and western Asia, and during the summer months, most of southern Europe and Central America.

Figure 3. Relative changes in precipitation (in percent) for the period 2090–2099, relative to 1980–1999. Values are multi-model averages based on the SRES A1B scenario for December to February (left) and June to August (right). White areas are where less than 66% of the models agree in the sign of the change and stippled areas are where more than 90% of the models agree in the sign of the change.



The IPCC's report is developed drawing on scientists from around the world, including the Panel Chairman, Dr Rajendra Pachauri from India, and Dr. Dahe Qin, from China, the co-chair of the

science working group. Its results thus have significant standing in all countries – a standing that will make its conclusions (essentially indicating the urgency of the problem and the need for prompt and significant action) even more compelling.

A further indication of the general acceptability of the science is in another, equally prestigious statement issued jointly by the Academies of Science of Brazil, Canada, China, France, Germany, India, Italy, Japan, Russia, UK and USA in 2005, which stated:

> *"The scientific understanding of climate change is now sufficiently clear to justify nations taking prompt action.... We urge all nations, in the line with the UNFCCC principles, to take prompt action to reduce the causes of climate change, adapt to its impacts and ensure that the issue is included in all relevant national and international strategies. As national science academies, we commit to working with governments to help develop and implement the national and international response to the challenge of climate change[1]."*

2. We must start action immediately

While the science of climate change is widely agreed, there is a much weaker consensus on how quickly we must act, or with what stringency. However, a report released by Sir Nicholas Stern (former chief economist at the World Bank and economics advisor to the UK government), commissioned by the UK Chancellor of the Exchequer, and reporting to both the UK Chancellor and to the Prime Minister, has brought considerable clarity to this discussion. As the report states:

[1] For full text of Academies Statements see http://www.royalsoc.ac.uk/displaypagedoc.asp?id=20742

> *"Stabilisation at 450ppm CO2e is already almost out of reach, given that we are likely to reach this level within ten years and that there are real difficulties of making the sharp reductions required with current and foreseeable technologies. Costs rise significantly as mitigation efforts become more ambitious or sudden. Efforts to reduce emissions rapidly are likely to be very costly. An important corollary is that there is a high price to delay. Delay in taking action on climate change would make it necessary to accept both more climate change and, eventually, higher mitigation costs. Weak action in the next 10-20 years would put stabilisation even at 550ppm CO2e beyond reach – and this level is already associated with significant risks.*[2]"

The IPCC, in the third volume of its 4th assessment report, will include some review of the Stern materials; however, the Stern view on this issue is basically consistent with the consensus among the research community[3].

3. Emissions must be cut by 60 to 80%, requiring multiple policies covering all sectors.

The IPCC's science assessment provides a comprehensive examination of the physics of the climate system. From that analysis, several points clearly emerge:

- We are putting considerably more greenhouse gases into the atmosphere than can be absorbed by the Earth's system.

---

[2] Ibid, p 15.

[3] It should be noted that the one area of controversy in the Stern report is related to the discount rate it uses. The decision, ultimately, is whether we adopt a discount rate that values future generations as highly as we value our own, or whether we believe that technology and opportunities will grow in the future, thus making current costs more important than future damages. On the issue of taking immediate action, however, there is very little disagreement.

- To reach equilibrium requires significant reductions, the rate and magnitude of which are a function of the level of concentrations that are tolerable. Stabilisation - at whatever level - requires that annual emissions be brought down to the level that balances the Earth's natural capacity to remove greenhouse gases from the atmosphere. The longer emissions remain above this level, the higher the final stabilisation concentration. In the long term, annual global emissions will need to be reduced to below 5 GtCO2e, the level that the earth can absorb without adding to the concentration of GHGs in the atmosphere. This is more than 80% below the absolute level of current annual emissions.

While deciding how quickly we wish to stabilize is a political question, it is amenable to technical analysis. According to Sir Nicholas Stern (and based on the IPCC science),

> *"...[S]tabilizing atmospheric concentrations at or below 550ppm CO2e would require global emissions to peak in the next 10 - 20 years, and then fall at a rate of at least 1 - 3% per year. By 2050, global emissions would need to be around 25% below current levels. These cuts will have to be made in the context of a world economy in 2050 that may be 3 - 4 times larger than today - so emissions per unit of GDP would need to be just one quarter of current levels by 2050. To stabilise at 450ppm CO2e, without overshooting, global emissions would need to peak in the next 10 years and then fall at more than 5% per year, reaching 70% below current levels by 2050.*

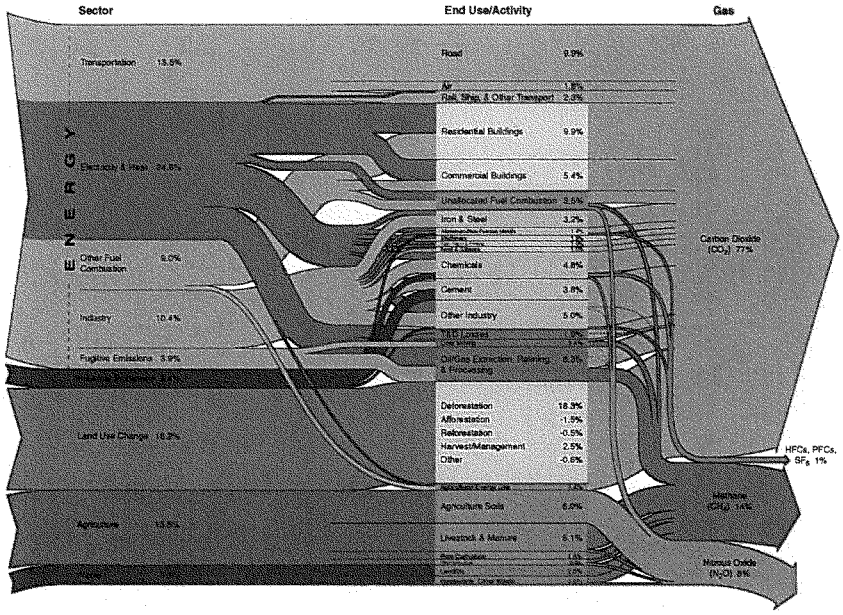
If we base our decision on historic information, we see that the world has no experience of sustained emissions reductions – or even of sustained economic growth – at rates of 5% or more

per year over a 50 year period. This would, in turn, suggest the need to start quickly so as to avoid the need for a very rapid – and potentially impossible – reduction effort later.

4. Policies must address all sectors and all gases; this will require multiple instruments

Greenhouse gas emissions arise from all sectors of the economy. While we do not have comprehensive recent data on emissions from all countries (a gap that needs to be rectified), it is instructive to look at the most recent information available (from 2000) to assess how broad a range of policy choices and actions will be required. Figure 4 shows the share of gases, and how total emissions are divided between sectors and end-use activities.

Figure 4. Global GHG emissions by sector, end use activity and greenhouse gas



We can see that energy (with about 60% of global emissions) and CO2 (with about 3/4 of the total) are the primary areas of concern. However, other gases (in particular methane) and other sectors (in particular, land use and agriculture) must also be addressed if we are to be successful at solving the climate problem.

There are very few policies that could address all emissions and sectors across all countries. Of these, the simplest would be a GHG tax. However, while some countries have applied such a tax (e.g., Norway and Denmark with their carbon taxes), its application is not widespread, and there is no desire in the international community to adopt a common and harmonized GHG taxation system. Countries are not prepared to give up the sovereignty required for its implementation.

Other policy choices, most much more narrowly targeted, are thus likely to be used. One attractive solution, a cap-and-trade system, is likely to be applicable to the energy sector (either upstream, in which case it could include transport), or downstream (in which case it might be more focused on electricity), as well as to industry. However, it may not apply easily to land use or forestry, and even in the energy area, may be difficult to apply to residential buildings. Other policies, including incentives, regulations and standards, R&D programs, and voluntary initiatives may thus be needed.

5. Not all countries are the same; different policies will be needed for each

As can be seen in figures 6 and 7, there are significant differences between countries with a respect to their sources of emissions and the relative shares of gases in their emission totals. Thus, for a country like Brazil, for which (in 2000) nearly 60% of all emissions derived from deforestation, a significantly different policy will be required than for China, where an even more substantial share (68%) of emissions arose in the energy sector.

Similarly, if the differences in GHG shares are considered, a CO2 only policy might be relatively effective for the US (with 82% CO2 in the mix) but much less effective for India (with 55% CO2 only).

The Kyoto Protocol dealt with this issue by allowing all countries to choose their own policy mix, according to their own national circumstances and priorities. Including all six major greenhouse gases, and allowing maximum policy flexibility continues to seem a good choice or a global policy regime.

A different issue emerges when considering a specific policy choice: can all countries implement a specific policy uniformly? Is this a pre-requisite for a successful global regime? The answer seems to be that for some policies, common application is necessary for success, while for others, it is less critical. Thus, for example, emissions trading will not be successful across countries (and countries cannot even link their national systems) unless equally stringent compliance regimes, and full and robust monitoring and reporting programs are in place in both. Given the current detail and robustness available in national GHG inventories for Russia (which has yet to complete or submit a national GHG inventory), or China (which has only submitted a single inventory – in 2004, containing 1994 data), or Brazil, which has submitted an inventory containing 1990 and 1994 data), it seems none of these countries would currently be ready to participate in a full global trading system.

Conversely, a policy that would set agreed standards, or allow multiple countries to exchange information on best practice need not be constrained by such national differences. Thus, for example, a group of countries could all pass automobile efficiency standards (even with varying stringency) and exchange information on their effectiveness and jointly commit to make them more stringent over time.

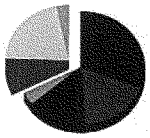
Figure 6. GHG Emissions by Sector in 2000. Data for CO2, CH4, N2O, PFCs, HFCs, SF6 from all sources including land use change & international bunkers

Brazil

Sector	MtCO2	%
Energy	321.1	14.4
Electricity & Heat	49.8	2.2
Manufacturing & Construction	92.6	4.2
Transportation	125.7	5.7
Other Fuel Combustion	44.6	2.0
Fugitive Emissions [1]	8.4	0.4
Industrial Processes [2]	32.6	1.5
Agriculture	446.0	20.1
Land-Use Change & Forestry	1,372.1	61.7
Waste	39.9	1.8
International Bunkers	11.3	0.5
Total	**2,223.0**	

China

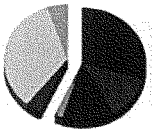
Sector	MtCO2	%
Energy	3,203.3	68.3
Electricity & Heat	1,465.9	31.2
Manufacturing & Construction	859.4	18.3
Transportation	219.4	4.7
Other Fuel Combustion	483.2	10.3
Fugitive Emissions [1]	175.4	3.7
Industrial Processes [2]	378.4	8.1
Agriculture	1,008.5	21.5
Land-Use Change & Forestry	-47.3	-1.0
Waste	135.9	2.9
International Bunkers	14.3	0.3
Total	**4,693.2**	



* Represents shares of total emissions excluding LUCF.

India

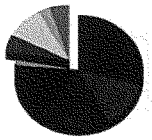
Sector	MtCO2	%
Energy	1,067.8	58.3
Electricity & Heat	558.4	30.5
Manufacturing & Construction	230.5	12.6
Transportation	92.0	5.0
Other Fuel Combustion	146.6	8.0
Fugitive Emissions [1]	40.4	2.2
Industrial Processes [2]	70.8	3.9
Agriculture	639.3	34.9
Land-Use Change & Forestry	-40.3	-2.2
Waste	87.7	4.8
International Bunkers	7.4	0.4
Total	**1,832.7**	



* Represents shares of total emissions excluding LUCF.

European Union (25)

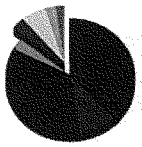
Sector	MtCO2	%
Energy	3,879.0	78.3
Electricity & Heat	1,464.3	29.6
Manufacturing & Construction	661.1	13.3
Transportation	889.8	18.0
Other Fuel Combustion	783.4	15.8
Fugitive Emissions [1]	80.4	1.6
Industrial Processes	229.9	4.6
Agriculture	477.0	9.6
Land-Use Change & Forestry	-20.9	-0.4
Waste	140.4	2.8
International Bunkers	249.6	5.0
Total	**4,955.1**	



* Represents shares of total emissions excluding LUCF.

United States of America

Sector	MtCO2	%
Energy	6,013.9	91.1
Electricity & Heat	2,684.5	40.7
Manufacturing & Construction	660.5	10.0
Transportation	1,719.9	26.1
Other Fuel Combustion	719.5	10.9
Fugitive Emissions [1]	229.5	3.5
Industrial Processes	210.9	3.2
Agriculture	444.1	6.7
Land-Use Change & Forestry	-402.8	-6.1
Waste	185.7	2.8
International Bunkers	146.4	2.2
Total	**6,598.1**	

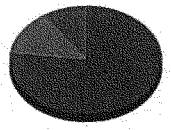


* Represents shares of total emissions excluding LUCF.

Figure 7. Total GHG emissions by gas in 2000 (includes land use change and international bunkers)

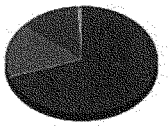
Brazil

Gas	MtCO2	%
CO2	1,720.1	77.0
CH4	298.5	13.4
N2O	207.7	9.3
PFC	3.9	0.2
HFC	1.6	0.1
SF6	1.1	0.0
Total	**2,232.8**	



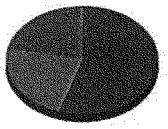
China

Gas	MtCO2	%
CO2	3,435.9	69.7
CH4	798.6	16.2
N2O	644.7	13.1
PFC	5.9	0.1
HFC	41.8	0.8
SF6	3.2	0.1
Total	**4,930.1**	



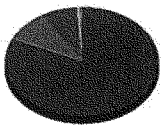
India

Gas	MtCO2	%
CO2	1,021.3	55.0
CH4	428.6	23.1
N2O	399.0	21.5
PFC	0.8	0.0
HFC	5.3	0.3
SF6	1.2	0.1
Total	**1,856.2**	



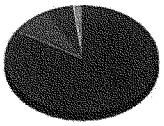
European Union (25)

Gas	MtCO2	%
CO2	4,073.5	82.0
CH4	448.5	9.0
N2O	387.6	7.8
PFC	14.1	0.3
HFC	39.6	0.8
SF6	7.4	0.1
Total	**4,970.7**	



United States of America

Gas	MtCO2	%
CO2	5,534.6	83.7
CH4	546.4	8.3
N2O	395.6	6.0
PFC	14.4	0.2
HFC	105.1	1.6
SF6	19.1	0.3
Total	**6,615.2**	



Finally, it should be noted that national emissions are only one representation of national circumstances. Other factors, such as national capacity, measured by national or per capita GDP, or ability to innovate and implement new technology may be relevant. Table 1 shows the national and per capita GDP of five of the largest emitting countries (with the European Union listed as a single entity). It is clear that even though total national Chinese and Indian emissions are high, on a per capita basis, they are quite low, and their ability to undertake major new investments is circumscribed by the overall poverty as well as institutional constraints in each country.

Table 1. GHG Emissions (2000) and GDP (2003): National and Per capita

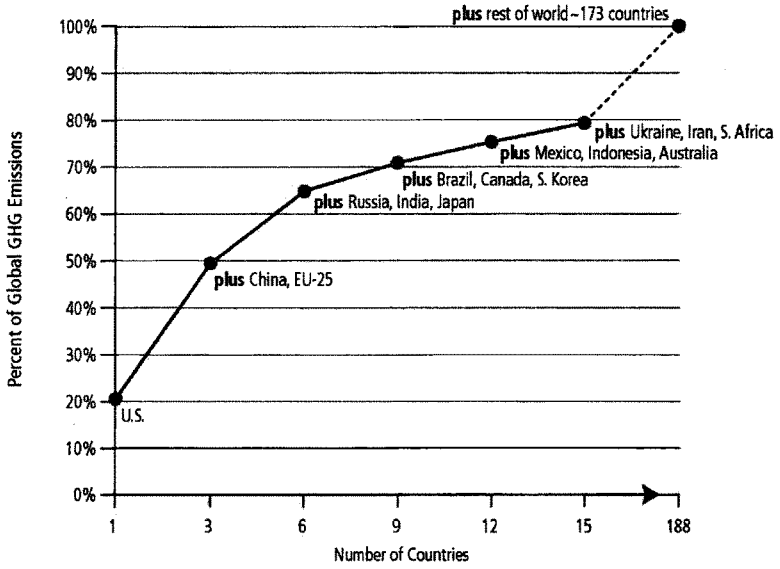
Country	MtCO2	Rank	% of World Total	Tons CO2 Per Person	Rank	Intl $ Per Person	Rank	Total, Mill. Intl $	Rank	% of World
United States of America	6,468.80	1	15.65%	22.9	14	35,373	2	10,286,830	2	21.10%
China	4,915.80	2	11.89%	3.9	122	4,966	88	6,398,317	3	6.00%
European Union (25)	4,721.10	3	11.42%	10.4	53	23,770	21	10,845,226	1	22.30%
Brazil	2,221.50	5	5.37%	12.8	38	7,306	59	1,325,290	10	13.10%
India	1,848.80	7	4.47%	1.8	163	2,731	108	2,907,332	5	2.70%

6. The largest 15 countries (including the EU as one) must be at the table.

Emissions from all countries, as seen in the table above, are not equal. However, if we are to be successful in combating the threat of climate change, we must get the largest emitters to take action. Figure 8 shows the largest emitters; collectively, the top 15 countries account for 80% of

global emissions. This does not mean that other countries might not be critical: the largest source of CO2 from deforestation is from Indonesia, and the second largest steel company in the world is based in Luxembourg – and neither rank in the top tier for total emissions. However, while for some policy solutions, other nations may be appropriately involved, for a large scale, satisfactory solution, at least the major emitters must all be engaged.

Figure 8: the Largest Emitters (6 gases, 2000 data)



It is clear that none of these major countries will act from coercion or under duress. We clearly see this when Russia, in the face of global objection, takes over private interests in its gas and oil sectors, and when Iran is prepared to defy global opinion to establish its nuclear arsenal. Policies to mitigate climate change are not likely to be different. They require a country to shift its national priorities and change fundamental development paths; this is only likely if a country is

convinced it is in its own interest. External support and negotiation of common goals to reduce competitiveness barriers and constraints will help smooth this path, but the basic decisions must be taken at the national level.

7. There are solutions

In developing solutions to climate issue, and taking account of the differing national circumstances and priorities described above, it is clear that no single policy will apply in all cases. A portfolio will ultimately be necessary. I suggest three options here: (1) emissions trading, (2) Sustainable Development Policies and Measures (SDPAMS), and (3) sectoral and technology based agreements.

Emissions trading

For developed nations – in this case, particularly including members of the OECD, an emissions trading system is likely to reduce collective emissions at least cost. A single negotiation need not be undertaken for national systems to link. Already, the European Union has developed a regime that allows 25 member states, with different targets and national circumstances to join forces in a common effort. US States (e.g., the NE State's Regional GHG Initiative, RGGI) are proposing to accept EU allowances for compliance with their regime.

To join such a system, the US must negotiate its own national trading program. We could then choose to accept the allowances of others, linking our systems formally, or we can allow the market, through various arbitrage mechanisms, to link them informally.

However, linking to other countries may be less straightforward. Absent a strong and robust system for assuring compliance, and for monitoring and reporting, it is not realistic to accept

emissions allowances from another country. For such countries, the option of accepting credits (through an emissions offset program) is possible. This would assure US companies of lower cost emissions reductions opportunities, while avoiding the problems of inadequate legal regimes.

It has frequently been argued that if the US were to establish its own emissions trading program, while other competitors (such as China or India) did not, we would be at a competitive and commercial disadvantage. In one sense, this is true: goods and services that were subject to the implicit GHG price in the US would cost more than those same goods produced in countries without such costs. However, a number of proposals have been made as to how to "level the playing field". One option is to rebate some of the proceeds from the trading system to offset the competitive disadvantage for exporters. Another is to allocate allowances in such a way as to reduce the liability. A third possibility is to work with specific affected sectors to undertake sectoral negotiations so that all companies in a given sector are meeting new and more climate friendly standards, avoiding the problem entirely. Finally, it is possible that the problem is significantly overblown: according to most economic analyses, the total cost of major US emissions reductions will be at most a few percent of GDP over the next 50 years or more. In effect, this means that US GDP would still more than double by 2050 – but in March of 2050 instead of in January 2050.

Sustainable Development Policies and Measures (SDPAMS)

For many developing countries, climate change is much lower on the list of priorities than are other major domestic problems: health, access to electricity, clean air and water, and a growing economy are all higher. The SDPAMs approach starts from the premise that while climate mitigation may never rise to the importance of these other policies, many of them can be implemented in a way that simultaneously reduces GHG emissions.

Several examples can help illustrate the point:

(1) Energy security and climate: meeting energy needs is a growing concern not only for the US, but also for China India and others. China is expected to import 75% of the oil it consumes by 2030. Any policy that reduces its demand may have enormous benefits. Thus, fuel efficiency standards, or efforts to switch from oil/diesel electric generation to renewable energy or nuclear power would be valuable. Each of these would also lead to a reduction in associated GHG emissions. China, acting on the basis of an energy security constraint, could also mitigate its climate footprint. Of course, not all security measures would necessarily be beneficial: if China increases its coal liquefaction program (particularly without concomitant CO2 sequestration), its emissions would rise precipitously, even though its energy security problems might be diminished.

(2) Clean air and climate: Another serious problem facing many cities in the developing world s increasing air pollution. As vehicle traffic increases and dirty industry and power generation grow, air quality declines, with related consequences for human health and welfare. Solutions to promote clean air – switching from coal to gas, increased automobile efficiency, improved mass transit, and process standards for industry can all improve the local pollution problem while simultaneously reducing the GHG footprint.

(3) Deforestation and climate. One of the major causes of deforestation is land clearing for agricultural purposes. However, land cleared from forests in much of the equatorial regions is relatively poor, and is often left fallow after only a few years of farming. Policies that improved existing agricultural land could both reduce the need for forest clearing as well as improve productivity for food and fiber supplies.

A successful SDPAMS approach will need to be country specific, and issue specific. It will need to build on the domestic priorities, and find synergies between development agendas and climate. This will require technical inputs on the US government side from agencies like DOE, EPA, DOC and AID, and on the private sector side from both multinationals and from SMEs. Congress will need to create systems to encourage such engagement – and push the State Department, DOC and USTR to open opportunities for trade relationships so that markets in such new technologies and systems can be easily developed and exported.

Developing countries too will support such an approach – but it must meet both their local development needs and business interests. China and India are already beginning down this path. For example, China has fuel economy standards that require all new cars and light trucks to achieve 21 to 43 mpg by 2008 (depending on class). This policy is projected to save 960 million barrels of oil and avoid 130 million tons of carbon emissions through 2030. India has a goal of using renewable energy for 10 percent of new power generation by 2010, and another goal to electrify18,000 rural villages by 2012 from non-conventional sources such as biomass, solar, wind, and small hydropower[4].

The US role in promoting SDPAMS is central. It will mean working to create fair trade agreements in new technologies, and will likely lead to increased competition for the manufacturers of such low cost technological solutions. Historically, US companies have done well in such markets; we need to develop the skills to do well in this new world of environmental technology too. However, this market will develop whether or not we participate. The issue for the US is whether we will play "catch-up" as we have done for many of the telecoms and

[4] WRI maintains a database of policies and measures being taken in key developing countries; see http://cait.wri.org/sdpams/search.php

automotive applications that were invented in the US but built elsewhere, or whether we will be market leaders, with the concomitant economic wealth creation that such leadership brings.

Sectoral and technology agreements

A final option for developing an international regime is around key sectors and technologies that are widely traded and where a relatively small group of companies are key manufacturers. An example in one sector (transport) and one technology (carbon capture and storage; CCS) help illustrate the value of this approach.

- Transport. According to the OICA, as of 2005, five multinational manufacturers produced more than half of all the world's vehicles. The EU capitalized on the small number of manufacturers to push through an agreement setting a target of 140 g/km (representing a 25% reduction over 1995 levels and corresponds to a fuel consumption figure of 6 liters per 100 km) to be met by any European, Japanese or Korean manufacturer selling cars into the EU market. Inasmuch as manufacturers have not been meeting the voluntary goals, the EU is now considering making them binding.

- CCS: Unlike most other technology approaches, CCS has no ancillary benefits. It is likely to reduce the efficiency of the electric generating unit to which it is applied, and increase operating costs. However, inasmuch as coal is the fuel of choice for many countries (representing about 70% of China's total energy supply, and nearly 60% or India), it is clearly critical that we find a technology solution to reduce the impact of its use. Agreements, such as the Carbon Sequestration Leadership Forum, are exploring opportunities to exchange information on the technologies for CCS. However, they will inevitably also require new funding sources and incentives – without which it is unlikely that these technologies will make it to market.

The Administration has been experimenting with sector and technology partnerships, albeit in a very modest way. The US Methane to Markets Program, the Carbon Sequestration Leadership Forum, and the International Partnership for a Hydrogen Economy, are all examples. To date, US efforts have been sadly under-funded. The International Energy Agency projects that global energy investment will total more than $20 trillion over the next 25 years. To date, the US investment in these new technology initiatives, designed to shift global energy infrastructure and investment, is much too small to make a difference. To be effective, it must be significantly ramped up – by a factor of ten or more. The $100 million announced by DOE to be spent over 4 years on hydrogen fuel cells, as well as the modest demonstration projects that are the extent of the CSLF effort to date will not ever allow this approach to reach its potential.

It is clear such sectoral and technology approaches can work. They already engage the key countries that must be at the table, and create pubic private partnerships that could be instrumental in making successful commercial markets in new technologies. Congress could increase their chances of success by authorizing additional resources to them, and by creating incentives for companies that work in these agreements to develop and disseminate the technologies they produce. Furthermore, Congress can provide a framework for technology investment so that the large scale private capital and investment community is more actively engaged. Financing for technology development on a scale needed will ultimately need to come from such resources; the role for the government is in creating the market framework to promote such new investment decisions.

8. We will need to adapt

Unfortunately, our best projections suggest we are not likely to be on a path that will keep our climate unchanged. This will require adapting to the changes we cannot avoid.

To a certain extent, the critical question for developing adaptation policy is one that the science can help answer: whether (in any given circumstance) climate change will be slow and incremental or fast and large scale. If the former, we can and must develop a resilience to change that will enable us, collectively, to cope. Thus, we can work so that we can manage a drought that occurs every 10 years instead of every 12, or a change in rainfall that leads to 10% less water, or an increase in the disease vectors for malaria, or the need to create corridors in addition to parks to protect diversity. In these cases, we need to do a bit more of what we are now doing: more careful husbandry of scarce resources, more medicines, and better planning.

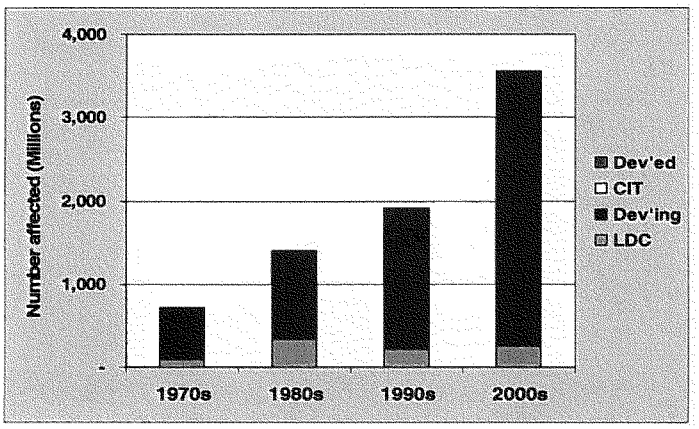
On the other hand, if climate really leads to a step change, an incremental adaptive strategy may be counterproductive. A potentially catastrophic example of this may be the city of Lima, Peru: if, as predicted, the glacier that waters the city is melted in 25 years, the city does not have an incremental option – small savings in water will be inadequate. Instead, they need to accept a major change: leave town, begin massive desalination operations, or commence large scale shipping of water into the city. Clearly, to cope, there will also be a need for massively increased efficiency, and perhaps in the near term, some shifting away from water intensive activities. But over the longer term, these changes will not suffice. The Lima scenario paints a picture less of resiliency than of paradigm change.

Decisions on how to spend adaptation money thus require a clear answer to the question: "What are we trying to adapt to?" Wasting money on incremental change that could be spent on

relocating populations must be avoided; conversely, if incremental shifts are adequate, huge society-wide programs would be equally foolish.

According to the World Bank, nearly 2 billion people in developing countries were affected by climate related disasters in the 1990s, and the rate may double this decade (see figure 9). People in developing countries are more than 20 times as likely to be affected by such disaster as those in the developed world.

Figure 9. Vulnerability to Climate Change



Source: World Bank, Ian Noble

One key part of any future international regime will therefore need to consider who will pay for the adaptation required. The sums involved are very large: estimates of climate related impacts range from $10 billion to more than $100 billion per year, and these are only likely to increase. Meeting these costs poses both a moral and a political dilemma. Most developing countries consider historical responsibility in determining who should pay for damages. Under this model

(using WRI data) the OECD countries along with the FSU are responsible for about 73% of the contribution to the rise in atmospheric GHG concentrations between 1850 and 2000. This same group of countries also has the capacity to pay: in 2003, OECD & FSU countries produced about 60% of the world total GDP.

However, the politics of such payments are much more difficult. Virtually all OECD countries have seen development assistance decline as a percentage of their GDP. Even including private charitable donations (usually forthcoming in times of massive disaster), we have demonstrated a limited willingness to pay for sustained, long term development priorities.

On the more positive side, there will be business opportunities in disaster preparedness and relief, in the development of technologies that reduce the consequences of climate change such as new drugs, new water savings technologies, and new crops. All of these will reduce the burden that governments must meet. However, Congress has a responsibility too: it should consider increasing support for USAID and the various development banks that many of the poorest nations will turn to when disaster strikes. And it should support global agreements, including agreements that include insurance coverage and liability, and financial assistance to alleviate the worst of the suffering that will likely be borne by the world's most vulnerable communities.

9. Negotiating a solution requires a portfolio approach

For many problems facing the international community, bilateral or simple multilateral agreements suffice to frame and implement solutions. Climate change, which affects the entire global population, and virtually every facet of human activity, may require a much more complex regime.

There are several possible fora for negotiating international agreements. Of these, the most widely used is the regular meeting held under the auspices of the UN Framework Convention on Climate Change. With representatives of about 190 parties (including the US), it provides an opportunity for countries to discuss options for actions on climate mitigation and adaptation.

That agreement, and its subsidiary Kyoto Protocol, have established some of the basic building blocks for a long term architecture. The UNFCCC itself established rules for reporting on GHG emissions (although many countries do not fully comply). The Kyoto protocol set up rules for a global cap-and-trade market. If the USA chooses to create its own independent market, it may still seek to use the Kyoto rules for accepted project based offsets.

In parallel, the US and others have set up a series of small, plurilateral systems for discussing (and possibly negotiating agreements). The US established groups to address methane, carbon capture and storage, and hydrogen, while Europe (through the Renewable Energy and Energy Efficiency Program, REEEP) has established a partnership to address these issues. At the same time, the G8 countries, led by the UK, has regularly included climate change on its agenda; Germany (currently the G8 president) and Japan (which holds the presidency in 2008) have committed to include the major developing countries in discussions under this agenda item.

Simultaneously, industry has been active: the International Aluminum Institute, a consortium of the major aluminum producers (including about 80% of global production) set – and is meeting – a target to reduce by 80% the perfluorocarbons in aluminum manufacture, and a 10% decrease in the energy used in smelting.

Work in each of these fora needs to be continued and strengthened. It is highly unlikely that any one regime will fully meet the demands of the complex and fragmented structure that a climate solution is likely to require. This will require US support in multiple arenas –from the formal negotiations under UN auspices to informal bilateral arrangements and business support networks.

Today, we are clearly missing strong US engagement. Historically, many of the most innovative solutions to international issues have come from US – including the very structure of the climate agreements themselves, as well as systems to promote technology innovation and global trade. If the world is to reach a successful conclusion to the climate change problem, it will only be if the US is actively involved, and shouldering its share of the burden.

There is money to be made from the solutions. Done right, climate policy can foster innovation and new markets for clean technologies. The United States, with its high levels of innovation, deep capital markets and world-class technology companies, is extremely well-placed to make the most of these markets. The ever-growing chorus of American companies calling for clear climate regulation (of which the USCAP is among the most recent) is clear evidence that they see a carbon-constrained world as one in which they can thrive. In the absence of such policies, new clean technology markets, from renewable energy to hybrid vehicles, will be led by our competitors.

If Congress can effect such a shift, it will indeed be a major contribution.

SUMMARY

Dr. Jonathan Pershing, Director, Climate Energy and pollution Program
World Resources Institute

Testimony submitted to the
US House of Representatives Subcommittee on Energy and Air Quality
Committee on Energy and Commerce
March 27, 2007

Thank you Mr. Chairman. I appreciate this opportunity to discuss my views and provide input to your deliberations related to international action on climate change. In my testimony, I make several points:

(1) The science is real – and it is seen as real in all countries.

(2) We cannot afford to wait to act.

(3) The scale of the problem is enormous; it requires that we reduce our long term, global emissions by 60 to 80%.

(4) No single policy or action in any single sector will be adequate to solve the climate problem. It will require efforts in all sectors, all gases, with multiple policy instruments.

(5) Not all countries are the same. We cannot and should not expect any future international arrangement to set the same requirements for every country.

(6) Some countries clearly matter more than others for climate mitigation: the largest 15 countries, responsible for about 80% of global emissions must be at the table. But we cannot coerce them to participate; we need solutions that speak to each country's self-interest and desire for long term sustainable growth.

(7) Fortunately, there are solutions:

- A price on greenhouse gas emissions
- Capturing the co-benefits of climate solutions – for energy security, local air quality and community.
- Develop and adopt new technologies – which could be a new US market opportunity

(8) Part of the global effort will need to be devoted to adaptation – and it will be the poorest and least able to cope who will be most significantly affected.

(9) We will need to use all available fora for international negotiations, including the UN Climate Convention, existing and new bilateral and multilateral arrangements, and private sector engagement.

Testimony of

Annie Petsonk, International Counsel, Environmental Defense

before the

Subcommittee on Energy and Air Quality

Committee on Energy and Commerce, U.S. House of Representatives

2322 Rayburn House Office Building

March 27, 2007

"Climate Change – International Issues, Engaging Developing Countries"

Good morning Mr. Chairman and distinguished members of the Subcommittee on Energy and Air Quality of the House Energy and Commerce Committee.

Thank you, Chairman Boucher, for your invitation to provide the views of Environmental Defense on "Climate Change – International Issues, Engaging Developing Countries."

My name is Carol Annette (Annie) Petsonk, and I am international counsel at Environmental Defense. Environmental Defense is a leading national nonprofit organization representing more than 500,000 members. Since 1967, we have linked science, economics and law to create innovative, equitable and cost-

effective solutions to society's most urgent environmental problems. Environmental Defense is dedicated to protecting the environmental rights of all people, including future generations. Among these rights are clean air, clean water, healthy food and flourishing ecosystems. We are guided by scientific evaluation of environmental problems, and the solutions we advocate will be based on science, even when it leads in unfamiliar directions.

Engaging Developing Countries. . .

Thank you for asking for our views on the extent to which Environmental Defense perceives developing countries as taking, or considering taking, steps to reduce their greenhouse gas (GHG) emissions, and the effect of U.S. and other developed countries' actions on such considerations.

Engaging developing countries in cutting their total greenhouse gas (GHG) emissions is essential if the world is to curb climate change. The United States is the world's largest current and historical GHG emitter. Fast-growing developing countries, however, will soon emit more than we do. Global warming can't be solved unless both the U.S. and large developing countries cut total GHG emissions. The steps Congress takes will be crucial.

A number of large-emitting developing countries have taken, or are considering, steps to slow the increase in their GHG emissions:

- The world's second-largest emitter, China, has adopted more stringent fuel economy standards for passenger cars than has the

United States. China has also adopted a renewable energy goal, and committed significant funding for renewable energy.

- The world's fourth largest emitter, Brazil, has converted most of its passenger car fleet to sugar-cane ethanol. And it has reduced deforestation over 50% in the last two years, in part through conservation measures and environmental law enforcement. That's important: 70% of Brazil's emissions come from deforestation in the Amazon.

But most developing countries are reluctant to take further climate protection steps unless and until the United States does. And most are certainly not likely to take more stringent or faster steps than the U.S. does.

Consequently, if the world is to reduce total GHGs, Congress must lead with workable, enforceable, sufficiently stringent steps that engage developing countries to join us – quickly - in stabilizing the climate at safe levels. Congress must also take tough, shrewd steps to ensure that if developing nations fail to engage, neither America's environment nor her competitiveness will be jeopardized.

. . . Engaging Developing Countries Through the Carbon Market

Developing U.S. cap-and-trade legislation affords Congress three crucial opportunities to use the power of the carbon market to meet these challenges:

1. Lead By Example

When Congress enacts a climate bill, the rest of the world will be watching closely. In effect, when Congress acts, America will lead by example. Such leadership is urgently needed. The international climate treaty talks have stalled because of the unwillingness of the Executive Branch to engage. Time is running out. America's trading partners are recognizing that the only way the United States will act to cut emissions in the narrow time window for averting dangerous climate change, is if the Congress acts. Sensible Congressional action could yield great benefits for America's environment and economy, and provide a template for the world.

As Congress moves to cap and cut America's GHG emissions, there are a number of steps Congress can take that can have a significant positive effect on developing countries' consideration of, and implementation of, steps to reduce their own emissions. Taking these in coordination with other developed countries will increase their effectiveness. But Congress should not wait for other nations to act. Instead, by taking the lead, Congress can show all nations how to break the climate logjam and correct the mis-steps that led to the logjam in the first place.

If Congress creates a clear, enforceable U.S. carbon market that taps American innovation in favor of stabilizing the climate at safe levels, it will set the bar for other nations' actions. If instead Congress litters the program with "intensity targets" that don't cut total emissions, and with "safety valves" that are

really escape hatches, it will simply tempt America's trade competitors to put the same or bigger loopholes into their programs – and drive global emissions higher.

a. On cap design, Congress should lead by example. The most important step for Congress is to cap and cut U.S. total GHG emissions in the range recommended by the U.S. Climate Action Partnership (US-CAP), with broad flexibility for firms to choose how to meet their targets, and vigorous enforcement if they don't. That's the kind of emissions trading market that allows American firms to play to their strengths – their capacity to innovate, to compete on a level playing field, and to profit by finding better, cheaper, faster ways to cut emissions. That's the kind of program that would give the United States the credibility to demand comparable action by our trading partners. In fact, by enacting this kind of framework in 2007-2008, Congress could leverage it into becoming the new template for the international climate treaty talks in 2009-10.

Timing is important. International carbon markets offer great potential for innovative U.S. companies to sell low-emitting technologies and processes. Congress should move swiftly to enact cap-and-trade, in order to open opportunities for U.S. firms in global carbon markets, and to avoid having U.S. firms miss out on carbon market participation. If Congress enacts cap-and-trade legislation in 2007-2008, the federal agencies could finish the implementing regulations in time for our market to link smoothly to the post-2012 international

market. Delaying enactment beyond the 110th Congress, however, could delay our market's launch beyond 2013, potentially disrupting the international carbon markets and depriving U.S. firms of important carbon market opportunities.

More importantly, if Congress enacts this kind of framework and developing nations do follow suit with similar caps on their total GHG emissions, it should be possible to limit the total amount of warming from pre-industrial levels through to atmospheric stabilization, to roughly 2.0° Centigrade - below what many regard as dangerous warming (see Figs. 1-5).

b. But if the U.S. adopts intensity targets, so will developing countries – and total emissions will increase. If instead of capping America's total emissions, Congress adopts "intensity" targets (limiting U.S. GHG emissions per unit of economic output), that approach would not allow the U.S. to link up to international carbon markets built on the cap-and-trade design template. More importantly, however, intensity targets would set an environmentally bad precedent for developing countries. Even if fast-growing developing countries adopted as-stringent targets (which is unlikely), their rapid economic growth, coupled with their intensity targets, would mean that their emissions would be allowed to rise rapidly, swamping our emissions and foreclosing safe climate levels (see Fig. 6). It's more likely that if Congress adopted intensity targets, at least some of our trade competitors would adopt even softer intensity targets, allowing even more rapid emissions increases.

To lead by example, Congress should enact caps on total emissions, not intensity targets.

c. If the U.S. adopts price-based "safety valves," developing countries will use those as an escape hatch too. If Congress enacts a cap and trade program with a cap on total tons of GHG emissions, that program could dovetail well with existing and emerging international carbon markets, and provide a model for developing nations to cap their total emissions too. Suppose, however, Congress adopts price controls (which some have dubbed a kind of "safety valve"), such that if the price of carbon in our market rises above a certain number of dollars per ton, then government prints more allowances for sale to those industries at the controlled price.

Some of America's trading partners might consider this to be an actionable subsidy under the World Trade Organization (WTO). Others, particularly industrialized countries with national cap-and-trade programs, would decide that because the "price cap" busts our emissions cap, it precludes having the U.S. link to other cap-and-trade markets.

But more fundamentally, what kind of leadership-by-example would this escape hatch show to developing nations? Some would be tempted to adopt their own escape hatch, patterned on ours. They might set their prices at our levels, or they might cap prices at significantly lower levels commensurate with their lower levels of economic development. American low-carbon technologies and high-efficiency products might not be able to compete at price-capped levels in these

nations. A downward cascade of protectionist price caps would lead to a race to the bottom, freezing American ingenuity out of other nations' markets and sacrificing effective limits on the emissions of all the countries that deploy this kind of escape hatch.

To lead by example, Congress should recognize that the real danger is not that the costs of abatement will be too high – every serious study, and a now-substantial body of experience with the U.S. Acid Rain Trading Program, teaches that the costs always turn out to be lower than estimated. The real danger is that price caps will simply give developing countries a new and additional economic advantage to use against industrialized countries with emissions caps. To guard against this danger, Congress should refrain from enacting carbon market price controls.

2. Create incentives for developing countries to reduce emissions broadly.

In establishing the U.S. cap-and-trade market, Congress can create incentives for developing countries to reduce emissions broadly, rather than engaging them only on scattershot projects. A good place to start would be with tropical forest nations.

Tropical forest destruction emits as much CO_2 as the whole United States (see Fig. 7). Tropical forest nations are among the world's top emitters. According to WRI/CAIT, the third and fourth largest emitters in the world are Indonesia (#3) and Brazil (#4), and more than 70% of their GHG emissions come

from deforestation (see Fig. 8). In some countries, forest protection initiatives are underway but need help.

Well-designed carbon markets should offer incentives to reduce tropical deforestation. Kyoto offers none.

With Brazilian NGO partners, Environmental Defense has pioneered a proposal called Compensated Reduction, in which any tropical forest nation that reduces its national deforestation emissions below a historical baseline would be eligible for compensation via carbon markets (see Fig. 13). Were Congress to open the U.S. carbon market to credits earned by developing countries that reduce deforestation nation-wide, Congress could strengthen those nations' climate and biodiversity protection efforts and create a model for engaging developing countries broadly.

We believe Congress should include Compensated Reduction of tropical deforestation in U.S. cap and trade legislation. Congress should also direct the Executive Branch, working with tropical forest nations and other nations, to assist developing countries in establishing the infrastructure and institutions needed to measure, monitor, and transparently track emissions from deforestation; to implement and enforce forest conservation measures; and to ensure that market-based compensation redounds to the benefit of local forest communities.

3. Include carrots and sticks as design elements in the carbon market.

Congress can design the U.S. carbon market to provide carrots and sticks that encourage other countries – even recalcitrant ones - to join our efforts. Our carbon market is likely to be the largest in the world. Other nations will want access to our market – for carbon finance, and to sell us credits. Those nations' interest in gaining access to our carbon market gives Congress leverage, just as in any other market access negotiation. Below we describe some "carrot and stick" options for Congress to consider, among the many potential options that could be envisioned.

a. Congress could offer emission "premiums" for countries that sign up to emissions caps early. Congress can offer carbon market access on more generous terms to nations that sign up early for emission caps. Consistent with the objective of stabilizing the climate at safe levels, Congress could offer such countries the opportunity to choose different base years for their cap-and-trade, or the opportunity to adopt a cap-and-trade with more lenient targets, for example.

b. Congress should levy mandatory "multipliers" on emission credits generated in uncapped countries. If nations that haven't yet capped emissions want to sell us credits, Congress can impose conditions on those sales until they

do. This approach would enable Congress to overcome a problem sown into the international carbon market framework over a decade ago.

In 1995, nations adopted the Berlin Mandate, which provided that the emissions limitation commitments to be adopted by industrialized nations at Kyoto two years later would not result in any new commitments for developing nations. As Kyoto's market-based framework began to take shape, however, some developing nations wished to experiment with emissions trading, without capping their emissions. Consequently, under Kyoto, developing nations – which have no emission caps – can earn emission credits from individual projects that reduce emissions below what would have otherwise occurred. They can then sell these credits to industrialized nations with emissions caps, which can use the credits to offset emissions increases in the capped nations.

This mechanism, in principle, allows industrialized countries to reduce the costs of meeting emission caps, by harvesting cheaper emission reduction opportunities in the developing world. But in practice, letting uncapped countries sell credits from projects that cut emissions below business-as-usual does not reduce global emissions. It simply shifts emissions from developing to industrialized countries (see Figs. 9-10).

As noted above, global emissions must begin to decline very soon in order to stabilize the climate at safe levels (see Figs. 1-5). The inexorable conclusion is that it simply will not be possible to stabilize global emissions at those safe levels if developing countries' only role is to undertake scattershot projects whose

credits, earned for cutting emissions below business-as-usual, are then transferred to industrialized nations for use in offsetting the latter's emission increases.[1]

To rectify the environmental problem, and to strengthen incentives for developing nations to reduce their emissions nation-wide, Congress should not only require that such credits meet the traditional tests of baseline, additionality, verification, permanence, and leakage. Congress should, furthermore, apply a mandatory "multiplier" to project-based carbon credits from uncapped nations. Under the multiplier approach, Congress would prohibit U.S. emitters from using such project-based credits on a 1:1 basis to meet their compliance obligations. Congress would instead require U.S. emitters to tender such credits on a 1.1:1, or 1.5:1, or even 2:1 basis for compliance with their domestic emissions caps. Congress should then mandate that the additional tons of credits generated by the multiplier be permanently retired from the system, and not made available for any emitter's compliance purposes (See Figs. 11-12). That would ensure that such projects deliver globally real reductions.

The multiplier approach is superior to the approach of placing quantitative restrictions on the amount of these reductions that can be used for compliance (as the European Union has done). The quantitative restriction approach discourages investors from investing in emission reduction projects beyond the

[1] "Even if emissions from developed regions ... could be reduced to zero in 2050, the rest of the world would still need to cut emissions by 40% from BAU to stabilise at 550 ppm CO2e. For 450 ppm CO2e, this rises to almost 80%." Stern Review, Chapter 8.

quantitative limit. The multiplier approach, by contrast, encourages investors to search for emission reduction opportunities economy-wide in uncapped nations, while ensuring that the trading of those reductions yields global environmental benefits. The multiplier approach also delivers a continuous incentive for uncapped nations to consider taking caps in order to gain full access to America's carbon market. It should be noted that implementing the multiplier approach would require coordination with other industrialized nations, who would need to adopt similar multipliers in order to ensure that the goal of the U.S. program could not readily be evaded.

c. Congress should instruct the Executive Branch to negotiate carbon market access agreements with other countries. The fundamental challenge of climate policy is to induce the world's major emitting sovereign nations to cap and cut their carbon emissions fast enough to meet the objective, ratified by the United States in 1992 with the unanimous consent of the U.S. Senate, of stabilization of atmospheric concentrations of greenhouse gases at a level, and in a timeframe, so as to avert dangerous anthropogenic interference in the climate system. The time window is narrowing. Failure to start global emission cuts in the next decade could foreclose that objective – permanently.

As noted above, the 1995 Berlin Mandate did not deliver strong incentives for engaging developing countries – in fact, it had the opposite effect. Congress can and should create an entirely different negotiating dynamic, leveraging the

power of access to what will likely be the world's largest carbon finance market, to encourage high-emitting developing countries to cap and cut their emissions. Thus, by building directly into the design of the U.S. cap and trade system powerful incentives to encourage the early and robust participation of all other major emitting nations in capping and cutting GHG emissions, and by directing the Executive Branch to negotiate carbon market access agreements on America's terms, Congress can create a new framework that cracks the competitiveness conundrum and shows the nations of the world a path forward to successful climate policy.

To accomplish these goals, Congress should create a new framework that is designed to increase, significantly, the Executive Branch's consultation with Congress, its consultation with affected stakeholders, its ability to move swiftly, and its negotiating leverage with other nations, on a matter in which both consultation and timing are of enormous importance to Congress.

As a first step in creating that framework, Congress, exercising its constitutional power to regulate commerce with foreign nations, should instruct the Executive Branch to negotiate carbon market access agreements with other nations, under which, by dates certain, those nations will cap their national GHG emissions and establish mutually compatible cap and trade systems.

As a second step in this new framework, Congress should establish negotiating objectives for these carbon market access agreements, namely that other nations should agree to:

- cap or otherwise substantially reduce[2] their total emissions (no intensity targets);
- refrain from adopting cap-busting safety valves that act as escape hatches;
- apply mandatory multipliers to emission credits from uncapped nations;
- coordinate on measurement, reporting, registration, tracking, and accountability for GHG emissions;
- refrain from discriminating against bona fide emission reductions earned in the United States – including in our agriculture and forest sectors; and
- keep under ongoing review their – and our - progress in actually achieving the emission reductions set forth in the agreements, including restrictions on emissions trading if national commitments are not being met.

Such a framework would enable Congress to authorize new emissions trading partners to "dock in" to our emissions trading program. It would invite America's trading partners to include, in any post-2012 climate agreement they might adopt, a reciprocal provision allowing the U.S. to "dock in" to the international post-2012 carbon market.[3] And it would allow Congress and the American public to keep

[2] For tropical forest nations whose principal source of emissions is deforestation, agreements to implement Compensated Reduction would be eligible to meet these criteria.

[3] Under the current Kyoto Protocol, only Parties may participate in the carbon market, because only Parties have Kyoto-cognizable carbon allowances to trade. If the 110th Congress enacted strong cap and trade legislation for the United States, but the Executive Branch did not participate in the climate treaty talks in 2007-2009, it is possible that a new post-Kyoto agreement would be adopted without significant participation of the United States. By signaling to the international community through domestic legislation, however, that Congress wishes the United States to participate in the international carbon market, Congress could encourage the climate treaty Parties to adopt a reciprocal docking-in provision in the new agreement authorizing carbon market transactions with non-Parties (i.e., the United States) provided that the non-Parties had adopted comparable carbon caps and a comparable trading program. For precedent, see the Convention on International Trade in Endangered Species of Fauna and Flora (CITES), which

under continuing transparent review the GHG emission reduction performance of the United States and other nations.

The absence of such a framework for coordinating climate change policy between Congress and the Executive Branch has resulted in nearly two decades of poor communication between the branches, with the American people, and with our trading partners; and dangerously slow progress in the international arena. A new framework is essential.

d. Learn from Europe's experience. A U.S. cap and trade market is likely to be more effective if it links to cap and trade markets in other nations, provided that each can maintain integrity. The European Union's cap and trade market for carbon dioxide, while imperfect, is already delivering emission reductions beyond what scholars estimate would have occurred in the market's absence.[4] With the EU's announcement of its target through 2020, trading in vintage 2008-2009 allowances remains strong, and the first trades in carbon futures beyond 2012 have already taken place – another sign that the markets are ahead of the law-makers. (See Fig. 14) While a detailed discussion of the EU's system is beyond

---

provides, in its Article X: "Trade with States not Party to the Convention. Where export or re-export is to, or import is from, a State not a Party to the present Convention, comparable documentation issued by the competent authorities in that State which substantially conforms with the requirements of the present Convention for permits and certificates may be accepted in lieu thereof by any Party."

[4] See "Over-Allocation or Abatement? A Preliminary Analysis of the EU ETS Based on the 2005 Emissions Data," Denny Ellerman and Barbara Buchner, NOTA DI LAVORO 139.2006 (November 2006), CCMP – Climate Change Modeling and Policy Program of the Massachusetts Institute of Technology and the Fondazione Eni Enrico Mattei (FEEM), see: http://www.feem.it/Feem/Pub/Publications/WPapers/WP2006-116.htm#summary

the scope of this testimony, a quick sketch of its strengths and weaknesses, together with recommended policy changes, can provide guidance to Congress.

European Union Emissions Trading Scheme (EU-ETS): Strengths and Weaknesses			
EU-ETS	Strengths	Weaknesses	Lessons for US System
Time horizon	Three-year pilot phase (2005-2007) provided firms with experience in cap-and-trade	Pilot phase too short to stimulate major capital investment decisions.	Predictable, long time horizon is essential to spur environmental investment and provide economic stability
Cap on total emissions	Cap is on total emissions, not "intensity"	Pilot phase cap too lenient; when its true lenience was made known, carbon market prices crashed	Cap should be placed on total emissions, not "intensity"
Coverage	50% of economy covered	No clear plan for transportation sector; plans to include EU aviation emission	Congress should enact caps with wider coverage. Transportation and aviation sectors need to be addressed.
Level of Initial Cap	Modest initial cap was intended to "make compliance easy"	EU established initial caps based on emitters' projected emissions; emitters greatly overestimated projected emissions	Caps should be derived based on historical emissions, not future projections
Transparent Reporting		EU reporting system needs to be made electronic	Require annual emission reports
Interface with electricity framework	Ambitious caps can stimulate cleaner fuels	Poor interface with electricity sector pricing regulation allowed some windfall	Improve interface to promote innovation up and down value chain
Domestic offsets		Initially not included; some nations moving to include	Launch with framework for robust offsets
Trading with uncapped nations		10% limit on reduces ambit for low-carbon investment in those nations, without guaranteeing actual environmental benefit; no serious engagement of developing nations	Use market access to drive participation: --Tropical forest nations --Premiums for nations that cap early --Restrict trading with uncapped countries --Consider AEP-IBEW trade-climate link

e. Ensure that America's environmental protection efforts are not undermined by other nations' inaction. At bottom, it is the responsibility of Congress to direct the Executive Branch to administer strong medicine in the event that developing countries do not follow our lead.

In the "strong medicine" category, one proposal that has been put forward is that if after substantial bilateral and regional outreach toward conclusion of carbon market access agreements, high-emitting countries fail to cap or substantially cut their emissions by a specified date, then any high carbon-intensity products that they wish to export to the United States must be accompanied by emissions allowances to cover the emissions incurred during the products' manufacture. Such a provision is admittedly powerful. But something in this category of power will be essential to protect America's environment against the possibility that high-emitting developing nations might continue to produce products without climate safeguards. It will also be essential to ensure that other nations' failure to participate in emissions cuts doesn't simply result in the off-shoring of our emissions.

A version of the "allowances-for-trade" proposal has been put forward by the CEOs of American Electric Power (AEP) and the International Brotherhood of Electrical Workers (IBEW). Environmental Defense believes this concept merits close study and a careful and thoughtful determination about how best to place it, or something of comparable strength, in U.S. legislation.

A Post-Script on Timing

Once the U.S. caps emissions, every day of delay in engaging developing countries means more GHG-intensive infrastructure going in to fast-growing economies. There are two timetables: the atmospheric timetable, and the carbon market timetable.

The atmospheric timetable is clear. The goal is averting dangerous climate change. Every delay increases the risk that U.S. and/or developing country inaction will foreclose opportunities for averting dangerous climate change.

The carbon market timetable is also clear. Congress must get the U.S. carbon market up and running fast enough to ensure that there are good opportunities for U.S. firms to compete in the international carbon market. The existing international carbon market runs out in 2012. The rules and the players for the post-2012 international carbon market are under discussion now. Even with its flaws and uncertainties, the international carbon market is driving investment around the world into low-emitting technologies and processes. Any disruption of that market risks adding, needlessly, to the atmospheric burden of GHG emissions, and depriving American firms of the opportunity to participate in that market.

Working back from the goal of opening the U.S. carbon market by January 1, 2013, and given time for the federal agencies to develop any needed implementing regulations, the 110th Congress should make every effort to enact cap-and-trade legislation by 2008. Stated differently, failure to enact cap-and-trade legislation in the 110th, and to finish the regulations in time to open the U.S. carbon market by, at latest, January 1, 2013, could needlessly disrupt the global carbon market and cost American firms important low-carbon investment opportunities around the world.

Enactment by the 110th Congress will send the signal to other nations in the international climate treaty talks that they should, by 2009-2010, reach agreement on extending the global carbon market beyond 2012, working from the design template established by the Congress. It will encourage those nations to include in their post-2012 framework a "linking" provision allowing our market to "dock in" to the international market, thereby opening up enormous opportunities to bring American ingenuity, American technology, and American expertise to bear on the GHG emissions challenge world-wide. Enactment by the 110th will also send a powerful signal to high-emitting developing nations that America is going ahead with cap-and-trade, and will look to them to follow suit swiftly, strengthening our leverage in the negotiations that Congress instructs the Executive Branch to undertake. Here is a timetable:

Timetable: U.S. Climate Policy and the International Carbon Market	
2007-2008	The 110th Congress enacts legislation capping America's GHG emissions, establishing our emissions trading market, opening that market to developing nations, including tropical forest nations, that reduce national emissions from a historical baseline; requiring any project-based reductions from uncapped nations to be tendered into that market for compliance at a multiplier of greater-than 1:1; and directing the Executive Branch to launch bilateral/multilateral negotiations with high-emitting developing nations.
2009	Executive agencies begin drafting implementing regulations. Executive Branch, in close consultation with Congress, launches negotiations with developing nations, including in international climate treaty talks. International climate treaty talks adopt a new agreement establishing post-2012 carbon market, with a "docking-in" provision so that if the U.S. wishes, it can dock in on an expedited basis with a view to making use of early actions. Tropical forest nations, with assistance from private capital markets, begin investing in rainforest protection, on a credit-for-early-action basis.
2010-2012	Executive Branch finalizes cap-and-trade regulations; pursuant to instructions from Congress. Working closely with Congress, Executive Branch concludes negotiations to allow developing countries that cap and cut emissions to "dock in" to our carbon market.
January 1, 2013	U.S. cap-and-trade market opens, linked via "docking in" provisions" to international markets.

Mr. Chairman, the framework and timetable we have presented are ambitious. We believe the climate challenge demands ambition. We hope that these concepts will be of assistance to you and all the Committee members as you together begin your close consideration of the Congressional role in engaging developing countries to join with America in meeting the climate challenge. We thank you and all the Committee members for your hard work. We would be happy to answer any questions.

ENVIRONMENTAL DEFENSE

FIGURE 5

Potential coastline retreat as a result of ice sheets melting Florida

The shoreline of Florida today

★ **Miami**

Florida in the event of a Greenland ice sheet melting

Florida in the event of both the Greenland and West Antarctica ice sheets melting

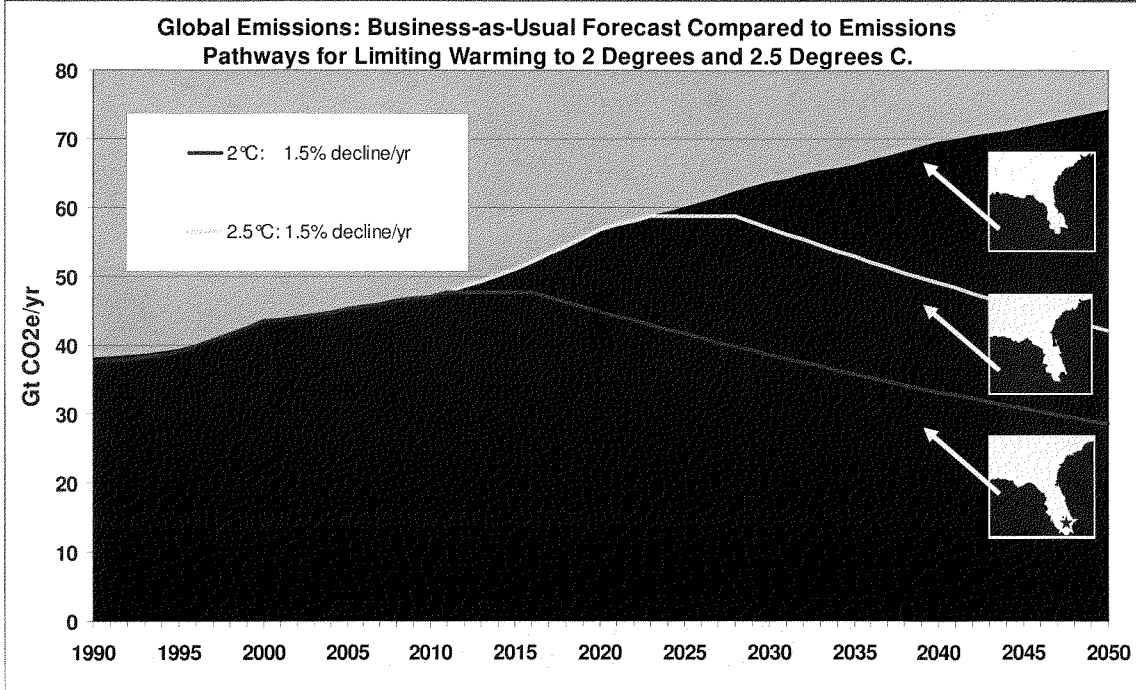
Courtesy of Byron R. Parizek, Ph.D., Pennsylvania State University

Table 2.1 Proposed numerical values of 'Dangerous Anthropogenic Interference'.

Vulnerability	Global Mean Limit	References
Shutdown of thermohaline circulation	3°C in 100 yr 700 ppm CO_2	O'Neill and Oppenheimer (2002) [44] Keller et al. (2004) [28]
Disintegration of West Antarctic Ice Sheet (WAIS)	2°C, 450 ppm CO_2 2–4°C, <550 ppm CO_2	O'Neill and Oppenheimer (2002) [44] Oppenheimer and Alley (2004, 2005) [45, 46]
Disintegration of Greenland ice sheet	1°C	Hansen (2004) [17]
Widespread bleaching of coral reefs	>1°C	Smith et al. (2001) [67] O'Neill and Oppenheimer (2002) [44]
Broad ecosystem impacts with limited adaptive capacity (many examples)	1–2°C	Leemans and Eickhout (2004) [30], Hare (2003) [19], Smith et al. (2001) [67]
Large increase of persons-at-risk of water shortage in vulnerable regions	450–650 ppm	Parry et al. (2001) [49]
Increasingly adverse impacts, most economic sectors	>3–4°C	Hitz and Smith (2004) [22]

Source: Oppenheimer and Petsonk, 2005 [47].

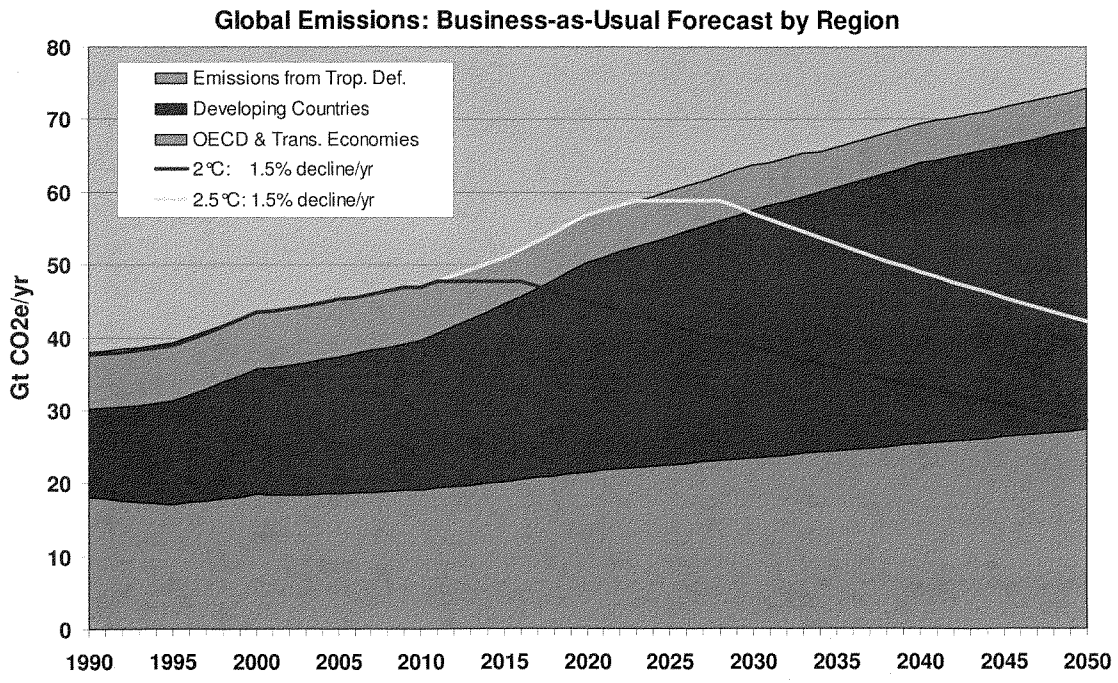
ENVIRONMENTAL DEFENSE



Testimony of Annie Petsonk, Environmental Defense

Figure 3

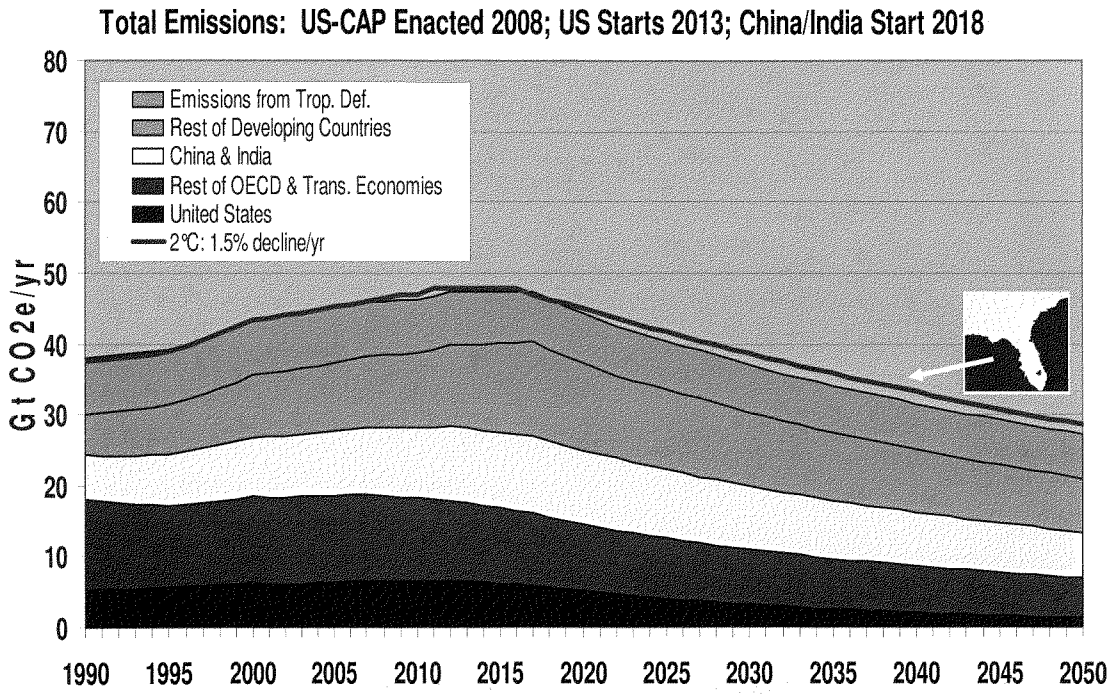
ENVIRONMENTAL DEFENSE



Testimony of Annie Petsonk, Environmental Defense

Figure 4

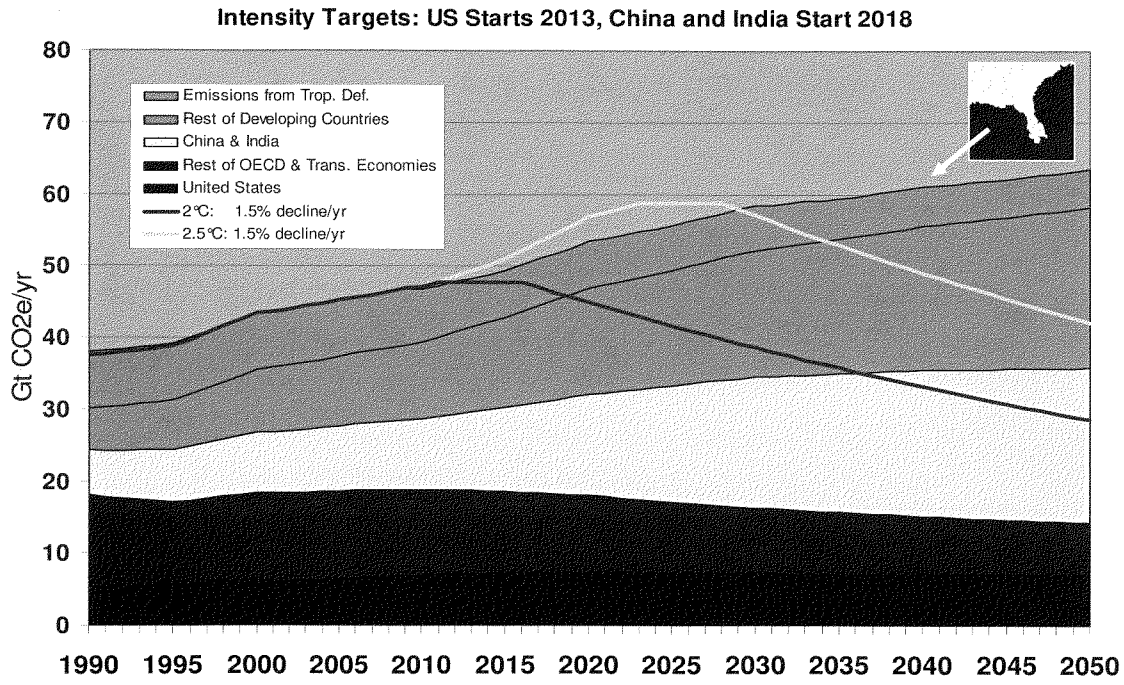
ENVIRONMENTAL DEFENSE



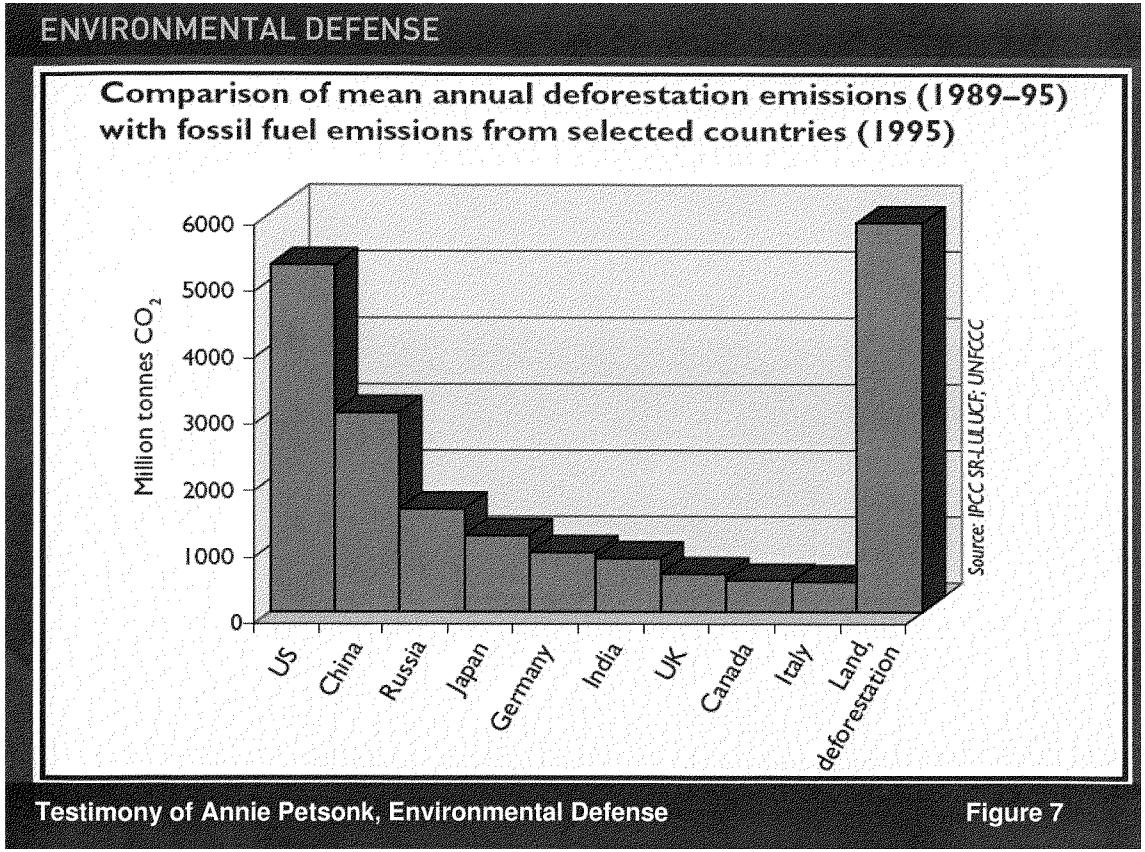
Testimony of Annie Petsonk, Environmental Defense

Figure 5

ENVIRONMENTAL DEFENSE



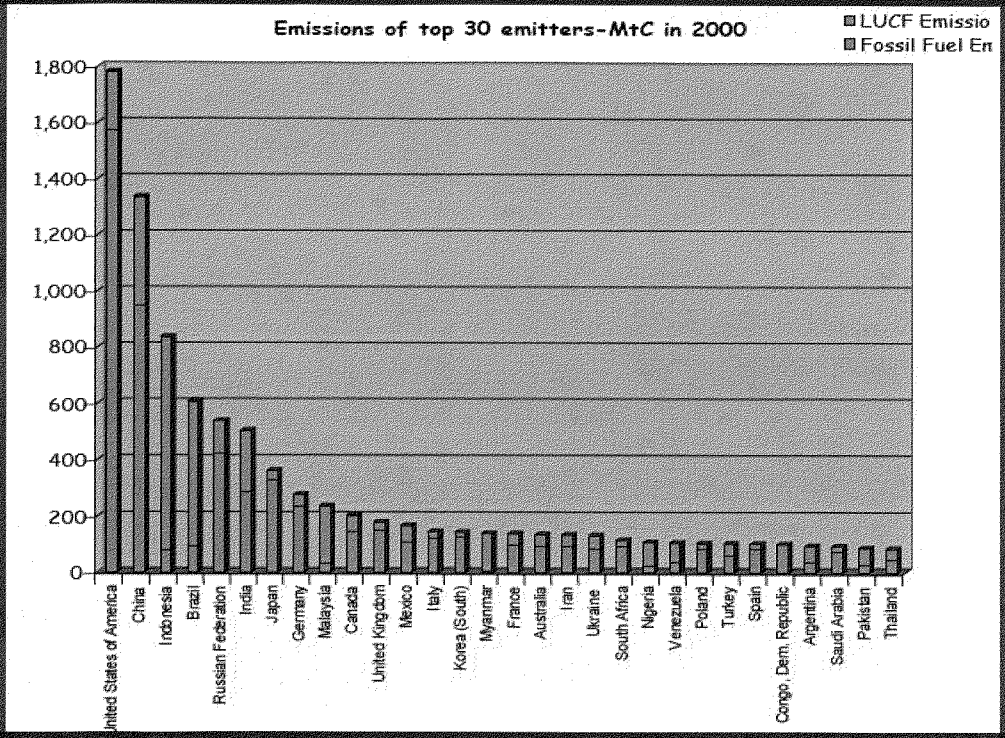
Testimony of Annie Petsonk, Environmental Defense Figure 6



Testimony of Annie Petsonk, Environmental Defense

Figure 7

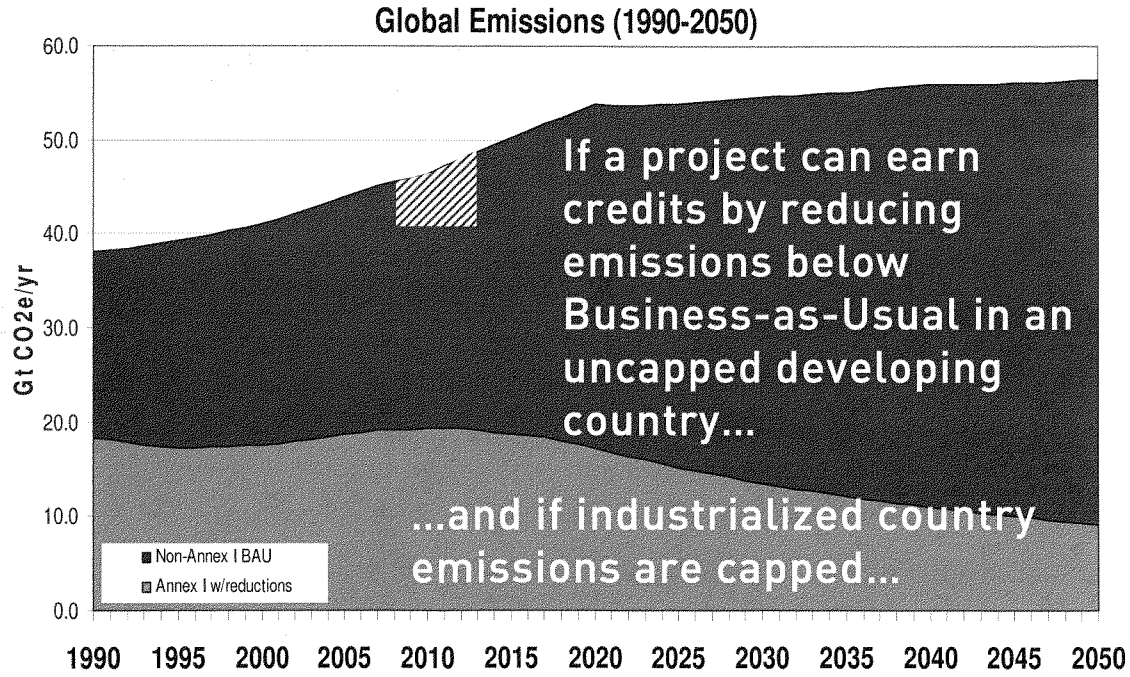
ENVIRONMENTAL DEFENSE



Testimony of Annie Petsonk, Environmental Defense

Figure 8

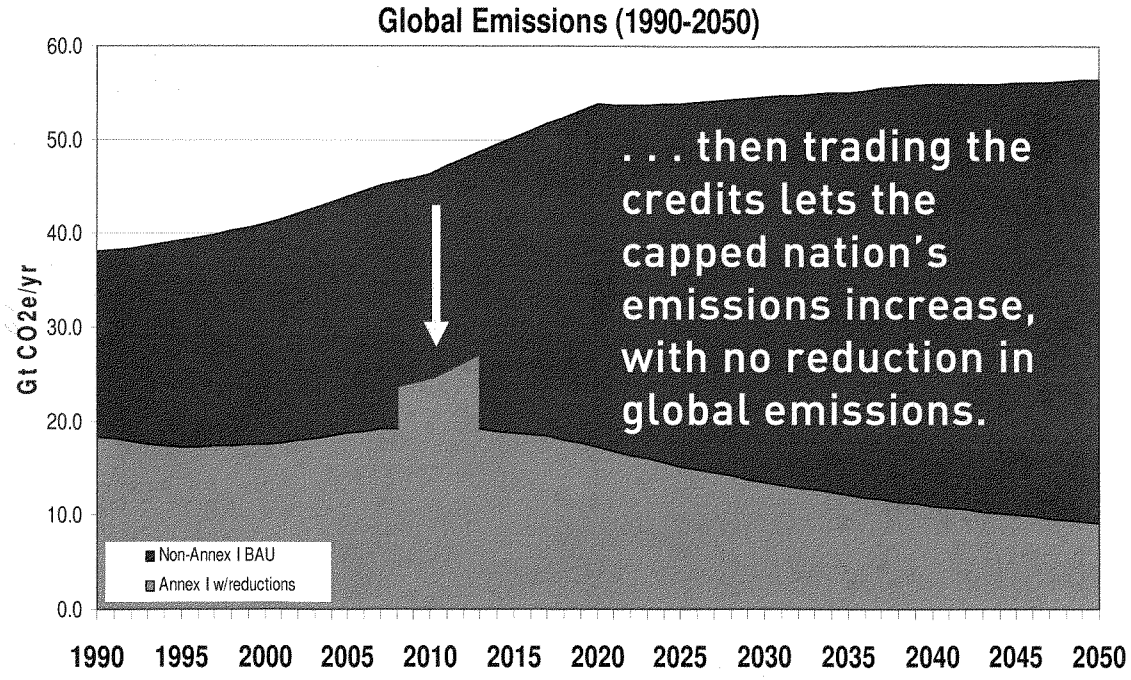
ENVIRONMENTAL DEFENSE



Testimony of Annie Petsonk, Environmental Defense

Figure 9

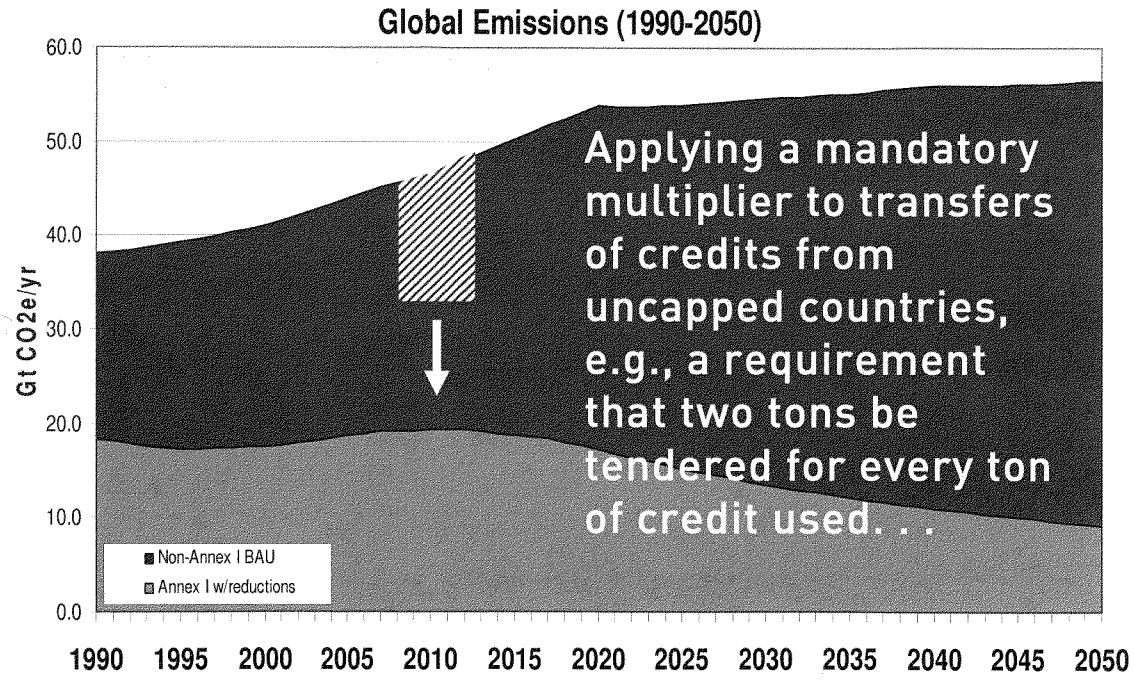
ENVIRONMENTAL DEFENSE



Testimony of Annie Petsonk, Environmental Defense

Figure 10

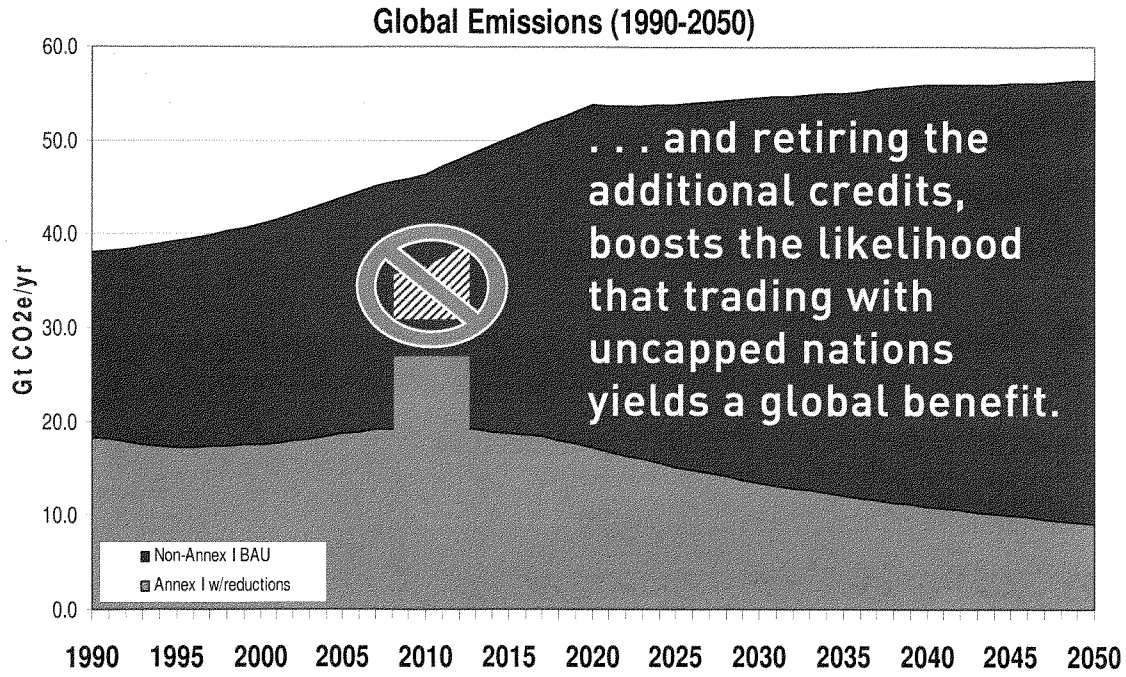
ENVIRONMENTAL DEFENSE



Testimony of Annie Petsonk, Environmental Defense

Figure 11

ENVIRONMENTAL DEFENSE



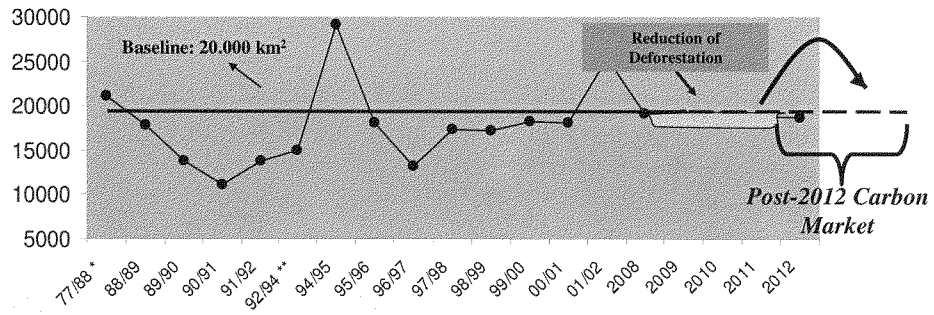
Testimony of Annie Petsonk, Environmental Defense

Figure 12

ENVIRONMENTAL DEFENSE

Compensated Reduction of Deforestation:

Reductions 2008-2012 would be compensated in the Post- 2012 Carbon Market



Source: INPE 2003, IPAM

* Decade mean

** Biennium mean

% reduction of deforestation = ~ 5%

Avoided Emission: mean of 12 Million Tons C/yr

Reductions in deforestation 2008-2012 would be compensated in the post-2012 Carbon Market

Ref: Tropical Deforestation & Climate Change, Moutinho & Schwartzman, eds. (IPAM 2005)

Testimony of Annie Petsonk, Environmental Defense

Figure 13

ENVIRONMENTAL DEFENSE

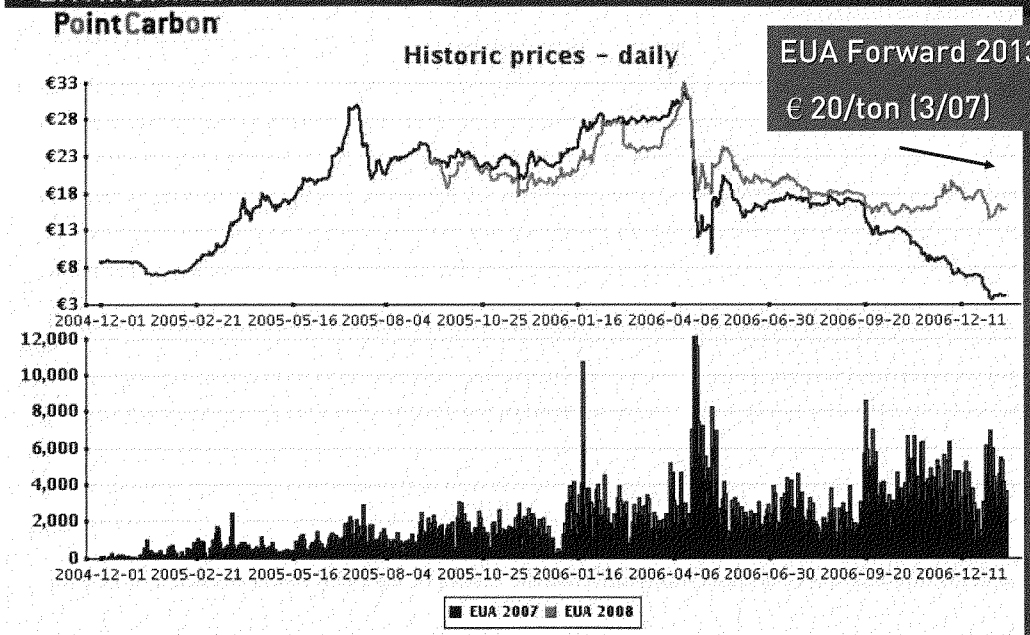


Fig. 3. EU ETS – Price and Volume
Source: Point Carbon 2007 (used by permission)

Testimony of Annie Petsonk, Environmental Defense

Figure 14

House Committee on Energy and Commerce

Hearing on "Climate Change -- International Issues, Engaging Developing Countries"

27 March 2007

Testimony of

Edward S. Steinfeld
Associate Professor of Political Science
Co-Director, China Energy Group, Industrial Performance Center
Massachusetts Institute of Technology

Mr. Chairman, and members of the committee, thank you for the opportunity to appear before you today to discuss China's energy sector development and its implications for global climate change. My comments are drawn from two decades of research on China's industrialization process, as well as my participation as one of eleven principal authors in the recently released MIT study "The Future of Coal: Options for a Carbon-Constrained World."

A major premise of MIT's "Future of Coal" study is that the risks of global warming are real, and that action should be taken to restrict the emission of carbon dioxide and other greenhouse gases. A second and related premise is that coal will continue to play a major role in meeting global energy needs, particularly in developing countries, and most clearly of all in China. Over the long run, global carbon mitigation efforts, to be successful, must encompass China.

China over the next twenty-five years is expected to account for more than half of global growth in coal supply and demand. The country today is world's largest producer of coal (2.23 billion tones in 2005), and coal accounts for over two-thirds of China's primary energy supply. Electricity generation accounts for just over half of all coal utilization in China, and about 80 percent of Chinese electricity generation is fueled by coal. Indeed, the supercharged growth of the power sector is arguably the single most important factor driving China's impact on carbon emissions and global climate change. In 2005, approximately 70 Gwe of new generating capacity was brought into service (an addition nearly the size of the UK's entire power grid). In 2006, an astounding 102 GWe of capacity was added, again primarily in the form of coal-burning power plants. Though Chinese per capita electricity consumption remains low (about 20 percent of average per capita consumption in the world's advanced economies), the scale and pace of the power sector's build-out is extraordinary. In aggregate terms, China is expected to overtake the United States as the world's largest emitter of carbon dioxide within the next two years.

To understand China's current energy situation – as well as the context for future Chinese participation in carbon mitigation efforts – one must recognize three key features of the Chinese system. First, especially at the national level, China's energy-related governmental bureaucracy is highly fragmented and poorly coordinated. Responsibility for energy pricing, for the approval of infrastructure projects, for the oversight of state energy companies, and for long-term energy policy is spread across many agencies, most of them seriously understaffed, and some of which – given their very recent emergence on the scene – are notably weak in relation both to other agencies and to the players they

are supposed to be regulating. In much of the Chinese power sector – except for the nuclear area – precious little evidence exists for coherent, top-down policy making or even a clear overall policy agenda.

Second, under these conditions it is the state energy companies – the national oil corporations and the national power generating groups – that are among the most coherent entities. These are the organizations that are most capable of defining their own interests and that are most likely to act, making decisions that their ostensible state regulators and overseers can barely keep up with and sometimes do not even monitor. At the same time, and reflecting China's increasingly deep integration with the global economy, these corporate entities are hardly simple organizations themselves. Listed on both domestic and foreign stock exchanges, the state energy corporations encompass complicated groupings of stakeholders, including state-appointed senior executives, domestic and foreign corporate board members, major financiers from the global investment banking community, and international institutional investors. Textbook examples of shareholder-driven corporate governance they are not, but neither are they simple puppets of the state – in no small part because the state itself is so fragmented and lacks a clear voice on energy policy. In essence, the central government in Beijing today has neither a coherent national energy strategy nor much capacity to monitor, support, or impede the actions of state-owned energy companies – actions that are often misunderstood by outsiders as merely echoing government policy.

Third, and most important, the remarkably rapid growth of energy consumption in China has been possible because a host of infrastructural issues are being resolved very quickly by individuals and organizations operating well below the level of national energy corporations. Key decisions about China's physical and technological infrastructure – decisions with profound consequences for its long-term energy development – are being made almost daily by actors at the grass roots level. Boundaries at this level between regulators, investors, and commercial operators are hazy at best, and some decision makers simultaneously occupy several of these categories. Despite such admittedly chaotic conditions, generating capacity has consistently been added. It has been added, though, on an ad hoc basis, in a wide-variety of forms (ranging from large-scale municipal power plants to smaller scale off-grid generation by industrial consumers), utilizing a wide-array of technologies, and often in tension with existing regulatory strictures.

To attribute China's aggregate energy demand growth – or even the actions of the state-owned energy companies – to central government agendas or geopolitical strategy is thus mistaken. What many outsiders take to be the deliberate result of Chinese national "energy strategy" is in fact better understood as an agglomeration of ad hoc decisions by local governments, local power producers, and local industrial concerns, few if any of whom have the national interest in mind, and most of whom are rushing to fill a void left by the absence of national-level energy strategy. Amidst surging energy demand and frenetic local decision-making, agencies and individuals in the central government are scrambling simply to keep abreast of developments on the ground. China's astonishingly

rapid energy development may well be spinning the heads of outsiders, but it is vexing, perplexing, and even overwhelming Chinese governmental insiders too.

In light of these conditions, how can China become part of the solution to – rather than just the newest major driver of – the challenge of global climate change? First, we should recognize that the Chinese government's capacity to achieve targets for reducing hydrocarbon consumption or pollutant releases, or Kyoto-like limits on greenhouse gas emissions, is in practice limited today, and will likely be so for the next five to ten years. Neither louder demands for compliance by outsiders nor escalating penalties for non-compliance are likely to yield the desired results.

Second, and equally important, China's national leadership will likely be prepared to enter into such agreements over the longer term, but on a primarily aspirational basis. The term "aspirational" on the one hand relates to the Chinese central leadership's desire to come to terms with many of the same issues facing policy makers in the United States. Chinese leaders are feeling the combined pressures of increasing reliance on foreign sources of energy, increasing demands from citizens in many regions for better environmental management, and growing concerns about the perceived direct effects of global warming on China today (namely, the prolonged water shortages and rapid desertification patterns afflicting the nation's North and West). As a result, certain policy makers have become focused on building central regulatory capacity to address a wide variety of energy-related externalities, including – though not primarily – climate change.

The Chinese central government's very publicly announced goal to increase national energy efficiency by 20 percent from 2006-2011 is a clear example of this aspirational bent. Key actors within the central government have grown increasingly aware of China's energy vulnerabilities and the urgent need for more sustainable utilization of energy resources. Against some opposition from within their own system, they fought hard to include the efficiency targets in the 2006-2011 five-year plan. Public commitments to such targets, by putting the government's reputation on the line (vis-a-vis its own citizens, let alone outsiders), suggest a certain determination to depart from "business as usual" – probably a necessary, but by no means sufficient condition for change to occur. Of course, given that the first of the five year efficiency targets were not met in 2006, the question of governmental capacity still remains open.

In a second "aspirational" sense, China's central government will likely over time seek to join global accords on carbon mitigation if doing so becomes accepted practice among the world's advanced industrial nations. Chinese governmental legitimacy has increasingly come to rely on the ability of the state to persuade citizens that it is modernizing China, effectively bringing to China the laws, institutions, and practices of advanced industrial societies. While the issue of democratization is still sensitive, the government has increasingly encouraged citizens to judge it in terms of its delivery of rule of law, private ownership, a better environment, etc. – terms all measured against the established standards of advanced industrial societies. For at least ten years, the Chinese government has urged its citizenry to take up the cause of "putting China on the global track" and "getting China onto the global standard." As a result, we have witnessed

China doing things we would not have anticipated previously – joining the World Trade Organization on fairly strict terms, building rules of intellectual property rights protection, expanding the rights of private entrepreneurs, and moving toward a more modern system of currency management. In each of these areas, change has been incremental, regulations have often been slow to emerge, and enforcement has tended to lag even further behind. Yet, in each of these cases, positive change has taken place over time, often at considerable cost to key societal constituencies, and often well beyond the expectations of domestic and foreign observers. The point is that "getting onto the global standard" – a standard defined by the world's advanced societies – carries great importance in China, both for the legitimacy of the government and the individual citizen's sense of the status of the nation.

How, though, can China's highly decentralized system of energy sector governance be directed to meet the aspirational goals of citizen and state alike. In one sense, this is not a system capable of responding deftly to either domestic or international mandates, particularly when such mandates call for dramatic near-term change. Indeed, the response by subordinate officials to dictat from above is more likely to come in the form of distorted information reporting than actual changes of behavior. In another sense, though, this is a system in which players are emerging at every level who have a stake – whether political or commercial – in achieving more sustainable energy outcomes. That some central agencies have been able to work into the policy agenda stricter energy efficiency targets, that citizens in China's more advanced cities like Shanghai are demanding and getting better air quality enforcement, and that some domestic energy

companies are positioning themselves for an environmentally-constrained market are just some indicators of this. Although these players are not coordinated, and they at times represent competing interests themselves, they are frequently looking outside, particularly to the advanced industrial economies, for guidance and models to emulate. Moreover, they are doing so in the context of a system that is highly integrated into the global economy, to the point that foreign commercial entities are often deeply involved in domestic decision making, particularly with respect to the strategies of China's domestic energy companies.

Perhaps most important of all, for all its faults, the Chinese system is highly experimental, flexible, and – as evidenced by developments over the past two decades – capable of great change. Those entities that are seeking more sustainable energy solutions in many cases actually have the ability to pursue experimental projects, often on a large scale and often involving foreign players. For example, several municipalities, including Beijing, have taken advantage of aspects of the new national Renewable Energy Law to establish cleaner, more efficient, large-scale biomass-fueled power plants. The specific terms of such projects – who pays for them, who designs and controls them, and so on – are always subject to ambiguity, negotiation, and ad hoc interpretation. This is, after all, a nation with an institutional tolerance for "systems within systems" and a wide array of quasi-legal, gray area activities. Experiments on the sustainable energy front are certainly possible, and in some cases are beginning to happen. Those most likely to succeed will not be national in scale, but localized, replicable, and able to propagate to other localities. These experiments, particularly since they so frequently involve foreign

participants, are also likely to be consistent with trends in advanced economies. China's economic and commercial development is now so dependent on global integration that it will not permit itself – and, indeed, in purely commercial terms, cannot permit itself – to become an outlier in terms of the technological and institutional underpinnings of its energy system. In this respect, the commercial ambitions that make China's energy sector so difficult to regulate also contain the seeds, over the long run, for successful Chinese participation in global carbon mitigation efforts.

Mr. Chairman, thank you again for inviting my testimony. I greatly appreciate the effort of this committee to shape our nation's response to the risks of global climate change, and to do so with a full understanding of the likely responses from major developing countries such as China.

Testimony of W. Thomas Stephens
Chairman and Chief Executive Office
Boise Cascade, L.L.C.
Subcommittee on Energy and Air Quality
Hearing on Climate Change – International Issues, Engaging Developing Countries
March 27, 2007
Washington, D.C.

Chairman Boucher, Mr. Hastert, Chairman Dingell and members of the committee, and my distinguished co-panelists with whom I am appearing today, my name is Tom Stephens and I am the chairman of the board and chief executive officer of Boise Cascade, L.L.C. Boise is a paper and building products manufacturing and distribution company headquartered in Boise, Idaho with approximately 10,000 employees in 60 locations in 24 states and in Canada, the United Kingdom and Brazil. I also serve as a member of the board of directors of the American Forest and Paper Association and Trans-Canada Pipeline and am a trustee of Putnam Funds. I appear today solely in my capacity as CEO of Boise.

I am here to talk to you about how potential climate change legislation may impact Boise Cascade, the competitiveness of U.S. industry and jobs in this country.

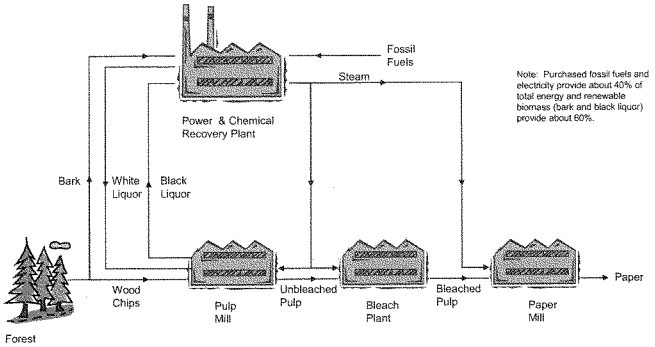
Forest Products Industry – Energy-Efficient and Sustainable

First, I would like to put the forest products industry into perspective. This industry produces products, using energy primarily from the sun, that are durable, renewable, low cost and efficient. Our products are used to house families, schools and businesses, safely package food and a wide-range of other materials and provide a low-cost medium for writing and printing. These products come from renewable resources –

trees - and are recyclable and/or biodegradable. Simply put, this is an industry which is environmentally friendly and sustainable.

The forest products industry is very efficient and one of the largest producers and users of renewable biomass energy in the world. Boise is a proponent of the Sustainable Forestry Initiative®, which endorses forest management practices that ensure all forest values – wildlife habitat, watershed, recreation and timber production – are sustained for the long term. In many areas when we harvest a tree, the largest part of the tree goes to sawmills or plywood plants where the bark is removed and the logs converted into lumber, plywood or engineered wood products. The bark is burned in highly efficient boilers and the steam is used to dry the lumber or the veneer, which minimizes the need for fossil fuels. Even the sawdust produced during lumber milling is used to make particleboard for furniture production.

Next, the residual parts of the log are chipped into small pieces and shipped to a pulp mill to produce wood pulp and eventually paper. During the chemical pulping process, the wood fibers are separated from the lignin, the naturally occurring "glue" which binds fibers together in a tree. The lignin and the chemicals used to extract it are put through a recovery process through which the chemicals are recycled and the lignin is burned in a boiler, providing the mill with a renewable biomass based source of energy.



Bleached Kraft Pulp & Paper Mill – Elementary Flow Schematic

In many cases, mill power boilers burn additional biomass, such as bark. The energy from the boilers is used to operate the pulp mill and to dry the paper. These boilers often are also connected to a steam turbine to co-generate electricity. The result, again, is minimizing the use of fossil fuels. At Boise Cascade, between 60% and 65% of the energy used in our manufacturing processes comes from renewable sources, with the bulk being biomass as I've described. While this may sound like a high rate, it is not unusual for the forest products industry.

In addition to its renewable energy portfolio, the forest products industry supports actively and sustainably managed forests which sequester carbon through nature's process of photosynthesis, combining carbon from the atmosphere with water and sunlight energy and turning them into cellulose while releasing oxygen back into the

atmosphere. And forest products store carbon over the long term – wood installed in homes may last hundreds of years and paper is often archived or recycled. By contrast, manufacturing alternative construction materials is significantly more carbon intensive. Manufacturing many substitute materials takes significant energy and does not typically utilize biomass. Further, these materials are not as effective an insulating material as wood.

While actively managed forest land sequesters carbon, forest land that is not actively managed has contributed to greenhouse gas emissions. Recent large forest fires on federal lands in western states emit very significant amounts of CO_2. In some years in the state of Oregon, these fires have released as much carbon as was emitted for the entire year from burning fossil fuels in the state. The number and intensity of these fires have escalated with the accumulation of fuel load since the federal timber program was reduced. Further, the lack of timber sales and the expense of fire fighting mean there is little funding available for replanting and forest thinning. So the cycle continues. The decisions being made in the courts to stop thinnings and post-fire reforestation are not based in science but rather show the risks of unintended consequences as policy is formulated. As Congress considers legislation to deal with climate change, I strongly urge you to consider the unintended impacts of policy. We've put a lot of people out of work and our continued appetite for forest products in the U.S. coupled with shutting down U.S. production has resulted in growing the industry in places around the world where environmental practices and enforcement are not as rigorous as here in the U.S.

and fires and insects destroy the very forests and the habitats that well intentioned people intended to preserve.

Global Nature and Competitiveness of the Forest Products Industry

The forest products industry is global and trade moves relatively freely. Key drivers of competitiveness are the costs of wood fiber, energy, labor and capital. The industry is highly capital-intensive; for example, a greenfield pulp and paper mill of competitive scale would cost well in excess of one billion U.S. dollars. Pulp and paper mills must operate at very high levels of capacity due to the high fixed-cost component of the cost structure, including the large fixed investment. Because of these characteristics, the relative competitive position of our industry and the jobs it supports will be impacted by what Congress ultimately puts into place on climate change.

Perspective on Climate Change

I will now outline my perspective on climate change. While science continues to evolve, I believe that the weight of currently available scientific evidence indicates that global warming is real; that a build-up in greenhouse gases, principally carbon dioxide, is a significant cause; and that man's actions contribute to this build-up primarily through combustion of fossil fuels and changes in land use, especially conversion of forests to agricultural and other uses.

At Boise, we believe that Congress needs to consider alternatives to address the issue. We support a firm cap on greenhouse gas emissions and a trading mechanism to

facilitate the most efficient reductions in greenhouse gases. We believe that, over time, the cap should be reduced to move the economy to a more net neutral greenhouse gas position. Other alternatives should be considered but whatever is put in place should be economy-wide and based on sound science and should have mechanisms for adjustment as science evolves and unforeseen circumstances develop.

While we believe our trading partners, including developing countries, have a responsibility to reduce their emissions as well, we believe that the U.S. must act. Any climate change legislation should incorporate incentives for our trading partners, including developing countries, to develop their own programs to reduce greenhouse gas emissions. These incentives should include access to U.S. markets, not in the form of duties, but fundamental access. Unlike many environmental impacts, CO_2 emissions do not have a zip code. If all we do with legislation is export the CO_2 production, we will have failed to mitigate climate change and we will have lost jobs in the process.

According to a recently released Sigma Xi report, between 15% and 25% of the increase in atmospheric CO_2 since 1750 has been the result of land-use conversion – primarily the removal of the carbon sink that forests provide due to deforestation in developing areas of the world. In fact, in the U.S., there is more forestland today than there was 100 years ago largely because financial incentives to maintain forests outweigh incentives to convert the land to other uses. The primary current incentive to maintain timberland in forest use is that owners can sell timber to nearby mills, replant the forest and repeat the process indefinitely. In many developing countries, often no

such incentive exists and the result is deforestation and conversion to agricultural use, which pays a better return for a brief period until the land is overgrazed or otherwise wasted through overuse. The argument has been made that eco-tourism could provide income for these forests to ensure their preservation. This is an ideal that has met with only limited success in much of the developing world, where returns from black-market logging and pasturing cattle for a few years far outweigh dollars generated by eco-tourism. Ownership, responsibility and opportunity for a sustained, managed forest need to be part of the engagement with developing countries to turn the land converted from forests back to forests. We need to engage our like-minded trading partners to support and enforce bans on illegal logging much as we brought the ivory trade to a stop. We need to use our trading relationships with countries that do not practice sustainable forestry to ensure they support the maintenance and growth of forests in the developing world.

Boise believes in free trade, but fair trade. Today, the U.S. market is the largest market in the world for goods and services. Our manufacturing jobs have been shifting to other parts of the world. That's because low-cost labor and, in some cases, lower regulatory costs, allow producers in Brazil, China and India to make goods at significantly lower cost than we can in the U.S. Today, China, with few forest resources and little clean energy, has the fastest growing paper industry in the world. Today, China imports logs from Russia and exports paper to the U.S. At the same time, the U.S. has elected to significantly reduce the management of its federal forests for sustainable wood production and has lost tens of thousands of jobs in our forest products sector. To date,

the U.S. has elected to not pass judgment on how other countries regulate their forest products businesses. The US has been guided by the philosophy that these countries can make their own decisions on trade-offs between their environment, the rights of their workers and the desire for economic growth. I'm not here to debate issues where one can argue the impacts are localized. However, greenhouse gases are a different story. This is clearly a global issue and environmental practices in other parts of the world have a clear and direct impact on the U.S. and its citizens. It is likely that U.S. manufacturers will experience increased operating costs and potentially some economic dislocation. However, in the U.S. there will be economic winners as well. If we raise the costs for U.S. producers while overseas producers get a pass, we will have made the U.S. less competitive. Over time, I believe that smart money will find smart people and solutions will be developed; however, if we do not hold our developing trading partners to the same standards, we will ship both the jobs and the greenhouse gas production overseas.

The US has a Responsibility to Act

Climate change is a real problem and as the largest emitter of greenhouse gases, the US has a responsibility to act. As the largest and richest economy in the world, the US has a responsibility to act. As the most innovative economy and society in the world, the US has a responsibility to act. While we need to ensure all of our trading partners, including the developing economies of the world, do their fair share, the US must lead from the moral high ground. We should provide developing countries with technical assistance in the areas of reforestation, energy conservation, renewable energy, low

emitting energy systems and carbon sequestration. In the event our trading partners do not act, I believe that the G8 should, in concert, leverage all tools including market access to ensure these countries act. Frankly, the forecasts I've seen on the negative impacts of climate change are focused more in the developing world than in the developed world. As a result, I expect these countries will see it in their best long-term interest to act. However, in the short term they may need a nudge.

I have great faith in our economy and our country to develop technology to meet this climate challenge. But the technology will develop much faster with financial incentives – that's the way our system works. I also believe that developing countries will be able to "technology skip" much as they have in information transfer and storage and telecommunications. Today China has over 300 million cellular phone subscribers. China went from reading newspapers posted on walls to using the Internet in a very short period of time. They went from hand written paper to the personal computer. They quickly adopted the most efficient technologies. Forty years ago, there was no cellular phone, no Internet, no high-speed trains, very few planted forests and we had not yet landed on the moon – I have faith that in the next 40 years, we will be able to make similar technological leaps if we provide incentives to attract our best and brightest to the challenge. I believe that the U.S. can and will overcome this challenge of rapid climate change, and if we provide the right incentives, we will be able to bring our trading partners, including the developing world, along with us.

Thank you.

O