ADDRESSING CLIMATE CHANGE: VIEWS FROM PRIVATE SECTOR PANELS

HEARING

BEFORE THE

SUBCOMMITTEE ON ENERGY AND AIR QUALITY

OF THE

COMMITTEE ON ENERGY AND COMMERCE

HOUSE OF REPRESENTATIVES

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WITNESSES

ADDRESSING CLIMATE CHANGE: VIEWS FROM PRIVATE SECTOR PANELS

TUESDAY, FEBRUARY 13, 2007

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

The subcommittee met, pursuant to call, at 10:00 a.m., in room 2322 of the Rayburn House Office Building, Hon. Rick Boucher (chairman of the subcommittee) presiding.

Members present: Representatives Butterfield, Barrow, Markey, Wynn, Doyle, Harman, Gonzalez, Inslee, Baldwin, Hooley, Matheson, Dingell [ex officio], Upton, Whitfield, Shimkus, Myrick, Sullivan, Burgess, Bono, and Barton [ex officio].

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

Mr. BOUCHER. I want to say a word of welcome to all members of the subcommittee as this morning we begin the hearing process for the 110th Congress.

Our agenda will largely focus on a multi-faceted strategy for promoting domestic sources for transportation fuels and on the Congressional response to climate change, the regulatory jurisdiction for which lies with this subcommittee.

We will also oversee the progress of the Department of Energy in developing the Yucca Mountain site for high-level nuclear waste disposal and we will oversee the implementation of, and perhaps make adjustments to, the 2005 Energy Policy Act.

Other matters will be added to the subcommittee's agenda and I encourage all members of the subcommittee to share with me your priorities and recommendations for either hearings or legislation. We will make every effort to accommodate you.

We will operate in a bipartisan manner. Those who have worked with me know that is my practice, and I intend to consult Members on both sides of the aisle on the matters that will be before us. I will attempt to make all of our legislative efforts truly bipartisan.

This morning we will begin our work with the first in a series of hearings on the congressional response to climate change. Our hearings will proceed over the next several months as we examine every facet of this challenging subject, from the state of the science to the views and recommendations of industry sectors, scholars and the environmental community.

We intend to review the experience with cap and trade programs generally including what I think most would concede as the highly successful SO2 emissions trading program that this committee developed and was embodied in the Clean Air Amendments of 1990. We will also look at the more recent application of cap and trade to greenhouse gas emissions that has been employed by the European Union.

Among our other inquiries will be how emissions allocations could be made in a nationwide program, the role of offset, and the level and timing of reduction, how to ensure international participation including the critical participation by developing nations, how to structure Government incentives for the development of technologies that can enable the continued use of today's fuels including coal in a carbon constrained economy, and we will be examining other steps to prevent economic dislocation. This is not an exhaustive list of the subjects that we intend to examine but I think this list serves to underscore the complexity of the task that we have before us.

Let me say that this is not a subject that I personally come to with ease. All of Virginia's coal production is in my congressional district and coal is the single large industry in my district, so perhaps understandably today to date I have been a skeptic on the need for a mandatory control program for greenhouse gas emissions in the United States.

But my view is changing as is the view of much of the energy industry. The scientific consensus about the extent of the human contribution to greenhouse gas accumulation and the effect of that accumulation on our future climate appears to be deeply solidified.

Arctic science and extraordinary weather patterns across the world suggest that are presently seeing the effects of climate change and so I have concluded that the time has arrived to write a mandatory climate control regime for greenhouse gas emissions. I have consulted closely with Chairman Dingell of the full committee in developing an agenda for climate change hearings and in reaching a decision to go forward with legislation.

Any bill that we report must have bipartisan support and industry support. It must be economy wide and restricted not to just certain economic sectors. It should be capable of passage not just in the House but also in the Senate with its 60-vote barrier and we will seek advice from the administration on the measure as it is constructed and hope to have administration support in this exercise.

Our goal will be to develop the same kind of cooperative process that enabled the 1990 Clean Air Amendments to pass the house without amendment and with a very large bipartisan vote. It is going to be a challenging task but it is one that I think that working together and with cooperation from interested stakeholders that we will be able to achieve.

In today's hearing, we will receive testimony from private sector organizations which have made recommendations both for and against mandatory climate change legislation.

Tomorrow we will hear from the scientific community about the state of the science.

I now have the pleasure of saying a word of welcome to the ranking member of this subcommittee and I would note that while he is not in attendance this morning because of a recent illness from which he is recovering, that we are very honored that the ranking member of this subcommittee is the former Speaker of the House of Representatives, the gentleman from Illinois, Mr. Hastert. We welcome Denny back to the subcommittee, and I just want to say, and I hope somebody here will tell him I said this, that I personally very much look forward to working with him and I know that we will have a great bipartisan rapport as we seek to address the subjects that come before the subcommittee.

In his place today I want to say a word of welcome to my good friend, the gentleman from Michigan, Mr. Upton, who is currently the ranking member of the telecommunications subcommittee. I believe that is right.

Mr. UPTON. That is the powerful and influential Subcommittee on Telecommunications.

Mr. BOUCHER. I am sorry. I got the title wrong, and I proudly serve on that subcommittee also. And Mr. Upton is going to stand in for Mr. Hastert until such time as he returns to the subcommittee. So at this time I am pleased to recognize for his opening statement the ranking member of the hearing for today, the gentleman from Michigan, Mr. Upton.

OPENING STATEMENT OF HON. FRED UPTON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MICHIGAN

Mr. UPTON. Thank you, Mr. Chairman, and I am sure that former Speaker Hastert will receive your kind remarks in good stead. He does hope to be here by the end of the week and certainly when Congress comes back after its recess after next week, and I have to say too that I am sure that all the Members on this side of the aisle appreciate your opening statement and pledge to work in a bipartisan basis and move this legislation to its proper place.

I want to begin by thanking you and Chairman Dingell for the chance to begin our examination of the facts surrounding the topic of global climate change. Our side does look forward to working with you as well as with Mr. Dingell to better understand this very complex subject.

At the beginning of any effort to legislate an area such as this where the problem to be addressed is complicated and not necessarily well understood with a number of various legislative proposals put forth, they have a potentially dramatic consequence on our society and our economy, and I try to keep in mind the time-tested precept, first do no harm. The phrase is meant to remind a physician that they must first consider the possible harm that any action may do to a patient before proceeding with their treatment. As we start our series of global climate change hearings, I believe that it is in the best interest of our communities and our Nation for us to bear this prescription in mind.

While a hearing such as today's that showcases proposed legislation that is sure to produce some dramatic moments, I would suggest that the committee be better served silver medal methodological examination that attempts to answer the numerous questions that should precede potential solutions including what does the

science say, where is there certainty and uncertainty regarding the causes and consequence of climate change. What steps is our Government currently undertaking to examine and address that issue? What steps is the private sector currently undertaking? What can be done in terms of technological advancement to address climate change, and what will the various responses to global climate change cause, not only in terms of dollars but in terms of economic competitiveness and future expansion?

Only after we provide answers to those questions should the committee begin to weigh proposed solutions. A careful review and assessment by Members is further justified when one considers that combating global climate change is a trillion dollar prospect, a cost that is often borne by U.S. taxpayers. The stakes are too high to simply settle on any one legislative proposal at this time.

Today's witnesses are here to promote solutions to global climate change that involve placing a fixed limit on U.S. carbon emissions, and it is my position that such an approach is at best premature. It is extraordinarily risky for the U.S. to cap greenhouse gas emissions until we have a better understanding of the impact such a policy will have upon today's economy and tomorrow economic competitiveness. We cannot ignore the fact that a cap and trade system has been implemented in Europe as a result of the Kyoto Protocol and we will hear in testimony today that experience has been plagued by the complexity of significant economic cost. Additionally, it has become clear that most European countries, maybe even Japan, will not meet their Kyoto targets, so we have to begin to question the value of unrealistic caps as a solution to climate change.

As we all know, the Kyoto regime does not include massive carbon dioxide emitters such as China and India, and it is difficult to imagine a scenario where the U.S. would wish to or even could afford to participate in such a regimen that the rest of the world doesn't necessarily participate in. So it is a fact that the environment derives no benefit if the U.S. capped or even eliminated CO^2 emissions if these emissions are simply transferred to other countries like China or India.

CO^2 molecules are not labeled "made in the USA." In contrast, the two proposals by U.S. CAP and NCEP, we will hear testimony from Dan Domico, chairman, president and CEO of the Nucor Corporation. He represents the views of the industrial energy consumers of America and provides us the perspective of America's leading manufacturing industries. I look forward to his testimony, his expert opinion on the impact on the U.S. manufacturing sector were it to be saddled with tough emission limitations.

In conclusion, I look forward to the exchange of ideas at today's hearing, the opportunity to work with you and Chairman Dingell, and obviously my ranking member, Mr. Barton, to methodically build a hearing record on this very important topic, and I yield back my 8 seconds.

Mr. BOUCHER. Thank you very much, Mr. Upton, a very timely statement. And now I am pleased to recognize for 5 minutes the chairman of the Energy and Commerce Committee, the gentleman from Michigan, Mr. Dingell.

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

The CHAIRMAN. Mr. Chairman, thank you. I commend you and thank you for calling this important hearing. I am happy indeed that this matter will be in your hands and in the hands of this distinguished subcommittee because it is a matter of great importance.

I would like to begin by assuring all that this will be a matter of great concern to the committee. We will proceed with all proper speed and with extraordinary care and diligence to present to the Congress a good bill, one which will attract work, and as our friends in the medical profession said, first do no harm.

Today we are about to confront a topic that has emerged as a central environmental issue of our time. We have before us an ambitious goal: to produce legislation that will adequately address climate change without causing undue harm to the economy of the Nation and the lives of our people. To say that this task is difficult qualifies as a vast understatement. To say that because it will be difficult we should ignore it or not grapple with it qualifies as folly.

I look forward to the coming months. I am reminded as I do so of a sign hanging on an office door proclaiming the following: "Good, fast, cheap, pick any two." That is the kind of choice that we could face unless we adhere carefully to a few guiding principles, those which have guided this committee as we have gone through our business in the years that I have had the privilege to serve here.

First we must be thorough. Chairman Boucher and I have laid out a comprehensive series of hearings that aim to explore all aspects of this complex topic, the scientific views on the causes and effects of climate change, the policy options that are available to the United States, the consequences of these policy options for various segments of our society and how those options can fit into a global solution. This week alone we will be conducting two hearings and continuing our series of regular Friday staff briefings.

Second, we must work in a nonpartisan and bipartisan fashion, and it is my intention that we shall do so. Neither party has a monopoly on wisdom, and this is a problem which has to be addressed by all of us regardless of our party affiliation. It will take all of us working together representing the diverse viewpoints of the American people to reach a successful conclusion which will address the concerns of the American people.

The Clean Air Act Amendments of 1990 reflected a hard-fought and difficult negotiation but ultimately resulted in a product that passed the House by a margin of 401 to 25.

Lastly, this committee and those who consider this matter must keep an open mind. All policy options will be on the table and must be on the table. As the committee learns more about the complexity of the issues, certain policy alternatives will fall by the wayside. That is the natural order of the legislative process. The administration has already signaled that it will oppose certain policy options, a position that I find to be regrettable. In order to be successful, we must go through the facts and to achieve a solid consensus where those facts lead us.

Some of our witnesses today have experiences in reaching agreement on this issue. They represent diverse interests ranging from environmental groups to heavy industry, yet they have worked together to unite behind certain ideas. I look forward to learning how their experience may inform ours and assist us in our work. As we begin our work, let me finally note that this will not be an abstract endeavor or an exercise in public relations. This will be an exercise in the legislative process and it will be conducted in that fashion and it will encompass all that the phrase entails.

This challenge is difficult but I can think of no committee better equipped to meet it. Our committee has proven that it can resolve complex and difficult environmental issues and I would remind all that the Superfund, Safe Drinking Water Act, the Resource Conservation Recovery Act and, as I mentioned earlier, the Clean Air Act Amendments of 1990, all the landmark environmental statutes and all of which have worked magnificently well after the careful intention that this committee has given the process and the completion of the work.

Mr. Chairman, I look forward to working on this hearing. I look forward to working very especially with you and I consider you to be extraordinarily well qualified to lead this subcommittee as it goes about its business in this difficult matter.

I also want to say that I am particularly pleased to be working with our good friend and colleague, Mr. Upton from Michigan, who will be serving I think with extraordinary distinction as the ranking minority member, and my dear friend, Chairman Barton, who has a long record of working with me and a close friendship which we share and which I look forward to using here with his guidance and help to bring about a good enactment of worthwhile legislation which will be another definitive and proud chapter in this committee's history. We have a fine group of Members in this committee. I look forward to them working responsibly on this difficult question and I look forward to working with them, and I thank you for your recognition, Mr. Chairman.

Mr. BOUCHER. Thank you very much, Chairman Dingell. Now there is recognized for 5 minutes the ranking member of the full committee, Mr. Barton from Texas, with whom we all look forward to working as the subcommittee's business moves forward.

Mr. BARTON. Thank you, Chairman Boucher. It is good to have a hearing where you are chairing it. I look forward to working with you. I have sat where you sat. Mr. Sharp has sat where you sat. I think Mr. Dingell at one time has sat where you sat and so you have got plenty of help in the room if you——

Mr. BOUCHER. I am going to need it.

Mr. BARTON. We are also appreciative that you have chosen this particular hearing to be your maiden voyage, so to speak.

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

Mr. BARTON. We have dealt in this room with this subcommittee over the years with numerous pieces of comprehensive energy legislation, environmental legislation including the CAFE, the Clean Air Act, acid rain, electric restructuring, and in the last Congress, the comprehensive Energy Policy Act. Through it all, most of the

people that have served on this committee have had four objectives in mind. As we look at those issues, we want to keep the lights on, we don't want the cost of using the energy to bankrupt us. We want to drive wherever we are driving comfortably and conveniently in terms of our transportation system. Above all, we want to keep our jobs.

Going forward, these four tasks have never been more challenging. We need to grow electricity production in the United States by over 50 percent in the next 15 to 20 years just to keep up with basic demand of the needs of people who work for a living. We need to close the gap between secure oil supplies and fuel consumption for cars, trucks and planes. We need to make sure that we don't divert our limited supplies of domestic natural gas into electricity production unnecessarily and away from the homes of people who need it for heating and cooking or away from the factories where millions of our people work and earn their daily living.

This last one is especially important to me. Our chemical factories and fertilizer factories can't compete for natural gas when it goes up in price. When the price goes up, they shut down and those jobs move abroad, sometimes forever. So whatever legislation this subcommittee considers in this Congress, I am going to measure it against the four historical yardsticks that we have used in this subcommittee. Does it help or hurt our effort to keep the lights on? Does it keep mobility affordable? Does it help keep the energy prices down, and most importantly, does it cost U.S. jobs?

I want to welcome back a former Member and an old friend, Phil Sharp of Indiana. I want to thank Chairman Boucher for inviting him to be the first witness. He is certainly a man of integrity and an individual who knows quite a bit about this subject before us today.

It does appear to me, however, that the politics of global warming are more important than the policy of global warming, so much so that the House is thinking about convening a very special kind of committee called the Select Committee. That committee, if it is convened, will have neither the institutional history nor staff expertise to delve into an issue of this complexity. My good friend John Dingell on the other side of the dais has appropriately nicknamed it the Fish Feather Committee, and I think he is being kind in the use of his nomenclature. It is this committee, the Energy and Commerce Committee, that has the depth of knowledge and the diversity of views based on real-world experience that if we are going to legislate, it needs to be before this committee.

I support the public comments of the subcommittee chairman, Mr. Boucher, and the full committee chairman, Mr. Dingell, that the Energy and Commerce Committee is the committee of jurisdiction and will take a deliberate and serious approach to the examination of this important issue. It is a very complex issue. The science is complex. The economics are complex. The emotions are complex, and obviously the politics are complex. It is surrounded by so much smoke and mirrors that it is essential, in my opinion, that we establish a real record, a detailed and thorough record based on the science, based on the facts before we even think about legislation.

The proposals that are before us today both advocate capping America's carbon emissions at a fixed level and then provide a trading system to allow companies to purchase or sell those emissions credits. The proposals envision that the United States capping emissions unilaterally with the hope that such an act will inspire other countries such as China and India to follow suit. Good luck. That is not going to happen. This cap and trade approach has proven unworkable in countries that have signed the Kyoto Protocol and it will be unworkable if it is tried in the United States. Few participants in the protocol are on track to achieve their targets under Kyoto. An increasing number of countries are unwilling to strangle their own economic growth through stricter carbon caps no matter what the politics say.

Another fundamental flaw with the Kyoto Agreement is the exclusion of the developing nations like India and China. China is soon to have the distinction of being the largest emitter of greenhouse gases in the world and they do not have the productivity of the American economy which is currently number one in that item. The rationale for letting the developing nations off the hook is fairly straightforward. Poor countries get off the hook because they need to. Rich countries like the United States are better able to absorb the misery when the growth slows and the jobs are lost. Well, I am not going to tell my people down in Texas that they have to lose their job so somebody in India and China can keep their job.

Mr. Chairman, I am unilaterally opposed, unilaterally, unalterably opposed to any mandatory cap and trade system. I want to make that perfectly clear right off the bat. And I will have an open mind on the issues if we can come to some system—well, you got to be straight, folks. It is too important. If we can come up with something that makes sense economically and is based on some of the voluntary approaches that are working in the United States, I am open to that. But a mandatory system that doesn't meet those four tests, I am not going to support.

With that, I look forward to working with the people of this subcommittee and the full committee and see if we can at a minimum create a record that tells what the facts really are on this important issue, and I apologize for going over my opening statement. Thank you, Mr. Chairman.

Mr. BOUCHER. Well, I thank the ranking member for that statement and for his open-minded approach to the subject, and I assure him that we will work diligently in partnership with him to try to make sure that his very fair test is met with regard to legislation that we draft in this subcommittee.

Pursuant to the rules of the committee, members of the subcommittee will now be recognized for 3 minutes to make individual opening statements, and I would note that under the rules, any Member who decides to waive an opening statement will then have 3 minutes added to his time for asking questions of the witnesses.

And we will begin Member statements by calling on a person who I also want to welcome to the subcommittee. He is the vice chair of the subcommittee, and I believe this is the first term that he has served on this subcommittee and we are very glad to have him here, the gentleman from North Carolina, Mr. Butterfield.

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

Mr. BUTTERFIELD. Thank you very much, Chairman Boucher, to the ranking member. Let me first thank you for calling this very important hearing today. This is indeed my first opportunity to sit on this committee and to participate in these very important discussions. I am confident that with your leadership and the leadership of the ranking member, we will make tremendous strides forward in dealing with climate change. It is a subject whose time has come and finally we are ready to get serious in a bipartisan way in dealing with this important issue.

There is no doubt in my mind that the issue of global climate change will be a defining issue of this Congress and of this generation. There has been debate for decades on the reason for climate change, and whether the trends we have seen over the last 50 years occur naturally. I am confident that the science is now conclusive. The Earth is warming, and mankind and womankind are to blame. Thousands of the world's best scientists including members of the most reversed scientific communities agree, and Congress must take action to most us in the right direction.

What remains unclear to me, however, is what legislative remedies will produce the right amount of regulation to foster a good climate policy as well as a sound business plan. Some cap and trade plans will force burdensome and expensive requirements onto companies while others offer a more responsible, longer-term approach. Some changes in CAFE standards will be too immediately for automakers while others, I believe, offer a proper timeline and adequate milestones.

It will not be enough for us to demand that industry alone be cleaner. The Federal Government must shoulder some of the burden for moving the necessary technology forward through research and through development programs and technology grants. The origins of our climate change problems are not rooted in industry alone nor can the solutions be their responsibility alone.

And so Mr. Chairman, I look forward to the opportunity to discuss these issues with our witnesses today. I yield back.

Mr. BOUCHER. I thank the gentleman, and recognize now for 3 minutes the gentlewoman from North Carolina, Mrs. Myrick.

Mrs. MYRICK. Thank you, Mr. Chairman, but I will waive.

Mr. BOUCHER. I thank you. The gentleman, Mr. Sullivan, is recognized for 3 minutes.

Mr. SULLIVAN. I waive.

Mr. BOUCHER. OK. Thank you, Mr. Sullivan. And seeing no further members of the minority, the chair now recognizes the gentleman from Massachusetts, Mr. Markey, for 3 minutes.

OPENING STATEMENT OF HON. EDWARD J. MARKEY, A REPRESENTATIVE IN CONGRESS FROM THE COMMONWEALTH OF MASSACHUSETTS

Mr. MARKEY. Thank you, Mr. Chairman, very much, and thank you for having this hearing.

In his State of the Union address, President Bush actually uttered the words "serious challenge of global climate change." Not

since Charles Foster Kane whispered the word "Rosebud" on his deathbed at the beginning of the movie "Citizen Kane" has a phrase touched off so much speculation about what its author actually meant and what it all signifies.

Clearly, the political climate has shifted in the debate about climate change. We have seen the Bush administration go from questioning the science of climate change and questioning whether human actions were the cause of climate change to having Energy Secretary Bodman declare that "Human activity is contributing to changes in the Earth's climate." He added, "That issue is no longer up for debate."

But if the debate over the reality of global warming and the threat it poses to our planet is largely settled due to the overwhelming international scientific consensus, the debate about what we should do to respond to this threat has only just begin.

Today we will be hearing from two bipartisan private sector panels comprised of a diverse mix of electric utilities, labor unions, environmentalists, academics, consumers and manufacturers. While the details of their proposals differ in some respects, most are in agreement on the need for a mandatory cap and trade system that would freeze and then reduce emissions from carbon and other greenhouse gases known to cause global warming. These panels each lay out a pathway for our country to be a leader rather than a laggard in cutting carbon pollution. Both panels call for cost-effective energy efficiency measures such as more fuel-efficient cars and SUVs that could significantly reduce the amount of carbon pollution we generate, more-energy-efficient green buildings and more-energy-efficient consumer, commercial and industrial appliances. Both call for policies to promote research, development and deployment of low- to zero-emitting greenhouse gas technologies, many of which are already cost-effective and simply sitting on the shelf such as wind power, solar power and other renewables.

In addition, both panels call for action to promote lower carbon transportation fuels such as ethanol made not only from corn but from corn stocks, grasses and farm waste. If Rumpelstiltskin was around today, he wouldn't be turning straw into gold, he would be turning it into ethanol. Like Rumpelstiltskin, ethanol entrepreneurs are finding ways to turn green into gold by developing a low-carbon, domestically produced renewable fuel that can power our cars and light our homes.

What is needed to move these technologies forward is a set of bold Governmental policies to provide incentives and opportunities for these new technologies to meet their full potential. According to a recent study, this is all possible.

I welcome back Chairman Sharp. Phil Sharp was chairman of the Energy Subcommittee for 14 years. It is an honor to have you back with us again today, Phil, and I yield back the balance of my time, Mr. Chairman.

Mr. BOUCHER. The chair thanks the gentleman, and recognizes for 3 minutes the gentleman from Texas, Mr. Burgess.

Mr. BURGESS. Thank you, Mr. Chairman. I obviously want to thank Chairman Dingell for convening this hearing. I will submit my statement for the record and save time for questions.

[The prepared statement of Mr. Burgess follows:]

PREPARED STATEMENT OF HON. MICHAEL C. BURGESS

Thank you Mr. Chairman, for convening this hearing today.

Speaker Pelosi has set a very ambitious timetable for addressing the subject of global warming and global climate change. I'd like to applaud you, Mr. Chairman, for your efforts to ensure that any legislative solution move through regular order and through this committee.

As you said earlier, this is the first of many hearings on the subject and I look forward to hearing from our witnesses.

But I am a bit puzzled by the order of these hearings. In order to make thoughtful, well-informed policy decisions, committees hold hearings, where Members can question expert witnesses.

Only after the committee has gathered information, should we then begin to evaluate policy proposals.

Yet our first hearing, this morning, will examine several rather complex cap-and-trade programs suggested by independent organizations and tomorrow we will turn to a discussion on the science.

I believe it would make a lot more sense to first inform ourselves of the facts, and then turn to policy proposals. And as we evaluate those policy proposals, we must keep in mind the costs to individual Americans and small businesses.

As we begin this discussion, I would express my serious concern about proposals that would exclude India and China, particularly when China will soon eclipse the U.S. in terms of CO^2 emissions.

Again, I thank the witnesses for appearing here today and I look forward to their testimony.

Mr. BOUCHER. The chair thanks the gentleman, and recognizes for 3 minutes the gentleman from Maryland, Mr. Wynn.

OPENING STATEMENT OF HON. ALBERT RUSSELL WYNN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MARYLAND

Mr. WYNN. Thank you, Mr. Chairman. I am very pleased that this subcommittee has a proud tradition of sound environmental legislation. I am particularly pleased to hear your commitment announced today that this subcommittee will pass a mandatory climate change regime.

Some of my colleagues on the other side of the aisle mentioned the axiom from the medical profession, "first do no harm." But I think it is important as we have this discussion today that we distinguish between harm and pain because there is another axiom that says "No pain, no gain." If we are mature, we have to accept the reality that this process will not be painful, we should be under no delusions about that fact, and that pain will have to be shared by both industry and consumers. At the same time, we also have to recognize that in order to move this process forward, we must strike a delicate balance between the need to pass climate change legislation and a need to preserve jobs in this country.

I think there are a couple things that we should keep in mind. First of all, we must aggressively promote technology research and development programs to promote clean energy technology such as hydrogen fuel cells, which have zero emissions. Second, we must also reward the firms that are already acting to reduce emissions and discourage investment in high-emitting facilities. Third, we must take the lead in addressing global climate change.

One of the previous speakers indicated that greenhouse gases don't carry a "made in the USA" label. That is certainly true. But it is also true that as the largest polluter or contributor of greenhouse gases, we cannot expect developing countries to reduce emissions if we don't set the standard ourselves. As for China, that is

a classic example where we do need to set an example but it should be noted that China is already working to require 20 percent of its electricity to be generated from renewables compared to the 10 percent that is projected for the United States. China is also working to have higher fuel economy standards than the United States, which would also adversely affect our auto manufacturers in the future.

I am very excited about the prospect that this subcommittee will take up the challenge of climate change. I understand it will require sacrifices from all sides but I think under your leadership and working in a bipartisan fashion, we can develop legislation that will be good for the country but will not harm our economic prospects.

I relinquish the balance of my time.

Mr. BOUCHER. The chair thanks the gentleman, and recognizes the gentleman from Pennsylvania, Mr. Doyle.

OPENING STATEMENT OF HON. MIKE DOYLE, A REPRESENTATIVE IN CONGRESS FROM THE COMMONWEALTH OF PENNSYLVANIA

Mr. DOYLE. Thank you, Mr. Chairman. I would like to welcome our distinguished guests who have come before us to testify about what may be the single most important issue that faces our current Congress. I am looking forward to hearing their recommendations as Congress for the first time begins to address the very real and very serious effects that global warming will have on all of us.

While we have figurative light-years to go before we can say that we have been able to fully and effectively deal with this issue, I think it is important to note that together we are all taking the first steps toward reversing the trend that is not only unsustainable but may in fact threaten each of the inhabitants of our planet if it is allowed to continue, but what is important with this hearing and this new commitment of the 110th Congress is that we are no longer playing dueling scientists where for every expert who says global warming is a reality another is brought out to say the science is inconclusive. Much like the early years of the Government investigation into big tobacco, we have been stuck in a "he said, she said" type of debate and I for one am ready to move forward and start addressing the very real threat that global warming poses for all of us.

I am encouraged to know that many of our panelists feel the same way. So what do we do? As I have no doubt each of you will testify to, there is no single silver bullet-type action that Congress or industry can take to meet this challenge. Instead, it must be a combination of Government actions on the policy, regulatory, enforcement and research levels along with the deep commitment of private industry to become more efficient, burn cleaner fuels, capture their emissions and become true stewards of our environment, but we cannot do this alone.

Global warming is just that, a global problem. While America must lead the charge to fight it, this is not something we can or should do alone. It is critical that we engage our neighbors across the globe to ensure that countries such as China, India, Germany and Great Britain are free and full partners in this challenge.

I was suggesting to my good friend, Mr. Markey, who is going to chair the Speaker's Select Committee on Global Warming, that he may want to hold his first two hearings in China and India. Their active and full support in finding a solution is critical toward ensuring that global warming can be slowed, stopped and eventually reversed. With the support of the world community, I believe we can meet this challenge. Never before has the spirit of American ingenuity been unable to meet a challenge that faced our country, and I know the spirit will be triumphant again through new technologies, a real commitment to efficiency and the development of new sources of power, we can achieve the goal.

I look forward to working with my colleagues on this critical matter, and Mr. Chairman, I yield back the balance of my time.

Mr. BOUCHER. I thank the gentleman, and I am pleased to recognize for 3 minutes the gentleman from Illinois, Mr. Shimkus.

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

Mr. SHIMKUS. Thank you, Mr. Chairman. Perfect timing, so it is great to be here.

We have a couple important principles as we start in this debate and many of you know follow what I have been working on for many, many years, is we use electricity and we use a lot of electricity and we need more supply to have competitive rates, to keep our manufacturing base strong and be competitive in the world market.

Having said that, there are concerns, so the real issue is, let us look at the science but let us look at a market-based approach by which we can stay competitive in the world environment, and let us don't undermine the aspect that the Kyoto Treaty has been a failure. People aren't complying with it. You are keeping Third World countries from being involved in that who are the greatest potential abusers of any type of system because of their rush to become a modern society.

I have been involved in a lot of different issues in my 10 years here in Congress and the focus will be working together bringing all parties involved, not highlighting the bad guys and then separating them and defining who the good guys are, but working in a consensus by which this country continued to be the leader on the globe in growth and economic development.

I am in the minority now. I am going to have to raise my voice and make sure that the people who employ our workers of this country, that their voices are heard, and that is going to be my task at hand in this whole debate. It unfortunate that we have to develop a special committee to debate that where we are not able to do that within our own committee jurisdiction and I hope that we will reclaim that authority through the legislative process.

With that, Mr. Chairman, thank you and I yield back my time.

Mr. BOUCHER. Thank you very much, Mr. Shimkus, and I am now pleased to recognize for 3 minutes the gentlewoman from California, Ms. Harman.

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

Ms. HARMAN. Thank you, Mr. Chairman. I am pleased to be back on the committee and I applaud you for your opening statement on bipartisanship and your clear call to action.

Climate change is the challenge of our generation and the catastrophe for the generations that follow us. For every day we fail to act, the effects of climate change will be a little worse and the resources and ingenuity required to fix the problem a little greater. By the end of the next decade, I believe, we may have blown it.

Southern California has been ahead of the curve for a long time. Automakers in my district pioneered hybrid vehicle technology. My house in Venice, California, is solar-powered as are others nearby and I and many others drive hybrid cars.

It is important to understand that reducing emissions of greenhouse gases and strengthening our economy is not a zero-sum game. Both our planet and our economy can win or both can lose.

In August of last year, a U.C. Berkley study showed that mandatory reductions in carbon dioxide emissions could produce substantial economic growth and substantial job creation. The study estimated $60 billion of economic growth and 17,000 new jobs by 2020 in California alone, all the result of spurt investment in technology and reinvesting saved energy costs.

I am proud to see my home State of California leading the charge in showing the Nation how this can work. We mandated emissions caps late last year and I am confident that we will, as we often do, set the example for the Nation.

As we have heard, China and India ought to be having the conversation we are having here today but there are other countries, especially in Europe, that had that conversation some time ago. Time is not on our side. We must show leadership and hopefully we will do that in this committee, the committee of jurisdiction in the House.

Thank you, and I yield back.

Mr. BOUCHER. I thank the gentlewoman, and I recognize for 3 minutes the gentleman from Texas, Mr. Gonzalez.

Mr. GONZALEZ. I waive also.

Mr. BOUCHER. I thank the gentleman. The gentleman from Washington State, Mr. Inslee.

OPENING STATEMENT OF HON. JAY INSLEE, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF WASHINGTON

Mr. INSLEE. I really think it is our country's destiny to really lead the world in finding the technologies to deal with global warming. You can't tell me that the people who invented the airplane, the light bulb, the Internet, mapped the whole human genome, perfected the Internet, are going to stand aside and be second-class economies when it comes time to develop these technologies, and I think the real fuel, the real renewable fuel we are going to use in this revolution, and it is going to be a clean-energy revolution, is going to be confidence, and we ought to have the confidence that Americans have shown historically in dealing with transitions because every time there is a technological transition, we make money and we are going to do that in this clean-energy revolution.

You go out to the Nano Solar Company in Palo Alto, California, where they are developing a thin cell, photo-otaic cell. They will have confidence. You go to the Logen Corporation ready to build the first cellulosic plant in Idaho. They have confidence. You go to the Solar Heating and Thermal Company, a company somebody just moved from Australia to take advantage of the good technology we have here. They have confidence. You go to the Ramgen Company in Tacoma, Washington, that just developed a compressor that could help perfect clean coal by reducing compression costs of CO^2 so we can put it in the ground by a factor of 50 percent. All across the country, there are companies right now the A–123 Battery Company in Massachusetts, which is going to build the first battery for our first plug-in hybrids, the Volt that GM is getting ready to build.

We have people who have confidence and this Congress has to have confidence in dealing with this issue, and I want to talk about a cap and trade system, why that is a measure that is founded on confidence. Number 1, it is founded on the confidence that we want to make sure these technologies that we are inventing get used. We are spending $1 billion on clean coal research, research that I fully support, but no one will ever build a clean coal plant as long as they can dump their CO^2 into our atmosphere without regulation for free. We have got to make sure that they have an incentive to use the technologies that our brilliant Americans are inventing.

And second, I want to talk to some of my Republican brethren, those with open minds, and I have there are many there on the other side. This is a conservative economic principle. It is the conservative economic principle of property rights. Everyone in this room has a property right in a thin sheet of atmosphere that guards the world to keep us from freezing, and if we treat it right will keep us from burning up. It is a property right, and no company in America should be able to put their garbage, their carbon dioxide on our property for free. This is a conservative principle. We are protecting with a cap and trade system something that is unique in the solar system which is an atmosphere that we share that allows human life to flourish in God's creation, and a lot of people are talking about creator's care right now and a cap and trade system is a meaningful, common-sense way to take care of the garden. So for those who consider themselves conservatives, I urge them to join us in developing a system that will protect the most important property to humankind right now which is that thin sheet of atmosphere that we have, and we are going to get that job done because we are the folks with the real confidence.

Mr. BOUCHER. The chair thanks the gentleman, and is pleased to recognize a former chairman of this subcommittee, the gentleman from Texas, Mr. Hall.

Mr. HALL. Mr. Chairman, since I have another committee hearing, I will waive my right and save time to ask questions. I thank you, sir.

Mr. BOUCHER. The chair thanks the gentleman and is pleased to recognize the gentlewoman from Oregon, Ms. Hooley.

OPENING STATEMENT OF HON. DARLENE HOOLEY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF OREGON

Ms. HOOLEY. Thank you, Mr. Chairman. I want thank all of the witnesses for taking time today to appear before this committee as we begin our work on what will certainly be the most environmental issue addressed by Congress. In fact, without sounding too dramatic, this could be the most important and difficult environmental issue we are going to face in our lifetimes. We can't lose sight that this is not just a U.S. problem, this is truly a global issue.

Due to the inaction of both the administration and Congress to engage in this debate for the past 6 years, we have very little credibility on climate change within the global community. Since the United States is responsible for 25 percent of all greenhouse gas emissions, we cannot begin to address this problem on a global scale unless we lead by example. Working towards a global solution for climate change is dead in the water without the leadership of the United States.

As our committee begins to work through these tough issues, I look forward to hearing from our panels today as they testify on the harsh realities of global climate change and the innovative and sometimes provocative ways in which they feel our country can move forward in a way that will yield positive results while keeping us competitive in the global marketplace, and I yield back the remainder of my time. Thank you.

Mr. BOUCHER. I thank the gentlewoman, and I am pleased to recognize the gentleman from Utah, Mr. Matheson.

Mr. MATHESON. I will waive.

Mr. BOUCHER. Thank you. The gentleman from Georgia, Mr. Barrow.

Mr. BARROW. Thank you, Mr. Chairman. I can add nothing of consequence to the opening statement of the chairman and Chairman Dingell and nothing of eloquence to the statement of my friend, Mr. Inslee, so I will waive opening statement. Thank you.

Mr. BOUCHER. The chair thanks the gentleman, and I assure you, that will not count against your time. And I am now pleased to call on the gentlewoman from Wisconsin, Ms. Baldwin.

OPENING STATEMENT OF HON. TAMMY BALDWIN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF WISCONSIN

Ms. BALDWIN. Thank you, Mr. Chairman. Many years ago, a Senator from my home State of Wisconsin had a vision. He envisioned a world in which our precious oceans and lakes are protected, our air is clean to breathe and our planet is placed under the proper stewardship for the benefit of future generations. Being a wise man, Senator Gaylord Nelson saw that everyone around him was observing evidence of environmental degradation, everyone, that is, except his fellow Senators who in his estimation weren't interested in action. He knew that if the environment was to have its place on the political agenda, it had to be put there by the people. So he announced that there would be a nationwide grass-roots demonstration on behalf of the environment. He called it Earth Day. At the time it was a gamble but I think well worth the try. No one

anticipated the level of participation. Over 20 million Americans came out to participate. The sheer number got the attention of Gaylord Nelson's colleagues in the Senate and it was those voices that led to congressional action on some of our most treasured environmental laws: the Clean Air Act, the Clean Water Act and the Safe Drinking Water Act.

Mr. Chairman, we sit here over 35 years after the first Earth Day and we are again facing a growing threat to our environment. Scientists have told us loudly and clearly that the Earth is warming at an unprecedented rate, that carbon dioxide levels are rising and that human activities are largely the cause. But for too long this administration and Congress have sat silent. Our Nation has remained the largest consumer of electricity, oil and natural gas, all without altering our environmental policies. Meanwhile, counties with significantly smaller footprints on the world have made incredible advances and have improved the quality of the air they breathe, the food and water they consume and the lifestyle they lead.

Fortunately, the American people are once again engaged. As they did three decades ago, they are again speaking out at the grass-roots level for change, and as we see before us today, we now have business leaders and NGOs that have organized themselves because they too realize it is time to protect and respect our environment and natural resources.

I am pleased that corporate America has taken steps to gather such a unique group on the premise that we can and we must make progress on climate change, and by partnering together with NGOs like Pew, Environmental Defense and the Natural Resources Defense Council, you are saying to the world that America is finally ready and willing to take prompt, thoughtful, environmentally responsible action.

It is clear that Wisconsin Senator Gaylord Nelson's legacy has extended far beyond Earth Day. I think we are seeing proof of that today.

Thank you, and I yield back the balance of my time.

Mr. BOUCHER. I thank the gentlewoman. That completes the opening statements by members of the subcommittee.

We now turn to today's witnesses, and it gives me a great deal of pleasure to welcome back to the subcommittee a personal friend and someone who certainly is no stranger in this hearing room. He is at the present time the chair of the National Commission on Energy Policy and testifies on behalf of that commission today. He is the president of Resources for the Future and he is a former chairman of the predecessor committee to this subcommittee, which in those days, as I recall, was the Subcommittee on Energy and Power, and in that position he was the father of what has been an enormously successful legislative effort, the Energy Policy Act of 1992, and so with that introduction and a warm word of welcome, Mr. Sharp, we will be happy to hear from you, and we will make your written statement a part of the record, and ask for a 5-minute summary.

STATEMENT OF HON. PHILIP R. SHARP, PRESIDENT, RESOURCES FOR THE FUTURE

Mr. SHARP. Well, thank you, very much Mr. Chairman. I am honored to be with you and honored to be with you as you take charge of leadership of this subcommittee.

Just as a historical note, 32 years ago this week, John Dingell became chairman of this subcommittee and had his first energy hearing. At the time I was a freshman Member which was one of hundreds of hearings to follow, as many of you can appreciate. Mr. Dingell at that time began consideration of President Ford's comprehensive energy bill called the Energy Independence Act of 1975. Out of those efforts of that day and multiple hearings to follow came landmark energy legislation including the Energy Policy and Conservation Act which by the way was the beginning of fuel economy standards, was the beginning of the Strategic Petroleum Reserve and many other item, and ironically, in President Bush's State of the Union address on these two policies I just mentioned, he articulated the need to increase both. So there has been a long bipartisan tradition in this subcommittee and outside of this subcommittee in dealing with these issues.

For the record, I must indicate I am president of Resources for the Future, a nonpartisan, non-advocacy organization for the last 50 years working on energy and environment issues, and while our scholars, some of them are quite busy on designing questions relating to cap and trade policy for climate change and other climate issues, today I am representing the National Commission on Energy Policy where I was the congressional co-chair. That commission was established in 2002 by the Hewlett Foundation. It was to bring together bipartisan representatives from business, labor, academia and environmental organizations to see if they could come together on some energy policy recommendations, which we did to the surprise of myself and other people, in 2004, and that included a framework on climate change.

Just very quickly, that package was very broad-based, had to do with oil security, electricity markets, new energy technology, supply incentives, efficiency incentives and the need for critical investment in infrastructure in this country, and indeed in 2005 many of you folks were involved it the 2005 Energy Policy Act which adopted proposals that were in many cases supported by that commission.

When it came to climate change, the commission was concerned in 2002–04 time frame with three things. One, the importance of getting started, albeit slowly but getting started with a mandatory program to retrain the growth of carbon and other major greenhouse gas emissions. In those years the science still had many questions around it but it was being heavily articulated, this was real and we needed to act and the commission came to the bipartisan conclusion that it was prudent to begin action at that time. As you know, just 2 weeks ago the fourth assessment of the Intergovernmental Panel on Climate Change came forth with a significantly strengthened point of view as to the urgency to the act and to the consensus on science on these matters and it reinforces among commissioners the view that action now is required.

The second major concern was the uncertainties about the cost to our economy and indeed the world economy, particularly to our own, and many commissioners shared a number of their views that some of you have articulated about this concern about how high can the costs go, do we have any idea. Those are legitimate concerns and obviously lead to considerable opposition or concern about advancing.

The third concern of the commission was the imperative over time, as articulated by many of you, that the key developing nations have to join in at some point. It doesn't have to be immediately but it does have to occur at some point if we are to be effectively and not simply shift who is making what around the world. Of course, a number of advanced countries have already begun mandatory programs.

The basic approach that the commission took was the recommendation that we should adopt a lasting, something that can last, framework for how to do deal with this question to regulate these emissions, a framework that can be adjusted over time as we learn more about science, as we learn more about the pace of technological innovation, as we learn more about the economic impacts, as we learn more whether or not other nations, key nations are in fact advancing as we trust they must.

The essential feature of this recommendation, of this framework was to say there needs to be a price in our economy for the major CO^2 and other greenhouse gas emissions. This is a very conscious and deliberate choice. It is almost taken for granted these days of not going the route of command and control, in other words, not going the route of the thinking that we can regulate tailpipe and smokestack standards and set what those technologies are in place by the Government doing them as we have done in other aspects of the Clean Air Act but rather choosing a market mechanism to maximize the innovation, to maximize the number of decision makers that will take action within our economy and bring about, we hope, all kinds of good results.

There are obviously two choices when you decide to put a price in the marketplace. One is, you could tax these items and that will have that effect. We chose primarily for pragmatic reasons to say we would go with cap and trade model, as the chairman has already indicated after the SO2 acid rain trading program which nearly everybody agrees has been highly successful.

A couple words about the cap and trade design, and then I will close here quickly. First of all, of course, this is to put a cap or a budget for the entire broad-based economy, not just for one sector of the economy. Permits then could be traded and sold. They will tell marketplace what is the cost of emitting CO^2, for example, but a key feature in our proposal which was designed to deal with the political and legitimate concerns about, do we know what the costs of this are to the economy, is something called the safety valve in which you set it in place and you say at a certain point, a certain cost point, the Government will sell permits and therefore the costs to the economy of a ton of CO^2 will not rise higher than that. You provide certainty on the cost side. Admittedly, it does not give you as much certainty on the emissions control side but it answers that

question. Obviously what you pick and how that arises is a critical question.

We also see this as providing an answer to the problems that arose out of the system in Europe, the trading system where they had no experience in Europe with this. They were trying to pattern after us and they frankly botched it in the way in which they designed it but it caused a shoot-up in the prices that almost led to political withdrawal of support for the program there which they had no experience with, and so there were a number of design features they made a mistake on. One is, I think we would design it better, but two, I think that we would have protection with a safety valve of knowing whether or not what are the consequences.

A third and the last feature I want to just mention of this is that the safety valve was designed in our proposal to continue to rise so that means the potential costs would rise on carbon dioxide. However, after so many years we would just automatically flatten it to give Congress a chance to examine the question, is China, is India, is Brazil, are the major other emitters taking actions that are necessary, in other words, an unwillingness to make an open-ended commitment to continuing costs in the economy. These features, the safety valve and the flattening, are somewhat controversial. There are many different approaches one might take to them, and indeed, even the commission itself is reviewing the question of the low price level that we actually set or the low tolerance level that we set for getting started back in 2004.

One last proposition—Mr. Chairman, I appreciate the tolerance on the time—is the fact that we recognize this is only the framework for how to regulate the emissions. There needs to be supplemental policies, many of you have been articulating them, some of them in the 2005 Energy Policy Act, to advance technologies in this country and their deployment, to get more energy efficiency, to see that we have nuclear power, to see that we have coal sequestration ready for us. There are multiple additional things that need to be done because it is very unlikely that the Congress will or the country will tolerate an extremely high price on carbon dioxide at the outset or in the near future and therefore we will not get all the impacts you need to continue to advance us forward.

And to close, I simply indicate we and others who have put before as is being put before you today are only putting before you frameworks. I recognize, and I think most of our commissioners recognize, there are lots of tough questions in scaling up and designing an effective cap and trade system that you will have to do or you will have to delegate to others. This is tough work, lots of work that needs to be done. Nobody should pretend it is easy. We just think it is very important.

Mr. BOUCHER. Thank you very much, Mr. Sharp, and we look forward to working with you as we try to design the system that meets that high hurdle.

I gather from your testimony that in your view the European Union's experience with cap and trade is mostly a model of how not to do it correctly. Would that be a fair statement?

Mr. SHARP. Well, I am not exactly an expert but we do have some scholars who spent a lot of time trying to figure out what they did there, but clearly they had an abnormal rise in the price

of their carbon emissions credits. It has come significantly back down but for a while they couldn't even figure out why it was. They had information questions they didn't how to publish. We had a much more transparent system in our SO2 thing which at marketplace needs for people to know how high to bid. So they had multiple difficulties. Besides that, they adopted a Federal principle, given the fact that the European Union is somewhat of a Federal structure, in which they let every government take all kinds of variations on the theme and it seems to be there were just some inherent difficulties there.

Mr. BOUCHER. Well, I suppose one question we can ask them is, if they had it to do over again, how would they do it differently based upon the experience they have had.

I made reference in my opening statement to my concern about coal, and I want to get your advice on this. I think it is very important that as we design this system that we assure that coal at least keeps its current place in the energy mix. Today it occupies about 51 percent of the market for electricity generation. The Energy Information Administration predicts that over about a 10-year period, coal will grow to a larger share, I think the number 56 or 57 percent has been mentioned. Is there a way that we can allow not only coal to retain its current market but enable it to grow as it is currently predicted to grow? And I would assume the answer is, that is done through technology. So elaborate a little bit, if you would, on first of all, is that possible, and secondly, what do we need to do to be able to assure it?

Let me also add to the question, that it is fundamental not just to protect people like the ones I represent in Virginia's coal industry although I have to say I care about them a lot. It is also fundamental that we do this to prevent even greater pressure on natural gas. If coal is abandoned or if there is a substantial switch by coal-fired utilities to another source, an obvious early candidate would be natural gas, and would cause an even further spike and greater volatility in natural gas prices to the disadvantage of the entire economy. So I think we have to do this for a lot of reasons. Your comments on how we could do it effectively.

Mr. SHARP. Well, first and foremost, let me just say that the commission took a point of view, I believe you will find it in other proposals we have before us, that coal will be a part of our future energy mix. It is not going to in any near time be done away with. You are asking at what percentages will be under the numbers that are recommended in 2004, and admittedly, we are reconsidering whether to make them stiffer. The run on that by the Energy Information Agency suggested that coal would continue to grow, I forget, for 20, 30 years ahead, what period of time. The 20, 30 time frame is what they used. And that that would continue, not as rapidly as what is under the business-as-usual case today. Obviously as you say, one is how constrained you are makes a difference, but second of all, as you articulated, the technology questions are very important. The MIT coal study of future coal is about to come out in a couple of weeks. That has some very important recommendations for how to advance the sequestration R&D program of the U.S. Government so that it is more effective, more quickly ready for big scale, and we are talking about a big-scale operation here.

We already know how to sequester that. It is technically possible. We do it in the oil fields and whatnot. But to do it on a big scale is what we need so that coal can play or other carbon fuels can play in this mix. So it is a combination of how to advance the technology, and the commission itself also recommended trying to advance sequestration, trying to advance IGCC and other advanced technologies. If you just get coal to be burned more efficiently, you will automatically do a better job on this. So if in China, if in India, if in the United States the coal burning we are doing is with higher-efficiency technologies, we gain from CO^2 point of view.

Mr. BOUCHER. One final question that I have for in the diminishing seconds I have available, one of the big concerns—and I think a number of Members mentioned this in their opening statement—is making sure that if the United States acts with a cap and trade program that we get some correspondence with the international community and particularly with developing nations, and that China, India, Brazil, other major emitters of greenhouse gases also begin to take part in the global programs to assert controls. There is no way to know today if that is going to happen or how quickly that is going to happen, and I am wondering about your view as to whether it might make sense to have some kind of safety valve built in to the legislation that would anticipate international cooperation on this but would not have at least the latter phases of a controlled program here go into effect in the event that we don't get buy-in from the developing world. Is that kind of approach workable, and do you have any thoughts about it?

Mr. SHARP. Well, that kind of approach was adopted by the commission, not the full out that you have mentioned at some point but what I said, that we flatten the requirement, in other words, it doesn't continue to grow on the U.S. economy, the requirement for constraint unless the Congress determines at a future point—you set a date, I forget what we said about 10 or 15 years out, the other nations are participating and then you and others can decide whether or not we really have cooperation. That is not the only kind of thing. Of course we have to be aggressive leaders internationally and whatnot. It is interesting to note, a lot of people are predicting the consequences of climate change will be uglier for China than they will be for the United States. If that is true, they may discover they have incentives that we don't now see to move.

Mr. BOUCHER. Thank you very much, Mr. Sharp. The gentleman from Michigan, Mr. Upton.

Mr. UPTON. Thank you, Mr. Chairman, and Mr. Sharp, Phil, welcome back. I want to just touch on a couple of things. You were once chairman of this subcommittee and had a great victory I think in the Energy Policy Act of 1992. That was right about when I got on the full committee and did not serve on the subcommittee then. You have seen some of the challenges that the Speaker and others have put out. They want to see legislation addressing this issue by I believe June 1. How difficult a job will that be knowing that it is literally March now?

Mr. SHARP. Well, Mr. Upton, I have recovered as a politician but I haven't totally forgotten about being a politician, so I will probably avoid answering that question directly. Let me suggest to you——

Mr. UPTON. Give us a straight answer.

Mr. SHARP. Let me suggest to you——

Mr. UPTON. You are in a much better position to give a straight answer now.

Mr. SHARP. This is tough, and I think it is going to take and require a lot of both effort to self-educate and to coordinate so I think those will be tough deadlines to meet. Now, you can meet those deadlines if you delegate a lot of the decisions in here to some Federal agency. That is always an easier way to legislate but it defers some of the tough decisions. In the 1990 Clean Air Act Amendments on SO2, we of course went through the brutal negotiations over how to allocate those credits and we set very strict rules that EPA had very limited ability to alter. We kept the decisions in Congress. If you do that, it will take more time.

Mr. UPTON. Now, when your commission began to look at what it had done with Kyoto, of course Kyoto started in 1990. That was the baseline levels it started. What would you recommend that this committee look at in terms of a benchmark year? 2006?

Mr. SHARP. We didn't frankly attempt it. We didn't set our cap in that manner. We just simply assumed Kyoto was off the table for the United States. We were not trying to be with Kyoto or against Kyoto. We were just separate from Kyoto. We took an entirely different point of view and we set a thing that it actually was patterned after the Bush administration in hopes that it might entice them to be interested in it of setting the cap by using an intensity mark and we wouldn't start it until 5 years after the program is adopted. So this some of the critics view as a weaker way to proceed but it is different, but you have got a key issue to decide which is where do you start and what is the baseline you use.

Mr. UPTON. And where did you piece in the mix of nuclear power as a component of this legislation?

Mr. SHARP. Well, in our proposals we articulated the need to advance Yucca Mountain to the consideration of the NRC for licensing, and of course that is a decision the NRC has to make if that meets the safety requirements. We articulated some of the things that were commended in the MIT future of nuclear power report which said the Federal Government should put incentives in place, which you did in fact in 2005 for a new generation of plants. We ought to keep a strong R&D program going. I think most of our members saw that we could not see a future in which we could plan to do significant restrain on carbon that simply excluded nuclear power.

Mr. UPTON. And did you look at any number knowing that we have about 103 nuclear plants now?

Mr. SHARP. Again, we did not try in that manner to say where each of the wedges would come from. We frankly see the marketplace as the critical way to do that. It is why we use a price signal to help figure that out.

Mr. UPTON. Last question from me, and that is, as we look at the performance of those countries that did sign Kyoto, particularly in Europe, I am intrigued by your safety valve thought, knowing that of course we have got, as you said, China and India as well as Brazil, some other soon-to-be major manufacturing counties that

are not signatories. At what point, you said the safety valve would kick in a number of years after——

Mr. SHARP. No. The safety valve starts with the program and we set a figure of $7 per ton of carbon emitted. Most people say we were awfully low but that was $7 per ton of carbon, and the assumption was that in fact as you began to start this under our proposal, you would not even reach the safety valve in the first 3 years. It is just a question, but at some point you would. That safety valve would automatically raise, as I recall, by 5 percent a year so it is on a steady increase, meaning that it could potentially rise higher. I don't remember the actual dates but 10 years out I think we flatten that and say it will no longer rise, which means you are no longer allowing costs to go unless Congress decides to go forward after it has seen what the rest of the world is doing with that.

Mr. UPTON. Thank you.

Mr. BOUCHER. Thank you, Mr. Upton. The chair now recognizes the chairman of the full committee, the gentleman from Michigan, Mr. Dingell, for 5 minutes.

The CHAIRMAN. Mr. Chairman, thank you. I am delighted to welcome back our old friend, Mr. Sharp. You have been in this room many times on both sides of the table and you served here in this Congress and in this committee with extraordinary distinction, and I will recall that you were one of the Members that I used to look to for leadership advice and guidance and help on difficult legislation, and you authored many valuable pieces of legislation, particularly in the area of energy and clean air. So we are happy to welcome you back, Mr. Sharp.

Mr. SHARP. Thank you.

The CHAIRMAN. Mr. Sharp, I don't disagree with your observation that developing countries are unlikely to act first, but the second half of your thesis is that developing countries will follow the U.S. if the U.S. unilaterally limits its greenhouse gas emissions. This is a very important question, because if they do not follow us, then we have the problem of having lost some trading cards and the ability to procedure their assistance in addressing what is clearly an international problem. What are your comments on that?

Mr. SHARP. Well, I don't disagree. I do not accept the notion they will automatically follow. I think what is true is, they won't take action if we are not since they see us as——

The CHAIRMAN. I had a meeting at Kyoto with the Chinese delegates and they informed me that China was a developing nation, would not be bound by Kyoto, would always be a developing nation, would never be beyond by Kyoto and that they looked to us to be the principal nation which would reduce CO^2 emissions, indicating that they propose to continue, and you will note that the Chinese emissions are going to very shortly surpass our own. This puts in somewhat of a dilemma, does it not?

Mr. SHARP. Well, it does, Mr. Chairman, but I would just suggest that they may find changing their mind on this proposition, because I suspect that they had been talking to representatives of the U.S. Government at the same time they were told the same thing, we were never going to adopt Kyoto, we were never going to do it. I don't mean to debate you in that regard. I think it takes tough

international leadership. I think we have to get started but I think we have to provide ourselves a way to negotiate over time and to control the costs.

The CHAIRMAN. Now, in your comments, you indicate the National Commission on Energy Policy may issue updated recommendations that strength the 2004 report. On the one hand, that could be helpful to the Congress. On the other hand, our timetable for action in this matter will be only a few months because the Speaker has indicated she wants a bill by the 1st of June. Can you give us an appreciation about areas the commission may strengthen, and can you tell us when this additional work may be completed? How should the committee act itself on these matters?

Mr. SHARP. Well, we don't have a specific timetable. I think the commission plans another meeting in March at which point that may happen. It has been working on the notion of not changing the basic framework of what we have recommended but whether or not we would simply recommend different numbers. But frankly, I think you folks are quite capable of plugging in different numbers and running through the EIA computers and seeing at least to the extent we are able to use models what they represent and so it is really going to be a difference of how fast to ramp this up over time is the question I think before the commission.

The CHAIRMAN. Mr. Sharp, you served, as I mentioned, with great distinction on this committee and helped us to move forward major bills through the legislative process. The committee has been, as I have mentioned, given approximately until the 1st of June to complete legislation on this matter. You have given us an excellent statement, but can you tell us first of all what should go into a bill? Second of all, what advice can you give us about how to get a bill enacted, in other words, how to get from where we are now to the adoption of legislation, and if you were still serving on the committee, how would you get from policy to legislative language to political consensus in the enactment on a topic involving so many complex and moving parts?

Mr. SHARP. Well, what I would have done is asked you, Mr. Chairman. That is a hugely tall order, and I have to admit, when I was teaching classes at the Kennedy School, I used you as a paramount example of a political leader who understood or could figure out over time how to get the substance, how to get the process and how to get the politics right, and it takes all three to do it. June seems awfully tight to accomplish those three propositions.

The CHAIRMAN. In other words, my dear friend, you are punting.

Mr. SHARP. I am punting. You have that difficult obligation. I find life a lot healthier outside this institution.

The CHAIRMAN. Mr. Chairman, I note that I have completed with 15 seconds excess. I thank you for your courtesy, and I am delighted to welcome back our old friend.

Mr. SHARP. Thank you, sir.

Mr. BOUCHER. Thank you, Mr. Dingell. For 5 minutes, the chair recognizes the gentleman from Texas, Mr. Barton.

Mr. BARTON. Thank you, Mr. Chairman. I want to say at the outset that throughout these hearings, I am going to be the contrarian. I have a fundamental problem in that I still don't accept that we have this catastrophic problem. So it is pretty hard

for me to debate the nuances of proposed solutions before we have satisfied to my objections that we really have a problem.

I want to start by putting up on the overhead three or four charts just to kind of highlight what I am talking about. This first chart is U.S. energy production. The bottom numbers are conventional energy resources of natural gas and hydro and nuclear and renewables, and that top number is coal. The chart within the chart shows the demand for electricity increase between 1980 and 2030 in the U.S. economy, and as you can tell, we are counting on using a lot of coal. Well, if you burn coal, you get CO^2. Now, we can maybe capture that CO^2 with the FutureGen project. We can liquefy it and somehow do something, but basically if you burn coal, you are going to create CO^2, and if you are not going to burn coal because of these cap and trade systems that we are talking about today, you have to use a lot more nuclear power. In fact, you would have to probably triple the number of nuclear power plants that we have, maybe quadruple, or you are going to have to have some miracle of technology in renewables. It is that simple.

Go to the next chart. This chart shows the CO^2 emissions on a global basis. The top number is all the world except for China, the European economy and the U.S. economy. That red line is Chinese emissions of CO^2. You can see that it is about to pass the United States, and by 2015 it is going to pass the entire western European economy. You see the U.S. number that is the flattest number there. We do have a large number of CO^2 emissions but our emissions are increasing at a much less rapid rate than anybody else in the world. So as Mr. Boucher has pointed out, if you adopt some cap and trade system on the U.S. economy, you are basically doing it for symbolic purposes because you are not doing anything about the largest emitter soon to be in the world.

Go to the next chart. This is the vaunted western European effort to actually meet the Kyoto accord. You can see that that huge economy of Sweden, they have actually done it. In Switzerland, they are huge industrial players in the world markets. They have also done it. Now, to their credit, United Kingdom, which is fairly industrialized, has also done it. The Netherlands, France, which is almost totally nuclear, and Germany, which truly has a robust economy. None of the other economies have done it, and some of them are short as much 25 percent. The economies that tend to be the shortest like Spain are economies that are still growing. When you talk to leaders in those countries that haven't done it, with few exceptions, at least off the record, most of them tell you they have no intention of doing it, not at all. Kyoto in their mind is more for symbolism than it is for real environmental purposes.

Finally, show the last chart. This is something called carbon intensity. This is in the U.S. economy. At the top, that red line is the growth in gross domestic product in the United States economy. We are the world's most efficient economy. We are the world's most productive economy. That number going up is a good thing. That next line is our emissions. The solid line is current trends and the dotted line is if we adopt some of the voluntary proposals that President Bush has advocated. It is going up but it is going up very slowly so the bottom line, if you compare the increase in output with the increase in energy or the increase in emissions, that is a

measure of what is called intensity and that is going down. So what this chart shows you is what we are doing is working, is working and it is not wrecking our economy.

Now, here is the dilemma that I have, Mr. Sharp, and the members of this committee. My grandfather was born on dry land cotton farm in Hill County, Texas, south of Dallas in 1893. He didn't have indoor plumbing. He didn't have running water. He didn't have electricity. Everything that they ate, they had to cultivate, shoot or raise. Now, my son, who was born in 2005, lives in a 2,400-square-foot home that is air conditioned in the summer, heated in the winter. When he needs to go to the doctor or go to daycare or something, he hops in an SUV, in a car seat in total comfort and moves to where he needs to go. I don't want to go back to 1893. I think my son, who was born in 2005, has a much preferable lifestyle to my grandfather, who was born in 1893. I am not going to sit by and watch our economy wrecked because of some utopian goal that there is some perfect temperature, maybe 1960 or 1980 or even 2000, and that somehow we have the arrogance as men and women of the world that we can manage the world's climate.

With that, Mr. Chairman, I yield back.

Mr. BOUCHER. Well, thank you very much, Mr. Barton. I always find your comments to be captivating, and I appreciate the candor with which they are delivered.

We are going to have a series of four votes on the floor. I think we probably have time for Mr. Butterfield to ask his questions and following that we will recess the committee pending these votes. The gentleman from North Carolina for 5 minutes.

Mr. BUTTERFIELD. Thank you, Mr. Chairman. I will make this very brief in light of the impending vote. Mr. Sharp, thank you very much for coming forward and I enjoyed your testimony. I look forward to reading the text of your testimony later this evening.

Mr. Sharp, you testified that we should encourage other nations to take action. I think we probably need to do more than encourage the other nations but less than demanding the other nations to take action. It is imperative that we reach out to the world and it is imperative that we succeed. I think we all agree on that.

You have studied and you are an academic on this subject; I am not. Have you thought outside of the box and thought of some creative things that we could do that we are not discussing to get the attention of the world?

Mr. SHARP. Well, I am probably not the one to ask that question but there are a lot of people working on that question as to how to engage, how to transfer technology, how to get them going. I don't mean to overpreach on the proposal we put before you but one of the features of the proposal we put before you is a signal to the outside world we will go so but only so far and then hopefully that is a piece of and only a piece of the leverage that helps tell China, India and others you have got to be players here.

Mr. BUTTERFIELD. Now, my friend, Mr. Barton from Texas, said a few minutes ago that he is convinced that the other nations really don't have an intention of working with us in developing a better policy. Have you found that to be true?

Mr. SHARP. There are a lot of reports that are conflicting about Chinese leadership on this question but certainly it is no longer a

C word in China the way it was 5 or 6 years ago. There is lots of discussion of it. There is lots of concern in China, we were told, about what happens to the Gobi Desert, what happens to major aspects of their geography, their agriculture and things if the warming continues. Indeed, as I indicated before and I don't purport to be extremely knowledgeable about this, lots of people are saying the effects could be worse on them. If that is true, they are bound to begin to develop some incentive in this and frankly, if they want to be world leaders as there is every indication they want to be, the rest of the world is going to expect them to belly up on major——

Mr. BUTTERFIELD. Have we done anything to measure public opinion in China? Do we have any inclination?

Mr. SHARP. You would have to ask someone else on that.

Mr. BUTTERFIELD. All right. Thank you, Mr. Chairman. I yield back.

Mr. BOUCHER. The chair thanks the gentleman, and the committee stands in recess pending the conclusion of the last vote. We will reconvene 5 minutes following the last vote.

[Recess]

Mr. BOUCHER. I recognize the gentleman from Texas, Mr. Hall, for his questions and he has a total of 8 minutes.

Mr. HALL. Mr. Chairman, thank you. I thank Mr. Sharp. Phil, good to see you, and I would like for you to know that at least partially Mr. Dingell speaks for me. I didn't get to stay here and listen to him talk to you but I understand he and I may be on the same track on this situation. I want to ask you a few questions.

Mr. SHARP. Sure.

Mr. HALL. It is good to see you, and you haven't changed at all.

Mr. SHARP. It is good to see you, sir, and you haven't either.

Mr. HALL. The cap and trade proposal was part of the energy policy package and they included an increase—you may disagree with this—worldwide oil and natural gas production. I guess, let me start off by asking you, are you in favor of opening Anwar?

Mr. SHARP. I haven't been in favor of opening Anwar but it always struck me that there was a deal to have been made here in Congress over the last 20 years, between that and CAFE.

Mr. HALL. Well, somewhere I figure they would pull the two together, you get both of them. Is that right? Is that the hope?

Mr. SHARP. That is a real possibility. The National Commission on Energy Policy frankly ducked the question and simply did not pick it up although it did talk about trying to open up more of the outer continental shelf to production.

Mr. HALL. The fear really of opening Anwar, if there is 19 million acres and the bill calls for 2,000 acres, and I have heard it said that that would run, that 2,000 acres would run, Anwar would be tantamount to saying postage stamp at the end of a tennis court and run the whole tennis court.

Mr. SHARP. Well, sir, you have dealt with that more recently than I have. Twenty-five years ago we had hearings in the Interior Committee and that is the last time I looked it as closely as I would want to, and so I am going to punt and just leave it to you and others to work that out.

Mr. HALL. That is OK. That is a better answer than I get from a lot of people. But how about the outer continental shelf, opening it to oil and gas production?

Mr. SHARP. Pardon me?

Mr. HALL. Outer continental shelf.

Mr. SHARP. Well, our commission said that we really should be looking at what those resources are—I am speaking for this broader group now—what those resources are and obviously there are considerable natural gas resources in particular which—for example, lease 181 which hopefully is going forward and others so that our group took the view that should not be all off the table. These are important resources and they should be examined as a potential supply option.

Mr. HALL. Well, I think all of us are at least upset, is the easiest way to put it, at getting 60 percent of our energy from people that don't trust us and could be shot out of the saddle almost at any time, and so I can't remember how you were on nuclear energy when you were here. Are you in favor of nuclear energy?

Mr. SHARP. Always in favor of nuclear energy. I helped lead through the last, the previous time before of reauthorization of Price-Anderson Act. Our group that again I am speaking for says that we don't see how it could not be part of our future and we ought to have incentives to help advance that technology and get new power plants.

Mr. HALL. I am a fossil fuels guy, but I have always been in favor of nuclear energy because good, clean nuclear energy instead of people standing up there saying "no nukes," you might say "no wars," and that is the way to address the young people on that issue. Because I go to schools and talk to them and ask how many are in favor of nuclear energy. Well, none of the teachers are and none of the pupils are and then talk to them about what it might to prevent wars, then ask how they felt about it. Little kids were for nuclear energy and the teachers didn't change much. But I think about 20 percent of our energy comes from there now and England lives off of that in the North Sea and France lives off it. We could use a lot more nuclear thrust, and I think as a fossil-fuel-state guy, I think that is giving a little bit.

And while we are on that situation, are you and your group supportive of the nuclear waste depository at Yucca?

Mr. SHARP. The group said it definitely should go forward with NRC with an application being put to NRC, which is still waiting for Department of Energy to do that in hopes of advancing it. It left open the question for NRC to do the judgment. It has to do if it is safe, but certainly that should be advanced as well as creating a central interim storage facility somewhere in the country to help get the backup that is occurring at some of the utilities now managed.

Mr. HALL. It has been some time since I have been to China but the last time I was there they were kicking them off on almost every other hill. In your studies, have you run across that? What is the present situation with their nuclear thrust?

Mr. SHARP. I am sorry I can't speak to that. I know they are building new nuclear power plants. They are building more coal plants relative to the nuclear plants but they are doing both and

they are doing—because they are aggressively electrifying a country that essentially hasn't been electrified.

Mr. HALL. And you mentioned CAFE standards. How high should those standards be?

Mr. SHARP. We did not decide what that should be. We simply said that it should be reformed and it should be increased significantly. So we didn't do the hard political work you guys have to do, which is decide how much.

Mr. HALL. Let me read you something and you can comment on it if you want to. "A cap and trade approach to controlling greenhouse gas emissions has been proven unworkable in countries that signed the Kyoto Protocol and it would be unworkable in the United States. Such a program's artificially high energy costs would cripple the United States manufacturing base and suppress the job creation for working American families."

Mr. SHARP. Well, I think there are two different questions there. One is, of course, how vigorous a program you adopt. Our organization suggested you start slow. We are not interested in imposing massive uncertain costs at the outset so we said start slow so we trust that it would not wreck the economy. If anything, we are criticized for being too slow.

The second part of that though is very significant. Has anybody successfully run a cap and trade program? Well, we of course have in the United States under acid rain but admittedly it is a smaller universe than what we are talking about with this kind of cap and trade. The European situation, frankly, they have had very little experience at it. I think it has been less than 2 years that it has actually been in operation and it did have the major design flaws and prices rose rapidly about the credits but then they came back down and settled down, and frankly many people in America that have been involved in the creation of our own cap and trade system thought they had design flaws to begin with. So to be honest with you, I think we would have done a better job if we had designed it here.

One of the protections that we argue in our proposal against that uncertainty whether it works well is the so-called safety valve where we cap off how much the cost could possibly be by having the safety valve. That is where the Government would just continue to sell credits at a certain level so you knew the price couldn't go above that for carbon dioxide so that if you miscalculated your design of your cap and trade system, you wouldn't get stuck with——

Mr. HALL. Let me ask you a question that Chairman Barton may have covered.

Mr. SHARP. Sure.

Mr. HALL. How much sense really does it make to even discuss a cap and trade program that doesn't include India and China, particularly when China is soon going to be the largest emitter of carbon dioxide in the world? Really, how sensible is it to do that and not take that into full consideration as you approach this?

Mr. SHARP. Well, first of all, I think we do have to take that into consideration. I do think that is a serious long-term issue. But the question is, should we start now or should we wait until we finally get some kind of international agreement on it? Our group came

to the conclusion we should start now, we should start modestly. We should have a safety valve on there, and if they did not over time demonstrate they were going to be serious about this issue, then we would not remain committed to a constant increase in costs here. So we tried to recognize that. I don't think this is the only answer to that question but that is a long-term, no question about it, issue of what do the other nations do.

Mr. HALL. And the final question is, and I think Mr. Dingell brought this out, isn't a hard, cold fact that China has told us unequivocally without any question or any doubt that they are not going to participate?

Mr. SHARP. Well, I don't know how hard and unequivocal——

Mr. HALL. Mr. Dingell was there.

Mr. SHARP. No, I understand. I think they have articulated that. I think our administration articulated that for several years to them too so I don't think there is any shock about this.

Mr. HALL. And finally, we had never voted to send anybody over to the Kyoto meeting and the Senate had voted 89 or 92 to 0 on that. Need I say more? Thank you, Phil.

Mr. SHARP. Usually you have the best stories and the best ways of illustrating a point of anybody in this chamber, Mr. Chairman. I would address you as Mr. Chairman because you have been a——

Mr. HALL. Well, I get outvoted every time I go over there and vote, so——

Mr. SHARP. Oh, you are used to that.

Mr. HALL. Thank you, Mr. Chairman.

Mr. BOUCHER. Thank you, Mr. Hall. Actually that vote was 98 to nothing but that was with reference to Kyoto, which is something very different than what we are now talking about today.

The chair now recognizes the gentleman from Massachusetts, Mr. Markey, for 5 minutes.

Mr. MARKEY. Thank you, Mr. Chairman, very much. Welcome back, Phil.

Mr. SHARP. Thank you.

Mr. MARKEY. First of all, I completely disagree with Joe Barton. I think his approach is a business-as-usual approach, a voluntary approach. That approach has not worked. We need to institute a process by which there are binding requirements that are put in place in order to make sure that the job is done. So that is the essence of the debate that we have here, and I respect Joe Barton's right to have that view as I do Ralph Hall's but I think that science and the politics of the issue have now moved to a different place. We are now debating over what those terms will be.

In your report, Phil, your commission calls for a 4 percent increase in fuel economy standards. I agree with that. The President actually mentioned 4 percent in his State of the Union address but when I searched his legislative language I could not find anything that was anything more than rhetorical, nothing binding. Do you believe that the Congress as it did in 1975, which actually produced tremendous results by 1987, should the mandate be mandatory so that we get the benefit that comes from the increase in fuel economy standards not only from a global climate change issue but also from an energy independence perspective?

Mr. SHARP. Well, first of all, the commission strongly recommended there be a significant increase in CAFE requirements, meaning mandatory, and secondly, it did not actually set numbers but it argued that it should be——

Mr. MARKEY. I think 4 percent is in your——

Mr. SHARP. I think in the National Commission on Energy Policy, you won't find numbers that the group committed to. You may also be referring back to the National Academy of Science's study of 2001. But the general point is true, whether the numbers are a significant increase but also reform. The system needs to be changed to modernize it in that process as well.

Mr. MARKEY. Do you agree with the statement that it is technologically and economically possible to obtain a 4 percent a year fuel economy improvement so that we get 35 miles per gallon by 2018.

Mr. SHARP. I am sure it is technologically possible. I can't speak to the economics of that. I was on that national Academy study in 2001. I have kind of forgotten the data, but the one demonstrable fact on that was, without excessive cost you could unquestionably adopt technologies that were already in place. That was before the view was that the Prius or the hybrids was really going to come into the marketplace, which they have radically, so there is plenty of opportunity there.

Mr. MARKEY. So I am going to introduce legislation that calls for 4 percent a year mandatory by 2018 with the reforms that are necessary to make the system work better and then after 2018 have it be 4 percent but with some discretion. Do you think that makes sense as a formula?

Mr. SHARP. Again, I won't commit to a number, OK, especially representing the commission. But the general proposition of the Congress taking action and/or the administration taking action is certainly one that is totally consistent with what the commission is recommending.

Mr. MARKEY. And when you look at——

Mr. SHARP. Which by the way is for both, as you I am sure will articulate, but it is both for oil security reasons and for climate reasons because you get benefits on both of those major goals.

Mr. MARKEY. Do you think Europe is now about to take tougher actions on global warming? Do you think there is a change that is taking place there as well?

Mr. SHARP. I am not a very good one to address that but I am told that they are. I was kind of surprised to see you find quite a difference in politics in Great Britain. The new conservative party leader is giving the Labor Party that is in power that enormous grief over their failure to act more aggressively on climate change, which just shows you a different kind of politics.

Mr. MARKEY. So I think where we are right now is that President Bush is saying he wants to reform CAFE but to trust him even though he will be out of office before the first set of regulations goes into effect, even as he has been opposed to any change for the first 6 years that he has been in office, and I think that if we are going forward, we have to have a guarantee for the energy from an energy independence perspective that we are going to reduce by two to 3 million barrels a day the amount of oil we import from the Middle East, from Venezuela, from other parts of the world.

Since we put 70 percent of all oil that we consume in gasoline tanks, we have to look at fuel economy standards. I think it is a central issue.

I thank you, Mr. Chairman.

Mr. BOUCHER. Thank you, Mr. Markey. The gentleman from Washington State, Mr. Inslee, is recognized for 5 minutes.

Mr. INSLEE. Thank you. We are sure glad to see you here in this context. My friend Joe Barton proposed a future for his grandkids. He was worried that they would be back chopping cotton and wearing overalls and living kind of in the dirt, and I want to propose a different vision for his grandkids, just think of his grandson for a second and how cap and trade might fit into that vision for his grandkids. I see a potential where he lives in a 2,400-square-foot home just like he does now but he uses 50 percent less energy because it is built through green building standards. It uses Microsoft technology to coordinate all the appliances. It uses GE heating and air conditioning that is 50 percent more efficient, which has been achieved in California, by the way. It has already been achieved. This is real stuff. He has got Canarca solar panels made in Massachusetts to run most of his electrical work but on a cloudy day he uses clean electricity that comes one-third from solar thermal built by the Lens Two Company, one-third from clean coal technology and one-third from the general compression technology used to make wind turbines 30 percent more efficient, another technology that is coming in line. He gets in the car to go to work. It is a plug-in hybrid built by General Motors. It is called a Volt. It gets 100 miles to 150 miles per gallon and it burns cellulosic ethanol with the prices lower than gasoline. He plugs it in at night. He gets to work. He is working in a building that is 50 percent less energy intensive than buildings we are using now because of passive solar and the air conditioning systems that we are developing, and the name of his company is Barton Energy Export Company and their expertise is selling American energy to China.

Now, I think that is a great vision of turning Texas into an export center for American technology to China, because I will tell you, one way or another China is going to have technology and they are going to figure it out one way or another, and we ought to be the people selling it to them.

Now, my view of the cap and trade system is, that will help bring that vision to fruition because it will drive and help spur investment in these technologies that I am talking about. Right now they have to deal with dirty oil. It is cheap because they put their garbage in the atmosphere. If we get a cap and trade system, it will help these companies to develop that vision. I just wonder if you want to comment on that sort of view.

Mr. SHARP. Well, first of all, many of the things you articulated are already possible.

Mr. INSLEE. Right.

Mr. SHARP. They are not universally used in this country and the technologies are moving rapidly, which suggests to us there is a way to skin this cat without bankrupting or wrecking the economy and you identified potential pluses, so I totally agree with that general proposition. None of us can know exactly how it will work out. The principle the commission articulated was to get that market

signal for cap and trade precisely because it will encourage all kinds of investors and all kinds of innovation and all kinds of consumer choices over time. However, because we did not recommend and we suspect Congress will not adopt a stiff signal for concerns over the immediacy of the economy that you also need to supplement that, as many of you have articulated, with other kinds of things to help advance the technology whether it is coal sequestration or nuclear power or energy efficiency or transportation efficiency.

Mr. INSLEE. I want to ask you about the safety valve that you put into the discussion. I think I understand the motivation for it. Why isn't Congress the safety valve? Why isn't an alternative approach of establishing standards that set signals to the market, which I think are incredibly important here, to send signals to Wall Street, the venture capitalists, the inventors, the innovators, that they are going to have a market because this cap is going to be there. And frankly, my concern about a safety valve is, it just weakens that message. It just weakens what we are trying to do, which is to establish certainty in an investment climate. But we always have Congress frankly to change the statute. You can understand, we are not putting this into the granite tablets that came down from the mountaintop. We have the ability to change. Why isn't that an adequate safety valve?

Mr. SHARP. Well, that is a legitimate point of view that Congress is always sitting. In fact, all of what we are talking about can be undone by the next Congress at any time it technically decides to do that kind of thing, so you are not wrong about that. I guess what I would argue is that Wall Street and everybody else might find a clear-cut safety valve but I am talking about one that escalates so that it actually does not make it too cheap. Might find that a more certain proposition about where the prices are headed. You might find that more attractive, at least politically, if not economically. But I think this is a legitimate debate over what is the most appropriate way to provide that.

One of the key things is though what dollar figure you ascribe to that, and we admittedly ascribe to a very low dollar figure to which the commission is actually reviewing, given the new science since the time we did this and given frankly the political equation, which is more favorable to taking action.

Mr. INSLEE. I want to show you one slide. Can we put up the second slide here, the declining investment in energy R&D? This is a slide, if I can just refer you to it. It shows our energy R&D Federal investment, on the left showing energy from 1960 to 2006. You will see we had a spike in the late 1970's, early 1980's. It has come down less than half of what it was now. In the middle graph it shows health investments going up. It has gone up by a factor of probably 20 or 30 since 1960. We look at on the right research and development in the defense industry that has gone up by a factor of, oh, 5 or 6 or 7 during that period of time. So looking at these, my take on this is that we have this emerging planetary crisis and yet our energy R&D—do you have any comments on R&D funds?

Mr. SHARP. Very rapidly I will just respond, one of the things I didn't mention was the commission actually recommended almost a doubling of what we spend in R&D, much of it going on these

climate things but also on other energy things, and it would have been paid for by virtue of when you sell credits, auction off some of the credits, it would have been enough money to cover that so the whole proposal would have been rather unusual. But no question about it that while we have done lots in R&D, we have got to on a stable, serious way do that and so do other nations.

Mr. INSLEE. Thank you.

Mr. BOUCHER. The gentleman's time has expired. Phil, thank you very much. We enjoyed having you here today and your testimony as always was useful, informative, and we will be calling you back.

Mr. SHARP. Well, you are generous, Mr. Chairman. Thank you and good luck.

Mr. BOUCHER. We look forward to working with you as we undertake this process.

We turn now to our second panel of witnesses, and I will say a brief word by way of introduction of each of them as we welcome them to the table, and you can please come up to the table.

Mr. John G. Rice is the vice chairman of the General Electric Company and the chief executive officer for General Electric's infrastructure division, which I understand also is responsible for the company's energy business. He is here to speak about the company's involvement with the U.S. Climate Action Group.

Mr. Fred Krupp is the president of Environmental Defense. He is also here to speak about his organization's involvement in U.S. CAP.

Ms. Eileen Claussen is the president of the Pew Center on Global Climate Change and she is here to speak about her organization's involvement also with U.S. CAP.

Mr. Steve Rowlan is the general manager of environmental affairs for the Nucor Corporation, and he has graciously agreed to step in at the last minute for the chief executive officer of Nucor, Dan DiMicco, who I understand was prevented by weather from being with us here today, and we look forward to his comments on behalf of the industrial energy consumers of America.

We have Dr. Stefan Ulreich. He is an energy policy specialist with EON Energie and is here on behalf of the Federation of German Industries.

We welcome each of the witnesses. Each of your prepared statements will be made a part of the record, and we would welcome 5-minute summaries, and we will be happy, Mr. Rice, to begin with you.

STATEMENT OF JOHN G. RICE, VICE CHAIRMAN, GENERAL ELECTRIC COMPANY

Mr. RICE. Thank you, Mr. Chairman. Members of the committee, good morning, or good afternoon. We appreciate this opportunity to appear before you today.

As you noted, my name is John Rice. I am vice chairman with General Electric Company. At the dawn of the 21st century, growing concerns about energy security, availability and continuing changes in the world's climate compel us to search for better solutions for energy production and consumption. Meeting these challenges will require a combination of efforts from the public and pri-

vate sectors coordinated to achieve the maximum impact in the shortest period of time.

GE is at its heart a technology company. We have withstood the test of time for 125 years because of our commitment to invest in the capabilities to solve problems, meet market needs and improve standards of living. We are accelerating these efforts and will double our investment in more efficient and environmentally responsible technologies to $1.5 billion annually by 2010.

Some people believe that companies like GE are involved in environmental activities just to make money. To those people, I say that while profit is certainly not our only motive, we fully expect that our investment here just like any other will deliver a reasonable return to our shareholders. In fact, I think the true sustainability both in terms of effort and environmental impact can only happen if private sector companies achieve risk-reward tradeoffs that are appropriate to the significant investments required.

The foundation for this must include a legal and regulatory framework that provides clear, consistent policies and incentives applied over a period of many years consistent with the long-term nature of these investments. We believe that Government policies should support the development and deployment of a broad range of power generation and fuel choices.

Today many people seem to be searching for the answer to a complex set of questions. GE has been investing in a broad range of energy and power generation technologies since Edison invented the light bulb and we sell these today to our customers around the world. If nothing else, this allows us a measure of objectivity when comparing the merits and tradeoffs between diverse options like coal, wind and nuclear. For different reasons, these and other alternatives can and should be part of an energy and environmental future that we are proud to leave to our children's children.

The challenges presented by global climate change demand effective collaboration and a combination of efforts across a broad spectrum of activities. The adoption of policies that establish reliable market pricing mechanisms for carbon and other greenhouse gases will stimulate and accelerate research, development and deployment of sustainable technologies that make a difference.

The need for clarity and consistency in this area is especially critical at this time. Capacity additions are being made in the U.S. and around the world with long-term implications. In some cases the decision to invest in no- or low-carbon-emitting technologies are being deferred, largely because the economic or risk-reward models assign no value to carbon reduction.

Coal is frequently discussed in this context as a carbon contributor. I would remind its critics that coal is the predominant fuel source not just in the U.S. where it is slightly over 50 percent but also in China in India where it is 79 and 68 percent, respectively. Coal will continue to be a significant fuel source in these countries and in many other parts of the world because of its abundance, it is relatively inexpensive and a critical part of many countries' energy infrastructure. Continuing technical advancements will allow it to be burned more efficiently and with reduced environmental impact. Longer term, carbon capture and sequestration will become

more viable. Support for the development of these capabilities must also be part of a responsible regulatory framework.

As I suggested earlier, it is not just about any one fuel or power generation source. Many will have to work with ever improving efficiency, lower costs and little or no environmental impact if we are to have a world where 6 or 7 or 8 billion people can live in health and prosperity. As the cornerstone of responsible regulation, a carbon cap and trade system will go a long way to further innovation, help the environment and improve the overall effectiveness of the world energy system.

I appreciate the opportunity to be with you today, and we look forward to working with this committee to enact responsible climate change legislation at the earliest possible date.

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

STATEMENT OF FRED KRUPP, PRESIDENT, ENVIRONMENTAL DEFENSE

Mr. KRUPP. Thank you, Mr. Chairman and members of the subcommittee. Thank you for the opportunity to testify on behalf of the U.S. Climate Action Partnership. My name is Fred Krupp. I am president of Environmental Defense.

Since 1967 we have been linking science, economics and law to create innovative, equitable and cost-effective solutions to the society's most urgent environmental problems. We have a history of working in a very bipartisan way. We worked with the current Bush administration, the Clinton administration, the previous Bush administration, across party lines and particularly on cap and trade systems for sulfur and other pollutants.

I might mention the other mentions of the U.S. Climate Action Partnership. They include Alcoa, BP America, Caterpillar, Duke Energy, DuPont, ourselves, the FPL Group, General Electric, Natural Resources Defense Council, the Pew Center on Global Climate Change, PG & E Corporation, P & M Resources in New Mexico, and the World Resources Institute.

I will describe a little bit about what U.S. CAP is proposing, which is also outlined in our report. You will notice, by the way, that in the report we talk repeatedly about rapid enactment of these policies and that is driven in my mind by the science. We strongly believe that Congress needs to pass serious global warming legislation as quickly as possible if we are going to solve this problem. As I look at it, the science is unforgiving.

Here is the overall goal: to cut global warming pollution enough to stop its worst impacts and to do it in a way that helps our economy and cuts our oil addiction, and here is how we get there. We recommend that Congress pass legislation that stabilizes global atmospheric greenhouse gas concentrations at between 450 and 550 parts per million through a mandatory emissions reduction plan with specific steps, specific targets. In 5 years emissions should be between 100 and 105 percent of today's levels, in 10 years emissions should be at 90 to 100 percent of today's levels, and by 2050 emissions should be 60 to 80 percent below current levels.

Recently we have heard some voices of pessimism declare that solving climate change is impossible. In some cases, these critics

went straight from "it is not happening" to "we can't stop it." Not only are these critics wrong about current technologies, Professors Pakala and Sokolo at Princeton have demonstrated there are 15 existing technologies available to make the necessary reductions. But I think they are wrong about Americans' ability to innovate and win. It is the considered judgment of these corporate leaders and environmental experts that these cuts will stabilize the climate and are both technologically achievable and economically sound.

The cap and trade policy we chose is the centrist approach. The Government leads by setting a goal while giving the private sector the flexibility to achieve it in the most efficient and profitable way possible, and because we can't afford to leave anyone who can contribute to solving this problem behind. The program should cover as much of the economy's greenhouse gas emissions as possible. We should also use offsets from a range of activities such as no-till farming. Offsets can be a very powerful transition tool that reduces the overall cost to the economy while delivering real environmental results.

Some have criticized the participation of some of the member companies at CAP, that they are just in it to make money. To me, that is the power of cap and trade. Market-driven solutions and not Government subsidies are what will enhance our global competitiveness, boost our economy and get the best technologies at the lowest cost. That is the heart of the U.S. CAP proposal. A clear, unambiguous signal, a cap and trade system, will give the essential green light to investors and innovators eager to make money and deliver the best answers.

As those of you who have participated in the passage of the Clean Air Act Amendments know well, the allocation of allowances garners much interest. U.S. CAP provides the framework. An admission allowance allocation system should seek to mitigate the economic transition cost to entities in regions that will be relatively more adversely affected and also to recognize those who have already made investments in higher cost, lower greenhouse gas technologies while simultaneously encouraging the transition from older, higher-emitting technologies to newer, lower-emitting technologies.

As we get a cap and trade program up and running, we should recognize that companies which have taken early action, granting credit for eligible reduction starting from a specified date until the mandatory program becomes effective. We hope you will also promote aggressive technology research, accelerate deployment of zero- and low-emitting technologies as well as energy efficiency while discouraging investments in high-emitting facilities.

I thank and commend you, Mr. Chairman and the subcommittee for taking on this serious issue. Environment Defense and U.S. CAP look forward to working with the subcommittee as you continue your work.

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

STATEMENT OF EILEEN CLAUSSEN, PRESIDENT, THE PEW CENTER ON GLOBAL CLIMATE CHANGE

Ms. CLAUSSEN. Mr. Chairman and members of the subcommittee, thank you for the opportunity to testify on the U.S. Climate Action Partnership. My name is Eileen Claussen and I am the president of the Pew Center on Global Climate Change.

As Fred mentioned, the U.S. CAP believes that our environmental goal and economic objective can best be accomplished through an economy-wide market-driven approach that includes a cap and trade program that places specified limits on greenhouse gas emissions. This approach will ensure emission reduction targets will be met. At the same time, it generates a price signal that will stimulate investment and innovation in the technologies necessary to achieve our environmental goal.

One issue often raised in discussions of cap and trade programs is the projected cost of the policy and how the program can be designed to keep costs reasonable. The U.S. CAP believes that the most powerful control measure is a robust cap and trade program since markets do the best job of controlling costs over time.

If Congress weighs additional cost control measures, we would recommend considering which parts of the economy are affected, the time duration of the impact and the remedy, the implications for international competitiveness, the implications for international emissions trading, and how the measure affects the price signal necessary to stimulate investment and technological innovation. If used, cost control measures must be designed to enable a price signal that is stable and high enough to drive investment in low- and zero-emitting technologies including carbon capture and storage, and it must respect the integrity of the cap over a multiyear period.

U.S. CAP also believes that measures are needed, at least initially, to complement a cap and trade system for new coal-based energy facilities and other stationary sources, carbon capture and storage, transportation and buildings in energy efficiency. As you said, Mr. Chairman, coal supplies over 50 percent of our current electricity generation and will play a continuing role in our energy future. Policies are needed to speed transition to low- and zero-emission stationary sources that can cost-effectively capture CO^2 emissions for geologic sequestration.

We also recommend that Congress require EPA to promulgate regulations to permit long-term geologic sequestration of carbon dioxide from stationary sources and provide funding for at least three sequestration demonstration projects, each at levels equivalent to emissions produced by a large coal-based power plant.

U.S. CAP believes that climate protection legislation must achieve substantial greenhouse gas emission reductions from all major emitting sectors of the economy including the transportation sector. We recommend Congress enact policies to reduce greenhouse gas emissions in the transportation sector including consideration of policies to promote lower carbon transportation fuels, cost-effectively decrease allowable greenhouse gas emissions of automobile manufacturers' fleets and promote new low-emission vehicles and reduce vehicle miles traveled.

Policies are needed also to realize the full potential of energy efficiency. We recommend establishing Federal and State policies that

align incentives with utilities' business interests to aggressively pursue energy efficiency programs and promote policies that decouple utility sales and revenues in conjunction with requirements for utilities to pursue all cost-effective energy efficiency savings. Stronger energy efficiency codes and standards are needed for whole buildings and for equipment and appliances, as are incentives and tax reform measures to advance the infrastructure necessary to support new smart and highly efficient technologies and distributed generation.

Let me close by discussing the international dimension of this issue. The effects of climate change are global as are the sources of greenhouse gas emissions. While taking the necessary first step of placing limits on our own emissions, Congress should strongly urge the administration to safeguard U.S. interests by engaging in the international climate negotiations with the aim of establishing commitments by all major emitting countries. The members of U.S. CAP believe strongly that U.S. action to implement mandatory measures and incentives for reducing emissions should not be contingent on simultaneous action by other countries. Rather, we believe that U.S. leadership is essential for establishing an equitable and effective international policy framework for robust action by all major emitting countries.

I thank and commend you and the subcommittee for taking on this critically important issue. The Pew Center looks forward to working with the subcommittee as it continues its work.

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

STATEMENT OF STEVEN ROWLAN, GENERAL MANAGER, ENVIRONMENTAL AFFAIRS, NUCOR CORPORATION

Mr. ROWLAN. Thank you for this opportunity to share our views about climate change. Our focus must be on the future. This means that China, India, Brazil, Russia and other developing economies are the linchpins to any effort to address this global problem.

Nucor is one of the country's largest steel producers. Steel-making is an energy-intensive industry and any action on climate change is likely to affect us directly. A healthy steel industry is essential for the national security of the United States as well as for our Nation's long-term prosperity. For these reasons, Nucor has worked with the Industrial Energy Consumers of America, IECA, an organization dedicated to finding solutions to America's energy challenges.

I am here today representing both Nucor and IECA. Nucor is the country's single largest recycler. We annually recycle over 42 billion pounds of steel. We make our steel using electric arc furnaces and use less than a third of the energy traditional methods need to make a ton of steel. We emit roughly 67 percent less carbon-equivalent emissions in our processes as well. Overall, the combined U.S. steel industry has reduced its process-related carbon-equivalent greenhouse gas emissions by 39 percent below 1990 levels, even though we make more steel today than we made in 1990. This is five times greater than the 7 percent reduction that the Kyoto Protocol would have required of the United States, and we are not done.

We are developing revolutionary ways to make steel that use significantly less energy with much lower emissions. We took these steps voluntarily and will take more because it makes good sense for our business and for the environment. Climate change is a global issue that requires a global solution. The global solution must include three of the largest economies in the world: China, Brazil and India. While we think of these economies as developing, they are home to many of the largest, most sophisticated manufacturing companies in the world. These companies do not lack access to capital nor technology. They do not need to be paid to control emissions. The technology to reduce their emissions presently does exist.

For example, China is building the equivalent of an entire U.S. steel industry every 2 years. Let me repeat: China is building the equivalent of an entire new U.S. steel industry every 2 years. Brazil and India are also adding large amounts of new steel capacity. A recent study by the Center for Clean Air Policy estimates that greenhouse gas emissions by the Chinese steel industry will increase by 50 percent by 2010 while those of India will nearly double in the same time period. The International Energy Agency's world energy outlook 2006 projected that China would surpass the U.S. as the number one emitter of greenhouse gases by 2009.

These counties benefit from the international system of commerce and as such they must share in its responsibilities, and that includes environmental responsibilities. Unless these countries are required to curb their emissions, any measures taken by the United States will be ineffective and will be counterproductive.

An effective climate change program must encourage innovation and investment while discouraging emissions migration and with it the loss of good-paying jobs. Emissions migration occurs when manufacturing activities move from the United States to countries with much weaker regulation and enforcement. The E.U. cap and trade system, for example, has led certain European steel makers to shift production to countries with no caps on emissions. As a result, the E.U. limits have likely caused an increase in worldwide greenhouse gas emissions. Moreover, the E.U. system actually rewards the biggest emitters because allowances are based on past emissions. Since new, efficient producers must buy allowances to expand production, it may be economically difficult or even impossible for them to enter the market. Had an E.U. system been in place in the U.S., efficient steel producers like Nucor could not have created the energy-efficient industry we have today.

I urge this subcommittee to examine the E.U. cap and trade system carefully to avoid their mistakes, especially as to allowance allocation and how the E.U. companies invest in China to generate allowances. If the news reports are correct, massive E.U. investments have paid China to do things that U.S. companies do voluntarily at a fraction of the cost.

IECA's paper entitled "Eight Things Congress Should Consider before Capping Greenhouse Gas Emissions" discusses their additional concerns, especially natural gas and electricity prices. An effective climate change program must first focus on developing sources of affordable energy with low carbon intensity. But statutory barriers impede the construction of new nuclear plants and

drilling for new sources of natural gas. We will also need more renewable sources—wind, solar power, recycling, energy efficiency, demand response, and more R&D is needed on our technological responses to climate change.

In conclusion, my biggest fear is that the U.S. manufacturers who have already made huge improvements far in excess of Kyoto will be subject to tight new emissions limits and higher energy prices. Meanwhile, our competitors in China, India and elsewhere will be free to produce and emit without restriction. If our carbon-intensive industries move offshore, the United States will lose even more manufacturing jobs while greenhouse gas emissions continue to rise. This is worse than doing nothing. A successful climate change strategy must control global greenhouse gas emissions while preserving American jobs and enhancing the prosperity of our country. In reality, cap and trade is a poorly designed tax that unnecessarily transfers revenue and jobs offshore.

Thank you.

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

STATEMENT OF STEFAN ULREICH, CONSULTANT/SPECIALIST, ENERGY POLICY, EON ENERGIE, AG

Mr. ULREICH. Thank you, Mr. Chairman, ladies and gentlemen. Since we talked a lot about the European emissions trading scheme, I think it will also be good to share some experiences of the system with you. I want to concentrate on four issues with respect to this.

First, the European emissions trading system works operationally. Trading is taking place. Second, the emissions trading scheme is incentivizing investments into new technologies and into new power plants. Third, we already talked about the flaws in the system. I want to raise one flaw, and that is the problem of time scales. Technology is the answer to climate change but it needs some time to develop, and there were some errors with respect to this in the E.U. emissions trading scheme. And the fourth problem that we have heard today, I will also repeat it, a global solution is needed, and I will also explain why this can be done with a trading system in the easiest way.

Point No. 1, emissions trades work operationally. Already since 2003, emissions allowances were traded in Europe and this was done before the legislation was started in 2005, mainly because traders wanted to have trading experiences within these quantities, within these allowances, and it was also important to create the infrastructure to make this trading workable. Not only steel producers, chemical plants or power plants are taking part in this trading, also banks and insurances, making this really a vivid trading place. Today we see a lot of large turnovers in this market. We have about 5 million points allowances traded each day, which is quite a big surprise, at least for those who have looked at these markets a few years ago.

The problem with this market was already mentioned. This was this price hike we saw in the year 2005 where prices were over 30 euros a ton. This was mainly due to the fact that only abatement within the first 3 years of the trading period could lead to an effect.

The first trading period was defined to be between 2005 and 2007. Building new power plants is of course no answer because the lead time for a new gas plant is about 3 years, the lead time for a new coal plant is about 5 years, so you cannot do anything of abatement within this 3-year period of time. The only thing you can do is switching from a coal plant to a gas plant. This has happened to a large extent within the E.U. Unfortunately in 2005, the gas prices also had a dramatic price hike. This was due to several effects. One effect was that the U.K. was in fear of running dry of gas. One effect was done by the high oil prices that we saw, and in the end, the switching from coal to gas was really expensive and therefore the CO^2 prices increased a lot. Now with more relaxing gas prices and also with a more comfortable situation on the E.U. allowance balance, the prices of the E.U. allowances are going back.

We have seen already that the time scale is playing a crucial role. The emissions trading scheme should incentivize new investments and is also doing it. We have already a market for allowances for 2008 through 2012, so the next 5 years have already shown some price signals, and these price signals also leading to the development of new technology and to the building up of new power plants with low-emitting properties.

The E.U. already indicated that after 2012 the story is not over. We have a new discussion about the goals. So far the E.U. until 2020 we should have abatement for 20 percent. If other countries would take place, it would be 30 percent. This kind of goal is giving at least the industry some kind of idea what can happen and also gives some kind of investment security because you can be rather sure that after 2012 we are still to abate and to do things like developing technology.

As I already stated, technology has some own time scales and it needs some time to develop. We already heard a lot about carbon capture and sequestration today. This is a technology traded today. The first steps are done today. Hopefully we have a solution within the next 10 years' time but we cannot be sure about this. Technology development is no guarantee but that is the only way to go. Carbon sequestration is also important for us to make our coal reserves further unusable because we in Europe still rely on coal. About 50 percent of the German power production is done by coal and we cannot to go to any other stuff. But to develop the technology we need time and also a time frame and a long-term prospective for the carbon problem.

A global solution is needed, and the E.U. is responsible for less than 15 percent of the worldwide carbon emissions. The E.U. on its own will not solve the problem. We need the help of other countries to solve the problem of carbon and climate change. A trading system can be a rather interesting choice for establishing a kind of level playing field, mainly because the price of carbon can be a global one and so every country has to pay the same price for it, whereas if you go for a tax system or any other system, the taxes can differ from country to country, making this kind of advanced trading system non-existing.

I hope that I can share with you some experiences of the E.U. trading system. Of course, if you have any further questions with respect to this, I am happy to answer. Thank you.

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

Mr. BOUCHER. Thank you, Dr. Ulreich, and the chair's thanks to all of the panel members for your testimony here today. Let me say to our witnesses from the U.S. Climate Change Partnership that I am very impressed with your set of recommendations and I note among your members among the 10 companies, two of the major coal-fired electric utilities including Duke Energy, which is the third largest coal-fired utility in the country, and I think that fact gives your recommendations a certain gravity at least with me.

I want to ask you about international participation. I listened, Ms. Claussen, very carefully to what you had to say about that, and I will have to say that I would be very concerned about a system of mandatory controls, a cap and trade program being put into effect in the United States if that action here were not replicated at least in some measure in the developing world. And so one of the things that has been proposed for our consideration by a number of people is that any program we put into effect has some safety valves, and one of those safety valves might well be relief from our program in the event that within a certain period of time we do not have participation from the developing world. And I am going to ask you for your views on the potential for that kind of safety valve being placed in the U.S. program. Ms. Claussen, would you like to begin?

Ms. CLAUSSEN. Yes, but let me just clarify that I am going to speak as the Pew Center here because U.S. CAP did not get into great detail on the international side.

Mr. BOUCHER. One way or the other.

Ms. CLAUSSEN. OK, one way or the other. Obviously this has to be a global solution. I think everybody recognizes that, and the 20 largest emitters account for 85 percent of emissions. They all have to be doing something to reduce emissions or limit their growth in emissions. So we believe that that is absolutely crucial. On the other hand, we do not see those countries moving forward to do anything unless the U.S. shows that it has a program in place to reduce emissions, and I think——

Mr. BOUCHER. Let me interrupt you. Don't you think of we enacted a program and said this is what we intend to do contingent upon the developing countries also agreeing to take part and setting some time frames for the effectiveness of our program, it obviously would not be effective immediately. It would be effective on a target date. Doesn't that send an international signal?

Ms. CLAUSSEN. You could do it that way. You could also, in my view, start in a modest way, and I think our proposal is relatively modest in the early stage, and then work really hard to see if you can get everybody to take some action. Let me make one other point though on the some action point. I think it is important to understand that not everybody is in the same place or would do everything in the same way, so I think you need a very flexible global framework that lets countries do things that are in their own interest just as we would like to do them in ways that are in our inter-

est as long as the result is the right one. I think that was one of the flaws with Kyoto.

Mr. BOUCHER. That is a fair point.

Ms. CLAUSSEN. In other words, everyone has to do the same thing in the same way.

Mr. BOUCHER. I have one other question for the U.S. CAP group. At the present time the Energy Information Administration predicts that coal's place in the electricity generation market will grow, perhaps over about a three-decade time frame to as much as 56 or 57 percent of the total market from about 51 percent today. If your recommendations were put in place, let us suppose we adopt what you are recommending, is there any place within your range of recommended targets and time frames that we could expect to see that growth in the coal market actually take place, Mr. Krupp?

Mr. KRUPP. Well, let me say, Mr. Chairman, that one of the reasons U.S. CAP is for action now is to get a signal sent to investors and developers of technology that there will be change coming. The longer we wait, the more we put ourselves in a position where the change will be very abrupt. Put another way, U.S. CAP has talked about this and believes the single-most important driver to ensure the future of coal is a price signal that will accelerate the deployment of these low-carbon was to use coals. Mr. Rice may want to add.

Mr. BOUCHER. Mr. Rice?

Mr. RICE. We totally agree with that. As I said in my comments, coal's significance is not to be disputed. I don't think anyone here debates that point. Predictions as far as the future use I think have to take into account other forms of energy, what happens with the aging nuclear fleet and how are those units replaced, so I think there is a combination of things that have to be considered in this complex problem set.

Mr. BOUCHER. Thank you. Just a word about carbon sequestration. Secretary Bodman testified before the full committee last week that the Department now has seven partnerships. They will be doing seven test bores with the capacity of 1 million tons of carbon per year per project. Ms. Claussen, you noted the need to have test bores equal to the annual output of a large coal-fired plant. Do you happen to know how much that is? If you don't, that is OK. We will learn. I assume it is more than a million tons per year.

Ms. CLAUSSEN. I think it is but we can supply it for the record. I am sorry.

Mr. BOUCHER. Well, just as a point of information, DOE is asking for the money to go forward in fiscal year 2008 with these seven projects. I then asked Secretary Bodman when he thought based on the Department's projected work that carbon sequestration would be available and reliable as a technology with adequate long-term sequestration, and he said he thought 5 to 6 years. Do you think that is realistic or is he being optimistic when he suggests that?

Mr. KRUPP. I think the technology is viable in that time frame. I think one of the things that has to be understood is the long-term impact on geologic formations and exactly—and pinning down a precise date to confirm that is I think the challenge. As I know you understand, you have enhanced oil recovery sequestration, you

have sequestration in saline aquifers. The former is more well understood than the latter so there is a lot of additional information, I think, that needs to be gathered about sequestration to confirm what happens over time.

Mr. BOUCHER. At the same time, would you not agree that we have to have reliable sequestration at hand before the emission caps can actually go into effect? Otherwise the adverse effect on coal becomes dramatic.

Mr. KRUPP. One thing, Mr. Chairman, that I would add to that is that while——

Mr. BOUCHER. I am looking for a yes there hopefully from you.

Mr. KRUPP. I just want to point out, Mr. Chairman, that we do have reliable sequestration at hand today. Not only are there a series of mechanical sequestration projects out there and the sooner the legislation passes, the sooner EPA can be directed to put in place rules we have called for, but there are also on farms across America opportunities waiting to happen where farmers can change their farming practices, go to no-till agriculture and biologically sequester carbon in the soil. I visited a farm in Kansas of 5,000 acres, part of the Agrimark cooperative that together owns a million acres. There is millions upon millions of acres available to do biological sequestration the moment you pass legislation.

Mr. BOUCHER. Thank you very much. My time has long expired and I apologize to the members for my lengthy questions. At this time I would like to call on the ranking member of the full committee, Mr. Barton.

Mr. BARTON. Thank you, and I thank Mr. Upton for yielding to me so I could do this and then go do some meetings and then come back.

I want to compliment Mr. Inslee. I am told that in his remarks he talked about my son's future and that he knew my son would have a son that was more efficient and a car that was more efficient. I am glad he at least admits my son should have a house and a car. We are moving in the right direction there.

I didn't realize it until Mr. Krupp just spoke but my grandfather that I mentioned was an environmentalist ahead of his time. He went to no-till agriculture in the 1920's because the boll weevils knocked him out and he moved from the farm into town and made the mistake of getting into the telephone business right before my great-uncle took all the family money and went to Mexico and then my grandfather had to tell the telephone company to pay off the stockholders of the bank so that our name was untarnished in Whitney, Texas. So my ancestors were environmentalists ahead of their time.

Mr. Rice, you mentioned in your testimony that methane is 21 times more powerful a greenhouse gas emission than CO^2. Now, I am told that the largest emitters of methane in United States are cows and that we have a lot of them. Do we need to have a cattle reduction program or a methane capture program for cows as a part of this effort?

Mr. RICE. Well, sir, I guess we could have that but what we would prefer to have is technology like we do have available, reciprocating gas engine technology which can process methane, both

the methane that is created from cows and the explosive and poisonous methane that is produced or generated in a coal mine.

Mr. BARTON. Do you know or does any of the panel know the ratio of methane emissions versus CO^2 emissions? I would assume CO^2 overwhelms it but I——

Mr. RICE. I think so but I don't know.

Mr. BARTON. Again, Mr. Rice, what is a good baseline price for electricity retail kilowatt to use in these estimates of these various cap and trade programs? What price should we put into the equation for the U.S. economy?

Mr. RICE. Well, from our vantage point, Mr. Barton, we tend to look at the cost to produce, and depending on which technology you choose, that can range from three or cents a kilowatt to seven or eight cents a kilowatt.

Mr. BARTON. But, if you are going to have a cap and trade system, you are going to have to have a baseline price and ultimately that price has got to be translated into a retail price that everybody in this room pays. Now, different regions of the country—Mr. Inslee's region is blessed with hydroelectric power. His region pays some of the lowest prices in the country. I don't know what retail he pays but he probably pays retail 5 or 6 cents a kilowatt-hour. Here in Virginia, the Dominion, my retail price I paid at my condo in Virginia last month was 7 cents. In Texas I paid 13 cents because we depend on high-price natural gas right now. Our New York friends probably pay about 20 cents in the Northeast. So it is a fair question to ask if we are going to have these cap and trade systems, there must be some estimate of what the baseline price is.

Mr. RICE. Well, I think that would depend on the price that is elected for the target price. What we focus on is the offsetting costs and we use the development in technologies like coal-fired power generation or natural gas or wind. Today the power produced by a wind turbine is half the cost that it was 10 years ago and a——

Mr. BARTON. But the truth is, you don't have a number, do you?

Mr. RICE. We didn't get into that level of detail. We expect that the cap and trade mechanism will add cost and that there will be other offsets.

Mr. BARTON. Dr. Ulreich came all the way from Germany. What is your estimate of the cost to the German economy of the cap and trade system that has been put in place there? Has it been a cost-free transition or has it cost a fair number of Deutsche marks or euros?

Mr. ULREICH. Yes, we still have the euro so the Deutsche mark has gone away. But it was a few million euros, of course, definitely. There was some kind of virtual cost because the allowances were given for free to the companies. Nevertheless, by this kind of opportunity, the electricity producers have to include it into the power prices and together with the gas price hike we saw in the year 2005, it was an increase of the wholesale market about 30 to 40 percent of the electricity price. Of course, wholesale energy is different than what the customer pays because grid fees and other stuff is also coming to it. In Germany we have about 20 eurocents a kilowatt-hour so even in Texas you are quite cheap.

Mr. BARTON. This is my last question because my time is expired. Even having said that, in the real world of power generation in Germany, if I heard you correctly, what they have done is switch to the extent of building new generation, they are building natural gas-fired generation. Is that correct?

Mr. ULREICH. It is both correct. They are building out new gas and they are building out new coal generation.

Mr. BARTON. And doesn't natural gas emit CO^2?

Mr. ULREICH. Yes, but half of the hard coal plant and one-third of the ligmat coal plant.

Mr. BARTON. Thank you, Mr. Chairman.

Mr. BOUCHER. Thank you, Mr. Barton. The gentleman from North Carolina, Mr. Butterfield for 5 minutes.

Mr. BUTTERFIELD. In my absence, I missed the testimony of Mr. Rice. I am sorry about that but I have your written testimony and I have been quickly looking through it and it appears to be a very comprehensive piece. But let me ask you, your testimony seems to suggest that hydrogen—well, your article mentions that hydrogen is one of our future methods that will change the way we produce energy in this world. Let me ask you this. In the short term, you also emphasize the need to utilize the world's abundant supply of coal. Do you think that energy derived from hydrogen will ever be less expensive than energy derived from coal?

Mr. RICE. Sir, I think the difficulty with hydrogen is around the infrastructure and that would depend on the investments that were necessary to transport it and store it and all of that I think happens over a much longer period of time. So really understanding the tradeoffs between coal and hydrogen is something that would require in my view a lot of further study.

Mr. BUTTERFIELD. Mr. Krupp, let me ask you this. Your plans calls for rapid enactment of aggressive policies to stop climate change. Many people argue that if drastic policy changes are enacted too rapidly, it may place an unfair burden on industry and push them either out of the country or out of business. Now, please elaborate, if you will, on what you mean by rapid enactment, and if you could comment on what you think could be done to offset placing undue burden solely on industry.

Mr. KRUPP. Thank you, Congressman. By rapid enactment, that the signal should be sent rapidly, that whatever program you put in place should be done in this session of Congress rapidly. I very much appreciate the June 1 target date. But what should be in place is a centrist, modest plan the way the U.S. CAP has proposed. This is a plan that has the support of the 10 businesses and four environmental groups. It is a step-wise plan with modest goals, just stabilizing emissions within 5 years or even 5 percent increase as opposed to a steeper signal. In terms of what can be done to lower the costs, as Ms. Claussen said, the best protection to lower the cost is a market system. A cap and trade system will serve to grind down costs because innovation will be rewarded, but the broader that you place the cap including farmers and foresters and giving them the ability to plant trees that soak up carbon and giving them credit for changing agricultural practices that soak carbon out of the air, those are things that can be done to lower the costs.

Mr. BUTTERFIELD. Let me thank all of you for your testimony today. I am going to yield back the balance of my time.

Mr. BOUCHER. Thank you, Mr. Butterfield. At this time we will recognize the ranking member of the subcommittee, Mr. Upton, for 5 minutes.

Mr. UPTON. Temporary ranking member.

Mr. BOUCHER. Temporary ranking member.

Mr. UPTON. I do have some sad news to report. I just heard that our colleague, Mr. Norwood, passed away in the last hour.

Thank you all for being here for this important panel. Mr. Ulreich, I have got a couple questions for you. You indicated in your testimony that Germany produces about 50 percent of its energy from coal-fired plants, and I think I heard you say that with the passage of Kyoto, at least the last couple of years your electric energy costs, consumer costs have gone up somewhere between 30 and 40 percent. That is wholesale cost? Is that right?

Mr. ULREICH. Wholesale.

Mr. UPTON. So even more retail or is there a cap?

Mr. ULREICH. Trade fees are also part of the——

Mr. UPTON. But eventually it will catch up?

Mr. ULREICH. Yes.

Mr. UPTON. Sort of like what they are talking about in Virginia here, right? So my question is, I know that France has about 90 percent of the energy today, the electricity that they consume is nuclear. Where is Germany on the nuclear question?

Mr. ULREICH. On the nuclear side in Germany it is rather sad news also because we have to have a phase-out in France so until 2022 the last German nuclear power plant should have been switched off. Of course, me and my colleagues are trying to give the politicians a different idea on this and to run longer on the nuclear power plants. The time where the nuclear phase-out was concluded was during the time where the Kyoto protocol didn't play a major role and so of course we are now saying well, now we have different conditions and we should discuss again.

Mr. UPTON. I know you are not a representative of the German government but do you expect the nuclear question will come back now that it is——

Mr. ULREICH. It is already discussed now and today but of course there are always some kind of technical questions and politics because our energy minister wants to become chancellor of Germany and so this is a crucial point for him to have the Green Party on his side.

Mr. UPTON. We will watch with great interest.

Mr. Rice, when I met you at the beginning of the hearing a couple hours ago, we talked very briefly about light bulbs and I must say unlike Mr. Inslee, who might think of appliances with GE. As a Whirlpool family, my family helped start Whirlpool. We think of appliances with Whirlpool and now Maytag, not necessarily with GE. But with light bulbs we do think about GE. But tell me a little bit about the new light bulbs that are out now in terms of the energy savings and where we are in terms of manufacturing those and what would be the impact if we saw some incentives for a real changeover? I must confess, I was part of a group that went to North Korea a number of years ago to try and get the six-party

talk started and was very glad to hear about the news and everywhere we went we saw the new, in essence the HD light bulbs that are out there. Where are we on that?

Mr. RICE. Well, they are being manufactured. In fact, we in our own plants have initiated a program where over the next couple years we will re-lamp 150 or so of our own facilities. We have done 40 to this point with the kind of lights that you are describing. We have saved about $3½ million in energy costs, thousands of tons of emissions and greenhouse gas elimination from that, and it is about a year payback, a little over a year cash payback to make these kind of investments. So frankly, the technology for that is very promising and it is available today.

Mr. UPTON. Thank you. Mr. Rowlan, in your role here this afternoon, as we talk about emission caps, we hear about the increases in energy costs. What would happen to the U.S. economy if our wholesale energy costs went up 30 to 40 percent? Describe for me what the economic climate would be if we looked at something like that as what happened in Germany in terms of the next 3 to 5 years?

Mr. ROWLAN. Well, probably the easiest way to explain that is, I was over in Europe and I heard one of the other steel makers put a presentation on to us with respect to the impact of Kyoto and the E.U. trading program for them, and he said that first off, if I remember correctly, their energy costs have gone up 40 euros per megawatt and then had dropped down. That was roughly a double—or energy costs had gone up two times. His environmental costs which he was really the purchaser of the allowances and that type of transaction had gone up approximately another 10 to 13 euros per ton. So if you kind of throw that in there, you are talking potentially $30 to $40 a ton on steel or possibly more than that. That is just using the numbers that they showed us over there. In an industry that is sometimes razor-thin whether you are going to make any money or not, that would be tough for us. For other industries that are competing with other countries' products that are shipped into this country and have a much larger carbon footprint and they have to compete with that, and they have lower energy costs, we have the higher energy costs, we may have lower emissions with it but they have higher emissions with their product. That would be devastating for some of their industries.

Mr. UPTON. Thank you. I know my time has expired. Thank you, Mr. Chairman.

Mr. UPTON. Thank you, Mr. Upton. The gentleman from Washington State, Mr. Inslee.

Mr. INSLEE. Thank you. Mr. Rowlan, congratulations on your energy efficiency your company has been achieving. It is really impressive.

I want to ask you, Germany has a cap, America does not. Have there been any steel mills moved from Germany into the United States following application of their cap?

Mr. ULREICH. As far as I know, not, because of the demand for steel is a worldwide one and it is quite good at the moment and so there are some price difficulties for our colleagues and then certain ways of producing steel. They are still able to export and produce in Germany.

Mr. INSLEE. Mr. Rowlan, are you aware of any companies that moved from Germany to the United States as a result of Germany's cap?

Mr. ROWLAN. I don't know if it as a result of Germany's cap. They don't state that as a reason but Tiss and Krepp have announced that they are going to build a facility someplace in the United States.

Mr. INSLEE. Ms. Claussen, you made a comment about the need for three separate sequestrations. Could you elaborate on that? I am not sure I know how that relates to Secretary Bodman's seven holes they are going to punch. How do those relate to each other?

Ms. CLAUSSEN. I am sorry. I don't know exactly how they relate either because I didn't have a chance to look at Secretary Bodman's testimony, but I will do that and I will try to get back to you on the record. I think the bottom line is, it is essential that we move as quickly as possible on carbon capture and sequestration because we are going to use coal, the Chinese are going to use coal, the Indians are going to use coal, and we have to have a technology that can deal with the carbon emissions. In our view, the largest number of sequestration demonstrations using significant amounts, because you really want to be able to use it from a coal-fired power plant, the better, and the faster you do it the better you are going to be in a position to actually start to ratchet down on your emission levels.

Mr. INSLEE. Could I ask Mr. Krupp or Ms. Claussen, on the issue of grandfathering, Mr. Rowlan talked about if you grandfather existing plants, it makes energy of more energy-efficient plants more difficult who have to then bid into the system. What advice did your group come up with in that regard, whether there should be grandfathering or not?

Mr. KRUPP. U.S. CAP came up with a general framework that you should consider both, who would be disaffected by a cap, what the transition costs would be, who is using cleaner fuels. The details, Congressman, we left for you. But that is a very important question. I don't mean to minimize it and that is going to be a very important negotiation.

Mr. INSLEE. So you are suggesting the devil is not just in the details, it is in Congress, too? That is an even broader indictment.

Mr. KRUPP. Well, from an environmental standpoint, the important thing is to have a firm cap. From the standpoint of giving incentives to the U.S. consortium exporting these technologies, it is important that we have a firm cap. As to how you allocate the cap——

Mr. INSLEE. I am just thinking out loud here. Is there a reason to grandfather existing polluters other than pragmatism and politics of getting something through the Congress? Is there any sort of economic reason to do that? I guess the other way of asking it, TXU was thinking about building 10 or 12 coal plants right now that would not have sequestration technology on them, and if they skip in underneath this cap, why should they be grandfathered relative to a son of Nucor who might want to come in and build a new coal plant and then have to bid for it?

Mr. KRUPP. I would only say, Congressman, that it is up to you to decide what year the cap goes into effect, what the baseline is, and we look to your wise judgment in making that decision.

Mr. INSLEE. And I look to you for cover, so thank you very much. Thank you. I don't have any more questions.

Mr. BOUCHER. Thank you very much, Mr. Inslee. I have one additional question and then I will be happy to recognize Mr. Barton if he has questions. Dr. Ulreich, I was listening very carefully to your comment about what happened to wholesale electricity prices when the cap and trade program was put into effect at the European Union, and you indicated about a 30 to 40 percent increase. Mr. Sharp, when he was here earlier today, said in his opinion the European cap and trade program had been somewhat hastily and improperly designed and that a better design would avoid some of the problems that have occurred. Do you agree with that, and if you do, what better in particular could be done in order to have avoided perhaps those significant price spikes?

Mr. ULREICH. With respect to the price spikes, I think no system can avoid these things. If you want to restrict CO^2, it makes the power production of electricity expensive. It makes power plants that you have to build as to become in a different status of technology, and this is usually more expensive and so prices will increase definitely. It is also the goal of some environmentalists that they say OK, due to the fact that electricity becomes more expensive and then incentives for better use, higher efficient use of electricity is given and this the way how to reach parts of the country or parts of the system that are not covered by the emissions trading scheme. What I would make better from the E.U. emissions trading scheme is, as I mentioned, the time scales. You have to keep in mind that investment cycles, especially in the power industry, is quite long. You have 10 to 20 times until the power plant really earns money and you have to expect this when doing this kind of system, that you give some kind of long-term stability and reliability on the system. The second point, with grandfathering and all benchmarking and alternative schemes and if you are using grandfathering of costs, there will be a lot of political debate how to give what amount to whom. If you are using benchmarking as a kind of best available technology and you are giving some kind of technology incentive, on the one hand but this is only possible for certain industries. In Germany there is debate because the power industry is quite busy to define this kind of benchmark. As for the paper industry, it seems not to be possible.

Mr. BOUCHER. Has any work on carbon sequestration been undertaken in the European Union? Are you familiar with that?

Mr. ULREICH. Yes. There are a few projects, especially in Germany, because we are also burning ligmat to produce electricity. There are at the moment two big projects with carbon sequestration, and one of them is a rather small entity with a 20-megawatt power plant. The other is a bigger one with 81 megawatts. There are projects in Norway where they pump in and store and the CO^2. There are also some projects in the U.K. So there are some things done on this issue.

Mr. BOUCHER. Thank you very much. Mr. Barton, do you have some additional questions?

Mr. BARTON. I do, but I did ask one round.

Mr. BOUCHER. Oh, I am sorry. Mr. Burgess has arrived and I did not see him. I am sorry, Mr. Burgess. I will be pleased to recognize you for 8 minutes.

Mr. BURGESS. I thank the chairman and I apologize for missing so much of the hearing today. We are downstairs trying to straighten out the FDA and that is a full-time job as well.

Let me, if I could, Mr. Ulreich, we were just talking, what about the stockpiling and fuel switching concept? What is involved with fuel switching?

Mr. ULREICH. Fuel switching means that you are using a gas plant instead of a coal plant, and since gas has power carbon intensity than coal, you are abating fuel by producing electricity.

Mr. BURGESS. So it would be a modification of a coal-burning electrical plant to use natural gas?

Mr. ULREICH. You cannot modify the plants within these kind of short times. To modify a plant that can be used both by coal and by gas is too expensive and would take some years to build up. What we have done in Europe is using the existing power plant for the country's weather heads, gas plant and power plant in a sufficient quantity and just to switch the production from the coal plants to the gas plants.

Mr. BURGESS. But combustion of natural gas is still going to release carbon dioxide. Is that correct?

Mr. ULREICH. Yes, that is right.

Mr. BURGESS. Is that still a problem as far as the overall burden of the greenhouse gases in the atmosphere?

Mr. ULREICH. It is not yet a problem. It will become one. Of course, if you want to become a complete carbon-free society, then you cannot accept gas plants definitely also but if you have the choice between goal and gas, most environmentalists prefer gas, but certainly the carbon sequestration will also have to apply to gas plants and it will take a few years.

Mr. BURGESS. The reason I bring that up is, the chairman had us take a CODEL to Denmark, Sweden and Norway last summer and in the Norwegian parliament, of course, they rely significantly on hydro power but unfortunately it hadn't rained in 3 years so they were running low and they produce solid to liquefied natural gas that goes into that picture that Mr. Markey likes to show with the Norwegian tanker coming in to the Fall River port. But they weren't going to build any gas plants to supplement their electricity production for the people in this coming winter because being signatories to Kyoto, they felt they could not do that, so they are actually going to buy their power from Denmark which was burning coal which didn't make a lot of sense to me, but in a circuitous way I guess they were conforming to their Kyoto obligation.

What about the issue of stockpiling? What is being stockpiled?

Mr. ULREICH. Stockpile—already in 2004 a little bit of more of the stuff you wanted to produce and so you have fewer emissions in 2005. It is a shift of the production timing.

Mr. BURGESS. Production timing for generation of electricity?

Mr. ULREICH. No. Electricity cannot store. You have to produce in the moment that demand is present. But for some other industries this kind of stockpiling was possible.

Mr. BURGESS. So are you stockpiling coal or natural gas or——

Mr. ULREICH. Not necessarily. Steel, for example. You can stockpile steel, you can stockpile copper or any other products and then produce more in these kind of years before.

Mr. BURGESS. So stockpiling of the product and not the energy source.

Mr. ULREICH. Yes.

Mr. BURGESS. Let me ask a question of Mr. Rice. We are talking about cap and trade proposals. Do we have any concept of how much that is cost every American family to implement that?

Mr. RICE. No, and as I said earlier, we have to do more work to determine exactly what the ultimate cost is and over what time period and also we would expect that there would be cost offsets. I think maybe you were out of the room when I mentioned the progress that has been made in helping a number of forms of power generation technology become more efficient over the years, wind and coal and natural gas, and we would expect those improvements to continue and to provide some offset to any cost increase that might be caused by a cap and trade.

Mr. BURGESS. Does anyone else on the panel have a thought on that?

Mr. KRUPP. The only thing I would add, Congressman, is cost in part is going to be determined by how you engage and design the system. For instance, in the European Union, they have not allowed farmers to be part of the solution, and that is one of the reasons the cost is higher there than in a smart program that I expect you all will design here, because anyone who can sequester carbon should be allowed to generate a credit, sell it into the market. The more credits that you allow to be generated, the lower the cost will be. That is a key flaw in the European Union program.

Mr. BURGESS. What type of carbon sequestration are we talking about here? Are we talking about pumping it back into the Earth's crust or are we talking about growing an oak tree that is going to bind carbon for a couple of generations?

Mr. KRUPP. Growing an oak tree, that would be an example. Growing forests would be an example, absolutely.

Mr. BURGESS. You talked about farmers so——

Mr. KRUPP. Farmers, specifically going to no-till agriculture, so instead of plowing up the land and continuing to deplete the carbon in the soil, an increasing number of farmers have found for a variety of reasons by drilling a hole in the ground and dropping seed in and leaving the organic matter, that they actually build carbon up and the scientists at Kansas State University and a whole variety of agricultural colleges and universities around the country can measure how much carbon is being built up so in a good cap and trade system, we give those folks the opportunity to be part of the solution and it lowers the cost.

Mr. BURGESS. So what are some things that are good carbon sequesters? What are the examples of some things that a farmer might grow that would be helpful? Are grasslands inherently better than forests?

Mr. KRUPP. Well, a variety of crops could go to no-till including corn could go to no-till agriculture. There is a whole range of crops that can be grown with no-till equipment. It also reduces the

amount of energy used because instead of tilling the land, you are going over with a lighter tractor drilling holes. There are other ways that farmers can be involved too. Capturing the hog waste in various feed lots, getting the methane off that and destroying it. There are a whole lot of ways. In a well-designed system, there would be economic opportunities for farmers to be part of the solution.

Mr. BURGESS. Ms. Claussen?

Ms. CLAUSSEN. I would like to make a slightly different point. There are 30 to 35 companies that have implemented voluntary caps on their emissions and I think it is worth looking at their experience when you think about an overall cap. Of those that have implemented the caps voluntarily, a fairly significant number, more than half, have already met those caps and they have done it by efficiency.

Mr. BURGESS. So how much we have lowered the Earth's temperature?

Ms. CLAUSSEN. Thirty is not a lot compared to the totality here. U.S. emissions continue to go up even though a lot of very progressive companies have started to limit their emissions. My point is a slightly different one and that is that most of them have done it by implementing efficiency improvements which have actually helped the bottom line rather than hurt it, and I think when we think about a cap, you have to think about what people will do first. I think the first thing they will do is efficiency. Then they are going to look at technologies. They are going to look at offsets. So it is not all a big cost right away, particularly if your cap and trade starts in a fairly modest way and only becomes more stringent after there is more new technology.

Mr. BURGESS. Well, I am given to believe that China and India would be larger players in this issue. When do we expect to see them initiate a cap and trade program?

Ms. CLAUSSEN. Well, I think if the U.S. did something domestically and then played a significant role in trying to develop a global framework, we actually might see the Chinese and the Indians take some serious steps. They are actually doing small things now but I think they would take more serious steps if we would actually show the way.

Mr. BURGESS. I don't think we should hold our collective breath although that would cut down carbon dioxide emissions. Thank you, Mr. Chairman. I will yield back.

Mr. BOUCHER. Thank you, Mr. Burgess. Mr. Barton, if you would like to ask some additional questions, we will be happy to recognize you.

Mr. BARTON. I want to, but in the spirit of back and forth, I think we ought to give Mr. Inslee first crack.

Mr. BOUCHER. That is not a bad idea. You are good at this job. You must have had some experience.

Mr. BARTON. I did. You used to tell me that when you say right by me.

Mr. BOUCHER. Mr. Inslee.

Mr. INSLEE. Well, I would defer to Mr. Barton. He has a much tougher argument to argue from.

Mr. BARTON. I just lost a net of 10 votes. I went from five votes in the majority to five votes in the minority. My argument is the same. The win is much more difficult now.

Mr. BOUCHER. Overall it is tougher. I think we all would agree. Mr. Inslee?

Mr. INSLEE. I want to ask this issue. I think it is actually one of the harder issues about the question of Americans moving forward while some of the world is not yet moving forward. I think it is a hard issue for us to deal with, and I believe that when we move forward, it is going to help us drive technological innovation that we will become the marketers to the world including to Germany and some great technology we are developing here.

But I think there is a moral obligation here too. When I teach my kids—I have three boys who are little rapscallions and I taught them not to throw stuff out the window when we are driving around, and one time one of my kids said look at all that stuff on the side of the road, other people are doing it, and I kind of tried to explain to him that old sort of precept that there is sort of an individual moral obligation. Now, I think it is consistent with American values to say that there is an American value of not trashing the planet independent of what other people are doing in other countries. There is an independent American reason for doing this, that we have an obligation to the creator's garden not to trash it, even if China and India are a little bit behind us in that regard. Now, I do think they will follow over time and it may be more difficult for them because they are trying to develop an economy. I guess the question I have, is it legitimate, is it useful to talk about this issue in those terms? It is just an open-ended question to anyone.

Ms. CLAUSSEN. Well, I will take a try. I do think this is at least in part a moral and ethical issue. It is true that China's emissions are growing but we are the largest emitter and even though China's emissions will surpass ours pretty soon, the cumulative emissions in the atmosphere are mostly ours. So I think in that sense, there is a responsibility to reduce emissions. I also think there is an ethical issue with respect to future generations because I think we would like to leave a world for the future generations that is at least as good as the one we inherited and I think it is incumbent upon us to do something about this issue because if we do not, we will not be in that position of leaving future generations a world that is at least as good as ours.

Mr. INSLEE. Mr. Krupp referred to credits for sequestration and capturing. There is a company, and I think its name is E3, and they have this incredible closed-loop system there, I think in Illinois or Michigan. They are generating ethanol and they run their ethanol plant on methane captured from the cow manure, so they are taking cow manure, creating methane, using that to run an ethanol plant, feeding the residual matter from the ethanol plant, the leavings of the ethanol production to their cows, this incredible closed-loop system. Is that something that could be considered a credit in this program?

Mr. KRUPP. Yes, if you design the program right, you should have the possibility that low-carbon biofuels would earn credits and there is more than one company that is doing that. I think there

is another one called Prime BioSolutions that I am familiar with, so there is more than one way to produce low-carbon fuels.

Mr. INSLEE. I want to ask Mr. Ulreich, as far as costs, you experienced increased electricity prices, and have those come down at all since the first launch of this?

Mr. ULREICH. The year 2005, this price increase on the wholesale market was not only due to the fact of carbon allowance prices. Carbon allowance price was one important effect. The other important effect was the rise of coal prices on the market, the rise of oil prices and the rise of gas prices. So a few things came together to explain this price increase.

As I stated earlier, if you want to have CO^2 less intense power plants, you have to pay a certain price for it.

Mr. INSLEE. So let me tell you what I personally believe. I started writing a book about clean energy about 6 months ago, and in the course of that I just ran across all these companies—I have noted several today—that are just doing this incredible work that I didn't know about 6 months ago and I keep learning about them every week. I learned about a company that week that has improved compression technology. You can put it on top of a turbine, compress air and basically build a battery for wind turbine. They think they can increase revenue for wind farms by 40, 50 percent. My perspective is that what this will do, this cap and trade system, will create an economic incentive for the creation of these technologies. When these technologies come online, it will diminish if not eliminate the increases that we would otherwise see if you assume that we had static technology, and all of our worries are assuming that technology is frozen, that we are just not going to ever invent another technology. I guess the question is, is it a realistic assessment in looking at your experience over time that we are going to have new technologies that decrease the rate of increase we might otherwise experience in cost?

Mr. ULREICH. I think with respect to renewable energy, you need a long breath until they become really competitive with nowaday power prices. We in Germany have a renewable—and this gives really lucrative prices to the producers of wind energy and biomass and any other kind of renewable energy but these prices are still far away from a market price of electricity plus the CO^2 advantage. So at least for this technology you would need a lot of time for some other stuff like carbon sequestration when it happens like efficiency gains by power plants. The time is now.

Mr. INSLEE. Thank you.

Mr. BOUCHER. Thank you, Mr. Inslee. Mr. Barton.

Mr. BARTON. Thank you, Mr. Chairman. I have a couple of announcements. On a personal sad note, I have been informed that Congressman Norwood, a member of this committee, passed away at about 12:45 and we are all praying for his family.

Also, the Federal Government is shutting down because of an ice storm. It is a little bit ironic that we are hearing about increasing temperatures and we are shutting our Government down because of ice.

Mr. BOUCHER. Will the gentleman yield on that point? The gentleman is correct, and I was actually going to make this announcement after his questions, but in the interest of saying this for Mr.

Burgess and Mr. Inslee's benefit while you are still here, we are going to postpone the hearing we had scheduled for the morning. We have already had about half of our witnesses for tomorrow call us and tell us that their airplane flights have been canceled. And sometimes it is actually helpful to have witnesses when you have a hearing to listen to what other people have to say. Occasionally it is informative, so we are going to wait until we can be assured of their attendance. So the hearing we had scheduled for in the morning has been postponed. I thank the gentleman.

Mr. BARTON. I am going to ask to be put in the record, as soon as the majority staff has seen it, an article that just came across my desk this afternoon that scientists at University of Colorado and I think University of Seattle have announced that their theory about glaciers melting faster in Greenland may be a little bit premature. Their latest study shows that they did melt faster for the last 2 or 3 years ago but it looks like this year they have gone back to their old pattern and so we may have jumped the gun on all the melting glaciers, at least in Greenland. So there is still some debate about some of these subjects.

I did a back-of-the-envelope estimate based on what Dr. Ulreich said about the costs to the German economy. Now, I admit this is a back-of-the-envelope estimate. I am tempted to say it is as accurate as some of these global warming estimates but I won't say that. But my rough back-of-the-envelope estimate, if Dr. Ulreich is correct that it costs about 30 to 40 percent increase in wholesale electricity prices in Germany, if that holds for the U.S. economy and if you assume that our average retail electricity price which is 10 cents a kilowatt hour, the annual cost to the U.S. economy would be about $400 billion a year. That is not the capital cost, that is the annualized cost of compliance at retail. Now, maybe I am off 10 percent, 20 percent, 50 percent, but I am not off that there is not going to be a huge price increase if we adopt any of these benign mandatory cap and trade policies.

So my question to you, Mr. Rowlan, representing a user of electricity in the United States, what happens to Nucor if your costs go up 40 percent and the cost of your competitors in Mexico and China and Brazil, other parts of the world don't go up 40 percent?

Mr. ROWLAN. It doesn't take a rocket scientist to figure that out, but obviously we are put at a serious competitive disadvantage. We are proud of our record of never having to lay anybody off. We continue with that but we do idle our plants and sag back based on market, so if we can't compete, we can't compete. That starts to roll down to the marketplace.

Mr. BARTON. Is there anybody on the panel that says there is not going to be a significant cost to the U.S. economy? Ms. Claussen?

Ms. CLAUSSEN. Yes. Let me just say this about what Mr. Ulreich said first and then get to your question.

Mr. BARTON. He is in the real world.

Ms. CLAUSSEN. I know. I understand. But he also said, and I think you were out of the room, that the increase was for more than the carbon limits. There were other things that were going on at the same time. So just keep that in mind.

The second thing that I think is worth keeping in mind is that Germany is not the U.S. Our economy is different than theirs and

I don't think you can say because it happened there it will necessarily happen over here. And the third thing is that——

Mr. BARTON. Are we so much better than them that we can——

Ms. CLAUSSEN. No, we are actually less efficient and I think we could probably limit emissions more cheaply because we are much less efficient.

Mr. BARTON. We are actually more efficient.

Ms. CLAUSSEN. No, I think not.

Mr. BARTON. I think so.

Ms. CLAUSSEN. Well——

Mr. BARTON. I can prove that.

Ms. CLAUSSEN. I think not.

Mr. BARTON. Unless all the economic statistics that our Government puts out are wrong, we are the most productive economy in the world. We use 25 percent of the resources, we produce 33 percent of the goods and services and we are getting better, not worse. I will be happy to do a hearing on that and send the chairman a letter, a rule 11 letter, if he wants me to.

Mr. BOUCHER. Not at the moment. But I am interested in hearing Ms. Claussen talk about the difference between Kyoto, which was —1990 levels by 2010 and what we are talking about.

Ms. CLAUSSEN. Exactly. That is the third point that I think is really important. The decrease that Germany agreed to as part of Kyoto was a significant percentage below 1990 levels. In the U.S. CAP proposal or even in the NSET proposal, we are talking about today's levels, not going down right away either, sort of leveling and then going down a little bit. So it is a very different kind of trajectory and so I don't think you can actually say that they are the same.

The last point I would make is that when we talk about the costs, and I am not saying this is free because I don't think it is——

Mr. BARTON. That is progress.

Ms. CLAUSSEN. I never said it was free. I think it is also important to consider the cost of not doing anything because if the impacts of climate change are as the IPCC is now saying and others are now saying and we are actually seeing documented, there are actually costs to not doing anything and you should weigh those costs against the cost of——

Mr. BARTON. Well, did you see the chart I put up about carbon intensity?

Ms. CLAUSSEN. I did.

Mr. BARTON. Do you disagree with that?

Ms. CLAUSSEN. I think that in our GDP, the U.S. emissions have gone up more than Europe's. Not that one.

Mr. BARTON. That is not the carbon intensity one. That is not it.

Ms. CLAUSSEN. Our carbon intensity has gone down. Our overall emissions have gone up because——

Mr. BARTON. We are an increasing emitter. I will grant you that. But our line is a lot flatter and our efficiency is increasing versus the Europeans, and we can prove that.

Ms. CLAUSSEN. Well, I would love an opportunity to share some data.

Mr. BARTON. My time has expired, Mr. Chairman. I want to make one final point. We have gotten into the moral realm here, which is fair. There is a reason that the Chinese and the Indians are increasing their CO^2 emissions. They are doing it because they are trying to give their people a better lifestyle, and just as when my grandfather was born in 1893, their life on their farm outside of Whitney, Texas, was a pretty hardscrabble existence. U.S. industrialized throughout the early 20th to mid–20th century and created a much better lifestyle for our people that the rest of the world wants to emulate. They are using more coal to generate more electricity to create a better lifestyle for their citizens, and that is a good thing. That is not a bad thing.

Now, we may need to figure out a way to reduce the amount of greenhouse gases. I am not going to say that that is a terrible policy goal but for us to sit here and say as the gentle lady representing the Pew Foundation that somehow we have a moral obligation because we have used or emitted more greenhouse gases earlier, I think is a little bit extreme because we created a lifestyle that has made us the envy of the planet and some of this greenhouse gases were emitted in the defense of freedom in World War I and World War II. Had we not done that, who knows.

It is obvious that I have a very intense interest in this issue and I am very grateful that my chairman is willing to hold these hearings, and I do appreciate all the witnesses and I do want to tell my friend from GE, I am glad your company is making a profit and I support wind power. There is probably more wind power in Texas than anywhere else. I support nuclear power. I am glad to see that you stated in your testimony that coal had a future. We just need to work on how to do that.

Mr. BOUCHER. Thank you very much, Mr. Barton. Mr. Burgess, do you have anything further?

Mr. BURGESS. I would just like to acknowledge the presence of Mr. Rowlan on the panel. Nucor Steel is a big deal down in Denton, Texas, and we appreciate the way the company contributes to the economy locally and the way it contributes to our university program for developing tomorrow's engineers, tomorrow's people who are going to be able to figure these problems out, and also acknowledge that I have got a big windmill blade manufacturer in my district up in Gainesville, Texas, and just urge Mr. Rice not to buy those cheap Brazilian blades. Good American-made, union-made blades will be the best for wind generation, and I yield back, Mr. Chairman.

Mr. BOUCHER. Thank you, Mr. Burgess. And to conclude our hearing today, we will recognize the gentleman from Illinois, Mr. Shimkus, for 5 minutes.

Mr. SHIMKUS. I thank you, Mr. Chairman. My apologies to you all for not being present most of the time. I have been escorting the president of Lithuania around. Shimkus is ethnically Lithuanian, and I have been involved in a lot of the issues there, from meeting with Senator Durbin to now just leaving a meeting with the Speaker of the House. But it does coincide a little bit because the president of Lithuania used to be head of region IV EPA. He is a lifelong Chicago resident, has done well, gone back home to become the president of Lithuania, Vala Damkus.

Lithuania is a nuclear state. It had a Chernobyl-style reactor. It is deactivating that. It is now building a state-of-art nuclear technology. And you heard some of my opening statements. I am about supply. I am not about limitations. And so some of the problems I have with my colleagues is, you can't get them to say a lot about nuclear power. You just can't.

So I would like to ask you all while I have you here, what do you see the role of nuclear power in this country in the next decades to come to the future? Do you support nuclear power and the advancement of nuclear power in this country?

Mr. RICE. We do, and we have a very active nuclear business and we are working very hard to try to get the next generation technologies installed in the United States. As was pointed out earlier, there are just over 100 plants, all of which will come offline because of their age at some point over the next 45 or 50 years, which leads us with a substantial amount of power to replace.

Mr. SHIMKUS. For the sake of time, let me go to Mr. Krupp.

Mr. KRUPP. Thank you, Congressman. I think there is still some serious questions about nuclear power that——

Mr. SHIMKUS. So I put you down as a no?

Mr. KRUPP. No, I think if the problem of global warming is as serious as we think, then everything has to be on the table, so put me down as——

Mr. SHIMKUS. As a yes?

Mr. KRUPP. Put me down in the category of let us go on to solving the challenge.

Mr. SHIMKUS. I have a great example. The chairman when he was the ranking member was trying to get panelists to always answer in yes or no manner. Mr. Dingell is an expert at that so I don't think he would let you off easily as I will let you off.

Yes, ma'am, you are next.

Ms. CLAUSSEN. The Pew Center cannot imagine a world in which we deal with global warming without nuclear power.

Mr. SHIMKUS. Amen. Mr. Rowlan, bring it on. Mr. Ulreich?

Mr. ULREICH. I think our company's position is quite clear that we have to rely on nuclear power. About half of our electricity is produced by nuclear stations. Of course, we can't avoid it.

Mr. SHIMKUS. And that brings up a lot of policy issues that we have to deal with, Yucca Mountain and the ex generation and the stuff, so there are big supporters here and this is a big aid in this debate.

Let me ask, especially for U.S. CAP and the IECA about the support of clean coal and coal-to-liquid programs. Clean coal technologies.

Mr. ROWLAN. We are in favor of anything that puts more electric energy into the grid.

Mr. SHIMKUS. Have you been following the coal-to-liquid debate at all?

Mr. ROWLAN. I haven't followed that personally.

Mr. SHIMKUS. It is joined with this because the opponents to coal-to-liquid will talk about carbon emissions. If you believe in clean coal technology and gasification and coal sequestration, that same argument can be made to coal-to-liquid technologies which

the Germans did in World War II at the end of the war and the South Africans do now so——

Mr. ROWLAN. I think the fear that everybody has is that there is a technology that everybody says—you get the most technologically advanced system out there and you have got some that are grandfathered or technologically unadvanced and all of a sudden you say everybody else has to cut across the board and so the technologically advanced has to buy allowances to shut down the one that didn't invest in the technology. I think that is a real fear there, that something like that could happen under cap and trade.

Mr. SHIMKUS. I will tell you that really our Government should be applauded at FutureGen proposal and the gasification of coal and the sequestration of carbon dioxide as not just a model for the United States but something that can be used since it is of course a consortium of other countries and other corporations. Who has it from U.S. CAP? I am sure you have a unified position on this.

Mr. KRUPP. We do actually, that the best way to get carbon sequestration up and running is to have a cap so then there is incentives to go ahead and do it.

Mr. SHIMKUS. So that is a yes for clean coal technology and coal-to-liquid applications?

Mr. KRUPP. Coal-to-liquids we did not discuss.

Mr. SHIMKUS. Why don't you discuss it and come work with us?

Mr. KRUPP. Having a cap on carbon emissions is the most constructive way that you can figure out all sorts of new technologies to be able to contribute without doing violence to the atmosphere.

Mr. SHIMKUS. And I know my time is out and I really appreciate the chairman for his time. I will say that those of us who want to decrease our reliance on imported crude oil are going to make a concerted effort in this Congress to move this country to coal-to-liquid applications using our great coal reserves. I would think it would incumbent upon U.S. CAP because it is part of the global warming debate that you engage in this, especially with the great, powerful chairman I have with me and that we work to find some accommodations so that we can move forward in decreasing our reliance on imported crude oil and something that is available within the United States.

So thank you, Mr. Chairman. I yield back.

Mr. BOUCHER. Well, thank you very much, Mr. Shimkus. Were you referring to me as——

Mr. SHIMKUS. I think so.

Mr. BOUCHER. Oh, OK. Well, thank you very much. I am honored. I thought perhaps you were referring to Chairman Dingell.

Well, let me say thank you to this panel of witnesses. You have been very patient——

Mr. BURGESS. Mr. Chairman, if I could just ask one follow-up question.

Mr. BOUCHER. Mr. Burgess.

Mr. BURGESS. I asked Dr. Ulreich, but since we have heard from Mr. Shimkus, who is from a coal area, I reside on top of the biggest natural gas or one of the biggest natural gas formations, the Barnett Shale. What does the U.S. CAP group think about natural gas and the carbon emissions from combustion of natural gas for generation of electricity? Are we going to be able to continue to

burn natural gas to provide electricity for our citizens or is this something that is also going to be clouded in the future?

Ms. CLAUSSEN. It is a significant improvement over coal without carbon capture and sequestration. I think in the end you might want to figure out, or companies are working on how to figure out how to capture and sequester the carbon from gas plants as well.

Mr. BOUCHER. Thank you very much, Mr. Burgess. We are going to adjourn the hearing. I actually have a meeting in my office I need to attend. I think for today's purposes we are going to let everybody go. I want to thank everyone, and the hearing is adjourned.

[Whereupon, at 2:41 p.m., the subcommittee was adjourned.]

[Material submitted for inclusion in the record follows:]

TESTIMONY OF DAN DIMICCO
NUCOR CORPORATION

BEFORE THE HOUSE ENERGY & COMMERCE COMMITTEE
SUBCOMMITTEE ON ENERGY AND AIR QUALITY

Hearing: "Addressing Climate Change – Views from Private Sector Panels"

FEBRUARY 13, 2007

Introduction

Good morning. I am Dan DiMicco, Chairman of the Board, CEO, and President of Nucor Corp. I would like to thank Chairman Boucher, Chairman Dingell, Congressman Barton, and the other members of the subcommittee for giving me the opportunity to share my views about climate change. Our focus must be on the future. This means that China, India, Brazil, Russia, and other "developing" economies are the linchpins to any effort to address this global problem.

Nucor is one of the two largest steel producers in the United States. Steelmaking is an energy-intensive industry, and any action on climate change is likely to affect us directly. A healthy steel industry is essential for the national security of the United States, as well as for our nation's long-term prosperity. For these reasons, Nucor has worked with the Industrial Energy Consumers of America ("IECA"), an organization dedicated to finding solutions to America's energy challenges. I am here today representing both Nucor and IECA.

The U.S. Steel Industry and Greenhouse Gases

Nucor is the country's single largest recycler; we recycle over 20 million tons of scrap metal annually. We make all of our steel using electric arc furnaces. We use less than a third of the energy traditional methods need to make a ton of steel, and emit sixty-

seven percent less carbon equivalent emissions. Over the last five years, Nucor has further reduced the amount of energy needed to make a ton of steel by 17 percent.

Overall, the American steel industry has reduced its process-related carbon equivalent greenhouse gas emissions *39%* below 1990 levels, even though we made 11% more steel in 2006 than in 1990. This is five times greater than the 7% reduction the Kyoto Protocol would have required of the United States. We are not done. We are developing revolutionary ways to make steel that use significantly less energy and produce much lower emissions. We took these steps voluntarily, and will take more, because it makes good sense for our business and for the environment.

The Global Nature of the Challenge

While the United States can do much to reduce greenhouse gas emissions, it cannot solve the problem by itself. ***Climate change is a global issue that requires a global solution.*** A global solution must include three of the largest economies in the world – China, Brazil, and India. While we think of these economies as "developing," they are home to many of the largest, most sophisticated manufacturing companies in the world. These companies do not lack access to capital or technology. They do not need to be paid to control emissions.

For example, China is building the equivalent of an entire new U.S. steel industry every two years. Let me repeat: ***China is building the equivalent of an entire new U.S. steel industry every two years.*** (Over the last three years, China's *increase* in steel production was roughly twice the total production in the United States or Japan.) (See Attached Chart from the American Iron and Steel Institute, North American Steel Council, February 7, 2007.) Brazil and India are also adding large amounts of new steel capacity. A recent study by the Center for Clean Air Policy projects that greenhouse gas

emissions by the Chinese steel industry will increase by 50 percent by 2010, while those of India will almost double. The International Energy Agency's "World Energy Outlook 2006" projected last year that China would surpass by 2009 the U.S. as the number one emitter of greenhouse gases.

These countries are receiving all of the benefits of the international system of commerce. They must also share its responsibilities, including the responsibility to control greenhouse gas emissions. Unless these countries are required to curb their emissions, any measures taken by the United States will be ineffective, and may be counterproductive.

Drawbacks of Cap and Trade Systems

An effective climate change program must encourage innovation and investment while discouraging "emissions migration," and with it the loss of good-paying jobs. Emissions migration occurs when manufacturing activities move from the United States to countries with much weaker regulation or enforcement, like China, to avoid the costs of greenhouse gas limits. The European Union, for example, has had a cap and trade system for greenhouse gases in place for some time. The EU system led certain European steelmakers to shift production to countries with no caps on emissions. In this way, the EU limits may actually have caused an increase in worldwide greenhouse gas emissions.

Another negative aspect of the EU cap and trade system is that, because allowances are based on past emissions, the system actually rewards the biggest emitters. Because new, efficient producers must buy allowances to expand production, it may be economically difficult or even impossible for them to enter the market. The U.S. industry was able to make the improvements I described earlier because more efficient producers,

like Nucor, were able to expand production – in our case, by 600 percent since 1990. Had an EU-type system been in place in the United States, this might not have been possible.

I urge this subcommittee to examine the EU cap and trade system carefully to avoid their mistakes, especially as to the allocation of allowances and the mechanisms by which the EU companies invested in China to generate allowances. I am a businessman, not a policy expert, but if the news reports are correct, massive EU investments went to preventing emissions of very potent greenhouse gases and at highly inflated costs. Yet U.S. companies apparently prevent these emissions voluntarily.

Suggestions for Immediate Action

IECA has identified a number of issues the Congress should first consider in addressing climate change. These issues are discussed in a short paper prepared by IECA, entitled "Eight Things Congress Should Consider Before Capping Greenhouse Gas Emissions." One of IECA's greatest concerns is the potential impact of climate change regulation on energy prices and especially natural gas and electricity prices. Higher energy prices will have an obvious impact on the American economy. An effective climate change program must first focus on developing sources of affordable energy with low carbon intensity. Today, only nuclear power, natural gas, and coal can provide energy on the scale our economy requires, but statutory barriers impede the construction of new nuclear power plants and drilling for new sources of natural gas.

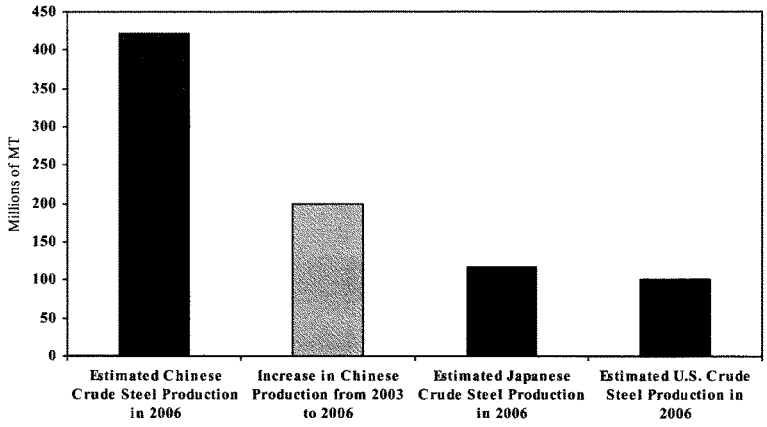
We will also need more renewable sources of energy, like wind and solar power. We must encourage and reward recycling and energy efficiency, including demand response programs. To complement these efforts, we must adequately fund research and

development on all aspects of responses to climate change, including carbon sequestration.

Conclusion

When I think about climate change and the U.S. manufacturing industry, my biggest fear is that those of us who have already made huge improvements -- far in excess of what Kyoto would have required -- will be subject to tight new emissions limits and higher energy prices, while our competitors in China, India and elsewhere are left free to produce and emit without restriction. If our carbon-intensive industries do move offshore, the United States will lose even more good-paying manufacturing jobs, further widening the wealth gap, while global greenhouse gas emissions rise. This is worse than doing nothing. A successful climate change strategy must remove statutory barriers to expanding low carbon intensive energy supply, effectively limit global greenhouse gas emissions, while preserving jobs and enhancing the prosperity of our country. Thank you.

Over the Last Three Years, China's *Increase* in Steel Production Is Roughly Twice the *Total* Production in the United States or Japan



Source: Data for China taken from World Steel Dynamics, Steel Thermometer (Dec. 21, 2006). Data for Japan and the United States taken from the International Iron and Steel Institute web page. U.S. and Japanese estimates based on production from January to November of 2006.

Statement of

John G. Rice
Vice Chairman, GE
President and CEO, GE Infrastructure

Before the

Subcommittee on Energy & Power
Energy & Commerce Committee
United States House of Representatives

February 13, 2007

Mr. Chairman, Members of the Committee. Good morning and thank you for this opportunity to appear before you today on the US Climate Action Partnership's or US CAP's principles and recommendations for climate change legislation.

I am John Rice, Vice Chairman of the General Electric Company, and President and CEO for GE Infrastructure. GE's Infrastructure organization includes our aviation and energy businesses, our financial service units for aviation and energy, as well as our oil and gas, rail and water businesses.

GE's founder, Thomas Edison, built the first coal-fired power plant, the Pearl Street Station in Manhattan, in 1882. In those early days of GE it was the electric motor and the incandescent light bulb that were the technological breakthroughs of the time. During the next 125 years, the electricity industry and GE grew and changed together.

Today, we find ourselves at another crossroads, perhaps as important as the one Edison faced at the end of the 19th Century. At the dawn of the 21st century, climate change and energy independence compel us to search for smarter and cleaner ways to use energy and slow, halt and ultimately reverse the impacts of climate change.

This challenge is what brings us here today. What we confront is the need for a fundamental transformation in the way we do business. This is clearly recognized in the US CAP's Call *to Action*, when it states: "The scale of the undertaking to address climate change is enormous, and should not be underestimated. For this issue to be successfully addressed—and failure is not an option—the way we produce and use energy must fundamentally change, both nationally and globally."

GE Energy is a worldwide supplier of advanced electrical generation equipment and service solutions for the power generation industry. GE is unmatched in providing technologies that operate on a comprehensive array of electricity generating fuels from nuclear, to fossil fuels like natural gas and coal and renewables including hydro, solar, wind, and biomass. We are also a leader in the development of advanced research for fuel cells and hydrogen.

GE at its heart is a technology company and one that has stood the test of time. We have stood the test of time and remained a technology leader because of our

commitment to always invest in next generation technologies needed by the country to address the problems we face. Over the last 5 years, we have invested over $600 million annually or $3 Billion total in advanced energy technologies. And going forward, our ecomagination commitment is to continually increase our annual investment in research on next generation, cleaner technologies to $1.5 Billion by 2010.

In short, what we are looking for with respect to climate policy, and what we believe our customers want as well, is *clear, consistent* governmental policy to help us as we address the next big challenges in developing and deploying energy technologies that enable the country to address the climate issue in the most cost-effective way possible.

GE believes a diverse fuel mix for electricity generation is necessary to ensure the security and reliability of our customers' power generation portfolios as well as the Nation's energy independence. We also believe that our country's energy and environmental policies should promote a balance of available, reliable, clean and low cost energy.

GE is a founding member of US CAP. We, along with nine other companies, became members after Environmental Defense (ED) and the World Resources Institute (WRI) approached us and asked us to work with them, NRDC and the Pew Global Climate Center to explore developing a consensus on an approach

to US legislation on climate change. US CAP legislative principles and recommendations were jointly released on January 22.

US CAP's *Call to Action* is a consensus document that represents a remarkable agreement among participants with a wide range of interests and opinions.

Through US CAP, we all agree:

- The science is sufficient to act now on climate, and that the need for certainty supports legislative action sooner rather than later.
- The response should be global, and include all major emitting nations in the developing world, but that the US must lead if we are ever going to have a workable global solution.
- All major emitting sectors of the US economy should be a part of the solution—no one sector should bear the burden alone; but that the solution should also be flexible and take into account the economic and competitive needs of particular sectors through phasing and sector specific measures.
- The primary imperative of legislation should be to prevent unacceptable greenhouse gas concentrations in the atmosphere in a cost effective way that recognizes the need for economic growth. This can best be achieved through market-based mechanisms and incentives, particularly through a cap and trade program.

- Cost control measures, including a "safety valve," may be necessary and offsets from projects in the developing world should be a compliance option.
- The program needs to be fair and disproportionate impacts to sectors, regions and groups must be addressed.
- A significant portion of carbon allowances initially should be distributed free to capped entities and those disproportionately impacted; but over a reasonable period of time, these allocations should be phased to an auction system.
- Technology is ultimately the most effective and impactful manner in which to address climate change. The adoption of policies that establish a market price for carbon and other greenhouse gases over the long term will stimulate research, development and deployment of lower emitting and lower cost technologies.

Because GE is a technology company, it is on this last point that I would like to focus my remarks. In our view it is impossible to divorce policy decisions from technology decisions. Clear policy accelerates technology development and deployment. I would like to illustrate this with two examples:

First, if we look at gas turbine technology performance, we have increased efficiency from 40 to 60 percent and reduced NOx emissions by a factor of 8 over the last decade. The driving force for this result was a combination of

requirements of the Clean Air Act and research and development support from the Department of Energy, our investments and market and competitive factors

Secondly, lets look at what has been learned from our experience with wind energy. Fifteen years ago, the technology and the industry hardly existed. In 2006 the US wind energy industry installed nearly 2,500 megawatts of new generating capacity—this represented a growing annual investment of $4 Billion in the energy infrastructure and energy independence of the US. The total installed capacity of wind in the US is now over 12 Thousand megawatts, an increase of 27% over 2005. We believe the industry will continue to grow globally through 2030 at an estimated rate of 13% CAGR with clear policy in place. This growth was fueled by government policy encouraging wind energy has been pivotal in the development of this technology worldwide. In the US the policy has been the federal Production Tax Credit and Renewable Portfolio Standards in over 20 states, which will continue to be an important element of developing this industry. In Europe, the growth of the wind industry has been driven by similar policies, although they have been more consistently applied, particularly in Germany, which is why their installed base has grown so quickly and their wind technology is so competitive in the global market.

The need for clear, consistent policy on green house gas emissions is especially critical at this time. In the near future, the US power industry will begin to build significant new capacity. Without long term, clear, consistent policy direction that

creates a market price for carbon, technologies that can address these emissions will not be developed and deployed to their full potential, regardless of whether they are renewables, natural gas, nuclear, or cleaner coal with carbon capture and sequestration. To best address the climate issue in the most cost effective way, we need policy action now, because this new generating capacity will be with us for a very long time.

Continuing the uncertainty in how the greenhouse gases will be addressed distorts technology decisions for new capacity in the US and could make responding to the climate issue more costly in the future. An example of this distortion is demonstrated by IGCC. In the US, power generation technology decisions must be justified on the basis of costs for rate recovery in the case of regulated utilities, or on financing in the case of independent power producers. While such cost-based requirements make sense, because there is no greenhouse gas policy, it also effectively disadvantages technologies, such as IGCC, that may have higher initial capital costs, even though they can or will become more cost effective than existing technologies when carbon is taken into account. The end result is a strong current bias against deploying IGCC even though carbon regulation is generally viewed as inevitable.

With respect to coal and coal technology, I would like to make one additional point. Coal fuels about 51% of electricity generation in the US. It also supplies an even larger percentage in China (79%) and India (68%). GE believes that

coal will continue to be a significant source of energy in the United States and in a carbon-constrained world. Neither China nor India will likely reduce their use of coal, and we should not do so either and for the same reason: Coal is an abundant, reliable, and a relatively inexpensive energy source. Using it is necessary for energy independence and US competitiveness. If we are to address climate change, which we agree must be done, it is imperative that our energy and environmental policies speed development and deployment of cleaner coal technologies and carbon capture and sequestration (CCS). CO2 has been injected into the ground for enhanced oil recovery (EOR) for decades, and this beneficial use and storage of CO2 should be continued and encouraged with expanded incentives; but we need to be clear that EOR has not been conducted on the scale or for the long period of time that will be required for CCS from coal powered electric generation. The ability to do so at scale needs to be further developed. From the evidence provided by experts in the scientific community (see attachments), the prospect for successful long-term geologic sequestration is good. We recommend legislation include at least three large-scale demonstration projects. Legislation must also include a clear legal and liability framework for CCS and encourage and reward those who undertake sequestration in the near term through credit for early action and other incentives.

GE believes a cap and trade system will not only create incentives for the deployment of currently available technologies, it will also drive accelerated

innovation of emerging technologies currently in the development pipeline that could change the way the world produces power, including hydrogen energy systems.

We have commercially available technology today that can reduce greenhouse gases from power generation sources. As time is limited today, I will focus on four of our technologies for doing so:

- The first are our truly air emission free generating technologies of wind and solar. Wind is the fastest growing segment in GE Energy's technology portfolio. In 2006, GE was the largest provider of wind turbines in the United States, selling over two thousand wind turbines worldwide with two-thirds of the units staying in North America. We sold 40% more wind turbines in 2006 than we did in 2005. Since acquiring the business in 2002 with an investment of about $300 Million, GE has invested nearly as much to improve the technology, and this investment has contributed significantly to our sales growth. Today we build turbines that have 30% more energy capture per turbine than the turbines that were made by Enron when GE acquired the business. In the last 4 years, we have made progress on the following aspects of wind turbine technology that when combined have significantly improved wind turbine performance - higher capacity factors, improved reliability, longer, lighter blades, advanced controls and seamless grid integration. From 2002 to 2006, GE has driven technology advancements to increase the capacity

factor of wind turbines from less than 38% to approximately 47% to realize best in class performance. A one-point increase capacity factor over the US installed base produces enough electricity for 90,000 average households.

- The second is GE gas reciprocating engines: These high efficiency engines burn methane gas from landfills, coal mines and agricultural waste to reduce the venting or flaring of these greenhouse gases in the atmosphere. Each ton of methane has 21 times greater an impact on greenhouse gases than a ton of CO2. We have more than 1,600 of these engines deployed around the world, producing nearly 1,500 GWs of power.
- The third technology is nuclear, which is a key part of a balanced energy portfolio and an essential technology for addressing climate change. Its fuel source is not subject to high price volatility and it does not produce carbon from electricity generation. GE is improving on its technology leading ABWR designs to produce and license a simplified design ESBWR, with passive safety features, improved safety and security, and a modular design with reduced capital costs.
- The fourth technology is IGCC. We are in process of contracting to build 600 MW facilities for AEP, Duke Energy and others. We are working with other customers, such as BP, who will use carbon captured from IGCC for enhanced oil and gas recovery. We believe that IGCC can be more cost

effectively configured for carbon capture than pulverized coal and will be the technology of choice when carbon is priced into decisions.

Before closing I would like to make one more technology point. There is no perfect energy technology. Each technology has both positive and negative points. For example: Wind has no CO2 emissions; it is an abundant, domestic source with no waste products; but it takes a lot of space for the energy produced, it cannot be installed everywhere; and not everyone agrees that it is aesthetically pleasing. Because there is no perfect single energy source, and its likely there never will be, we need an array of energy options, including nuclear, natural gas, coal and renewables.

In conclusion, we look forward to working constructively with this Committee, the Administration and other stakeholders for a reasonable and responsible climate change law at the earliest practicable date.

Thank you for your consideration.

Testimony "Emissions Trading in the EU" by Dr. Stefan Ulreich

Emissions Trading works operationally. Already in 2003 the first trades of EU allowances took place. With the establishing of the electronic registries for EU allowances in the year 2005 the trading volumes continuously rose (Actual trading volumes about 5 million tonnes per day). The most active participants are energy companies (electricity, gas, oil) and also financial players without emissions (banks, insurances, hedge funds). Due to the fact, that allowances of the first period 2005-2007 cannot be banked to the second period 2008-2012, short term abatement is setting the fundamental price, i.e. primarily the switch from coal to gas in electricity production.

Emissions trading give an incentive towards investments in new plants; however, the framework must have a long-term perspective. The allowance prices are integrated into the daily operation decisions of industrial production and also in the investment decisions. Via the latter an incentive is present to use more advanced technology with less emissions output. But investments in new plants need some security to be planned: Construction and planning of new plants needs lead time to become effective. In case, the planning horizon given by an emissions trading scheme is too short, investments in new installations will face a severe market risk and can be postponed. Only with a long-term perspective the investments have a sound background. The EU is currently thinking about a 10-year trading period after 2012 and about goals until the year 2020 and longer. Connected with the lead time issue is also a time lag between the start of an emission trading scheme and an effective CO_2-abatement. In consequence the actual abatement of greenhouse gases by emissions trading in the EU is quite low compared to the efforts: Abatement will come later, when the new installations enter into operation.

Technology is the answer – the markets give the signals to develop technologies. Emission trading itself does not lead to greenhouse gas abatement: Technology provides the answers for lower emissions in the future. To develop new technologies e.g. carbon capture and sequestration, research activities are needed. A long-term view on the greenhouse gas abatement strategy helps to foster this research. Apart from developing new technology, the use of state-of-the-art technology also offers major contributions to greenhouse gas abatement. The replacement of e.g. older power plants by more efficient power plants leads automatically to a strong reduction of CO_2 emissions. The use of CO_2-free production like renewable energy or nuclear power is a further abatement option available today. The latter also helps to get less dependent on energy imports.

A global solution to combat climate change is needed. The EU is responsible for less than 15% of the worldwide CO_2-emissions. Obviously, the EU alone will not succeed in lowering the global greenhouse gas emissions, but needs help by other countries. Thus the EU is in discussions about linking the EU emissions trading scheme to similar trading schemes, e.g. California, RGGI or Norway.

STATEMENT OF FRED KRUPP

Thank you Representative Boucher for your invitation to submit testimony.

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.

Today, I am here on behalf of the US CAP of which Environmental Defense is a member.

I will describe in some detail what US CAP is proposing, which is also outlined in our report.

You will notice, by the way, that in the report we talk repeatedly about "rapid enactment" of these policies. That is driven, in my mind, by the science. We strongly believe Congress needs to pass serious global warming legislation as quickly as possible if we're going to solve this problem. As I look at it, the science of climate change is unforgiving.

This group has delved into the details and we've arrived at a remarkable amount of consensus on a number of important details. Normally with a group of big players like this, you only get broad themes—but we quickly realized that this problem demands some very specific answers. It is a credit to the seriousness of my colleagues that we were able to achieve agreement on them.

Here is the overall goal: Cut global warming pollution enough to stop the worst impacts. And do it in a way that helps our economy and cuts our oil addiction.

Here is how we get there: We recommend that Congress pass legislation that limits global atmospheric greenhouse gas concentrations to a level that scientists tell us will minimize the worst impacts of climate change on humans and the environment. That means concentrations need to be stabilized over the long-term at between 450 and 550 parts per million in the atmosphere. But we live in the real world and we know you can't flip a switch and achieve the reductions tomorrow. We're recommending a realistic, step by step approach. That's one of the reasons we have to start almost immediately. The longer we wait, the harder this is going to be.

Legislation should focus on what we know can be cost-effectively achieved over the next 20 to 30 years, while putting us on a path for deeper emission reductions by mid-century.

We recommend that Congress establish a mandatory emission reduction plan that has specific targets:

In 5 years, emissions should be between 100 and 105 percent of today's levels—in other words, no more than 5 percent above current levels. We allow for that slight rise at the beginning because it takes time to switch over to new technologies and fuels.

In 10 years, emissions should be 90–100 percent of today's levels.

Finally, we are calling for a cut in emissions of 60 to 80 percent from current levels by 2050.

It is the considered judgment of these corporate leaders and our environmental experts that these cuts are both technologically achievable and economically sound. The US CAP went into detail as to how we think these goals should be achieved.We chose a cap and trade approach because it guarantees the pollution cuts we need and generates cash and creativity from the private sector. This is the centrist approach—government leads by setting a goal, while giving the private sector the flexibility to do this in the most efficient and profitable way possible. The cap and trade program should cover as much of the economy's greenhouse gas emissions as possible. We cannot afford to leave behind anyone who can contribute to solving this problem. Legislation should also allow the use of offsets, from a range of activities such as no till farming. Offsets include not only those from agriculture but other domestic sources of emissions that are not subject to the cap and projects outside the US. Offsets can be a tremendously powerful transition tool that reduce the cost overall to the economy of any program and deliver real environmental results.

In fact, some have criticized the participation of some of the member CAP companies, charging that they are just in it to make money. To that I say, that is the power of cap and trade. It can align profit and protecting the environment, and it reduces the cost to the economy. Market-driven solutions—not government subsidies—that enhance our global competitiveness, boost our economy,—and—get to the best technologies at the lowest cost—that is at the heart of US CAP. A clear,

unambiguous signal, i.e. a cap and trade system, will give the essential green light to the investors and the innovators eager to make money and deliver the best answers. Requirements for reducing emissions may vary between sectors and should be designed to promote sustained economic growth and prompt, efficient action in the shortest time reasonable achievable.

As those of you who participated in the passage of the Clean Air Act Amendments know well, the allocation of allowances garners much interest. USCAP provides a framework. An emission allowance allocation system should seek to mitigate economic transition costs to entities and regions of the country that will be relatively more adversely affected by greenhouse gas limits or have already made investments in higher cost low-greenhouse gas technologies, while simultaneously encouraging the transition from older, higher-emitting technologies to newer lower-emitting technologies.

It will take time to get a cap and trade program up and running. We need to reward those firms that have already acted to reduce greenhouse gas emissions and encourage other to do so while the program is being established. This credit for early action should grant credit for eligible reductions starting from a specified date until the mandatory program becomes effective. Other actions that should be placed on a fast track within the overall legislation is an aggressive technology research and development program and policies to discourage new investments in high-emitting facilities and accelerate deployment of zero and low-emitting technologies and energy efficiency. None of these are instead of a cap and trade program—these are a group of fast track actions that can begin within one year of enactment while the cap and trade system is put in place.

As you can see, our recommendations are both comprehensive and specific. We believe the time for general principles has passed. The time for incremental steps, if it ever existed, has passed. Just as the National Academy of Sciences has shown us the way on the science, these experienced corporate leaders are showing us how to solve this problem and grow our economy—a strong cap and trade system is the way forward. Thank you.

STATEMENT OF EILEEN CLAUSSEN

Mr. Chairman and members of the subcommittee, thank you for the opportunity to testify on the U.S. Climate Action Partnership. My name is Eileen Claussen, and I am the President of the Pew Center on Global Climate Change.

The Pew Center on Global Climate Change is a non-profit, non-partisan and independent organization dedicated to providing credible information, straight answers and innovative solutions in the effort to address global climate change. [For more on the Pew Center, see *www.pewclimate.org*] Forty-two major companies in the Pew Center's Business Environmental Leadership Council (BELC), most included in the Fortune 500, work with the Center to educate the public on the risks, challenges and solutions to climate change.

The Pew Center is one of fourteen organizations currently belonging to the U.S. Climate Action Partnership (USCAP). On January 22, the USCAP announced an interconnected set of recommendations for the general structure of climate protection legislation that we would urge Congress to enact as quickly as possible. Among other things, the USCAP recommends enactment of a greenhouse gas cap and trade program, federal technology research and development, and policies and measures pertaining to specific sectors.

Allow me to discuss a few specific elements of the climate legislation we would recommend.

Cap and Trade is Essential. The USCAP believes that our environmental goal and economic objectives can best be accomplished through an economy-wide, market-driven approach that includes a cap and trade program that places specified limits on GHG emissions. This approach will ensure emission reduction targets will be met while simultaneously generating a price signal resulting in market incentives that stimulate investment and innovation in the technologies that will be necessary to achieve our environmental goal. The U.S. climate protection program should create a domestic market that will establish a uniform price for GHG emissions for all sectors and should promote the creation of a global market.

Cost Control Measures. One issue often raised in discussions of cap and trade programs is the projected cost of the policy and how the program can be designed to keep costs reasonable. Cost control measures are policies designed to provide capped entities with greater confidence that their cost will be limited. The USCAP believes that the most powerful cost control measure is a robust cap and trade program that covers multiple greenhouse gases and sectors, and allows offsetting reductions from

non-capped firms and international sources. The cap and trade approach allows for firms that can make inexpensive reductions to provide allowances for firms that cannot. At the same time, it encourages investment in efficiency and innovative technologies. Any additional cost-control option considered by Congress must ensure the integrity of the emissions cap over a multi-year period and preserve the market's effectiveness in driving reductions, investment, and innovation.

As policy makers weigh additional cost control options, we would recommend that they consider which parts of the economy are affected, the time duration of the impact and remedy, implications for international competitiveness, the implications for international emissions trading, and how the measure affects the price signal necessary to stimulate investment and technological innovation. Additional cost control options could include a safety valve, borrowing, strategic allowance reserve, preferential allocations, dedicated funding, technology incentives and transition assistance. If used, cost control measures must be designed to enable a long-term price signal that is stable and high enough to drive investment in low- and zero emitting technologies, including carbon capture and storage.

Sector-Specific Policies and Measures. USCAP believes that policies and measures are needed to complement an economically sound cap and trade system to create additional incentives to invest in low-GHG approaches in key sectors. The need and scope of sector specific measures will depend on the stringency of targets, scope of coverage, and point of regulation in the cap and trade program. Some of the sector-specific measures are intended to be transitional in nature and should be phased out over time. USCAP recommended sector-specific measures for new coal-based energy facilities and other stationary sources, carbon capture and storage, transportation, and buildings and energy efficiency.

NEW COAL-BASED ENERGY FACILITIES AND OTHER STATIONARY SOURCES.

USCAP recognizes that coal supplies over fifty percent of our current electricity generation and will play a continuing role in our energy future. Policies are needed to speed transition to low- and zero emission stationary sources that can cost effectively capture CO2 emissions for geologic sequestration. We do not take a position as a group on any specific project, even though as individual organizations many USCAP Members do have such positions.

Carbon Capture and Storage. USCAP recommends that Congress should require EPA to promulgate regulations promptly to permit long-term geologic sequestration of carbon dioxide from stationary sources. Funding should be provided for at least three sequestration demonstration projects in depleted and abandoned oil and gas fields and saline aquifers with carbon dioxide injection, each at levels equivalent to emissions produced by a large coal-based power plant.

Transportation Sources. USCAP believes that climate protection legislation must achieve substantial GHG emission reductions from all major emitting sectors of the economy, including the transportation sector. We recommend Congress enact policies to reduce GHG emissions in the transportation sector, including consideration of policies to:

- promote lower-carbon transportation fuels;
- cost-effectively decrease allowable GHG emissions of automobile manufacturers' fleets and promote new low-emissions vehicles, for example with GHG or fuel economy performance standards;
- efficiently decrease vehicle miles traveled and enhance mass transit and other less carbon-intensive transportation alternatives;
- promote better growth planning;
- educate consumers; and
- address emissions from air, rail, and marine transport.

Buildings and Energy Efficiency. USCAP believes that policies are needed to realize the full potential of energy efficiency as a high priority energy resource and a cost-effective means of reducing GHG emissions. To achieve this objective, we recommend that climate legislation should establish federal and state policies that align financial and regulatory incentives with utilities' business interests to aggressively pursue energy efficiency programs and promote policies that "decouple" utility sales and revenues in conjunction with requirements for utilities to pursue all cost-effective energy efficiency savings. Stronger energy efficiency codes and standards are needed for whole buildings and for equipment and appliances, as are incentives and tax reform measures to advance the infrastructure necessary to support new "smart" and highly-efficient technologies and distributed generation. Finally, the legislation should create separate incentives for regulated entities, building owners, and other parties not subject to the cap to go even further in producing energy efficiency savings.

Accounting for the Global Dimensions of Climate Change. Let me close by discussing the international dimension of this issue. The effects of climate change are global, as are the sources of GHG emissions. Success will require commitments by all of the major emitting countries. Toward this end, the U.S. government should become more involved in developing the post-2012 international arrangements for addressing climate change that are now being discussed. So, while taking the necessary first step of placing limits on our own emissions, Congress should strongly urge the Administration to safeguard U.S. interests by engaging in these negotiations with the aim of establishing commitments by all major emitting countries. The members of USCAP believe strongly that U.S. action to implement mandatory measures and incentives for reducing emissions should not be contingent on simultaneous action by other countries. Rather, we believe that U.S. leadership is essential for establishing an equitable and effective international policy framework for robust action by all major emitting countries.

I thank and commend Chairman Boucher and the subcommittee for taking on this critically important issue. The Pew Center looks forward to working with the subcommittee as it continues its work.

TESTIMONY OF PHILIP R. SHARP

Good morning Chairman Boucher and members of the subcommittee. I am Phil Sharp, president of Resources for the Future, a non-partisan, non-advocacy research organization, which for 50 years has been dedicated to researching and informing policy decisions on important environment, energy, and natural resource issues. However, today, I am representing the National Commission on Energy Policy, for which I am the Congressional Chair. (As requested, further biographical information is attached.) The National Commission on Energy Policy is a diverse and bipartisan group of energy experts that first came together in 2002 and issued a comprehensive set of consensus recommendations for U.S. energy policy in December 2004.[1]

Our group came to a consensus on a climate policy that could put us on a path towards a lower carbon future. This path would be economically responsible and would encourage action by our major trade partners. But before outlining key elements of that approach, let me say a few additional words about the Commission itself.

The Commission was formed in 2002 by the Hewlett Foundation with support from several other private, philanthropic foundations. The Commission's ideologically and professionally diverse 16-member board includes recognized energy experts from business, government, academia, and the non-profit sector (see attachment). Our final recommendations, which are described in our 2004 report, Ending the Energy Stalemate, were informed by intense discussions over several years, by dozens of analyses, and by extensive outreach to over 200 other groups. Those recommendations, I should stress, deal with a comprehensive set of energy policy issues including climate change, our nation's dependence on oil and the need for increased investment in new energy technologies and critical energy infrastructure. As a group, however, we recognized from the outset that climate change presented one of the central energy challenges of our time and so we devoted considerable effort to developing a detailed set of recommendations for addressing this issue. A short summary of the Commission recommendations on climate change is attached at the end of my testimony.

I should add that Commissioners are very grateful for the considerable work and talent of the commission staff, headed by Jason Grumet, and I additionally appreciate their preparation of this testimony.

THE SCIENCE POINTS TO ACTION

After reviewing the science, the Commission decided that a mandatory climate program was a prudent response to the risks of climate change. This need for action was reinforced two weeks ago, when the United Nation's Intergovernmental Panel on Climate Change (IPCC) released its latest report assessing the last 6 years of climate science research from around the world. The report states that evidence of warming "is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global mean sea level." The report confirms that the current level of carbon dioxide in the atmosphere "exceeds by far the natural range over the last 650,000 years."

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1. The full report can be found at *www.energycommission.org*.

This increase has already led to warming —11 of the last 12 years rank among the 12 hottest years on record. The IPCC report concludes that if we take no action to reduce emissions, there will be twice as much warming over the next two decades than if we had stabilized heat-trapping gases at 2000 levels. Clearly, we must begin to face this challenge. The costs of delay in initiating reductions are likely to be substantial. The faster we can get started, the smaller the burden of future mitigation and adaptation efforts and the smaller the human suffering and long-term environmental damage.

ELEMENTS OF AN EFFECTIVE CLIMATE CHANGE POLICY

With the potential risks of climate change no longer in doubt, it is imperative that the United States engage this issue, act responsibly, and provide leadership. Ours is the world's largest economy and it accounts for 25 percent of global CO^2 emissions.[2]

Without our participation and leadership, the rest of the world cannot effectively address what could be the most difficult and far-reaching environmental problem we have yet faced. The Commission believes that the U.S. can best provide leadership by adopting approaches that do not significantly harm our economy and that encourage other nations to take comparable action.

The Commission spent 2 years reviewing a range of policy options on climate change. We became convinced on the basis of more than a decade of experience that voluntary approaches alone are not adequate. In a competitive market economy, where companies are expected to maximize shareholder value, it is unrealistic to expect them to invest significant resources absent a profit motive. While there are numerous cases where a combination of good will, good public relations, and positive ulterior motives (like reduced energy bills), create an adequate basis to reduce greenhouse gas emissions, these cases will remain limited if the financial value of reducing those emissions remains zero.

It is for this reason that the Commission strongly endorsed a mandatory program to address climate change.

What are the critical components of a mandatory approach on climate change? First, we believe that the immediate goal should be to put in place a policy architecture or framework that can last many years and be adjusted as we learn more about the evolving science, economic impacts, technological developments, and actions of other nations. We must get started with a clear signal to investors, consumers, and other nations. In the 2004 report, the Commission's specific recommendations would have us start slow, moving over a 10-year period to reduce the growth rate in emissions. This would be followed by a period of preventing further growth in emissions, with an ultimate long term goal of getting absolute reductions. In light of recent scientific developments and the time that has passed since NCEP's 2004 recommendations, the Commission has begun evaluating opportunities to strengthen its proposal

Second, a climate change program should be market-based and economy-wide. We are convinced that market-based approaches, like the landmark Acid Rain Program, are the most effective way to marshal the least cost emissions-reduction options and to create powerful technology incentives. Yet, unlike the Acid Rain Program, which focused just on the power sector, we believe that a climate program should cover the entire economy. In contrast to sulfur dioxide, which is primarily emitted by the power sector, CO^2 emissions arise from fossil-fuel consumption throughout the economy. It should be noted that a climate cap and trade program will be far larger than the acid rain model and will involve a host of tough issues. The commission has held workshops on these issues, and my colleagues at Resources for the Future are doing in-depth analysis of them.

Third, we continue to believe that cost certainty is critical to forging the political consensus needed to move forward without further delay. To date, debate about the economic impact of climate proposals has been characterized by intense arguments over whose economic model had the right assumptions about technology change, fuel prices, and other factors. Different assumptions can produce wildly different estimates of the costs of reducing emissions. The safety valve feature in our proposal-which would make additional emissions allowances available for purchase from the government at a predetermined, but steadily escalating price-helps to cut through that debate by assuring that the per-ton cost of emissions reductions required under the program cannot rise above a known level. In other words, even if an economic

2. Note that although carbon dioxide is the predominant greenhouse gas, there are other gases that contribute to climate change. These include methane, nitrous oxide, and some industrial fluorinated gases. These gases would all be covered in the Commission's climate proposal.

analysis is overly optimistic, the use of a safety valve allows Congress to hedge its bet about the ultimate impacts on the economy.

The Commission recognizes that the decision to include a "safety-valve" to cap costs under an emissions trading program is highly controversial. It obviously provides greater certainty about controlling costs and less certainty about controlling emissions. The Commission concluded this was the prudent course, emphasizing the critical importance of getting a policy in place while addressing the claims of opponents of action that costs would be excessive. This approach seems particularly appropriate given the recent experience with price volatility in the European Emissions Trading Scheme (EU ETS), which has illustrated that cost uncertainty can undermine both public confidence in the system and long-term investment. Although the Commission opted for initially providing greater economic reassurance, the group recognized that at some point in the future, the need for environmental certainty may outweigh the need for cost certainty. Indeed, once there is greater international consensus about the ultimate goal of emission reduction efforts and about the means necessary to achieve that goal it will likely be appropriate to transition away from the safety valve toward firm emission caps. The Commission also recognizes that other legislative proposals provide alternative approaches for containing program costs. We welcome further analysis and debate on which mechanisms best address the cost and competitiveness concerns that have been raised by labor unions, energy-intensive industries, consumer groups, and others.

Fourth, the Commission believes that any successful national policy must place considerable emphasis on promoting wider international cooperation. By some accounts, China is now adding new coal capacity at the rate of one large power plant every week to ten days and is set to surpass the United States in total carbon emissions as early as 2009.[3]

Though some will argue that this sobering development weakens the case for unilateral action by the United States, the Commission draws the opposite conclusion. In our view, the current trajectory of global emissions instead underscores the liabilities of continued paralysis. If one accepts that rapidly industrializing countries like China and India are likely to accept emissions limits only after the United States and other wealthy nations have demonstrated a willingness to take the lead, it follows that postponing action will come at a high price-not just in terms of U.S. emissions but in terms of prolonging business-as-usual trends in other countries. At the same time, we continue to believe that once the United States takes action, it is imperative that within a reasonable time frame our major trade partners and other large emitters follow suit. The Commission therefore proposed a 5-year review provision, which would link continued tightening of the emissions target and further increases in the safety valve price to significant action by these countries.

Fifth, the Commission's emphasis on the necessity of a major technology program to spur the development and deployment of lower-carbon technologies follows directly from our judgment that near-term progress demands a policy with modest initial costs. We strongly believe that a combined strategy of market signals and robust technology incentives is the most effective and least costly way to achieve a meaningful shift from business-as-usual trends, while equitably sharing the burden of emissions mitigation among shareholders and taxpayers. A further critical element of the Commission's approach, therefore, is the inclusion of a complementary package of public incentives for the accelerated development and early deployment of promising low-carbon technologies.

Sixth, the Commission continues to believe that solutions to climate change must be pursued in concert with other important energy policy objectives. In fact, one of the Commission's founding premises has been that America's energy challenges call for a

comprehensive response-that efforts to address oil security or climate change will fail if they do not also include complementary policies to promote improved efficiency and assure ample, reliable, and affordable energy supplies. Without making any attempt to review the full suite of issues and recommendations included in our 2004 report, I would like to flag four key areas. First, there must be a concerted push to improve transportation efficiency and reduce oil demand. The Commission's central recommendation in this regard consisted of a call for Congress to "significantly strengthen" and "simultaneously reform" the existing Corporate Average Fuel Economy (CAFE) program. Second, the cheapest, cleanest, and quickest response to climate change and security concerns is to target energy efficiency. The Commission report endorsed strengthening of energy efficiency standards and believes this is a critical piece of the solution. Third, the Commission noted the importance of nuclear

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3. See http://select.nytimes.com/search/restricted/article?res=F50B12F83A5B0C748CDDA80994DE404482

power in our future energy mix, and recommended several measures to reduce the obstacles to an increased role for this zero-carbon technology. Finally, the Commission believes that incentives for advanced coal technologies, such as IGCC with geologic sequestration, should be a priority as we move forward.

Economic Impacts of Mandatory Action

We are encouraged that economic analysis has allowed us to address one of the questions at the heart of the debate over climate legislation: Is it possible to take a meaningful first step to limit greenhouse gas emissions without harming the economy? A 2005 Energy Information Agency (EIA) analysis of the Commission proposal demonstrates that the answer is yes. EIA found that under the proposal, the overall growth rate of the economy during the period of analysis was "not materially altered." In a recent analysis of a similar, but somewhat more stringent proposal, EIA found that U.S. GDP in 2030 is reduced by only one quarter of 1 percent compared to the baseline case. This is equal to slowing the rate of economic growth by roughly one month over the next 20-plus years.

To say that greenhouse gas limits can be imposed without harming the economy is not to claim that the program is costless. Any honest debate will need to acknowledge that there are costs and that-as with any public policy intervention-there will be winners and losers. For example, according to EIA's recent analysis of a proposal similar to the Commission's, electricity prices would increase by 11 percent and the growth in coal use would be cut in half by 2030. We do not doubt that innovative and efficient companies can prosper under a carbon mitigation regime. Moreover we believe that the technological innovation sparked by a carbon price signal could well produce additional non-climate benefits in the long run. In the near term, however, the same price signal will impose new costs on fossil fuel consumption and reduce the value of carbon-intensive capital stock. So yes, there will be costs. But as always, the real choice is not between some cost and no cost. Rather the relevant question is whether the costs of action are reasonable and justified when compared to the liabilities of inaction. We believe that if a program is designed with the elements I've mentioned in my testimony, the answer to this question is yes.

One important economic aspect of a cap and trade program is the distributional issue of who gets valuable emissions allowances. The Commission's 2004 report established the principle that all allowances need not be distributed for free to emitting sources. We recommended that a portion of the allowances (5–10 percent) should be auctioned, with the revenues funding the development and deployment of low carbon technologies. Subsequently, Commission staff has given additional thought to this issue. This week, they are releasing a new staff white paper that outlines an allowance distribution approach. A central conclusion of that white paper is that at most 50 percent of the emissions allowances initially available under a mandatory trading program should be distributed for free to private interests, including major energy producing or consuming firms. The remaining 50 percent of available allowances should be directed to public purposes where those purposes could include mitigating impacts on low-income consumers; investing in low-carbon energy technologies and end-use efficiency; creating incentives for agricultural carbon sequestration; and reducing the Federal budget deficit and/or supporting broader tax reforms.

Over time, moreover, the proportion of allowances directed toward public purposes should continue to increase gradually as private entities have an opportunity to adjust to carbon regulation. Such an approach would represent a significant departure from the allocation model used in the Acid Rain Program and in the first phase of the European Union's emissions trading program, but would result in a far more equitable distribution of burdens across different stakeholders in the economy. We are submitting a copy of the NCEP staff's new white paper to the Committee with my testimony.

In conclusion, the message from the Commission is that it is time to get started. A delay in action by the U.S. will have a multiplicative effect on emissions because it will lead to additional delay in engaging China and other countries. These countries will be unwilling to act until the world's wealthiest and highest emitting country does so. I hope Congress will not lose sight of this fact as the inevitable debate about numbers and dollars and tons and jobs unfolds in the months to come. A war of numbers too easily leads to paralysis. And right now it matters less exactly which numbers you choose than that you recognize the essential principle at the core of our proposal: Strictly voluntary, seemingly costless approaches will not enable the marketplace to attach a known value to carbon reductions. Only when emission reductions have real value can companies justify serious long-term investments in new, low-carbon energy alternatives and only then will we unleash the ingenuity

and innovation of the private sector in addressing the climate change problem and in developing the clean technologies that will be in global demand for decades to come.

Mr. Chairman, thank you again for this opportunity to testify today and for your leadership on this critical issue. We hope that the design principles in the Commission proposal will be helpful, even as we recognize that ours is not the only approach and that there are many worthwhile ideas that the Committee will consider as it moves forward. The Commission and its staff would be happy to provide assistance to you as the Committee moves forward with its important work.

NCEP FACT SHEET ON CLIMATE CHANGE

SUMMARY OF DECEMBER 2004 PROPOSAL

• The Commission proposes a mandatory, economy-wide tradable-permits program designed to slow projected growth in greenhouse gas emissions while capping the initial cost of reductions at $7 per metric ton of carbon dioxide (CO^2)-equivalent.

• The proposed tradable-permits program would go into effect in 2010. Thereafter it would be reviewed every 5 years to assess its efficacy and to determine whether emission mitigation efforts by other nations (including major trading partners such as China and India), together with evolving scientific understanding, warrant adjustments to the U.S. program.

• Starting in 2010, the U.S. government would begin issuing permits for greenhouse gas emissions. The initial quantity of permits issued each year would reflect a 2.4 percent per year reduction in the emissions intensity of the U.S. economy, where emissions intensity is the ratio of emissions in tons per dollar of GDP.

• Initial emissions budgets would be calculated well in advance, using widely accepted GDP forecasts. The vast majority of permits would be distributed at no cost to emitting entities, with a small quantity of permits (5 percent at the outset) set aside to be auctioned to accommodate new entrants and to finance climate-friendly technology appropriations and incentives. The quantity of permits auctioned would begin increasing gradually in the third year of program implementation at a rate of 0.5 percent per year (e.g., to 5.5 percent of the total permit pool in 2013; 6.0 percent of the total permit pool in 2014; etc.) up to a maximum of 10 percent of the total permit pool.

• To limit possible costs to the economy, the government would sell additional permits at an initial price of $7 per metric ton of CO^2-equivalent. This so-called "safety valve" price for additional permits would increase by 5 percent each year in nominal terms, thereby providing a market signal for avoided emissions that grows gradually stronger in real terms over time.

• Absent adjustment by Congress as a result of the first 5-year review in 2015, the Commission recommends that targeted greenhouse gas intensity reductions increase to 2.8 percent per year starting in 2020.

• The Commission proposal is designed to first slow emissions growth (over the period from 2010 through 2019), before attempting to stop emissions growth starting in 2020. Ultimately, emissions will need to decline in absolute terms to stabilize greenhouse gas concentrations in the atmosphere. The Commission has focused on developing a policy framework that can be adapted as science, technologies, and international consensus evolve.

• Absent policy action, annual U.S. greenhouse gas emissions are expected to grow from 7.8 billion metric tons of CO^2-equivalent in 2010 to 9.1 billion metric tons by 2020—a roughly 1.3 billion metric ton increase. Modeling analyses suggest that the Commission's proposal would reduce emissions in 2020 by approximately 540 million metric tons of CO^2-equivalent below this business-as-usual forecast.